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Patch – Switch – Stratus. An insight into infrastructural spatial mediation strategies in contemporary Lisbon metropolis

João Rafael Santos

(Architect, MSc. Urban and Environmental Regeneration, Lecturer, Faculty of Architecture/TU Lisbon, joaorafael@netvisao.pt)

1 ABSTRACT

Infrastructure spatial mediation is a concept being developed on an ongoing research in Urbanism addressing morphological and planning mechanisms capable of giving an insight into the complex issue of how to qualify and integrate metropolitan scale infrastructures with local urban tissue and unoccupied landscape. The impact of global infrastructure on cities and public space is not a new phenomenon; Amsterdam's canal streets staged the 17th century's equivalent to today's logistic hubs, accommodating global navigators, merchandise handling and local urban activities on a common infrastructural space. However, the new specialized transportation networks (of people and goods, but also of energy and information), bring new and challenging problems to address and accommodate into the urban and territorial planning agenda.

Assuming *mediation* elements as a central theme for today's urban research, we propose a further distinction and combination between mediation spaces and mediation processes, in which the former may be analysed from a morphological approach, as whereas the later allow for an interpretation of mechanisms of integration into wider territorial and conceptual framings. These framings would contribute as a renewed *lens* to the understanding of contemporary metropolis from an infrastructural perspective. *Patch*, *Switch* and *Stratus* as some of these mediation mechanisms, combined in different infrastructure and public space interventions in Lisbon, in the context of several European metropolises.

2 INFRASTRUCTURAL SPATIAL MEDIATION – METHODOLOGICAL ISSUES

2.1 On mediation

The concept of mediation[1] takes into consideration a third party mechanism to co-relate different systems into a combined result. The nature of mediation stems from its condition of medium, media, interfacing between differentiated and contest realities and processes, which tend to be conflicting and often incompatible. It is, as such, a process which allows greater interactivity and feed-back effects, increasing the complexity of simple cause-effect relationships. Mediation results therefore as a facilitator and smoother of rigid hierarchical and structural determinants.

To build on this interpretative framework, a number of questions arise:

- which should be the territorial scales to interpret spatial mediation? One of the key aspects to be taken into consideration is the multi-scalar configuration of contemporary infrastructural development, and its ability to function as scale interfacing mechanisms;
- what are the resulting spatial configurations of such mediation territorial elements? To address such issue we will focus on its public space structure;
- within which territorial structures are these mediation elements integrated? And, putting it inversely - does their specific configuration and locational patterns help to outline such structures on a metropolitan scale?

2.2 A preliminary systematization

The systematization of mediation spaces and processes stems directly from the inherent complexity of Lisbon's metropolitan territory as a case study. It is not a locked, univocal or vertically segregated arrangement. On the contrary, it is open to the emerging of new synthesis, as further geographical and time layers are continuously overlaid on the territory. It accounts for the possibility that urban transformations occurring during a long period of time may incorporate different mediation processes resulting from

[1] On *mediation* refer to the *Vocabulaire Technique et Critique de la Philiosophie*, 10ème edition, Paris: Editions PUF, 1968 and the chapter 'Mediaciones en la arquitectura y en el paisaje urbano' in Solá-Morales, Ignasi, *Territórios*, Barcelona: Gustavo Gili, 2003

technological developments, policy reshaping, new design and professional interactions, changing forms of urban growth, thus providing a diachronical stratification. On the other hand, it also accommodates for the simultaneous overlapping of more than one key factor for infrastructural and urban transformation in a given time.

Such approach recognizes locked interpretation systems as being too narrow to be operative in explaining and providing design tools for contemporary metropolitan spatial realities and planning. Multiplicity and hybridization are far more appropriate conceptions when dealing not only with today's metropolis morphogenesis, but also in line with current transversal urban theory (Venturi, 1966, Koolhaas, 1995, Pavia, 2002, Shane, 2005). In fact, much of the recent innovation in design, planning research and cultural significance of cities is target precisely at the more vague, contested and interstitial territories continuously reshaped by multiple urban, landscape and infrastructural strata.

