2011 International Conference on Green Buildings and Sustainable Cities

# Patterns of local development as a roadmap towards urban transport sustainability

Ilaria Delponte[a*], Pietro Ugolini[a]

*[a]University of Genoa, Faculty of Engineering, DICAT - Via Opera Pia 15/a, Genoa, 16145, Italy*

**Abstract**

Urban transport sustainability is a shared challenge nowadays and many were the responses given to it in the very recent years. The paper, amidst the huge quantity of references and data around the subject, intends to face the problem from an original point of view: more and more detailed plans as well as sophisticated technologies are not enough (alone) to make transport system efficient and mobility management sustainable. Authors purpose clustering, training investments and development of organic relationships among local stakeholders as a key-action for the improving of competitiveness and smartness in urban contexts.

*Keywords:* transport plans; sustainable mobility; information comunication technologies; clusters; training; local stakeholders.

## 1. Introduction

Nowadays, sustainability in transport is one of the majors concerns throughout the developed countries, at different levels of government. Although, in the early 1990s, this theme was often reduced to the debate around negative environmental externalities, the term owns certainly a much broader meaning. Discussions over greenhouse gas emissions and global climate change, as well as the potential depletion of petroleum, have been joined by issues for urban air quality, the excessively large number of vehicle

* Authors' contribution: the text refers to the activities of the equipe of territorial planning of CRUIE (Research Centre in Town planning, Infrastructures and Ecology, University of Genoa). Parts written by Ilaria Delponte deal with the general approach of the paper, the description of the two case-histories and the conclusions. Pietro Ugolini wrote the introduction and is responsible of the research projects as a director of CRUIE.
* Corresponding author. Tel.: +39-010-353-2088; fax: +39-010-353-2971.
*E-mail addresses:* ilaria.delponte@unige.it

accidents and their resulting fatalities and injuries. There are also concerns for noise and vibration damage as well as some biological impacts on flora and fauna connected to traffic management, but we wouldn't talk about that here.

As a last update concerning transport vision at the European level, the Third White Paper [10] stressed on new emergent patterns around sustainability and efficient combination of modes. Information, better services and safety improvement are the main cited aspects; deepening the future strands of development, we find also energy efficiency, optimization of logistic performances and information system in the current approach [6, 11].

Then, the purpose of the paper is to demonstrate that what permits sustainability is a human way to plan, use and improve transport: but how? Trying to answer on a living-experience-ground, we propose an original formula that can be assumed as an integrated pattern of development, locally shared and deployed. Planning culture, ICT's evolution as a form of technicalities' improvement lead by a spread cluster, but also educational commitment, training investments, agreements and partnerships between university labs and public bodies are the selected ingredients for the pursuing of long term effects (section 2). In the paper, two main experiences, broadly referring to the authors, are exposed (section 3): afterwards, starting from those, it will be possible to drawn some brief remarks for both scholars and public decision makers, as well as for entrepreneurs (section 4).

## 2. Planning issues, ICT advance and territorial integration

Running fast along these recent years, the advance in knowledge around urban dynamics and a wider consciousness of the transport rules lets planners' methods and tools develop and change: the result was a more evolved conceptualization of planning instruments and an increasing value ascribed to the specific competences and techniques: from the model to the design, from the decision to the management phase, from the survey activities to the simulation. Some legislative interpretations attributed to the strategic and tactical vision of transport sector two different planning instruments, separating traffic management from mobility planning (notably in Italy). It is not just an intellectual division but a reflect of a deeper approach to the complexity of the problem. Consolidated is now, in fact, the perception of urban transport as an integrated issue, strictly related to land use, landscape and energy planning. A crucial outcome of this process, above all for local policy makers, was a major sensitiveness to the need of a strategic vision, able to conciliate multilevel governance and territorial requests through an appropriate stakeholders involvement.

Such a *planning culture*, as a wished integrated approach towards territory (and transport matters within), is certainly a fertile terrain for growing up of sustainability as the very form of territorial safeguard [19], preventing from sector and partial solutions and enlarging the spectrum of cause-effect's logics.

