

Revue Flux

Urban production and management: troubling knowledge

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Exploring the knowledge underpinning the management of materials, energy and data in inhabited spaces

Social and environmental changes are deeply transforming activities that are essential to the functioning of cities, such as communications, transport, road maintenance, sanitation, urban cleaning and street lighting –. The current challenge is to ensure that these activities continue to function without harming the biosphere. This issue has given rise to a great deal of research in the social sciences, notably in the journal *Flux*, which analyses the evolution of technical infrastructures for managing materials and energy in inhabited spaces through various lenses: economic models, information systems, professions and work, governance or uses of flows.

This issue explores a crosscutting aspect of these activities: the knowledge underpinning their implementation. Whether it involves sizing a wastewater treatment plant, installing a fibre-optic network, designing big data management software, sorting waste, cleaning a street, demolishing a building or getting around, each task requires relies on forms of knowledge that vary in their degree of formalization, ranging from expert and scientific knowledge to vernacular know-how. This call for papers doesn't aim at delving into philosophical (Besnier, 2016) or anthropological (Rodrigues dos Santos, 1997) debates on theories of knowledge. However, it adopts a holistic and constructivist approach, viewing knowledge as a set of embodied expertise, experiences and worldviews, which are enacted in practices, technical devices and discourses, contributing to a “reordering of the world” (Adell, 2011). The aim of this issue is twofold: the one hand, it seeks to examine how the prioritisation of the socio-ecological transition leads to a diversification or even a hybridisation of knowledge. On the other hand, it aims to explore how the actors who design, implement or use matters, energy or data make use of these expertise and knowledge in both the Global North and the Global South.

Since the Industrial Revolution, the design and implementation of urban infrastructure, as well as the management of flows and materials, have been guided primarily by engineers and their expertise (Barles, 1999). This expertise stems from a positivist epistemology and conceptual tools drawn from physics and mathematics (Picon, 2001), and, particularly with regard to flows, from the application of the concept of networks (Guillerme, 1991). From the 1960s, this dominant body of knowledge was challenged by the integration of major biophysical and ecological processes into engineering (Barles and Thébaud, 2018). But the current period appears to be undergoing even more profound and diverse upheavals. ‘Computational thinking’ (Vatin, 2008) - grounded in mathematics, physics and a particular approach to economic prosperity and social progress - now seems to be challenged or even openly criticized by some engineers themselves (Bouzin, 2023). The Ingenium network, established in 2006, and the Network for Multidisciplinary Studies in Engineering, established in 2020, reflect a commitment to integrating the knowledge and epistemologies of the social sciences—particularly their social hermeneutics—into engineering education (Lemaître, 2014).

Urban production and management draw on an increasingly diverse range of professions, knowledge and skills, from the mud-brick builder who assesses the soil by tasting it to the resource manager who monitors energy consumption from a computer, and from user expertise to specialist knowledge. These transformations may be blurring the positivist boundaries drawn in the 19th century between the realm of reason and that of the senses, by re-legitimising forms of know-how that draw upon senses and experiences. This issue aims to capture the knowledge on which these activities are based from a diachronic perspective, and to examine how they are nowadays being disrupted, renewed and hybridised through the training, professions or practices of actors involved in the design, implementation or use of urban flow management systems.

Professions, training and expertise requirements: troubled knowledge?

The transformation of professions linked to urban production reflects a questioning of the knowledge and approaches that once formed their foundations. Environmental imperatives and uncertainties challenge the ‘ambitions of control, planning and predictability’ (Girault, 2019, p. 3) that once formed the knowledge base of urban production and management. “From the controlled city to the complex city” (Fusco, 2022), the task now is to come to terms with “the uncertainty of knowledge” (ibid.), particularly in relation to urban technical networks (Beraud and Durand, 2023). Professional practices—that is, the knowledge, skills and values drawn upon in professional contexts—appear to be adapting: urban professions are drawing upon new “registers of knowledge (disciplinary, relational, cooperative, and experiential)” (Girault, 2019, p. 62). From a more institutional perspective, professional frameworks are evolving in response to “new calls for skills” (Biau, 2018), as documented in the *Cahiers du Réseau Activités et Métiers de l’Architecture et de l’Urbanisme*.

