The challenges and problems facing cities are numerous, complex and difficult to delimit. For the sake of the discourse, we propose to class the challenges and related problems into three groups:

- problems related to the reaching of saturation levels in many of the city functions and characteristics (such as saturation of traffic);
- challenges (threats and opportunities) related to the globalisation process;
- difficulties to reach consensus on urban planning.

To a certain extent the grouping corresponds to the different scope of intervention of local authorities or to the emphasis in the public debate on priority of urban issues.

In fact new concepts are emerging that synthesise aspirations towards a better future for the cities which correspond to the three groupings of problems:

- **sustainable** city - a city that internalise the problems it generates, solving them instead of transferring to other or to the future.
- **glocal** city (global/local) - a city with a better balance between the globalisation process and the ability to use local resources.
- **post-modern** or **agora** city - a human centred city with an harmonic relationship between the citizen and the urban space.

The above groupings will help, first of all, to understand the motivation (the why) for calling in RDT to approach the city challenges. Then, we should deal with the procedure (the how) by which RDT can contribute. Finally, we will list a series of possible RDT programmes (the what).
THE FUTURE OF THE CITY:
THE ROLE OF SCIENCE AND TECHNOLOGY
PROPOSALS FOR ACTION

1) INTRODUCTION

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It is easy to perceive the challenges emerging from the city system. However to pass from this perception to the actual definitions of the terms of the problems is quite difficult. 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.

It is on this contribution that we will here limit our analysis of the role for RDT for the future of the city.
2) SETTING THE CONTEXT FOR RDT ON URBAN MATTER

A) Urban planning: the choice of a scenario for the city future

By urban planning it is usually meant the intervention to set constrains on and to organize the layout of the city space and to develope physical infrastructures. 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. In particular, there is no agreement on the role that technology has had in the past and might have in the future.

Someone might argue against urban planning: it is a sectoral approach (physical planning), while the urban situation call for an integrated approach. However, urban planning is needed to set constrain, if for nothing else, on the development of the city layout.

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 one, however, has not emerged yet. 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?

Looking at a large scale territorial map, a city appears as a diffuse spot, where a complex mixture of activities takes place. It looks as a multi-functional node inserted into a web of networks across which circulate flows of different kinds (information, goods, peoples, money, etc.). On a finer map the apparent uniform mix of activities disaggregates into zones which look mono-functional or highly specialized (residential area, industrial districts, commercial quarters, dormitories and ghettos) showing a space hierarchy with center and periphery. A complex pattern of internal flows (people, goods, communications) compensates for the spatial separation of the activities.
We can classify such a situation as that of a modernistic city.

In contrast, the city of the past appears - even on a finer map - as a complex uniform mix of activities and functions. In the same buildings live reach and poor people, artisans and rentiers, professionals and workers. Boutiques and shops, offices and small factories are more or less uniformly distributed across the quarters. Individuals interact easily in an informal ways in the streets and piazzas.
We can classify this case as an agora city.

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 city characteristics.
However, is there a necessary direct causal relationships between technology
and the city pattern? Could technology called in to contribute as well (in an efficient way) to develop concepts responding to the different values and objectives of a modern agora city?

The response to the question is not obvious. Are we sure that the technological progress (that follows specific patterns) does not influence the setting of human values, by a sort of friction coupling between the inertia of the technological progress and of society behavior?

Whatever the doubts we might have on the above questions, we think it is more productive (action inducing) to assume that once a values and objectives laden scenario is chosen, technology can be called in to contribute an efficient solution.

B) Responding to the globalization challenge and integrating the city into the web of external infrastructures

Globalization is characterized by the emergence of new global systems (such as the financial one), by an increased volatility of the production factors (with delocalization of production activities), by the emergence of new actors such as the multinational enterprises, by a ‘multidimensional’ 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.

The historical development of cities, their status in a consolidated hierarchy of cities (that could be classed according to the functions performed) within a hierarchy of nation states, has been marked by the layout of natural and artificial infrastructures and their changes, by low mobility of production factors as well as by a clear hierarchy of repartition of power among public and private actors. The city status is now being challenged due to the globalization process. A new hierarchy of cities is emerging with a new typology according to different mixes of functions to be performed (world cities, financial centres, etc.). Some cities feel globalization as a threat in terms of a declining state in a multidimensional crisis (economical, social, political). Some others ride the opportunity wave.

To struggle against the decline, to keep the current status or to move up into the new emerging hierarchy, the action-plan sought by many policy-makers is to attract the new global actors (who need to localize in some place their activities) by investing in special infrastructures and facilities, by developing new service functions. In doing so, because of the supposed high volatility of production factors, cities have to strongly compete one against the others.