Five large fields for morphological mediation processes are being outlined in the preliminary findings of our ongoing research:

- the relationship of infrastructures to the physical shape of the territory, its accommodation and combination into linear axis of mobility, supply and ecological support;
- the bounding determinants of infrastructural development, forming geographies of inclusion/exclusion in relationship to wider territorial scales and the emergence of ring configurations;
- the transversal and frame armatures accompanying infrastructures, exploring its thickness and the building of wider skeleton, gridded and sector-based arrangements;
- the spatial splintering and unbundled forms of infrastructure, public and private spaces and the specificities of mobility spaces working at different speed and scales;
- the spatial interfacing of multiple infrastructures through complex modal switch, stratification and precipitation devices, triggering urban public space, functional and landscape regeneration and upgrading.

In this paper we will address the later of these fields, focusing on major examples of infrastructural interfacing and its recombination in Lisbon metropolis, throughout the last 150 years since early industrialization and the building of the first railroad lines in 1856. Major transformations during the 20th and early 21st centuries are identified as the metropolis evolves into highly complex territorial onfigurations structured on overlapping and specialized network strata.

3 SWITCH

Cities were always places of switching of people and goods. The infrastructural devices for such switching process used to be rather simple as roadways and sea lanes precipitated smoothly into the streets, plazas or quays of cities, defining special districts (harbours, markets, storage houses) articulated on spatial contiguity and continuity patterns. However, as mechanization and technological revolution introduced modern specialized transportation and supply lines, new switch spaces were needed and typological innovations arose (train stations, water pumps, deeper port wharves). Street sections were transformed to accommodate engineered gas, electrical and water supply infrastructures at the same time car and pedestrian traffic were given specific and standardized spaces (Hård and Misa, 2008). Large industrial districts were developed around train lines, port quays and water and energy supply basins. Switching protocols became system related and became responsive to larger organizational layouts, often missing close scale and a broader spectrum analisys of its connection potential (Easterling, 1999).

By considering these developments under a broader switching mechanism designation, one can trace the evolution of a metropolitan entity by identifying the main switching spaces and classifying them in relationship (1) to the infrastructural lines they combine and (2) to their surrounding morphological and functional elements.

A preliminary overview of significant cases of switch mediation was carried out in Lisbon, where the most basic urban/infrastructural switch device would be the small settlements positioned in a not yet urbanized territory in the city outskirts, assuming two simple configurations: the intersection of roads and the riverfront adjacency to the metropolis two estuaries (Tagus and Sado). The urban outcome reveals a tendency to

compact and contiguous urban development parcelled in clear patterns derived from the road/riverfront geometrical configuration. Density, contiguity and spatial hierarchy are clear and reflect the importance of specialized switching spaces, such as piers and quays or small squares. The transition from road to street is rather undistinguishable since they offer a spatial entity with clear and persistent characters (width and alignments, stone walls, accompanying trees, road fountains…) which integrate converging streets into a wider territorial scale. In the territory that would become Lisbon metropolis, such intersection pattern is quite clear in the northern bank of the Tagus River, where a dense network of roads along and across a deep valley topographical structure, defines a geomorphical matrix. On the other hand, the south bank offers a more smooth topography around the Tagus estuary made up of deep trenches, small rivers and shallow valleys, allowing for the formation of river based urban settlement. Further switching mechanisms were ingeniously developed not only in the field of mobility networks, such as water supply aqueducts closely interfaced with the gardens of aristocratically villas or the irrigated domains of religious convents. In all of these cases, switching was performed over a simple mechanism accommodating for multiple functions and clear urban spatial arrangements.