According to the advance in computer science urban transport sustainability is not only related to the physical design of places and localization in general, but often associated also to technological progress, because of the new possibility than it can provide. In fact, one of the remarkable facets of the integration between technology and social life is the capability of science, industry, and citizenry to see and implement new applications. They draw on an array of technologies, which, when combined in different configurations, can have potentially significance and, sometimes, unforeseen impacts on broad patterns of human settlement, mobility, industry and trade.

As known, transport is one of the most fascinating technology branches developed during the last 200 years; broadly speaking, we refer to information and communication technology (ICT) as a set of heterogeneous technologies (hardware and software) that allow for electronic communication, data

collection and processing in distributed networks (e.g. Newton, 1998), today fruitfully applied at every scale of transportation system.

Janelle and Gillespie [14] sustain that it is still too early to know how all of this will affect spatial patterns of land use and human activity, and impact on transportation demands, but clearly, this requires careful consideration by researchers interested in planning and communications systems [3, 8, 9].

However, lack of significant empirical work in a sufficiently broad set of case studies remains an obstacle to reducing conceptual and factual uncertainties on the impact of ICT on transport demand. Several examples were taken into account in order to illustrate the complicated and multidimensional effects of ICTs: they can have two opposite effects, urban dispersion as well as reinforcement and concentration [1, 17]. Indeed, a relatively large body of literature comes up with such contradictory conclusions about the expected effects of ICTs, emphasizing the complex effects of these technologies on the behavior of people and organizations [13, 15, 16].

It is this kind of context that makes the relationships between ICT use and transport impacts highly differentiated and difficult to understand.

Often, much of the research about the outcomes of ICT on the urban form is concentrated on one single channel of research. In most cases, there is no aggregate analysis that examines the interrelated effects of these technologies on the city as a whole organism: a city made up by buildings and roads but also by relationships (economical or social, institutional or commercial, educational or political,…). In fact, it would be expected that urban planners and urban decision-makers are likely to be major players in the ICT field. Indeed, some scholars are leading urban decision-makers to act in a hurry. Providing municipality information and services can reach a number of goals: improvement of services to the citizens and increase of public participation in local processes by better information and possibilities to react, on-line, to proposals in the city agenda (E-governance) are among of them. But, this is not the only contribution by ICT actors. The truth is that only maintaining its actual kind of practical support to governance ICTs can be really useful in urban context, not only for a town planning discipline reductively understood, but also for a yearned local growth, intended in a broader sense. As known, ICT enterprises are often gathered into districts or clusters as a distinctive character; because of their deep specialization, they share, in fact, scale-and-agglomeration economies' interests. Moreover, they are expected to gain a special role within the local area, thanks to a spontaneous geo-gravitation, even if, at the same time, they all play at the global market level, too. In other words, ICT enterprises must have a very strong vocation in territorial matters and be able to play a key-role in the multilevel governance sphere. As a consequence, "clustering" capabilities is a crucial requisite for the candidature of ICT developers as actors really involved in the process of territorial development. In this way, a structured cluster is not only representative for the industrial party, but pose itself as an institutional interlocutor, strongly characterized by its technological knowledge, but locally involved and working [18]. ICTs entrepreneurs know very well that their business depends on territorial liaisons and that public (not only governmental) stakeholders own a huge variety of competences that often are difficult to arrange. However, what we mean for "local development" is a large concept (built up during the recent decades of specialized studies), which starts from the mobilization and the coordination of potentialities and resources (material or immaterial), conducted by a community effort [7, 12]. The popular aim to improve local economic, social and environmental conditions must entail a process of elaboration of adaptation strategies to external constraints on the base of cultural and territorial features: the presence of a sound entrepreneurship, socially representative, is one of those. Administrative departments, agencies, business, research, trade unions and local community groups can enhance the value of people and place, enlarging access to opportunities in the form of income, employment, or consumption of goods. Moreover, in order to save competitiveness and innovation, local bodies and companies must provide joint-forms with universities and/or research educational and learning organizations, able to get the centre of interest [2]. The value of integration, confirmed by clustering strategies and local development theories, can be practically settled down in a urban context, building up a collective project around transportation

objectives. The actors, involved in such an *interesting formula,* as verified in the following cases, are local administrations, entrepreneurs' clusters and research entities. The examples behind, related to experiences lead in the sector of urban transport, aim, above all, to highlight the possibility of a pattern of integration among territorial growth interests and reveal how this roadmap can also contribute to the sustainable development. Plenty of references are available around the subject and a lot of considerations can be drawn about them [4, 5]: but here, we don't want to stress on them literally, but to pursue their implications through the "tale" of two real recent patterns, settled in Liguria, Italy.

