

# The Joint City

High Speed Train, New Urban Proximity and Macro-Functional Urban Systems Generation

Romano Fistola

Department of Engineering, University of Sannio, e-mail: [fistola@unina.it](mailto:fistola@unina.it); web: [www.romanofistola.it](http://www.romanofistola.it)

## ARTICLE INFO

### TeMALab journal

[www.tema.unina.it](http://www.tema.unina.it)  
ISSN 1970-9870  
Vol 3 - SP - March 2010 (15 - 20)

Department of Urban and Regional Planning  
University of Naples Federico II

© Copyright TeMA. All rights reserved.

#### Keywords:

Joint city  
High Speed Train  
Functional system  
Urban activities

## ABSTRACT

The new connections, which high speed train allows to activate among the metropolitan systems, seem to be able to give life to new urban macro-structures for which the transfer time, among the main poles of the railway segment, becomes comparable to an inside moving into the city and therefore considered as an inter-functional mobility. The tunnel effect generated by the high speed connection seems to be able to allow a new temporal and functional joint among the metropolitan systems consequently supporting the possibility, for the users, to move themselves among the different urban functions belonging to the different cities. The birth of these urban aggregations seems to drive towards new megalopolis, which we can define for the first time with the term: *joint-city*. For this new metropolitan settlement it seems to be very interesting to investigate the constitutive peculiarities, the systemic articulation, its relational structures, the evolutionary scenarios, and so on. The urban functions (activities) can be considered as structures of relationships between people that allows to define "organizational links" inside the community; the urban functions are located in specific places inside urban container or in open spaces. The urban functions represent the urban engines and the functional system can be thought as the "soul of the city", abstract but essential to its survival. In the definition set out here the analysis is carried out for many interconnected urban functional system points (specifically those in Rome and Naples). The new high speed railway has to be considered not only as a new channel of mobility between cities, but as a real possibility of joint between the functional systems of the two centres. A final consideration can be carried out in relation to the possibility of implementing new measures of governance of urban transformations considering the new macro-city: the "Joint City".

## Introduction

This article starts the discussion on new configurations that urban systems, linked by the High Speed Train (HST), will have in the future.

The formulation is based on the systemic interpretation of the city which, in the Seventies, has seen many scholars theorize the possibility of a new approach to the study of urban phenomena. In the early Nineties some urban economists theorized the possibility of halting the decline of large urban systems by considering new possibilities of physical and immaterial connections between them (with particular reference to high-speed railway and low cost air travel) which will be able to support the emergence of new metropolitan integrated "organizations".

Objective of the paper is to catalyze a research interest on new urban structures, suggesting some first thoughts on potential relationships that arise in cities connected by HST and foreshadowing a future development of the study based on the deepening of a new function of integrated "accessibility" to urban activities.

## High speed train and the birth of the "joint-city"

New connections, new link between the metropolitan areas allowed by the HST, seem to be able to create new macro-urban structures for which the transfer time between the poles of the rail track becomes comparable to a transfer inside the city and then accepted as a basic functional mobility.

In other words getting a site in the center of Rome from the center of Naples, where the central station is located can cost, in terms of time to Naples city-user (Martinotti 1993), just over 60 minutes, which becomes a time comparable to an urban transfer considering a couple of modal interchange and the related waiting times. The tunnel effect created by high-speed connection tends to produce a temporal/functional junction between metropolitan systems thus supporting the possibility for the user to move between urban functions belonging to different cities.

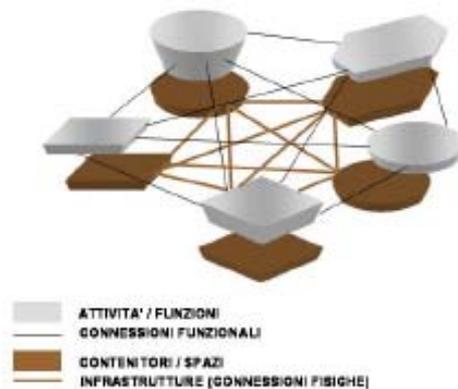
The birth of these junctions seems to lead towards new urban mega-cities, defined "joint-city".

