TECHNOLOGY AND THE FUTURE OF CITIES

RESPONDING TO THE URBAN MALAISE:

AN AGENDA FOR THE EUROPEAN UNION R&D

Ugo L. Businaro

28 July 1994

ALLA MEMORIA DI ANDREA

SYNOPSIS

The approach to the city issues starts by a perusal of the available literature and, specifically, of the reports prepared for the FAST study "The Future of European Cities: the Role of Science & Technology". The result is reported in Part I which is structured as a recurrent attempt to approach the complexity of urban issues from different point of departs. One gets confirmation of the difficulty to pass from the perception of city challenges to the specification of actions to respond to the challenges. The search, however, fulfils the important task to get better acquainted with the system.

The conclusion from Part I is the confirmation that the quest for solutions to urban challenges, to be fruitful, requires a specific approach to problem-solving, to circumvent the paradox between the holism of challenges and reductionism of actions.

Part II starts by describing the "design problem-solving paradigm" and then it pursues the attempt to apply it to urban issues. The starting point is to define the perceived challenges to which a response - taking advantage of R&D and technology potentiality - has to be developed. The selected challenges are described as a kind of 'urban malaise'. The approach resists the temptation to define too quickly the initial challenges in 'reduced' action oriented terms, even when they appear clearly related to a specific city sub-system. In fact, to start challenge's perception from the top holistic level of the system is a precondition to avoid a too quick jumping down to lower system levels looking for solutions.

If the challenges can be perceived and described - although in vague terms - at the global system level, then solutions in offer could also be described at that level in terms of scenarios. The circuitous turns at the global level can now be guided by the problem-solving procedures as a systematic comparison between the challenges and the potential solutions.

The aim of the approach is not to really start the solution development phase, but to define the terms of reference of the problems to be solved. The process of comparing challenges and solutions to define the problems, assures that the terms of reference are realistic (amenable to solution development). Provided, however, that the portfolio of solutions is broad enough. Due to the novelty of the challenges, this will seldom be the case.

The description of solutions to better define the challenges are under the form of general scenarios which serve as a guide to show how the portfolio has to be completed with more detailed solutions, to be able to get out of the holistic level with the description of the problem's terms of reference. Part II concludes recommending a series of studies and researches to be performed to increase the portfolio of potential solutions as a prerequisite to better specify needed actions to respond to the urban challenges.

In Part II, the specifications for new solutions to be developed to enrich the portfolio is done without detailing specific technology contributions. It is still a top-down specifications for solution searching. In practice, to try and develop such solutions one should consider the important effect of the *push* from current technology development. To demonstrate that this is not in contradiction with the design approach, in Part III the process is deepened to the level of characterizing the potential solutions within a given promising technology. The important case of the new ICT (Information and Communication Technology) is considered.

INDEX

FORWARD

The work here reported is the outcome of a visiting stage to the FAST Prospective team at the Research Directorate of the Commission of European Union.

The writer's basic interest to join temporarily the FAST team has been to have occasion to develop a line of study he was being pursuing on the problem-solving / decision-making process in highly complex context. Specifically, the decision-making related to planning R&D actions to contribute to problem- solving aimed at complex system's innovative changes.

The FAST team in its 15 years of activity has dealt with highly complex subjects with the intention to provide inputs derived from social demand to plan R&D to meet that demand.

The writer is not a professional student of decision-making / problem solving. His interest on the subject developed as a reflection at the end of a professional life involved in actually participating to industrial R&D activities aimed at complex system's innovation. Namely, to the 'adventure' of developing the peaceful application of nuclear energy and, lately, to the effort to innovate the automotive products to face the energy crises and the ecological constrains.

The first case was a 'paradigmatic' *technology push* example (from a basic dis-covery, to an invention, to the identification of an application responding to a basic need), while the second was a *need's pull* one (how to modify or change existing successful technology to respond to new challenges). In both cases, the context was quite complex, the needs were clearly stated and the technology routes already well traced. For someone involved in R&D planning it was clear that the dialectic between *need's pull* and *technology push* could be fruitfully exploited and lead to practical result. As a matter of fact, those that were involved can testimony that in both cases the emphasis has oscillated many times from the 'need's demand' to the 'technology's offer' and vice versa to try to match satisfactorily the two aspects. This notwithstanding, the actual development of the two mentioned fields has been such, one can argue, that at least the match between need's pull and technology push was not up to the expectation.

If this has been the outcome of planning R&D for cases - though complex - where both side of the game (the needs and the technology) were clear, huge resources allocated, proper organizations established, what will happen when the objectives are vague, the technology not well established, needed resources difficult to allocate, the or-ganization to perform the job not there?

In the meantime, in the society's agenda the number of hot issues has increased that require to call in all the human ability and creativity, all the resources available - not the least of which is the potentiality of R&D and of technological innovation - to respond to increasingly difficult challenges.

As a matter of fact, the efforts to plan R&D, to assess technology, to assure consensus on basic technological choices to respond to challenges, have increased.

However, the difficulties encountered by the diverse initiatives suggest that **we are still far from having developed a procedures to assure a satisfactory match between the pull of the needs and the push of technological options.**

The writer's biographic reference above, might explain his interest to reflect on this type of problems, perhaps under the motivation to judge retrospectively the outcome of one's professional life. It serves, however, the purpose to keep the reader advised on the many amateur limits of the analysis and how it is charged with metaphors and conjectures coming from a generalization of the writer's professional experience, more than from extensive professional study of the matter.

The first generalization is that, instead of 'technology push' we might refer to *solution push.* The second generalization is to see *the need's pull / technology push dialectic* as an instance of the *problem-solving* process. Heuristically, this process can be represented as a drama played between two set of actors, the ones representing the needs and those representing the potential solutions to respond to the needs.

The first metaphor that might help to clear the issues is that of the 'two cultures'. The interest of the metaphor for our concern will be immediately clear if the two cultures will be that of the 'theorist' on one side and of the 'practitioner' on the other, contrasting the 'cognitive' interest of the former to that of 'making' of the latter. The two cultures represent instead two different 'cognitive' approaches: the 'holistic' one of human and social sciences contrasting the 'reductionism' of physical sciences.

The reductionist's conjecture is that to understand a complex system one should break it down into its elementary components, while the holist's conjecture is that there are 'global' behaviour that could not be reproduced, bottom-up, by the understanding of the interactions among system's parts.

The debate between the two cultures becomes important when the 'cognitive' interest changes into the practical one: to 'do', to change the 'system' under observation. The emergence of 'applied' research from the 'pure' science, has, in fact, transformed the debate in a hot issue, the more so when the 'applied' research got the form of large projects concerning complex systems and involving huge amount of resources.

The emergence of 'applied' research has taken place more on the 'hard' physical sciences than in the 'soft' human ones. The hard scientists in our drama tend, therefore, to represent the actors that push for solutions (bottom-up solutions suggested by the reductionist cognitive approach), while the human scientists are the actors that represent the needs (which tend to be 'holistic', to regard the challenges to the entire system).

The metaphor of the two cultures could, therefore, help us to trace the difficulty of problem solving.

The *human sciences culture* 'holistic' cognitive approach is circular. It is preoccupied not to loose the effects uttering from the aggregation of system's elements, to underline how the system is more than the sum of the parts. To break down the system into its components will be a basic contradiction in the approach.

On the reverse, the hard scientists, by building a bottom-up representation of a complex system (as a set of interactive elements) will always be on a fixed frame where the 'whole' is a specified sum of the parts (even when including feedbacks from the 'whole' system to the parts).

The drama is therefore between the holistic actors and the reductionist ones unable to meet half-way: for the formers, how to get out of the circuitous trap of the global system to start a real top-down descent towards components where actions have to be focused; for the latter how to construct bottom-up a 'true' complex system (the sum being more than the parts).

The efforts - to respond to the needs to plan R&D, to match needs pull with technology push, to assess technology - will find, therefore, an intrinsic limit in the difficulty of matching the 'two cultures' approaches.

In fact, organizations charged with those tasks cannot but be made with a mixture of representative of the two cultures. Is there a way out?

The generalization from R&D planning to problem solving might help. Here the base motivation is not to 'know' but to 'do' and basic actors are not the scientists as such, but the 'doers'. Since the hard scientists are those that more naturally pass from pure to applied research, should one guess that the 'practitioners', the 'doers', are natural allies of hard scientists and that their vision of the world be a 'reductionist' one?

As a matter of fact, actions to build or to modify a given 'system' have to start from the 'bricks and malt', from the 'elementary' components. So, 'building', 'constructing', is a bottom-up process. Before building, however, one has to 'design' the system to be built or changed. Is the design process also a 'reductionist' approach?

The basic conjecture here - at the base of the intellectual interest of the writer in pursuing this line of studies - is that the process of 'designing and building' is actually a successful combination of the two approaches, the holistic and the reductionist one.

The metaphor of the artist might help here. The final result of the work of the artist is a 'whole', a system. It is made up of elementary components arranged into a system structure. A book is made of words, of sentences, of paragraphs, of chapters. The book cannot but be written bottom-up, word by word, (brick by brick). But at the end it is a whole. And it is the more so, the more it is a masterpiece. When did the 'holistic' features (the whole more than the sum of the parts) emerge? At the beginning of the writer's conception of the book? During the process of writing? At the end? We cannot give a unique standard response. We will know only at the end, when we are faced to a work of art, that it has succeeded in putting together the parts into a greater whole.

The metaphor of the artist can be used also for the case of the realization of practical objects, such as buildings, 'hard' or 'soft' products. The process of realization of a product is characterized by a continuous tension between the wholeness of the objective to be met (the user needs) and the details of a 'reductionist' view of the materials to be used, the components to be designed, their assembling into the subsystems and of these into the final product.

The tension that existed during the process of designing and building disappears at the end. It is not retraceable in a successful product, realized according to a 'good' design. In a bad design, however, the tension has not been resolved and it will be visible in the actual un-success of the product (it does not meet the user's expectations).

The process by which a product is designed has been fairly well studied.

Our conjecture is that in any product - no matter how simple it appears - complexity is intrinsically present.

We propose therefore to *refer to the design process as the tool to be used to try and respond to challenges no matter how complex is the system where the problem appears* and to use the procedure of problem-solving indicated by students of the design process, learning from simpler cases.

To see how the design process solve the paradox of the holistic need and the reductionist solution, one can consider it as a step-wise progression from the more global representation of the system down to the detailed one, step by step: at each step, at a given level, 'needs pull' and 'solutions push' are compared to better define the needs.

One can refer, for comparison, to the way Popper sees the progress of science: one start from a problem; by a process of trial and errors one selects a theory (a 'solution') to be confronted to the detailed aspects of the problem up to the point when it is 'falsified'; this leads to a new specification of the problem for which a new theory is developed, which will at its turn be falsified, and so on.

One can consider the design process as a top-down popperian process: the process start at the highest-level (in terms of the system description) perception of the problem. At the same level of generality a solution is identified (with a selective process that confront several alternative solutions). The process at each level is a circuitous one (better apprehension of system challenges, better identification of potential solutions) up to the point where the process is stopped ('falsification' reached) resulting in a better and more detailed definition of the problem to be solved. The process is shifted now to a lower level, starting with the greater detailed problem and stays at that level up to the moment where a new and more detailed definition of the problem is reached, and so on.

Decision-making enters into each step of the problem-solving process by deciding the allocation of resources needed at each step and - even more important - by deciding when the circuitous comparison of needs and solutions has to be stopped and the result made explicit into a better specification of the needs, to be used to start a new run at a lower level.

The tension between need's pull and solution's push is in this way assured, step by step, down to the level of the 'elementary' components that make the system. The 'top-down' process of design is terminated at that level and now a 'bottom-up' process of implementing (building) the designed solution is started.

The existence of various levels in the design process is well recognized in the design of products with expressions like: concept design, preliminary design, intermediate design, detailed design, final design. Or: system design, subsystem design, components design.

That the decision-making / problem-solving process has to be subdivided into various phases is, however, recognized also in other context far from the design paradigm. Expressions such as policy-making, strategic choices, and tactical approaches can all be re-conduced to different phases of complex problem solving.

What has R&D to do with the above problem-solving process, and how the design 'paradigm' can help R&D planning?

At each step of the design process the problem has to be compared with solutions, and that comparison is fundamental to better specify the needs. In order to do so, the portfolio of potential solutions should be as broad as possible covering the peculiar aspects of the problems.

When tackling a complex novel issue, however, one is not assured that the available portfolio of solutions is sufficiently broad. One might need therefore to develop new solutions (responding to solution push motivations) at the level where the unsatisfactory completeness of the portfolio of solutions first appears (it might be the global system level, subsystem or component level).

The new solutions at the very beginning of the process (high holistic level of system challenges perception) might simply consist of the description of alternative scenarios based on technology push. Or - at the other extreme in terms of engagement and resource allocations - a series of pilot projects has to be performed *in vivo* (to show how potential ideas can be effectively applied on the system getting indications of its reactions).

With reference to the design paradigm, therefore, R&D policy-making related to a specific issue or area of concern (environment safeguard, energy production, improving the quality of life), can be interpreted as the outcome of the design process at the very first level of the holistic system consideration. [1]

The application of the design paradigm was already attempted by the writer in a previous work (see Businaro 92) concerned with R&D policy-making at European level to react (take advantage or avoid negative impacts) to the globalisation process. One output of that exercise has been to show that there is a need to fill the portfolio of technology offer to be in a position to better react to the globalisation challenge. The latter is however a very broad challenge. To make the problem-solving exercise more concrete one needs to focus on its impact on specific areas of concern. In the above referred study the approach has been quickly applied to such areas as: environment protection, better management of the territory, better exploitation of the natural resources for a sustainable world, responding to shelter needs, learning to master complexity, putting technology to work.

The limits of the above exercise did not allow a deeper application of the design process methodology. The basic motivation of the writer's stage at the FAST team was, therefore, to have the occasion to continue this type of work to show the potentiality of the method by tackling a problem related to a complex issue of interest. The choice has fallen on the urban issue, taking advantage of the fact that FAST itself had devoted resources for an important study on the subject "The future of European cities: the role of S&T" (see Drewett 92).

---

[1] *The writer's conviction of the importance to plan R&D to develop a broad portfolio of solutions (to keep into motion the problem solving process) and to get the needed resources, comes from his experience to try and respond to the automotive sector challenges from the energy crises and the environment safeguarding concern. It was clear, at the time of his involvement in the matter, that the portfolio of available technological offer was not broad enough to respond to the new challenges. Correspondingly, R&D had to be planned and resource allocated, no matter how difficult it was to get consensus (to allocate an important part of scarce available resources on matter having only potential long terms prospective). The reflections on the application of the design process is a generalization of the type of arguments developed at the time to try and get the company decision to allocate resources to long terms R&D.*

Thinking retrospectively also at the nuclear energy case, the design process 'paradigm' might tell that it was a case where the circuitous process of meeting 'needs demand' and 'solutions offer' where started at a too low system level. While part of the great R&D efforts could have been properly intended as a way to better define the holistic needs - on which to get consensus and, then, to proceed further down - it was too quickly seen as a detailed solution to the problem (which was therefore assumed as implicitly specified by the solution itself).

While the writer's motivation has been mainly methodological, that of FAST was more practical, for a study that could contribute to deepening the subject area. The matching of the two motivations represented the stimulating environment of the stage. By chance, this stimulation has increased more than expected, because of an added target - unforeseen at the beginning of the stage - to contribute to produce the terms of reference for a call for tenders for studies on the role of S&T for the future of the cities. This has represented an important unexpected challenge for the methodology to be applied to the first phase of the problem-solving process (related to passing from the perception of the challenges to the specification of the problems to be solved). The call for tenders has therefore been conceived to fulfil this first important step of the problem-solving process, and the study here reported represented both the conceptual frame and the beginning of the process of defining the city challenges, pointing to the need to fill the gaps in the portfolio of solutions.

As a final note, one might indicate that the two motivations at the base of the study - the one of the writer to show the potentiality of the methodology of problem-solving and that of FAST for a specific study on the urban issues - are both well present in the text. The target readers can therefore be either those interested in the specific city issues or those more interested in the methodological approach.

Part 1. EXPLORING THE URBAN COMPLEXITY

EUROPEAN SOCIETY IS MORE AND MORE AN URBAN ONE. URBANITY IS AN ESSENTIAL DIMENSION OF EUROPE. EUROPEAN CULTURE AND CIVILIZATION ARE FIRST AND FOREMOST URBAN. THERE ARE 229 CITIES IN THE 12 EC MEMBER STATES WITH MORE THAN 300,000 INHABITANTS AND 122 OF THEM HAVE A CORE POPULATION EXCEEDING 200,000. 89% OF EUROPE'S POPULATION IS EXPECTED TO BE LIVING IN URBAN AREAS OVER THE NEXT THIRTY YEARS. THE URBAN EUROSCAPE IS THE SPACE WHERE MOST SOCIO-ECONOMIC DISPARITIES AND ENVIRONMENTAL PROBLEMS ACCUMULATE, BUT ALSO WHERE MOST PROGRESS TAKES PLACES. (PG. 3).

EVERY URBAN SECTOR APPEARS, MORE AND MORE OFTEN, AS JUST ONE ATOM IN THE COMPLEX MOLECULE THAT IS THE EUROPEAN CITY AND ALL ACTIONS MUST TAKE INTO ACCOUNT THE IMPACT OF ALL URBAN DATA AND POLICIES, ALWAYS BEARING IN MIND THE NECESSITY OF INSERTION ON THE WHOLE. THE BIG CHALLENGE IS THE COMPLEXITY OF REALITY. (PG. 17)

EUROPEAN FOUNDATION FOR THE IMPROVEMENT OF LIVING AND WORKING CONDITIONS.(93A)

The literature dealing with urban problems is discouragingly broad.

A systematic reading for a non-specialist is quite impossible and it will require too much time even when a pre-selection is done (as it was here the case by concentrating on the FAST reports and on the there referred basic literature). That approach could not fit, moreover, the general idea that there is no privileged way to look at a complex system.

The writer actually tried and learned as much as possible and as quick as possible of the urban systems by performing a series of tours through the literature being guided each time by the thread that uttered during the travel itself. At a certain moment of each tour he felt the need to stop and restart again looking for another thread to utter from the exploration.

The danger of the approach is lot of overlapping. This is however an intrinsic part of complexity: the same thing seen in a different context of relations because of the different point of observation.

This approach to the complexity of the urban system is actually reported here as a series of exploring tours. [2]

---

[2] *The metaphor here is that of a tourist visiting a city armed by the Baedeker. He follows one at the time the suggested different trajectories to visit the city ant its monuments. During the different trajectories he might encounter the same monument several times, each time however reaching it from a different direction.*

1.1 A reductionist search for the lost efficiency of the urban 'machine'

THE STARTING POINT: LISTING CITY PROBLEMS. THE SEARCH FOR THE CAUSES. A QUICK RECIPE: USE TECHNOLOGY TO INTERVENE ON THE CAUSATION FACTORS. A HYPOTHESIS FOR THE CITY: A STABLE SYSTEM WITH PROBLEMS OF REDUCED EFFICIENCY. A THREAT TO CITY STABILITY: GLOBALISATION. THE NEED TO BETTER UNDERSTANDS HOLISTIC CITY SYSTEM CHANGES. TRYING A DIFFERENT APPROACH: IS A HOLISTIC VIEW OF TECHNOLOGY POSSIBLE? BACK TO SQUARE 1: THE INTRINSIC LIMITS OF THE LINEAR APPROACH TO CITY PROBLEM. AN IDEA TO RETAIN: TECHNOLOGY FOR INFRASTRUCTURE.

The first attempt is to try the linear sequence: from the problem to the understanding of the causes, to try to intervene on the latter to get a change in the desired direction.

The starting point: listing city problems

The first idea is to start from lists of city problems. In Petrella (91) an agenda of problems to "re-build" the city is given. Because of quantitative and structural changes, endemic problems of modern towns have grown into major issues:

i) lack of social integration (social polarization due to population aging, inter-ethnic confrontation, etc.);
ii) inability to valorise human resources (such as mismatch between education and required qualifications);
iii) critical subdivision of power (swinging between decentralization and centralization);
iv) urban financial crisis (fiscal 'central' state solidarity against local needs);
v) unbalanced shifting from industry to tertiarization;
vi) increased threshold to develop new advanced services (such as R&D);
vii) development of mega-systems (concentration of infrastructure investments on teleports, high science labs, airports, TGV);
viii) decaying quality of life in parallel with economic crisis and environmental damaging;
ix) difficulty to follow the "modernization" trends (shift to new services, cooperation/ competition between cities to attract new 'global' ventures).

The search for the causes

The description of a list of factors (causes?) that contribute to the city worsening state of affairs can also be attempted (Petrella, 91).

Some factors are related to the demographic evolution with structural changes in European cities due to the aging of the local population and the increasing migration flow. Others are related to the competition between different targets for social expenditures and a plurality of political levels (local, regional, national) which instead of better focusing expenditures, increase dispersion and inefficiency. Moreover, the institutional reforms (decentralization of power) often do not match with financial reforms.

Important factors are related to the economic domain. The transformations in the productive system (towards more flexible manufacturing, a greater shift to tertiarization, the emergence of "quaternary" services) push for changes and adaptations at the local level not always easy to be followed promptly. The situation is made more challenging or threatening by the phenomenon of globalisation of economy that make vanishing past

local advantage factors by rendering them quite volatile. Knowledge enters with increasing importance among the new 'factors' of economic power. Competition between cities, therefore, becomes also a competition in the cultural field.

One should also underline the influence that the state of the hard and soft infrastructures that pervade the urban space have on the functioning of the city. Specific problems come from the inadequacy of the infrastructure to fit the changed city needs.

A quick recipe: use technology to intervene on the causation factors

By crossing problems with factors one might hope to underline areas of intervention for technology: *to act on the factors to have an impact on the problems.* Only some of the listed factors, however, can be directly affected by technology.

One *quick recipe* could be, as an example, *to take advantage of the volatility of the production factors related to technology to develop competitive strategies against cities that had an economic hegemony in the past* (based on the low mobility of the production factors). For other factors the role of technology is more indirect.

Since the future of the cities depends - to a certain extent - on its ability to renovate and adapt the infrastructure to the new technological potential, the *temptation* is strong to *limit the technology question to its role on infrastructures*.
However, in many instances when this straight approach was followed the results have been negative (see the case of intervention on road infrastructures which often produce only the result to shift traffic congestion in other areas of the city).

In general, to specify technology-oriented actions to respond to city problems one should, as a prerequisite, better understand the city as a complex system where techno-logy interacts in a multilevel way with other factors.

To do so it requires shifting the focus to another question. Is there a specific "urban process" or is it just another way to refer to social processes?

If there is such a thing as an "urban machine" characterized by a specific process, then technology should be seen as an element in such a process.

A hypothesis for the city: a stable system with problems of reduced efficiency

No matter which is the specificity of the city system we might consider that it is a system under stable conditions. If so, the actions should be oriented to increase the system efficiency. Moreover, one could consider the system as well structured into stable sub-systems, and the reduced efficiency be tied to one or more of the sub-systems.

In this way we are led to a specific "system strategy" that might be labelled the "modernistic city" strategy.

Modernistic city strategy: use technology to increase city efficiency

---

ONE POSSIBLE PASSWORD FOR THIS STRATEGY IS TO INCREASE THE "EFFICIENCY" OF THE CITY SYSTEM THROUGH AN EXTENSIVE RECOURSE TO TECHNOLOGICAL INNOVATION: IN MANUFACTURING, IN BANKS, IN THE PUBLIC ADMINISTRATION, IN EDUCATION, IN TRANSPORT AND COMMUNICATION, IN THE UTILITY SERVICES. AFTER ALL, THE PROBLEMS / CHALLENGES LISTED ABOVE MIGHT JUST RESULT - ONE MIGHT ARGUE - FROM A LOSS IN THE CITY "MACHINE" EFFICIENCY.

A "MODERNISTIC STRATEGY" PURSUED WITH DETERMINATION AND WITH ADEQUATE MEANS WILL CERTAINLY HAVE AN IMPACT ON THE FUTURE OF THE CITY.

BUT IF ONE GOES BACK TO EXAMINE THE LIST OF PROBLEMS, CAN WE BE ASSURED THAT THE IMPACT WILL BE POSITIVE IN ALL OR MOST OF THEM? HAVE NOT BEEN THE PROBLEMS OF CITIES IN PART THE RESULT OF EXPLICIT OR IMPLICIT POLICIES AIMED AT THE EFFICIENCY OF THE CITY SYSTEMS?

IN FACT, AN INCREASED EFFICIENCY IN THE CITY SYSTEMS MIGHT WORSEN SOME PROBLEMS. TO EXEMPLIFY: EFFICIENCY TENDS TO "SPECIALIZE" THE USE OF THE CITY SPACE, PUTTING A PREMIUM ON FUNCTIONALIZATION; ON ITS TURN THIS INCREASES SOCIAL SEGREGATION, REDUCES OCCASIONS OF SOCIALIZATION. SPECIALIZATION OF SPACE, SUBDIVISION OF SERVICES ACCORDING TO THE ABILITY TO PAY FOR THEM, LEAD TO SEPARATION OF RICHES AND POOR INTO GHETTOS (PARADISE?) FOR RICH PEOPLE AND GHETTOS (HELL?) FOR POOR.

Even if one stays with the 'modernistic strategy', the target for efficiency implicitly assumes that the system is stable, hierarchically subdivided into subsystems. Improvement in efficiency can be looked after, separately, for each subsystem (better transportation, better health services, better education, more competitive manufacturing). However, can one be assured that the today city is a stable system?

In general, answering this question for a given system depends on the interaction between the system and its environment.

The city has to be seen in the interaction with the territory (with all the fluxes of different variables that cross it along with the different infrastructures that impose a "structure" on the territory. Changes in the territory have therefore an impact on the city.

A threat to city stability: globalisation

One such a change, which is now quite visible, goes with the process of economic globalisation. Globalisation is, at the same time, effect and cause of the new communication infrastructure of the 'global' territory.

The city is affected directly by the globalisation phenomenon, first of all because the related actors have to establish their operation bases in cities. With the actors go important fluxes (capital, knowledge, political power) in a network of complex interconnections. To attract global actors and fluxes the cities have to compete among themselves. The success in competition will change the urban hierarchy.

This global dimension (with its global network of fluxes), however, crosses the others dimensions-networks (local, regional, national) in which the city system is nested. The difficulty to develop a coherent response to this crossing of different dimensions-

networks (with the related crossing of fluxes, with different logic of power, of decision-making, of action taking) might reveal as a critical point in the city system dynamics.

One is not at all assured that a recipe of improving the efficiency of the city systems can deal with the impact of globalisation.

In fact, the globalisation challenge might induce a higher level of complexity in the urban system, so requiring a higher level of "intelligence" to be able to manage successfully the city system (Petrella, 91).

The city as we were used to manage it before the globalisation challenge, was also a very complex system. However, it settled into separated stable subsystems, with separation of actors and power. This sectoralization has allowed dealing with "objects" (subsystems, such as the housing) in the cities, which could be changed without an impact on the entire system.

The need to better understand holistic city system changes

If the new city is undergoing a systemic change questioning the past sectoralization, then, first of all, a new approach in understanding the urban system is required (not giving for granted that the today system structure will allow a "sustainable /durable" city).

This represents a first great challenge: *we could not understand the systems as outsiders, but as part of it.* So we need (Petrella, 91) a "democratic" cognitive approach (open, capable to evaluate the mechanism of interaction between actors including the new emerging ones, to deal with the new interfaces and their impact on city dynamics).

This requires considering the system under study and the actors that study it at the same time, without taking for granted the past knowledge on city behaviour. This 'democratic' cognitive approach is a precondition to develop a proper policy to respond to the changing city system to regain the ability to consider the totality of the system. The policy should therefore become an 'holistic' policy capable to consider the system in its globality.

To look for technology to increase the efficiency for a stable, well-structured system, means, instead, to look for a sectoralized bottom-up approach (responsible sectors of city problems are identified and actions focus on those sectors. The global system change will be a consequence of the sectoral actions). Within this frame of mind, a technology push (technology first) approach can also be justified (start from the available solutions and ask for the problems that can be solved).

Checking the efficiency "modernistic" strategy against systemic challenges such as globalisation has pushed us back to the starting point.

If technology for efficiency might not be the answer to the city problems, if, moreover, the today city system stability can be challenged by external changes (that could induce a change in the system structure), then we better go back to a more direct approach to the city problems. A more global answer should be sought for, which could not a priori be de-coupled into sectoral smaller problems.

Trying a different approach: is a holistic view of technology possible?

Instead of a "technology push" approach anchored to the existing system structure we might start from a "need pull" approach (the problem first).

Contrasting with a modernistic high efficient stable city system, one might develop a scenario for a "desirable city of the future" where solutions of the basic human problems will be improved. A scenario for a human centred city with less social segregation, with a higher quality of life, in a better-balanced interaction with the external physical and economic environment.

But how can we bridge the gap between the definition of the desired characteristics based on needs and the possibility to match them by referring to technology use? If the problems has to be seen in the context of an holistic system, then to use technology we might need an holistic view of technology as well: is there a city technology?

A fundamental objection to the question is raised. Actions on a system cannot but be actions on *elements* of the systems (actions are *reductionist*). To act with technology is also to act in a reductionist way. Will at the end reductionist actions produce a 'holistic change' in the system in the desired direction?

To precede further, one need to focus on the question of the "urban system", on what characterize the urban process. Why the cities are different one from the others (even if one can try to group them according to some taxonomy)? Why some city apparently deprived of 'natural' resources can be (economical?) successful while other, which had a hegemonic position in the past, are under decline?

An 'holistic' view of the city system is important. But stories of success and decline are 'time' stories. Time has therefore to be included in the holistic view.

One can describe a desired scenario for the future of the city; one might recognize that the today complex city system is crossed by challenges and opportunities. However, to react to them successfully the past of the system is as important as the today city's realization.

Back to square 1: the intrinsic limits of the linear approach to city problem

We have therefore gone back to an even more engaging definition of the holistic approach. From a list of city problems, one has passed first to a list of factors that influence them, and then to focus on technology to modify the factors (by limiting to a target of efficiency improvements). But the basic doubt on the effect of the actions on a so complex systems in a challenging environment, has thrown doubt in the approach.

From a preliminary listing and definition of the city problems and the seeking for actions we have swung back to the need of a deeper understanding of the system, starting from a better definition of the potential desirable state of the future of the city.

An idea to retain: technology for infrastructure

We have learned from the above discussion that infrastructure renovation might be an important component of the city policy, but that it might be dangerous to separate the problem from a more general understanding of the changes underway in the entire city system.

This notwithstanding, one better keep the idea that *through infrastructure renovation there is a possibility to make use of technology to improve cities.* Infrastructures both hard and soft are strongly technology dependent.

1.2 The multiple threads of disciplinary approach to city complexity

IS THERE AN URBAN CONCEPT? THE CITY CHALLENGES SEEN FROM A DISCIPLINARY CROSS-VIEW. THE LINES OF ACTIONS FROM A DISCIPLINARY VIEWPOINT. A MULTI-DISCIPLINARY URBAN SCIENCE? TECHNOLOGY ON INFRASTRUCTURE TO INCREASE THE VALUE OF THE CITY? FROM OBJECTIVES DEFINITION TO PROBLEMS SPECIFICATION.

The base question to start a new round of thinking about cities and technologies is now *what kind of beast* a city is. Can one really consider the city as a system in its own right, with its peculiarity of behaviour, with a dynamic following a trajectory having a clear pattern, with an identity that characterize it notwithstanding the multifaced changes during its lifetime?

Is there an urban concept?

A synthesis of the present thinking on the "urban concept" is given by Drewett and Engelstoft (1990). They doubt that the concept has a uniform meaning for those who use it. According to the interest of those that observe cities, the problems that they see emerging are classed as social, or environmental or economical. The Commission of European Union is an example of the different way to see the city problems, according to the different Directorates that have programmes of actions on cities.

This might not by itself mean that there is not such a thing as an "urban beast". It is normal that if one looks at a system from different perspective, with different colour lens, different characteristics will emerge.
However in the case of cities, according to Drewett and Engelstoft, one does not see yet emerging - as a compound from the disciplinary views - a unifying perspective to look at the urban as a specific system. There is not yet an "urban science" that deals with the city problems. "The difficulty appears to be a inherent dilemma in urban studies, as each group of urban researchers (economists, geographers, political scientists, sociologists, architects and engineers) view and define urban problems differently." (ibidem, pg. 21).

For our approach, for the time being, this is not too much of an handicap. To a certain extent it might be easy to see what type of actions can be devised to respond to challenges if the city is not a 'real' system (having its own internal cohesion, its peculiar way to respond to challenges and perturbation). Policies for action can then be part of different policies such as economic, social, education, etc.

The city challenges seen from a disciplinary cross-view

Even if the city is a real system with its own identity, the different perspectives by which it is observed will let emerge useful indications on the system behavior and problems and also, hopefully, of the way to attack the problems.

Looking at the city as a complex system from different perspectives and specialization helps in identifying new problems or in putting old ones into new perspectives.

* FOR **URBAN ECONOMIST** CITIES ARE CENTRES OF ECONOMIC ACTIVITY. THE SPATIAL CONCENTRATION OF ECONOMIC ACTIVITIES IN AN URBAN ENVIRONMENT PRODUCE IMPORTANT EFFECTS, BY REDUCING TRANSACTION COSTS, BY THE FACILITATION OF FINDING SERVICES, BY MULTIPLICATIVE EFFECTS THAT INCREASE THE EFFICIENCY OF THE ENTREPRENEURIAL ACTIVITIES. IT LOOKS LIKE IF THE ECONOMIC ACTIVITY PRODUCE POSITIVE EXTERNALITIES FAVORING MORE ECONOMIC ACTIVITIES.

* FOR **ARCHITECT AND ENGINEERS** CITIES ARE PHYSICAL SPACES STRUCTURED BY INFRASTRUCTURES DESIGNED TO PERFORM SPECIFIC FUNCTIONS (HOUSING, TRANSPORT, ETC.). THE ORGANIZATION OF THE PHYSICAL SPACE CHANGES WITH THE CITY HISTORY ACCORDING TO THE EVOLUTION OF THE DIFFERENT ACTIVITIES THAT TAKE PLACE IN IT. ENGINEERS ARE CALLED IN TO ASSURE THE FUNCTIONING OF COMPLEX CITY SERVICES AND INFRASTRUCTURES, SUCH AS LOGISTICS SERVICES AND TRANSPORTATION.

* FOR **URBAN SOCIOLOGISTS AND ANTHROPOLOGISTS** CITIES ARE NETWORKS OF SOCIAL RELATIONSHIPS. BEING THE INDIVIDUALS THE KEY ELEMENTS IN A CITY SYSTEM, THE SOCIOLOGIST POINT OF VIEW COULD BE THE BEST PLACED TO TRY TO PUT THE QUESTION OF HOW A PECULIAR "COLLECTIVE BEHAVIOR" COULD EMERGE TO CHARACTERIZE THE CITY AS A SYSTEM. THE METAPHOR OF BIOLOGICAL EVOLUTION HAS BEEN PROPOSED.

* FOR **POLITICAL SCIENTISTS** CITIES ARE A SPECIAL KIND OF ADMINISTRATIVE UNITS. FROM THIS POINT OF VIEW PROBLEMS EMERGE OF ALLOCATIONS OF SCARCE RESOURCES, OF CONFLICT OF POWERS BETWEEN LOCAL, REGIONAL AND NATIONAL ADMINISTRATIONS. THE CONCEPT OF THE CITY AS A CORPORATION EMERGES (WHICH ARE THE FUNCTIONS, HOW ITS IS FORMALLY ORGANIZED?) WITH THE RELATED PROBLEMS OF ASSURING GOOD 'URBAN MANAGEMENT'.

* FOR **URBAN GEOGRAPHERS** THE CITY IS A SPACE WHERE A VARIETY OF FUNCTIONS ARE AVAILABLE TO PROCESS DIFFERENT VARIABLES (SUCH AS BANKS FOR FINANCE). THE FUNCTIONS CAN BE CLASSED ACCORDING TO HIERARCHICAL LEVELS (FROM SIMPLE TO VERY COMPLEX) AND SPATIALLY DISTRIBUTED. ACCORDINGLY, CITIES CAN BE CHARACTERIZED BY THE SPATIAL MORPHOLOGY OF FUNCTIONS DISTRIBUTION (A SIMPLE MODEL IS THAT OF AN HIERARCHICAL SPACE WITH A CENTER AND A PERIPHERY, WHERE THE HIGHER LEVEL FUNCTIONS ARE CONCENTRATED IN THE CITY CENTRE). CITIES CAN BE CLASSED IN A **CITY TAXONOMY** THAT TAKE INTO CONSIDERATION THE LEVELS OF FUNCTIONS THAT CAN BE FOUND IN IT (SO, CITIES SUCH AS LONDON, BECAUSE OF ITS INTERNATIONAL FINANCIAL FUNCTIONS, CAN BE LABELED AS INTERNATIONAL CITIES, WHILE OTHERS ARE MORE PROVINCIAL OR SPECIALIZED, SUCH AS ROTTERDAM BECAUSE OF ITS PORT FUNCTIONS).

* FROM THE POINT OF VIEW OF **SCIENTISTS AND TECHNOLOGIST** CITY CAN BE SEEN AS A PRIVILEGED SPACE FOR KNOWLEDGE PRODUCTION BECAUSE OF THE CONCENTRATION OF RESEARCH FACILITIES.

(FROM DREWETT AND ENGELSTOFT, 92)

Since the different points of view, while mono-disciplinary, consider the entire system and not only single subsystems or sectors, the interrelation between problems emerges. So, as examples:

* from the **economic** point of view, successful cities are efficient economic machines, with a propensity of growth with an environment favorable to entrepreneurship. Problems of cities emerges when for different reasons they loose the ability to be a virtuous economic circle and they enter into a phase of economic decline. The industrial restructuring and the globalization challenges point to **urban skills-gap (**problems of structural unemployment and lack of skilled personnel), and induce changes in the social class structures (reduced importance of the middle class) which leads to **urban social conflicts**.

  Furthermore, the economic activity which has produced positive externalities is now inducing the emergence of negative externalities that pose problems of **urban**

environment quality safeguard that require intervention of **engineering** as well as of **governance;**

* the way city space is structured can be the object of specific **urban plans** to favor changes in given directions, to rationalize natural trends. Moreover, the quantitative growth of the city produces new challenges due to the **congestion and saturation of the capacity of the infrastructures** and of related services.

* collective problems emerges of a **social nature** such as that of age groups, of quality of life in urban ghettos, of social creativity in different fields (voluntary associations, cultural events, etc.). The different type of activities in the city, by inducing negative externalities (such as environment pollution) have important social impact by worsening the quality of life. The increasing needs to cope with social problems are associated to **urban fiscal crisis**. This is accompanied by an increased **shift from public investments to private** or mixed ones.

* the urban "machine" is a quite complex one to manage, to maintain, to keep in an efficient state. When the complexity of the systems growth with the general quantitative and qualitative growth of the city, it induce not only problem of **institutional conflicts** among different sectors of the city administrative units, but more intrinsic difficulties. New problems of interest for **policy science** emerge in Europe as a consequence of the process of unification that might change perspectives for the future of individual cities with **uncertainties on the power subdivision between the local and the regional.** Opportunities and challenges emerge for potential **development of different regional basin.**

* the **spatial characterization of cities** is now being challenged because of the effects of communications and transportation infrastructures which make easier to access functions placed faraway. In fact, a city can be seen as a cross-point of a variety of internal and external networks. However, the question of **city identity** remain an important concern for **geographers** even if it is less dependent on the city spatial morphology as it was in the past. A "city spirit" characterizes a given city, (a city *milieu)* because of its historical roots which add something to the peculiarity of the actors that lives and operates in the city. Recently, the metaphor of self-organizing system has been suggested. The system react to the external inputs changing, if needed, its structure but keeping its identity. So, as an example, a former successful textile city can react to competition from countries having lower labor costs, by using its peculiar knowledge to change from textile manufacturing to textile machine production.

* city can be considered, from the **science and technology** point of view, "an environment that creates the conditions for all kinds of innovations including technological, social, cultural institutional and morphological" (ibidem, pg. 5). The knowledge heritage, the ability to process and generate knowledge is therefore an important part of the *milieu* that contribute to the city identity.