3.1 Railroad switching

The introduction of the railroad would represent a major transformation in the way how cities and territories structure themselves in relationship with mobility. Although in Portugal, it was firstly seen as a national and iberian system it would develop at an later stage as a powerful regional (suburban) infrastructure. From a public transportation perspective, radial lines were the backbones of suburban growth, even though most of them were thought as national scale lines (northern line connecting Lisbon to Porto, of which the first track between Lisbon and Carregado was opened in 1856, South and Southeast lines - on the south bank of Tagus River -, opened in 1860 and Sintra and Oeste line, 1887). Cascais line (1889) was the only exception being specifically built as suburban line serving the emerging touristical area of Costa do Sol, with small and short distanced stations.

The only truly suburban line – Cascais – had its stations positioned on a coastal area, serving a range of small settlements favoured by sunny and mild climate and a reputed aristocratical and bourgeois atmosphere for the late 19th and early 20th centuries' beach bathing, casino and prestigious hotel offer. Soon, old farm estates close to railroad stations were subdivided into single family houses and chalets according to regular gridded street patterns filling open spaces in-between the station and the old Lisbon-Cascais road or the waterfront.

This differentiation is crucial to the understanding of a subtle but significant variety of infrastructural mediation processes and can be addressed by looking to the way how these stations became structuring elements of its urban surroundings.

Only the terminal stations were given some architectonic elaboration, still far from the elegance and monumentality of European counterparts, most of them modest and often quite fragile elements, weakly integrated with their surroundings (Cais do Sodré, Santa Apolónia). The exception was the Rossio central station, built to be the terminal station of the international lines connected to Spain and France. Its premium location at the heart of downtown was only made possible by the tunnelling of 2,6 km under the sloping hills where the city was growing, completed in 1890. The station offers an ingenious solution to accommodate into a steep slope, with two levels articulated by an eclectic façade. The station was accompanied by a distinguished hotel designed by the same architect. Both played a key role in the urban articulation of Rossio and the 1886 extension of Avenida da Liberdade boulevard.

3.2 New technological mediation in urban space

From an urban scale perspective, Lisbon's modern public transportation was firstly introduced in 1901 with electrical trams, based on a network of radial lines which would evolve into a dense reticulate matrix, covering much of the city's sloping hills. Being integrated into existing street axis, one could argue that no new spatial switching mechanisms were developed for its operation and interfacing of passenger flows. However, when considering its technological apparatus linked with electrical power supply, evidence of another type of switching arises: the tram network's private power station was built in 1901 on a late 19th century very large land fill gained to the Tagus River, accommodating new harbour docks, quaysides and storage houses and serving as the bed for a new wide and tree lined avenue (24 de Julho) and railroad line

(Cascais line) parallel to the river. This land fill would also accommodate Lisbon's main electrical power and gas plants along with port facilities. Such support and utility infrastructures established a functional profile to a vast territory which completely redefined Lisbon's relationship with the riverscape, from now on mediated by an essentially technological linear and flat switch space where all of the new mechanized transportation, industrial and supply infrastructures converged. The 6,5 km long land fill has become one of the most contest spaces today in Lisbon, as some of its areas were transformed into public space (namely in Belém, after the 1940 Portuguese World Exhibition), being at the core of urban renewal strategies in the wake of de-industrialization and port relocation and modernization dynamics.

3.3 Multimodal switching and the development of a networked metropolitan mobility

Leaping forward and refocusing on the public transportation facilities, one identifies the first multimodal interfacing stations were built as the terminal stations of the three trenches of the subway line in Lisbon which duplicated its radial structure. They were designed to facilitate switching between subway and bus lines, mainly serving fast growing suburban axis to the north. Interestingly, although very close to the ring railroad line, none of these interfaces were designed to accommodate passageways to the train stations serving these areas. This suggests an essentially radial perspective of metropolitan transportation systems where switching is essentially located and configured to serve such structure. The same conclusion can be asserted from observing the subway pathway under the historical district in downtown Lisbon, reaching Rossio, an important and lively plaza close to one of the city's most important train station. Both the railroad station and the subway line were mainly dedicated to commuting employees of commercial downtown and again, no interfacing between both of them was initially built.