For these new macro-cities it is very interesting to investigate the constituent characteristics, composition system, the relational

structure, the evolutionary scenarios, and so on. Moreover, the new possibilities of interconnection between the cities, partly due to joint-city, have already been analyzed on a larger scale, considering the increasingly frequent intercontinental travel among the global cities (Sassen 2001). This phenomenon is particularly considerable for New York and London giving life to a SuperCity named: "NyLon" by Colum McCann.

### A new functional system

The systemic approach goes back to the theoretical definitions that von Bertalanffy developed in the General Systems Theory and other scholars took up adapting to different scientific fields (von Bertalanffy, 1971).



A conceptual scheme of the the two urban subsystems

Within the study of urban phenomena contributions, Mc Loughlin and Gibson are two of the main references still useful for reflection on the city. The systemic approach, also understood as a conceptual framework (Palermo 1992), still appears among the paradigms for the interpretation of urban complexity (with different interpretations, adaptations and evolutions) that allow effective analysis studies and propositions of Government's procedures of urban transformation and planning. Derived from this approach there are interesting ideas and propositions of new urban models among which it seems useful to mention the "Fractal city" (Batty and Longman 1994).

Using this approach, also considering the contribution of Regulski in the early eighties, it is possible to think the city as a system composed of elements between which there is a structure of interactions or as a set of nodes and links between them.

Among the various properties of the system it should be considered, in particular, the one pointing out sub-systems components and

according which each system is contained in a larger system (meta) and its parts are themselves systems (sub-system) (Regulski 1981). Starting from that assumption, we can say that among the various sub-components of the urban system especially two can be identified: the functional system and the physical system, which Regulski describes as "space structures".

This conceptual distinction is not reflected in reality where the two systems are inside an indivisible one, but the abstraction is required to build the systemic interpretative model. The system on which it's interesting to draw attention is the functional one. The functional system (FS) made by urban activities (functions) and by the relationships among them (interactions). The FS is characterized by particularly dynamic evolution primarily attributable to an internal characteristic of the system concerning the internal relationships. The "structure" of the functional system (made by the interactions) consists of the relationships between the parts.

It is therefore easily to understand how the system evolution produces changes in the structure of the parts and then changes the status in the sub-systems which, consequently, generate changes inside the urban system as a whole.

The FS, as mentioned before, is composed by a set of related interacting elements. In the interpretive model it represents the cornerstone of the whole conceptualization, contains as constituent parts, the principles of operation and development of a city: the urban functions.

At this point it seems necessary to defined primarily the concept of "urban functions" or otherwise to specify the meaning that this study wants to adopt.

The definitions of urban function are numerous and generally "reflect" the disciplinary fields in which they were developed and adopted. However, it's possible to say that we can reconduct the different definitions towards two basic formulations: the sociological/geographical matrix and the systemic interpretation of urban phenomena.

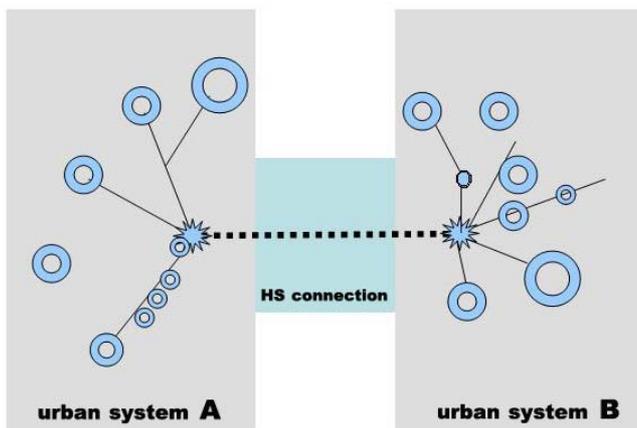
The first formulation assumes that: "urban functions can be understood as any activity that in any historical period were carried out in places where the population was densely concentrated" (Gottmann 1988); other authors consider the urban function as a city activity (such as residence, mobility, trade, manufacturing, education, etc.). "which meets the needs of the city, both internal and external to it, and thus justifies the very existence of the city as an organized social unit in its dealing with larger regional entities, national entities, international entities" (Dematteis 1993).