The lines of actions from a disciplinary viewpoint

The perception of new challenges that results from taking a systemic look to the urban system - even within the limit of disciplinary points of observation - is an important result. But even more important - for our concern to find ways by which technology could help to respond to the city challenges - is that specific **lines of actions** utter corresponding to the different direction of analysis:

* **architects and engineers** can operate on the **urban physical plan** and on the maintenance, management and control of different **infrastructures and city services and utilities;**
* **sociologists** point to improving the **quality of life** by acting on the physical environment, by increasing security, health services, reducing social segregation. Some of these lines of actions are amenable to hard or soft physical interventions that can be supported by innovative technological approaches (e.g. improvement security by space monitoring). An interesting general type of actions that concerns social scientists is the way the city *milieu* could be influenced to induce a more **creative citizens response** to city problems;
* **political scientists** point to ways to **improve city governance** in general, which, to certain extent, could also find technological support (such as, e.g., development of **city models** to check in advance effects of alternative actions);
* **geographers** are interested in improving the quality of **city functions** or adding new functions of higher levels. One important technological inroads could be represented by **investing in networks** (through hard and soft infrastructures) that assure better accessibility to existing functions (internal or external to the city);
* **scientists and technologists** can point to the importance of **immaterial investments** into knowledge development and application (university, research laboratories) as one way to improve the city *milieu.*

A multi-disciplinary urban science?

We have left open the question if the city is a kind of "animal" in its own right or if one uses the word 'city' or 'urban' just as a "catchword" to aggregate together problems that refers to different sectors of concern. The hypothesis that the city is a system with an identity for each individual city, while not
proven, is however not only fascinating, but much more productive than its denying.

To consider the city as a system that might change its structure with time and external challenges but keeping its identity, open a new series of concerns. First, as already remarked above, the sectoralization approach is valid to act on the system as long as the actual system structure is stable. If it is undergoing changes, then one needs to resume an holistic view of the system and consider the interaction of the different sectors in which the system governance has developed.

An integrated approach to the city as a complex system call for the emergence of an **urban science** which should integrate the different disciplinary approaches listed above.
Complex system as a **discipline** should be added to the others, contributing with its portfolio of knowledge on complex system behavior. It should also contribute practical ideas on the ways of governing complex system close to saturation, on the means to observe incipient revolutionary transition to new system structure, on the ability to act on the system by looking for intrinsic multiplicative effects.

Technology on infrastructure to increase the value of the city?

It is interesting to note here that the idea to invest in infrastructures has emerged both in the first attempt to approach city complexity (previous section) as a means to increase the **efficiency** of the city systems and in the one of this section. However, the

holistic consideration of the system have led us to the objective to increase the **value** of *the city as a centre of generation of wealth, knowledge, quality of life*. In a way, to act with "the visible hand of the king" to amplify the effect of the "invisible hand" that emerges from the city *milieu.*

The same type of action (on system components) might therefore be conceived to meet quite different global objectives of the system. The challenging question for planners of specific actions is therefore how to design them so to assure that the collective reaction of the system to the actions taken (in this case actions to modify infrastructure) will go in the direction of the global objective specified.

From objectives definition to problems specification

The trick of the game might be to be able to decompose the general holistic objective of system changes into specific sub-objectives that can be spelled-out in terms of detailed specifications of problems that will constrain the designer response to solve the problem.

A new area of concern emerge here. Is one sure that the perceived challenges can be unambiguously translated into problem specifications?
A prerequisite to attack the question is a better understanding of how challenges emerges from the system and are perceived.

Changing paradigms in Social Urban Theory

SMITH (94) PRESENTS A REVIEW OF SOCIAL URBAN THEORY. A SYNTHESIS IS HERE REPORTED. THERE IS A PARADIGM SHIFT IN URBAN SOCIOLOGY:

OLD THEORY 'HUMAN ECOLOGY'

PRIMARY ROLE OF TECHNOLOGY AND FUNCTIONAL NECESSITY. BASIC ASSUMPTION ON 'NATURALNESS' OF ECONOMIC COMPETITION, TECHNOLOGICAL CHANGES, POPULATION DYNAMICS, SOCIETY'S TENDENCY TOWARD COLLECTIVE ADAPTATION. TECHNOLOGICAL CHANGE ALLOWS POPULATION AGGREGATES TO ADAPT TO THEIR ENVIRONMENT THROUGH CHANGES IN SOCIAL AND SPATIAL ORGANIZATION. ASSUMPTION OF 'STAGES AND PHASES' OF CITY GROWTH (STRUCTURAL-FUNCTIONAL DEVELOPMENT OF CITY IN XIX CENTURY). TECHNOLOGICAL CHANGES BY IMPROVING COMMUNICATION AND TRANSPORTATION LEAD TO INCREASE IN SIZE OF INSTITUTIONS AND CONCENTRATION OF ACTIVITIES.

ECOLOGICAL METAPHOR: COMMUNITY GROWTH FROM SIMPLE TO COMPLEX, FROM GENERAL TO SPECIALIZED. FUNCTIONALIST APPROACH: COMMUNITY IS A COMPLETE AND SELF-SUSTAINING WHOLE THAT IS INTERDEPENDENT AND CONSTANTLY ADAPTING TO ITS PHYSICAL AND SOCIAL ENVIRONMENT AND PASSES THROUGH VARIOUS STAGES OF EQUILIBRIUM.

NEW URBAN THEORY (NUS)

NUS PAYS MORE ATTENTION TO SOCIAL INEQUALITY AND CONFLICTS. IT INTERPRETS SOCIAL CHANGE AND URBANIZATION IN TERMS OF THE WAY SOCIETY'S PROCESSES AND STRUCTURES PRODUCE ADVANTAGES FOR CERTAIN GROUPS AND DISADVANTAGES FOR OTHERS. IT IS CONCERNED WITH SYSTEM OF DOMINANCE AND SUBORDINATION DRIVEN BY THE ACTION OF SOCIAL GROUPS WITH SPECIFIC INTEREST. SUCCESSFUL CITIES (HOUSTON) ARE NOT THE PRODUCT OF FREE ENTERPRISES BUT THE RESULT OF PLANS AND COLLUSION BETWEEN GOVERNMENT AND BUSINESS ELITES. ROLE OF LAND INVESTORS AND SPECULATORS. DIVERSE TRAJECTORY OF URBAN GROWTH BETWEEN THE THIRD WORLD AND THE WEST.

NUS STRESSES THE IMPORTANCE OF UNEVENNESS RELATED TO URBANIZATION: UNBALANCE BETWEEN THE LIFE CHANGE IN URBAN AND RURAL ENVIRONMENT; CONCENTRATION OF LIMITED RESOURCES IN CAPITAL CITIES; ECONOMIC DISPARITY WITHIN CITY BETWEEN THE POOR MASS AND THE RICH ELITE.

A GLOBAL PERSPECTIVE ACCOUNT FOR THE IMPORTANCE OF THE UNEVENNESS TO LINK URBANIZATION TO THE EXPANSION AND CHANGING DYNAMICS OF THE CAPITALIST WORLD-SYSTEM. THE CURRENT MODE OF PRODUCTION OPERATES AT THE GLOBAL LEVEL, INDUCING AN HIERARCHICAL, ECONOMIC AND POLITICAL RELATIONSHIP. THE 'DEVELOPMENT NEEDS' OF SPECIFIC CITIES ARE NOT RELEVANT TO KEY DECISION-MAKERS AT THE GLOBAL LEVEL. CITIES ARE THE OUTCOME OF DECISION-MAKING PROCESS INFLUENCED OR DIRECTED BY DOMINANT CLASSES AND STATES.

PRINCIPLE ON NEW URBAN SOCIOLOGY:

- CITIES ARE SITUATED IN A HIERARCHICAL GLOBAL SYSTEM (GROUPS PLACED IN SOME PART OF THE WORLD EXPLOIT RESOURCES IN OTHERS PART/ PATTERNS OF URBANIZATION DEPENDS ON HOW IT FITS INTO THE INTERNATIONAL DIVISION OF LABOUR);
- THE WORLD-SYSTEM IS THAT OF COMPETITIVE CAPITALISM (LOCAL ACTORS COMPETE TO ACCESS TO CAPITAL, CHEAP LABOR, RESOURCES / URBAN LAYOUT, CONCENTRATION OF INFRASTRUCTURES AND BUILDING DEPENDS FROM GLOBAL COMPETITION);
- CAPITAL IS EASILY MOVED, CITIES ARE FIXED;
- POLITICS AND GOVERNMENT MATTER (STATES ARE FUNDAMENTAL ACTORS DETERMINING THE FLOW OF CAPITAL OVER THE EARTH);
- PEOPLE AND CIRCUMSTANCES DIFFER ACCORDING TO TIME AND PLACES AND THIS DIFFERENCE MATTER (PEOPLE MAY COOPERATE OR COMPETE TO SUPPORT DIFFERENT POLICIES IN A CONTINGENT WAY).

ROLE OF TECHNOLOGY:

- IT IS NOT THE POSSESSION OF SOPHISTICATED EQUIPMENTS THAT COUNT, BUT CONTROL OF KNOW HOW;
- ADVANTAGES OF LOCATION OF TIGHTLY INTEGRATED AND ECONOMICALLY INTERDEPENDENT INDUSTRIAL DISTRICTS TO PERMIT QUICK AND FLEXIBLE RESPONSES TO CHANGING DEMAND
- TECHNOLOGY ARE CRUCIAL SHAPERS OF URBAN REGIONAL AND NATIONAL DEVELOPMENT IN THE CONTEXT OF POLITICS AND CLASS DYNAMICS IN THE WIDER GLOBAL CAPITALISTIC ECONOMY.;
- FACTORS OF HUMAN ECOLOGY SUCH AS INFRASTRUCTURE PROVISION, LEVEL OF TECHNOLOGY ARE STILL CAUSE OF URBAN CHANGE, BUT HAVE TO BE UNDERSTOOD IN THE POLITICAL ECONOMIC CONTEXT OF NATIONAL SOCIETIES EMBEDDED IN THE WORLD-SYSTEM.

(FROM SMITH, 94)

1.3 The holistic quest for a creative, innovative, intentional city

THE CITY AS A SYSTEM: STRONG OR WEAK COHESION? LOOKING FOR A COHESIVE SELF-RESPONDING PRO-ACTIVE CITY. THE IMPACT OF EXOGENOUS CHANGES ON CITY COHESION. THE CITY 'GENES' AND ITS KNOWLEDGE-BASE. THE METAPHOR OF THE CORPORATION. APPLYING THE CORPORATION METAPHOR: KEEPING THE CITY IDENTITY. INDICATORS OF THE CITY IDENTITY: PRODUCING AND USING TECHNOLOGY. POLICY INDICATIONS TO IMPROVE CITY DISPOSITION TO PRODUCE AND APPLY TECHNOLOGY. FROM SCIENCE AND TECHNOLOGY TO THE BROADER CITY KNOWLEDGE-BASE CONCEPT. UNDERSTANDING THE IMPORTANCE OF THE CITY KNOWLEDGE BASE. TOWARDS A POLICY FOR A CITY KNOWLEDGE-BASED DEVELOPMENT. TECHNOLOGY FOR INFRASTRUCTURE TO INCREASE THE KNOWLEDGE BASE? FROM CREATIVITY TO INNOVATION. FROM CREATIVITY TO INNOVATION: LOOKING FOR INTRINSIC CITY SYSTEM MULTIPLYING EFFECTS. TOWARDS POLICY FOR AN INTENTIONAL CITY.

We start this round with the hypothesis that the city is a system in its own right. The general definition of system is sufficiently loose (a set of interactive elements that shows collective behavior with respect to the external world) to be applicable to a city. Difficulties arise if one tries and better delimits the type of system.

The city as a system: strong or weak cohesion?

For our concern - to understand how challenges emerge - two extreme cases are of interest. The system reacts to changes in the environment: a) by "adapting" to them (weak internal system cohesion) or, b) by filtering the external inputs exploiting the opportunities and discarding the threats in order to keep unchanged its "identity" (strong system cohesion).

In the second case the system is not passively waiting the build-up of exogenous changes, but it tries and anticipates them preparing its reaction in advance (pro-active behavior). This condition might change with time and the system might show a life cycle passing from weak internal cohesion in the initial phase of its development, to strong cohesion, to a decline state again of weak internal cohesion.

If one could measure the evolution of the system and detect positive and negative phases of development, not necessarily one will find that a weak adaptive system is marked by negative phases of development. The environment changes might represent "opportunities" more than treats, so that the system can grow by adapting to (being 'slaved' by) the exogenous forces. It is to be expected, however, that under strong exogenously led changes the growth be unbalanced (not all the elements or subsystems that compose the system share the same opportunities).

Unbalanced growth of a weak cohesive city

Going back now to the city challenges, they emerge not necessarily because the city is under an overall decline. They might be related to an unbalanced growth. The economic indicators of growth can be positive while at the same time social segregation increases, the rich become richer and the poor poorer. When the exogenous changes represent a threat, the weak cohesive city risk disgregation and decline. And even the decline trajectory is an unbalanced one with some sectors of city feeling less than others the decline.

The different fate of different cities responding to the same external changes might be interpreted in terms of the stronger or weaker internal cohesion of the city as a system. Opportunity waves are ridden by strong cohesive city to grow in a balanced way and the response to threats not necessarily means a trajectory of decline.

Looking for a cohesive self-responding pro-active city

The above considerations points to actions-taking in a new direction. Instead of selecting the single challenges and responding to each of them (which is anyway difficult and full of uncertainties due to the complex reaction of the system), why not helping the system to "heal the wounds" by its own means, the wounds that, after all, is itself producing (lacking sufficient internal cohesion in responding to exogenous changes)? This new direction of approaching city problems requires, as a prerequisite, to better understand what is "cohesion" for a city system.

The "glue" that ties together the city system elements is a multifaced "material". We can go back to the "disciplinary cross sections" of the city system and find: the economic components of the "glue"; the social ones; the more ethereal "cultural" parts; the "spirit of the city" (the *milieu*).

The impact of exogenous changes on city cohesion

The intensity of the cohesive forces to assure a pro-active response to exogenous changes depends on the intensity of exchanges with the environment. In the past, the low mobility of "production" factors (due to the state of the art of communication and transportation) assured a kind of protective barrier for the city against external competition and market forces. The globalization challenge has now changed the situation.

For European cities opportunities and threats come also from the process of European integration. Quoting from Richard Knight:

" Europe's challenge is also a global challenge; it is to find a new development path, to humanize development by democratizing science and minimizing the social and environmental costs, i.e. of making 'sustainable development' a matter of policy. The removal of national borders within Europe will not necessarily result in sustainable development. The role of market and technology forces will be increased and their great potential, but this forces have their own logic -- they are not inherently stable or democratic and they will not necessarily favor orderly or sustainable development, particularly not at the level of cities or regions. Cities have a great role to play in the governance of these forces.

There is a great risk in taking the future of cities for granted, i.e., allowing technological and market forces to shape their development." (Knight, 92,pg.2).

The internal cohesive forces has to adapt to the time. In the past a city might have developed a strong cohesion that has sustained its successful development. In many cases, as a result of the industrialization of Europe in the last two centuries, city cohesion developed along with a strong productive specialization. With the eventual crisis of the specific industrial sector, the strong cohesive internal force resulted too narrow in scope to allow adaptation to changes. Cities like Glasgow (it developed as a shipyard town) or Detroit and Torino (car producers town) are example of strong but rigid cohesion.

The city 'genes' and its knowledge-base

The FAST program on "The Future of European Cities: the Role of Science and Technology" and especially the work of Richard Knight on the "Cities as Loci of Knowledge Development" (see Knight, 92), considers the importance: i) to recognize the value of the city knowledge endowment (the knowledge base), ii) to trace the past roots that have led to build the knowledge and iii) to include as an important issue of city policy to cut existing barriers among different components in the knowledge base and to increase the base itself.

A biological metaphor for the pro-active city

USING THE BIOLOGICAL EVOLUTION METAPHOR A CITY HAS NOT ONLY TO BEHAVE AS AN ORGANIC UNIT, BUT IT HAS TO BE 'FIT FOR THE ENVIRONMENT'. CITY "SPECIES" HAVING A BROAD 'GENETIC POOL' ARE BETTER FIT TO SURVIVE IN A CHANGING ENVIRONMENT.

AT A DIFFERENCE WITH THE NATURAL SELECTION METAPHOR, HOWEVER, WE ASSUME THAT THE "GENETIC ENDOWMENT" OF THE CITY CAN BE CHANGED BY THE SYSTEM ITSELF TO BE BETTER FIT. STAYING WITH THE BIOLOGICAL METAPHOR, CITIES MIGHT BE CONSIDERED MORE AS "PROCARIOTIC" ORGANISM (BACTERIA) WHOSE GENETIC POOL IS DISTRIBUTED THROUGHOUT ALL THE SPECIES. A SPECIFIC BACTERIA SPECIES, IF NECESSARY, MIGHT CHANGE ITS INTERNAL

GENETIC POOL BY TRANSFERRING THE NEEDED GENES FROM OTHER SPECIES. THE METAPHOR OF BACTERIA IS THAT OF A NETWORK WHERE THE GENETIC ENDOWMENT IS DISTRIBUTED IN THE DIFFERENT NODES (SPECIES). NETWORKING WILL PERMIT TO SHIFT THE NEEDED GENES STORED IN ONE NODES TO ANOTHER.

TO PUSH THIS METAPHOR FURTHER, A CITY CAN BE SEEN AS A MIX OF DIFFERENT BACTERIA SPECIES LIVING TOGETHER. THE PROBLEMS THAT EMERGE, EURISTICALLY REFERRING TO THE METAPHOR, ARE TWOFOLD. THE 'GENES STRANDS' MIGHT BE THERE BUT THE NETWORKING MIGHT NOT BE EFFICIENT. BARRIERS MIGHT IMPEDE THE INTEGRATION. OR, SOME VITAL BACTERIA SPECIES MIGHT NOT BE PART OF THE COLONY OR BE TOO WEAK A PARTNER.

The work of R. Knight provides already a positive answer on the possibility to intervene by specific policy to modify the intrinsic ability (the cohesion) of the city to govern its future, its destiny.

Before examining Knight's analysis in more detail, we better push further the hypothesis that the city is a "real" system. To do this we will refer, for heuristic purposes, to the metaphor of the "corporation".

The metaphor of the corporation

Some of the concepts used by Knight, such as that of innovation, can be better applied to corporation operating in the industrial fields. Other concepts are generally applicable also to corporation in tertiary sectors. However, efforts have been made to extend the concepts of creativity and innovation also to the service sectors.

To do this, the concept of product and process needs be defined in a different way, less anchored to the 'hard' components of an industrial product. If innovation in industry is the final outcome of a creative process that encompass basic research and technological development, the equivalent in the tertiary sectors might depend on extending the concept of R&D to more 'soft' disciplines.

The scientific and technology base that characterize the input of the innovation process in 'hard' industrial processes and products might become a broader "knowledge base" which include commerce, finance, culture. The clear borderline separating an 'industrial' product from its user is much more vague in the case of a 'service' product. The 'production' of the service product might include the phase of consuming the product itself (see the case when the product is a 'conference' or a 'concert'). (see Bellaflame, 86).

The metaphor of the industrial corporation

THERE IS NO DOUBT THAT A CORPORATION IS A SYSTEM. AT LEAST IT IS A FORMAL UNIT WITH A HIERARCHICAL ORGANIZATION. IT IS AN ACTOR. HOWEVER, IT IS A COMPLEX SYSTEM. IT MIGHT HAVE AN INTERNAL STRONG COHESION, BROAD IN SCOPE OR NARROWLY SECTORALIZED. IT CAN GROW OR DECLINE ACCORDING TO ITS CAPABILITY TO RESPOND TO THE ENVIRONMENTAL CHANGES. IT IS A "BEAST" IN ITS OWN RIGHT; HOWEVER A DIFFICULT ONE TO ANALYZE. IN TRYING TO DO SO, METAPHORS HAVE BEEN USED, SUCH AS THE ORGANISMIC ONE, THE BIOLOGICAL EVOLUTION. CONCEPTS LIKE CREATIVITY, INNOVATION (PROCESS OR PRODUCT), REACTIVE OR PRO-ACTIVE BEHAVIOR, SPECIALIZATION FOR MARKET NICHES OR MULTI-PRODUCT FLEXIBILITY, HAVE BEEN USED TO STUDY CORPORATIONS.

THE DEFINITION OF THE VARIOUS CONCEPTS WHEN APPLIED TO CORPORATIONS ARE NOT WITHOUT AMBIGUITY. HOWEVER THEY PERFORM THE PURPOSE TO HELP DECISION-MAKING. A CORPORATION MIGHT DECIDE TO CHANGE ITS INNOVATION CHARACTERISTICS FROM PROCESS ORIENTED TO PRODUCT ORIENTED; FROM BEING A FOLLOWER THAT TRANSFER INNOVATION BY IMITATION, TO BECOME A LEADER. CHANGING STRATEGY REQUIRES MAKING SHORT OR LONG-TERM INVESTMENTS, ALLOCATING THE SCARCE RESOURCES IN DIFFERENT WAYS. DECISION CAN REGARD THE LAUNCHING OF PROJECTS (SUCH AS FOR A NEW PRODUCT) OR INVESTING IN NEW INFRASTRUCTURES (SUCH AS A CORPORATE R&D CENTRE). DISINVESTMENT, RESTRUCTURING, RETRAINING THE STAFF ARE PARTS OF THE TYPOLOGY OF ACTIONS OF A CORPORATION. WHILE KEEPING ITS IDENTITY AS A CORPORATION, ITS STRUCTURE MIGHT UNDERGO COMPLETE CHANGES, SUCH AS BY DE-VERTICALIZATION, MERGERS AND ACQUISITION.

THE EXTERNAL DYNAMICS OF THE ENVIRONMENT IN WHICH THE CORPORATION IS OPERATING CAN FOUND IT PREPARED OR NOT. THE KNOWLEDGE OF THE CHARACTERISTICS OF THE EXTERNAL DYNAMIC AND OF THE EXPECTED CHANGES IN THE EXOGENOUS FORCES CAN BE USED BY THE PRO-ACTIVE CORPORATION TO BE BETTER PREPARED TO REACT TO THE EX-OGENOUS CHANGE. THE KNOWLEDGE THAT PRODUCTS HAVE AN INTRINSIC DYNAMIC SIMILAR TO A LIFE CYCLE (WITH A YOUTH PHASE WHERE INNOVATION IS MORE PRODUCT ORIENTED FOLLOWED BY A MATURITY PHASE WHERE INNOVATION IS MORE PROCESS ORIENTED, AND A DECLINE PHASE AT THE END OF WHICH A NEW PRODUCT WILL EMERGE) IS AN IMPORTANT INPUT FOR THE PRO-ACTIVE CORPORATION. AS WELL, THE KNOWLEDGE OF THE GLOBAL ECONOMIC CYCLE (SUCH AS THE KONDRATIEF WAVES) CHARACTERIZED BY A SHIFT IN THE PREVAILING TECHNOLOGICAL PARADIGM, IS ALSO RELEVANT.
HOWEVER, EVEN THE PRO-ACTIVE CORPORATION MIGHT FIND DIFFICULT TO ALLOCATE INTERNAL SCARCE RESOURCES TO PREPARE IN ADVANCE FOR THE EXTERNAL CHANGES.

The efforts made to extend concepts to broader and less "hard" characterized class of corporations and its operational usefulness is of comfort in trying and extending the effort to the case of cities. One should expect in doing so, that the ambiguity of the concepts increases. First of all, the unitarian aspects of the corporation derives from its being, even formally, an actor. Can the city be considered as an actor? If not, should this be taken as an unchangeable point or an actor-like behaviour could emerge (may be helped by institutional changes)?

An important effort to extend to the city the concepts of creativity, innovation, use of the knowledge base to pro-active changing its future has been made by the FAST program on the 'Future of the Cities' (see for a synthesis of the program results Drewett, Knight, Schubert, 92a and 92b). The FAST programme has used the development of such concepts - underpinned by on the field study of city cases - for S&T policy recommendations.

Applying the corporation metaphor: keeping the city identity

Armed with the corporation concepts extended to the city, new points of view can be added with respect to the disciplinary ones, and new questions to try and better understand the behaviour of the city system. Individual city can be analyses trying and making its 'identity card' (answering question such as: is it creative? is it innovative? is it intentional? does it recognize the importance of investments to increase its knowledge endowment?).

The challenges and problems of specific cities now emerge under a new light. The understanding of individual city historical development can be done by coupling this city peculiar attributes with macro-analysis of external changes.

Even changes in the spatial morphology of city functions (the geographers view on cities) can be traced back to the city higher or lower degree of adaptation to external technological product cycle. In a city that grows by specializing on a given industrial product manufacturing, the emergence of a leading product design, the subsequent routinization of production processes will favour deverticalization of the manufacturing process with diffusion to the peripheral zones of the cities of small and medium firms. At the same time, the market increase - with the induced effect of scale of production - will require to shift manufacturing activities of large enterprise to bigger factories on new sites, increasing the functional specialization of the city space.

Indicators of the city identity: producing and using technology

Where all that lead us with respect to our concern of trying and find how science and technology can help addressing urban challenges?

By introducing the categories of creativity and innovation to qualify the city system, we might feel to have ended directly and naturally into science and technology. City to a lesser or larger degree is a *generator* (a *producer)* of scientific and technological knowledge. Moreover, city is an *applicator* (a *user*) of technology because of its economic activities and of the technology that enters into the city infrastructures, functions and services. The marks of 'creative and innovative city' can therefore be given according to some indicators (such as numbers of patents taken by inventors working in the city, degree of advanced technology used in the manufacturing process, new products launched by enterprises operating within the city space, use of advanced solutions to respond to city challenges).

Among the requisites for creative technological approaches is the existence of universities and research laboratories both public and private.
Policies to increase the creative and innovative potentialities of a city, considered from a science and technology point of view, can therefore be targeted in terms of:

i) *investment in new scientific infrastructures,*
ii) *launching projects that use advanced technological solutions to renovate city infrastructures and services* (such as advanced traffic control, new public transport systems, etc.),
iii) *attracting firms that produce advanced technology products*.

In more general terms, city creativity can be influenced by the attitude of the city administrators and by social actions they promote.

Policy indications to improve city disposition to produce and apply technology

The FAST case studies have pointed to the increasing importance of the R&D
activities in cities, but also to the uneven distribution of the related capacity in few "innov-
ation islands" in Europe.

Specific policy issues and recommendations emerge that refer directly to the city
actors, but also to the European Union. Not only the R&D capabilities are unevenly
distributed, but there are also barriers to access to their services and knowledge.
Summarizing:

* **as 'loci' of science R&D and innovators** city should:
- strengthen local networks to favor interactions between policy makers, civic leaders,
  scientists, researchers, innovators;
- strengthen networks between cities to overcome gaps in the *milieu* endowment;
- strengthen local education and training possibilities;
- rethink local R&D policy with cities becoming more directly actors in R&D policy.

* **as 'loci' of applied technology** city should
- improve in general the use of the knowledge endowment by better city networking ta-
  king advantage of the potentialities of new information and communication technol-
  ogies;
- favor the supply side of technology by developing general facilities and services,
- favor the demand side by better defining the public needs, helping the diffusion of
  technology in public services.

From science and technology to the broader city knowledge-base concept

While interesting, the above attempt to reduce the holistic approach of the city system to its science and technology components conceals a risk.

To show the case for concern, let us consider the application of the concept of creativity and innovation to the service sectors. If an effort is not made to extend and generalize the concept (as indicated above when referring to the extension from industrial to tertiary corporations), the risk is that - if the only innovation is the "technological" one - it will remain confined within the limit of "substitution innovation". The target will be limited to increase the productivity of the existing services (tertiary 'products') by introducing technologies (such as automation, computer processing) in the process to produce them.

The potentiality of conceiving new service products will therefore be limited. In fact, when other components of knowledge (market, social, organization) enter predominantly into the invention and conception of a new product, the focusing of the innovation concept on the "hard" part of the knowledge becomes an handicap to the creative process.

Extending the concept of creativity and innovation to the entire "knowledge base", including its softer components, will at the end favor synergetic effects among all the components. New unforeseen roles of technology might utter to directly or indirectly fuel the conception of new service products, of better social processes.

Understanding the importance of the city knowledge base

The opportunity to extend the concern to a broader definition of innovation has been recognized by the FAST programme which has dedicated part of the analysis to the concept of the "knowledge base" and of "city knowledge-based development" (see Knight, 92). The point of departure is that cities should be defined as "a civilizing force ... in terms of their core competencies, values and distinctive qualities" (Knight, 92, pg. 4).

To think about the future of cities one should consider new modes and paths of development, "think about the forces affecting their future, and about how cities can shape these forces more to their advantage so that cities can be made more humanistic, democratic, and sustainable" (ibidem, pg.5).

The present situation is that not only cities fail to grasp the importance of the entire knowledge base with all its hard and soft components, but, moreover, "science and technology tends to be viewed primarily as a means for making industrial production more competitive rather than a new form of wealth creation which is applicable to other types of economic, social and cultural activities" (ibidem, pg. 5). The future of European cities is not necessarily condemned to that of harsh competition with some succeeding and many failing. There is a paradigmatic change in the way wealth is created with an increased role played by the soft components of the knowledge base. Accordingly, "traditional ways of thinking about cities and their development need be reevaluated. ... New paradigms and new mechanisms for strategic, long term and comprehensive planning which explicitly account for new forms of development, i.e., for activities in the knowledge sector as well as in the production sector, need to be developed at the city and regional level" (ibid, pg. 7).

Towards a policy for a city knowledge-based development

The base recommendation - that come from the analysis of city knowledge base and its perceived role in a few european cities - is simple: "If science and technology and other types of knowledge are to be transformed into local economic development, they will first have to be integrated into the local culture. The problem is primarily conceptual; cities have to learn how to think strategically about their core competencies, how to improve their intellectual and knowledge infrastructures, and how to make [themselves] more attractive and competitive in terms of quality of life they offer" (ibidem, pg. 7).

One should first recognize what are the knowledge resources of a city and to rate their importance for future development. The analysis of city cases points, in the order, to:

- sciences & technology (universities, public and private R&D),
- commerce, banking, insurance,
- industry & production know-how,
- administration & coordination (national and international),
- arts & culture,
- creativity in arts and culture.

It is recognized that the knowledge resources can be improved, provided, however, there is awareness on their importance for the city development. The existing resources can be more efficiently put to work by eliminating barriers (especially cultural barriers, as for the case of the 'two cultures') and favoring the diffusion of knowledge. Creativity and in-

novation should be pushed: however a given city should recognize the peculiar characteristic of its knowledge base specializing the development along its points of force.

Technology for infrastructure to increase the knowledge base?

One important area for investment is to make the existing knowledge base more accessible, to eliminate barriers, to encourage **networking**. How can technology help?

In our first round (section 1.1), the question of improving the *'efficiency'* of the city "machine" emerged and we pointed to infrastructures renovation as one scope for technology intervention. In the second round (section.2) the more subtle concern to increase the 'value' of city surfaced and again infrastructures renovation can contribute by creating networks inside the city and connecting them to outside ones.

In the third round followed in the current section we have made a step further in the holistic approach to the city asserting the opportunity to change its destiny by focusing on its *'knowledge base'*. Again, the question of infrastructures, hard and soft ones, has emerged, pointing, however, to a novel aspect, that of *investing to make 'networking' more efficient.*

The three different points of departure and directions in exploring the complexity of city problems have shifted the area of concerns, the way the needs for interventions are defined. All the three cases, however, point to the same type of intervention of technology, that of helping improving and renovating the infrastructures. The same type of technology (e.g. the new information and communication technologies) can help: i) in improving efficiency, ii) in increasing the value of the city system, iii) in inducing internal system forces to operate to change the future trajectory of the system along a 'planned' direction.

The differences will come from our *ability to specify in detail what we want and to direct on different specific objectives the potentiality of the same technological knowledge.* The lesson to be derived in terms of the "intentional city" is that not only one has to recognize the value of the resource base, not only one has to increase the endowment of the city knowledge resources and favor its use (to be better placed to meet the city challenges), not only one should invest to increase the 'creative' and 'innovative' mood of the city, but one has to guide them to follow privileged trajectory (to meet specified objectives).

From creativity to innovation

There is a certain amount of paradox in this conclusion. This paradox does not clearly emerges in the FAST analysis of the knowledge-based city development, because it does not enter more deeply into the distinction between the condition to improve city creativity and that of applying it to planned innovative changes. The recommendations there are more on the development of preconditions for being able to take advantage of the knowledge resources.

More than of a paradox, however, we might think to the metaphor of an oscillating spring.

The positive message of the FAST analysis is that it is possible to become an 'intentional' city if one recognize the potentiality of the knowledge resources for the city development (especially for the closer future, taking into consideration the changing

29

context of economic globalisation, the new technological paradigm, the institutional changes of the European Union). It focuses, therefore, on the bottom-up phase of the spring oscillation (how to improve the bottom-up predisposition of the city to change). When the 'spring' shift to the other extreme - to top-down planned actions - then one has to restart focusing on specific challenges to be met in the respect of the general scenario of the desirable future of the city.

The two phase of the oscillation might be distinguished as the 'creative' phase and the 'innovative' one. We might have therefore to better distinguish between the two concepts, between creativity and innovation applied to city.

Creativity in an individual is a kind of 'state of mind'. In the case of the city this can be translated into a *genius loci*, a disposition to be open to suggestions from citizens, to be able to amplify bottom-up initiatives - especially those related to 'soft' matters (social and cultural initiatives) - the ability to build networks among interested actors to pursue new initiatives.

The term *innovative* city, instead, indicate more the ability to successfully plan (top-down) to solve 'hard' problems with innovative solutions. In general, the concept of *'creative city' can indicate the ability to explore extensively all the future potential of development* of the city.

Policy for a creative city?

BY OBSERVING AN COMPARING CITIES ONE CAN GRASP THE MODALITY BY WHICH CREATIVITY MANIFEST ITSELF AND THE WAY TO FAVOR ITS DEVELOPMENT. A FAVORABLE DISPOSITION OF THE CITY AUTHORITIES IS IMPORTANT AND IT CAN MANIFEST IN DIFFERENT WAYS (BY THE ACTION OF DEPARTMENT CHARGED BY SOCIAL AFFAIRS, BY THE SET UP OF FORA FOR PUBLIC DEBATE, BY PROVIDING FUNDING TO DEVELOP BOTTOM-UP CULTURAL INITIATIVES, ETC.).

CREATIVITY, HOWEVER, CANNOT BE 'PLANNED' TOP-DOWN. THE UTTERANCE OF CREATIVITY SEEMS RELATED TO THE EMERGENCE OF INFORMAL NETWORKS AMONG INTERESTED PEOPLE AND ACTORS AND THEIR SUCCESSIVE TRANSFORMATION INTO FORMAL NETWORKS.

CREATIVITY COULD IN PRINCIPLE FIND A FERTILE GROUND ON THE MULTICULTURAL PRESENCE IN THE CITY (EVEN IF OFTEN THE POTENTIALITY OF THE 'DIVERSITY' IS BLOCKED BY CLASS AND ETHNIC SEPARATION). ON THE OTHER HAND, THE UTTERANCE OF CREATIVE CITY 'SPIRIT' IS SERIOUSLY HANDICAPPED BY THE FRAGMENTATION OF THE CITY, OFTEN A CONSEQUENCE OF THE DECLINE OF FORMERLY MONO-SECTORAL SUCCESSFUL CITY (SUCH AS CITY BASED ON PRIMARY INDUSTRY). THE LIFE CONDITION IN DEPRIVED QUARTERS OF CITIES ARE OFTEN SUCH TO BRING ABOUT AN ABULIC SPIRIT WITH LACK OF ANY INITIATIVES IN ALL THE AGE SECTORS OF THE POPULATION.

HOW TO OVERCOME THE RISK OF BECOMING A 'DEAD' CITY IN TERMS OF THE ABILITY TO BOTTOM-UP PROPOSED INITIATIVES IS A SERIOUS PROBLEMS FOR THE CITY AUTHORITIES. BLOCKING FACTORS REDUCE THE ABILITY FOR CREATIVITY TO EMERGE.

THERE IS SPACE FOR ACTIONS, STARTING FROM THE CITY COUNCIL. HOWEVER, THE LINES OF A POTENTIAL PROJECT ON 'CREATIVE CITY' HAVE TO TAKE CARE OF THE FOLLOWING PREOCCUPATIONS:
I) CREATIVITY IN A COMPLEX HIERARCHICAL SYSTEM HAS SYSTEMIC ASPECTS (GLOBAL SYSTEM CREATIVITY AND SUBSYSTEM / COMPONENT CREATIVITY),
II) 'HARD' CREATIVITY (CONCERNING PHYSICAL CITY PROBLEMS) IS AS IMPORTANT AS 'SOFT' CREATIVITY,

Back to the oscillation between creativity and innovation, one should remarks that the debate on city creativity is very timely.The base reasoning is the following:

1) the type of challenges and problems facing cities today require very innovative solutions,

    2) creativity is a preconditions to 'invent' new solutions to a problem,

    3) therefore, creativity has to be specifically promoted in the city.

The additional remark is that we are talking of creativity and innovation concerning the entire knowledge-base and not only its hard science and technology components.

From creativity to innovation: looking for intrinsic city system multiplying effects

The statement 2) above is obvious, but it requires some deeper understanding, especially if one deals with the 'global' creativity of complex system. To develop successfully innovative changes in a complex system it will practically be impossible unless one can count on the intrinsic 'cooperation' of the system to change in the desired direction.

A complex dynamic system, like a city, is continuously endogenously reacting to the environmental changes trying to adapt, to react, to impose itself. One can suppose that a 'liveable' system is *continuously exploring the 'space of opportunities'* it has available to *keep its identity*. It is therefore very important to be able to recognize potential endogenous directions of changes so to select the desirable ones and to get multiplicative (leverage) effects from endogenous systems forces. Does the system emit signals that shows the undergoing exploration of potential changes?

The important hypothesis concerning city **creativity is** that it is actually **the clear expression of such endogenous incipient changes**. The metaphor of individual creativity is clear on this respect: a creative individual supposedly has a very mobile subconscious activity, that however is recognized only when it 'express himself' in the creative work.

If we could 'detect' the state of creativity in a city by suitable indicators, a high level of creativity will mean first of all that the city is a very living system actively exploring its future development potentialities. However, not necessarily a lower level ranking in the creativity indicators might means that, endogenously, the city is not actively exploring its future potential. It might simply mean that the ability to 'express' these movements is blocked.

The process of passing from the un-expressed phase to the expressed one is very important, because it is already part of the selection of the direction of changes among the potential alternatives.

To let potential creativity to become evident and to express itself is therefore a first very important step that decision-makers, interested in responding innovatively to the many city challenges, has to do.

The recipe for a creative city might therefore include, first of all, to let emerge the potential creative bottom-up 'energy' of the city (all the city actors down to the individual citizens), by eliminating blocks, facilitating networking, providing premiums and prizes, devoting resources to develop creative proposals. Institutional and organizational changes can facilitate this objective.

One should, however, also stimulate with top-down initiatives the *city system exploration* of the space of future potentialities. To do this most profitably, one should better concentrate to stimulate actors such as entrepreneurs, urban designers, the re-search communities. Among the possible initiatives, one could indicate the methods of prize contest, of inducing the basic research community to think more in terms of applied research by supporting 'finalized research' projects, etc.

In any case, the city has to devote a part of the (always scarce) resources to increase the state of creativity of the city as a precondition to address challenges with innovative solutions.

Towards policy for an intentional city

Going back to the starting point of this section, the cohesive internal force of a city as a system can be object of analysis. Actions can be taken to improve it so that the city can better master its destiny (even when the external world undergoes strong changes). By acting to increase the cohesion of a city system, one improves the intrinsic attitude of the city to react as an intentional actor to external changes.

To progress further in the analysis, one should on one side consider how the increased disposition to follow innovative solutions to respond to challenges is fueled by practical decision making on specific issues. On the other hand, the inertia of the city system dynamical trend has also to be realistically considered and how it is slaved by the dynamic trends of the external world.

1.4 *Patterns of city changes: external conditioning, inertial trends*

AN INTENTIONAL CITY FACED WITH EXTERNAL CHANGES.THE DETERMINANTS OF CITY PATTERNS OF CHANGES: SOCIAL DIFFERENTIATION. THE DETERMINANTS OF CITY PATTERNS OF CHANGE: THE LOCAL-GLOBAL NETWORKING. THE DETERMINANTS OF CITY PATTERNS OF CHANGE: SYSTEMS OF CITIES. THE INERTIAL TRENDS OF CITY PATTERNS OF DEVELOPMENT: THE CITY LIFE CYCLE. BACK TO SQUARE 1: HOW TECHNOLOGY CAN IMPACT THE CITY PATTERN OF CHANGE? TECHNOLOGY, POPULATION CHANGE AND CITY LIFE-CYCLE.

The positive message coming from the holistic vision of the city system is that policy of intervention could be designed to increase the system cohesion, its ability to govern its destiny. However, a better inclination of the city system to be creative and innovative - an increased 'intentionality' of the city as an actor - will not only have to face the intrinsic contradiction between the 'holistic' objectives and the 'reductionist' actions (with the consequent difficulty to assure that the effects will be in the desired direction). One should also take into consideration the fact that the city system has a strong inertial trend and it is immersed in an environment which strongly influence the potential of city system development.

