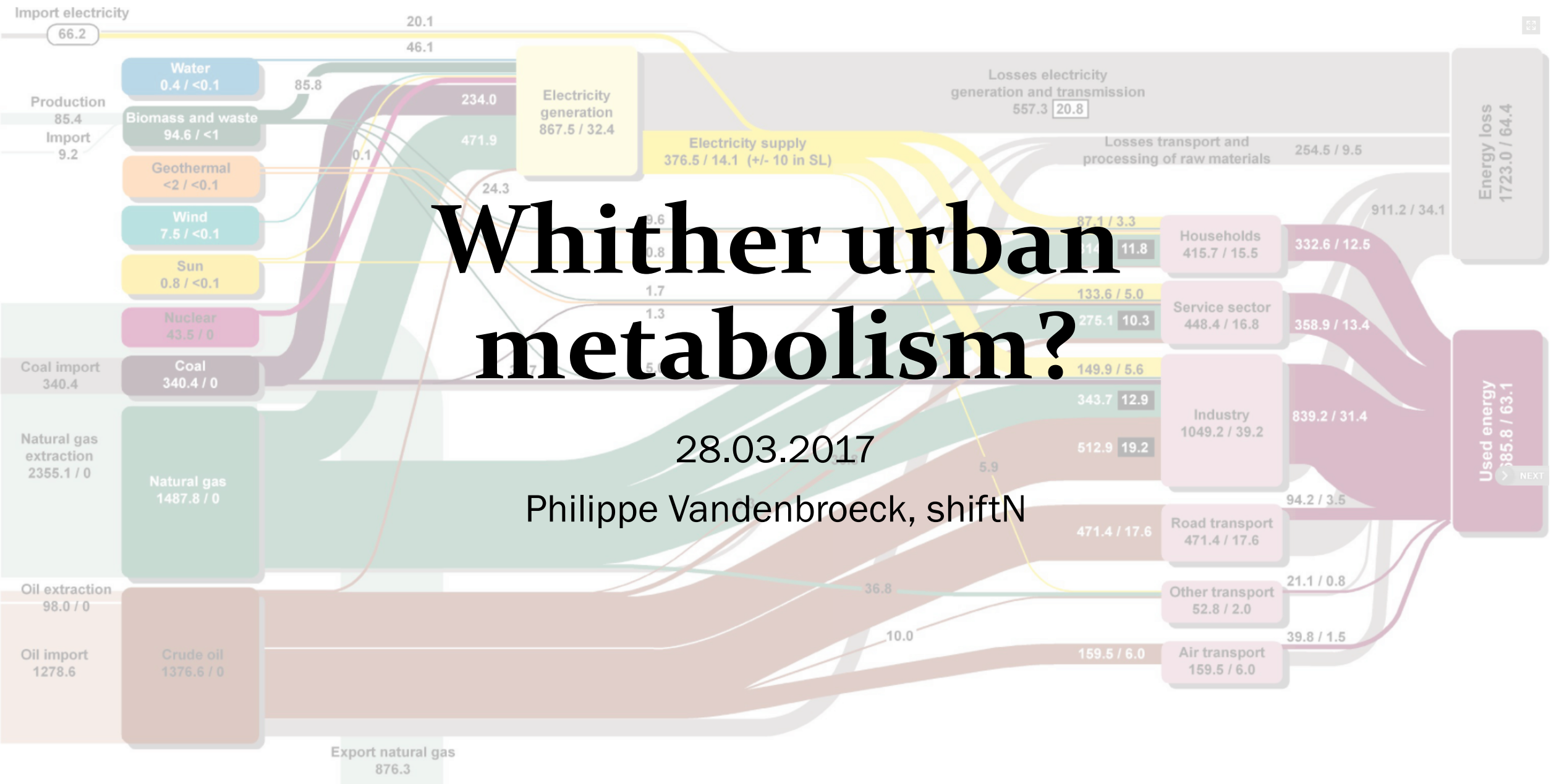


Whither urban metabolism?