## 3. "Living" research: learning from experience

After the financing of industrial districts granted by national State (Education and Research Minister) and the will of the Liguria Region to develop specialized skill in innovative sectors, a new technological district were constituted in Genoa, particularly oriented to info-mobility and logistics as priority areas (March 2005).

The presence of a notable number of enterprises providing worldwide services, software and hardware around ICT and security makes reasonably the district very active, but not only from the manufacture point of view. Besides forecasted advantages derived from agglomeration and scale economies, a definite improvement was determined by the presence of university teams within the district, as co-founder members which enforces its institutional role among local stakeholders.

The "institutional" kind of the Genoa technological cluster (called SIIT - Intelligent and Integrated Systems of Telecommunications) was clearer when, (not from the beginning, thanks to a spread mentality in which territorial competences hadn't been taken into account at first, as not directly involved in industrial matters) the town planning research équipe entered as a member. The increasing awareness of the need of a dialogue between the entrepreneurship party and public administrations kindled the interest on territorial planning, and, above all, around transportation planning issues.

In January 2011, in occurrence of a recent call, aiming to the constitution and enlargement of districts, Genoa proposed a project subscribed also by three Southern Italian Regions (Calabria, Sicilia e Campania, besides a neighboring partner as Piemonte) centered on computer science supporting mobility, logistics and security ("ILS Platform"). The focus is to approach territorial information's collection as a network system (an architecture with a cloud data and a repository of course, comprehensive of supervisor, clearing house and security providers for the availability and soundness of data and with an experimental governance model for treatment of information – service chain), where public bodies might participate as suppliers as well as users. Here, the role of planners' team in the relationship between local entities and entrepreneurs is crucial: the crossing among the demand of data integration, specific competences (ruled by law), existent tools and a huge amount of possibilities makes realizable by technology (but often impracticable or unfeasible by administrations, let alone useless) can be matched only by them.

In fact, the guiding role in this creative process was played by a planning act as a result of a strong collaboration with research party: a strategic action plan submitted to the European Commission a couple of months before (end of August 2010) represented a sort of guideline to implement ICT solutions, already tested in urban areas or about to be. This is the Sustainable Energy Action Plan (SEAP) proposed by the SEE Campaign within the Covenant of Mayors, where big and small cities by Europe signed their voluntary commitment to energy saving and greenhouse gas reducing until 2020. Genoa had its plan approved as first in the EU and was cheered by the Covenant as a sample-case for other (equally committed) municipalities, with particular praise as far as sustainable transport actions were concerned. While technological minds were involved in structuring the stepwise deployment and sought conformities with EU directives and lasting platforms (in order to offer also some elements useful for a decision support system), planning experts were searching for programs and protocols (at every level of scale)

where innovation in transport's architecture were expected as long as already planned (or forthcoming). In parallel, fruitful relations are coming out with Genoese local bodies around possibilities of local networks' improvements (AVM for monitoring the fleet, just-in-time congestion information providing, sensorial net for anthropic and natural risks and so on) due to the deepening or updating of the environmental and transport plans, sustainability-oriented. Researchers in this context, proposed also innovative patterns of planning, leaving from ordinary ideas but trying to got innovation from advanced conceptions of integrated plans. The SEAP became the strategic milestone other plans (regulatory, transport and energetic) turn around: moreover, it was proposed that a piece of a plan could be better defined in another or one stated monitoring process could be matched with the task of another plan.

Thanks to these recent planning experiences, to the relevant activities of the local ICT cluster and to a living participation of public bodies, Genoa has decided now to submit its candidature to the Smart City European Call, proposing its urban solution as a sought way to urban sustainability. Municipality, ICT groups and research entities, constituted themselves in a consortium, are developing a shared "smart program" for the long period: projects go from electric grids to urban elevators, from public lighting to off-shore wind plants. The development of local potentialities and skills (industrial, technological, scientific, …) was the result of an organic integration among local stakeholders engaged in advanced patterns of innovation, research, training investments and governance improvement.