To increase the city cohesion is a response to the risk to be slaved by the external changes. However, the external context can favor or resist city intentional changes.

An intentional city faced with external changes

An "intentional" city might therefore have to try and influence the external environment. One important area of intervention is on the infrastructures that modify the external space in which the city is immersed.

Regional spatial policy might emerge from the cooperation of cities belonging to the same region or from competition with other cities to try and influence to own advantage the national policy. The success of these type of policies depends, however, from the existing situation.

Changing space infrastructure is in any case a lengthy and costly process. Moreover, the efficiency of the actions will depend from the inertial trends of the involved systems.

Understandings the trends of exogenous forces and of the city system is, therefore, important in order to define the strategy of actions. In fact, the inertial forces or the pattern of development induced by external changes can be expected to be so great to make wishful thinking any attempt to move the system in a contrary direction. The general recipe for a successful action is to try and find multiplicative effects in the existing system forces and trends, realistically taking into consideration the situation.

The determinants of city patterns of changes: social differentiation

We might have to this effect to reconsider the question of what type of 'beast' a city is. A general definition is used by Strohmeier (92) and reported in the FAST study. More than to administrative or political delineation of an urban territory, he refers to "conceptions expressing some kind of interrelation of elements making up a city".

The conceptions might focus on different type of interrelations, as we have noted above when speaking of the point of view of the economist, of the geographer, of the sociologist.

In general, the city might be viewed as a "social system consisting of social actions of people in places". Urban development has to be seen as a quantitative and qualitative phenomenon. In quantitative terms the city can grow or decline. In qualitative terms "development is a process in which compositional or 'structural' attributes of the urban population changes. ... Compositional change ... implies processes from, for example, sectoral employment shift due to demographic aging... " (ibidem, pg. 6).

The process of social differentiation

THE PROCESS BY WHICH A CITY DEVELOPS IS PART OF THE GENERAL PROCESS OF 'SOCIAL DIFFERENTIATION'. " 'DIFFERENTIATION' IS THE PRINCIPLE GUIDING THE EVOLUTION OF MODERN SOCIETY WITH ITS SOCIAL AND SPATIAL ORGANIZATION. SOCIAL DIFFERENTIATION IS THE SOLUTION TO THE PROBLEM OF MAINTAINING SOCIAL ORDER AND COHESION IN A PERMANENTLY CHANGING AND INCREASINGLY COMPLEX WORLD. COHESION OF MODERN SOCIETY IS BASED ON THE SEPARATION AND SPECIFICATION OF FUNCTIONS ON DIFFERENT LEVELS OF SOCIAL AGGREGATION, IT IS SUPPORTED BY THE MUTUAL INTERDEPENDENCE OF THE DIFFERENT SPHERES UPON EACH OTHERS" (PG. 6).

THERE IS A MULTIPLICITY OF LEVELS OF SOCIAL DIFFERENTIATION: FROM SYSTEM OF NATIONS, TO SYSTEMS OF REGIONS, TO SINGLE CITIES, TO URBAN QUARTERS, TO HOUSEHOLDS. "QUANTITATIVE POPULATION SHIFTS, SUCH AS CHANGES IN THE NUMBER OF BIRTH AND DEATHS, OR CHANGES IN THE GEOGRAPHICAL POPULATION DISTRIBUTION WITH MIGRATION FLOWS IN DIFFERENT DIRECTIONS, AS WELL AS SOCIO-STRUCTURAL CHANGES IN THE POPULATION ARE THE VISIBLE 'MORPHOLOGICAL' SIDE OF THE DIFFERENTIATION OF MODERN EUROPEAN SOCIETY. SOCIAL DIFFERENTIATION HAS ALWAYS A SPATIAL CORRELATE. THE INCREASING DIVISION OF LABOUR IN SOCIETY AND THE GROWING SPECIALIZATION OF LAND USES ARE TWO SIDES OF THE SAME COIN." (PG. 8).

(FROM STROHMEIER, 92)

The urban patterns of change (urban life-cycle?) can be interpreted in terms of changes in social differentiation, induced by the change in individual life style and by population demographic dynamic. In the latter one should include not only the level of natality and mortality, but also the change in family size, the increased individualism and the multiplicity of life styles. The motivations of people moving in the early phases of urbanization (low spatial mobility and concentration of job opportunities in the city centre) are quite different from the re-urbanization motivations.

A variety of motivations are necessary to take into considerations the increased diversity and heterogeneity of the population. A phenomenon like the "gentrification" of

declined urban quarters can be explained only by the variety of life-styles of individuals and different social stratifications.

The urban pattern of change is the results of individual decision to move, which in turn depends on life style, and on the increased spatial span reachable (because of the increased means of mobility by public and private transport means). The observation of the urban dynamic pattern seen only in quantitative terms will not help much in developing urban policies. To make an example, the growth of population in the city core not necessarily will means a reduced demand of mobility and transportation.

The determinants of city patterns of change: the local-global networking

An interesting analysis of city development is that proposed by the urban geographers 'school of Torino' (Dematteis, 91 and 92, Conti, 93 and 94).

Cities as networks

DIFFERENT SCALES INTEREST THE CITIES (AS A **POINT**, AS A COMPOSITE POLYCENTRIC **AREA**, AS **NETWORKS**). THE BASIC HISTORICAL CHANGE REGARDS THE 'SIZE', THE DIMENSION. TO REPRESENT THE CITY 'OBJECT' ONE SHOULD HAVE A SPATIAL CONTAINED DIMENSION (AN AREA). BUT THE NETWORK DIMENSION IS ALSO IMPORTANT. IN FACT, CITIES CAN BE CLASSIFIED ACCORDING TO THE TYPOLOGY OF URBAN NETWORKS:

- NETWORKS WITH A DETERMINED HIERARCHY (MODEL BY CHRISTALLER & LOSCH): CENTRALIZED CONNECTION AS IN AN HIERARCHICAL GRAPH,
- MULTIPOLAR NETWORKS: A SET OF INTERRELATED SPECIALIZED LOCAL UNITS IN STABLE CONFIGURATION (AS A CIRCUIT INTERCONNECTED GRAPH)
- EQUIPOTENTIAL NETWORKS: URBAN FUNCTIONS REPRODUCED AT DIFFERENT NODES; NO STABLE DIFFERENTIATION BETWEEN NODES; FUNCTIONS' SHARING CHANGE WITH TIME.

THE URBAN SPACE IS CHARACTERIZED BY THE LEVEL OF EXTERNALITIES (AVAILABILITY OF SERVICES). THE LEVEL OF EXTERNALITIES CAN SERVE AS A CITY CLASSIFIER: I) MAXIMUM (TRANSNATIONAL, STRATEGIC FUNCTIONS); II) INTERMEDIATE; III) LOW (BANALIZED FUNCTIONS NOT TYPICAL OF URBAN LIFE).
SUCH LEVEL VARIES WITHIN THE CITY. IN THE HIERARCHICAL CITY MODEL THE MAXIMUM LEVEL OF EXTERNALITIES IS LOCATED IN THE CENTER.

CITY DYNAMIC DEVELOPMENT MIGHT SEE (COUNTER-URBANIZATION) THE THRESHOLD LEVELS OF HIGHER FUNCTIONS BEING OVERPASS IN MORE PERIPHERICAL ZONES. IN THIS WAY THE CITY IS CHANGED INTO A NETWORK. IN FACT, LARGE CITIES TEND TO BE INTERPRETED AS THEMSELVES NETWORKS OF CENTRES HAVING COMPLEMENTARY FUNCTIONS.
(FROM DEMATTEIS, 85)

Cities can be considered as *local* systems. They are made of subjects which are also part of other systems, of the 'global' socio-economic system. However, the local city level represents an intermediary aggregation of the subjects which behave in a collective way, as a collective subject, even if it might not be recognized as a formal actor. It has an identity, it acts to keep such identity.

The complex interactions among the city actors and the external ones passes through the space (there is no instantaneous force propagation). The physical terrestrial space is the **essential condition** for the development of social facts.

However, the communication innovation with the induced 'compression' of the space can change the effects of the spatial distribution of actors, their aggregation in local systems.

The difficulty to delimit within a geographic space a city come from the fact that for certain functions far cities are closely connected.

One can consider global network of the different functions. Cities are nodes in those networks. However, only for certain cities all the networks have there a node (metropolis). From the specific network point of view a city can be dispersed (fragmentation of cities) in many different urban centres (even faraway)

Global networks are flexible in terms of location (search for comparative local advantages), and tend to organize not as multilevel hierarchy, but as an interconnected complementarity between nodes. Global networks are multi-located organization. Their nodes are local units (e.g. UN agencies) or enterprises.

There are cities which are nodes of global networks: cities which through they self-organization transform specific local values into exchange values that can circulate in the global networks (metropolis; technology poles; centres of international commerce; centre of international culture).

Cities compete and cooperate between themselves setting up **global urban networks.** Cities as **local urban networks** (a set of connections between local actors: inhabitants, businessmen, local authorities) can therefore be part of global urban network which results as a multilevel composition of 'local' and 'global' urban networks.

The **local urban system** is embedded in a historical city's *milieu,* which is characteristic, irreproducible. Since the global network has to interact with the local ones, these peculiarities of the milieu counteract the effect that the diffusion of communication techniques has on **homogenizing** the space (close cities like Venice/Padova/Vicenza or Lion/ Grenoble will always be separated units and in competitions and will not become 'metropolis' notwithstanding the existence of local laws that will favor their merging together)

The determinants of city patterns of change: systems of cities

City are immersed in a structured space. Transportation and communication infrastructures links cities in a way that not only each city is a system on its own but it is a sub-system of a broader system. In Europe one can talk of the existence of a "metropolitan system" (see Dematteis, 93).

To characterize this 'super-system' one should develop some ways to classify the cities, such as the type of functions which are available within the city itself. If one distinguish between 'international' cities (cities having international functions such as international airports) and 'national' ones, the analysis of the European space show the existence of a core zone around the Rhine axis (where more than 50% of the cities are 'international'), a ring zone (only 25% of international cities) and a peripheral zone.

Together with the density of higher level cities in the core zone, goes an increased density of transport and communication infrastructures that increase the value of location of economics activities in the interested cities. To be at the core of the structured space therefore increases the opportunities of development for the city.

Is this situation to be considered unchangeable? An analysis made by the URBIN-NO network in the frame of the FAST Programme on Cities - using city classification criteria based upon population, accessibility and employment structures (Drewett et al., 92 a) - shows a trend in Europe to increase the area of the core region and the emergence of new axis of development (an east-west axis with respect to the north-south Rhine axis). The changing trends are, however, very slow.

To try to influence the future of a city in a peripheral zone one should start by recognizing and accepting the situation. However not necessarily this will mean that it has no development potential.

The city needs to select a strategy of development that change to its advantage the fact of being in a peripheral zone. It is difficult that a peripheral city, like Naples, could compete with cities in the core regions in attracting investments from outside on the basis of competitive advantages. The future of such large peripheral cities will depend more on their ability to organize their internal resources (human and of the 'milieu') to produce goods and services to be inserted in the global network of exchanges. (Dematteis, 93).

In conclusion, the space structure in which the city is located counts for the future of the city. Individual cities show characteristic patterns of change. However, cities belonging to a somewhat homogeneous space - such as the european one - tend to show a common pattern.

The inertial trends of city patterns of development: the city life cycle

All the above determinants of city changes contribute to the observation that they follow specific patterns such as a city 'life-cycle'.
The existence of this latter has been suggested to interpret observations on the quantitative changes (population) of european cities in the last half of the century.

Assuming that the urban space - the "functional urban region (FUR)"- can be subdivided into two zones, the core and the ring, the cycle is characterized by four stages (Drewett et al., 92 a):
- *urbanization*: total growth of the FUR with concentration of growth in the core,
- *suburbanization*: the total FUR growth continues, but is dominated by the growth of the ring,
- *desurbanization*: the city region enter into a phase of decline, accelerated in the core zone,
- *reurbanization*: while still the total FUR population diminishes, a relative growth of the core zone is resumed.

The cycle is observed - shifted in time - in different regions of Europe. The decline phase characterize the cities of north-west Europe in the years '70 - '80, while in the same period the cities of southern Europe are still in a growth phase. In the period '80 -'90 the

decline phase interests also the southern European cities. After 1985 most of the major European cities are undergoing a phase of revitalization of the city core (stage of re-urbanization). Regularity of patterns of changes are observed in the cities of the same country as a confirmation of the existence of a finer regional effects on city changes.

The characteristic pattern of changes does not seem to depend from the size of the city; ".. if a trend exists within a country it can be detected in various parts of the urban hierarchy... This suggests that other factors are determining growth and decline and discriminate between cities. A simple classification of cities on 4 classes (major, mixed, manufacturer and rural) illustrate the point... Major cities and mixed-functions cities are growing; rural and manufacturing function based cities are declining" (Drewett et al., 92 a).

Back to square 1: how technology can impact the city pattern of change?

The attempt to better understand the complex phenomenon of city pattern of changes - the complex social changes at a micro level that are at the base of the emergence of the collective pattern behaviour (with attention to be focused to develop policy for development); the influence of the external space on the city pattern of development; the changing perspective from physical space to networks; the general identification of a an urban life-cycle measured in terms of population dynamics - provide many elements that underline the complexity of the urban system. They make questionable the possibility to realize an intentional city, so many are the internal and external constraints and the inertia of existing pattern of change.

All this make even more difficult to translate perceived challenges in terms of policy actions to put technology at the service of an 'intentional' urban development.

One might therefore more directly try and connect urban pattern of development with technology. What in fact is the direct role of technology as a determinant of the urban pattern of change?

Technology, population change and city life-cycle

An interesting case is that of transportation and communication technology. Transportation technology has certainly had a great impact in the urban pattern of change. The increased spatial span reachable by the individual (in the daily time budget that can be allocated to move from one place to another), has accompanied the diffusion of the urban space with its functions.

To better consider the impact of the new technology a more refined analysis of the population that make a city system might be useful.

The spatial changes are, in fact, not only related to the specialization of the space (where the people live, where they go to work by commuting), but also to the distribution of functions to serve the many users of the city that do not live within the functional urban region. As an example, specific functions and service might be realized only to serve the population of city users (see the extreme case of a tourist city like Venice). The interests of the different urban population might be in contrast, so raising problems for city management.

The new urban space will be, more than in the past characterized by the integration and interaction with external communication and transportation networks, by special facilities developed to serve the needs of the city users and metropolitan businessmen.

Because of the world-wide homogeneity of this two populations and the homogeneity of the functions and services they need, there is a tendency to an homogenization of the appearance of the urban physical space. "This effect is already evident in the USA where the 'city skylines' as well the areas they depict tend to look alike. And this is not surprising because increasingly these areas are not the product of *national economies*, but a *segmental* unit of a larger entity. Hotels, offices and commercial centres built by the same companies in any cities, go together with the standardization of local shops interested to cater to an increasingly homogeneous trans-national population of urban travellers" (ibidem, pg. 2/9).

With the growth of the 3rd and 4th population the evolution of the city system will show a tendency to unbalance: "... it seems quite clear that the residential function and the urban *inhabitants* tend to be on the looser side. ... Local governments are elected by residents, but the economic interests of the metropolis are increasingly dependent on population not politically accountable..." (ibidem, pg. 2/10).

From the point of view of the role on new technology of information and telecommunication it is clear that its diffusion will be faster and the utilization of its potential higher for the new class of population. This might contribute to further unbalance the city system.

1.5 Cities as self-organizing systems

THE EMERGENCE OF CITY IDENTITY. EXPLORING THE CITY IDENTITY CONCEPT: THE CITY AS A SELF-ORGANIZING SYSTEM. CITY CLASSIFICATION AS SELF-ORGANIZING SYSTEMS. FROM A FUNCTIONAL TO A 'LOCAL' CLASSIFICATION OF CITIES. FROM 'TERRITORIAL' (SPACE BOUNDED) TO 'LOCAL' (SPACE UNBOUNDED) NETWORKS. TECHNOLOGY AS A 'LOCAL' ASSET.

The dynamic changes of a city seem to follow a general pattern with a life-cycle. On the other hand, the specific stages observed at a given time and the duration of the phases depend from the specific city's characteristics. They are also influenced by the characteristics of the regional space of which the city is part. Can we develop a taxonomy of city taking all this into consideration so that one could be guided in interpreting the past pattern of changes and forecasting the expected one?

We feel the necessity to follow a new thread in exploring the urban complexity to resume confidence on the ability of the city to master its destiny. Can we assume that city is a live system - with its own identity - that cannot be slaved by exogenous changes and that actions could be conceived and implemented to move the system in the desired directions even if in presence of strong inertial trends?

The emergence of city identity

The local development appear to be a selective process, geographically differentiated. Questions to be posed, therefore, regard the mechanism of the process, what relationships it has with the development of the economical system, what are the variables that characterize the local city system and which of them can be subject to control (at local, regional, national level).

Two basic motivations (see the works of Dematteis) are interrelated in the city development:
- the need to push economic development, the willingness and the ability to avoid a deterministic future. An example of a related policy action is that to build an industrial district to respond to local peculiarities enhancing the related potentialities.
    - the feeling of identity, of belonging, of historical continuity.

To understand the city as a system one should consider a vertical and an horizontal geographic dimension in the local space:
    - vertical: links and relationships of actors to the local environment (*milieu*),
    - horizontal: interrelationships with the external world.

One can have development through the 'valorisation of the territorial assets' (external economies of localization/ economy of scale) or 'local development' (economy of scope). In the first case the process is reversible; changing the comparative advantages of the local assets induce a corresponding positive or negative phase of economic development in the local system.

The second type of development, the emergence of an identity of the local system, is instead irreversible.

41

The existence of the irreversible local mechanism of development explains the apparent paradox of the effect of the globalisation of the economy. On one side, it tends to homogenize the territory by making volatile (space independent) the production factors. The tendency to 'homologate' the local systems however have effects only on the 'localizing externalities' (infrastructures, type of functions and services). On the other side, local diversification can build upon on this homogenisation pushed by the peculiarity of the *milieu* (synergy / self-organization).

Exploring the city identity concept: the city as a self-organizing system

The potentiality of the city system as an 'individual' (its 'genetic invisible map') can be realized only through interrelation with the global external network.

Using the metaphor of the 'self-organizing system' (the system is 'operationally closed' and its 'cognitive' system select the inputs from external systems) the development process is one of mutual selections: the global system selects the proposal to stimulate the local system, while the local system select the answer that it can give to the stimuli. In the city system a dialectic process develops between internal cohesion and external induced fragmentation: the solution depends from the plasticity of the local system. It is, therefore, difficult to forecast what will happen and to plan accordingly.

To deepen the analysis one should better focus on the way the local and global systems interact. They interact through networks. There is an hierarchy of networks: a global level of network with <u>local</u> nodes (cities) which appear as networks on their turn for the local users (people).

The local system, seen from its interior is 'auto-poietic' (self-organizing): it has an 'operational closure' in the sense that the external stimuli can lead to structural changes which however respond to 'internal logic' (keeping system identity = organization). If one look from the exterior, it seems that the 'node' <u>adapts</u> itself to the network. From the interior, however, the node 'adapts the inputs' to its organizational identity. Take the case of an industrial district. Seen as a self-organizing system, it might change its structure (e.g., from production of knitwear to production of knitwear machines), but keeping the organizational unity.

The conclusion of this analysis that put emphasis on the peculiar characteristics of the *milieu* that make a city a 'self-organizing system, is that it is difficult to rationally plan the future development of the systems. However, the system will 'learn by doing'. Reacting to the city problems is one important way to do this and therefore to learn, to increase the ability of the system to keep its identity, to develop by levering on it.

City classification as self-organizing systems

The city system is subject to 'local' (internal) and 'global' (external) forces. The 'local forces' are responsible of **operational closure** (maximization of autonomy and local integration). The 'global forces' are responsible of **functional opening (network integration)** of the cities to the global networks.

The prevailing of one force or the other can explain the pattern of development of cities faced with the globalisation process. Accordingly, one can class the cities into 4 types:

- minimum local integration/ minimum functional opening = marginalized cities/ internally fragmented (pre-colonial)
- min. local integration/ max. functional opening = large city of ex-colonies (third world) open to networks but internally disintegrated
- max. local integration/ min. functional opening = industrial specialized cities/ active local networks
    - max. local integration / max. functional opening = global cities

The changes observed in the city systems are part of macro characteristic of changes in economic /social organization which can be synthesized as: flexibility of system/ instability of business structures/ complex spatial behaviour (Conti, 93). In particular:

a) *organizational flexibility*: change in employment structure/ change in public-private relationships/ passage from enterprise-structure to enterprise-project (structurally unstable but organization identity = self-organized?);
b) *interdependence and networkization* of business structures: decentralization, multipolarity, local districts, enterprises agreements;
c) *less defined spatial dimension of enterprises*: need, to be an efficient partner, to be part of international networks (from the old model of spatially distributed specialized enterprises to new synergy of cooperation)

The fact that the economic system are more and more represented as networks have impact on the 'spatial analysis' of cities. The past model of spatial organization (hierarchy laden / space polarization of functions to respond to scale increase / sequential product life-cycle) have to be changed into network (flexible location and exploitation / interconnected networked organization / from center-periphery to a fragmented mosaic of different scales).

A new global/local dialectic is emerging. The concept of local development does not refer any more to 'localism': is not a dimensional concept. It implies a process of activation of specific territorial (time dependent) factors of transformation. It is a way to conceive the territory (time concept) independently of the scale, but referring to specific features (which might be located faraway, but strictly connected). Local organization is a structural component of the overall articulation of global society. 'Global' has not a dimensional character. Is not extensive but 'homogeneous and undifferentiated'

Space is not a mere support for the action of economic actors, but imposes a set of relations and networks (with historical memory). The territory has developed because of socialization (network production) which lead to territorial identity, to a local 'esprit'.

The above analysis has led to a change of focus on the theory of urban changes (Conti, 93). The scenario of 'meta-systemic' transformation of spatial urban analysis is changing

- from hierarchy laden deterministic and foreseeable organization, with polarization of functions due to scale phenomena, with a sequential model of decentralization and hierarchical fragmentation,
- to flexibility of location and competition, with network interconnected (instead of hierarchical) organization, leading to the overcoming of the centre-periphery polarization.

From a functional to a 'local' classification of cities

In the dialectic relationship between 'local' and 'global', the 'local' concept - no matter how ambiguous and ill defined - of the self-organizing city, tends to substitute the 'functional' concept used to characterize the city as a 'mechanistic' system.

From this change of focus in the theoretical analysis derives a different characterization of European cities: the potential of various urban area is not tied to the intensity of the functions being present, but to the resources and territorial conditions which are specific of the territorial pattern (due to history, structures, forms of social and spatial organization).

To develop a taxonomy of European cities, the local subsystems that characterize the structure of the 'territory' can be considered, such as (see Conti, 93):

- economic and industrial (traditional industries/ modern industries/ high tech industry / tertiary sector)
- social structure (universities and polytechnics/ second level education/ unemployment/ migration/ social diseases/ GNP per head)
- technological subsystem (venture capital/ technology parks/ technical R&D centres/ patents/ community investments)
- environmental subsystem (housing obsolescence/ libraries/ highway density/ cars per head/ ecological deterioration)
- internationalisation (industrial and financial leadership/ quaternary leadership/ international flights/ international organization/ data banks/ European R&D programmes/ stock exchange capitalization)

A city typology can be derived to group the European cities:
- international leadership (pure cities - e.g. London, Brussels / completed cities -e.g. Paris, Milan)
- industrial and technological transition (cities in technological transition - e.g. Munich, Turin / cities with consolidated industrial structures - e.g. Dusseldorf, Lyon/ functionally constrained cities - e.g. Genoa, Essen / cities with traditional industrial structure - e.g. Bologna, Antwerp)
- negative industrial transition (tertiarization - e.g. Utrecht, Glasgow / urban obsolescence - e.g. Naples, Lisboa).

From 'territorial' (space bounded) to 'local' (space unbounded) networks

One general prognosis that can be advanced looking at the importance of the networking of the space is that the destiny of local system is to transform itself progressively from 'territorial' networks (having a well defined geographical base) to 'local' networks, multi-localized and not territorial limited. The concept of proximity therefore

changes and will be different of that of space propinquity (Como, in northern Italy, can be closer to Los Angeles if both cities are specialized in silk manufacturing than to Varese which is only few km apart. On its turn, Varese might be closer to Seattle because both operate in the aircraft sector). (Dematteis, 92).

The analysis of the interaction between the local and the global networks becomes therefore an important way to deepen the understanding of the city dynamic of change. The cities are traversed by 'fluxes' of different types which are transported by networks.

The globalisation of economy are making some of the networking relationships more powerful than the cities. Cities appear as weak and fragmented with respect to the powerful global networks. Nevertheless cities have chances to resist to fragmentation keeping their identity as *local, stable, autonomous* system. In fact, they can be considered as nodes of such networks, *but*: they are not 'fixed' infrastructure nodes; instead, they are complex systems (systems of actors which, by interacting among themselves, produce the reaction of the node on the network).

Technology as a 'local' asset

With this concept of 'networked city', we can revisit the concept of the knowledge base and how to lever on it for city development.

Talking about the knowledge base of the city - as done in section 1.3 - and trying to measure its 'intensity', one can point to the functions existing within the city territory that deal with the production of knowledge (universities, etc.). Shifting focus from the functional mechanistic model to the local self-organizing one, it demands to revise the concept of the knowledge base and pose the question to which extent it is 'local'. The spatial unbound ness of the 'local' concept make more extensive the concept of knowledge base. To the extent that the local actors - which participate to the local *milieu* - are networked with knowledge producers (or have access to knowledge base) located outside the city spatial boundaries, then the potentiality to take advantage of the city 'local' knowledge base increases.

Notwithstanding this extension of the concept of the knowledge base, to build on it to further the development of a given 'local' city system by responding to city challenges, we are still faced with the difficulty to match a sectoralised, disciplinarised knowledge to the holistic, systemic city behaviour on which one intend to intervene. The more so, the more one shift from a mechanistic city description to the self-organizing one.

1.6 Holistic interactions of technology and cities

IS TODAY TECHNOLOGY APPROPRIATE FOR CITY? CAN CITY INFLUENCE TECHNOLOGY DEVELOPMENT POLICIES? CITY CHALLENGES: A RESOURCES FOR TECHNOLOGY DEVELOPMENT. THE OPPORTUNITIES TO DEVELOP APPROPRIATE TECHNOLOGY FOR CITY. CITY AS A PRIVILEGED SPACE FOR TECHNOLOGY DEVELOPMENT: THE CASE OF ICT. CITY AS TECHNOLOGY USER: THE CASE OF ICT. THE IMPACT OF TECHNOLOGY CHANGE ON URBAN SPACE: THE CASE OF ICT. THE MACRO-LEVEL SPATIAL ASYMMETRY INDUCED BY ICT. THE MICRO-LEVEL SPATIAL ASYMMETRY INDUCED BY ICT. THE PRECONDITION FOR AN ICT-BASED CITY DEVELOPMENT. ICT AND THE INTENTIONAL CITY. CITY AS AN ACTOR: PRECONDITION FOR APPROPRIATE TECHNOLOGY DEVELOPMENT?

The holistic approach followed in the previous sections have trapped us in the circuitous complexity of the urban system. While we have learned that there is the potential to develop an 'intentional' city, we have seen the difficulties due to the interaction with the exogenous factors and the inertial trends of the city system itself. The intent to approach the question of the contribution of R&D and technology to respond to the city challenges (to help the city to be 'intentional') has allowed only to point to interventions to change the attitude of the city towards creativity and innovation and to look for leverage effects in the knowledge's endowment existing in the city.

Since our specific interest is here action oriented, to attempt to operate on the technological sectors (to help city develop in the desired directions), we will start a new round approaching directly these latter.

Is today technology appropriate for city?

Seen from the technology point of view the city is both **a producer and a user of technologies**. As a user of technology cities represent an important market. However, did cities succeed in orienting technology to respond to their specific needs or is technology applied to city problems an adaptation of technology developed under other demands (industry, military)?

The question is taken up by Dita Bricwell as part of the FAST study on city (Brickwell, 92). Her answer is on the negative: "... cities ought to have a direct influence on research policy, because cities need a social technology which is able to react to the special problems of cities. ... Cities will have to overcome the insufficiencies of technical systems which they have inherited a century ago... Technologies which answer these needs, will have to be a new generation: adaptive to demands, easy to handle and corresponding with the potential of the urban labour force... Cities technologies have to be the backbone of social integration and better living and working conditions in the cities" (ibidem, pg. 8/1).

Can city influence technology development policies?

Notwithstanding the fact that city represents an important market for technology, "the access of cities to long range research policy is difficult: cities lack personnel, information and methods of policy formulation" (ibidem pg. 8/2). Cities however should find a way to determine research policy orientation. Cities are under pressure. "The consequence of high density, outdated, stressed technical systems or the problems following economic shocks in old industrial areas or the fringe positions in Europe or the

exposure to migration masses... impair urban life. All these difficulties - if they are dealt with - can provoke innovation, mobilize economic forces and build up new culture and identity.... Urban pressures are a resource for change. Accumulating problems ask for political attention, political attentiveness allows for dynamics to reallocate the budgets and mobilize potentials. <u>Dynamic situations enable the spirit of consensus to occur.</u>" (ibidem pg.8/9).

The opportunities to develop appropriate technology for city

THE REQUEST FOR APPROPRIATE CITY TECHNOLOGIES FACES ORGANIZATIONAL POLITICAL AND EDUCATIONAL PROBLEMS. " UP TO NOW <u>CITIES THEMSELVES HAVE HAD LITTLE OPPORTUNITY TO DEFINE THEIR NEEDS FOR TECHNOLOGY</u> OR TO ADJUST TECHNOLOGY TO THEIR REQUIREMENTS. THEY HAVE LITTLE MEANS TO ANALYZE WHICH INNOVATIONS IN INDUSTRIAL RESEARCH MIGHT BE ADAPTABLE FOR BETTER URBAN INFRASTRUCTURE. THEY LACK INFORMATION, EVALUATION TOOLS, TRAINED PERSONNEL AND PRESENCE IN DECISION-MAKING BODIES." (8/12).

THERE IS A ROLE HERE FOR THE EU TO PLAY. HOWEVER, COMMUNITY AND "NATIONAL R&D SCHEMES ARE OFTEN BASED ON KNOWLEDGE TARGETED BY INDUSTRIAL NEEDS DEFINED BY GLOBAL ASPECTS AND MARKETING. ... <u>CITIES NEED A SOCIAL TECHNOLOGY, A TECHNOLOGY WHICH HELPS TO SOLVE SOCIAL PROBLEMS.</u> ... THE SPECIAL CHARACTERISTICS OF SUCH TECHNOLOGY DEVELOPMENT ARE <u>SIMPLICITY, FLEXIBILITY, LOW COST, GOOD QUALITY JOBS, FOR WHICH UNSKILLED PERSONNEL CAN BE TRAINED</u>. " (PG.8/13)

WHAT ARE THE POTENTIALITY FOR TECHNOLOGIES TO RESPOND TO SUCH REQUIREMENTS? "TECHNOLOGIES FOR CITIES WOULD <u>MAKE USE OF MEGA CHIP INTELLIGENCE</u>. ... GENERATION, TRANSPORT AND STORAGE OF INFORMATION IS CHEAP ENOUGH TO ENABLE TO APPLY CYBERNETIC SYSTEMS ANYWHERE, SYSTEMS WHICH UNDERSTAND SITUATIONS, EVALUATE THEM AND ADAPT. THIS MAKES SENSITIVE TECHNOLOGIES AVAILABLE FOR ALL CITY HARDWARE - URBAN TRANSPORT, ENERGY USAGE, WATER SUPPLY AND DISPOSAL, WASTE MANAGEMENT. ... THE URBAN FABRIC OUGHT TO RESPOND TO THE FLEXIBILITY OFFERED BY INFORMATION TECHNOLOGY... <u>THE MODERN COMMUNICATION INSTRUMENTS</u> - CLEAN AND EFFICIENT AS THEY ARE - ENABLE A REORGANIZATION OF URBAN LIFE COUNTERACTING THE THREATS OF DENSITY AND OVERLOAD. ....
ANOTHER TECHNOLOGY LINE WHICH OUGHT TO BE DEVELOPED FOR CITIES IS <u>THE MODERN STATUS OF CRAFT.</u> CITIES NEED TO REPAIR HOMES RATHER THAN TO BUILD NEW ONES IN BIG NEW TOWN. ... THE OVERWHELMING MATERIAL FLOW IN CITIES (GOODS AND WASTE) IMPOSES THE METHOD OF RECYCLING... 'DESIGNING FOR DISASSEMBLY' IS A STRATEGIC STEP TOWARDS THIS DIRECTION.
THE PHILOSOPHY OF CITY TECHNOLOGY REQUESTS UNITS WHICH ARE SMALL IN COMPONENTS AND EASY TO EXCHANGE, ADAPTIVE AND INTELLIGENT WHERE NEEDED, SIMPLE WHERE POSSIBLE, THE MODULES WELL DESIGNED IN DETAIL" (PG. 8/14).
(FROM BRICKWELL, 92)

City challenges: a resources for technology development

From the city problems come challenges and opportunities. "The problems of population increase and influx of masses to cities contains also the chances of increased human capital. New inhabitants can be trained, educated, integrated. They offer their own values of culture and tradition... High urban density has its own endogenous forces of rationalization. Technologies, which are not feasible in low density context, can be easily applied in the highly urbanized setting. Energy cascading may be an example... Technologies could be designed to cope with density. <u>The quantitative dimension of urban</u>

<u>life is one of the prevailing sources of innovation.</u> ... The concern for healthy cities requests changes in industrial material. .. <u>The improvement of urban quality could be one of the grand industries, sustaining the urban economy.</u> .. The large scale renewal of urban infrastructures bears both an economic and a technological dimension... Decisions on basic services made now, lead into the next century. Technology improvement has to respond to the social and environmental crises of cities. A change is desired towards adaptive technologies..." (ibidem, pg. 8/10-11).

Cities as users of technology can therefore define specific requirements for technology. The possibility of technology to respond depends however (again a circle between demand-pull and technology-push) on the capacity of the user (the city) to adapt to technology and not only of technology to adapt to the user.

One can use the metaphor of the self-organizing system to interpret the above remarks and recommendations. City, as a self-organizing system, does not adapt to technology, but its 'cognitive system' filters-out from the technology offer only those potential solutions that meet its need to progress by keeping its identity. In approaching technology the self-organizing city has to be pro-active: to look for more adapt technology to fit its needs, to test in advance the effect of potential solutions based on new technology.

City as a privileged space for technology development: the case of ICT

When one talks about technology in reality one refers to a highly complex and structured field as its has developed through innumerable applications in different domains. To conceive new applications the existing technology structure is important, it constrain the application potentiality. Taking this into consideration the problem is posed if the offer is broad enough so that the 'cognitive' system of the self-organizing city can filter-out the useful offers or if the structured 'package' offered by technology are not too constraining, if they have to be broken-down into more elementary units to be acceptable.

Cities, however, have been the places where the structuring of the technology offer has taken place. Does it matters? Is there, because of this, a favourable preconditioning of technology for city as a user?

The case of the new ICT (information and communication technologies) is interesting because, in principle, it responds to the basic requirements above indicated for city technologies. Moreover the cities have been the privileged "market place" for the development of ICT.
In fact, the major 'user groups' (industrial, professional, commercial, public services, scientific research) are concentrated in cities. In the cities are the sources of information and there the information is processed.
"Although the development of distributed processing and rapid transmission of information make the location of database production seemingly irrelevant, it is significant that the majority of database hosts are located in major metropolitan area.... The major telecommunications networks exist primarily within the major metropolitan areas, linking the key decision-makers via costly and complex systems... It is also significant that the majority of the Value-Added Networks (VANS) and Value-Added Data Services (VADS) are provided out of major cities. ... The emergence of such VAN's can be directly linked with the alliances between organizations previously separate or in competition to meet the

business demand for the services they make possible. The head offices of such organization - newspaper and publishing companies, large industrial corporation, information services, government and other public sector agencies among others - are situated within major cities." (see Taylor , 92, pg. 4/10-11). [3]

As the privileged space for ICT development there should not be, one can guess, major difficulties for the cities to take advantages of ICT as a 'user' of technology (to solve city problems) and of the potentiality of economic wealth generation tied with ICT in a city as 'producer' of technology.

This might not, however, be an easy task.

City as technology user: the case of ICT

The 'cognitive' system of the city is the integration of the 'cognitive' systems of the citizens. The individual approach to the ICT potentiality is therefore important.

In fact, "... an informed view on what users require is an essential precondition for the creation of a truly competitive market for information products... [However the] ordinary citizens, already barred from access to information by lack of funds, will be further dis-enfranchised by the lack of skills and training to allow him to participate an increasingly technologically-driven world..... The globalisation of information, and the increasing centralization of 'ownership' of that information is increasing the division of the world into the information-rich and the information-poor.....The increased size of the information base which is on offer, and the technology which enable rapid access, is not accompanied by an increase in the skills and abilities of the users to creatively use the information on offer...There is evidence that there has been little up-take of the benefits of information technology by the public at large. This can lead to growing alienation among the population at large, rather than the brave new world prophesied by the visionary thinkers as little as 10 years ago. ... Technology has served, in many cases, as a barrier to knowledge access rather as a facilitator. Training in technical skills is obviously essential, but equally science policy should concern itself with education and investigation of the potential use of this new enabling technology to add to quality of social, economic and cultural life" (ibidem, pg.4/21-22).

Having tried to focus on a specific technology, the ICT, we are pushed back to consideration of a more general type, to the importance of recognizing the knowledge base of the city, to invest to increase it and to adapt to new technological challenges, or, better, to intervene pro-actively to modify the technology's structured offer. The more so, the more we are faced with a "revolutionary" transition in the economy and in the production organization.

The impact of technology change on urban space: the case of ICT

If the city is the central place for economy and production, a related transition will have to be accompanied by urban functional and spatial changes. This claim does not contrast the self-organizing hypothesis, since the city identity can be kept even by revolutionary change in the system structure, provided something else is kept unchanged (system organization?) that characterize its identity.

---

[3] *A new acronym - MAN - has recently added to the many invented for the new technologies. MAN stands for Metropolitan Area Network, and usually refers to high speed fibre-optic system.*

To favour the recourse to the potentiality of the ICT, the city might have to anticipate the spatial changes that go together with the transition. The subject matter is developed by Capello and Njikamp (92) in a contribution to the FAST study on the future of cities. According to them, we are moving toward a 'network economy'. " [A] modern economy tends to go through a period of transformation, signalled by the move from 'capital-intensive' production systems to 'information-intensive' production systems ... The emergence of the Information Economy is seen to be highly dependent upon the widespread diffusion and adoption of new ICTs... " (ibidem, pg. 5/1).

This will induce a "qualitative shift towards a new spatial and organizational configuration of activities... [which is] ... not unique in the history of the western world. Also in the past activities various types of drastic restructuring or transformation phenomena have occurred..." (ibidem, pg. 5/2).

The infrastructures have to be apt to respond to the new demand, the "logic of network" should be favoured instead of the logic of hierarchical organization.

Telecommunication technologies has already impacted in the past the city space. However, the introduction of computers with its information processing potentialities is radically changing telecommunication networks and infrastructure. "The intrinsic characteristics of traditional telephone infrastructure to guarantee public access is .. no longer .. valid and true for new and modern computer networks. The technological revolution has destroyed the 'universal access' to these infrastructures.. three kind of networks can be distinguished, namely private, club, and public networks.. for each of these categories different institutional and regulatory principles are required.." (ibidem, pg. 5/8-9).

The new ICT are characterized (see Capello an Njikamp, 92) by: a) pervasiveness, encompassing both the industrial and service sectors and the geographical diffusion to core and peripheral regions, b) capacity of destroying traditional inter-sectoral barriers and opening up competition between previously separated sectors, c) development along different trajectories in different countries which have led to technological asymmetry in advanced networks and services.

The potentiality of the ICT for local economic development are not without threats. Concerning the different national trajectories "... the threat of this asymmetry is that it can turn into a discontinuity in the existence of physical network, thereby disenfranchising national realities from participation in a network economy" (ibidem, pg. 5/12).

The macro-level spatial asymmetry induced by ICT

The spatial implication of the adoption and use of new ICTs can be analyses at a macro-level (effects on global regional development) and at a micro-level (changes in the industrial activities in a region).

The analysis of the impact at the macro-level can lead to contrasting theories (ibidem, pg. 5/21-22): a) ICTs "innovations can be used to overcome some of the previous problems of peripherality, such as limited information environments, remoteness from markets, lack of access to special services"; b) "the second opposite theory is that the

diffusion of new technologies is a centripetal process, destined to occur a priori in central areas, where a high potential demand density is present".

Limited access to "networks and services constitutes the major threat to peripheral area, which could be excluded from exploiting the advantage embodied in these technologies. Nevertheless, once they obtain an infrastructure endowment, major opportunities are given only by innovative use, through the choice of an 'appropriate technology'... [i.e.] an 'appropriate design and adaptation' of best technologies to the production needs and 'vocations industrielle' of the single area..."