28.03.2017

Philippe Vandebroek, shiftN



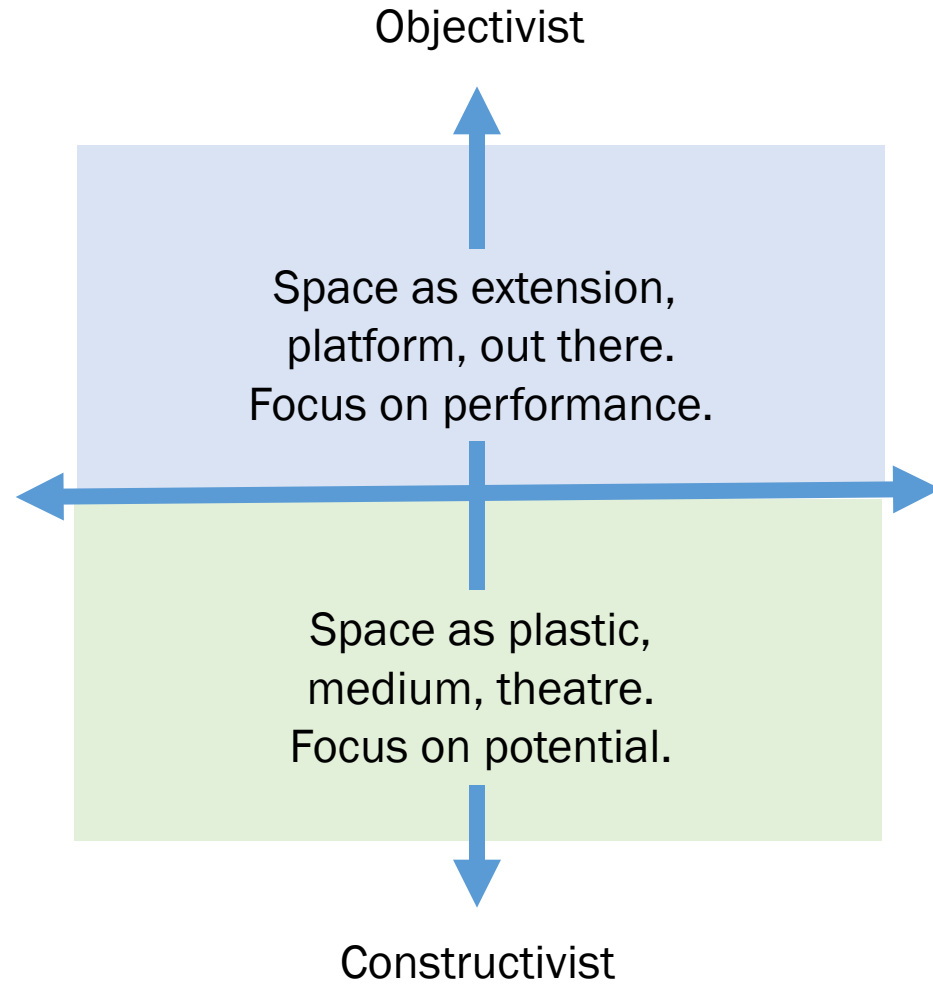
Thinking in flows

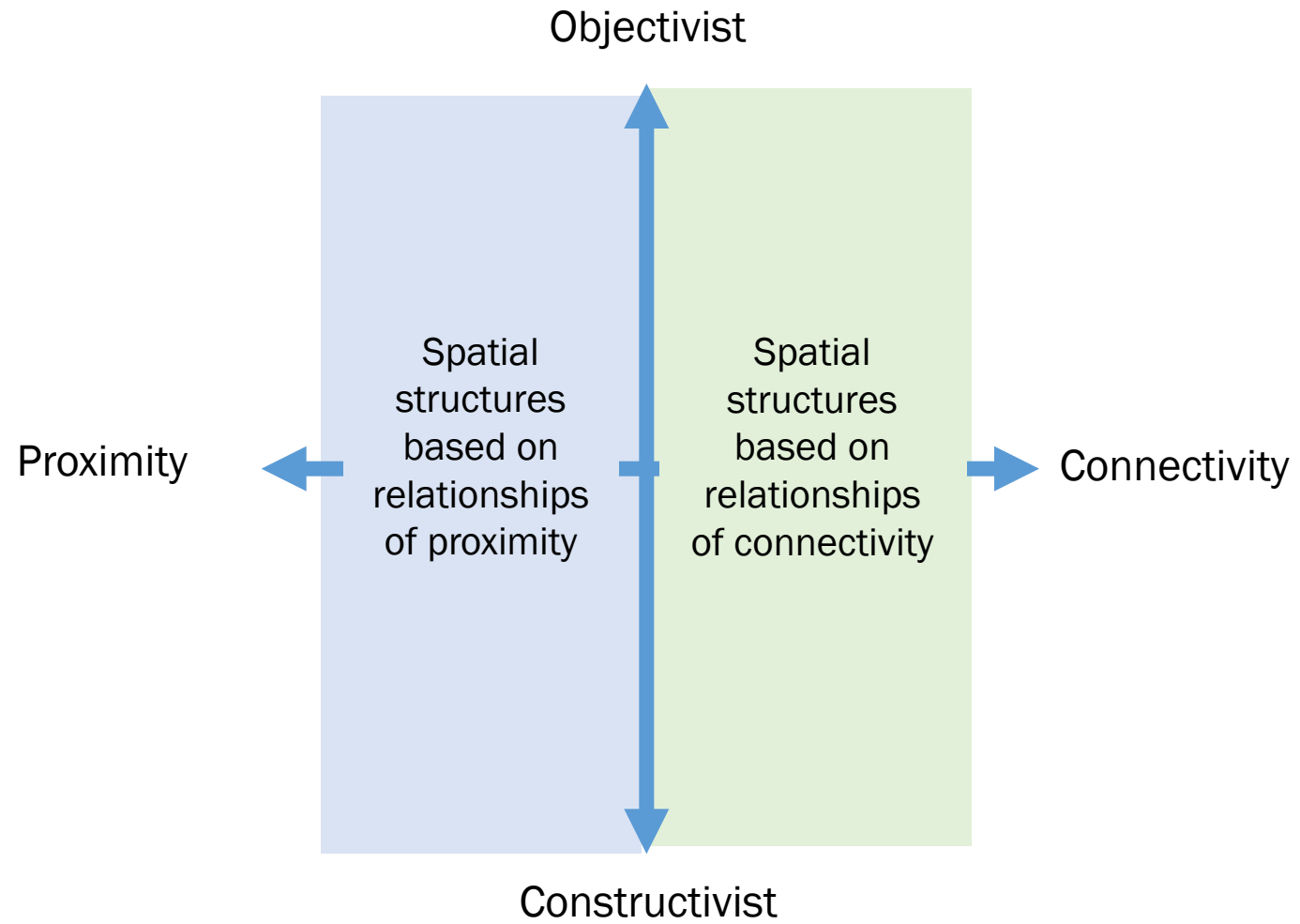
- Urban metabolism: a framework for the analysis of material and energy flows in metropolitan areas.
- It's also a metaphor that exploits the similarity between a living organism and a city.
- Metabolism: "the sum total of the technical and socio-economic process that occur in cities, resulting in growth, production of energy and elimination of waste." (Kennedy et al., 2007).