In spite of the important transport planning enphasis in a number of bus terminals during the 1960's (Lobato, 2005), it was not until late nineties that a new multimodal conception of metropolitan transportation was put forward through a policy of multiple multimodal switching stations, connecting subway, railroad and river terminals. In fact, this policy was part of an ambitious line extension program which not only offered quality public transportation to growing residential areas, but also – and central to this perspective – a more switched layout. Recent public transportation infrastructure investment in Lisbon deals with the opportunity to qualify and regenerate deprived districts and suburban areas (Chelas, Odivelas, Amadora), conflictive public spaces (Cais do Sodré, Terreiro do Paço) and old industrial areas (Expo 98) taking advantage of increased conditions of connection and attraction within a metropolitan scale territorial basin.

Future investments will be mainly associated to the new bridge over the Tagus River, combining metropolitan, national and high-speed train services with a fast lane highway. Once again, anchorage points for switching spaces reinforce the transversal connections (new subway/train interface in Chelas) and the emerging centrality areas (high-speed central station at Oriente).

3.4 Logistics switching

Less visible from everiday's urbanscape, but just as vital to the metropolitan processes, today's switching occurs in closely time synchronized devices, supporting just-in-time production and logistic systems but highly de-synchronized in terms of spatial structure. Putting it in simple terms, splintering effects occur from the unbundling of infrastructural networks and public space across multiple territorial scales (Graham and Marvin, 2001). The silent efficiency of highly automated logistic hubs and port terminals are parallel to the almost undisturbed sight of modern car or electronics production plants. They're no longer sceneries of congestion and pollution. Switching efficiency and the hygienist heritage of 19th century planning took them to far away locations for the urban centres. However, their connection – or more appropriately said – the multiple overlapped and spread over connections between multiple switching points, define a looser landscape pattern where the spatial mediation no longer exists as the 18th century synchronous morphological, topographical and infrastructural device. The mediation we can trace in these scenarios is both anchored to a global geographical state of constant flux and adaptation and to a local highly streamlined and perfected system of spatial layout, accessibility and connection to high-capacity networks. SMI/SME parks or logistic cities are absorbed into this aggregation and define a new field for public space planning and design, which has been almost exclusively dependent on functional layout criteria.

4 STRATUS

The horizontal expression of urban growth (Pavia, 2002, Secchi, 2005) as a process of continuous functional and spatial segregation is closely associated to some of the splintering switching mechanisms we discussed previously. The need to accommodate efficient switching for a specific function dictates the spatial desegregation of a number of network system interfaces, requiring greater amounts of space – to accommodate them but also as waste land left over in-between and in the wake of metropolitan development (Berger, 2006). This process is not, however, uniformly distributed as intensive nodes of attraction and connectivity arise in multiple locations across the territory. If in what used to be peripheral areas that intensity is not yet too conflictive due to considerable space availability and low land costs, in more densely built and expensive areas, congestion becomes a problem. In these cases, switching must be combined with another mechanism of mediation: stratification.

Just as we observed for switching, vertical stratification is not a new phenomenon. Early underground drainage systems were introduced as early as in the cities of the Roman Empire, defining a functional and infrastructural stratification of public space. Land transformations such as tunnelling, the opening and deepening of navigation channels, the infill of waterfronts, the introduction of multiple layers for underground utility and transportation networks are clear evidence of stratification mechanisms designed (1) to adapt natural topographical features for human activities and (2) to make a more efficient management of limited spatial resources by defining specialized areas to specific roles. Beyond such strategies, one can find the inherent architectural expression of stratification as a design tool with cultural and even plastic significance (Barley, Ireson, 2000) magnificently recognized in cases like Wacker Drive and the Loop in Chicago, in George Candilis' proposal for Frankfurt Romerberg district reconstruction or in The Hague souterrain tram tunnel by OMA. One can assume this perspective as a useful tool for a more elaborate design and planning of new or restructured mediation spaces facilitating a more condensed and interlocked combination of infrastructural strata and, hopefully, of territorial scales.

