Efficient services for better quality urban life

We have already referred to services that the user or customer seeks out in the previous point. Here we wish to deal with infrastructure- or network-based urban services (water, sanitation, energy, transport, waste removal, etc.). As regards efficient services, we can already highlight all research covering infrastructure cost and maintenance, e.g., transport infrastructures that need to hit on appropriate models (Côme et al., 2009, Chamroukhi et al., 2009) and come up with a suitable way of organising their maintenance (Donat et al., 2008).

Next, **approaches based around urban metabolism** (which still require much work) that attempt to cover the entire chain of consumption within urbanised spaces, highlight the importance of the performance and organisation of these services in terms of natural resource drawdown and the disposal of waste (into the atmosphere, water and soil, in liquid, solid or gas form) generated by urban living (Heynen et al., 2006, Barles, 2010). Awareness of the importance of these mechanisms remains partial and poorly documented (Coutard, 2010) and as one reference work shows, approaches in general are poorly spatialised (Ayres and Ayres, 2002) .

Nevertheless, all sorts of experiments and developments are afoot. The figure of the network — the whole bundle of interconnected equipment, planned and managed centrally and offering a more or less standardised service across a territory that it helps bind together (Tarr and Dupuy, 1988) — is being challenged in the "North" (Europe, North America, Japan, etc.) as well as in the "South" (emerging and developing countries) under the impetus of political, economic, technological (mostly concerning the increasing importance of digital technology) and environmental factors. This has created **a favourable context for the emergence of more or less decentralised socio-technical alternatives** (micro networks and autonomous systems to supply energy, gather rainwater or manage solid waste and waste water, etc.) that tap into existing networks to form new composite systems. The emergence of the notion of "*Eautarcie*" (Orszagh, 2001) is based around harvesting rainwater, differentiated uses of water depending on quality and the elimination of waste water. However, relatively little is known about infrastructural transition processes, the new underlying technical economic models or the benefits and limits of composite systems from a functional, environmental or urban perspective (Lienart and Larsen, 2006, Gires and De Gouvello, 2009).

The idea of short-term cycles in production, consumption, retrieval and recycling is catching on but involves an entirely new paradigm insofar as it challenges both technical know-how, forms of governance and lifestyles. The idea underlies the previous point where it was raised at the domestic level. At neighbourhood or catchment area level, it features in rain water management (Peters et al., 2005, Andrieu et al., 2010) or the global management of potable, waste, rain or reused water. Large-scale projects are currently in progress, e.g., in Australia (GHD, 2009).

Everywhere, we can see proof that the urban future is a function of increasingly complex phenomena involving overlapping questions straddling many different disciplines. And while scientific approaches that circumscribe specific problems in order to safeguard methodological rigour are still extremely relevant, the spheres that can be circumscribed in this way now benefit greatly from multi-disciplinary perspectives both in terms of scientific worth and in dealing with the crucial issues of sustainability (in a global sense that includes the three pillars) that all urban centres are going to have to face over the coming years. There is major scope for scientific progress in this respect.