Following these innovative adoption patterns, peripheral regions become 'adaptive regions', rather than 'dependent regions', where the difference between the two categories lies in the way technologies are used and exploited". In 'dependent regions' "local development lies on external technologies, available in the area through the location of branch plants of multilocalised firms...".

ICTs represent thus a challenge to economic systems to achieve a greater economic performance. Nevertheless, they also represent a new threat which territorial systems (national, regional, urban) have to face in the next future. The lack of ICT infrastructure may imply that territorial systems can be isolated from development processes and from integration processes characterising modern economies in Europe..." (ibidem, pg. 5/2-3).

In fact, "... the transition process from telecommunications to computer networks is far from being a simple development trajectory and is fraught with difficulties... This problem can be developed under three different perspective : a spatial perspective, regarding the role new computer networks have in fostering regional and urban development and in shaping a new spatial division of labour... [since] despite general belief... computer networks can lead to a concentration of economic activities in core area...; a demand perspective, regarding the additional capacity many users have in exploiting these new technological potentialities ... [which] can turn into a threat imposed to users to adopt these technologies in a short time and for new purposes; a supply perspective, regarding both the new marketing and competitive strategies" (ibidem, pg. 5/6).

The micro-level spatial asymmetry induced by ICT

At the micro-level (ibidem, pg. 5/22-23), "ICTs have also the potential to reshape the spatial structure of industrial activities..."

Again, two opposite ideas govern this field: a) "ICTs provoke strong decentralization effects, by allowing on-line remote production" control and management; b) "... the spatial restructuring of economic activities follows a centripetal pattern, favouring more advanced firms and regions, this process being justified by external economies, by spin-off effects of skilled labour force and by technological and organizational know-how..."

Different city, with different identity and 'cognitive' approach to the technology offer can be more or less successful in transforming the technology potential into opportunity for city development. Even more, technology as a well structured field - coupled with external macro changes - can impact on city as an 'invader' threatening the city system identity. As a 'self organizing' system the city cohesion might not be strong enough to avoid the risk of 'disintegration' by the invasion of the powerful new technology (or, better, by the system of interests that has developed along with the utilization of the new technology opportunities).

The precondition for an ICT-based city development

ICT will therefore have an important impact on the future of cities. In principle its opportunities are available to any cities. In practice, there are conditions that will favor the use of ICT as a source of city development.

A new hierarchy between cites will develop because of its tendency to favor central areas where a high potential demand density is present. However even metropolitan areas have to actively and intentionally behave to get the potential advantages of ICT.

"...[ICT] technologies are necessary but not sufficient conditions to develop comparative advantages in a geographical area. This is true also for metropolitan areas; the development of advanced networks does not guarantee automatically a privileged position in international competition.... it is the innovative use of telecommunications that provides major opportunities" (ibidem pg. 5/27).

The diffusion of ICT will change the urban space physically through the hard infrastructures. But, even more important, it will push for an increased competition between cities to participate to the economic development lead by the globalisation of economy. The urban space will be impacted therefore by the induced re-allocation of economic activities, the success or failure of cities in this competition
.
There are 'spatial conditions' to be met to increase the opportunity for a successful use of ICT (ibidem, pg. 5/27-28):

a) "the development of the 'raising awareness' among potential users located in metropolitan environments about the significance of advanced telecommunications in promoting competitiveness";

b) "the development of public advanced infrastructures and of modern applications by local governments";

c) "the existence of ICTs alone will not attract firms to locate in a particular metropolitan area... [The] traditional location factors...[such as] advanced industrial service sector, the presence of high skilled labour force, ability of organizational and managerial know-how... could become more attractive if related to the possible use and exploitation of new technologies... advanced services using advanced computer network applications... managerial and organizational ..capacity of exploiting new technologies...";

d) "each metropolitan area should strengthen the use of ICTs in accordance with its 'vocation industrielle'...;

e) "... it is absolutely vital for the success of local ICTs projects to have strict interconnection with a broader territorial project on the future urban division of labour among different centres at a regional and national level.... interconnection between urban planning and technological development planning..."

ICT and the intentional city

To transform the potentialities of the new ICTs in term of opportunities for city development as a "producer" of economic activity it is therefore important that the city be an "intentional city" with broad scope of investment and long term planning horizon. The opportunities are influenced by the city characteristics, its "historical heritage" its past and current activity, its interconnections with the external infrastructure networks.

An 'intentional' city might overcome the initial handicap by creative and innovative approach as "user" of technologies. ICTs might contribute advanced solutions to city problems. The ability to follow innovative trajectories to respond to city challenges will fuel the local development of new technologies to answer the local demand. The increased familiarity with the new technologies will open new application domains.

City problems are therefore, as noted above, an important resources for city development, provided appropriate city policies are developed to respond to the challenges.

City as an actor: precondition for appropriate technology development?

We approached this section's round of exploring the urban complexity by looking at technology. We found confirmation of the importance of technology for the future of the city. The case of new ICTs is significative and can be generalized.

Cities can lever on new technology for its development as a "producer" of economic activity, cities can look at technology as a "user" to respond to the many city challenges. However, from both sides it clearly emerges that the city has to be "intentional".

The question of technology and the cities leads, therefore, to the question of the city as "an actor". (see Drewett et al, 92).

But is a city an actor? If not, how it can become one? "The city becomes an actor when the varied interests of associations, institutions, corporations, foundations and individuals clustered together in space are reflected in policies which enable them to pursue their **collective interests** over and above their separate interests" (ibidem, pg. 113).

The analysis of the current situations is that cities are far from behaving as an actor especially in the domain of science and technology: "... most cities in Europe are **neither key actors in S&T policy nor are they even systematically assessing their knowledge resources or building a knowledge infrastructure"** (ibidem, pg. 114). This situation is somewhat paradoxical since the cities have always been - and it will even be more so in the future - the privileged space for S&T development. The paradox is explained by the fact that, if cities are the "loci for S&T, R&D and other types of knowledge resources... this does not mean that ...[these knowledge] are **integrated into local culture or that there is synergy between different types of knowledge in the city or that the city uses science and technology to address local needs, or that the interest of cities are reflected in science and technology policy at national and trans-national level**" (ibidem, pg.114).

The preconditions for cities to become an actor with respect to the role of knowledge for the future of cities is for cities to make a deep reflection on the matter:

a) on which are the key issues of cities today to which technology and knowledge in general could interact positively;
b) on what role the knowledge base can play to the development of the city as a producer of knowledge and more in general of economic activity;

c) on its being a 'user' of knowledge and to which extent it is willing or conscious to follow innovative use of knowledge as a client in specifying the city demand to respond to city problems.

1.7 Concluding remarks from Part I

CITY SYSTEM STABILITY: A TOO SIMPLIFYING HYPOTHESIS. THE BASIC PARADOX: HOLISTIC CHANGES, REDUCTIONIST INTERVENTIONS. WILL IT HELP TO SUPPOSE THAT THE CITY IS NOT A REAL SYSTEM? THE SELF-ORGANIZING SYSTEM HYPOTHESIS. CAN WE ACT GLOBALLY ON THE CITY, BY DESIGNING A COMPLETELY NEW ONE? CAN A HOLISTIC TECHNOLOGY BE DEVELOPED? TAKING ADVANTAGE OF THE SELF-ORGANIZING HYPOTHESIS FOR THE CITY. IN SEARCH OF A 'WISDOM OF COMPLEXITY' TO APPROACH CITY CHALLENGES.

In exploring the urban space as a complex system we found confirmation of the complexity of the system. If for nothing else, because of the difficulty - once more - to solve the paradox between the need to approach the system in an holistic way and to act in a reductionist way on its components.

The paradox has no consequences when the system is in a well stable state and the 'reductionist' actions on its components and sub-systems does not change the system stable structure. In this case the challenges come mainly from the fact that the system - which still has capacity available to adapt to its environmental changes - might be apparently saturated by an inefficient use of its capacities.

City system stability: a too simplifying hypothesis

Is this the case of today city challenges? We might not discard this hypothesis. However if this is the case, we should not be too worried about our ability to assure an acceptable future for our cities. In fact, in that case, the sectoralisation of the system stable structure is such to assure that 'sectoralised' actors are there to deal with the sectoralised challenges.

One might have simply to try and better understand what impede temporarily the system to use its existing 'slacks' to adapt responding to the challenges.

The quest for recuperating city systems efficiency is not to be discarded. Following it, one is also conducted to analyze type of actions that can be of importance in any case. As an example we have referred to the intervention to improve and renovate the city infrastructure (see section 1.1).

The basic paradox: holistic changes, reductionist interventions

Unfortunately, many are the signs that city challenges go well beyond the restoring of city efficiency. The degree of interactions of all the city sub-systems and components is such that it might be difficult to regain 'space' of adaptation simply by 'shaking' a stable but blocked system.

The paradoxical situation between the globality of the challenges - and therefore the need to consider holistic changes of the system - and the reductionist level of actions on the system components cannot be avoided. How can one be assured that the reductionist intervention will build up in a global system behavior along the desired lines? The complexity and non-linearity of the city system will assure of the contrary: one might not be able to plan local actions to assure global results.

55

Will it help to suppose that the city is not a real system?

What are the way out of the paradox? One possibility, that we have only indirectly referred to, is that maybe the city is not a real system.

If not, than we should consider the elements that we see aggregated to form a city 'pseudo-system' as part of other systems: the social system, the productive system, the knowledge system.

If so, we can act on such elements provided, however, that the related system they belong to is in a stable condition. But is this hypothesis acceptable? Is it not that our concern on the city challenges emerges exactly because we detect instability conditions - or the emerging of new system structure - in the social system, in the political system, in the production system?

This hypothesis will therefore put us in an even more difficult condition: to plan reductionist actions confronted with holistic changes of several different systems.

The hypothesis of the city as a place where different systems cross without that the city emerges as a real system in its own right, can however help us at least in better grasping what are the challenges and in defining them. In fact, that challenges are also emerging from the different systems that crosses the city one. It could also help in underlining the type of actions: social, economic, spatial (see section 1.2).

The self-organizing system hypothesis

In the rest of our exploration of urban complexity, we must confess to have privileged the hypothesis that the city is a real system. Among the different typology from system theory we have also favoured that of a self-organizing system with its own identity.

Does this hypothesis help us with the above paradox? To a certain extent, yes. In fact, the hypothesis means that the city, while being unstable - in the sense that it can go through system structural changes - it keeps something unchanged: its identity.

Before taking advantage of this hypothesis we have to better understand the action-taking process. It is a process that ties together the understanding of the system as it is now, the envisaging of actions on system components, the forecasting of system behaviour after the actions is taken. To improve our ability to act on a complex system such as a city, we have to progress in all the three steps.

We might be able to improve our holistic understanding of the past behaviour of the system. As a matter of fact one has to recognize progress of the urban research in this - direction. This progress might help to forecast system behaviour under changed conditions as the result of the actions. However, the dichotomy between the holistic understanding and the reductionist acting still remain. Unless in devising the action - developing the solutions to the system problem - we are able to behave also in an holistic way. Is it possible?

Can we act globally on the city, by designing a completely new one?

One hypothesis is that we might dare to redesign the entire city system. The illusion that this might be possible come from the 'new city' approach. If we start from the green

field, then we are not limited to intervene on single elements of an existing city. The design will take care of all the components and at the same time of the entire system.

This approach has not only been a dream of architects and urbanists. It has been followed in past and recent cases.

But, designing a new city is actually designing the 'city system'? The answer is obviously negative. The new city is actually only a 'container' for the citizen that will populate it. The real city system will be the integration and the interaction of these two components: the designed container and the inhabitants and users of the city.

Moreover, the blend of the two will have to react to an external environment which was not part of the design. The environment might be carefully assumed by the designer as given in its present and by forecasting its future states. It is however a complex system on its own, with its complex behaviour difficult to predict.

So, even in the case of a new city, the action has been taken at a reductionist level.

Can a holistic technology be developed?

The other possibility to answer the problem of the holistic design, is to accept that we will never be in the conditions to design the entire system. However, we might assume to know enough of the system to specify constrains and general conditioning of the solution to be developed so that the assimilation and integration of the system to the designed change will not be traumatic.

The appropriate metaphor here could come from chirurgical implantation, where one has to assure that the organism will not 'reject' the implant as a foreign body. What are the characteristic that technology should have to be acceptable for city? Can we develop a city technology? On the same mood, can we develop a social technology?

The questions were taken up in the previous section. The result is that - as in the medical metaphor - we can act to 'preconditioning' the city 'body' to consider technology not as a foreign element (see the policy recommendation to improve the city knowledge base) and/or we can select technology which fits general specifications (to be cheap, flexible, etc.) to be acceptable (section 1.6).

All these are important suggestions. Policy making can take advantage of them. Resources can be dedicated to preconditioning the city to take advantage of technology opportunity (to be creative, to be innovative, to be intentional) and to develop R&D policies favouring the development of 'city technology'. We will not, however, circumvent the basic paradox when faced to respond to given challenges. The actions will nevertheless be at a component level while the challenge might call for a system change.

Taking advantage of the self-organizing hypothesis for the city

It is here that the hypothesis of the city as a system which try and develop by keeping its identity, is important.

In fact, the hypothesis implies that the system is not passively waiting to adapt to the external change. It keeps pro-actively exploring the potential space of its future development. The direction of change is not given in advance. Different alternatives are possible and the chosen one will depend on the system exploration of the alternatives.

It is here that the planned action might be effective notwithstanding the disproportion between the system dimension and the smallness of the action, notwithstanding the holistic trajectory of the system and the 'localization' on components of the action.

Being close to system structural changes is not a disadvantage because the system is very reactive and it amplify the perturbations (including the ones due to our actions). Provided however that our approach is a learned one, that we have good knowledge of the system actual state and that we have a procedure to problem-solving that take advantage of the knowledge on city system complexity.

.
In search of a 'wisdom of complexity' to approach city challenges

For the subsequent part of the present analysis we will, therefore focus on this latter aspect, i.e.: how we can develop and use a procedure to recognize the city many challenges and to develop creative and innovative responses - making uses of the *'wisdom' of complexity* - applied to the city considered as a reactive system that amplifies the planned action, converges its internal forces to select the desired trend (provided, however, it is among the potential alternatives).

Part 2. RESPONDING TO THE URBAN MALAISE

THE URBAN REALITY SUFFER A LOT FROM RIGID ZONING OF THE URBAN FUNCTIONS AND MONO-FUNCTIONALITY. THERE IS A EUROPEAN TENDENCY IN DEFINING MIXTURE AND COEXISTENCE OF FUNCTIONS AS KEY FEATURES OF URBANITY AND MANY SUPPORT THAT THE CITY WOULD CEASE TO EXIST IF THE DIVERSITY AND MIXTURE DISAPPEAR. (PG 17)

OFFERING CITIZENS A BETTER AND CREATIVE ENVIRONMENT IS AN OBLIGATION AND THE TRANSFORMATION OF DERELICT AREAS INTO ATTRACTIVE ZONES GIVES INSPIRING RESULTS, FROM SALFOORD QUAYS TO THE GENOA DOCKLANDS. (PG.19)

ALL INNOVATIVE URBAN SOCIAL POLICIES AND ACTIONS SEEM TO HAVE A STRONG COMMON DENOMINATOR: THE CITIZENS' INVOLVEMENT AND PARTICIPATION. ... THE TYPE OF COMMUNICATION AND COLLABORATION BETWEEN THE STATE, THE CITIZENS AND THE MARKET FOR THE EFFICIENT AND EQUITABLE FUNCTIONING OF URBAN LAND USE ARE VERY IMPORTANT FOR THE SUSTAINABILITY OF THE URBAN EUROSCAPE. (PG. 16)

THE CREATION OF NEW ECONOMIC, ENVIRONMENTAL FRIENDLY, URBAN ACTIVITIES IS EMERGING AS A MAJOR FACTOR OF SOCIAL INTEGRATION. ... SOCIAL INTEGRATION CONCERNS ARE NOW STARTING TO BE TAKEN INTO CONSIDERATION IN ALL URBAN POLICIES. TRANSPORT POLICIES, WHERE UP TO NOW EFFICIENCY CONSIDERATIONS DOMINATED THOSE OF EQUITY, CAN PLAY AN IMPORTANT ROLE, AS THEY OFFER VARIOUS ACCESS AND MOBILITY OPPORTUNITIES. ... SOCIAL INTEGRATION CONCERNS PREVAIL IN POLICIES FOR IMPROVING LIVING CONDITIONS IN ANONYMOUS CRITICAL PERIPHERAL AREAS OF MANY EUROPEAN CITIES.... (13 -14)

       EUROPEAN FOUNDATION FOR THE IMPROVEMENT OF LIVING AND WORKING CONDITIONS (93A)

The exploration of urban complexity in Part I has confirmed the need to dispose of a systematic approach to problem-solving to get out of the holistic circuitous trap to try and respond to perceived challenges.

In this Part II the *design process* will firstly be presented as a proper tool to problem-solving for complex issues, and then an attempt will be pursued to apply it to the case of urban issues.

The target here is not, however, to go through all the phases of the design process, but to focus on the first one, that concerned with the translation of the perceived challenges in terms of specification of the problems to be solved.

This will be done in three steps. Firstly, the urban challenges will be described as 'urban malaises' emerging by considering the city wholeness. Secondly, a first response will be attempted by defining scenarios that refer to the values and objectives that one would like to see realized in the future state of the city. Thirdly, the gaps in the portfolio of available solutions to respond to city challenges will be underlined and an attempt followed to define an agenda for RDT actions. These latter will be aimed at developing new solutions to which to refer specifying the terms of reference of the problems to be tackled in the subsequent phases of the design problem-solving process.

2.1 The need for appropriate decision-making and problem-solving

COMPLEXITY IS EVERYWHERE. THE DESIGN APPROACH. THE FOUR PHASES OF THE DESIGN APPROACH. THE DESIGN APPROACH: AN INTERACTIVE CHAIN OF HOLISTIC - REDUCTIONIST STEPS. THE DESIGN PROCESS IS APPLICABLE TO EACH PROBLEM-SOLVING PHASE. THE NEED FOR CREATIVITY AT ALL THE DESIGN PROCESS PHASE.

In Part I, each time we started a round to try and devise responses to challenges we have been faced with the basic paradox that challenges are holistic, the objectives we input to respond to challenges are also holistic, while the actions are necessarily reductionistic (they have to be concentrated on some physical, hard or soft, system's element). To live with the paradox some kind of methodology on how to proceed to respond to complex system challenges is needed.

One such methodology is been described in a previous work (see Businaro et al., 92). It basically refers to a generalization of the design approach.

Complexity is everywhere

To deal with urban issues means to deal with complex system. The difficulties one encounters in responding to urban challenges are typical of the difficulties related to problem-solving in complex system. However, this should not be a novel situation:
"... we are used to complexity: we face it at every level of our actions...
If we are used to complexity, then - as active members of the system that we perceive as our own - we are used to act (react or pro-act) to respond to the system challenges. If so, we should hope that to deal with... [urban] challenges we can learn from experience.
The trick we uses in dealing with complexity is to limit the range of the complexity of what we consider "our" system: we *expel* higher levels out of the system to make them part of exogenous environment (we cannot act to change the environment; we can only try to forecast its changes to take pro-active decisions), and we *accept* as "atomic" unbreakable parts some of the system components and inputs we use to (reactively or pro-actively) change "our" system." (ibidem , pg. 5).

If we reconsider under this light the various routes followed in Part I, they appear as different attempts to define the level of the complexity to be faced: in the 'efficiency' recipe, the focus was on city 'subsystem'; in the 'disciplinary' approaches subsystems interaction was accepted, but limited to some of the system variables; in the model of 'spatially bounded city', the attempt is to clearly delimit the interior from the exterior of the system; if the city is considered as a 'nest of networks', the description of what is internal and what is external to the city system requires to introduce somewhat ambiguous terms such as "local global networks", "cities networks", "global network".
What can be considered "atomic" parts of the system varies accordingly: they can be the type of functions performed by the city; the type of networks; the city itself (when we focus on the challenges coming from the globalisation).

The design approach

The above trick to approach complexity is used in the **design process.** It suggests, first of all, "that an important preliminary organizational rule be followed: *to define clearly*

the roles of different actors in order to contrast the fuzziness caused by complexity and interdependence. " (ibidem, pg. 8).

The main actors considered in the design process are: ***the client, the designer, the producer, the user***. The user can be the same as the client, but not necessarily so. In the case of city the 'users' are the citizen at large, while the 'client' has to materialize under the form of some institution.

"*The [design] process can ... be considered as a chain of loops centred around each actor*. Each loop is covered a certain number of times involving the interactions of all the other actors up to a point when good enough convergence is met, so that it can be decided to pass the responsibility to the next actor down the problem-solving chain (from the client, to the designer, to the producer)." (ibidem, pg. 8).

The four phases of the design approach

The process start at the level of the "client" by the ***perception of the challenge*** a response to which should be developed. The first "loop" - that might be referred to as the **problem definition** phase - centred around the client actor end up with the ***"terms of reference" of the problem to be solved.***

The second loop - **the designing phase** - now sees the designer as the main actor. It start by accepting the terms of reference and it ends by ***developing a solution for the specified problem***.

The third phase is that of **implementing the designed solution** and is the responsibility of the "producer" (constructor). It starts with the ***blue prints*** developed by the designer and end with the ***new or changed product (system)***.

The Design process phases	starting	ending
PROBLEM DEFINITION	Challenge Perception	
		Problem's Terms of Reference
DESIGN	Problem's Terms of Reference	
		Problem's Solution (blue prints)
IMPLEMENTATION of the DESIGNED SOLUTION	Blue prints	
		System changes
ACCEPTANCE of the DEVELOPED SOLUTION	Proposed system changes	
		Assess system and environment reactions

We can add a fourth phase centred around the user as the main actor, which consists in **"accepting" the developed solution**.

In the case of highly complex system "user's satisfaction" might means to verify that the change in the system behaviour due to the action taken is in the desired directions. This phase might start at the end of the "construction" phase when the changes on the system are already implemented, or, before this latter phase is started, by analysing the *proposed system changes*. It will be terminated with the acceptance of the "product" or by having assessed system and environment reactions to the proposed changes.

This last phase can be the object of a "simulated" experimentation of the application of the devised solution and it might be requested by law (see the case of the "assessment of environmental impact"). The result of the assessment, if not acceptable, might require to go back to previous phases of the design process to find new solutions or even to change the terms of reference of the problem.

The design approach: an interactive chain of holistic - reductionist steps

The design approach solve the basic holistic / reductionist paradox of problem solving by somewhat mixing together the "two cultures" approaches to complexity: that of the human and social sciences that intrinsically accepts the holistic system features (that everything interact with everything else) and that of the physical sciences that looks for the elementary components into which to break down the system. Both "contributed to the advancement of our cognitive approach to understanding the world. However, neither of them are suited to specify actions able to change our world. The 'design' approach is actually a compromise between the two: it is an interactive chain of "holistic" cognitive approach and "reductionist" building of solutions". (ibidem, pg. 8).

To see how this compromise is achieved, let us focus on the five important verbs which enter into the design approach definition: to **perceive**, to **define**, to **design**, to **implement**, to **accept:**

* in the *"perception" of the challenge* it is important to grasp the "holistic" feature of the system. With reference to the case of the city, we might not know which kind of "beast" the city is, but we has to look at it as a global entity, not to be biased by already assuming a reductionist vision of it;
* in trying to transfer the perception of the challenge into a *"definition" of the terms of reference of the problem* to be solved, the question of which kind of system the city is has to be tackled. Not so much to know better the city ("cognitive" interest), but because to act we have to specify and delimit the system which is the object of the action. The delimitation can be artificial, devised according to a bottom-up approach (to apply available solutions). If so, we might discover later on that the assumption was wrong. We have in any case at a certain time to get out of the "holistic cognitive circle" and specify the best we can the hypothesis on the system;
* in the *"design"* phase, the search for a satisfactory solutions proceeds through a "divergent phase" (search for global solution) followed by a "convergent" one (designing the actual components to be changed), iteratively, at the various levels of the system on which the attention of the designer is progressively focused (from global, to subsystems, to components each one in its turn considered as a "complex" system);

* the *"implementation"* of the designed solution is certainly a "reductionist" process. The system to be changed is spelled out in the designed solution into subsystem and components, and the actions to be implemented well prescribed in terms of the elementary (atomic) parts to be "assembled" together to build new components and sub-systems. In general, however, also this phase has its holistic features such as when the constructor has to verify the practicality of the proposed solutions;
* in the *"accepting" phase*, in assessing the detailed reductionist description of the solution the user is faced to the holistic reaction of the entire system of which he is part.

The design process is applicable to each problem-solving phase

If we look with a magnifying lens at the design phases, we will see that each one is a complex problem-solving process that goes from an initial moment where a "problem" is perceived to a final moment where a "solution" is found, implemented and assessed. This is evident for the proper "designing" phase. However it applies also to the first phase. In fact to pass from the initial perception of the challenges to the specification of the problem to be solved one needs to explore also the potential solutions available, at the risk - on the contrary - of wishful thinking. The process oscillates back and forth: it passes through a first setting of the objectives we want to meet by responding to the challenge, a first verification of the practicality of the objectives, the need to better focus the challenge to redefine the objectives. If no compromise can be reached between the objectives and the available potential solutions, new ones might have to be invented and this necessity might be part of the terms of reference of the problem to be solved.

We can consider each phase as a design process in its own right to which to apply the "design" approach. In the "definition" phase, our concern is at the beginning "the whole" from which the challenge is perceived. We end up by defining the specific features of the delimited "system" to be the object of change. Because this phase is dealing with the specification of the object of the design we might call it a "meta-design" approach (designing the design).

In the "design phase" one starts with the "specified system's" terms of reference and ends up with a reductionist detailed description of the changes to be made.

If one looks with the amplifying lens also to the last phase, that of "accepting the solution", it will appear as a complex process to which the same design procedure might be applied. This is quite evident when the acceptance requires a formal "assessment of the solution" (one should perceive the problem that could derive from the implementation of the solution, how alternative better solutions might have being developed and at which conditions, etc.).

The need for creativity at all the design process phase

If each phase of the design process can be seen as a design process in itself, then all the categories of concepts that has been develop to understand the more mundane design process related to a specific product development (such as a new refrigerator) can be applied to each phase of the process even for the complex case of a city system. We can refer to creativity, innovation, advanced technology solutions for each phases. One has to be creative and innovative - as far as required by the objectives to be met - in the phase of specifying the problem to be solved and not only in the actual development of a solution to that problem. It is here where one could understand why and how research,

development and technology can enter already in the first phase of the problem-solving process.

In conclusion, the design approach accepts complexity's intrinsic features, such as: vagueness in the perception of the problem (at least when the process of design start); alternatives of objectives; interactions and feedbacks between different directly or indirectly interested actors; the returning back to initial phases of the process if the evidence developed by the design up to that point requires to reconsider and better focus the decision already taken (such as the initially specified objectives). Even more important, *it calls the attention of each of the actors on their direct responsibility for the quality of the response that will result from the process. Each of them - at their own turn of the design process - has to contribute to the creative and innovative aspects of the solution.*

2.2 The urban malaise

THREE GROUPS OF PROBLEMS. APPLYING THE DESIGN PROCESS: THE RELEVANCE OF THE FIRST PHASE. THE METAPHOR OF THE SICK MAN. ROLE OF RDT IN THE PROBLEM DEFINITION PHASE.

Armed with the holistic vision of city systems and with a reference model for the problem-solving process we can now go back to specific challenges and try and develop a response that takes into due consideration the wholeness of the city reaction to the attempt to intervene.

The challenges and problems facing cities are numerous, complex and difficult to delimit. To live and to govern the city is increasingly difficult. This is dramatically evident in very large urban agglomerations.

To try a taxonomy of city problems is therefore a challenge in itself. First of all one has to be congruent with the design recipe and consider the wholeness of the system when reasoning on what the challenges are. The risk is, otherwise, to shift too quickly to an already reductionist vision of the problem in terms of the solution to be developed.

Three groups of problems

Considering today the wholeness of the city, while it remains the privileged space for human development, an 'urban malaise' seems to diffuse to all cities, even those with a more manageable size.

What the reasons for? which the symptoms? can one develop a diagnosis followed by a cure? what the role for research, development and technology (RDT)?

The increased density in all of the urban system characteristics is at the base of many of the symptoms. The urban system has limited capacity. By increasing the density one reaches the saturation limits of such capacity. A system close to saturation is difficult to govern and it lets emerge strange new behaviors.

Consider a city from its physical space structure. From the viewpoint of the **organization and use of the urban space** an excessive specialization and functio-nalization is detected. 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 (trough the development of global networks) on the city. It looks like if the space has become multi-layered with different *metrics* according to the variable looked at: physically faraway points can become very close, while close ones can be felt as faraway lacking communication infrastructures. A tension is developing between the physical feeling of the space and the virtual proximity of faraway points in the infrastructures networked space. The citizens cannot but feel the increasing dis-harmony with the urban space, developing alienation, segregation, impotence to take actions to modify the situation.

Look at the city **as a privileged space for economic activity.** A decrease in efficiency is evident. The ability of the city to develop virtuous circles of wealth generation is broken. Economic activity in the past produced 'positive' externalities that increased the advantage to locate further economic activities. This seems now to have turned to the

opposite, producing 'negative' externalities with negative effects not only on economic activities, but, more generally, on the quality of life in the city. To this, one should add that the 'individuality' of the city as a centre for economic wealth production is loosing ground to the new phenomena of globalisation. An increased volatility of production factors substitutes for their low mobility of the past that has been the base to develop local advantages. The city has to compete with others to attract the localization of globalised economic activities.

More in general, looking at the city from the viewpoint of **the multifaced social process** that develop in it, one sees a decreasing ability to govern the process. Everything is interacting with everything else. The system is close to saturation in many of its characteristics and it becomes difficult to efficiently manage it.

Three groups of problems emerge quite clearly:

* problems related to human co-existence (social exclusion, multicultural and multiracial conflictual situations), representation and consensus (governance difficulties);
* problems related to the pressure from the globalisation process leading to development choices disconnected with local needs and social networks betterment;
* problems related to the reaching of saturation levels in many of the city functions and characteristics (such as saturation of traffic, air pollution, social solidarity);

To simplify, the situation can be synthesized by pointing to three syndromes that characterize the 'urban malaise':

* **the alienation syndrome**: excessive specialization and functionalization of urban space.
* **the de-localization syndrome**: globalisation's challenge to the local identity in a multidimensional networked space.
* **the holistic syndrome**: everything interacts with everything else inducing a crisis in city governance.

In terms of actions three new concepts are emerging that synthesize aspirations towards a better future for the cities:

* **'agora' city** - a human centred city with an harmonic relationship between the citizen and the urban space, social cohesion and economic development.
* **'glocal' city** (global/local) - a city with a better balance between the globalisation process and the ability to valorise local resources and diversity.
* **'sustainable' city** - a city that internalise the problems it generates solving them instead of transferring the burden to others or to future generations.

To a certain extent the grouping corresponds to the different scope of intervention of local authorities (such as, e.g. the urban planning department) or to the current emphasis in the public debate on priority of inter-sectoral urban issues.

The grouping will not avoid overlapping (the same type of problem emerging in different groups). For our specific purpose - to enlighten the role of RDT to help approaching and responding to city problems - overlapping is not to be avoided (creativity is often helped by the duplications of vintage points and overlapping).

Applying the design process: the relevance of the first phase

Following the design approach, we have to underline the importance of the "definition phase" for a so complex matter like urban issues. Notwithstanding the urgency to do something, it will be dangerous to quickly jump to concrete action-taking before having well understood which is and how can be specified the problem to which an answer has to be found. In fact, while it is easy to perceive the challenges emerging from the city system, to pass from this perception to the actual definitions of the terms of the problems might be quite difficult.

As we have indicated above, the case of city will confirm that the first phase of problem-solving is a complex iterative process between challenge perceptions, potential solutions (at hand or conceivable), redefinition of the challenge, in a loop that finally end in the terms of reference for the problem.
If one suspects that the challenges are not limited to the lost efficiency of a stable well structured system, but that they indicate global system changes, then a creative and innovative approach is required even for this phase of the problem-solving process. If new potential solutions has to be envisaged to assure that the specification of the problems is apt to the challenge, then the question of the role of RDT is relevant already for this phase.

As a matter of fact, RDT can give important contribution in this process by evaluating the existing potential solutions, by developing new ideas, by pre-assessing the response of the non-linear complex city system.

The metaphor of the sick man

To stress the importance of the first phase on the entire problem-solving process concerning a complex system like a city, one can refer to the metaphor of a sick man. The symptoms of the illness might be clear to him from the beginning. If he feels a concentrated pain on the ankle after a bad feet movement he will have no problem to advance himself the diagnosis of a possible distortion, (the "definition of the problem") and to pay a call to an orthopaedist.
If, however, the symptoms are vague, cover extensive part of the body, goes up and down during the day, he will perceive the "challenge", but he will not dare to make himself a diagnosis. He will pay a visit to a general physician hoping to get illuminated on what the problem is.
The physician himself might have difficult to formulate the diagnosis. This will depend from his experience of previous cases that had similar symptoms (the 'portfolio of available solutions'). No matter how expert he is, the syndrome might result unclear and a series of physical examinations might have to be done (developing 'new potential solutions'). At the end, the general physicians might be in a position to define a diagnosis and either to specify himself the cure, or to send the patient to a specialist (the "designer/ producer"). [4]

---

[4] *An interesting case for the metaphor would be that of a patient affected by a tropical illness acquired during a trip to*

One has to underline that the patient has not been passive on this first phase of "problem definition. He will have himself contributed to the definition of the diagnosis by better explaining the symptoms under the clever questioning of the doctor.

The doctor might tell him that there could be different approaches to be followed for the cure (such as chemical treatment or chirurgical intervention). The decision on which way to follow will depend on the "values" that the patient gives to his future quality of life and its propensity to take risks.

The subsequent phase, the real problem-solving one, therefore will depend on the way the first phase developed. The specialist doctor to which the generalists will have sent the patient might agree on the diagnosis, or revise it. He might require new analysis to be done. At the end he might consider alternative cures. However, the outcome of the first phase - the selection of the type of specialist doctor according to the generalists diagnosis and the patients agreement on the type of cure to be chosen - will have introduced an irreversible direction on the global course of the illness.

Role of RDT in the problem definition phase

With this metaphor we hope to have clearly emphasized the importance of the "problem definition phase" for the case of complex city issues and the importance to follow creative and innovative course of actions already at this phase. It will therefore be important to insist on this phase to try and answer the question of how RDT can help responding to city challenge.

Because of this relevance, we will **limit here the analysis of the role for RDT for the future of the city to the first important phase - *from the challenge perception to the problem specifications* - of the problem-solving process.**

The above groupings of city challenges will be referred to, first of all, to try and understand the motivation (**the why**) for calling in RDT to approach the city challenges (see sect. 2.3). Then, we should deal with the procedure (**the how**) by which RDT can contribute specifically to the "problem definition" phase (sect. 2.4). Finally, we will list a series of possible RDT programmes (**the what**) covering that scope (sect. 2.5 and 2.6).

Africa and whose effects appeared only several months later. The doctor never had a similar case before so it is difficult for him to pass from the symptoms to a diagnosis. City problems emerging because of the increased complexity of the city systems might appear as completely new and it might be useless to look for previous experience to approach them.

2.3 The first round to respond to city challenges: legitimate the desired scenario

URBAN PLANNING: THE "AGORA" SCENARIO FOR THE FUTURE OF THE CITY. THE GLOBALIZATION CHALLENGE: THE "GLOCAL" SCENARIO INTEGRATING THE CITY INTO THE WEB OF EXTERNAL INFRASTRUCTURES. THE "SUSTAINABLE CITY": RESPONDING TO THE PROBLEMS OF A SATURATED CITY SYSTEM.

We have started the first loop of the problem-solving process by defining in very general terms the challenges as an urban malaise. A first specification of the challenges has been given in terms of syndromes. By defining the syndromes the interaction between problems and solutions already took places. We have mentioned them by using three labels - the names of three scenarios - to characterize possible interventions.

One should now proceed to better define the objectives considered relevant and to be met by any attempt to respond to the challenges. To achieve this one method is to spell the objectives out by describing in terms of *a scenario the future of the city as we would like to see it*. This will be done here for each of the three groups of problems above indicated.

Urban planning: the "agora" scenario for the future of the city

By urban planning it is usually meant the intervention to set constrains on and to organize the layout of the city space, to develop physical infrastructures. In the course of their history, European cities have seen periods of bold urban planning which has revolutionized their physical appearance (see the intervention in Paris in the second half of the XIX century) and others of weak or '*laisser faire*' planning (see the case of the period of post-war reconstruction in many Italian cities).

Today, in many instances the situation is under stall. The ability to even think of urban planning seems to be lost. The reasons are several:

i) the need of an integrated approach that does not separate the physical planning from the social issues,
ii) the non linearity of the system (which emerge more evidently when the system is close to saturation) which makes practically impossible to forecast the effects of interventions (see the negative impact on traffic of urban motorways penetrating the city centre),
iii) the setting of multiple objectives to be reached, often mutually incompatible, with a social process unable to make consensus emerging on priorities selection.

To this list of difficulties one should add - which is important for our concern here - that there is no agreement on the role that technology has had in the past and might have in the future on the actual (planned or unplanned) development of the city. To this issue we will here focus attention.

Before going on, however, we have to underline that urban planning cannot simply be discarded from the policy-makers preoccupations, as someone might think (physical planning - it might be argued - is a sectoral approach, while the urban situation call for an integrated approach). One has in fact to recognize that there continues to be a need for

'physical' urban planning to set constrains, if for nothing else, on the development of the city layout (which cannot be kept frozen if the city is a 'living' system). [5]

To unblock the current stall in urban planning, society needs to agree on the priority values and objectives and to spell them out in a desired 'future scenario' for the city. It is felt that a new vision of urban plan is needed. A clear such vision however has not emerged yet (as can be grasped by the use by architects and urbanists of the vague terms of **post-modern** urban plan to indicate the trends). (see Mommaas, 94).

Technology should be called in as a tool to make the scenario feasible. But is technology - which tends to develop along its own trajectories - a tool available for whatever scenario?

Seen from a faraway point of view looking at a large scale territorial map, a city or an urban agglomeration will appear as a diffuse spot, where a complex mixture of activities takes place. It looks like a multi-functional node inserted into a web of networks across which circulate flows of different kinds (information, goods, peoples, money, etc.). When measuring the inputs and outputs of the flows across the city it can be seen as a sink or a well with patterns that varies with time. According to cases, we could label the city as a success city, or one under decline, being stationary or highly dynamic, etc.

If we now take a magnifying lens and use a finer map to see details, the apparent uniform mix of activities desegregates into zones which look mono-functional or highly specialized (residential area, industrial districts, commercial quarters, dormitories and ghettos) showing a space hierarchy with centre and periphery. A complex pattern of internal flows (people, goods, communications) compensates for the spatial separation of the activities so to recompose the complex 'uniform' mix as it appears when looking at a larger scale map.

We can classify such a situation as that of a **modernistic city**.

In contrast, the city of the past (still existing in old Europe, especially when history seems to have passed-by leaving the city in a somewhat dormant stationary state - see the case of Siena) appears - even when changing the ruler from a long to a shorter one - as a complex uniform mix of activities and functions. In the same buildings (perhaps at floors having different heights) live reach and poor people, artisans and *rentiers*, professionalists and workers. Boutiques and shops, offices and small factories are more or less uniformly distributed across the quarters. Individuals interact easily in an informal way in the streets and piazzas. We can classify this case as an **agora city**.

City periphery and fragmentation: challenges for an Agora scenario

"THE CITY, WITH ITS OBSESSION FOR CENTRALITY, PARTICULARITY AND GATHERING IN FACT PROVOKE A VIOLENT STRIVE FOR DECENTRALIZATION, INDIFFERENCE AND SPREADING, ARGUES THE FRENCH PHILOSOPHER JEAN-LUC NANCY. THE CITY CREATES ITS SUBURB BUT BEING UNABLE TO COPE WITH IT, REJECTS IT. THE SPLIT BETWEEN CENTER AND SUBURB ENDANGERS THE CITY ITSELF, DESPERATELY PRODUCING MIMICRY OF ITS LOST UTOPIA, ITS RURAL NOSTALGIA, ITS HISTORICAL HERITAGE. IN LOS ANGELES THERE IS NO SUBURB; THE SUBURB CONTAMINATED THE WHOLE CITY. L.A. DID NOT DESTROY THE IDEA OF THE CITY BUT

---

[5] *Because of this need, in many cases the State imposes by law to the city authorities to develop and adjourn at fixed deadlines the urban plan.*

DILUTED IT. THE CITY BECAME A COMMON PLACE, 'AN ENDLESS MULTIPLICATION OF EQUIVALENT DIRECTIONS AND CIRCULATIONS'[6] A GRID OF PLACES, MEETING, MOVEMENTS BUT ALSO OF POVERTY AND POLLUTION. L.A. SHOWS NO ILLUSION, NO HISTORY, NO WALLS, NO QUARTERS, NO DEAD-END STREETS, NO INTERIOR OF THE CITY AND BY CONSEQUENCE NO MONSTROUS OUTSIDE CITY EITHER. NANCY'S AMBIGUOUS APPRECIATION OF L.A. IS REGULARLY QUOTED IN WRITINGS ABOUT CHANGING URBAN CONDITIONS IN EUROPE. LOS ANGELES FIGURES AS THE MYTH OF ANOTHER POLIS.TRANSPOSED TO THE EUROPEAN CONTEXT IT SUGGESTS THAT THE PERIPHERY IS NOT THE DUMPING GROUND OF THE CITY, ITS ANTITHESIS, BUT COULD OFFER THE OUTLINE OF ANOTHER MODE OF URBANITY.