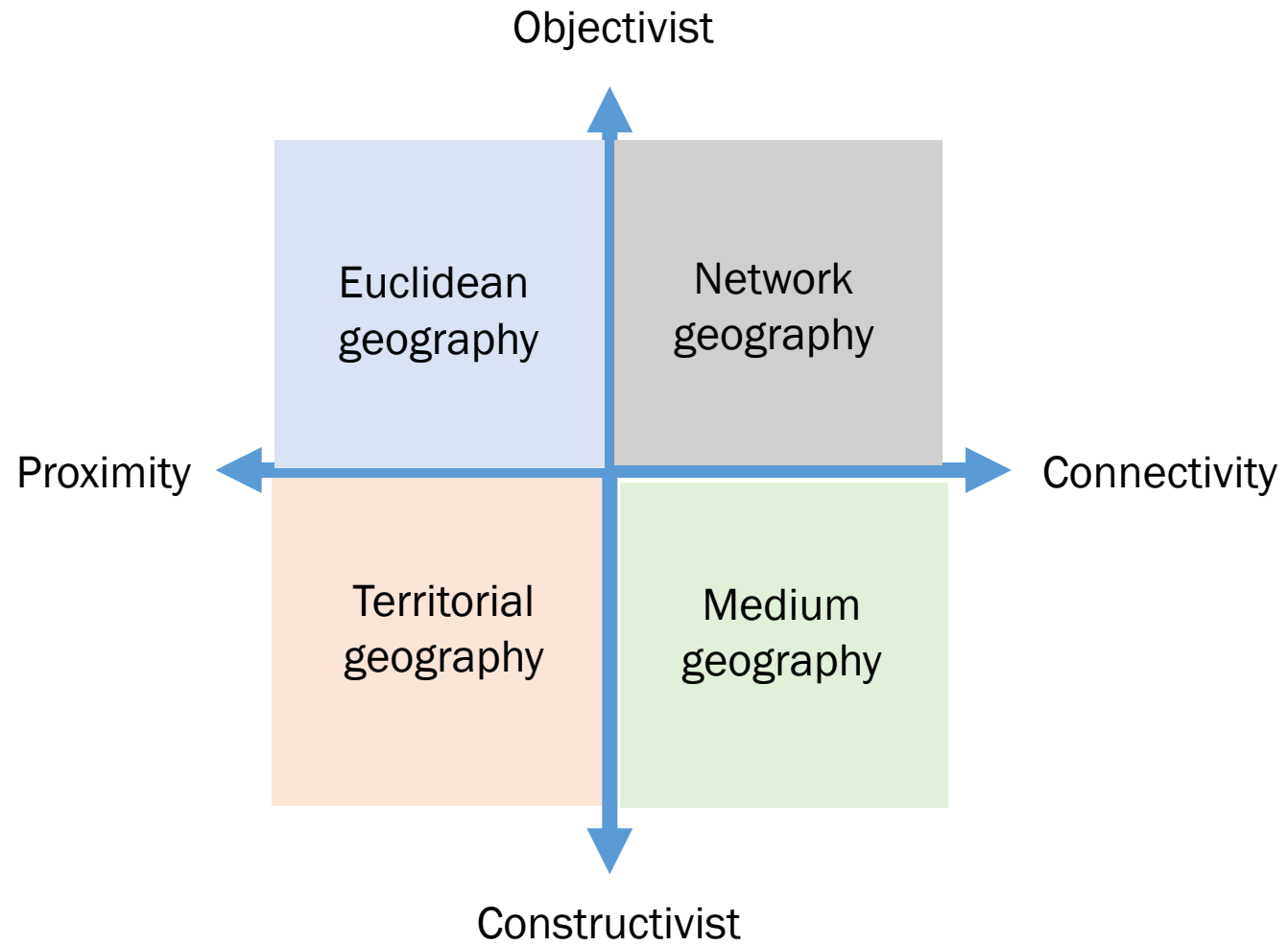
Why are 'we' interested?

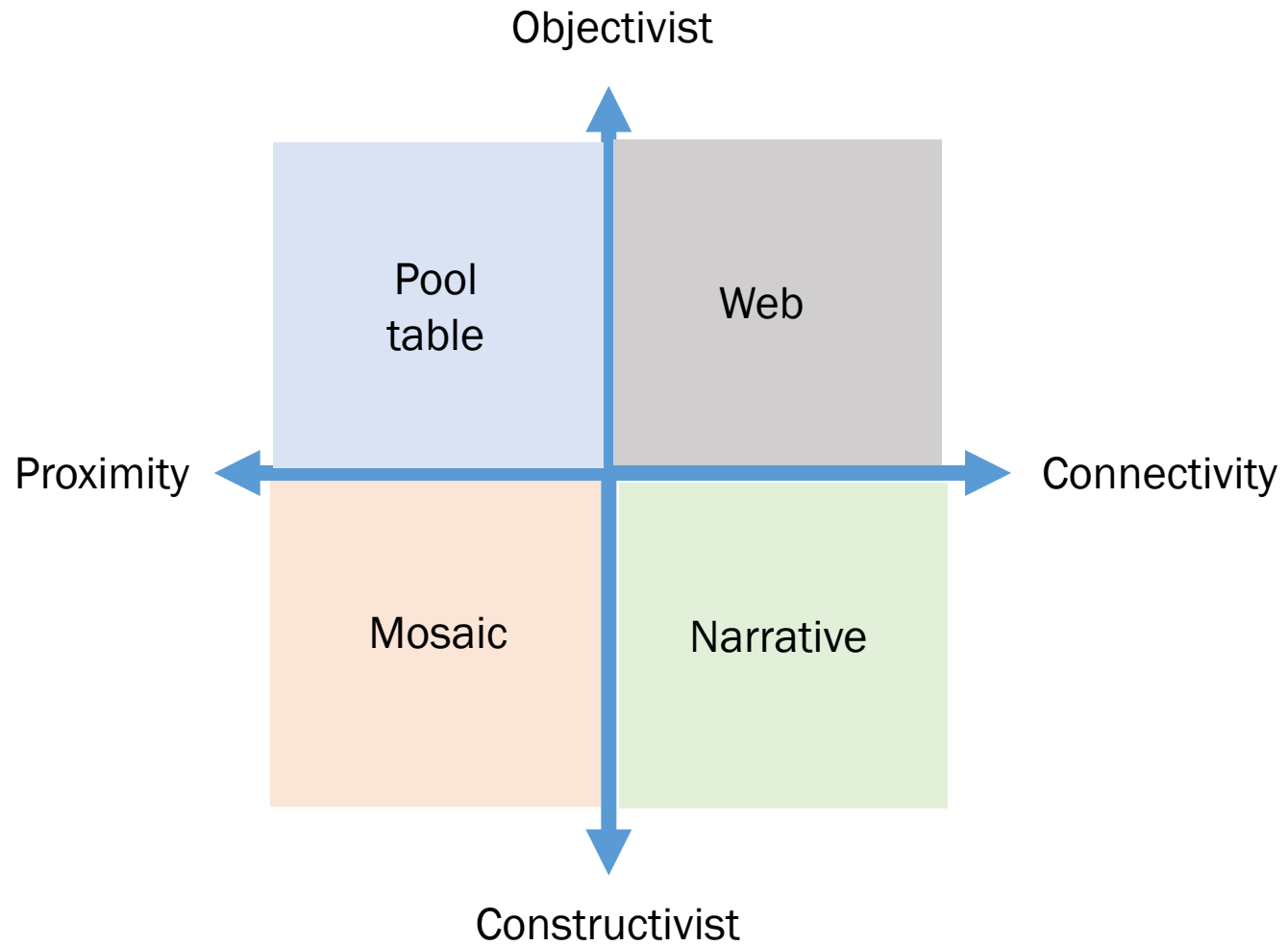
- Because we recognise that urban areas are key in transitioning to a more ecologically sustainable future.
- Because we have the capacity to monitor, analyse, communicate, visualise.
- Because of the advances in system dynamics and network science.
- Because of the intersection with other emerging urban agendas: 'smart cities', 'circular economies'.
- In short: **burning platform + technological convergence + opportunities for 'value' creation.**