4.1 The infrastructural stratification of water and public space

Lisbon's first major stratified approach to public space/infrastructural mediation was the building the 18th century water supply aqueduct with its storage and distribution network. Bringing water from a distance of about 14 km, the entire network reached the total length of 58 km, including the monumental arched structure over Alcântara Valley as well as a number of storage tanks (mães de água) and public fountains. Its interest to our discussion comes from some ingenious stratified solutions developed to accommodate large storage tanks within the city fabric. The mãe d'Água of Amoreiras is a monumental stone building, interfacing the above ground aqueduct with the underground network. It is positioned in slope, defining a platform where a simple but noble public square was built. Both the interior and its flat ceiling belvedering the city's skyline, were used as social venue stages for high-society. The lower levels were geared with water valves and a public fountain serving the nearby square of Rato. Another tank – in Principe Real – is accommodated in the underground of a large public garden plaza, under a central fountain. Today no longer used for the water supply, it is open for cultural venues and is part of a touristic trail along the old tunnels.

The stratified relationship to public space and to a wider urban and metropolitan scale comes also through the water distribution system's own inner working logic, where gravity and the siphon come into balance to provide the adequate pressure for water supply. Lisbon was stratified into three (currently four) service levels, each supplied from a major storage tank with some redundant interlockings. This system puts into evidence a transversal structure laid over (or more appropriately – laid under), the city's linear axis of top hills and valley talwegs. This alter-geography of aqueducts, storage tanks, underground pipes and public fountains in its association the public space structure of streets and plazas, has become a forgotten layer since the development of individual house-to-house supply networks disrupting the entanglement between infrastructure and public space, reducing it to a simple mechanical layout. However new approaches are being developed such as opening such infrastructure to public use bringing it into the visible realm of urbanscape.

4.2 The strata of underground transportation

The second stratified system was the above mentioned building of the Rossio tunnel in XXX allowing train access to downtown under passing Lisbon's difficult topography. Its infrastructural strength comes two way:

1) from a straight functional connection from the city historical district to one of the most important suburban growth axis and 2) from its association to the rather plain topographical strata needed to the operation of railroad which becomes coincidental with the main valley structure (Alcântara, Sete Rios, Benfica).

The third structure based on a stratus mediation is the subway network, opened in 1959 with the first layout duplicating the city's main urban avenue axis. Although much of this layout was due to the need to have a simple building solution – open air excavation – it surely reinforced those avenues not only in terms of functional attraction but also as a multi-scalar mediation space for urban wide relationships. As such, the first subway generation offered a simple juxtaposition of two infrastructural strata: the tunnel and the avenues above. As technological and financial capabilities increased, deeper tunnels and stations were built and mediation by stratification was redefined: no longer a linear juxtaposition, it became freed to serve the increasing demand of intermodal switch stations, where a more articulated stratification was developed (Cais do Sodré, Oriente, Baixa-Chiado). In these cases, architectural solutions become more elaborate and spatially responsive to urban surroundings, inner-space quality and easy connection to the various transport platforms. One interesting variant on subway multimodal interlocking is the case in which subway stations have direct entrances or imbibed into large shopping malls (Colégio Militar /Colombo, Oriente/Vasco da Gama, São Sebastião/El Corte Inglés, Baixa-Chiado/Armazéns do Chiado).