"ED TAVERNE STUDIED THE EXTENDED PERIPHERAL BELTS SURROUNDING PRESTIGIOUS ITALIAN CITIES SUCH AS FLORENCE, SIENA AND MILANO. TO PROTECT THE INTEGRITY OF THE HISTORICAL CENTRE, SPECULATIVE PRESSURES, DISTURBING FACILITIES AND INFRASTRUCTURES, MOVEMENT, INDIVIDUALITY AND BASIC COMMERCE HAS BEEN PUSHED OUTSIDE. A BRUTAL, CHAOTIC, UGLY BUT HIGHLY DYNAMIC "CITTÀ ESTERNA" DEVELOPED BUT WAS NOT CONSIDERED AS INTEGRAL PART OF THE URBAN REALITY. THE PERIPHERY BECAME BACK-YARD, GARAGE, GARBAGE BELT OF THE CITY, TRAVERSED BUT NOT NOTICED BY THE TOURISTS. THESE PERIPHERIES, TAVERNE ARGUES, REMAINING OUTSIDE THE SCOPE OF PLANNING AND ARCHITECTURE, NEVERTHELESS SHOW THE CONTEMPORARY FACE OF THE CITY. THEY DEMONSTRATE THE SENSATION OF UNPLANNED DEVELOPMENT.[7]

"WHERE CENTRALITY AND GEOMETRY CENTRE ARE NO LONGER SYNONYMOUS, A DISTINCTION CAN BE MADE BETWEEN PERIPHERAL LOCATION AND PERIPHERAL CONDITION. .. A PERIPHERAL CONDITION IS PRIMARILY CHARACTERIZED BY ABSENCE OF CENTRALITY. THIS CAN BE THE RESULT OF DIFFERENT FACTORS SUCH AS THE DECLINE OF AN EXISTING CENTRALITY, THE EXCLUSION FROM A FLOURISHING ONE... EXCLUSION FROM CENTRALITY MEANS MARGINALIZATION, STANDING IN ONE WAY OR ANOTHER IN THE MARGINS OF DEVELOPMENT....
PERIPHERAL CONDITIONS ENCOURAGE FRAGMENTATION. BUILT SPACES ARE COMPOSED BY JUXTAPOSITION OF LOOSE FRAGMENTS, A DEGREE ZERO OF SPATIAL ARTICULATION..... A STRONG MORPHOLOGICAL STRUCTURE, FORMED BY HISTORY, LOADED WITH MEMORY AND IDENTITY, IS MISSING. IN THE PERIPHERY, THE WHOLE IS .. LESS THAN THE SUM OF ITS PARTS....
DISPERSAL OF FACILITIES AND REGROUPING OF POPULAR MASS SHOPPING IN COMMERCIAL STRIPS ALONG MAJOR PERIPHERAL TRAFFIC CONNECTIONS CREATES A NEW KIND OF MARGINALIZATION PARTICULARLY AFFECTING LESS MOBILE AND LESS INFORMED GROUPS OF POPULATION UNABLE TO MAKE USE OF SERVICE AND DISTRIBUTION NETWORKS SPREAD OVER A VERY LARGE AREA. NOT WELL-TO-DO DWELLERS, CHILDREN, ELDERLY PEOPLE, SINGLE PEOPLE MAY SUFFER FROM THEIR LIMITED MOBILITY AND CONSECUTIVE ISOLATION.
A MORE SUBTLE FORM OF MARGINALIZATION HAS TO DO WITH LOSS OF PRIDE AND IDENTIFICATION WITH RECOGNIZABLE QUALITIES OF THE BUILT ENVIRONMENT. IDENTIFYING ONESELF TO AN OBSOLETE QUARTER, A SUPERMARKET, A PARKING LOT, A DISFIGURED LANDSCAPE IS FAR FROM EVIDENT. (PAG. 251-253)
LOECKX (93)

An important question concerning technology is now pertinent.

We know that the changes from *agora* to *modernistic* cities took place in parallel with the industrial revolution in Europe. Technology has therefore influenced very much the development of city characteristics.

However, is there a necessary direct causal relationships between technology and the city pattern or technology has simply contributed, *on request* of the decision-maker, to respond to specified values and objectives to which technology is indifferent?

---

[6] *Nancy, J-L. (1987): "Au loin, Los Angeles", in* Le temps de reflexion; *VIII La ville inquiéte, pp.19-26, cited by Loeckx (93).*

[7] *Taverne, E. "La Firenze Brutta. Thema's en situaties in een regionale metropool", in Archis, 9-89, cited by Loeckx (93).*

Could technology be called in to contribute as well (and in an equally efficient way) also to develop different concepts of the city responding to different values and objectives of a 'post-modern', or better, of a *modern agora city*? [8]

A more intriguing questions has therefore to be posed: *are we sure that technology does not enter into the setting of values and objectives*? Are we sure that the technological progress (that follows specific patterns and is often channelled into technological trajectories) does not influence the setting of human values, by a sort of friction coupling between the inertia of the technological progress and of society behaviour?

There are two opposite extremist postures with respect to the above question. In reality the situation is quite complex and, to try and answer, one should consider the non-linear process of values and objective settings, of problem definitions and problem-solving (i.e. the design process).

Leaving aside for the moment the problem of interactions between technology and objectives and going back to the former question, we will assume as valid (more productive) the hypothesis that **once a values and objectives laden scenario is chosen** (for the city we would like to see developing)**, technology can be called in to contribute an efficient solution** to problem solving.

The globalisation challenge: the "glocal" scenario integrating the city into the web of external infrastructures

The globalisation process is characterized, among others, by the emergence of new global systems (such as the financial one), by an increased volatility of the production factors (with a consequent effects of de-localization of production activities), by the emergence of new actors such as the multinational enterprises, by a 'multi-layered' space metrics (the 'distance' between two points change according to the entity to be exchanged). Geographically faraway points might be very close in terms of information exchange while very close ones might appear as distant if seen from the point of view of the time needed to transport materials or people or to communicate (when connecting infrastructures are lacking).

In the past, when communications, people, products travelled at the same speed (using the transport infrastructure) the world metric was 'mono-layered'. Even in the past, however, the metric was not uniform all over the earth surface because transport infrastructures where not uniformly distributed.

The historical development of cities, their status in a consolidated hierarchy of cities (that could be classed according to a taxonomy in terms of functions performed) within a

---

[8] *The response to the question is not obvious. Take the case of the trend in the development of a specific artefact, say an oil tanker, or an electrical power plant. The trend to bigger and bigger units is the results of applying new potentiality of technology as it progresses. However it was the decision-maker's responsibility to define objectives (e.g. to take into considerations only internal economic aspects leaving externalities outside of his scope of responsibilities) to be reached by applying technology to get efficient solutions.*
Technology could have as well responded in an efficient way to different objectives. Correspondingly, over the time a different technological trajectory could have resulted.

hierarchy of nation states, has been marked by the layout of natural and artificial infrastructures and their changes, by the relative low mobility of production factors as well as by a clear hierarchy of repartition of power among public and private actors. The recent infrastructure changes induced by technological revolutions in communication, information processing and in transport have contributed to change the 'world geography', increasing the volatility of the production factors. Hence a process which is referred to as globalisation. (Petrella, de la Saussay, 93)

Are cities condemned to compete?

"COMPETITION BETWEEN EUROPEAN CITIES IS .. MULTILAYERED AND COMPLEX. THE WORLD CITIES OF LONDON AND PARIS COMPETE ON ONE LEVEL. OTHER SMALLER CITIES COMPETE IN CERTAIN SECTORS, DEFINED INCREASINGLY BY THEIR INTANGIBLE ENDOWMENTS....
ONE RESPONSE TO INCREASING COMPETITION BETWEEN CITIES HAS BEEN THE GROWTH OF NETWORKING BETWEEN EUROPEAN CITIES. .. EUROCITIES IS AN EXAMPLE OF SUCH A NETWORK, INVOLVING OVER 40 CITIES IN THE EC DEVELOPING COOPERATION IN SUCH FIELDS AS ECONOMIC DEVELOPMENT, ENVIRONMENT, TECHNOLOGY, URBAN REGENERATION AND CULTURE...
"COMPETITION MEANS THAT THERE ARE WINNERS AND LOOSERS, BUT WHAT IS A WINNER, A SUCCESSFUL CITY? THE LINE OF ARGUMENT HERE WOULD SUGGEST THAT SUCCESS IS FIRST AND FOREMOST ENHANCED INCOME GENERATING CAPACITY. BUT THIS CONCEPT OF COMPETITION IS NOT WITHOUT PROBLEMS. FIRST, IS THE CITY AN ENTITY WHICH ACTUALLY COMPETES, OR IS IT GROUPS OF URBAN ACTORS, PERHAPS WITH CONFLICTING INTERESTS, WHICH ARE DRIVING THE COMPETITION FORWARD; TO WHAT EXTENT CAN THE CITY AS A UNIT INFLUENCE ITS OWN CHANCES OF SUCCESS? SECOND, SUCCESS IN INCOME GENERATION ASSUMES A CERTAIN STABILITY.. OVER A LONG PERIOD OF TIME. THIRD, IT SEEMS CLEAR THAT WE ARE NOT DEALING WITH A ZERO-SUM GAME; ALL CITIES IN A GIVEN CITY SET CAN POTENTIALLY BENEFIT FROM COMPETITION, WHICH IMPLIES THAT CITIES IN FACT COMPETE WITH RESPECT TO RELATIVE RANKINGS RATHER THAN ABSOLUTE INCOME LEVELS. FOURTH, A FACTOR RELATED BOTH TO INCOME GENERATING CAPACITY AND TO STABILITY IS OF COURSE POWER - PRIMARILY POWER OF DECISION AND CAPACITY TO DETERMINE THE BEHAVIOR OF OTHER ACTORS. SUCCESSFUL CITIES ARE POWERFUL CITIES, BUT CITY POWER IS VERY DIFFICULT TO MEASURE. FIFTH, CITY ARE LOCATED WITHIN A CITY-SYSTEMS AND INDIRECT AND INDUCED EFFECTS OF INCOME GENERATION CAN SPREAD UNEVENLY WITHIN THE SYSTEM. ...
FINALLY, IT IS NOT CERTAIN THAT SUCCESS, IN THE FORM OF GREATER INCOME-GENERATING CAPACITY, NECESSARILY IMPROVES THE WELL BEING OF THE CITY DWELLER. THERE ARE OTHER DIMENSIONS TO SUCCESS, INVOLVING QUESTION OF INCOME DISTRIBUTION, NEGATIVE EXTERNALITIES CREATED BY INCREASED INCOME..." (PG. 4-6)
JENSEN-BUTLER (93)

The city status is now being challenged due to globalisation. A new hierarchy of cities is emerging with a new typology according to different mixes of functions to be performed (world cities, financial centres, international commercial cities).

The impact of globalisation represents therefore new opportunities or threats to cities. Some cities already deeply feel the threats in terms of a declining state characterized by a multidimensional crisis (economical, social, political). Some others ride the opportunity wave and claim already to be labelled as 'world city'.

To struggle against the decline, to keep the current status or to move up into the new emerging cities hierarchy, the action-plan seek by many city policy-makers is to attract the new global actors (which in any case need to localize in some place their activities and facilities) by investing in special infrastructures and facilities, by developing new service functions.

73

In doing so, because of the supposed high volatility of production factors, cities have to strongly compete one against the others.

One important question here is whether or not cities can take advantage of existing local factors and externalities to win the competition.

One *important externality* is the location of *the city in the networks* of non-uniformly distributed web of infrastructures (transport, telecommunications) and the efficiency of connection to the external networks. Other important local factors have to deal with the global quality of life in the city, the availability of educated manpower (a low mobility production factor).

Leaving aside for the moment any critical judgement on this policy logic to react to the globalisation challenge, there are three direction on which the preoccupation of policy-makers have to focus:

i) the spatial distribution of infrastructures networks,
ii) the diffusion inside city space of connections to infrastructure networks,
iii) the local externalities concerned with the quality of life.

Technology has a role to play in all the three directions of concern.

Of the many complex different networks on which the cities (as nodes of the networks) are connected some seem to be space-independent while other show clear spatial clustering patterns with "privileged" regions crossed by an high density of infra-structure links. [9]

The impact of technology on the patterns of infrastructures networks has certainly been very great. Old networks are updated with the progress of technology, while completely new ones emerge thanks to radical technological innovations. For certain types of infrastructures technological alternatives exist or might be developed leading intrinsically to an higher or lower degree of space dependence (see the case of satellite or cables for telecommunication).

Here again, a preventive question on values and objectives has to be posed: *should we seek for an homogenisation of space and an high volatility in the use of the infrastructures or not*? If the alternative objectives have different costs, solidarity has to intervene at regional, national, macro-regional or global level to select the infrastructure having higher cost.

The choice of the objective for the spatial distribution of the infrastructure networks might however not be as straightforward as it appears at first sight, and not only because of the difficulties to apply solidarity at the required spatial dimension. Other values are impacted. A very important one is that of *diversity*. The homogenisation of the space while it will give equal opportunities to different cities to make use of the infrastructures, will it not

---

[9] *The actual situation is the result of a complex historical development where highly localized factors (such as, e.g., energy and material sources) inter-played with political issues, power struggles, competition between cities and regions, the law of increasing efficiency with density of infrastructures and of use, and so on.*

kill the existing diversity, making the comparative advantage of local factors to diminish or disappear?

As a consequence, **the concern about technology and the future of the city from the point of view of the globalisation challenge, cannot avoid to consider the city as part of the complex web of territorial infrastructures and therefore to intervene on the choice of investments in infrastructure outside of the city.**

The choice of the value and objective laden scenario for the territorial policies interacts with the technological available alternatives for infrastructures (including the alternative on global system design, such as, e.g., the type of network, the network hierarchy, grids dimension, the looking for 'missing networks', etc.).

It might be important, before proceeding further, to describe with a metaphor the change induced by globalisation in the local-global interaction.
In the past, in a weakly connected world, the process of wealth generation could be depicted as an aggregate of local 'virtuous' circles each one exploiting the local resources in a context of low mobile production factors. A web of inter-circles liaisons has developed with the time. Today this picture is radically changing with the emergence of a new global world-wide virtuous circle of wealth generation. The local autonomous virtuous circles are either vanishing or, in any case, reducing their relative weight, while the liaisons with the global circle are increasing in strength.

Should the scenario of the metaphor be considered as inescapable justifying therefore the competition policy of the cities (to attract the global system actors) as the only feasible? Could not a more balanced global-local scenario be considered (we might call it the **glocalization** scenario) where local virtuous circle can prosper while the ties with the global circle increases?

To this question has to be referred the above second direction of concern (related to the choice for investments inside the city to connect it to the external networks). Could not the local internal infrastructure investments which serve the purpose to connect to the external global networks, also be instrumental for a renaissance of the local virtuous autonomous wealth generation circles?
How will the choice of technological options interfere with the desired scenario for the future of the city? The diffusion inside the city of the connections to the infrastructure networks will not contrast with a scenario for an agora city, pushing again towards specialization of city quarters, separation of functions following the modernistic city pattern?

Renovation programmes in medium sized cities

AS PART OF THE FAST STUDIES ON "THE FUTURE OF CITIES", CASES OF MEDIUM SIZED CITIES WHERE INVESTIGATED (VONK, 91 AND 93) TO SHOW DIFFERENT APPROACH TO ACTION TAKING THAT "WILL AFFECT THE ECONOMIC RESTRUCTURING PROCESSES AND PROVIDE A SUFFICIENT 'COUNTERVAILING POWER' IN BUILDING UP A NEW URBAN ECONOMIC BASE. " (VONK, 91, PG. 1)

EIGHT MEDIUM SIZED CITY WERE SELECTED, TWO PER COUNTRIES, IN HOLLAND, FRANCE, GERMANY AND ENGLAND.

"THE PRESENTED PICTURE SHOWS A VARIETY OF APPROACHES AND IDEAS WITH MOST IMPORTANTLY, A VAST ARRAY OF MOSTLY MODERATE INTENTIONALITY. IT SEEMS THAT MANY CITIES FIND IT DIFFICULT TO COPE WITH ECONOMIC RESTRUCTURING, WHILE FEW CITIES ARE REALLY READY FOR A (NEW) POLICY APPROACH. ... [THE] TASK IS COMPLICATED BY THE EXISTING GOVERNMENTAL STRUCTURE WHICH AT THE LOCAL LEVEL IS VERY FRAGMENTED. VOLUNTARY COOPERATION SO FAR HAS BEEN LIMITED, WHILE UNTIL RECENTLY A TOP-DOWN PUSH TO COOPERATE BETWEEN LOCAL AUTHORITIES IN THE SAME URBAN AREA HAS BEEN WEAK. COOPERATION WITH OTHER PARTIES, PARTICULARLY THE PRIVATE SECTORS, IS MAINLY CARRIED OUT ON A PROJECT-BY-PROJECT BASIS... IN GENERAL ..IT SEEMS THAT THE ORGANIZING CAPACITY OF THE URBAN REGIONS... WILL HAVE TO GROW VIA A LONG LEARNING PROCESS." (PG. 7)

THE DIFFERENT APPROACH TO URBAN REGENERATION POLICIES IS SYNTHESIZED BY VONK IN THE TITLES OF THE RELATED CHAPTERS:
'EINDHOVEN, CITY OF TECHNOLOGY, THE REGIONAL CHALLENGE' / 'LEYDEN, AN AGROBIOLOGICAL COMPLEX, VISION WITHOUT COOPERATION' / 'SAINT ETIENNE, A PRODUCTIVE CITY' / 'NANCY, TOWARDS A NORTHERN TECHNOPOLIS' / ' 'BRAUNSCHWEIG, RESEARCH CITY' / 'AACHEN, TECHNOLOGY REGION' / HULL, A PORT CITY IN EUROPE'/ 'SHEFFIELD STEEL CITY IN TRANSITION'.

(FROM VONK, 91)

The second direction of concerns is therefore much connected to the third one, that of the development of a local 'quality of life' to improve the attractiveness of the city to induce the global actors to localize their activity there and not somewhere else.

A shift in the urban planner view: Global City vs Local Economic Development

DUNIN-WOYSETH (94) ENDEAVORS TO 'SHED SOME LIGHTS ON THE PROCESS OF URBAN CHANGE, THEIR SOCIO-ECONOMIC AND SPATIAL ASPECTS. A SYNTHESIS IS HERE ATTEMPTED.
A NEW SOCIO-ECONOMIC PARADIGM IS EMERGING:
- FROM ECONOMY OF SCALE (FORDISM) TO ECONOMY OF SCOPE; FROM HIERARCHICAL VERTI- CALIZED INDUSTRIAL PRODUCTION TO NETWORKS (PROVISION OF SUB-PRODUCTS OFTEN ON A GLOBAL SCALE / JUST-IN-TIME);
- ECOLOGICAL PROBLEMS FOLLOWED THE TECHNOLOGICAL DEVELOPMENT;
- INTERNATIONALIZATION: SPONTANEOUS PHENOMENON / ORGANIZED PROCESS (ONU;
- MISSING MIDDLE CLASS IN EMPLOYMENT, WHILE IN THE PAST SOCIAL WELFARE WAS BASED ON IMPORTANCE OF MIDDLE CLASS.

THE BUILT IN RIGIDITIES OF PHYSICAL STRUCTURE OF CITIES HAVE LIMITED THE SPATIAL TRANSFORMATION:
- SUBURBANIZATION RESULTED FROM POPULATION GROWTH;
- THE URBAN SPACE DIVIDED INTO THE REALM OF THE WEALTHY AND THAT OF THE POOR (CONCENTRATION OF IMPOVERISHED POPULATION IN DECAYED CENTERS / PARADISE ISLANDS FOR THE UPPER CLASS WELL CONNECTED BY TRANSPORT AND COMMUNICATION);
- SOME CITY CONTINUES TO GROW AND DEVELOP WHILE OTHERS DECAY.

TWO MAIN APPROACHES TO THE CHALLENGES OF THE NEW SOCIO-ECONOMIC PARADIGM:
- ACCEPTANCE OF THE DEVELOPMENT AND COMPETE TO BECOME 'GLOBAL CITY';
- CREATE LOCAL ECONOMIC DEVELOPMENT (LED)

GLOBAL CITY: A CROSS-ROAD ATTRACTING PEOPLE FROM DIFFERENT PARTS OF THE WORLD.

Doubts on all these matters are in fact emerging in the today debate concerning the policy to respond to the globalisation challenges. There is for instance the risk that a successful city (a city moving up the scale of the globalisation hierarchy) become a 'dual city': the part organized and specialized to perform the functions required to serve the localized facilities of the global systems and the rest (see the model of four populations in Martinotti, 92). Will not in such a case the city be the overlapping of two separate ones having different values, objectives and interests? [10]

The risk is real and it might be important to change completely the optics in reacting to the globalisation challenge as might be indicated by the **glocal** balanced scenario. A completely different logic of behaviour might results if instead of considering the city as a system that has to adapt to the changing environment, we see it as an *open but autonomous system* which react to the environmental change not so much to adapt but to keep its autonomy and identity. The metaphor in the latter case is that of the *self-organizing system* of the biological realm (see sect. 1.5).

At the state of the art it might seems too speculative to follow this new direction of thinking and in any case too faraway from the current reaction of policy-makers to the globalisation challenge. The preoccupation of not undermining the city system identity goes however in the same direction of the question posted above on whether or not technology application will put a bias on the city future scenario.

Due to the intrinsic uncertainties and openness of the alternatives, again we think that it is operationally more productive and prone to RDT policy-making **to assume that**

---

[10] *The same type of problems, as an example, has emerged in cities where much attention of public policy has been devoted to exploit tourism. See the extreme case of Venice.*

technological responses could be developed that efficiently couple an agora city scenario with an homogeneous high volatile external networked space, keeping or upgrading the city status in the new emerging pattern due to globalisation, while maintaining the possibility to valorise the local values (to exploit the city diversity assets and to develop a more balanced global-local relationship).

The "sustainable city": responding to the problems of a saturated city system

To the challenges coming from the stall in our capability to develop consensus to plan for changes in the spatial city layout and to those coming from the threats of the globalisation process, a third and even more urgent challenge has to be added. The city system, because of its quantitative development (increase in density in many of the variables defining the system), has in many cases reached a state of saturation.

In a complex system close to saturation small changes in the system variables and parameters might produce out of order and chaotic response. System efficiency (the ability to perform the system functions) drops tremendously.[11] The normal recipe to adapt a system to increased density (e.g. increased demands in transportation) when it is far from saturation - i.e. to increase proportionally the system 'capacity' - is no more applicable. The need to do something increases with the reaching of saturation while the ability to take significant actions decreases to almost nihil. This dramatic situation has already been reached for certain functions in larger cities: see, e.g., the case to intervene to temporarily stop private vehicles traffic because an alarm level is overpass in the quality of the air.

The saturated-interactive city: can one monitor policy adequacy by proper Indicators?

A SYSTEM CLOSE TO SATURATION BECOMES MORE INTERACTIVE. THE MORE INTERACTIVE THE URBAN SYSTEM, THE MORE IMPORTANT IS TO FIND SIGNIFICATIVE MEANS TO MEASURE THE SUCCESS OF ACTIONS FOLLOWING ALTERNATIVE URBAN POLICIES. JENSEN-BUTLER (93) INDICATES A VARIETY OF SUCH POLICY ALTERNATIVES AND SUGGESTS CORRESPONDING INDICATORS TO BE GROUPED ACCORDING TO DIFFERENT DIMENSIONS: EFFICIENCY / EQUITY / NEGATIVE EXTERNALITIES / BUDGETARY GOALS.

EFFICIENCY DIMENSION
NO INTERVENTION POLICY (BASED UPON 'LAISSEZ-FAIRE' PRINCIPLE):
- GROWTH RATE OF CITY GDP / CHANGE IN GDP PER CAPITA / INCREASE IN EMPLOYMENT.
   MARKET BREAKDOWN POLICY (SEPARATION OF PRIVATE AND PUBLIC, MARGINAL BENEFIT IN DECISION TAKING, STATE OF LOCAL POSITIVE AND NEGATIVE EXTERNALITIES):
- COST-EFFECTIVENESS INDICATORS OF PUBLIC SERVICES / COST OF SERVICE PROVISIONS PER INHABITANT;
   THE CITY AS AN ENTREPRENEUR
- CHANGES IN LEVELS OF PROFESSIONAL SKILLS / CHANGES IN R&D EXPENDITURES / CHANGES IN NUMBER OF PATENT APPLICATIONS / NEW FIRM CREATION RATES AND EMPLOYMENT GENERATION / NEW FIRM CREATION IN HIGH-TECH BRANCHES / COVERAGE WITH FIBRE-OPTIC CABLE IN THE CITY;
   THE CITY AS AN ACTOR IN INTERNATIONAL ARENA
- CHANGES IN PASSENGERS FLOWS COMING FROM OUTSIDE / FREQUENCIES OF LINKS WITH

---

[11] *As can be seen by the case of flow of traffic in a motor way when the addition of few vehicles might change the continues smooth flow into a stop and go 'cork' type motion.*

OTHER CITIES / CHANGES IN NUMBERS OF CORPORATE HEADQUARTERS

EQUITY DIMENSION
- CHANGES IN PERCENTAGE: OF TOTAL DISPOSABLE INCOME GOING FROM THE TOP TO BOTTOM
  DECILE OF URBAN POPULATION / OF UNEMPLOYMENT / OF SUB-STANDARD HOUSING / IN
  RATES OF SERIOUS CRIME

THE NEGATIVE EXTERNALITIES DIMENSION
- CHANGES IN LEVELS OF AIR POLLUTION FOR THE MAJOR EMISSIONS / CHANGES IN % OF
  UNTREATED SEWAGE AND OF SOLID WASTE RECYCLING / CHANGES IN AVERAGE TRAVEL
  SPEEDS IN THE CITY / CHANGES IN AVERAGE AND RELATIVE USE OF PUBLIC TRANSPORT /
  CHANGES IN QUALITY OF SURFACE WATER IN THE CITY

BUDGETARY GOALS
- GROWTH IN TOTAL CITY EXPENDITURE PER INHABITANT / FISCAL STRESS INDICATORS
(?)

(FROM JENSEN-BUTLER, 93)

If nothing can be done efficiently by increasing the city system capacity in the sectors where the saturation emerges (e.g. on the street system) there is the hope that an 'integrated' approach (combining the interventions on all the sectors) might succeed in pushing the system far from saturation so regaining 'govern ability'. The need to change to an integrated approach is well perceived. New attitudes are invoked from the policy makers, and new values underlined such as those condensed in the call for a "sustainable city".

The question concerning technology is here, even more than in the two previous groups of problems, laden with ambiguity. Is it not technology the culprit for the development of the sectoral approach to the city development (responding each sectors to their sectoral limited objectives of optimisation and maximization)? Is it enough to recognize the need for an integrated approach and to call the existing technologies to help, or existing technological solutions (see e.g. the critic on the fordism production approach) has to be discarded and new ones more 'humanistic' to be developed?

Here again the question is subtle and clear separation of issues and postures is difficult. As in the two former cases we think that also for this case (of responding to the challenges coming from saturation of the city system) is operationally more productive to assume that technology is by itself not value-laden and can be called in to support different value settings.

There is, however, another aspect of the dealing with the challenges coming from saturation that has to be underlined and that can be instrumental also to move policy-making with respect to the two former issues (those connected to the concern for urban planning and to the globalisation challenges).

The two related hypothesis that have been formulated above converges to a com-mon one which considers that *technology can be efficiently applied to respond to the realization of a preferred city scenario without penalizing the possibility to exploit the local assets of diversity in a globalized world to assure the city future well being.* This assumption however says nothing on the practicality of trying to implement a policy along

this line. In fact we have not to forget that we are dealing with a very complex system, having a very high inertia in following its dynamic trend.

To try and change the system trajectory applying exogenous forces might require to use impractical huge resources with at the end inappreciable effects or producing disruption on a critical social equilibrium. However, a very complex system like a city even when in a stationary equilibrium state is always traversed by continuous endogenous movements to respond to exogenous or endogenous perturbations. The more so, the more the system is approaching a saturation condition: it keeps "exploring" the space of potential new trajectories ("bifurcation" points). [12] Often the internal movements are not coherent and their interaction either leads to elision or to minor effects in terms of system changes.

When different movements becomes coherent, then great effects can results to overcome system inertial trend. *One important determinant for coherent motions is the social determination to respond to challenges and to concentrate resources to define and solve the related problems.*

We can now postulate the following third hypothesis: **the many challenges that a city is confronted with can be transformed into a powerful asset to make the city system changes. Provided, however, that such challenges are not only recognized and shared by the citizen, but that they are transformed into specific problem definitions and that a common determination to solve the specified problem be reached by the city**.

The fact that the city system have reached saturation in critical variables might represent the opportunity to take actions since no '*laisser faire*' attitude could be considered acceptable by the citizens who directly experience every day the challenges coming from the system saturation. *Perceiving the challenge is however not yet specifying the problem to be solved.*

---

[12] *See the case of urban traffic system. The global behaviour of the system depends on the behaviour of its elements and, specifically, of the car drivers. It is a common experience that a driver used to the city, in case that of normal traffic when going from one place to another will choose the trajectory to which he is accustomed in an automatic subconscious way. However, if the traffic is very dense he will become much more conscious, he will think about the best way to go, be attentive to possible queuing ahead, and decide abruptly to change direction hoping to optimise the total time even if at the end the trajectory was longer.*

2.4 From scenarios to action: the procedures for an efficient intervention of RDT

THE ROLE OF RDT IN SCENARIO DESCRIPTION. THE DIVERSE SCALE OF RDT ACTIONS. FULL SCALE RDT EXPERIMENTATION. THE ROLE OF PILOT PROJECTS IN CITY SYSTEMS. RDT CONTRIBUTION TO THE "EFFECTIVENESS" OF PROBLEM-SOLVING.

In the above turn from perception of challenges to objective setting in terms of scenario description, the logic of the loop between problem definition and solution search has also taken place. One has been forced to contrast the desired directions for the future of the city with the potentiality of following them in practice taking advantage - but also recognizing the risks - of new technological solutions.

The role of RDT in scenario description

It might be important to pause a moment here to deepen the understanding of the *design process* with specific reference on how RDT plays its important role by providing new ideas to enlarge the portfolio of solutions (from which to be able to close in a more satisfactory way the loop from challenge perception to problem definition).

The three above scenario hypothesis can be the basis for appropriate policy-making and subsequent action-taking. Actions derived by such policies will certainly be innovative. The implementation of any innovative actions will require the support of RDT.

The diverse scale of RDT actions

While this statement is easy to be accepted also for the case of intervention on a city system (and therefore to recognize that there is a role for RDT), the difficulty comes when one tries and applies the conventional wisdom coming from product/ process innovation (i.e. the separation between research, development, industrialization phases).

In fact, when actions aim at inducing modifications in the state or in the dynamic pattern of a complex system, the RDT process cannot be separated by the global action plan as a phase to be performed *in vitro* or in a laboratory set up. The experimentation to prove the concept being explored has to be done, full scale, *in vivo*.

To a certain extent, this necessity is recognized by RDT policy-makers when they talk about *pilot projects.* The dimension of a pilot project should however be such to really involve the true system. Pilot projects cannot therefore be considered as a small mock-up experimentation. For the actual system where the pilot study is performed, the RDT intervention represents the entire action plan. However, if the actual system is locally limited (such as a given city) the intervention can be considered as an RDT plan if the induced changes in the 'system under test' can be considered as 'paradigmatic' and transferable to other similar 'local systems'.

Full scale RDT experimentation

The conclusion is that **an innovative plan of action on a city system has to be done on a full scale without the possibility to separate the RDT phase from the following ones.** The success or the failure of the RDT phase concludes the intervention on the system.

RDT is needed to experiment in full scale new concepts hoping that the successful results could have a paradigmatic value for similar other cases.

What are then the differences, if any, between a full size intervention and a 'pilot project'? The decision-makers by labelling the project as a 'pilot' one, first of all recognize that the results in terms of system response are doubtful and therefore accept the risk of failure. But, more importantly, **a 'pilot project' to become a paradigmatic case has to produce information on the dynamic process by which the system reacts to the action taken.**

Usually every system sends out signals continuously on what is happening, on its internal changes. The problem is to collect such signals and be able to interpret them. To do so, **the system needs to be 'instrumented' to collect the signals; moreover, a process for signal interpretation** (translation into significative terms) **has to be available to make the signals significant.**

The role of pilot projects in city systems

Going back to our three scenarios and the hypothesis that technology can be instrumental in *inducing desired changes in today city systems*, *if RDT is needed it has to be implemented in terms of pilot projects.*

If pilot projects on complex system need to respond to the above sketched characteristics, one can asks if current projects so labelled are really 'pilot' ones. Doubts are justified: first of all regarding the dimension of the project (too small to be a real intervention on the system) and, secondly, from the lack of a proper accompanying data collection and evaluation process.

The fact that RDT projects labelled as 'pilot' might not belong to this category, not necessary means that they are useless. One has however to better understand what roles RDT programmes different from 'pilot projects' will perform *vis à vis* complex city systems.

To this aim one needs to better understand the complex decision-making process through which at the end a true pilot project on a city might start.

To this effect we have here proposed to refer to the *design approach*.

To start the process one has to **identify a challenge**. For cities, as we have indicated, it might be *the desirability of a scenario* quite different from the today state of the city (e.g. that for an 'agora' city). It might be *the preoccupation to compete with other cities* to attract 'foreign' investments adding a 'local value' to new 'volatile' technologies (e.g. the new world-wide spanning telecommunication infrastructures). It might be *the need to address local problems* (e.g. problems resulting from the fact that the city system is reaching saturation in some of its characteristics).

In the complex circular process to pass from the challenge to **the specification of the problem** *to be solved* and the related plan for action, the perceived challenges are confronted to potential solutions. Initial challenges are better focused or redefined, needed actors are defined which might not be represented by existing institutions (this is the case when the challenge leads to problems of higher dimension than those for which the society is organized to respond), and so on.

RDT can contribute to this process the more so the more the challenge is a new one.

The more the complexity of this first phase of the global decision-making process is recognized and the necessary resources allocated - including those needed for to explore new solutions using RDT - the better it will be for the following problem-solving phase.

RDT contribution to the "effectiveness" of problem-solving

To underline the different role that RDT might have in the first phase of the design approach (from challenge to problem specification) one could say that this phase aims at the **effectiveness** of the problem-solving process (definition of values, objectives, targets, actors) while the second one is concerned with **efficiency** (assuring the optimal 'trajectory' to reach the specified target).

The important assumption that is made here is that **RDT can play an important role in the search for effectiveness** and not only for efficiency.

Specifically, the role of RDT is that to assure that a sufficiently large portfolio of ideas and potential solutions be available to be sure that an *'optimal (darwinistic) selection'*

83

of the problem specification to respond to the challenges is done (no short cuts followed due to lacking of ideas while under the pressure 'to do something').

Here we will deal with specifying the need for RDT for the effectiveness phase of intervention on city problems.

2.5 From scenarios to action: updating and enlarging the portfolio of technological options

RDT TO SUPPORT THE DEVELOPMENT OF A DESIRED "AGORA" CITY SCENARIO. RDT TO RESPOND TO THE GLOBALISATION CHALLENGE AND TO INTEGRATE THE CITY INTO THE WEB OF EXTERNAL INFRASTRUCTURES. RDT TO APPROACH CITY PROBLEMS EMERGING FROM SYSTEM SATURATION.

Having underlined the peculiar and important role that RDT can play in the first phase of the problem-solving process we can now return to the three group of challenges and try and propose specific action programmes for RDT related to that phase.

RDT to support the development of a desired "agora" city scenario

The first appeal is on **the importance to develop new global urbanistic concepts**. We seem to have lost interests in the design of futuristic *'dream cities'* (as, in a completely different innovation field, we have lost interest in 'dream cars'). This might be due to deception from the outcome of the application of the *functionalist city concept* and from the development of the 'new cities' of the years '30-40. Or, we are so overwhelmed by the urgency of the problems to be solved in existing inhurbated area that we have no time and space to dream about new cities.

What is needed - this seems to be the prevailing mood - are solutions focussed to existing problems (for a similar reason the dream car has been substituted by research focussed on specific issues of energy consumption, environment pollution, and so on). Moreover, in Europe the process of space occupation by the urbanization process has proceeded so much that no space or purpose seems to be left for building completely new cities.

However - as the 'dream car' has never been intended as a prototype of a new car for the market, but only as a way to free the creativity of the designer while at the same time constraining him to show how new ideas can be integrated in a coherent global car design - so the *'dream city'* should perform a similar purpose of freeing and constraining the urban designer creativity. Since the word "dream" might be charged with the bias of wishful thinking, we will from now on refer to "concept city".

One can easily accept that the basic issues in urbanization is to do something on the existing inhurbated spaces. However, it will be a mistake to think that to conceive a desirable city - starting from the green field - will be of no use if the problem is to restructure an existing city (such as, thinking of new uses of old industrial buildings, how to change the quality of life in dormitory quarters, how to insert a 'city spirit' in peripheral urban zones).

The design of a 'concept city' could show concretely how new ideas - that derive from the sensitivity of the urban designer to the society needs and citizens 'dreams' as well as from the new technological options - can be integrated together into a coherent approach.

Can we dream about city future? A plea for urban *realpolitik*

LEVINE (94) MAKES A REVIEW OF THE STATE OF URBAN POLICIES AND CALL FOR REALISTIC URBAN POLICIES.

THE PLEA FOR ' NATIONAL URBAN POLICY', HOLISTIC AND BROAD IN SCOPE, MULTIFACETED AND COORDINATED ACROSS SECTORS, AGENCIES AND JURISDICTIONS IS FACING GREAT DIFFICULTIES. 'REALPOLITIK', LEVINE STATES, IS FOR FRAGMENTED, PIECEMEAL URBAN PROJECTS.

IN FACT, THE PURSUIT OF NATIONAL ECONOMIC GROWTH IS TAKING PRIORITY TO SPATIAL URBAN POLICIES. RESOURCES HAVE BEEN SHIFTED TO FORGE PUBLIC-PRIVATE PARTNERSHIP FOR ECONOMIC GROWTH.

THE HOPE FOR BETTER URBAN FUTURE LIES IN THE REALIZATION OF NARROW, IMMEDIATE, PRAGMATIC URBAN PROGRAMMES.

FOR LEVINE THE REASONS FOR THE FAILURE OF COMPREHENSIVE NATIONAL URBAN POLICIES, ARE:

- ANALYTICAL: LACK OF FIRM UNDERSTANDING OF THE CAUSES OF URBAN PROBLEMS;
- INSTITUTIONAL: BUDGETARY CONSTRAINS AND DIFFICULTY OF INTER-GOVERNMENT COORDINATION;
- POLITICAL: LOSS OF INFLUENCE OF CENTRAL CITY CONSTITUENCY (SUBURBANIZATION).

CITIES MUST PURSUE MOBILE CAPITAL TO MAINTAIN ECONOMIC VIABILITY. NO MUNICIPALITY CAN AFFORD REDISTRIBUTIVE POLICY THAT MAKE THE CITY LESS ATTRACTIVE TO BUSINESS. CITY CONCERN TO ATTRACT AND MAINTAIN ENTERPRISES TAKE PRECEDENCE TO SOCIAL SERVICES, HOUSING POLICIES.

AS A CONSEQUENCE ONE SEES IN FRANCE, EMERGING THE 'MAIRE-ENTREPRENEUR' (NEW INCENTIVES AND POWERS TO RAISE TAX AND LAUNCH NEW PROJECTS) AND IN UK AND USA THE DEVELOPMENT OF PUBLIC-PRIVATE PARTNERSHIPS FOR THE SUCCESS OF BUSINESS INVOLVEMENT IN URBAN AFFAIRS.