As evidenced by the creation of an ‘observatory of the professions and skills of the city of tomorrow’ by the Engineering School of the City of Paris (EIVP), emerging professions are diverse: ranging from the remote management of data flows and flow-related data by data scientist – often removed from their material reality, to the “master composters” directly engaged in the handling of physical materials. New project stakeholders, specialised in usage management, are emerging. In institutional discourses, collaborative work with residents is enriching the professions involved in flow management through experimentation (Spadaro, 2024). These changes are reflected in the training of engineers and urban planners, which seeks to incorporate knowledge from biophysical, ecological and sociological fields (Douay *et al.*, 2017; Paris, 2024).

Another manifestation of these uncertainties in knowledge is the demand for scientific knowledge and expertise expressed by institutions to inform their response to challenges relating to resource efficiency and environmental sustainability (Jouzel and Abbadie, 2022). The proliferation of regional IPCCs reflects this need for knowledge, which must be translated to make it ‘actionable’ in public policy (Bosboeuf, 2021). Knowledge synthesis, action research projects, and the involvement of scientists in political arenas reflect an increased reliance on science, giving rise to forms of knowledge that blend scientific, expert and operational approaches (Carriou *et al.*, 2022). The imperatives of the ecological transition transform the academic sphere itself. Calls for the intersection of knowledge (Barles *et al.*, 2020) to understand the socio-technical phenomena linked to flow management are contributing to the blurring of disciplinary boundaries, particularly between the natural sciences and the social sciences, especially in urban planning and development (Salomon Cavin and Granjou, 2021). The traditional economics of flow management is being disrupted by several changes, such as the integration of environmental factors into the balance sheets of companies and institutions (Rambaud, 2022) or the emergence of cooperative enterprises and associations.

The stance of public institutions, however, remains ambiguous. On the one hand, there is a challenge to the ideology that views science as inherently a driver of technical progress, ensuring economic

prosperity and social well-being (Dupuy, 1975). This techno-solutionism is sometimes criticised by these very institutions, which express a need for knowledge derived from the social sciences. On the other hand, the focus is often on controlling uncertainty rather than understanding social practices in order to adapt systems, as demonstrated by the widespread use of nudges (Mechin-Delabarre and Alexandre-Bourhis, 2024). This control also manifests itself in the increased use of information flows dedicated to monitoring energy consumption and transport system in real time, requiring expertise in big data processing as well as digital proficiency that is transforming urban engineering (Jeannot *et al.*, 2023).

The field of knowledge and emerging professions is diversifying in two directions at opposite ends of the technical spectrum. On the one hand, processes of re-materialisation draw on knowledge gained through experience and contact with space, matter, and on local skills and know-how. On the other hand, and at the opposite end of the spectrum, digitisation processes require formal knowledge, already applied in the field of flow management, sometimes enhanced by the use of tools or methods derived from modelling and digital technology (Maisonobe and Jeannot, 2023), or even artificial intelligence. These two trajectories are in tension: real-time monitoring of flow management through digital tools can lead to a form of data-driven management, which, in turn, disrupts existing management professions (Bognon *et al.*, 2020).

Several disciplines examine this diversification of knowledge as applied to the management of spaces, materials, urban planning or engineering: geography (Collignon, 2002), urban planning (Dillenseger, 2024), ethnology and the sociology of work (Corteel *et al.*, 2011), civil engineering (Pelé-Peltier *et al.*, 2023), sociology and anthropology (Denis and Pontille, 2022; Lemonnier, 1991; Julien and Rosselin, 2009) or even philosophy (Béranger, 2024). Beyond the interdisciplinarity they reflect, to what extent do these hybridisations manifest themselves—specifically or otherwise—in the management of materials, energy and data?