The question here is how cities can improve local externalities to win the competition. There are three directions 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.

The impact of technology on the patterns of infrastructures networks has been
great. Old networks update with the progress of technology, while completely
new ones emerge thanks to radical technological innovations. For certain
infrastructures technological alternatives exist or might be developed leading
intrinsically to an higher or lower degree of space dependence.

Here again, a preventive question on values and objectives has to be posed:
should we seek for an homogenization of space with high volatility in the use of
the infrastructures?

The choice of the objective for the spatial distribution of the infrastructure
networks is not straightforward. Other values are impacted such as that of
diversity. The homogenization of the space will give equal opportunities to
different cities. Will it not, however, kill the existing diversity, diminishing the
comparative advantage of local factors?

Before proceeding further, let us use a metaphor to depict the change induced
by globalization 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 ‘virtuos’ 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 virtuos circle of wealth generation. The
local autonomuos virtuos circles are either vanishing or reducing their relative
weight, while the liaisons with the global circle increase in strenght.

Should this scenario be considered as unescapable justifying therefore the
competition policy of the cities as the only feasible? Could not a more balanced
global-local scenario be considered (we might call it the globalization scenario)
where local virtuos circle can prosper while the ties with the global circle
increase?

Could not the local internal infrastructure investements which connect to the
external global networks, also be instrumental for a renaissance of the local
virtuos autonomus 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 infrastructure
networks might not contrast with a scenario for an agora city, pushing towards
specialization of city quarters and separation of functions?

Doubts on all these matters are in fact emerging in the debate concerning the
policy to respond to the globalization challenges. There is for instance the risk that a successful city (moving up the scale of the globalization 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.

The risk is real and it might be important to change completely the optics in reacting to the globalization challenge as might be indicated by the glocal balanced scenario. A completely different logics 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.

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 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 globalization), while maintaining the possibility to valorize the local values (to exploit the city diversity assets and to develope a more balanced global-local realtionship).

C) Responding to the problems of a saturated city system

To the stall in our capability to develop consensus to plan the spatial city layout and to the threats of the globalization 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 its variables) has in many cases reached a state of saturation.

The normal recipe to adapt a system to increased density when it is far from saturation - i.e. to increase proportionally the system 'capacity' - is no more applicable. The need to do somethings increases dramatically while the ability to take actions decreases.

If nothing can be done efficiently by increasing the capacity (e.g. on the viary 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 regaining 'governability'.

The need to change to an integrated approach is well perceived. New attitudes are invoked and new values underlined such as those condensed in the call for a "sustainable city".

The question concerning technology here is, even more than in the two previous groups of problems, laden with ambiguity. Is it not technology the culprit for the development of the sectorialized city development (responding each sectors to their sectoral limited objectives of optimization and maximization)?
Here again the question is subtle and a clear separation of issues and postures is difficult. As in the two former cases we think that also to respond to the challenges coming from saturation 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 we want to underline and that can be instrumental also for policy-making with respect to the two former issues. The two related hypothesis that we have formulated above converges to a common one which considers that technology can be efficiently applied to the realization of a preferred city scenario without penalizing the possibility to exploit the local assets of diversity in a globalized world.

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. To try to change the system trajectory applying exogenous forces might require impractical huge resources. However, a very complex system like a city even when in a stationary equilibrium state is always traversed by continuous endogenous movements.

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 induce city system changes. Provided, however, that such challenges are not only recognized and shared by the citizen, but that transformed into specific problem definitions and that a common determination to solve the specified problem be reached.

3) THE PROCEDURES FOR AN EFFICIENT INTERVENTION OF RDT

The three above 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. However, to induce modifications in a complex system, the RDT process cannot be separated by the global action plan. It cannot 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.

This necessity is recognized by RDT policy-makers when they talk about pilot projects. For the actual system where the pilot study is performed, the RDT intervention represents the entire action plan. The intervention can be considered as an RDT plan if the induced changes in the ‘system under test’ can be considered as ‘paradigmatic’ for similar systems.
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. To this end, the system needs to be ‘instrumented’ to collect the signals and to translate them into significative terms.

Many RDT projects labeled as ‘pilot’ might not respond to the above criteria. This, however, does not mean that they are useless. To see how, we have to better understand the complex decision-making process through which at the end a true pilot project starts.
The process to arrive at such a decision normally begins with the identification of a challenge. It might be the desirability of a scenario 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. It might be the need to address local problems (e.g. problems resulting from reaching saturation in some of the city system characteristics).