IN NETHERLANDS: THE PLANNING TO ORGANIZE SPACE (SEE THE CASE OF RAND STADT) WITH STRONG CONSTRAIN ON NEW HOUSING AND COMMERCIAL BUILDINGS HAS TO BE RELAXED. ROTTERDAM HAD TO GIVE PRIORITY TO THE NEW EUROPORT TO WIN COMPETITION WITH ANTWERP AND GERMANY. LOCAL SOCIALIST GOVERNMENT DEEMPHASIZED HOUSING SPENDING TO MAKE FUNDS AVAILABLE FOR ECONOMIC DEVELOPMENT PROJECTS.

IN FRANCE, THE COUNTRY OF 'AMENAGEMENT DU TERRITOIRE', SPATIAL PLANNING HAD TO YIELD TO ECONOMIC DEVELOPMENT. IN 1980 DATAR RELEASED BRAKES ON INDUSTRIAL EXPANSION. LEFTIST MUNICIPALITY, SUCH AS LILLE, ATTEMPTED TO OFFSET THE DRAMATIC LOSS OF INDUSTRIAL JOBS BY TAKING ADVANTAGE OF LOCATIONAL BORDER POSITION, AND WELCOMING BIG BUSINESS INVESTMENTS.

IN UK CONSERVATIVE GOVERNMENTS AFTER HAVING CONTINUED FOR A WHILE TO PURSUE TARGETED PLACE-ORIENTED POLICIES, HAD TO SHIFT TO PRIVATE-SECTOR-LED INVESTMENT AND THE DEVELOPMENT OF AN ENTERPRISES CULTURE WITHIN CITIES. URBAN POLICY HAS REJECTED REGULATION, POPULAR PARTICIPATION AND PUBLIC INVESTMENT STRATEGIES (THAT SEEK TO CORRECT INEQUALITIES AND UNBALANCE CREATED BY THE MARKET) FAVORING STRATEGIES THAT REINFORCE THE MARKET (TREND PLANNING THAT FACILITATES DEVELOPMENT IN CONJUNCTION WITH THE DEMAND, LEVERAGE PLANNING TO STIMULATE ADDITIONAL PRIVATE INVESTMENTS). THE RADICALIST SHIEFFIELD REPLACED ANTI-CAPITALIST POLICY WITH A BOOSTERIST POLICY TO SEEK REGENERATION THROUGH COLLABORATION WITH LOCAL CAPITAL.

THE AUTHOR THEN INDICATES PRINCIPLES AND STRATEGIES FOR SUCCESSFUL PIECEMEAL URBAN POLICIES:

- TARGET WHEN POSSIBLE, SPREAD WHEN NECESSARY (THE NATIONAL HEALTH IS A SPREAD PROJECT THAT BENEFIT POOR IN THE CITIES). HOWEVER, SPREADING DILUTE THE EFFECTS,
    - EMPHASIZE PROGRAMS FOR MIDDLE CLASS CONSTITUENCY (PRIORITY ON EDUCATION),
- EMPHASIZE PROGRAMS THAT TIE BENEFITS TO PARTICIPATION IN THE WORK PLACE (E.G.

A portfolio of alternative concept cities will help to show possible actions to respond to today city problem.

The first recommendation is therefore **to call urban designers to develop their own interpretation of a new city responding to the 'agora' scenario by making use of new technologies**. Multiple independent response are needed so that - by comparing them - one could extract suggestions for more mundane initiatives on modifying existing urban environment.

The city is a complex system made of sub-systems, made of sub-systems, down to a level that can be considered made of 'elementary units' (building blocks). Technology will enter (bottom-up) the system through the 'building block'. The availability of alternative global system concepts is important as an ideal reference against which to frame the concrete intervention on a given existing city. On the other hand, one needs also to be confronted with ideas on the potentialities to innovate and to change the city 'elementary' building blocks.

Therefore, in parallel to filling the portfolio of ideas with potential solutions on the global city concept, **one needs ideas and suggestions** at a lower scale, that of **city's elementary building blocks.**

How much elementary is a 'building block' is part of the question to which the RDT activity has to respond. To support the scenario of an 'agora city', the building blocks should be complex enough to assure the integration of the qualities that characterize the city scenario. All the ingredients to assure the quality of life in the city (mobility, environment, security, human relations, work, amenities, social activities) should be represented in the building block. Or, at least, the building block has to show its ability to behave as an interactive node in the web of networks that characterizes the city activities.

A reference elementary block might be a building, a quarter, a cross road between quarters, an entire mono-function network (e.g. the health care network).

To give examples, if it is a *building* it might have to be characterized as an 'intelligent' one (to assure integration on the communication networks, optimal response to energy use and to waste disposal, etc.).

If it is *a quarter* it has to show how a mix of different activities can easily be included, how basic issues such as security are taken into consideration, how technology could facilitate diffusion of service to people, commercial activities and so on.

If the building block is *a specialized network*, such as the offices of the local municipalities, the solution has to show the provisions to facilitate access to the network

service by the users, the integration with interactive communication networks, the ability to produce quick response to emergency, etc.

If it is *a cross road block*, it has to show integration of public and private transport, flexibility for installing future new infrastructure for physical and communication services, contribution to quality of the environment (e.g. reduction of noise level), integrability of construction techniques with existing street system and service networks and buildings, speed up of construction time, etc.

The second recommendation is therefore **to call for ideas to develop concepts that illustrate how** *new 'city's building blocks'* **can be developed as a base to intervene to modify a city system**, each block having to assure to intrinsically satisfy the requirements set forth by the desired city scenario.

Plan for urban renewal: the case of Marseille

"THE POLICY OF URBAN DEVELOPMENT OF MARSEILLE COMBINES A SERIES OF INTERVENTIONS, INCLUDING THE REINSERTION OF THREE LARGE PERIPHERAL SITES IN THE SOCIO-ECONOMIC TISSUE OF THE CITY, AND A MORE RATIONAL UTILIZATION OF THE SPACE WITH BOTH ECONOMIC AND RECREATIVE AIMS.

THE REVITALIZATION OF THE LARGE PERIPHERAL SITES PASSED THROUGH THE AMELIORATION OF PUBLIC EQUIPMENTS AND TRANSPORTS. AN URBAN PILOT PROJECT SPONSORED BY THE EU COMPLETE THESE ACTIONS. SPECIFICALLY, WITHIN THE PILOT PROJECT INITIATIVES ARE LAUNCHED FOR EDUCATION PROGRAMMES, FOR VOCATIONAL TRAINING, JOBS CREATION, CULTURAL INITIATIVES.

THE CITY DEVELOPS IN PARALLEL A BIG PROJECT TO VALORISE THE CLOSER ENVIRONMENT AND THE NEIGHBOURING LARGE SUBURB.

THE RESTORATION AND THE REHABILITATION OF THE HISTORICAL CENTRE OF MARSEILLE IS BASED ALSO ON AN ATTEMPT TO CALL FOR THE ARTISTIC CREATIVITY. THE 'CITÉ DE LA MUSIQUE' IS TODAY OPERATIONAL, AXED ON THE TEACHING OF MUSIC AND IT ADDRESSES BOTH THE STUDENTS AND MUSICOLOGUES AS WELL AS THE ENTREPRENEURS, THE EMPLOYERS, THE LOCAL POPULATION AND THE FUNCTIONAIRES" (PG. 44)

(FROM RECITE, 93)

Each city is an individual system having its proper identity which resulted from a complex interactions of history, cultures, recent and remote events, physical and human resources.

The action on a specific city is therefore a specific project to which RDT can contribute.

The availability of a portfolio of ideas and potential solutions from both a global city concept and city 'elementary' building blocks can help decision-makers of a specific city to tackle the problem of the reality of the present state of the city system and to take actions to help the system to move towards the desired scenario.

The question to be posed here is, however, if RDT could contribute to build examples of potential solutions on the possibility to intervene on the actual city system with its individual and idiosyncratic characteristics. This could be done if, while respecting the individuality of each city case, one accept that there is *a taxonomy of cases that can be considered as a rough reference for the individual city.* There are many ways to define a city taxonomy as we have seen in "exploring city complexity" in Part I. One possible recommendation is to refer to the taxonomy based on five subsystems-networks to characterize a city:

i) economic and industrial subsystem, ii) social structure, iii) technological sub-system, iv) environment, v) internationalisation. (see section 1.5 and Conti, 93).

As a third recommendation therefore we call for the **use of the paradigmatic characterization of cities into city models to apply the potentialities both of the 'concept city' and of the 'elementary new building blocks'** to show the practical possibility of intervention in different types of cities.

RDT to respond to the globalisation challenge and to integrate the city into the web of external infrastructures

In the Western World the response to the globalisation challenge is often seen as a move towards tertiarization and to high technology industrial products. The de-localization of more conventional industrial activities is accepted as a trend difficult to contrast. Development of complex services to production is considered a prerequisite also to shift production activities to higher technology products.

Public policy to help the shifting tends to concentrates on initiatives having a high visibility, such as the construction of high rising 'intelligent' buildings to host new services activities, the launching of specialized districts (such as research parks, business innovation centres, technological districts), the adoption of special facilities (such as teleport) to assure interconnection with the world communication system, and so on.

These special facilities, in the intention of the policy-makers, should set into motion the entrepreneurial local capabilities. However, in former industrialized cities the decline tends to be accompanied by an entrepreneurial crisis (entrepreneurship often developed along the opportunity represented by the supply needs of large firms now in crisis). It is therefore hoped that the new facilities will attract external investors. In this way the city is entering into competition with other cities. Financial or other forms of incentives are often the major 'externalities' to win competition. Other externalities that might increase the attractiveness of a city - such as the availability of highly qualified manpower - require time to develop and they go together with the success in shifting the production activity.

The above action-plan has met with success in certain cases, partly depending on the position of the city in the web of external infrastructures. However, not only it does not amplify the effect of existing local factors and externalities, but moreover it continue the trend of specialization of the urban space subdividing the city into specialized districts (modernistic city scenario).

One gets the impression that the action-plan is based on a somewhat pessimistic vision of the internal capabilities of a declining city to change the course of events without interventions from the exterior. Technology is called in to 'adapt' the city to serve the needs of the external users by realizing sophisticated facilities and assuring connection to the wide open world.

Specifically, the chosen priority of actions is to 'hook' the city to the external webs of infrastructures to facilitate the communication with the world.

These interventions can change the "metric" of the external space, by making the city very close to geographically faraway places. However, the distances within the city itself and its local environment might not decrease. It might still take hours to move from periphery to the centre because of traffic jam.

Intra-city networks in medium sized city to exploit city diversity assets: the case of Eindhoven and Nancy

"WHEN IN THE EARLY 80S THE CITY OF EINDHOVEN .. WAS CONFRONTED WITH A RECESSION IN THE LOCAL ECONOMY BECAUSE TWO MAJOR COMPANIES DIMINISHED THEIR LABOR FORCE... THE CITY FATHERS BECAME AWARE OF THE DANGER CONNECTED WITH BEING A MAINLY ONE COMPANY CITY.... THE EINDHOVEN CITY COUNCIL DECIDED IN 1981 TO GIVE PRIORITY TO AN EMPLOYMENT POLICY GEARED TOWARDS THE CREATION OF CONDITIONS FAVORABLE TO NEW, INNOVATIVE FIRMS. ...

"THREE RELATED ACTIONS WERE UNDERTAKEN: THE ESTABLISHMENT OF A REGIONAL ECONOMIC DEVELOPMENT CORPORATION....; THE FOUNDING OF THE WORLD TRADE CENTER ELECTRONICS...; AN (INTERNAL) RESTRUCTURING OF MUNICIPAL ORGANIZATION....

"IN 1986 EINDHOVEN PRESENTED ITS FIRST ORIENTATION MEMORANDUM, A STRATEGIC REPORT CONTAINING A STRENGTHS-AND-WEAKNESSES ANALYSIS AND AN EXPLICIT DESIRE TO FOLLOW A PRO-ACTIVE COURSE OF ACTION... [THE] MEMORANDUM FORMULATE THE GOAL TO STIMULATE THE DEVELOPMENT OF EINDHOVEN AS A CENTRE FOR TECHNOLOGY, EDUCATION AND (BUSINESS) SERVICES.... IN THE VARIOUS MUNICIPAL REPORTS... BIT BY BIT THE NOTION OD EINDHOVEN TECHNOLOGY CITY IS EMERGING AND TAKING SHAPE;" (PG. 14)

"WITH A POPULATION OF 99.000 PEOPLE, NANCY IS A RELATIVELY SMALL CITY IN THE EUROPEAN CONTEXT.... [THE] ECONOMIC PROBLEMS ARE REGIONAL AND HAVE TO DO WITH THE DECLINE OF COAL MINING ACTIVITIES, AND OF THE STEEL AND TEXTILE INDUSTRIES OF THE LORRAINE REGION... DUE TO ITS MORE BALANCED INDUSTRIAL STRUCTURE THE NANCY AGGLOMERATION DID NOT EXPERIENCE SUCH A SEVERE CRISIS [AS THE REGION]...

"[AMONG THE FACTORS THAT] SINCE THE LATE 1970S TRIGGERED OFF A GRADUAL CHANGE IN THE NANCY URBAN DEVELOPMENT POLICY... [IS] THE COMPETITION WITH METZ... REGIONAL CAPITAL OF LORRAINE...

"SINCE THE LATE SEVENTIES THE POLITICAL LEADERS OF NANCY ARE CONVINCED THAT THE CHANCES FOR A BETTER ECONOMIC FUTURE LAY IN STIMULATING THE CITY'S FUNCTION AS A SCIENTIFIC AND RESEARCH CENTRE... WITHIN THE CONTEXT OF STIMULATING COOPERATION, THE URBAN DISTRICT COMMISSIONED IN 1977 THE ESTABLISHMENT OF THE TECHNOPOLE NANCY-BRABOIS-INNOVATION... APART FROM THE ORGANIZATIONAL ASPECTS CONNECTED WITH THE MANAGEMENT OF SUCH TECHNOPOLE AND THE ATTEMPT TO CREATE OPPORTUNITIES FOR ENTREPRENEURS/ INDUSTRIALISTS AND SCIENTIST/ RESEARCHERS TO MEET, ONE MUST MENTION THE CREATION OF PROMOTECH IN 1980... [AN] INITIATIVE OF UNIVERSITY PEOPLE TO STIMULATE THE DEVELOPMENT OF MORE INNOVATIVE PROJECTS... ANOTHER MAJOR ORGANIZATIONAL STRUCTURE IS ADENA: AGENCY FOR THE ECONOMIC DEVELOPMENT OF NANCY... TWO OTHER INITIATIVES HAVE TO BE MENTIONED WHICH ARE ALSO SET UP TO BRING ABOUT COHERENCE AND INTEGRATION:... THE CITY AND THE AGGLOMERATION PLAN... IN THE CITY PLAN THE CONCEPT OF THE CITY AS A SYSTEM, INSTEAD OF THE CITY AS AN INSTITUTION, IMPLIES A SHIFT FROM SECTORAL TOWARDS URBAN DEFINED POLICIES. ..THE MAJOR OBJECTIVE OF THE AGGLOMERATION PLAN... IS TO GUARANTEE THE AGGLOMERATION'S PLACE IN THE EUROPEAN (URBAN) NETWORK." (PG.32-33)

VONK (91)

The pertinent question to respond to the globalisation challenges, is whether the outbound approach to adapt to external changes is the only one. We propose that **an inbound approach might be tried that assumes more optimistically that the city has internal capabilities to react to the challenge taking advantage of its 'diversity' and looking for internal leverage effects.** (see sect. 1.3 and the plea for an 'intentional' city).

The basic question now is how the city can benefit for its internal needs from the new communication technology and from the emergence of global system of services. The first remark is that the new communication technologies not only can reduce the distance

between faraway places but also between close ones. To give an example, fax transmission is not only used for long distance, but often to send letters and notes between offices at different floors in the same building.

The city is already a network inserted in a regional network of cities with some kind of hierarchy between quarters within the city and between cities within the region.

The globalisation challenge is having impact on the local and regional networks. Some city quarters might be more directly affected than others by the decline of city production activities. At the same time, the hierarchical status of a city with respect to the others in the regional network might be challenged. Smaller and peripheral cities might find different ways to react to the challenge, e.g. by shifting their relationship to another regional basin of attraction.

Seen from a local and regional point of view the globalisation challenge might therefore be **an occasion to modify the centre-periphery scheme both at the city level and within the cities**.

The alternative which is here proposed - to respond to the globalisation challenge - is to invest **to substitute the balanced network logic for that of centre-periphery**. To this effect, one has to change the 'local space metric' to reduce the 'distance' between the nodes of intra-city and regional inter-city existing networks. The nodes of the networks should become 'loci' of equal opportunities in terms of connection to the webs of internal and external networks and access to the networks services.

By **balanced network logic** it is meant that the different nodes can participate to the network activity and creativity in a non-hierarchical way, so to increase the opportunities to exploit existing potentiality of each node.

To make an example, a problem that often characterize the critical situation in an industrial city under decline is the loss of the organizing power that major industrial enterprises had in the past on the tissue of smaller industrial and service firms. Who can substitute for such organizer role? One possibility is that the 'network logic' might facilitate **the emergence of a 'meta-organizer' as a service to the small firms in the network**.

The case of Prato (a textile city) has shown the workability of the concept. [13]

The importance of networking for city balanced development

"[THE] OLD FASHIONED 'TRICKLE-DOWN' VIEW OF SPATIAL DEVELOPMENT WITH ITS CENTRALISTIC, DEPENDENCY-FORMING OVERTONES AND PERCEPTION OF PERIPHERIES AS 'PROBLEM AREAS', IS IN RETREAT .. IN ITS PLACE IS AN EMERGENT SET OF DEVELOPMENTAL PRACTICES WHICH ARE COMMONLY DESCRIBED AS 'NETWORKING' OR 'THE NETWORK PARADIGM'.. THE KEY ELEMENTS OF NETWORKING ARE .. RECIPROCITY ...TRUST ...LEARNING ...PARTNERSHIP .. DECENTRALISM...[WITHIN EU REGIONAL POLICY, IT] HAS NOW BEEN REALIZED THAT MUCH MORE INTRA-REGIONAL NETWORKING MUST BE ACTIVATED... [ONE IMPORTANT EU INITIATIVES IS RETAS - REGIONAL TECHNOLOGY STRATEGY]...

"[IT IS INTERESTING TO MAKE AN ATTEMPT TO] PROVIDE A PRE-EVALUATION OF THE 'NETWORKING PARADIGM' IN ACTION. SINCE IT IS OBVIOUSLY GOING TO BE A MAJOR MEANS OF

---

[13] *The local production reality is made of small independent enterprises that have, along with the, time specialized in different parts of the textile business. Some operators have specialized in providing services of marketing, of buying material and equipments, on assisting on transferring new technology. The case is cited by many as a kind of 'meta-corporation'.*

POLICY-DELIVERY...

[AN INTERESTING CASE OF NETWORKING BETWEEN INDUSTRY IS IN **BADEN-WURTTEMBERG** (BW)], ONE OF THE MOST RESEARCH-INTENSIVE LÄNDER IN GERMANY... THIS GERMAN LAND IS ONE OF THE MOST PROSPEROUS AND ECONOMICALLY POWERFUL REGIONS IN EUROPE. AGAINST AN EC INDEX OF GDP PER CAPITA OF 100, BADEN-WURTTEMBERG RATED 120 FROM 1986-1988. .. IS A STRONG MANUFACTURING REGION WITH 47% OF ITS EMPLOYMENT IN INDUSTRY AND ONLY 48% IN SERVICES, COMPARED TO AN EC AVERAGE OF 33% AND 59% RESPECTIVELY (1987 FIGURES)... UNTIL THE BEGINNING OF 1990S BW WAS SEEN AS THE MODEL OF THE NETWORKED ECONOMY. IN ADDITION TO LONG-STANDING AND FRUITFUL SUPPLY-CHAIN RELATIONSHIPS WITHIN THE INDUSTRY THE REGION ALSO BOASTED [MANY INDUSTRIAL R&D LABORATORIES, 11 MAX PLANCK INSTITUTES, 13 FRAUNHOFER, ETC.].. IN ADDITION, BW FIRMS ENJOY THE 'DUAL SYSTEM' OF TRAINING.. ONE THIRD COLLEGE-TAUGHT, TWO-THIRDS WORKSHOP FOCUSED...

THIS VOCATIONAL TRAINING SYSTEM IS MANAGED BY THE CHAMBERS OF COMMERCE...

"IN TERMS OF INDUSTRIAL SUPPORT, THERE IS THE MINISTRY OF ECONOMIC AFFAIRS AND TECHNOLOGY RESPONSIBLE [FOR MANY LOCAL AGENCIES OF INDUSTRIAL PROMOTION]...

OUTSIDE THE LAND GOVERNMENT BUT INTERACTING CLOSELY WITH IT ARE THE ...CHAMBERS OF INDUSTRY AND COMMERCE, THE EMPLOYERS ASSOCIATIONS, THE BUSINESS ASSOCIATIONS AND THE TRADE UNIONS, ALL WITH REGIONAL BRANCHES. THESE DIVERSE ORGANIZATIONS INTERACT CONSTANTLY, INFORMATION FLOWS, PROBLEMS ARE IDENTIFIED, SOLUTIONS ARE PRODUCED, INNOVATION ARE SPAWNED...

"AS AN EXAMPLE OF THE OPERATION OF THE NETWORKING APPROACH TO PROBLEM-APPRECIATION AND RESPONSE [ONE CAN CITE THE CASE OF] LEAN PRODUCTION [TO REACT TO THE INCREASED JAPANESE COMPETITION]... [AFTER A PERIOD OF DISCUSSION AND EVALUATION THAT LED TO A POLICY PROPOSAL] IT WAS DECIDED TO TRY OUT THE NEW POLICY FIRST IN THE AUTOMOTIVE COMPONENT INDUSTRY THEN IN THE MACHINE-TOOL....

"[TO] SUMMARIES, NETWORKING IN THE INNOVATIVE-RICH BW ECONOMY ... CONTRIBUTES MASSIVELY TO THE ECONOMIC STRENGTH OF THE REGION, IN GENERAL TERMS... AND EVEN WHEN THE CONDITIONS OF PRODUCTION BECOME LESS PROPITIOUS, THE NETWORKING MENTALITY ENABLES 'FAMILIES' OF SUPPLIERS TO RESPOND POSITIVELY IN ANTICIPATION OF EXCESSIVE PRESSURE FROM NETWORK ANIMATORS SUCH AS THE MAJOR AUTOMOTIVE OR ELECTRONICS CUSTOMERS...

"[ANOTHER INTERESTING CASE IS THAT OF] **VALENCIA REGION** ..WIDELY PERCEIVED WITHIN SPAIN AS BEING THE MOST SUCCESSFUL IN TERMS OF PURSUING A STRATEGIC DEVELOPMENTAL PROGRAMME IN SUPPORT OF ITS INDIGENOUS SMES... [A] CRUCIAL ROLE [IS] PLAYED BY THE REGIONAL GOVERNMENT AND ITS REGIONAL DEVELOPMENT AGENCY IMPIVA IN, FIRST, NETWORKING VALENCIA WITH BEST PRACTICE REGIONS SUCH AS BADEN-WURTTEMBERG... AND COUNTRIES SUCH AS DENMARK, TO LEARN CONDITIONS FOR SUCCESSFUL SME NETWORKING AND INNOVATION... [AND, SECONDLY,] THE KEY ROLE PLAYED BY TECHNOLOGICAL INSTITUTES PROVIDING 'REAL SERVICES' SUCH AS TECHNOLOGICAL ADVICE, MARKETING SERVICES, AND SO ON, AS WELL AS LEADERSHIP AND CO-ORDINATION IN UPGRADING AND STIMULATING INNOVATION ON A SECTORAL BASIS. ... [WITH] A GREAT DEAL OF ENCOURAGEMENT FOR THE FORMATION OF COOPERATION NETWORKS BY NETWORK BROKERS, A METHOD ADOPTED FROM DANISH PRACTICE. BY 1991, 43 NETWORKS EXISTED AND BY THE END OF 1992 150 WERE PROJECTED... PROMOTED BY IMPIVA, WHO RECRUITED NETWORK BROKERS FROM THE PROFESSION (CONSULTANTS, LAWYERS, ENGINEERS, ETC.). THE NETWORKS OPERATE IN SPHERES SUCH AS: DISTRIBUTION, SALES AND PROMOTION, EXPORTS, JOINT PURCHASING, NEW PRODUCTS AND SERVICES, AND ADVANCED TECHNOLOGY. ...

COOKE, (93)

The challenge is to maintain the existing tissue of industrial capability finding new costumers by offering an 'integrated' output of the otherwise dispersed production capabilities (thanks to the intervention of the 'meta-organizer').

Tentative to develop a 'meta-organizer' capability can be noted (e.g. by the activity of Commercial Chambers to let the production capability being known abroad, by the participation to commercial exhibitions as a 'local group', etc.).

However, a much more direct intervention is needed such as that of 'designing' new products that can be built by using the available local production as components of the final products. The 'product design' activity might be responsible to aggregate the today single supplied parts (each one produced by local firms) into a complex subsystem for a product. [14]

Another case refers to the potentiality of a knowledge-based development of cities (see section 1.3 and Knight, 92). This potentiality might be difficult to be exploited, because the existing local centres of knowledge production do not 'talk' one to the others. They behave as independent bodies, often more connected to external faraway homologue than to local ones (it is not rare that this be the case of homologue departments of two different local universities). The ability to recognize the usefulness to perform together some functions (such as R&D 'marketing') might change the situation, allowing the 'logic of network' to develop.

The network logic points to the need to improve the infrastructures (hard and soft) of the networks. It also lets emerge specific problems whose solution leads to **the development of new services that enrich and valorize the portfolio of existing production capapabilites**. As a result, it also increases the 'external' attractiveness of the city.

In terms of the **intra-city network** this will mean first of all to recognize the existing and potential 'carrefour' nodal points and **to invest for completing the potentiality of the carrefour to access the complex infrastructures facilities and services**. [15]

Networking to produce and exploit social capital: Cologne, city of art

"COLOGNE.. HAS ALWAYS BEEN A CITY OF COMMERCE AND HAS A COSMOPOLITAN ETHNIC STRUCTURE.... ALTHOUGH THE ECONOMIC BASE OF THE CITY IS COMMERCE, HANDICRAFT AND MANUFACTURING, ITS FUNCTIONAL SPECIALIZATION AMONG THE GERMAN CITIES PERTAINS TO THE ARTS.. THE ART AS AN INDUSTRY.. STARTED IN 1839 WHEN THE MAYOR WALLRAF, A MERCHANT AND RENOWNED COLLECTOR OF ARTS, CONVINCED OTHER DISTINGUISHED CITIZENS TO FOUND AN ART ASSOCIATION... THE LINKAGE BETWEEN RICH MERCHANTS, THE ARTS AND THE CITY CONTINUED OVERALL THE FOLLOWING DECADES AND EXIST STILL TODAY....IN PARTICULAR, THE THREE DECADES AFTER THE WORLD WAR II BROUGHT COLOGNE A BROAD AND RICH ARRAY OF CULTURE INSTITUTIONS, THE LAST BEING A CHOCOLATE MUSEUM (1993)... THE YEARS FROM 1950 TO 1970 WERE A DECISIVE PERIOD FOR COLOGNE WITH RESPECT TO ITS IMAGE... "THREE PROCESSES ACCOUNT FOR THIS DYNAMIC: THE EXPANSION OF THE ARTS, OF MODERN MUSIC AND AN ADMINISTRATIVE BACKBONE PROMOTING THEM... THE DIRECTOR OF THE OFFICE OF CULTURE.. WAS THE CORE OF A NETWORK OF ARTS AND MUSICS...[SUPPORTING MANY INITIATIVES AND EXHIBITIONS]... AMONG THE RESULTS OF THESE ACTIVITIES WAS AN EXTENDING NETWORK WHICH, IN TURN, ATTRACTED MORE ARTISTS, MORE GALLERIES AND COLLECTORS.... AT PRESENT COLOGNE HAS 160 GALLERIES...

"A MAJOR FOCUS OF MODERN MUSIC WAS THE 'STUDIO FÛR ELEKTRONISCHE MUSIK' AT THE WESTDEUTSCHER RUNDFUNK.... KAGEL AND STOCKHAUSEN, BOTH LIVING IN COLOGNE, ARE STILL INFLUENTIAL, CONTRIBUTING TO 'THE CITY AS A WORKSHOP'... ONE OF THE ACHIEVEMENT OF THESE CONTINUOUS ACTIVITIES IS TO HAVE ENLARGED THE AUDIENCE FOR MODERN ELECTRONIC MUSIC...

---

[14] *One should note a trend to aggregate the supply into subsystems in the strategy of complex products' end producers (e.g. in the automobile sector). One simple example is that of a car seat. The supply can be broken-down into the steel structure, the springs, the textile or consider, instead, the complete seat. Only in the last case the buyer might ask the supplier to take the responsibility for the functional response of the seat.*

[15] *To give example, this might mean to realize premises (intelligent buildings) open to a mix of users where interactive multimedia telecommunication (such as video conference) is available to be used for different purpose, including the access to 'open university' type of learning services.*

> "THESE DESCRIPTIVE DATA CAN BE ORGANIZED IN A SOCIOLOGICAL FRAMEWORK. IT IS EVIDENT, THAT A SET OF PERSONS AND CORPORATE ACTORS WERE ABLE TO CREATE A NETWORK OF COMMON INTEREST IN THE ARTS AND MUSIC.... THE NETWORK BETWEEN COMPOSERS, ARTISTS, ART GALLERIES, COLLECTORS/BUYERS OF ART AND THE COLOGNE ART ASSOCIATION HAS CREATED A SOCIAL CAPITAL... FROM WHICH NOT ONLY THOSE PERSONS BEING PART OF THE NETWORK BENEFIT, BUT AS WELL MANY OTHERS, INCLUDING THE CITY, WHO IS A FREE-RIDER OF THIS PUBLIC GOOD BY USING IT AS AN IMAGE FACTOR....
>
> "AS MOST LARGE GERMAN CITIES COLOGNE HAS LOST POPULATION IN THE FIRST PART OF THE 1980S. IN THE SECOND PART OF THE DECADE, AGAIN.. GAINED POPULATION BY THE IMMIGRATION.. THE ECONOMIC CONDITIONS WORSENED DUE TO THE STRUCTURAL FACTOR OF OVERALL ECONOMIC RECESSION IN GERMANY AND THE TRANSFORMATION OF A GOODS PRODUCING TO A SERVICE AND INFORMATION PROCESSING.. BASE. THE CITY HAS TO ADOPT A STRATEGY TO AVOID ECONOMIC STAGNATION. BASIC IDEAS... [CAN BE CHARACTERIZED AS 'A STRATEGY OF INTERNAL DIVERSIFICATION: THE CITY EXPLORES ITS SPECIFIC ADVANTAGES AND ECONOMIC NICHES AND TRIES TO EXPAND AND MARKET THESE'].. TO THIS END, THE NEW DIRECTOR OF THE OFFICE OF CULTURE [DECIDED] 'TO OPEN THE MONOSTRUCTURE'.. ASIDE FROM ARTS, NOW FILM AND (ROCK) MUSIC WERE PROMOTED...AMONG THE NEW ACTIVITIES WERE THE 'DEUTSCHER KAMERAPREIS'.. A FILM FESTIVAL.. AND THE PROJECT OF A COLOGNE FILM CENTER. THE OFFICE AS WELL PROMOTES ROCK BANDS, OF WHICH 1.000 ARE ESTIMATED TO EXIST IN COLOGNE...
>
> CONSIDERABLE EFFORTS WERE MADE TO INCREASE THE NUMBER OF JOBS IN THE MEDIA SECTOR.. TO IMPROVE THE RELATED FACILITIES, THE 'MEDIA PARK' WAS CREATED... FIRST IDEAS FOR THE PROJECT DATE BACK TO 1986. THE CITY WISHED TO SIGNAL TO PROSPECTIVE INVESTORS THAT COLOGNE HAD BECOME A MAJOR GERMAN MEDIA CENTER.... THE CITY ACQUIRED AN AREA OF 200.000 SQM CLOSE TO THE MAIN STATIONS... THE SYMBOL OF THE MEDIA PARK, A 27 STORY OFFICE TOWER IS... SUPPOSED TO BE COMPLETED BY THE END OF 1995....
>
> "... THREE TENTATIVE CONCLUSIONS CAN BE DRAWN FROM THE COLOGNE EXAMPLE. ASSUMING THE 'CULTURE CONTEXT' TO BE A VITAL ELEMENT IN THE CITY'S IMAGE AND ECONOMY. FIRST, IT IS A NETWORK, CONSISTING OF PERSONS PRODUCING A SOCIAL CAPITAL... SECOND, BY DEPENDING ON SOME CENTRAL INDIVIDUALS IN THE NETWORK, THE SOCIAL CAPITAL WILL BE LOST (OR DIMINISHED) IF THESE INDIVIDUALS WITHDRAW FROM THE NETWORK.... A THIRD CONCLUSION PERTAIN TO THE PRESENT DEBATE OVER PUBLIC-PRIVATE PARTNERSHIP. THE LESSON TO BE LEARNED.. IS THAT PRIVATE INVESTMENT IN PUBLIC GOODS AS WELL AS PUBLIC-PRIVATE PARTNERSHIP ARE NO NEW INCIDENTS, BUT HAVE THROUGHOUT THE HISTORY OF THE CITY BEEN A VITAL ELEMENT IN THEIR GROWTH."
>
> **FRIEDICHS (94)**

The carrefour nodes will play the role of the basin of attraction of the neighbouring space. For this latter **to become an equal opportunity space** for different productive activities, **the actual time for a person to move from one node to the others should be reduced** (by improving the transport means and infrastructures) to a small fraction (say 10 minutes) of the total daily time budget allocated for moving.

For the **inter-city regional networks,** to develop a more balanced equal opportunity spatial networks **the existing hub type liaisons** between the region's capital and the other cities have **to be corrected by reinforcing the direct links between the minor cities of the region.**

To exploit the 'network potentialities' **the 'time distance' between the cities have to be reduced** (say to half an hour) to make possible to consider moving from one city to the another in the network within the daily time budget.

The RDT agenda - to develop **evidence on the feasibility of investments to realize a local network space organization and to see the emergence of related network cooperation among economic and social actors** - overlap, as it should be expected, the ones described above and related to the 'agora' scenario for urban planning.

A **first area of research** is **to understand,** for paradigmatic actual city cases and their regional basin, **how the existing system can be represented and its behaviour simulated in term of a web of interacting networks**. This tasks will require system simulation coupled with data collection from the field.

A **second area of research** will be concerned with **the 'elementary units' of the intra-city network** (the carrefour nodal points and the links between and to the external 'world network') and of **the inter-city ones** (especially the links).

Specifically the investigation should aim:

i) to develop concept for advanced carrefour nodal point as a complex system of facilities interacting with the networks;

ii) to develop concept of special carrefour junction between local and external network (such as the interaction between inter-city and intra-city transport, between surface and air transport),

iii) to evaluate the use of existing technologies to link the nodes (such as TLC highways, surface public transport for intracity transport, fast train intercity connection);

iv) to develop innovative example of advanced services for the network users (such as development of new product that can profit of the existing production capabilities, or coordinated 'marketing' of knowledge production).

Intra-city network: the case of Braunschweig and Aachen

"BRAUNSCHWEIG LOCATION VERY CLOSE TO THE EAST GERMANY BORDER.. IS VERY MUCH RELATED TO AT LEAST PART OF THE ECONOMIC PROBLEMS.. FACED DURING POST-WAR PERIOD...[WITH] THE LOSS OF SOME 60.000 JOBS.. THE BRAUNSCHWEIG ECONOMY WAS PARTICULARLY VULNERABLE BECAUSE IT WAS DOMINATED BY AGRARIAN MANUFACTURING AND PRECISION ENGINEERING... ANOTHER CHARACTERISTIC OF THE LOCAL ECONOMY IS THE...PRESENCE OF A SUBSTANTIAL NUMBER OF RESEARCH ORGANIZATIONS..

"IN TELLING THE BRAUNSCHWEIG STORY ONE CAN POINT AT TWO MAJOR ACTIVE PARTICIPANTS: LOCAL GOVERNMENT AND THE CHAMBER OF INDUSTRY AND COMMERCE, WHILE THE UNIVERSITY AND THE STATE OF LOWER SAXONY PLAY A SUPPORTIVE ROLE... AS EARLY AS 1974 THE APPOINTMENT OF AN ECONOMIC ADVISOR.. WAS THE START OF A SERIES OF ACTIONS TO RESTRUCTURE THE LOCAL ECONOMY... [AN] URBAN ECONOMIC STIMULATION PLAN.. APPROVED IN 1977... INCLUDED AN ANALYSIS WHICH SHOWS A STRONG RESEMBLANCE WITH WHAT IS CALLED THE STRATEGIC PLANNING APPROACH: IT POINTS AT STRENGTHS AND WEAKNESSES OF THE CITY, BUT ALSO AT OPPORTUNITIES... ONE OF THESE STRONG POINTS WAS THE ... LARGE NUMBER OF RESEARCH INSTITUTES. .. ALTHOUGH THUS SCIENCE AND TECHNOLOGY WAS ALREADY RECOGNIZED AS AN IMPORTANT ATTRACTION FACTOR... IT WAS NOT BEFORE THE THIRD UPDATE OF THE PLAN IN 1985 THAT THE SCIENCE AND TECHNOLOGY NOTION WAS ELABORATED... DURING THE 1977-85 PERIOD THE EMPHASIS WAS ON IMAGE IMPROVEMENT... [IN] THE THIRD UPDATE OF 1985... THERE ARE SOME NEW ELEMENTS IN THE POLICY: THE FOUNDING A CENTER FOR INNOVATIVE STARTERS... THE CONCENTRATION OF EFFORTS, NOW FOCUSING IN MICROELECTRONICS... THE TECHNOLOGY PARK STARTED IN 1986... AN INITIATIVE BY THE CHAMBER... THE RECOGNITION OF MICROELECTRONICS AS A NEW IMPETUS FOR THE BRAUNSCHWEIG ECONOMY RESULTED IN A NUMBER OF NEW COMPUTER FIRMS, AND THE ESTABLISHMENT OF THE INSTITUTE FOR APPLIED MICROELECTRONICS...

"FOLLOWING THE FORMER FOOD PRODUCTION TRADITION ANOTHER INITIATIVE WAS TAKEN TO START 'CARE FOR FOOD': CONCENTRATED ACTIVITIES IN RESEARCH AND ENGINEERING... WITH RESPECT TO FOOD (PRODUCTION AND CONSUMPTION) MAINLY FOR THIRD WORLD COUNTRIES... ANOTHER SET OF ACTORS IS FOUND IN THE MOST RECENT INITIATIVE: THE ESTABLISHMENT OF THE SO-CALLED PRO LOG CENTER, A PRODUCTION LOGISTICS CENTER TO ANTICIPATE CHANGES NOW UNDERWAY WITH RESPECT TO THE ORGANIZATIONS AND TRANSPORT OF GOOD PRODUCTION." (PG. 36-38)

RDT to approach city problems emerging from system saturation

The challenges coming from the saturation of city systems is well perceived as well as the urgency to take-actions, as it is indicated by the emergence of the concept of **the sustainable city** and the amount of initiatives taken under this label.

It is also well recognized that to respond to the challenge and to move towards the realization of a sustainable city one needs an **integrated approach** while our decision-making capability is sectoral organized.

Passing from the perception of the challenge to the planning of specific actions is here particularly difficult because an integration approach call in the entire complexity of the 'global' city system. The intrinsic contradiction between calling for a global ('holistic') response and the fact that a plan for action has somewhat to be 'reduced' to manageable conditions gets here to its peak. In practice, integration of today sectoralized decision-making is difficult to obtain.

It is therefore here even more important than for the two previous groups of problems to focus attention on the process of passing from the challenge perception to that of problem specifications. RDT can therefore be expected to make essential contributions.

The perusal of the challenges that are on the discussion table on the issues for a sustainable city, the confrontation with potential solutions (that the RDT activity will have contributed to collect and to develop) should permit, first of all, to contribute to underline

the ambiguity of the challenges, and how dangers an opportunities might be mixed toge-ther. [16]

Comparing challenges and solutions is an important ingredient not only to better specify the challenges, but to rank them into a priority scale according to some parameters (e.g. capability to realistically apply the solutions, possibility to find the resources needed, etc.).

To show potential results to be expected from this type of study, let us deal with the "*meta-challenge*" (challenge of the challenges): how to improve our ability to respond "rationally" (maximizing the probability of success and the "global quality" - joint optimization of values/ objectives/ results - of the intervention) to any one of the challenges.

The first point to be considered is that the challenge is coming from a very complex system (therefore a precondition to successful intervention is that the problem solving process be adequate to the complexity of the system).
The second obvious point is that **the more one knows on system behaviour the more one will be able to make "rational" choices**. This statement carries even more weight if we consider necessary **to seek for leverage effects** from the system. To do this, we not only have to understand the system as it is now and how it behaved in the past, but how it will move in the future and to which extent it will feel our intervention or not.