Just as we saw in the case of switch forms of mediation, the location of complex stratified solutions tends to be firstly related to an urban and metropolitan geography of dense and intensively used areas where multiple infrastructures and topographical constraints require more elaborate spatial mediation mechanisms. As basic infrastructural programs come to completion after major EU funding aids, a new generation of challenges starts to emerge and a more landscape and urban distress sensitive approach is required for infrastructural improvements. Although not yet assumed in official policy guidelines, local authorities and professional practice look into international best practices as prospective planning scenarios.

5 PATCH

The use of stratification strategies is usually technically complex and cost intensive and is not suitable for development in all contexts where one finds splintering effects from infrastructure. For instance, low density urban fabrics with sparse functional dynamics will probably fall below a sustainable threshold for such mediation strategy. In these cases, usually associated to spaces located far from large urban attractors and in-between peripheral growth areas, patch strategies often offer lighter design solutions where public and natural open spaces are brought forward as key elements for infrastructural mediation.

The concept of patch is inherently associated to the implied existence of a mosaic built from somewhat fractured elements, upon which it will overlay, providing or reinforcing linkage and cohesion. Design and theoretical approaches to this concept were brought up by Rowe and Koetter (1978) in Collage City, where the fragmentary condition is appropriated as an urban design tool, recognizing the failure of crystallized formal planning in dealing with post-modern urban transformations. Still, much of their proposals were confined to a compositional agenda, missing a more operative integration with the increasingly dynamic and multiple layers of city and metropolis making. Shane (2005) understands patches as highly structured nodal mechanisms of confrontation and negotiation, which may operate simultaneously at various scales and across a number of infrastructural systems, often acting inconspicuously and with extreme flexibility as powerful links between local scale and global levels.

The conceptual usefulness of patch in our search for infrastructural mediation devices in metropolitan landscape comes from its metaphor as a suture mechanism where public space plays a leading role and a number of co-existing and overlaid functional systems are put into a coherent spatial layout to provide reconnection and qualification into fractured and splintered territories. Its metropolitan specificity and relevance would come from a criterious selection of metropolitan range infrastructures (whether artificial or natural) put into relationship by such a device as to integrate such disrupted spaces into wider territorial armatures.

From an architectural and urban design perspective, the work of Lukez (2007) offers a new insight on multiple layers, strata and constraints as potentially expressive elements if infilled and edited as hybrid evolving structures, creating new spatial, building and infrastructural typologies. Barcelona's public space

interventions along Ronda de Dalt have gained international recognition on its ability to integrate a new heavy traffic infrastructure with an intelligent and sensitive requalification strategy for the crossed-over urban districts. Its visibility comes however with a high building cost and can not be easily reproduced. In Lisbon metropolitan region such heavy interventions have not yet come to be developed for such an infrastructural integration has not yet been fully acknowledged into public work agenda and sectorial practices.

5.1 Multidimensional patching

Probably the most extensive patch related operation under development in Lisbon is the Polis Program intervention of Cacém where a number of topographical and infrastructural strata – topography with extreme slopes over a stream valley, railroad line (Lisboa-Sintra), fast traffic motorway (IC19) - come into conflict at one of the densest and fast growing suburban areas with a notorious lack of public space amenities and serious environmental deterioration. A masterplan (PP-Plano de Pormenor) was developed based on four interlocked interventions: 1) stream restoration and development of a linear park along its banks, 2) restructuring of road networks, especially when it relates to the motorway, 3) street profile and public space pedestrian friendly upgrading, 4) development of new service sector areas and urban facilities next to the stream and park and 5) the restructuring of the railroad station facilitating spatial continuities and urban restructuring. As the city develops on both slopes of the valley, the stream restoration strategy combined with a stronger public space structure plays the key role in the patching mechanism, serving as the new referential core for this rather anonymous residential area.

Other smaller projects involving infrastructural patching include railroad station redevelopment, usually targeted at safer linkage between both sides of the track and larger parking and public transportation interfacing facilities, but still far from taking advantage of such opportunity and assuming a truly urban requalification role. This is an area where Lisbon's metropolitan region has still a long way to go if it wants to get in line with international best practice.