To pass from the challenge to the specification of the problem to be solved and the related plan for action is a complex circular process where perceived challenges are confronted to potential solutions. In the process, initial challenges are better focused or redefined, needed actors are defined (which might not be represented by existing institutions), 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, the better it will be for the subsequent problem-solving phase.

We can say that the first phase (from challenge to problem specification) is aiming at the effectiveness of the problem-solving process (definition of values, objectives, targets, actors) while the second one is concerned with efficiency. RDT can play in an important role in the search for effectiveness and not only for efficiency.
Specifically, the role of RDT is to assure that a sufficiently large portfolio of ideas and potential solutions be available so that an ‘optimal (darwinistic) selection’ 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 the need for RDT for the effectiveness phase of intervention.
4) UPDATING AND ENLARGING THE PORTFOLIO OF TECHNOLOGICAL OPTIONS

A) RDT to support the development of a desired 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’. 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 urge of problems in existing cities that we have no time to dream about new ones.
What we need - this seems to be the prevailing mood - are solutions focussed to existing problems.

We 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 our 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 ‘dream city’ could, instead, show concretely how new ideas - that derive from the sensitivity of the urban designer to the society needs and dreams as well as from the new technological options - can be integrated together into a coherent approach.
A portfolio of alternative dream cities will help to show possibility of 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 responses are needed so that - by comparing them - we could extract suggestions for more mundane initiatives on modifying existing urban environment.

The city is a complex system made of sub-systems and of ‘elementary units’ (building blocks). Therefore, in parallel to filling the portfolio of ideas with potential solutions on the global city concept, we need ideas and suggestions on a lower scale, that of city’s elementary building blocks.

To support the scenario of an ‘agora city’, the building blocks should be complex enough to assure 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 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).
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 provision 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 the quality of the environment (e.g. reduction of noise level), integrability of construction techniques with existing viary system and service networks and buildings, speed up of construction time, etc.

Our 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 assuring that intrinsically they satisfy the requirements set forth by the desired city scenario.

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 of course 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 the process of decision-making for an actual city 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, by building examples of potential solutions, to intervene on the actual city system with its idiosyncratic characteristics. This could be done if, while respecting the individuality of each city case, we accept that there is a taxonomy of cases that can be considered as a rough reference for the individual city.

One such classification refers to five subsystems-networks to characterize a city: i) economic and industrial subsystem, ii) social structure, iii) technological subsystem, iv) environment, v) internationalization.

Using these key elements to look at the city system, typical patterns emerges:

a) cities having an international leadership (‘pure’ cities - London, and ‘complete’ - Paris);

b) cities in industrial and technological transition (cities in ‘technological transition’ - Munich, cities with ‘consolidated industrial structure’ - Dusseldorf, cities ‘functionally constrained’ - Genoa, cities with a ‘traditional industrial structure’);

c) cities into negative industrial transition (cities under ‘tertiarisation’ - Utrecht,
and cities under 'urban obsolescence' - Manchester).

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 'dream cities' concepts and of the 'elementary new building blocks' to show the possibility of intervention in the different city models.

B) RDT to respond to the globalization challenge and to integrate the city into the web of external infrastructures

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

The priority of actions is given to 'hook' the city to the external webs of infrastructures to facilitate the communication with the world. 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 centers, technological districts), the adoption of special facilities (such as teleport) to assure interconnection with the world communication system, and so on.

It is 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 'externality' 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 go together with the success in shifting 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).

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.

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 center because of traffic jam.

To respond to globalization challenges, the outbound approach to adapt to external changes is not the only one. An inbound approach might be tried that
assumes that the city has internal capabilities to react to the challenge taking advantage of its ‘diversity’ and looking for internal leverage effects.

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 globalization 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 globalization challenge might therefore be an occasion to modify the center-periphery scheme both at the city level and within the cities.

The alternative which is here proposed to respond to the globalization challenge is to invest in substitute the balanced network logic for that of center-periphery. To this end, 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. The challenge is to maintain the existing tissue of industrial capability finding new costumers whom to offer an ‘integrated’ output (thanks to the intervention of the ‘meta-organizer’) of the otherway dispersed production capabilities. 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 ‘network logic’ points to the need to improve the infrastructures of the networks. It also let emerge specific problems whose solution leads to the development of new services that enrich and valorize the portfolio of existing production capabilities. It 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. The carrefour nodes will play the role of the basin of attraction of the neighbouring space.

For the inter-city regional networks to develop a more balanced equal opportunity spatial networks the existing hub type liasons between the 'regional' 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 investements to realize a local network space organization and to see the emergence of related network cooperation among economic and social actors - overlap, as 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 sytem can be analized and its behaviour simulated in term of a web of interacting networks. This task 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 develope concept for advanced carrefour nodal point as a complex sytem of facilities interacting with the networks;

ii) to develop concept of special carrefour jonction 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 user (such as development of new product that can profit of the existing production capabilities).