The second type of definitions refers more closely to the specific urban functions capability to transform a place into a city; this assumption would emphasize the existence of the link between functional and physical system. In this sense it becomes crucial to

understand the nature of urban activities in relation to their potential to convert a site into a city.

The functions are therefore the main reasons for urban existence and in some cases are specific generating element of the city (think for example to the holy-cities).

Again, to make the concept better, it is possible to think to a city without urban activities (and therefore no functional system and in which there is only the physical system) like a "ghost town"; basically a city without functions is a non-city. As such it can be concluded that the city is the: "place of urban functions" (Fistola 1993). They can be thought of as structured and organized collective actions in space (education, healthcare, production, etc..) that are essential to city living and are located on specific places of the physical system. Mobility is the only urban function which is developed through the urban space.



The high speed connection between the two urban systems

Finally, and reflecting in part a definition already provided elsewhere, we say that the urban functions can be considered as relationships structure allowing to define the "organizational links" of the community.

The functions are located in specific areas and physical containers inside the physical system (except for mobility) and represent the urban engines (Fistola 1993); the functional system is "the soul of the city", abstract but essential to its survival.

When creating new connections between previously separated functional systems, supported by the deployment of physical infrastructure (such as HST), it's possible to envisage the emergence of new urban organizations, multi-urban areas, macro-functional resettlement of "joint-city" whose features and characteristics are all to be explored further and offer an interesting field of reflection for the research in urban planning.

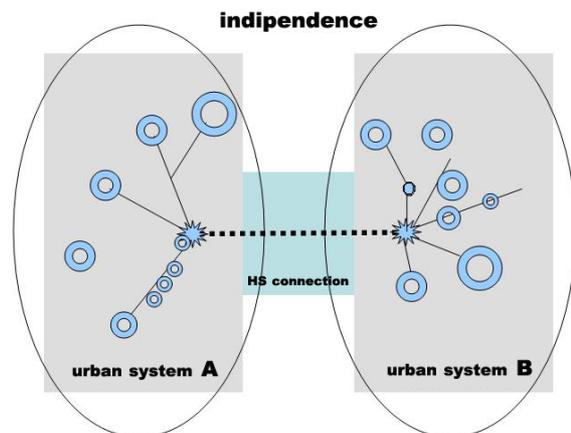
### Functional relationships between two metropolitan contexts (a taxonomy)

The birth of the joint-city seems to open up new perspectives in the analysis of systemic features of these innovative urban settlement. To start the new in-depth study it is necessary to outline the phenomenon and to carry out a new taxonomy for the different types of relationships established by the cities.

As already highlighted by interesting contributions (Urena 2005) it is possible to propose a taxonomy of the functional behaviors of urban systems connected by HST lines, focusing on the reciprocal role that urban systems can play. Trying to develop further reflection it seems possible to observe that the HST connection can generate, in a first approximation, five main types of relationships:

#### *Independence*

The two systems are connected by the high speed connection (HS), but the link does not produce any appreciable effect on urban externalities or even on the frame and functional extension of each one. The HST plays a role of mere support to the physical transfer, but does not affect the functional composition of cities.



The two cities are functionally independent

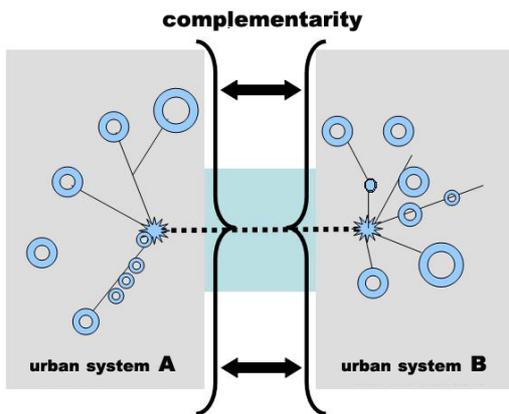
#### *Complementarity*

The two systems join their functional structure but there should be no real cooperation between them. This type is due to the union of two sets that do not produce, however, a new structure of relations and therefore a new system.