Expected contributions

This issue follows anthropologists' ambition to 'rethink knowledge' (Vinck, 2017) by applying it to the fields of materials, energy and urban data management, urban production and infrastructure. Indeed, in this vein, we share the observation that 'there is much to be done! Across all disciplines, but also, and increasingly, within collectives that transcend the former internal and external boundaries of the sciences, expertise, the arts and crafts, practical and technological know-how, and neglected forms of knowledge' (*ibid.*).

This issue calls for papers that examine how socio-ecological transformations in the management of materials, energy and data are challenging the knowledge of stakeholders at various levels: planning, design, implementation, management and use, in both the Global North and the Global South, and between them. We will pay particular attention to the intersection of newly mobilised knowledge with conventional knowledge (derived from engineering sciences). The aim is to examine the transformations and continuities in technical doctrines, in the everyday practice of design engineers and service providers, and economic models. Several avenues for reflection are suggested below; these are neither exhaustive nor rigid.

- What kind of knowledge are we talking about? Diversification or even hybridisation of knowledge

What knowledge is – has been – drawn upon, and how might we describe it? To what extent do we observe a hybridisation or a simple juxtaposition of diverse types of knowledge? Hybridisation may be disciplinary in nature, linked to whether knowledge is formalised or not, and to its dual sensory and intellectual dimensions. The boundary between these polarities is open to debate. Is the knowledge

used new? Or is it being used in a new way? Our interest lies in established forms of knowledge—produced by intraining programmes or sensory experience in knowledge put into practice by established actors, but also in the know-how or knowledge implemented by emerging actors: reuse cooperatives, data scientists, associations, users handling materials or data, or managing infrastructure.

- **Who produces or disseminates this knowledge?**

Which bodies, public or private, formal or informal, produce this knowledge, and how are they changing? The papers can focus on educational models for academic programs, professional standards, residents' training pathways, etc. The aim is to understand the conditions under which knowledge is produced, and any tensions, conflicts or power dynamics arising from this production, whether these relate to the intellectual property of the producers of knowledge or tools (open-source software, digital applications, etc.), or to the processes of revising professional standards.

- **How and by whom is this knowledge put into practice?**

Which local authority departments, design consultancies, client representatives or project managers, large corporations or small businesses, and voluntary organisations are most affected? The aim is to understand whether certain types of flows (materials, waste, water, energy, information, transport, etc.) or sectors (such as cleaning, digital, urban nature, etc.) are more favourable to the emergence of new forms of knowledge and their integration with conventional engineering. How is this knowledge concretely applied in the design, management or use of flows and materials? Through which tools is it implemented? How does it reshape the processes of planning, design or implementation of flow management? What ethical questions are raised by the involvement of stakeholders, particularly residents, who were previously users of these flows or systems? Papers which analyse the potential resistance or friction arising from this diversification and hybridization, are particularly welcome.

How to apply

Deadline for abstracts: 31/08/2026

Contributors should submit an abstract of no more than 4,000 characters, along with the authors' names and their institutional affiliations, to:

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Deadline for full paper (first version): 11/01/2027

Based on the abstracts previously approved by the editorial board of the journal *Flux*, authors will have until 11 January 2027 to submit the full version of their article.

This must comply with the journal's standards (see note to authors), namely a text of no more than 50,000 characters (including spaces), an abstract of 1,000 to 1,500 characters in French and English, and a biographical note of approximately 600 characters.

Please check the recommendations to authors accessible via the link:

<https://revue-flux.cairn.info/wp-content/uploads/sites/8/2016/11/Flux-CONSIGNES-AUTEURS-2025-VF-Mise-en-ligne-30-09-2025.pdf>

The thematic issue is scheduled for publication in June 2028. Articles completed ahead of schedule may be published online in advance.

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