C) 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 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 sectorally organized. 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. Here RDT can 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 underline the ambiguity of the challenges, and how dangers an opportunities might be mixed together.
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" (maximising the probability of success and the "global quality" - optimization of values/objectives/results - of the intervention) to any one of the challenges. The obvious point here is that the more we know on system behavior the more we will be able to make "rational" choices.
This statement carries even more weight if we consider the necessity 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.

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, incentivize networks between cities, encourage experimentation in different conditions (that are 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 continuous feeding the model with data collected on the system itself. Special sensors might have to be installed to monitor continuously the system (such as is done for testing the air quality). 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 on the intervention on the system will be taken, but, even more importantly, later on 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 for approaching 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. ¹

The initial challenge has to be better defined to follow the recipe of seeking for leverage system effect. RDT investements will still contribute significantly to 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, but citizen solidarity, urbanistic concept revision, incentives for personal services, etc.

¹ As an example 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 individude 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 in such a leverage effect, call for synergetic effects 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 conception from monofunctional space specialization to multi-functional ones, increasing the mix of space use and dwellers. Moreover, the investement in technology to increase security might be designed also to put to motion other initiatives (such as keeping boutiques openend in night hours) because of increased space security, increase the solidarity of other inhabitants (intervening to secour, feeling more confident on police patrolling), etc.
THE FUTURE of the CITY:

AN AGENDA FOR RDT

to develop a portfolio of ideas on potential solutions to help translating the perceived challenges into problem definition to initiate actions on actual city system (pilot projects).
Objective A) To provide ideas on solutions to act on urban planning to move from the modernistic city plan (monofunctional zones, high individual alienation, social segregation) towards an agora city plan (human centred organization of a multifunctional urban space).

Objective B) To provide ideas on solutions for a balanced relationship between the exogenous impact of globalization (global virtuoso circle of 'economic' wealth generation) and the endogenous drive to capitalize on the local diversity assets (local virtuoso circle of 'quality' wealth generation).

Objective C) To provide ideas on solutions to identify options to act on the today city by taking advantage of leverage effects of endogenous system forces to move the system far from saturation towards a sustainable city.
a.1 develop new global urbanistic concepts: alternative designs of 'dream city' to respond to today city problem.
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 the designs for suggestions on modifying existing urban environment.

a.2 develop concepts of new 'elementary building blocks' for the city as a base to intervene for the transiton from today to an 'agora' city.
To call for ideas to conceive 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 the building block. A reference block might be a building, a quarter, a cross road between quarters, an entire mono-function network.

a.3 apply the 'dream cites' concepts and the 'elementary building blocks' to show possible intervention on actual paradigmatic cities.
To call for conceptual design development that shows how actual city plan can be moved in the direction of a chosen reference 'new city' by the introduction of new elementary building blocks. The specific city to be investigated will be chosen with reference to city taxonomy.
b.1 develop a conceptual frame that will permit to look at the city and regional basin as a web of local interactive networks.

To call for system analysis of paradigmatic city to show potentiality to modify the existing local networks layout to obtain a more homogenous equal opportunity space. The analysis will show conditions for emergence of local 'network logic' to better exploit local assets and to better interact with the global networks and the globalization process.

b.2 develop concepts for the 'elementary units' of the intra-city network (carrefour nodal points and links) and of the inter-city ones.

i) to develop concept for advanced carrefour nodal point as a system of interacting facilities
ii) to develop concept of special carrefour jonction 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' as a service to local actors in the network.

To call for studies to show how cooperative design activity can be developed to aggregate parts produced separately by local firms into complex subsystems.
To show how new service emerge from the network logic and related problems.
c.1 improve our understanding of city behaviour as a complex system.
To call attention of science policy on the research on "urban science".
To develop specific "simulation models" of given cities to be used by the concerned actors to simulate effects of conceived intervention. The simulation model have to be made interactive with the actual city system, by continuos feeding it with data collected on the system itself.

c.2 develop ideas on solutions for approaching 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 investigation to develop terms of reference for problems to respond of integrated city system challenges. The investigation should shows how the initial perceived challenges will change due to the non linearity of systems reaction and how the problems specifications could take advantage of the intrinsic system forces and inertial dynamic patterns. A mix of short and longer terms initiatives for action taking has to be suggested that involves not only "sectoral" (or multi-sectoral) responses but citizen solidarity, urbanistic concept revision, incentives for personal services, etc.