A typology of 'geographies'

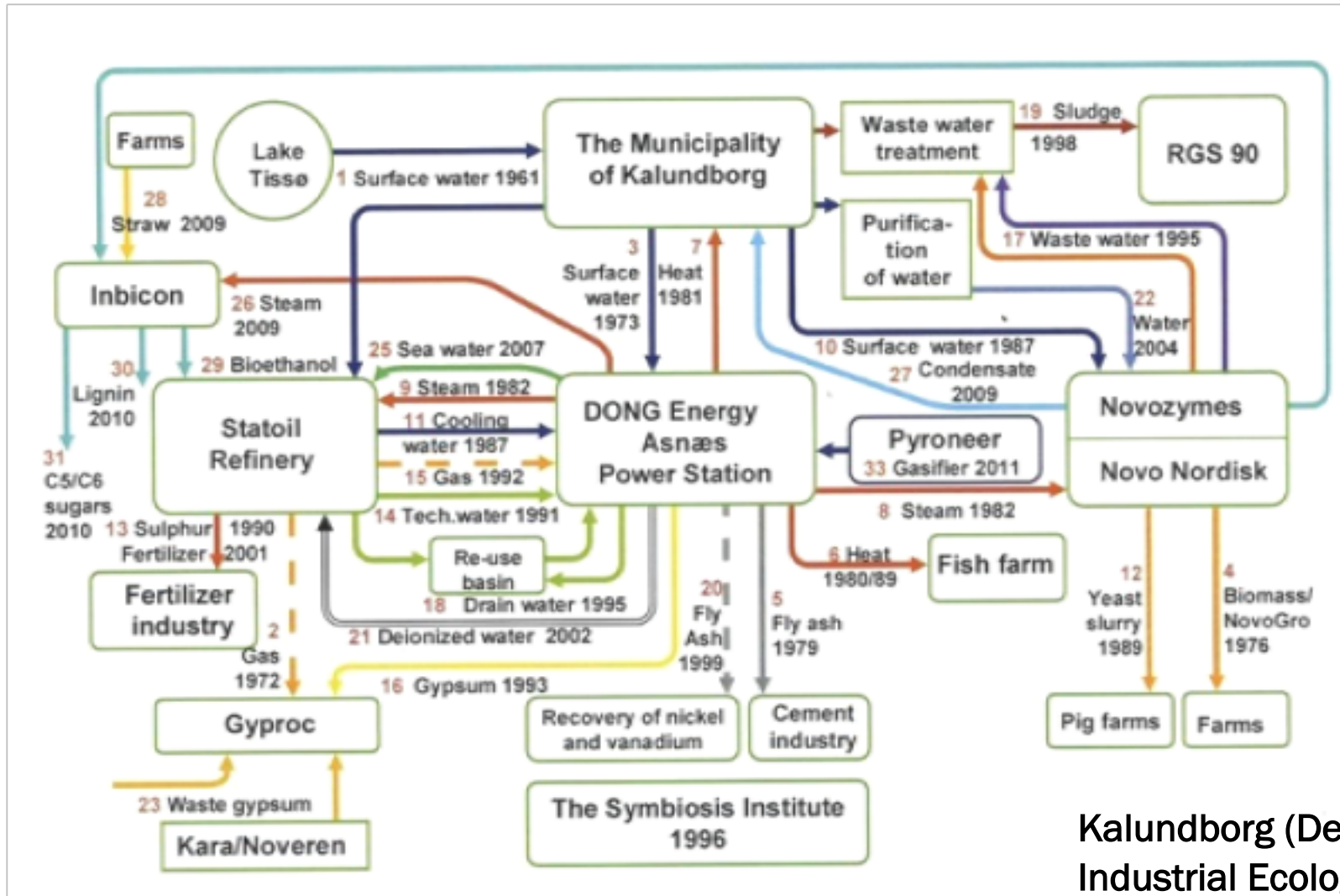






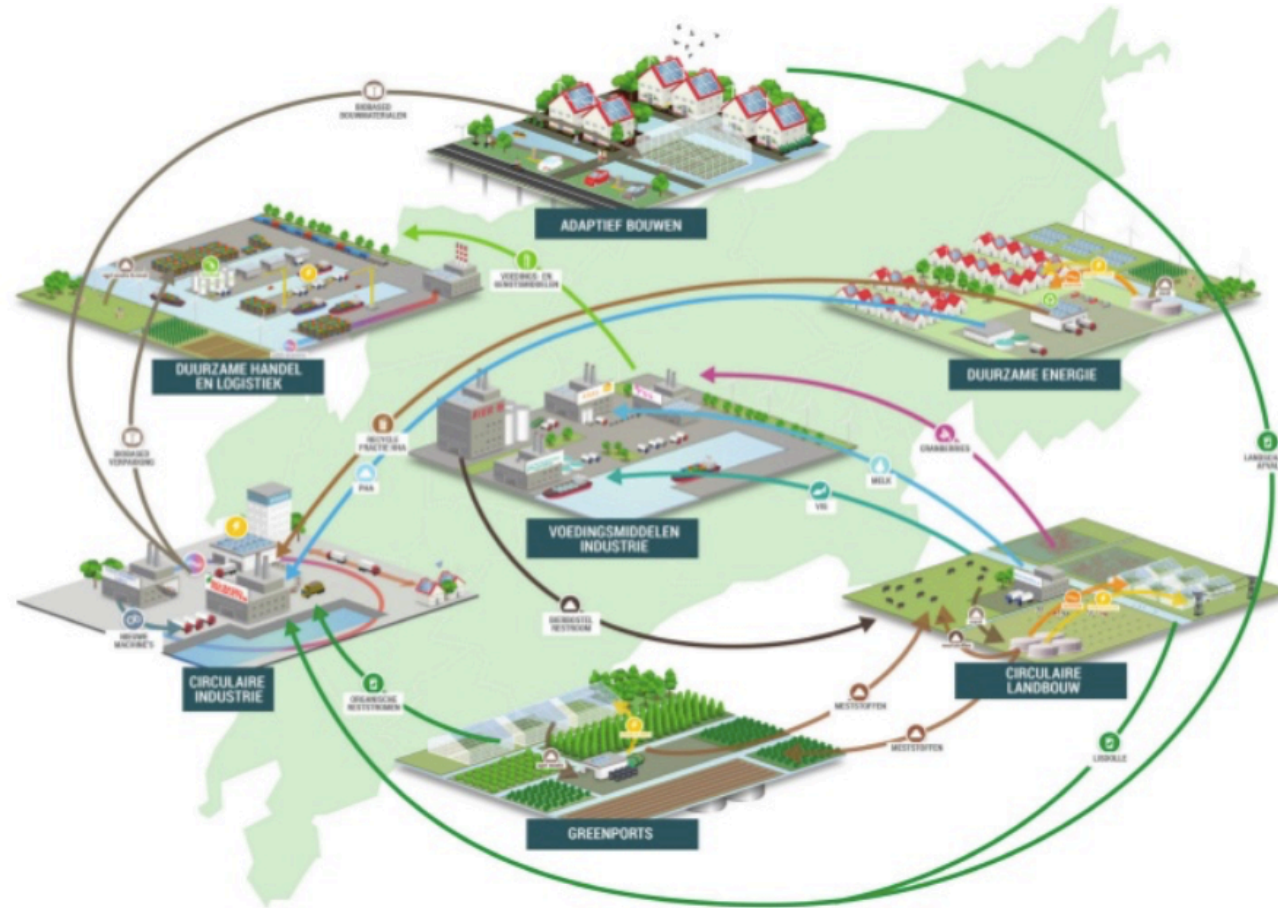


'Pool table metabolisms': Industrial ecology



Kalundborg (Denmark)
Industrial Ecology System

'Pool table metabolisms': Industrial ecology



Source: Metabolic.nl

Pool table metabolisms: *Industrial ecology*

- **Focus:** systemwide optimisation of efficiency of resource flows (materials, energy) with an eye to realising environmental and economic benefits.
- **Key strategy:** closing loops, minimising waste within spatially localised constellations of complementary stocks and sinks.
- **Dominant framework:** ‘the circular economy’.
- **Constituent elements:** physical armature + ‘business models’.

CIRCULAR ECONOMY BUSINESS MODELS

- **Power of the inner circle:**

- Pay per use and leasing
- Repair
- Waste reduction
- Sharing platforms

- **The power of circling longer:**

- Performance based contracting
- Takeback guarantees
- Through-sales
- Refurbishment