Anyway it seems interesting to consider the large size and variety of functions that the "merge" of the two systems is able to offer to urban users.

*Subsidiarity*

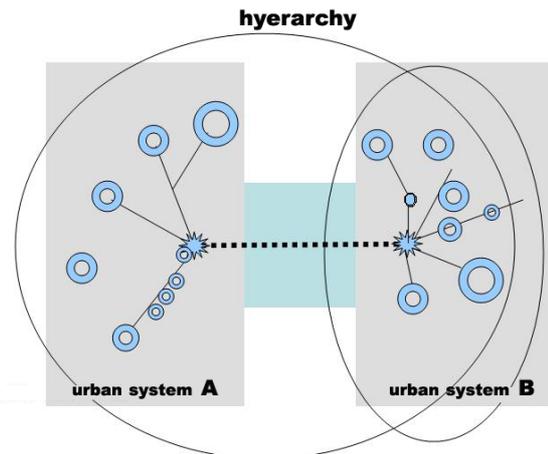
The two systems share and establish cooperative relationships supported by new administrative procedures, government processes, protocols, good communicators, etc.. The two systems also cooperate mutually and can promote a common functional development.



The two urban systems are complementary and integrated

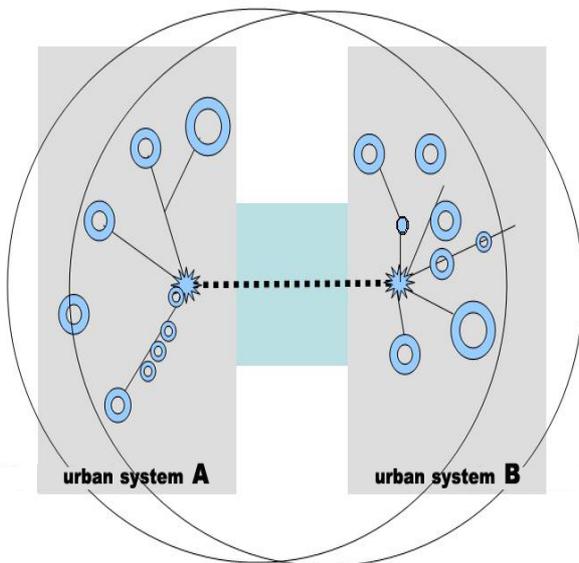
*Hierarchy*

The two systems establish a hierarchical relationship of cooperation between them. This kind of relationship designates a dominant system over another (or several) that, in reference to the first, acts at a functional lower level. The level of action, however, is subsidiary of synergy than the main reference.



The two cities are hierarchically connected

**subsidiarity**



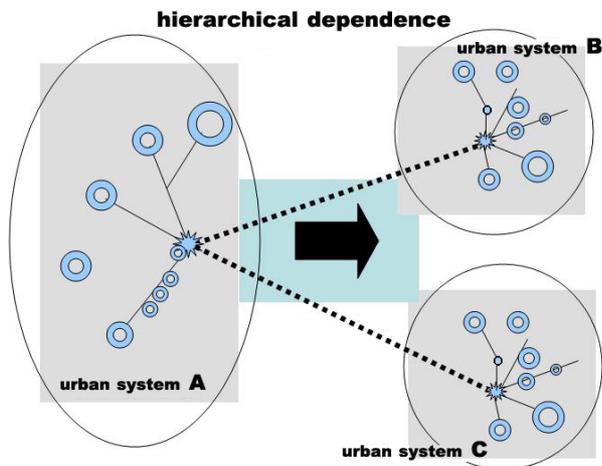
The two cities generate cooperative and synergistic relationships

*Dependence*

The system establishes, in this case, a hierarchical relationship in which the dependent system (one or more) is subordinated (as regards few functions) to the first and receives almost "passive" streams of users without obtaining a benefit (development effect) thanks to the interconnection.

If that functional type is determined, the dependent system (or systems) may lose its metropolitan role.