Another story.
In the summer of 2009, the Municipality of Savona decided to update an old (and got over) traffic plan, putting existing sources and analysis in order. Requiring a not-ordinary supervision activity, which was expected to be followed afterwards by an official call (addressed to private parties), Savona asked for the involvement in the process of the town planning research team of the University of Genoa (which has also a campus in the outskirts of Savona), that has been engaging in urban transport planning matters for a long time.

Starting from the more significant features of the Savona context, the collection of the data shed light on a complex and sprawled situation, distinguishable for two main characteristics: big territorial projects with almost careless outcomes at local level and a lot of small interventions to be provided without a steady long-term perspective. In such a context, not only a traditional approach to traffic topic (in sense of congestion reducing) could be enough, as well as a wide-area strategy on mobility without the building up of a shared consensus.

Going on with a traditional implementation of traffic planning (using the two-years plan foreseen by the law), the occasion to settle down a debate around the different options for the future would not have been allowed. At the same time, always in compliance with the law, a more strategic vision (Mobility Plan, so called PUM in Italian) could not be drawn in Savona: the PUM is possible to be proposed to Transport Minister (in order to receive national funds) only by cities with more than 100.000 inhabitants (and Savona is little over 60.000).

According to the different decision levels, the team proposed to the Municipality to mix-up the two tools (traffic and mobility plan) and write down guidelines which must be reached by the following drawers of the plan. At the birth of the new form of plan (called PUMT - Urban Mobility and Traffic Plan), two exigencies must be performed: a tactical vision related to immediate and integrated interventions and a perspective reflection over a decennial horizon.

Savona, in fact, despite its bounded population, works a gravitational power over neighboring municipalities, for reasons of work, study and harbor activities: the research team's solution convinced that a mixed instrument might have fitted to the case. Guidelines were written and the project managers of the plan designated. But the real application of an innovative instruments was not so easy to put in

practice: scholars were involved also in the Strategic Environmental Assessment of the plan (in compliance with 2001 EU Directive), the first experience in Liguria of SEA procedure lead in the field of urban transport. The alternative scenarios and the hypothesis of monitoring parameters were selected by an heterogeneous équipe composed by councilors, traffic officers, researchers, local policemen and project managers. The whole process was followed by a sequence of public appointments, aimed to disseminate plan's contents and enlarge at best the consensus around it: social categories, schools, trade unions, neighboring municipalities and other local entities took part into the debate. The results were not expected for a long time: the Region cheered the process and it became a sort of best-practice, disseminated region-wide.

At the same time, the Italian Environment Minister launched a call for the mobility management in medium-scaled cities: Savona, thanks to its good plan and its recent initiatives, proposed a candidature for an ambitious project focused on the construction of a new laboratory centered on traffic and environmental monitoring, charged also of the boosting of communication and sensitization activities. The score was positive and the Minister financed the start-up: this would have been the occasion to ground a systematic analysis around mobility habits, public transportation management and assessment of pollution's externalities due to traffic. But the *formula* didn't change: an agreement between Municipality and university was signed in order to establish a shared investment on educational objectives, at the base of the first activities and as a guarantee of the related methods of implementation. University made available two grants for PhD students and a steering committee who will care the right application of the experimental plan and the building up of a scientific approach on mobility management to be carried out by the new lab.

Deepening the main issues drawn by this experience, we can affirm that the presence of synergies, built up by public bodies and university above all, was a key-factor in the process. The commitment of the researchers and the creation of an institutional "establishment" which leads the activities (legitimated mixed committee) are at the ground of a valued strategy of territorial cohesion, integration and development. Transport ended up to be a sector-based planning and became the competitive field the Municipality is focused on and where it can also find improvements and excellences at the national level, according to what is expected by the Minister of Environment. Forthcoming involvement of ICT applications is discounted at this stage. Mobilization of potentialities and integration among stakeholders in the perspective of a long-period project drive to a territorial interaction and a local development, strongly yearned and heralding further outcomes. Amidst others, also the junction between PUMT and SEAP is under construction, stimulus and guarantee for a reliable monitoring of pollution reducing in transport field.