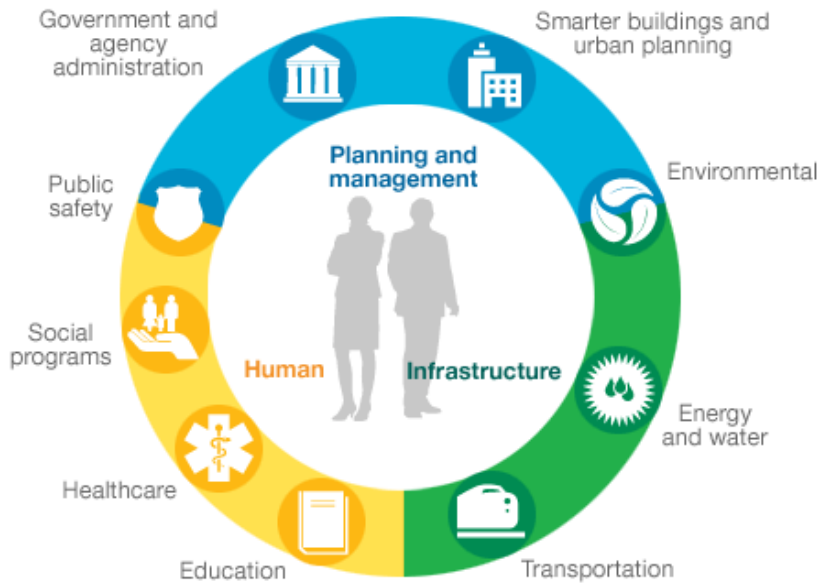
- **Power of cascaded use:**

- Upcycling
- Recycling
- Supply chain collaboration

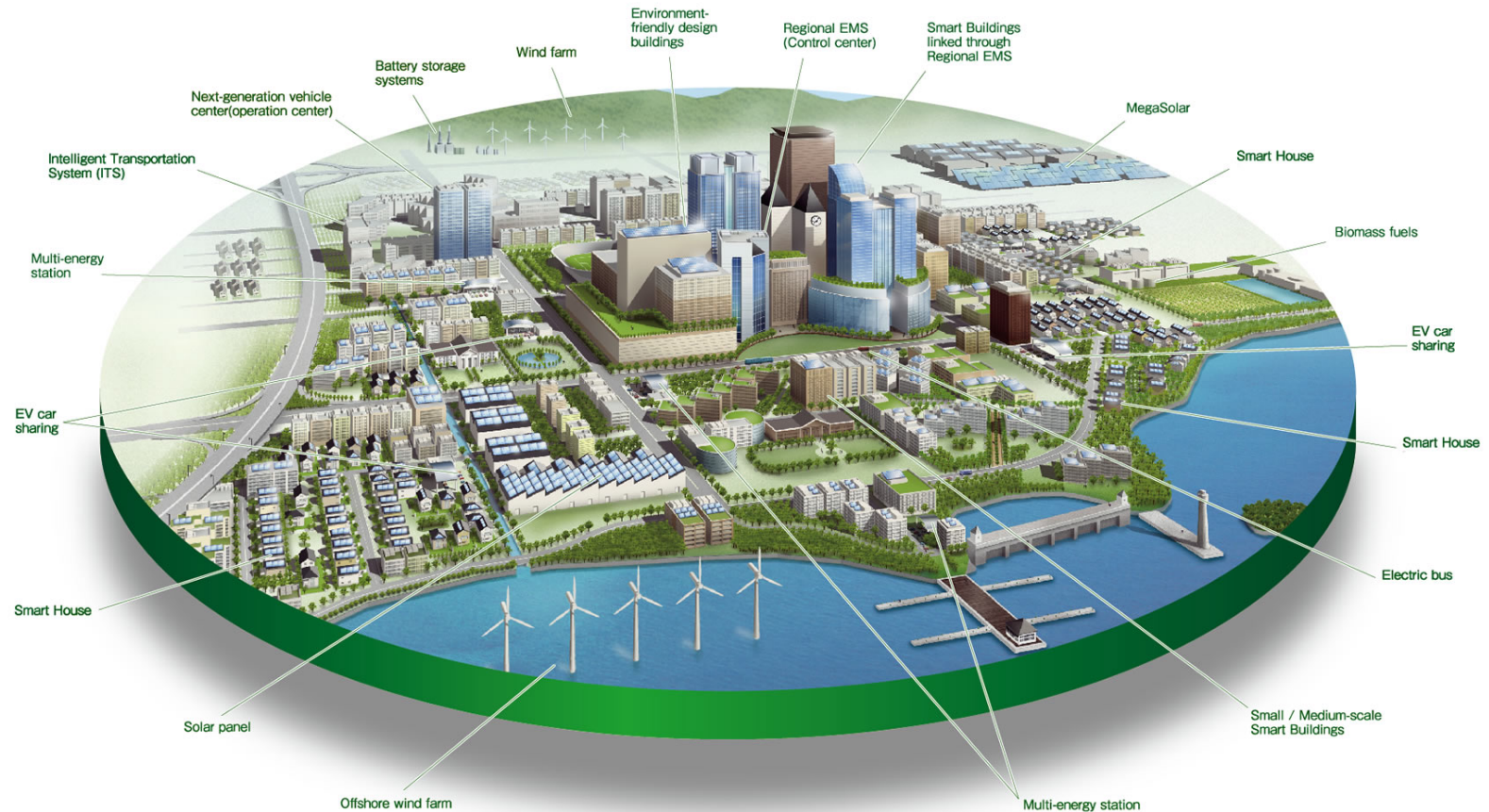
- **The power of pure inputs:**

- Monomaterials
- Certified materials
- Circular procurement and sourcing

Web metabolisms: the 'smart city'