However, the assessment of such opportunity areas begins to be outlined as a number of local scale interventions starts to form continuity patterns and as wider attention is being paid to the public space and environmental upgrading of natural systems. Just as Galí-Izard (2005) points out, continuity is a key characteristic of natural systems and landscape physiological processes and simple interventions may combine them in ways to make spatial structures readable and in dynamic equilibrium.

5.2 Opportunities for light patch interventions

In Lisbon, lighter solutions have been put forward in line with limited financial resources, usually using open space as a patching element, bundling new public space with natural systems of streams and valleys. This locational pattern offers and interesting view for it reveals a local strategy adopted by peripheral municipalities to develop such amenities in recent urban areas deprived of urban facilities and generally lacking adequate and diverse infrastructural and functional offer. Some interventions include the urban parks of Rio da Costa (Odivelas), Ribeira de Algés (Miraflores/Oeiras) and Ribeira de Queluz (Sintra) which were developed by local municipalities as part of their public space and urban policy. Individually considered, each one of these parks are still far from defining a truly metropolitan open space structure, but if understood under the planning guidelines offered by the 2002 Metropolitan Area Regional Plan (PROTAML) in which natural continuities of ecological importance play a foremost role, it is possible to outline a potential field of intervention along such water lines. Although still under construction, we identified two further interventions providing interesting perspectives on the patch mediation mechanism: the Alcântara valley (Lisbon) and Prior Velho valley (Loures).

Alcântara is a deep geomorphical feature long established as one of Lisbon's historical boundaries (the first circunvalação). Because of its difficult and steep topography and associated waterlines it became occupied by precarious urban development, industrial areas and low-income neighbourhoods on its fringes, accentuating a character that could be described by the city's backyard. From mid-20th century onwards it became the bed for strategic infrastructural lines such as the highway access to 25 de Abril Tagus River Bridge (opened in 1966), the railroad line passing through the Bridge (built in 1999) and a major waste water treatment plant (built in 1989). It is also the eastern border to the 1000 hectares Monsanto forest park. In the late 90's and early 2000's, along with a major urban housing renewal operation was developed, along a

refurbishment and expansion project for the waste water plant. These offered the opportunity to develop the steep valley slopes as a landscape corridor integrating and reframing the multiple road and railways, the waterline and the wastewater system into a large scale urban structure. Within such frame, individual projects work out an architectural approach to the landscape continuity concept, such as the gardened roof of the renewed waste water treatment plant. The whole valley is currently undergoing masterplanning preliminary stages, involving environmental assessment, post-industrial urban renewal interventions and major infrastructural upgrading of a complex port, railroad and arterial road nodal intersection at its mouth.

Although of much smaller size and infrastructural importance, Prior Velho valley is an important basin for Sacavém, a suburban area close to Lisbon's northern boundary, built over and around the waterline without planning concerns towards stormwater accomodation. Additionally, much of the Lisbon's airport runway platform (extended over several valleys in 1962) is drained to the Prior Velho valley resulting in serious flood hazard. In order to prevent regular floods a water interceptor and retention dam combined with a new urban park will be built along the valley. The works started in late 2008 having SIMTEJO – a multi-municipal waste water treatment company – as its global contractor in cooperation with Loures Municipality, providing a renewed and innovative institutional arrangement between infrastructure and public space planning and management. Together with a global urban renewal operation[2] near completion in Sacavém, targeted mainly at public space and urban facilities improvement, Prior Velho valley provides a multi-dimensional and multi-infrastructural approach to metropolitan planning and design.