An important help to successful actions might come from the fact itself that the city system is close to saturation. A conjecture for complex system being in such condition, is that it keeps exploring the 'space of potential alternative routes' for its development (to react to the internal and external changes). One could therefore try and take advantage of the high 'mobility' of the system looking for multiplicative effects. To this end, however, one need (even more here than in the case when the intended actions are on a stable system far from saturation) to collect and interpret the signals from the system.

Models for complex systems

A MODEL IS A 'REDUCED' DESCRIPTION OF THE REAL SYSTEM WITH THE ASSUMPTION THAT THERE IS SOME KIND OF 'ANALOGY' RELATIONSHIP BETWEEN THE MODEL AND THE REAL SYSTEM. MODELS CAN BE DEVELOPED TO PERFORM DIFFERENT PURPOSE: AS A KNOWLEDGE RESEARCH GUIDE TO INDICATE MAJOR NEW AREA TO BE INVESTIGATED (BY PUTTING TOGETHER IN A CONSISTENT WAY THE INCOMPLETE AVAILABLE INFORMATION ON THE SYSTEMS); AS A TOOL FOR DECISION-MAKERS TO FORECAST HOW THE SYSTEM WILL RESPOND TO GIVEN ACTION (WHAT-IF MODEL); TO TRANSLATE SYSTEM SIGNALS INTO COMPREHENSIBLE MESSAGES; TO DETECT THAT SYSTEM HAS REACTED TO EXTERNAL EVENTS.

THE MORE COMPLEX IS A SYSTEM THE LESS A RELIABLE MODEL CAN BE DEVELOPED. IN

---

[16] *As an example, the increased spatial density in urban environment is at the origin of many of the issues. However, the high density (see sect. 1.6 and Brickwell, 92) itself makes possible to follow certain solution alternatives (e.g. traffic collapse comes from high density in transport demand; this, however, is also a precondition for effective collective transport investments).*

ANCIENT TIME, WHEN THE GENERAL BEFORE THE BATTLE ASKED THE AUGUR TO INTERPRET THE SIGN OF THE DESTINY BY LOOKING AT THE INTESTINES OF A SACRIFICIAL BEAST, HE WAS IN HIS WAY USING A MODEL OF REALITY. MODERN, SOPHISTICATED COMPUTER BASED MODEL MIGHT BE NOT MORE RELIABLE THAT THE AUGUR RESPONSE. THIS NOTWITHSTANDING THE SEARCH FOR MODEL DEVELOPMENT IS WORTH WHILE.

FOR THE CASE OF THE URBAN SYSTEM A FIRST IMPORTANT APPROACH ON CITY MODELLING IS TO DEFINE A SERIES OF URBAN INDICATORS AS A CODED STANDARD WAY TO COLLECT SIGNALS AND INFORMATION FROM THE SYSTEM. THE INDICATORS MIGHT REGARD THE URBAN STRUCTURES (E.G. ITS GEOMETRICAL DESCRIPTION) OR THE STATE OF SYSTEM VARIABLES (E.G. THE TRAFFIC FLOW AT A ROAD CROSSING). TO GET MEANINGFUL INDICATORS, THE DIRECT DATA COLLECTED ON THE SYSTEM (BY HARD OR SOFT SENSORS) MIGHT HAVE TO BE PROCESSED WITH ELABORATE SCHEMES (CITY MODELS). INDICATORS CAN BE USED FOR TAXONOMY PURPOSES. THE MORE IMPORTANT USE HOWEVER WILL BE TO BE ABLE TO DETECT THE URBAN SYSTEM REACTION TO SPECIFIC ACTIONS.

A SYSTEM CLOSE TO SATURATION EMITS SIGNALS THAT INDICATE SUCH A CONDITION. IT WILL BE IMPORTANT - BUT PARTICULARLY DIFFICULT - TO DEVELOP 'SENSORS' AND 'TRANSDUCERS' ABLE TO COLLECT THE SIGNALS AND TRANSFORM THEM INTO SIGNIFICATIVE INFORMATION FOR INTERVENTION TO ASSURE THAT THE SYSTEM WILL NOT ENTER INTO A SATURATION COLLAPSE.

The **first item on the research agenda** will therefore be **to improve our understanding of city behaviour as a complex system**.

To this effect, one should support specific theoretical and experimental investigations on actual city cases, support networks between cities, encourage experimentation in different conditions (paradigmatic of urban taxonomy) and the sharing of the resulting knowledge.

In general one should call attention of science policy to put the **research on "urban science"** among the priority issues.

To an increased interest in fundamental research, **more applied intervention** are to be added to help the decision-makers to respond to the urban challenges. Recipes are well known and should be implemented.

The advancement in complex system simulation can be applied **to develop specific "simulation models" of given cities** to be used by the concerned actors to simulate effects of conceived intervention.

The simulation model however have to be made interactive with the actual city system, by continues feeding the model with data collected on the system itself. [17] Special sensors might have to be installed to monitor continuously the system (such as in testing air quality). If the system is close to saturation, the sensors should be able to indicate how close to actual saturation conditions. [18]

---

[17] *In fact, the actual system send out signals continuously. The problem is to collect them and, more importantly, to be able to translate them to become meaningful for the decision-maker. Data can be relieved from the system by many different approach (e.g., simply by putting questions to the system users, such as the well known OD (origin - destination) questions to get information of the patterns of transport demand).*

[18] *A simple case - to underline the importance of sensors and their sensibility to saturation conditions - is that of a motorway. The average speed in a motorways decreases with the increase of the car flow (number of cars per second crossing*

So instrumented, the city system will send useful information to the simulation model which can then be used not only at the moment when the choice to intervene on the system will be taken, but, even more importantly, later on when to understand the effects of the intervention (if it is producing results or not, if any leverage effects from the system is emerging or not).

The **second item in the research agenda** is to **develop a portfolio of specific ideas and potential solutions to approach the challenges of a saturated city system**.
Because of the inertia of any large and complex system for the proposed solution to be effective one should try to **look for leverage effects coming from the system endogenous dynamical trends**.

Multiplier effects from the city system: the case of security

AS AN EXAMPLE OF HOW **TO LOOK FOR LEVERAGE EFFECT FROM SYSTEM**, LET US CONSIDER THE CASE OF PEOPLE SECURITY. IMPROVING THE PERSON SECURITY IS AN IMPORTANT CHALLENGE, INCREASING WITH THE CITY DIMENSION, FUNCTIONAL SPECIALIZATION OF CITY SPACE, SEGREGATION, ETC.

RDT CAN HELP BY PROVIDING MONITORING EQUIPMENT BOTH FIXED OR MOBILE, PORTABLE PERSONAL ALARM CALL, POSITIONING OF THE REQUEST FOR HELP, ETC. TO BE EFFECTIVE, THOUGH, THE MONITORING SYSTEM HAS TO BE COMPLEMENTED BY AN EFFICIENT QUICK RESPONSE AND INTERVENTION. THIS WILL REQUIRE A DIFFUSE POLICE PATROL SYSTEM.

SO CONCEIVED, THE SOLUTION TO THE PROBLEM CONSIDER THE CITY SYSTEM ITSELF AS INERT, EXOGENOUS TO THE SOLUTION. THE SOLUTION IS THEREFORE EXPENSIVE, REQUIRE MOBILIZATION OF A LOT OF HUMAN AND PHYSICAL RESOURCES COMPLETELY DEDICATED TO THIS SCOPE. THE INDIVIDUAL SEEKING FOR SECURITY IS CONSIDERED AS COMPLETELY ISOLATED IN AN HOSTILE ENVIRONMENT. IN EFFECT THIS IS OFTEN THE SITUATION IN CERTAIN QUARTERS, SUCH AS OFFICE QUARTERS, DURING NIGHT HOURS.

IN OTHER CASE THE SITUATION IS DIFFERENT, INHABITANTS ARE AROUND THAT MIGHT INTERVENE TO HELP. IN SUCH A CASE THE URBAN SYSTEM IS COOPERATING TO RESPOND TO THE CHALLENGE. COULD WE NOT LOOK - FOR AN INCREASE OF SUCH A LEVERAGE EFFECT - FOR SYNERGY IN USING AVAILABLE RESOURCES? TO ANSWER THIS QUESTION, LONG TERMS INITIATIVES MIGHT BE NECESSARY TO COMPLEMENT SHORTER TERMS ONES, SUCH AS: CHANGING THE URBANISTIC CITY CONCEPT FROM MONO-FUNCTIONAL SPACE SPECIALIZATION TO MULTI-FUNCTIONAL ONES, INCREASING THE MIX OF SPACE USE AND DWELLERS.

HOWEVER, ALSO SHORT TERMS INITIATIVES CAN HELP. AS AN EXAMPLE, THE INVESTMENT IN TECHNOLOGY TO INCREASE SECURITY MIGHT BE DESIGNED ALSO TO PRODUCE A MULTIPLIER EFFECT BY PUTTING INTO MOTION OTHER INITIATIVES (SUCH AS KEEPING BOUTIQUES OPENED IN NIGHT HOURS) BECAUSE THE INCREASED SPACE SECURITY INCREASES THE SOLIDARITY OF OTHER INHABITANTS (INTERVENING TO HELP, FEELING MORE CONFIDENT ON POLICE PATROLLING).

The initial challenge has to be better defined if one tries to follow the recipe of seeking for leverage system effects. RDT investments will still contribute significantly to

---

a given point). A sensor can easily be devised to count the car flow. However, if one observes the car motion in a motorway one knows that in certain condition the simple addition of one car can change abruptly from a smooth motion to a stop-and-go one. The detector - to be of practical use to avoid this condition to be reached (by closing the access to the motorway) - has to be so designed to be able to sent an alarm signal well in advance of the actual reaching of the saturation condition.

the specification of the problem to be solved, as part, however, of a broader intervention that have to consider a mix of short and longer terms initiatives that involves not only the "sectoral" response (in the case of security, to increase the police ability to intervene), but citizen solidarity, urbanistic concept revision, incentives for personal services, etc.

2.6 Conclusions from Part II: An agenda for RDT

The methodological approach followed in Part II has made possible to translate the holistic perception of urban malaise into scenarios that spell out the features of the city of the future. However, when comparing 'dreams' with 'reality' we find that many building blocks are lacking. This point to actions to be taken to complete the portfolio of solutions.

Summarizing, it is here proposed an RDT agenda aimed **to support the development of a portfolio of ideas on potential solutions to help translating the perceived challenges into specific problem definition** to initiate actions on actual city system (pilot projects).

To the three urban malaises, three scenario have been contrasted. The three scenario lead to **three general objectives** for a call for ideas to fill the portfolio of solutions. For each objectives few specific actions are indicated for a total of **eight actions**.

A summary of the proposed RDT Agenda is here attempted.

Objective A)

To provide a portfolio of ideas and potential solutions that will permit to act on urban planning **to move from the** *today* **modernistic city** *plan (with separated mono-functional zones, high individual alienation and social segregation)* **towards an agora city plan** *(human centred organization in a multi-functional urban space).*

A.1 - Develop new *global urbanistic concepts*: a portfolio of alternative designs of 'concept city' to show possibility of actions to respond to city problems.

To call urban designers to develop their own interpretation of the ***agora*** city scenario by designing a 'new city' which make use of new technologies.

To compare alterative concept designs to extract suggestions for more mundane initiatives to modify existing urban environment.

A.2 - Develop concepts that illustrate how new '*elementary building blocks*' for the city can be developed as a base to intervene for the transition from the today city to an 'agora' city.

To call for ideas to conceive city system's 'building blocks' complex enough to assure integration of the qualities that characterize the agora city scenario. All the ingredients to assure the quality of life in the city (mobility, environment, security, human relations, work, amenities, social activities) should be represented in each 'building block'. Or, at least, the building block has to show its ability to behave as an interactive node in the web of networks of city activities. A reference block might be a building, a quarter, a cross road between quarters, an entire mono-function network (e.g. the health care network).

A.3 - Apply the potentialities both of the 'concept cites' and of the new 'elementary new building blocks' to show the possibility of *intervention on actual cities* chosen as paradigmatic cases.

To call for conceptual design development that, by starting from an actual city plan, shows how it can be moved in the direction of a chosen reference 'new city' plan by the introduction of new 'elementary building blocks'. The specific city to be investigated will be chosen with reference to a city taxonomy, coming from the analysis of today city dynamic patterns, such as:

a) cities having an *international leadership,*
b) cities in *industrial and technological transition*,
c) cities into *negative industrial transition*.

Objective B)

*To provide a portfolio of ideas and potential solutions to **develop a balanced relationship between the exogenous impact of globalisation** (global virtuous circle of 'economic' wealth generation) **and the endogenous drive to capitalize on the diversity assets and local resources** (local virtuous circle of 'quality' wealth generation).*

B.1 - Develop a conceptual frame that will permit to look at the city and its regional basin as a web of local interactive networks.

To call for system analysis of paradigmatic city cases to show the potentiality to modify the existing local networks layout to obtain a more homogenous equal opportunity urban and regional space with respect to the today prevailing central-periphery scheme. The analysis will show how and for which conditions (changing the 'local space metric' to reduce the 'distance' between the nodes of intra-city and regional inter-city existing networks; equipping the nodes of the networks with infrastructure and facilities to become 'loci' of equal access opportunities to connect to the webs of internal and external networks services) a local 'network logic' can emerge, with cooperation between local actors to better exploit local assets and to better interact with the global networks and the globalisation process.

B.2 - Develop concepts for the 'elementary units' of the intra-city network (the carrefour nodal points and the links between them and to the external 'world network') and of the inter-city ones (especially the links).

Specifically, the call for ideas should aim:
i) to develop concepts for advanced carrefour nodal points as a complex system of facilities interacting with the networks;
ii) to develop concept of special carrefour junction between local and external network;
iii) to evaluate the use of existing technologies to link the nodes;
iv) to develop innovative example of advanced services for the network user.

B.3 - Show the emergence - in a network logic - of 'meta-organizers' to produce new services for local actors (e.g., small firms) in the network.

To call for studies and investigations, for paradigmatic city cases, showing how cooperative activity can develop to aggregate the simple components produced separately by local firms (as suppliers to larger firms) into complex subsystems (to be cooperatively supplied to firms responsible for the end product).

To call for investigations to show how cooperation between knowledge producers can increase the opportunity for a knowledge-based city development.

To elaborate on the proposed cases to show how the emergence of a network logic of cooperation carries new problems whose solution leads to **the development of new services so enriching and valorising the portfolio of existing production capabilities** and **knowledge base,** while increasing the 'external' attractiveness of the city.

Objective C)

To provide a portfolio of ideas and potential solutions to better identify options to act on the today city systems by taking advantage of leverage effects of endogenous system forces to move the system far from saturation towards a sustainable city.

C.1 - Improve our understanding of city behaviour as a complex system.

To call attention of science policy to put the **research on "urban science"** among the priority issues.

To develop specific **"simulation models" of given cities** to be used by the concerned actors to simulate effects of conceived interventions. Simulation models have to be made interactive with the actual city system, by continues feeding the model with data collected (with the help of existing and new hard and soft sensors) on the system itself.

C.2 - Develop a portfolio of ideas and potential solutions to approach the challenges of a saturated city system looking for leverage effects coming from the system endogenous dynamical trends.

To call for proposals for theoretical and empirical investigations to develop terms of reference for problems to be solved to respond to integrated city system challenges. The investigation should show how the initial perceived challenges is changing because of the non linearity effects of systems reaction and how the problems specifications could take advantage of the intrinsic system forces and inertial dynamic patterns (taking advantage of system's mobility, when close to saturation, to explore the 'space' of opportunities to react to internal and external changes). A mix of short and longer terms initiatives for action taking has to be suggested that involves not only the "sectoral" (or multi-sectoral) responses but citizen solidarity, urbanistic concept revision, incentives for personal services, etc.

Part 3. THE CASE FOR INFORMATION & COMMUNICATION TECHNOLOGY

THE "NEW TECHNOLOGIES", A BLEND OF COMPUTER SCIENCE AND TELECOMMUNICATIONS, ARE ACCELERATING THE TRANSFER OF INFORMATION TO A FANTASTIC EXTENT. THEY HAVE PRACTICALLY ABOLISHED SPACE AND TIME. WHAT DOES THIS HOLD IN STORE FOR OUR CITIES? (PG. 15).

IN THE POST-INDUSTRIAL SOCIETY INFORMATION AND KNOWLEDGE ARE NOT ONLY THE PRINCIPAL RAW MATERIAL BUT USUALLY THE PRINCIPAL PRODUCT TOO. IN PARTICULAR, THE SUCCESSFUL OPERATION OF BUSINESS, CITIES, GOVERNMENT AND SO ON INCREASINGLY DEPENDS ON ABILITY TO PICK OUT FROM THE EVER INCREASING MASS OF AVAILABLE DATA ONLY THE INFORMATION THAT IS REALLY OF VALUE, AND TO CHANNEL IT INTO PRODUCTIVE USES. (PG. 27).

... AT THE SAME TIME AS WE ARE DEVELOPING THE TECHNOLOGIES WITH WHICH TO BRING PEOPLE CLOSER TOGETHER, A GAP SEEMS TO BE OPENING UP WHICH TECHNOLOGY CAN DO NOTHING ABOUT. IT IS CERTAINLY WITHIN EACH INDIVIDUAL THAT THE GROUND NEEDS BREAKING, BY MEANS OF WHAT WE CALL CULTURAL ACTIVITY, AND THE TECHNOLOGIES OUGHT TO CONTRIBUTE HERE, ESPECIALLY THE VAST FACILITIES FOR INTERCOMMUNICATIONS, AND TELEVISION IN PARTICULAR. (PG. 20).

OECD (92), CITIES AND NEW TECHNOLOGIES.

In Part 2 an attempt to devise a general approach to city challenges has been presented. We have assumed that technology can play an important role, provided it takes part in all the phases of the complex problem-solving process. The need to enlarge the portfolio of solutions was used to propose an RDT Agenda.

We will now use the scheme developed in Part 2 - and the suggested types of action programmes - to consider the case of the ICT (Information and Communication Technology). This more focused analysis will show how the portfolio of potential solutions can lead to specific action-taking in a coherent way with the global objectives spelled out in the scenarios.

An extensive review of the impact of ICT on cities is reported in a recent OECD study (see OECD, 92). The effort made here is to use the available information on ICT and the city for an exercise to show how the scheme presented in Part 2 can in practice be implemented, even with the constrain of referring to only one technology.

Talking about technology role for the city, we have expressed concern on the possibility that technology could have contributed to the development of the present un-desirable cities situations. ICT, notwithstanding its recent appearance in the technological scene, is not free from this concern.

In fact, its development can push towards more specialization and functionalisation of urban space (by the aggregation of activities centred around teleports, by the space structuralization of ICT 'highways', etc.), towards an increased separation between the *haves* and the *haves-not*.

But it should not necessary be so. In section 1.6 we have underlined important features of ICT that should made it a candidate to contribute to the development of a 'city technology'.

For this to happen we are required to develop visions on the alternative futures made possible by the use of technology. For this, we will refer to the three scenarios indicated in Part 2.

Requirements for ICT urban development

"WITHOUT PEOPLE... WHO ARE CAPABLE OF DESIGNING THE DESCRIBED DEVELOPMENTS, PRODUCING THEM AND FOLLOWING THEM IT WILL NOT BE POSSIBLE TO REALIZE GOOD AND UP-TO-DATE TELECOM FACILITIES.

"**EDUCATION AND TRAINING** IS OF GREAT IMPORTANCE IN THIS AS ARE COMPANIES WHERE PROFESSION OF ICT CAN BE CARRIED OUT. A WELL EDUCATED WORKING POPULATION, FAMILIAR WITH THE WORKING WITH COMPUTERS AND SOFTWARE PROGRAMMES, IS SEEN AS ONE OF THE MOST IMPORTANT FACTORS IN LOCATIONAL CHOICE. THIS POSES AN ENORMOUS TASK IN CITIES WITH LARGE GROUPS OF (YOUNG) LOW-EDUCATED UNEMPLOYED, VERY OFTEN IN ETHNIC BACKGROUND....

STANDARDIZATION IS ESPECIALLY IMPORTANT FOR COMPANIES THAT COMMUNICATE WITH OTHERS IN MANY DIFFERENT WAYS AND WHO DISCOVER THAT THIS GIVES CONNECTION PROBLEMS. ESPECIALLY FOR COMPANIES WHO CANNOT DICTATE TO OTHERS IN WHICH WAY COMMUNICATION IS TO TAKE PLACE, THIS CAN INCREASINGLY DAMAGE THE CONDUCT OF BUSINESS. ...

SECURITY IS IMPORTANT WHEN FILES OF A STRATEGIC OR PERSONAL NATURE ARE IN-VOLVED. WITH THE CONTINUING PROGRESS IN AUTOMATION THIS IS BECOMING MORE IMPORTANT. THE SENDING OF SO-CALLED BACK-UPS OF FILES TO OTHER PLACES ... IS BECOMING MORE AND MORE EASY WITH THE INTRODUCTION OF LARGE CAPACITY NETWORKS.

RELIABILITY IN TELECOM TRAFFIC IS EXPRESSED IN THE WISH OF COMPANIES TO BE IN A NETWORK WHERE RE-ROUTING OF THE INFORMATION FLOWS IS POSSIBLE IN CASE OF CALAMITIES. THESE POSSIBILITIES CAN BE OFFERED MORE EASILY IN AREAS WHERE THERE IS A HIGH DENSITY OF FLOW THAN IN MORE PERIPHERAL AREAS.

THE **NEED FOR CAPITAL** IS GREAT IN ORDER TO REALIZE GOOD TELECOM FACILITIES. THIS CONCERN THE NECESSITY OF CAPITAL FOR INVESTMENTS IN NEW INFRASTRUCTURE FACILITIES. .. WHERE THERE IS A GREAT DEAL OF TELECOM TRAFFIC OR WHERE A GREAT DEAL IS EXPECTED, A GREAT DEAL CAN BE INVESTED. LOCAL AUTHORITIES WILL INCREASINGLY HAVE TO TAKE THIS INTO ACCOUNT WHEN DEVELOPING INDUSTRIAL OR OFFICE AREAS. .. (PG. 6/10-11)

BONGENAAR & LE CLERQ, (92)

3.1 ICT 'building blocks' for new city scenarios: the portfolio *of ideas*

ICT IMPACT ON SPACE NETWORKING. A COMMUNICATION 'AURA' ON THE INDIVIDUAL. INTELLIGENT BUILDINGS. ICT IMPACT ON PROCESS CONTROL.

A lot has been said about the potential of the new ICT and its effects on the human way of life. Existing applications are however still very far from fully exploiting the ICT potentiality.

'Building blocks' on which the applications to the future of the city could be developed can, however, already be identified:

* **Telecommunication infrastructures** such as: broadband broadcasts / two ways TLC links / digital TLC highways / teleports / urban cable networks / mobile terminals for TLC;
* **TLC services** such as: VAN (value added network) services (videotext, etc.) / computer networks services / electronic mail / health care applications / distant learning / multimedia TLC / utilities networks management aids;
* **intelligent buildings and homes**: electronic home (domotique) / shared ICT facility centres / community teleservice centres / media resources centres;
* **city system process control**: traffic control / air quality 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 somewhat de-materializing the physical space, and, even more important, inducing a 'logic of network' in the 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 individual. As technology have succeeded in amplifying the muscular forces and the sensorial perception, so the new TLC is providing a kind of *communication 'aura'* around the person (the effect is particularly clear with the mobile telephone, the ability to communicate world-wide that accompany the person wherever he moves).

The third type of impact is that of improving the ability to *govern the complex sub-systems* that compose a complex city.

ICT impact on space networking

For the **networking** effect:

- *telecommunication infrastructures*, by the intensification of connectedness within and between cities, is operating a kind of space convergence: the logic of networks penetrates the city; new entrepreneurial strategies for urban economic development are emerging;
- *TLC interactive services*, by the information, transaction, messaging services, they are becoming alternative to existing services - e.g., to postal services (electronic mail) - or make possible entirely new services (e.g. computer conferencing). Greater impacts will come from the success of current experiments (such as, e.g., speech recognition to

translate into text, voice mail). Open University type of services impact the way we organize the learning activity;

- *2-way TV*, are already being experimented in local communities for democratic poll and for social services (e.g., for elderly: social services information, peer socializing, inter-generational contacts, citizen / government interaction).

A communication 'aura' on the individual

For the **communication aura** effect, let us underline the change induced by ICT on the home (the so called ***domotique***).

Domotique (see Rubinstein, 93 and Moran, 93) is a vague definition that 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 interest of the inhabitants. *Domotique* sees the home as a complex system of internal networks interacting with external ones. [19]

Domotique can provide a better living inside the house with:
i)   automated smart home (better home services management),
ii) increased security,
iii) optional filtering of communication access,
iv) better living for the elderly and the handicapped [20],
v)   better liaisons with the external world (such as conference call, videophone),
vi) emergency intervention (Personal Alert System for elderly and handicapped),
vii) mobile alarm,
viii) health home assistance (home hospital: prevention, monitoring, diagnosis, therapy, rehabilitation,
ix) home tele-banking and tele-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 [21], two partners videoconference.

The 'information and communication *aura*' is enhanced also in specially instru-mented intelligent buildings.

---

[19] *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).*

[20] *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) (see Cullen & Moran, 92).*

[21] *In Finland a switched videotelephon service is being marketed. The EC Commission RACE Programme is supporting experiments for people with special needs.*

Intelligent buildings

ONE APPLICATION IS FOR COMMERCIAL BUILDING WHERE SPECIAL INFRASTRUCTURES (SUCH AS LAN - LOCAL AREA NETWORK - TWO WAYS INTERCONNECTIONS, DYNAMIC COMPUTER LOAD-SHARING) MAKE POSSIBLE WORLD WIDE TLC (TELECOMMUNICATIONS) INTERCONNECTION AND THE ACCESS TO SPECIAL SERVICES (SUCH AS DIGITIZED VOICE, ELECTRONIC MAIL, REMOTE PRINTING AND PUBLISHING, ETC.). INTELLIGENT BUILDINGS CAN AFFECT THE WAY ENTERPRISES ORGANIZE (E.G. MAKING EFFICIENT TO SUBSTITUTE MULTIPLE SMALL UNITS OFFICE ORGANIZATION FOR THE CONCENTRATION OF PEOPLE INTO HUGE BUILDINGS), MAKE CONVENIENT THE HOUSING OF A MIX OF ACTIVITIES IN THE SAME BUILDING (OFFICE, COMMERCE, HOUSING).

OTHER APPLICATIONS REFERS TO SPECIALIZED BUILDINGS AS CENTRE FOR CIVIC ACTIVITIES AND ENCOUNTERS WHERE IS POSSIBLE TO FIND ICT MEANS TO COMMUNICATE WORLD-WIDE. ONE IDEA THAT HAS FOUND LOCAL INTEREST EVEN IN MEDIUM SIZE CITIES IS THAT OF **MULTIMEDIA CIVIC CENTERS**, SOMETHING THAT TO AN EXTENT HAS SIMILARITY WITH A THEATER AND A TV STUDIO, BUT WHICH WILL PERMIT - WITH THE AID OF MULTI-MEDIALITY AND SPECIAL SOFTWARE PROGRAMMES - TO CREATE SPECIAL CULTURAL EVENTS (IN COLLABORATION WITH OTHER CITIES CONNECTED IN REAL TIME). ONE IS STILL FAR TO GRASP THE NOVELTY AND CREATIVE POTENTIALITIES OF THESE APPLICATIONS (E.G., THEATER SHOWS WHERE THE ACTIONS IS INSERTED IN 'VIRTUAL' ARCHITECTURES) ON THE BASIS OF THE FEW EXPERIMENTAL CASES.

ICT impact on process control

For the improvement in **process control of city sub-systems** most of the focus has been on the transportation sub-system, 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 soon.

Just the collection of data by properly '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).

3.2 From the portfolio of solutions to better define problems: ICT contribution to an agora city scenario

ICT AND THE 'SHELTER' FUNCTION. ICT AND THE 'WORK' FUNCTION. ICT AND THE 'LEISURE' FUNCTION. THE THREE DIMENSIONS OF ICT INTERVENTION FOR AN 'AGORA' CITY.

To an efficient urban planning, society needs to agree on the priority values and objectives and to spell them out in a desired 'future scenario' for the city.

In Part 2 we have proposed the "agora" scenario as a condensed description of values and objectives.

ICT should be called in as a tool to make the scenario feasible and, even before, to better spell out the scenario. But is ICT a tool available for whatever scenario?

The answer is positive as can be argued by the two extreme and somewhat caricatural scenarios that we can devise with the help of ICT:

* **the super-functionalised and space-specialized city**: the sectoralization of the modernistic city plan that have divided the city space into 'efficient' monofunctional zones (where to work, where to shop, where to live) - with the citizens hurrying as aliens to move from one zone to the others - can still be increased by the intervention of the new ICT. Intelligent skyscrapers represent the added new specialized zone for services to the global economy thanks to 'teleports' connections.
* **the virtual-space home-centred city**: thanks to the new ICT a super-functional home is 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.

ICT should therefore be available also to support a more desirable in-between city scenario.

The space organization of an **agora city** should favour the natural needs for socialization of the human being, favouring solidarity and social cohesion.

To revisit the urban plan to find the potentiality to benefit from ICT we can focus on four main functions: shelter, work, leisure.

ICT and the 'shelter' function

Starting from **shelter**, we note that the home has passed, at least in rich society, from performing the simple function of shelter, to that of centre of socialization (a place to meet friends), and a symbol of status. ICT will add the role of information amplifier.

The electronic home or '*domotique*' by extending and completing the communication networks could represent a true revolution - the 'intelligent' home - by inducing the emergence of a different way to live the home.

The risk is that instead of becoming an enhancer of the social life of the family, the 'intelligent home' by increasing the dependence from technology, will push towards a de-responsibilized, 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 (be able to control the technological excess),
ii) integrity of the individual and preservation of life (security, privacy, assistance),
    iii) freedom from ingrate tasks (to pass from 'useful' time to 'leisure' time),
iv) communication and information (to be connected with the entire world, to know all about everything).

The impact of the Electronic Home on city planning

" .. CHANGES IN THE USE OF THE HOME HAVE IMPLICATIONS FOR USE OF OTHER LEVELS OF THE SYSTEM, I.E. THE NEIGHBOURHOOD AND WIDER ENVIRONMENT. .. THREE ISSUES [ARE OF RELEVANCE]:

TECHNOLOGY AND ENVIRONMENTAL CHOICES: CHOICES MADE IN THE PLANNING, DESIGN, MANUFACTURING AND USE OF TECHNOLOGY HAVE IMPLICATIONS FOR THE KINDS OF TECHNOLOGIES DEVELOPED, WHAT PURPOSES THEY WILL SERVE, WHO WILL USE THEM AND WHERE THEY WILL BE USED. THE SOCIAL AND ENVIRONMENTAL OUTCOMES OF DIFFERENT CHOICES HAVE IMPORTANT IMPLICATIONS FOR LAND USE PLANNING, TRANSPORTATION USE, PATTERNS OF SOCIAL INTERACTION AND ENVIRONMENTAL EXPERIENCE. OPTIONS RELATED TO COMMUNAL PROVISION AND USE OF TECHNOLOGIES ARE IMPORTANT IN THIS CONTEXT.

ATTRACTIVENESS OF OUT OF HOME ENVIRONMENT: THE CHOICE BETWEEN USE OF THE HOME AS A LOCATION FOR TECHNOLOGY RELATED AND OTHER ACTIVITIES AND USE OF LOCATIONS OUTSIDE THE HOME IS INFLUENCED INTER ALIA BY THE ATTRACTIVENESS OF OUT-OF-HOME ENVIRONMENTS. QUALITY OF LAND USE PLANNING, AVAILABILITY OF DESIRED FACILITIES AND AMENITIES, THE RESOURCE POTENTIAL OF THE PUBLIC SPHERE, SAFETY AND QUALITY OF PUBLIC ENVIRONMENTS; ALL IMPACT ON PEOPLE'S CHOICE OF LOCATION FOR ACTIVITIES...

TRANSPORTATION: TRANSPORTATION PLAYS A VITAL ROLE IN ESTABLISHING AND MAINTAINING CONNECTIONS BETWEEN THE ELECTRONIC HOME AND THE ENVIRONMENT BEYOND. DEVELOPMENTS IN TECHNOLOGY CAN IMPROVE COMFORT, SAFETY AND EFFICIENCY OF TRANSPORT USAGE AND DECREASE ENVIRONMENTAL POLLUTION. MOBILE COMMUNICATIONS CAN FACILITATE 'KEEPING IN TOUCH' WHILE ON THE MOVE. GIVEN THE SOCIAL ISOLATIONIST POTENTIAL OF MANY OF THE TECHNOLOGICAL DEVELOPMENTS CHARACTERISTICS OF THE ELECTRONIC HOME, DEVELOPMENTS IN THE TRANSPORTATION AREA ARE VERY IMPORTANT TO SOCIAL CONNECTIVITY." (PG. 66)

MORAN (93)

The urban planner can make use of the new home by taking advantage of the multifunctional new roles of the home 'system' and integrating it in the other functions that the citizens perform in the city.

ICT and the 'work' function

Concerning **work,** the urban planner cannot but consider the potentiality of tele-work. From the two extreme scenario listed above - from a super-functionalised city to a home centred city - urban planner might focus on an intermediate one where the work organization will amplify the occasion of socialization (far from the two extremes of being an alien in the multitude of a big office or an isolated individualist at home).

The concept of telework (see OECD, 92, pg. 77-108) span from the decentralization of big offices into autonomous satellite units ('fragmentation' of firm organization), 'dispersion' of work into small units (each one referring to a decentralized subunit), 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 important implication for self-employers (such as free-lancers, consultants, translators, insurance agents, etc.) or for supplementary work (such as the work at home of university researchers).

The fragmentation of large company work organization into satellite offices will have impact in the building concepts which might loose their single-function characteristic by hosting a mix of activities and functions.

To facilitate the decentralization of work of self-employed, *satellite work centres* can be conceived and realized with public support (public shared facility centres) with work places equipped for telework. Self-employers and skilled workers might find in such centres complementary expensive facilities to that available at home (multimedia network connection and processing).

Experiments are being done in different countries.[22] *Community Teleservice Centres* are provided in remote location to reduce the handicap of geographic isolation (experiments in Nordic countries - see OECD, 92, pg. 97).

ICT and the 'leisure' function

Concerning **leisure** activities, we will simply refer to one possibility among the many (e.g., multimedia presentation of vacation resorts) that can take advantage of ICT.

The idea is the following: ICT could 'multiply' the possibility to follow special cultural events such as theatres show, by realizing a network of small public halls equipped with large screen HDTV where the theatre play can be seen in real time.

In principle with cable TV service the play can be seen at home. However, the HDTV specially equipped hall will permit the social effects of getting together and cheaper costs.

---

[22] *As an example, at the Hawaii Telework Demonstration Project 16 workplaces are provided partly for public employees and party for private ones. (see OECD, 92, pg. 96)*

The three dimensions of ICT intervention for an 'agora' city

In general the concept of an **agora city** should aim at recuperate the value of 'neighbourhood' which has often been destroyed by the present city social fragmentation and subdivision of the urban spaces into monofunctional zones.

There are three dimension in the concept of neighbourhood: a *social dimension* (feeling at home between friends), a *practical dimension* (to find the services we need, to work, to go to school), a *political dimension* (to share common interest, to be part of voluntary activities, etc.).

For the ***social dimension*** ICT should help in restoring the local network of contacts and security. Network ICT services such as Minitel in France (more than 5.5 million terminals) can permit the realization of friendship virtual network. Experimentation of social application ('modern public space' /virtual space) have been on in France. But the social dimension require direct physical contacts.

One such function in the past was performed by small shops and boutiques. The economy of scale have killed many of them. An economy of scope can substitute for the economy of scale (e.g. postal office performing other services such as booking theatre tickets). Boutiques can be equipped for 'virtual shopping' showing by the intervention of multimedia facilities the merchandize available in large store departments and collecting the client order.

The same services can in principle be available at home (home teleshopping). However, apart from the fixed cost of investments and of the extra service of home supplying, there is the socialization effects that the actual boutique will add.

As for the ***practical dimension*** of neighbourhood, local community - as a counter-balance to too much 'domotique' (services home supplied) which might increase the feeling of isolation - can help by setting up 'integrated service canters' where citizen might find a variety of services.

Experiment designed by different names ('service shops', citizen offices, neighbouring offices) are underway in different localities where experts on different area (fiscal, finance, social security) can respond to demands on the best way to get a service (whom should I contact, what has to be done, how to get repairs done at home) and to perform the service themselves on behalf of the citizen (e.g. apply for pension).

Concerning the ***political dimension*** of neighbourhood, an important trend is for the municipality to decentralize offices, to set up civic tele-service spaces where people can access city information.

Local TV can also play an important role: to solicit voluntary social initiatives, to point to local problem, etc. Two ways TLC links will be instrumental in developing new methods 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.

3.3 From the portfolio of solutions to better define problems: ICT contribution to an harmonic global/local city

ICT AND THE NETWORKIZATION OF URBAN SPACE: THE CASE OF EDUCATION. ICT AND CITY CONNECTION TO EXTERNAL NETWORKS.

With respect to the city of the past the new 'agora' city should be able to find an equilibrium between a human centred local space and the 'multi-layered networked virtual' space in **a balanced 'local-global' (glo_cal)** vision of human activities.

The urban space has always been characterized 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.

Since the running and using of networks has a cost, a basic needs to access to the networks service has been assured in advanced society by the so called 'life-line' (free access for emergency call, etc.).

The availability of information and knowledge networks will pose even more than with other networks the problem of equality of access and of 'life-line' (socially shared cost of accessing and using some of the network services).

ICT and the networkization of urban space: the case of education

To see the effect of *networkization* of urban space let us consider the case of education. The impact on the city scenario comes from the transition of ICT from the processing of information (*information* society) to the process of knowledge (*cognitive* society).

The fact that a large fraction of work will consist of processing information (in advanced countries such as USA already today 60% of working population) will impact the way of life in the city.

The knowledge processing revolution (knowledge in all its forms - data, images, sounds - can be computerized, processed and transmitted) will change even more the work organization and others activities: e.g. the availability of expert systems (with computer aids, new knowledge can be inferred from existing knowledge base) 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 valorised both on the spot and by tele-services (*virtual library*).

The availability of multimedia network will let emerge a 'network knowledge': knowledge shared in different media can be processed on spot, stored in different parts of the network, transmitted and teleprocessed.

Today the educational tasks is taylorised, based on received truth organized into well separated disciplines. Teaching is collective in a school class.

The potential 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 will be to guide the school boys in this task. Out of the school class, learning will continue at home (connected to educational TV, videotext

services, CD ROM, etc.), in civic '*media resources centres*' specially equipped to be con-
nected to the knowledge network, and at the working place.

By 'media resource centres', are intended both the old libraries transformed (via computerization, multimedia knowledge storage, and network connection with other centres) and the museums (art and science) which will also have completed the transition toward multimedia processing of the 'exhibited' knowledge (audiovisual aids, user friendly computer terminals, etc.).

The potentiality of knowledge network will also impact the many existing educational and cultural private clubs which will become also centre of multimedia knowledge processing to better perform their voluntary tasks.

ICT and city connection to external networks

Teleports will connect cities to the entire world.
There is a real risk, however, as we have discussed in sect. 2.3, that city becomes a weak fragmented set compared to the external networks that cross it.

The signal is made evident by the increasing intercity competition to attract global actors to install facility in the city. To this competitive strategy TLC infrastructures and services are certainly of primary importance. Successful city 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' might emerge, leading to new entrepreneurial strateg-ies for urban economic development (reacting to the today trend of fragmentation of urban economies 'slaved' by global economy dominance).
Telematic network will create new liaisons for new partnerships in business or private. [23]

ICT will therefore provide basic tools to realize the 'glocal' city scenario.

---

[23] *The necessity to promote urban use of TLC potentialities is well recognized and experimentation are underway. France has promoted several initiatives: Urban 2000, a national think tank to provide support and guidance to urban telematics initiatives (cabling, teleports, videotext); 'Observatoire de TLC dans la Ville', which promote studies, debates, local telematics experiments; ZTA (Zone de Telecommunications Avancè) to promote, with governmental support, special areas inside a teleport city equipped to take most advantage of TLC. (see OECD, 92, pg.51-76)*

The importance of good telecom facilities for cities

"FOR THREE REASONS IT IS IMPORTANT TO PAY ATTENTION IN POLICY MAKING TO DEVELOPMENTS IN THE INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) ON LOCAL/REGIONAL LEVEL:

- ICT IS A FACTOR IN THE COMPETITION FOR MULTINATIONAL COMPANIES BETWEEN THE LARGE EUROPEAN URBAN AREAS;
- TO CREATE THE CONDITIONS FOR REGIONAL BUSINESS TO MEET THE CHANGING INFORMATION AND TELECOMMUNICATION REQUIREMENTS AND TO PROFIT FROM THE OPPORTUNITIES THEY OFFER;
    - TO OFFER THE POPULATION THE POSSIBILITY OF SHARING IN THE NEW FACILITIES AND SERVICES.