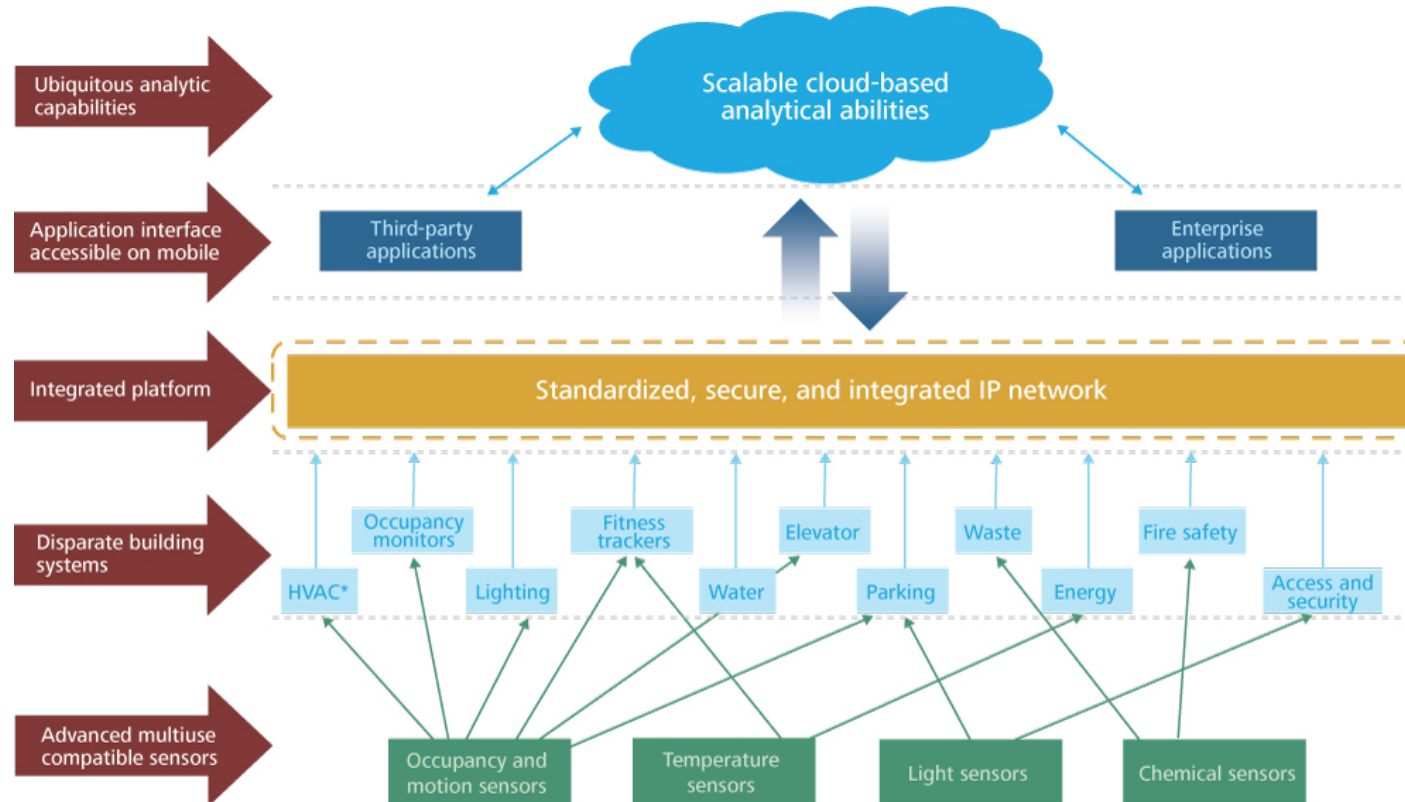
Source: IBM Smarter Cities



Whither Urban Metabolism?

Digital armatures

Figure 1. IoT information value stack for CRE buildings



Source: Jim Young, "BioT—BUILDING Internet of Things™," Realcomm, January 23, 2014; Deloitte Center for Financial Services analysis.
*HVAC refers to heating, ventilation, and air-conditioning.

Graphic: Deloitte University Press | DUPress.com

Web metabolisms: *Smart City*

- **Focus:** optimal use of urban assets (including, but not limited to material, energy, transportation flows) to realise environmental and economic benefits, increase convenience and enhance security.
- **Key strategy:** Self-regulation through feedback systems among wired citizens and urban actors.
- **Dominant framework:** ‘the city as a brain’.
- **Constituent elements:** digital armature (network) + protocols to identify and act upon collective preferences.

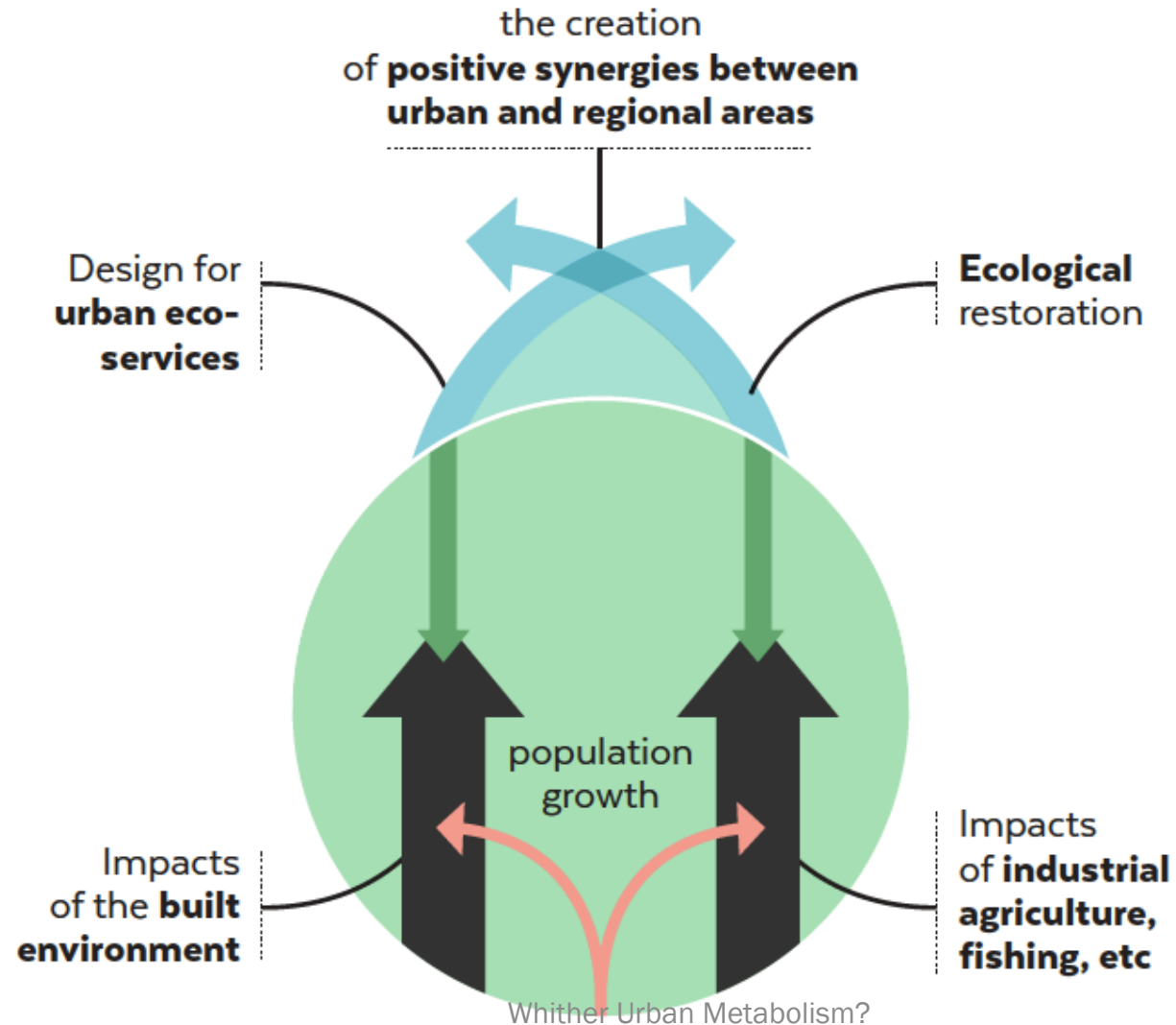
Whither?