Under the conceptual umbrella of patch mediation, one can distinguish a number of sub-mechanisms, although all having in common the ability to link and sew surrounding areas with a significant degree of distress and splintering, through the system-responsive, spatial coherent and institutional interlocked combination of several infrastructural strata. Although one recognizes the opportunity and relevance of such interpretative and design agenda to address contemporary metropolitan planning, it must be remembered that it is by no mean a new way of dealing with such bundling, since we can trace similar strategies in the early agricultural valleys, convent and villas irrigation systems or even in the innovative landscape and park design of Frederick Law Olmstead in which basic landscape structures were closely intertwined with complex infrastructural and public space arrangements (Rybczynski, 1999).

6 CONCLUSION

Although one recognizes the paramount conceptual width of mediation processes and spaces, it is possible to identify five key fields to address them, as we have seen in point 2.2. By focusing on one of those fields – spatial interfacing through public space and multimodal facilities – one could identify three major mediation processes in which specific mechanisms allow for interfacial role in-between scales and spaces: switch, stratus and patch. This approach has the conceptual advantage of not being confined to closed chronogical boundaries since such processes are to be found in several territorial structures in different time periods. This diachronical transversality is also usefull to the planning and design for it allows renewed perspectives on long established mechanisms and innovative recombinations.

However, one can distinguish different weights that each one of the three processes has in metropolitan territorial evolution. Even if their characteristics are long embebed in the multiple urban infrastructural layers, it is clear that switching was vital since the genetic formation of pre-industrial settlements (i.e., land-water interfaces, crossroads) and gained refinement with industrialization and the modern mobility surge (railroad, modern port technology, air travel, ICT's), whereas stratified solutions required a significant technological background to be implemented along with a spatial and infrastructural complexity and intensity to justify costly solutions. Patch mechanisms are emerging as recurrent characters of planning strategies in post industrial urban regeneration, public space renewal and complex infrastructural streamlining even though it is possible to recognize parallel systematic bundling principles in early territorial development stages (irrigation, plazas, park and boulevard systems).

As contemporary metropolis require denser and more interconnected network systems aimed at improved mobility and communciation efficiency along with environmental perspectives on natural systems' integration as structural elements for metropolitan territorial cohesion, mediation mechanisms are increasingly combined into complex arrangements.

[2] PROQUAL – EU funded program for critical neighbourhoods in metropolitan areas.

Waterfront renewal is often such a complex challenge for planners and designers, so that a number of mediation mechanisms may have to be employed in-between, under or over the multiple parallel linear structures laid along the river or sea fronts. In these cases, besides patching strategies, stratified solutions may be necessary to accommodate smooth and compatible infrastructural crossings, public space continuities or water drainage systems. And, of course, as river and maritime traffic interfaces, switching will probably have a leading role in organizing multiple transportation and logistics networks converging on waterfronts. The aforementioned Alcântara Valley is paradigmatic of such multi-mediation matrix, in which one cannot handle one single space or element without assessing the global intertwined outcomes.

Designing public and infrastructural space in tomorrow's Lisbon metropolis will probably be increasingly focused on variable intensity mult-mediation strategies, that is to say, resorting to a pallete of spatial mechanisms aimed at strengthening continuity solutions and better flow connectivity while improving architectural and landscape quality. As recognized by several authors (Sieverts, 2003, Marinoni, 2006), contemporary metropolitan territories can no longer be address on simple urban compactness solutions and criterious interventions must be developed assuming dispersal, low density and fragmented scenarios as persistant and irreversal characters of future development. Sectorial, zoning and constraint based urban and metropolitan planning array has proven incapable of accommodating dynamic, heterogeneous and often inconspicuous growth, demanding cross-sector approaches and a keener perspective on what are truly structural elements capable of providing clear armatures supporting a more flexible local development pattern.

Switch, stratus and patch are conceptual metaphors for specific spatial mechanisms and transformation processes operating precisely at those structural metropolitan armatures. By resorting to them, individually considered or, increasingly, in multiple combinations, may offer a better understating on the reconfiguring of cities and urban territories and an operative planning tool for intervening at strategic nodes of contemporary metropolis.

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