By adopting the proposed classification for the joint city: RoNa, made by Rome and Naples, it's possible to see that the absolutely dominant role that the Italian capital is able to play in many functional aspects (administration, travel, residence, culture, etc..) could set up a hierarchical relationship of dependency expressed by Naples, which is undergoing a pervasive functional crisis (administrative and management) at present. A reflection set according to these patterns may support the development of new policies and measures to develop functional Neapolitan urban centers that could be implemented even considering the new rail infrastructure.



The urban systems are in a hierarchical relationship and the urban systems B and C are in a passive state

### Interconnected functional centers: a study of accessibility

As just shown, the joint-city is generated when the two interconnected cities join their functional structures; such connection generates a relationship that becomes a harbinger of new urban development. It is anyway important to consider the mobility choice, taken by the city user, in order to get an urban function located inside the other city. Overturning the concept it is possible to say that a joint-city is generated when there is an high level of reliability, comfort and punctuality of trains and the possibility to work on-board (due to presence of fast Internet connection); but above when all the urban functions, allocated in the two cities, are able to produce an high polarization. This can be measured by functional specialization, the rarity of the activity provided but above all by the physical accessibility to the place of function allocation in relation to the railway station. It is not an objective of this paper to propose a specific focus on accessibility to urban functions but to provide a first indication, which could lead towards future researches, about the estimation of the potential polarization of urban functions (Schönfelder and Axhausen 2002), through a redefinition of the classic formula of the accessibility which considers the relationship between attractiveness and impedance. The elements proposed and listed below could therefore be also distinguished between the quantity to be included in the accessibility numerator (attractiveness) and the quantity to be considered in the accessibility denominator (impedance), for a function that should be reached by a city user located inside the joint urban system. In a first approximation it seems useful to envisage a linear function, not weighed, enabling it to assess the

effectiveness of the formulation. Among the variables to consider, in qualitative way as well, you might consider the following:

- A) direct connection with the final pole through a subway station;
- B) distance from the pole of HST (station);
- C) number of connections (possible);
- D) quality of the connections;
- E) accessibility of the cluster (total stops to reach the pole);
- F) number of interchanges on railway;
- G) number of intermodal trade;
- H) average distance between stops on railway;
- I) interchange times in the the pole (accessibility to the metro);
- K) average wait for metro interchange.

The variables shown may be settled inside indicators or given directly to the accessibility function after appropriate standardization. In this case the numerator contains the standardized sum (with the introduction of eventual weights) of the variables A, C, and D and the denominator contain the sum of the remaining standardized. That indicator expresses also a measure of the network connection of the various functions located inside the territory. In the final paragraph we will attempt an estimation of the function for a single urban activity by identifying the origin and destination activity respectively in the two centers interconnected. Finally it should be noted that the urban functions can have a different interconnection capability and effect of interrelation. For example, health, tourism, research, etc., leading to a strong functional junction between the joint systems, while other activities such as: residence, finance, etc.. leaves the system in a substantial independence. A special focus on these polarizations may offer interesting perspectives for the definition of urban government policies.

### Health function

In this final section it's proposed an example of a functional connection analyzed for the health function. This analysis could be further developed by distinguishing among different relationship typologies that can be generated between the functional centers (patients, doctors, medicines rare, blood, organs, etc.). It also possible to consider the eventuality that during the transfer, in case of of a medical team with the possibility of Internet access on-board, a tele-meeting can take place before the medical intervention. Health is an activity that must be articulated according to a widespread attitude in the metropolis but, in large cities it is concentrated in specific poles (polyclinics). In the city of Rome and in Naples there are such macro-functional poles characterized by different location peculiarities: in the case of the roman general

hospital, the complex is located in an area close to the rail terminal and is immediately reached by the metro line B through a specific stop. The estimated time to reach the main hospital stop (called: Policlinico) from the Termini central station is about 3 minutes. The case of Naples is substantially different, where the macro-functional medical pole is located on the hills of the city and is reached by the metro line 1; the line climbs over the hill of "Vomero" and, in the next few years, will be directly connected with the Naples central station. At the moment it is necessary to make an interchange at the station "Cavour" where it is possible to switch from line 1 to line 2, which connects the central station with the area of "Campi Flegrei", the west part of Naples. The total displacement between the two macro-functions may require, in terms of average time, about 2 hours, which can, in any case, be acceptable for patients who require medical consultations, specific diagnostic tests or treatments. To support the link between medical facilities and, hopefully, the birth of a "network" between the health units of the two joint cities, you may create an information system (data-base) for common access, able to manage the patients between Rome and Naples. It should also be given the opportunity to propose administrative protocols connection between the functional systems so as to support the transfer from one to another immediately.