....THE THREE POINTS CANNOT BE CONSIDERED SEPARATELY.

ICT DEVELOPMENTS CAN ONLY BE FULLY EXPLOITED IN A REGION WHERE THE POPULATION IS FAMILIAR WITH THE INFORMATION AND TELECOMMUNICATION TECHNOLOGY, AS A CONSUMER AND IN THEIR WORK. THIS LEADS TO A REGIONAL MARKET AND A LABOR POTENTIAL THAT IS FAMILIAR WITH ICT PRODUCTS AND THE WAY THEY ARE USED. IN ADDITION THIS CAN LEAD TO AN ATTRACTIVE LOCATIONAL CLIMATE FOR INTERNATIONAL COMPANIES. THERE, THEY KNOW, WILL BE SUFFICIENT EMPLOYEES AND SUPPLIERS TO THEIR ADVANCED INFORMATION AND TELECOMMUNICATION SYSTEMS." (PG.6/1-2)

BONGENAAR & LE CLERQ (92)

3.4 From the portfolio of solutions to better define problems: ICT contribution for a sustainable city

ICT AND THE SATURATION OF UTILITY NETWORKS. ICT AND THE SECURITY PROBLEM. ICT AND CITY SUPPLY LOGISTIC.

Another important new aspect with respect to the past is related to saturation and un-sustainability of the city system. (see sect. 2.3).

Lacking the possibility to increase the capacity of the system the scenario has to include a new 'wisdom of complexity' to regain governance of the system by better understanding its intrinsic dynamics so that human action can find a multiplicative effect in the endogenous system forces to assure an intergenerational identity of the local diversity in an **autonomous and self-supported (sustainable)** city system. ICT could be instrumental to meet such an objective.

Saturation of urban system often appears as saturation on the capability of city networks. The case of the transport networks is the more evident.

ICT and the saturation of utility networks

Saturation might be real or connected to an inefficient uses of the network capabilities.

Take the case of water supply network. In certain cities the dispersion of water due to leakages, mismanagement of reservoirs, failure of preventive maintenance are responsible of the mismatch between demand and supply.

Information collection and processing can help here very much in optimizing network management. Telephone has already played an important role on this matter.

ICT will make possible to even conceive a 'network of networks' in the sense that an information networks will permit to collect data from the different networks and take advantage of common processing and inter-networks exchange of data for a better global management.
Information network will permit to realize an hierarchical management system where decision will be taken at the proper level. [24]

In general one can say that the application of ICT with the aid of new sensors to collect data from the system, planning schedules, modelling techniques, flexible control and operation strategies will permit to operate the actual networks as close as possible to the 'virtual' network (a network that match ideally demand and supply with no time delay).[25]

---

[24] *E.g., in the case of traffic light control this strategy permits to the local light to react to local traffic within constraints decided by a central traffic control strategy. An early experiments to prove the application of this control strategy was successfully performed in Torino, in the early '80s.*

[25] *Examples of common information network for utilities networks are underway in France (ASTARTE system), in Germany (TEMEX system) and other countries. (see OECD, 92).*

ICT and the security problem

Another field where ICT networking will have important effect in responding 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 in security by automatic signalling, advanced sensors, 'intelligent' data processing, use of wired city potentialities. To give an example, image data processing - such as showing best (fastest) route to find a place - can help patrol intervention on demand for urgent help.

ICT and city supply logistic

Another problem where ICT can help is in optimising 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). [26]

---

[26] *See, eg., the ODETTE system used by car manufacturers.*

3.5 Conclusions from Part III

The examination of a given technology, as we have cursorily done in this Part III allows, on one side to better and more deeply depict the scenarios for the city future, and on the other to better specify the needs for an 'adapt' technology.

For the case of the *Agora scenario* we have been able to better describe some *"social"* implications of the technology (how to make easier personal contacts), some *"practical"* ones (e.g., the effect of providing 'city centres'), and some *"political"* implications (e.g., how to favour the exercise of democratic rights by civic teleservices).

For the *"glocal" scenario* the concept of networkization assume clear evidence

as the new technology permits to tackle in a new way some basic issues such as education.

For the *"sustainable" scenario* the concept of saturation becomes clear through the specific case of the networked services.

The "design process" exercise - to better specify the "demand" by the examination of the "offer" of potential ICT solutions - results in the end in the specification of the requirements for new technology "building blocks". In fact, the existing "offer" might be "packaged" into too elementary or generic units (e.g. personal computers) to be of help in conceiving how it will impact the future of the city. Or, the technology "building blocks" can represent packages of technology already developed but strictly matching objectives different from our owns (e.g. the teleports solution might not respond to some basic criteria of equity and accessibility to the network included in the glocal scenario).

The existing ICT "building blocks" - such as those indicated in sect. 3.1 - need to be revisited. We have therefore pointed to some new possible idea (see the case of the "media resource centres") that can be realized without any basic innovations on the ICT but simply "assembling" together with a different objective in mind existing technological "components".

At the end, the ability for a planner to "design the city" depends on the availability of the "building blocks" that match the needs derived by the scenario description, which, though complex, can be used as elementary "brick" (they do not have to be broken into parts, since they already are coherent with the global needs) to assemble the city global plan.

As a result of this more detailed exercise of comparing needs and offer for a special technology family such as ICT, an **R&D Agenda** could be defined that aims at the development of **'adapted ICT building blocks'** to contribute the portfolio of solutions to respond to urban challenges.

One should recognize that in the current EU R&D Programme some programmes cover the scope to increase the portfolio of city 'building blocks'. This it is, e.g. the case of the DRIVE Programme concerned with urban transportation issues.

Other R&D initiatives are, however, needed to assure a broader coverage of the urban issues. To show how specific 'terms of reference' for ICT city building blocks can be arrived at, in the Appendix a description is given for an idea that refer to the "glocal" city scenario. In sect. 3.3 we briefly referred to the impact of ICT on the networkization of the urban space considering the case of education. The project described in the Appendix considers the importance to learn how to make use of the computerized information

technology. Since this latter is penetrating society at high rates, its knowledge is of decisive influence for the individual as well as for the society. To maintain social stability and prevent dis-balances by lack of skills, it is necessary to include all members of our societies in this technological knowledge. Specific actions have to be taken to respond to the challenge. The proposed project intends to show that actions are indeed possible.

POST-FACTION

A European writer living since several years in Japan said to a friend visiting for the first time the country and making comments on the local way of life: "If you stay here one week you can go back home and write a book on Japan. If you stay one month you can only write an article for a newspaper. If you stay more than one year, you will not be able to write anything". The morale of the anecdote is clear and applicable to a complex city: the more one tries to understand its multivarious aspects, the more new issues and interrelations emerge that make difficult to make inference, connect causes and effects, establish priority of issues. A humoured reader could say that this 'thick' report confirm the anecdote: it is the result of a short visit to urban complexity.

A less humoured reader might instead find a difference in the three Parts on which this work is divided. He might consider the last Part, dealing with a specific and detailed suggestion for actions, as presumptuous as the visitor that after one week think to have got at the core of the Japan reality to be in the position to suggest what the Japanese should do to improve their way of life. He might perceive Part II more as the result of a one month visit: ideas are clear but one has the impression that much more - a much longer stay - is needed to really be able to get conclusion, to suggest specific actions. Instead, concerning Part I, the reader might get the impression that it looks like the result of more than one year visit: one appreciate how complex is the situation but is not able to suggest any specific actions because so many comes to his mind and they are so inescapably intertwined.

The anecdote might, however, have to be completed to get a proper morale for our case. Suppose that the European gentlemen living in Japan for more than one ear is there engaged by a contract with an editor to write a book on Japan. What should he do? Break the editor contract, realizing the impossibility to keep the promise? The other possibility for him is to get out of the "holistic trap" of complexity on which he is fully immersed and recuperate some of spirit that he had after the first month of stay and, even more, the spirit of the first week. Being enriched, however, by the consciousness of the real complexity of the matter.

Each of us, no matter if simple citizen or city mayor is so immersed since ever in the urban complexity, that will find difficult even to dream about specific ideas to do something to solve city problems. It is true that during the election campaign to become mayor of a large and complex city we might have heard a young candidate to promise that, if he or she gets elected, knows what to do and will do it. The reality of urban complexity, after being elected, will soon appear and his or her enthusiasm fade away quickly. The urban complexity is such, however, that an 'expert' senior mayor might not feel better. The effort made here is to show that after the full immersion in complexity, a methodological approach can help us to recuperate the enthusiasm of the beginning of the trip and be able to organize a response to meet the urban challenges.

APPENDIX

A project proposal: "CALL / Computers and Local Learning - Computer Literacy, Cyberworlds and social action [27]

(CONTRIBUTION BY H.E VAN BOLHUIS AND V. COLOM) [28]

The scope of the project is to realize a network of multi-media processing facilities distributed in several quarters of the interested city, connected through a center to the external ICT networks. The facilities should be at the disposal of users interested in developing their skills to make use of multimedia knowledge processing.

CALL will concentrate not only on computer literacy and creative / productive skills, but on the notion of networks and Cyberspace. Here, social politics may find an unexpected and completely new way out of actual social problems in urban areas. The multimedia and networks technology can enhance new skills, new ways of employment, more individual action in economical and artistic questions and a renewal of social ties within the urban quarter's community.

The general idea is to bring these technologies into disadvantaged urban quarters where they may serve as a future base for new developments of infrastructures, creative work and social activities.

By offering a chance to quarters with high unemployment rates to approach these technologies, CALL will contribute to develop knowledge and skills in computer technology use and help creative and professional development as well. Participants and users will get in contact with the most advanced technology available, develop skills required for jobs, enhance their own creative and professional capacities with state-of-the art technology.

The ultimate aim then is to start a self supporting and self stirring process that after a time of public support and financing, can become, at least partially, autonomous. One condition for the success of such an action is the decentralized, autonomous execution by units based on city's quarters. These units are the carrier of the project. On its ability of adaptation to the local situation depends the success or non-success of the proposed project. CALL intends to be an incentive to start successful regional and local actions on the base of new workforce with skills that correspond with the needs of the most advanced industries, arts and other activities.

---

[27] *CALL is a computer-network command to establish a network connection to other computers, networks and cyberspace. The City Action CALL is thus equipped with a symbolic name.*

[28] *Visiting scientists to the FAST Perspective team of the EU Commission.*

CALL Project Targets

The CALL projects responds to a set of challenges produced by the deterioration of urban quarters due to unemployment and social isolation. In dealing with these challenges, the CALL city-action works along the lines of established socio-political representation.

The targeted quarters are those having the following characteristics:
- high unemployment rates,
- deterioration of living conditions (housing, streets, water supply etc.): slums or slum-approaching conditions,
- few skilled job chances;
- bad school conditions.

Quarters of such a consistence are found in low-industrialized cities of mainly rural oriented areas (e.g., southern Mediterranean belt) or in cities who where highly industrialized in primary sector industries (steal/coal) and now under decline.

The main aims of CALL can be described with the following terms:

- computer literacy for the participating people,
- network ability, Cyberspace orientation and navigation faculties,
- knowledge 'navigation' and mental upgrading abilities,
- the enhancement of creative and artistic work from music to multimedia presentations,
- general knowledge building in all knowledge and skills people are interested in,
- new professional skills for job search or job creation,
- stimulating and guiding role of the CALL centres for new employment forms,
- stimulation of the establishment of new social links between the targeted quarters and the regular society, thus re-integrating quarters in wider social structures using computers as a link element (their fascination, their social group building),
- trying to build a quarter centred social network based on the CALL centres.

The CALL action will find its limits with the growing skill of its users. So, when a user has reached a skill level which allows her or him to build up an own little company, buy an own computer or find a job, she or he leaves the circle of the CALL participants. Nevertheless, this person can always rely for special purposes on the technology of the CALL centre or - given new unemployment or a failure in its entrepreneurial undertaking - return to the CALL centre to learn further. The decision when a participant should leave the CALL perimeter is up to the responsible in the corresponding CALL center.

CALL: the target population

THE CALL PROJECT AIMS AT ALL INHABITANTS OF THE INVOLVED CITY-QUARTERS. THE TARGETED GROUPS CORRESPOND TO SOCIALLY DISADVANTAGED PEOPLE, ESPECIALLY YOUNGER GENERATIONS:

- UNEMPLOYED,
- YOUNG LOW SKILL WORKERS TILL 30 MENACED BY UNEMPLOYMENT /

INTERIM WORKERS,
- YOUTH GANGS AND OTHER QUARTER INTERNAL SELF-ORGANIZATIONS,
- YOUNG PEOPLE UNDER 18, NOT IN SCHOOL, NOT IN REGULAR ECONOMICAL PROCESS,
- YOUNG FEMALE POPULATION / ALONE MOTHERS / PROSTITUTES.

TO ALL THESE GROUPS, CALL OFFERS A CHANCE TO DEVELOP NEW SKILLS AND SO BUILD A NEW INDIVIDUAL CAREER.

IT IS STILL AN HYPOTHESIS THAT MOSTLY YOUNG PEOPLE, SCHOLARS AND YOUTH WITHOUT SCHOLAR CAREER WILL BE THE EXCELLING USER GROUP. THE SUCCESS OF THE CALL INITIATIVE WILL, HOWEVER, BE GREATER IF ALSO THE OLDER GENERATION, THE MOTHERS AND FATHERS, THE ADULT UNEMPLOYED AND THE ELDERLY COULD BE INTERESTED. THE USE OF THE EQUIPMENT BY BOTH SEXES SHOULD BE ENHANCED. [29]

The structure of CALL

The project starts with building up of a network of **Urban Quarter Units** (QNU) and equip them with high-efficient and modern computer and multimedia facilities. The quarter units will be connected to a powerful, mainframe based **Central Processing Station** (CPS) serving special applications (like high-capacity printing, presentations, small productions). Furthermore, it will serve as a central data-base connected to the external world as a non-profit Internet-gateway.

Each QNU will be equipped with high-standard PC-facilities allowing all sorts of computer and multimedia applications (like advertising and *luditive* designs), audiovisual or processual artworks (like musical applications), program writing and a world-wide networking via the CPS-gateway, thus getting a global knowledge at immediate disposal.

The QNUs will be linked with each other via the CPS, so that they form a Local Area Network (LAN). Therefore, the users of the QNUs can communicate with each PC in the QNUs and the LAN. Furthermore, they have a global network access.

The suggested technology to be used for CALL is described in the Box.

---

[29] *One has to remember that the character of CALL is one of social experimentation. The offer, therefore, could not cover everybody who is interested. However, if the interested people are mothers around fifty who grasp the idea for looking for a new job or communicating these skills to their children, they are welcome. The same is valid for a grandfather of eighty-five. To the same extent, the winning over of unofficial, "grey" social authorities in these quarters (youth gang leaders) and the deriving action is up to the CALL centres in the quarters. Main linking condition in the CALL action is the general principle of free accessibility and free use of its centres by the urban population.*

CALL proposal: *The technology to use*

WHAT TECHNOLOGY DOES FIT BEST FOR THE PURPOSES OF THE CITY ACTION CALL?
THE CPS HAS TO BE EQUIPPED IN ITS CPS-RELATED FUNCTIONS WITH A GOOD MAIN-
FRAME COMPUTER, HIGH STORING CAPACITIES AND APPROPRIATE SOFTWARE. THE NEEDED
NETWORK SOFTWARE CAN BE DOWNLOADED AT NO COST FROM ANY BBS IN THE RELATED CITY.

THE CPS WILL NEED FOR ITS LAN-FUNCTIONS (IN TERMS OF HARDWARE):

- SEVERAL EXCHANGEABLE HARD DISKS TOGETHER WITH A STORING CAPACITY
  OF SEVERAL GIGABYTES. ALL THE PERSONAL SOFTWARE OF THE CALL USERS
  AND THE NETWORK MESSAGING CAN BE BACKUPED THERE. ADDITIONALLY, THE
  LAN SOFTWARE OF THE QNUS IS STORED THERE AS WELL,
- A 12 BIT CPU,
- SEVERAL TELEPHONE LINES AND MODEMS FOR THE LAN-UTILITIES AS WELL AS
  FAX FACILITIES AND SOFTWARE,
- UPGRADABLE PROCESSORS AND CPUS, BEGINNING FROM 486, BETTER 560 / 586.
  THE PENTIUM AND POWER PC DEVELOPMENTS SHOULD BE TAKEN IN ACCOUNT.
  TO TAKE NON-UPGRADABLE CHIPS WILL BE - FACING THE ERUPTIVE
  TECHNOLOGICAL PROCESS - A SEVERE FAULT,
- A PERMANENT INTERNET CONNECTION, WHICH MEANS BASICALLY A CON-
  TINUALLY RUNNING HARDDISK WITH MODEM EQUIPMENT.

THESE ARE THE BASIC CONDITIONS FOR CREATING A LAN. AS THE INTERNET ADDRESS
CAN BE A DIRECT ONE, THERE IS NO NEED FOR A COMMERCIAL SERVER.
IF, APART FROM THIS, OTHER FUNCTIONS ARE REQUIRED IN A LATER PHASE OF THE
CALL PROJECT, THAN THE CORRESPONDING HARD- AND SOFT-WARE CAN BE BOUGHT.

A SPECIAL FEATURE OF THE CPS COULD BE THE HOLDING IN STOCK OF CAMERAS AND
OTHER SPECIALIZED EQUIPMENT TO ALLOW ADVANCED URBAN QNU USERS TO USE THIS
EQUIPMENT FOR SPECIAL PURPOSES - LIKE GATHERING VIDEO MATERIAL FOR MULTIMEDIA
APPLICATIONS ON THEIR COMPUTERS. THE CPS COULD COOPERATE WITH OTHER COMMUNAL
INSTITUTIONS TO SAVE MONEY ON SUCH ACTIVITIES.

THE QUARTER NETWORK UNITS SHOULD CONSIST IN A SERIES OF LAN-CONNECTED PCS.
THE STORING CAPACITIES OF THE HARD-DISKS SHOULD REACH AROUND 500 MEGABYTES.
PARALLEL TO THE CPS HARDWARE, ALL PARTS OF THE PCS SHOULD BE EXCHANGEABLE AND
UPGRADEABLE AS WELL. THIS WILL ENSURE A LONG-TERM EFFICIENCY OF THE CALL
INITIATIVE. THE RANDOM ACCESS MEMORY (RAM) SHOULD BE OF IDEALLY 8 MEGABYTE, AT
LEAST 4 MEGABYTE WITH UPGRADING OPTION.
EVERY PC SHOULD BE A MULTIMEDIA MACHINE, WHICH MEANS THAT IT IS EQUIPPED
WITH A SOUNDCARD AND THE RELATED SOUND SPEAKERS. FURTHERMORE, IT HAS TO HAVE A
CD-ROM-DRIVE.
THE NUMBER OF PCS CAN VARY. ONE CAN BEGIN IN A FIRST TESTING PHASE WITH NO
MORE THAN FIVE MACHINES PER QNU TO TEST THE REACTION IN THE TARGETED QUARTER. IF
THIS REACTION IS POSITIVE, THE NUMBER HAS TO BE EXTENDED, SAY, TO TWENTY. MORE THAN
TWENTY MACHINES WILL DESTROY THE ENVISAGED INTIMATE ATMOSPHERE. THEN IT IS BETTER
TO ESTABLISH ANOTHER NEIGHBOURED QNU.

THE USED SOFTWARE SHOULD BASICALLY FULFIL TWO MAJOR TASKS. ACCUSTOM
USERS TO THE USE OF DOS-LEVELS AND RELATED QUESTIONS, INTRODUCE THEM TO
PROGRAMMING LANGUAGES AND TO THE USE OF WINDOWS-RELATED SOFTWARE (DESKTOP
PUBLISHING).

The opportunity to link up one's individual approach with world-wide standards
established by the Cyberspace-communities will be a central point of future-building in

these disadvantaged quarters. The invested energy is not only fruitful from a local point of view, but will be developed under a neat global setting and thus be valuable no matter what possible global developments might come.

The learning facilities of the QNUs will differ widely from classical school facilities. They will be based on multimedia programs in which a sound-image-text based software routine will interactively teach the computer user the knowledge she or he needs. This is good solution for developing computer literacy[30]. In the quarter centres, one will find also possibilities to learn **English**.[31]

Who will manage CALL?

ONE CONDITION FOR THE SUCCESS OF CALL IN THE QUARTER'S STRUCTURE IS THE GENERAL ACCESSIBILITY TO THE EQUIPMENT[32]. NO ONE SHOULD BE EXCLUDED BY TERMS OF MONEY OR FEES OR EVEN - IN CERTAIN LIMITS, NATURALLY - BEHAVIOUR[33]. SO, THE PRESENCE OF POTENTIALLY EVERYONE IN THE QUARTER IS ONE ELEMENT OF SUCCESS ON THIS BEHALF.

THE QNUS THEMSELVES WILL BE MANAGED BY ONE OR TWO PERSONS IN A DECENTRALIZED, SELF-SUPPORTING WAY, BY GIVING TO THE "SPECIALISTS IN THE FRONTLINE" THE DECISION-TOOLS TO DEVELOP "THEIR" QNU TO A SUCCESSFUL "UNIT" (INCLUDING A SMALL OWN QNU-BUDGET WHICH MIGHT BE ENRICHED BY COOPERATION OF THE UNIT WITH LOCAL ENTREPRENEURS). THE PROJECT EMPHASIZES A DECENTRALIZED APPROACH, AS CONDITIONS VARY IN CITIES SOMETIMES FROM STREET TO STREET. SINCE THE HUMAN FACTOR IS AN ESSENTIAL FACTOR IN THE CALL ACTION, IT MIGHT BE THAT AN ENTHUSIASTIC COMPUTER "FREAK" WITH SOCIAL RESPONSIBILITY IS PREFERABLE, AS QNU MANAGER, TO SKILLED, SPECIALIZED BUT COMPUTER-COOL SOCIAL WORKER.

THE CENTRAL ELEMENT OF SUCCESS RELIES ON TWO MAJOR QUALITIES: COMMUNICATION CAPACITIES OF THE QNU-MANAGERS AND HIGH COMPUTER SKILLS. THIS DIFFERENTIATES CALL FROM OTHER PROGRAMS WHERE PURELY SOCIAL-COMMUNICATIVE MOMENTS PLAY MAJOR ROLES. IT HAS TO BE STATED THAT SUCH PURE SOCIAL PROFESSIONALISM IS EVEN TRAMPLE ON THE AIMS OF CALL.

The acquired knowledge will encourage people to try out more computer facilities and applications, thus enhancing an organic, interactive, hypertextual growth into the world of electronics.

---

[30] *It will work with for example little films, Monthy Python sketches, programming exercises, network-messages.*

[31] *It should be stressed that for a successful introduction of computerized networks, the knowledge of English is a precondition comparable to the knowledge of Latin even in the remotest corner of the Roman Empire. English has since the growing of the Cyberspace become completely independent from its anglophone "home-bases". It is affectionately nicknamed the "CNNese" of the Net. Its importance for computer literacy, programming capacities and computer based communication is central.*

[32] *Naturally, as the value of the equipment is for the envisaged quarters astronomical, it should be thought over enhancing a social action of vigilant nature. Thus, the people and users of the quarter themselves would be responsible for the guarding and night guarding of the equipment - an example of social participation which could be aligned with other attempts to enhance people's re-appropriation of their own cities.*

[33] *It has to be taken into account that a joking, easy, playful (or, in american word, 'soft mastery') approach will suit the appropriation of the hypertextual world of PCs far more than the strict, direct, serious, linear approach of the Gutenberg-world. As Sherry Turkle in "The Second Self (1983) points out, the learning and concentration effects on PCs, especially when used in combination with programming and creative action, are astonishing.*

Furthermore, with the growth of the semi-professional use the QNUs will grow and their structure should include the possibility to be extended. In an ultimate step, a second QNU per quarter can be built.

The development of CALL activities

In these QNUs with their free access, all the following levels of computer activity should be possible:

- Beginner's and non-professional everyday activities like first programming, type-machine use of the PCs, little graphics, etc. This should be available also to persons which may be considered as "visitors" (but they acquire a basic understanding of computers and their worlds and transmit that into broader social circles: so, they act as multiplicators).
-
- Creative activities of all art and design rubrics, including those with "commercial" purposes. These activities will serve the needs of the amateur as well as the semi-professional artist and allow a development into professional artist and/or designer, etc. When people improve their skills they might be able to sell products - for example, artistic graphics to tourists - or, grasping the Cyberspace chance, they could sell product designs on the networks.

- Artistic action will - using the potential of multimedia computers - include all electronized or "electronizable" art and design forms: music (ranging from electronic/synthesizer to rock, pop and classical composition), drawing and painting (paintings, design, comic strips), processual art forms, audio-visual products (as art or game). These *oeuvres* could be "networked" and eventually sold in Cyberspace.

- Computer programming. These activities can range from simple graphic programmes and little games to professional and semi-professional software development, and open other business training possibilities. The upgrading of the internally used QNU software in this framework could be an important training ground for the users which allows them to obtain professional skills.

- Computer networking, messaging, electronic and paper newspapers. Using the Cyberspace option offered by the CPS, users of the QNUs could link up to the rich world of communication networks. They can participate in global discussions, get knowledge which is otherwise unreachable, learn and develop their abilities and enrich their personal and local culture. From these applications the path could lead directly to the world of publications, enhancing and fostering the production or participation in the production of newspapers and electronic publications, eventually electronic books. This would open a way into the future electronic publishing as the present spreading of electronic bookshops on the networks prove.

This process will build up continually computer competence. The QNU-equipped quarter will change little by little: for some people, there might be new jobs; others will develop their own professional career.

One aim of the CPS/QNU-units will be to create jobs. It has to be seen in an experimental social action whether this will work or not. However, it can be stated that cooperation with local enterprises[34] will be of major importance for the structural effects of CALL initiatives.

Network effects of cooperation with CALL

A CENTRAL CONDITION FOR A SUCCESSFUL INTRODUCTION OF CALL WILL BE THE COL-LABORATION WITH THE LOCAL COMPUTER CLUBS AND BULLETIN BOARD SYSTEMS (BBSS). THERE ONE WILL FIND A HIGHLY DEVELOPED AND DEMOCRATIC POTENTIAL OF COMPUTER-SKILLED AMATEURS AND PROFESSIONALS, WHICH WILL BE MORE THAN HELPFUL TO BUILD UP A LAN AND DEVELOP ITS TECHNICAL OPTIONS. THIS COOPERATION MAY HELP CALL WITH NETWORK PROBLEMS, WITH VIRUSES, WITH SOFTWARE PROBLEMS, WITH LACKING SKILLS.

THIS TEAMWORK APPLIES AS WELL TO SPECIALIZED KNOWLEDGE IN THE EDITING, DESIGNING AND OTHER SKILLS. SPECIALISTS FROM DIFFERENT SECTORS AND SCHOOLS SHOULD HELP USERS IN FULFILLING SPECIFIC TASKS. THEIR TASK MAY BE REDUCED WHEN THE LEVEL OF COMPETENCE OF THE CALL PARTICIPANTS IS HIGH ENOUGH TO USE THE NETWORKS FOR THEIR PROPOSES AND MANAGE THEM.

No formal training is foreseen by specialized school coursers. School, in general have to learn to live with the computer society themselves. To reach its aim, CALL should be run by enthusiastic, computer oriented **and** social responsible people of both sexes (to prevent the white male dominance).

The CPS, in its central function, is based on a highly automated mainframe computer with upgraded storing capacities for QNU-backups and personal mail- and workboxes of the QNU-users.

If one limits the CPS only to these communicative connection functions, then there is no need for human supervisors apart from regular controls, backup actions and hard-disk cleaning which can be done by the QNUs. In this case, virus-shielding of the CPS and the periodical virus scans of the system as well as the upgrading of the doorway software can be done by the QNU personnel. This picture changes if the central quality of the CPS is exploited.

The psychological challenge

This is the most difficult part of the project. The psychological challenge means mainly two things:

- first, to convince the people living in the targeted quarters to try the offer and develop an own creative or professional action, acquire skills, know the Cyberspace and develop self-confidence.
- secondly, it requires a moral effort from the offering side: the readiness to deal with **all** the difficulties, accept the limitations vis àvis the Cyberspace and multimedia technology and accept social realities.

---

[34] *Which on the longer run might expand, take computer skilled personnel from the QNU or articulate a need for adapted software built on flexible local supply.*

<div style="border: 2px solid black; padding: 20px;">

The steps to CALL

IF WE SUPPOSE A MINIMUM SCENARIO, THAN A CITY CAN START WITH A ONE CALL CENTER WHICH IS A CPS AND ITS FIRST QNU AT THE SAME TIME; PROBABLY IN ONE BUILDING. IN THIS CASE, THE CPS WILL BE BUILT UP AS A LARGE QNU WITH A MAINFRAME-EQUIPMENT AND THE CORRESPONDENT QNU EQUIPMENT. IN A LATER STAGE, NEW EXTERNAL QNUS CAN TAKE OVER THE ROLE OF QUARTER CENTRES FOR TARGETED QUARTERS.

THE CPS COULD THEN TRANSFORM TO A CENTRAL ASSEMBLING UNIT WITH HIGH-TECH EQUIPMENT FOR PRINTING AND EDITING OF, E.G., NEWSPAPERS, BOOKS, GRAPHICS ETC., OR FOR AUTOMATED LITTLE (ARTISTIC) PRODUCTIONS (FIGURES IN AND ON WOOD, GLASS OR STONE). ABOVE THIS, A HIGH-TECH EQUIPMENT WITH BIG SCREENS CAN MAKE POSSIBLE HAPPENINGS AND MULTIMEDIA PERFORMANCES - FOR EXAMPLE, THE NETWORKED ARTISTIC MULTIMEDIA PRESENTATION OF SEVERAL QNUS OR NETWORK-RELATED INFORMATION PRESENTATIONS.

IN THIS SCENARIO, THE CPS WILL HAVE TO BE EQUIPPED WITH QUALIFIED PERSONNEL. A STAFF OF COMPUTER-LITERATE PEOPLE (IN THE BEST CASE RECRUITED SCHOLARS FROM THE URBAN QUARTERS) WILL TEAM UP WITH EXPERIENCED STAFFS OF MUSEA, ARTS AND SOCIAL WORKERS, THUS FORMING A KNOWLEDGE SUPPLY FOR THE RELATED QNU.

</div>

The CALL challenge has **several dimensions**.

First, CALL has to overcome the normal social resistance from the targeted urban quarters, where the social structures may significantly vary in comparison to the "mainstream" of our societies. Working, intellectual efforts and other characteristics related to the middle class activities, may not have a high standing within these quarters. Thus, CALL has to work on three arguments to convince refusing inhabitants:

- CALL has to show that the CPSs / QNUs are a chance to enter a positive career. The learning chance is a gateway to a better future.

- CALL has to stress that working with computers has a specific fascination. Here, the playful approach helps to surmount fears of the "devil computer" a lot.

- CALL has to give people a chance to participate in learning processes, to develop their own ideas and visions. Any "teacher-like" approach ("we know it and you don't") is not only a pretension (because teacher's, employees, politicians simply **do not** know), but destroy any chance to produce a self-supporting process. Furthermore, it violates the fundamental democratic and communicative potential of the computer.

Secondly, CALL has to overcome other major problems: The network world people are encouraged to enter, have psychological different structure as compared to the "Gutenberg Galaxy" of the established society. This problem may not be as sharp as in middle class families (as textual literacy is not the major element of psychological orientation). Several analysis[35] show that the hypertextual structure of computer

---

[35]*As several analysis have proved, there is a strong cultural action in Fan-clubs and other "poaching" sub-cultures. This has to be seen in addition to the proved psychological qualities of the computer. Cfr.. Sherry Turkle 1983, and Henry Jenkins, Textual Poachers (1992).*

knowledge is not that difficult to grasp for non-literate people in the textual sense. This fact, in combination with the fascination of the interactive technology, may facilitate the work of CALL - **if** the executors can stay away from trying to translate textual literacy into computer literacy. Even assuming that CALL does not clash with strong textual literacy based reservations, it will have to deal with untrained minds - at best accustomed to the absolute passive consumer mode of mass-media.

Thirdly, CALL has perhaps to deal with unexpected scepticism. As the targeted quarters are socially weak and show high unemployment rates, there will be a sort of basic desperation - "*we, anyway, have lost, no matter what they say*". This has brought parts of the youth to adapt a rebellious attitude towards the mainstream society. That means that CALL has to deal with for example youth gangs. In this case not the individual youngsters or his/hers parents are to be won over for the project, but the leaders of these groups.[36] CALL should therefore build on the inner structures of the targeted quarters. A city action of this quality can only reach its aims in close cooperation with the "street". Therefore, CALL needs people who not only know thoroughly the situation but have the confidence of the important persons in the quarter.

To state the consequence clearly: CALL means not only a psychological challenge for the people who are supposed to learn and have a chance by the acquired computer knowledge. As well, the same mental effort has to be done by the other side: *politicians*, who have to be sincere with their limitations and have to accept situations and partners they would like to deny; *teachers and social workers* who have to admit that their knowledge about the computer world is limited; *enthusiastic computer mavericks* who have to cooperate with people they only know from television - if at all.
Accepting these facts, it is possible to develop CALL in a way to reach a deep going effect in the targeted quarters. The *keywords* are: modernization, cooperation, creativity, originality, no formalities but effectiveness, new thinking, future orientation, enthusiasm.

---

36   *To illustrate this it should be mentioned here the example of the "Vandals", a big, more than hundred persons, gang of young Berlin Turks which was long feared for its criminal activities. Having encountered a lot of bad experiences and after having reflected these, the gang and its leaders decided to prevent their younger brothers and sisters to go to the same way and assumed a civil responsibility - building up little enterprises, looking for jobs for the younger ones, keeping the own quarter free from hard drugs, etc. Unfortunately, the Berlin Senat did not understand the unique chance to win a whole quarter of the city and is not providing money and buildings for these groups. Thus, the experiment had no chance to spread.*

Similar experiences are reported from Den Haag. This proves that cooperation between social precarious groups and the established society is possible and should be used to get ahead.

BIBLIOGRAPHY

Belleflamme C. et al. (96), Innovation and R&D process analysis in Service activities, FAST report FOP 116, Brussels, 1986

Bongenaar A. , le Clerq F. (92), Assessing information & Communication technology facilities: the caso of Amsterdam, in Drewett R. (ed) Cities as loci of new technology, FAST-URBINNO report, vol. 3, Brussels, 1992.

Brickwell D. (92), Research and technological development for cities. Towards a memorandum, in Drewett R. (ed) Cities as loci of new technology, FAST-URBINNO report, vol. 3, Brussels, 1992

Businaro U.L. (92), Applying S&T to Globalisation issues: reflections on globalisation, complexities and problem-solving, in FAST report FOP 323, Brussels, 1992

Capello R. and Njikamp P. (92), Information & Communication Technology as a catalyst saptial develoment strategy, in Drewett R. (ed) Cities as loci of new technology, FAST-URBINNO report, vol. 3, Brussels, 1992

Cooke P. (93), Regional innovation systems: an evaluation of six European cases, in Getimis and Kafkalas (ed), Urban and regional development in the New Europe, Topos Special Series, 1993, Athens

Conti S. (93) New technological paradigm, urban identity and metropolitan networks in Europe, Colloque "Avancement de la recherche comparative sur le villes européenne, Saint-Cloud, 21 Octobre 1993

Conti S. (94), The network perspective in industrial geography. Towards a model, to be published in Geograpfiska Annalen, 1994

Cullen K., Moran R. (92), Technology and the elderly, Fast Report, EUR 14419, Brusssels, 1992

Dematteis G. (91), Sistemi locali nucleari e sistemi a rete. Un contributo geografico all'interpretazione delle dinaliche urbane, in Bertuglia. S, La Bella A. (ed.): I Sistemi Urbani, Franco Angeli, Milano, 1991

Dematteis G. (91), Possibilità e limiti dello sviluppo locale, IRIS, Incontri Pratesi, septembre 1991

Dematteis G. (92), Global networks, local cities, IGU Conference on urban system, Detroit, august 1992.

Dematteis G. (93), Towards a metropolitan urban system in Europe: core centrality vs network distributed centrality, Colloque "Avancement de la recherche comparative sur le villes européenne, Saint-Cloud, 21 Octobre 1993

Drewett R., Engelstoft S.,(90): The Future of Cities: the Human Dimensions and the Role of Science & Technology, FAST report FOP 220, Dec. 1990.

Drewett R. (92), The Future of European Cities: Cities as Loci of New Technology, FAST/URBINNO final report no. 3, Brussels, 1992

Drewett R., Knight R., Schubert U. (92a): The Future of European Cities. The Role of Science and Technology, Part I, Synthesis, FAST report FOP 306, Brussels, 1992

Drewett R., Knight R., Schubert U. (92b): The Future of European Cities. The Role of Science and Technology, Part II, Specific synthesis report on Urban System Dynamics and Macro-level comparative studies, FAST report FOP 312, Brussels, 1992.

Dunin-Woyseth H. (94), De Hominibus, Pecunia et Locis. An intersection of the socio-economic analysis of urban change and the contemporary / future role of Architectural and urban planning theory, paper presented at the Conference on Cities, Entreprises and Society, in Lille, 16 march 1994

European Foundation for Improving Living and Working Conditions (93a), Innovations for the Improvement of the Urban Environment. A European Overview, EC Publication Office, Luxembourg, EF/93/23

Friedichs J. (94), Cologne - A creative City, paper presented to the Workshop on Creative Cities, Glasgow, 12-15 may 1994

Kleinman M. (94), Inequality, Public Policy and Cities, paper presented to the conference on Cities, Entreprises and Society, Lille, 16 march 1994

Knight R. (92), The Future of European Cities - Cities as Loci of Knowledge-based Development, FAST report FOP-379, Brussels 1992

Jensen-Butler C. (93), Competiton between cities, urban success and the people role of urban policy: a theoretical framework, paper presented at the ESF Conference on Urban and Regional Restructuring, Stockholm , May 1993

Levine M.A. (94), After the death of National Policy: the Rise of National Urban Policies, paper presented to the Conference 'Cities, Entreprises and Society, in Lille, 16 march 1994

Loeckx A. (93), The city out of place. Questioning the peripheries: taxonomy, theory, design, in Getimis and Kafkalas (ed), Urban and regional development in the New Europe, Topos Special Series, 1993, Athens

Martinotti G.(92), Technological innovations & the New Metropolis, in Drewett R. (ed) Cities as loci of new technology, FAST-URBINNO report, vol. 3, Brussels, 1992.

Martinotti G. (94), The four metropolitan populations, paper presented at the Lille
    Conference on 'Cities, entreprises and societies', 16 march, 1994

Mommaas H. (94), Modernity, globalisation and the crisis of social modernism, paper
    presented at the Lille Conference on 'Cities, entreprises and societies', 16
    march, 1994

Moran R. (93), The electronic home. Social and spatial aspects. A scoping report,
    European Foundation for Improvin Living and Working Conditions, EC Publica-
    tion Office, Luxembourg, EF/93/22

OECD (92), Cities and New Technologies, OECD, Paris, 1992

Petrella R., (91): Demain, les Villes Européennes. Questions et Enjeux. FAST report,
    November 1991

Petrella R., de la Saussay P. (93), Gloabal Perspective 2010 - Habiter la Terre, Fast report
    FOP 321, Brussels, April 1993

RECITE, 92, RECITE. Regions and Cities for Europe, Bureau RECITE, Commission EU,
    Brussels, 1993

Rubinstein M. (93), L'Impact de la Domotique sur les Fonctions Urbaines, European
    Foundation for Improvin Living and Working Conditions,
EC Publication Office, Luxembourg, EF/93/24

Schubert U. (92), The Future of European Cities: Cities as Loci of Science, R&D and
    Innovation, FAST-URBINNO final report Part 2, Brussels 1992

Smith D.A., (94) The new urban sociology meets the old: rereading some 'classical' human
    ecology, paper presented to the Conference on Cities, Entreprises and Society,
    in Lille, 14 march 1994

Strohmeier P. (92), Demographic transition and the social diferentiation of european cities,
    in Drewett R. (ed), Urban system' dynamics. Macro-level comparative
    perspective, FAST-URBINNO report, vol.5a, Brussels, 1992

Taylor M. (92), Mediating the role of information technology in accessing information
    resources, in Drewett (92)

Vonk F.P.M. (91), Regeneration Policies in Medium Sized Cities, unpublished FAST
    report, Brussels, 1991 and F.P.Vonk, chapter 14, in Getimis and Kafkalas,
    Urban and regional development in the New Europe, Topos Special Series,
    1993, Athens