## 4. From an interesting formula to a roadmap

The two stories have dealt with a sustainable-oriented process, implemented locally but with a lot of references and connections to the transport matters worldwide. Also, the creation of a well-integrated network of competences addressed to plan urban development is reckoned as a sort of common challenge nowadays, not only "technically" speaking.

To summarize, the proposed experience grounds on a tested mix among these ingredients: a culture strongly planning-based, the link with entrepreneurship's clusters for the selection of urban development options, the commitment of research entities engaged in scientific advance as well as training and educational activities, and a subsidiarity approach of the governance of the city. It need not to be pointed out by means of a quantitative arguments, not even to be endorsed statistically. But it wants to make to reflect about social concerns (human relationships) in planning development patterns for territorial contexts.

Playing with the word "roadmap" (from the title of the latest White Paper on transportation), we argue for own "roadmap", underlining that the growing of relationships and agreements in planning activity is a crucial point for transport sustainability, too, maybe first than others, and it could be possible, even when unpredictable. So a tested experience could become a roadmap for others, whereas someone could be interesting in the same path.

## References

[1] Audirac I. Information Technology and urban form: challenges to smart growth. *International Regional Science Review* 2005; **28(2)**: 119–145.

[2] Belussi F. Policies for the development of knowledge-intensive local production systems. *Cambridge Journal of Economics*, CPES, 1999.

[3] Black WR, van Geenhuizen M. ICT Innovation and Sustainability of the Transport Sector. *EJTIR* 2006; **6(1)**: 39-60.

[4] Castells M. *The Informational City: Information Technology, Economic Restructuring, and the Urban Regional Process*. Oxford, UK; Cambridge, MA: Blackwell;1989.

[5] Cohen-Blankshtain G, Nijkamp P. The appreciative system of urban ICT policies: an analysis of perceptions of urban policy makers. *Growth and Change* 2004; **35(2)**: 166-197.

[6] Delponte I, Tomasoni L. Trasporti ed energia: strategie di pianificazione in ambito urbano. *Tema- Urban Plannng and Mobility 2010*; **3(1)**: 75-84.

[7] Dei Ottati G. Social Concertation and Local Development: The Case of Industrial Districts.*European Planning Studies* 2002; **10(4)**: 449 – 466.

[8] Donggen W, Fion YTL. Impacts of Information and Communication Technologies (ICT) on time use and travel behavior: a structural equations analysis, *Transportation* 2007; **34**:513–527.

[9] Dupuy G. *Urban networks, network urbanism*.The Netherlands:Techne Press, Design Science and Plannin; 2008.

[10] European Commission. *White Paper - Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system*, Brussels, COM 144 final; 2011.

[11] Fien J, Wilson D. Advancing Social Sustainability Through Vocational Education and Training. In: Willis P. et al. (eds.), *Rethinking Work and Learning, Technical and Vocational Education and Training: Issues, Concerns and Prospects* 9. Springer Science Business Media B.V.;2009.

[12] Garofoli G. Local Development in Europe. Theoretical Models and International Comparisons, *European Urban and Regional Studies* 2002; eur.sagepub.com.

[13] Golob TF, Regan AC. Impacts of information technology on personal travel and commercial vehicle operations: research challenges and opportunities, *Transportation Research Part C 9*; 2001: 87-121.

[14] Janelle DG, Gillespie A. Space–Time Constructs for Linking Information and Communication Technologies with Issues in Sustainable Transportation, *Transport Reviews* 2004; **24(6)**: 665–677.

[15] Mellander C, Paulsson T, Karlsson C. *A spatial ICT clusters in Sweden – An empirical method to identify necessary conditions for existence, Entrepreneurship and Dynamics in a Knowledge Economy*. London & New York :Routledge; 2004.

[16] Mokhtarian LP. Telecommunications and Travel, The Case for Complementarity. *Journal of Industrial Ecology* Massachusetts Institute of Technology and Yale University; 6/ 2.

[17] Mundula L. *Ict@territorio. Ruoli e strategie del'economia globale per lo sviluppo sostenibile locale*, FrancoAngeli; 2004.

[18] Porter M. Clusters and New Economics of Competition, *Harvard Business Review* 1998; Reprint 98609: 77-90.

[19] Ugolini P. *Approccio alla sostenibilità nella governance del territorio*. Milano: FrancoAngeli ;2010.