## Conclusions

The aim of this paper was to offer some thoughts that could catalyze a research interest on the new interconnected metropolis (joint-city), which have been created thanks to new connections between the functional systems of two or more urban centers linked by HST. At the end it is possible to observe that, firstly, the possibility of creating a joint-city is heavily influenced by travel time in HST, between the metropolitan centers and, consequently, between urban functions inside of them. Some recent studies indicate that the isochronous drawing the boundary of the potential users area of urban functions is 1.5 h.. It should however be noted that these studies make an analysis being centripetal and not interconnected. In other words, the catchment area that is generated as a result of travel time that a user is willing to employ to reach the site of the function, which acts as central node within the urban system. In the definition set out here the analysis is conducted for multiple interconnected systems (specifically those in Rome and Naples); the HST must not be considered as a new channel of mobility between cities, but as a real possibility of union between the functional systems the two centers. However the time of 1.5h./2h. appears useful for the establishment of the interconnection. A further observation can be carried out in relation

to the possibility of putting in place new measures of governance of urban transformations considering the "joint-city".

Interesting synergies and relationships of subsidiarity between functions could arise by allowing a new, more efficient and specialized service supply.

To fully understand how to articulate government action it might be interesting to construct an array: activity/type of relationship showing, for each urban function, what type of interconnection (including those listed, but probably it can also identify other sub-categories), is to establish.

We could therefore generate a joint-city in which some functions tend to settle in virtuous cooperative ties and other relationships that tend to strongly hierarchy or dependency.

In this sense, the result would be that of a joint-city functionally characterized for the health, tourism, etc., which represent the new macro-centres of the new territorial structure.

## References

- Batty M. and Longmann P. (1994) *Fractal Cities. A Geometry of Form and Function*, Academic Press, London.
- Dematteis G., (1993) *Le funzioni urbane*, in AA.VV. *Geografia Urbana*, Utet Libreria, Torino.
- Fistola R. (1993) *La città come luogo delle funzioni urbane*, in Beguinot C. (a cura di), *Aree Metropolitane e innovazione*, pf. 3.1, Consiglio Nazionale delle Ricerche - Progetto Strategico Aree Metropolitane e Innovazione.
- Gibson J. E. (1997) *Designing the new city: a systemic approach*, John Wiley, London and New York.
- Gottmann J. (1988) *La città invincibile*, Franco Angeli, Milano.
- Martellato D. (1991) *Teorie della crescita dei sistemi urbani*, in Bertuglia C.S., La Bella A., *I sistemi Urbani*, Franco Angeli, Milano.
- Martinotti G. (1993) *Metropoli la nuova morfologia sociale delle città*, Il Mulino, Bologna.
- Palermo P.C. (1992) *Interpretazioni dell'analisi urbanistica*, Franco Angeli Urbanistica, Milano.
- Regulsky J. (1983) *La pianificazione della città un approccio sistemico*, Officina Edizioni, Roma.
- Sassen S. (2001) *The Global cities: New York, London, Tokyo*, Princeton University Press, London.
- Schönfelder S. and Axhausen K.W. (2002) *Activity spaces: Measures of social exclusion?*, *Arbeitsbericht Verkehrs- und Raumplanung*, 140, Institut für Verkehrsplanung und Transportsysteme (IVT), ETH Zürich, Zürich.
- Urena J. M. (2005) *Alta Velocidad Ferroviaria (AVF) y nuevas actividades en tres situaciones territoriales*, in I.T.n.70, 2005.
- von Bertalanffy L. (1971) *Teoria Generale dei Sistemi*, Il Mulino, Milano.