- A reenactment of the past. The city as an ‘environment’ calling for techniques of governing that allow to ‘police’ space. But: increase in granularity and scale, emergence of new programs.
- Biopolitics: “The population should now not be seen solely as the object of control, but equally as a resource that undoubtedly needs to be tempered and at the same time is also allowed to develop on its own.”

Mosaic metabolisms

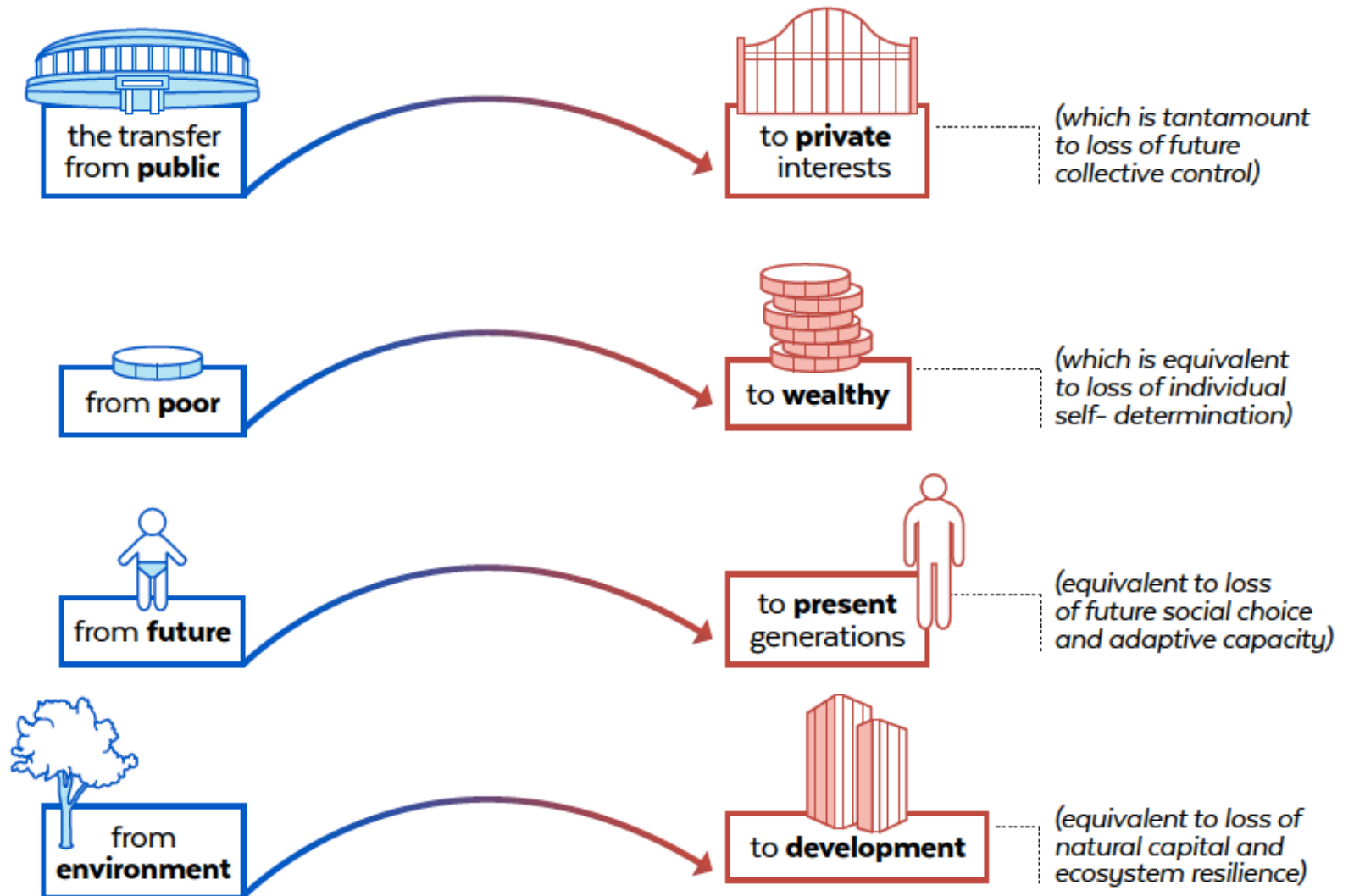
- **Focus:** re-territorialisation, i.e. the restoration of ecological equilibrium and cultural identity by articulating the historic link between city and hinterland.
- **Key strategy:** 1) valorisation of site specific qualities, 2) reinforcement of local governance, 3) local anchoring of employment and productive capacity, 4) maintenance of context-specific balances between humans and the environment.
- **Dominant framework:** ‘the urban bioregion’.
- **Constituent elements:** site, in its spatial and temporal manifestation (landscape and heritage) + agency.

Birkeland's concept of 'positive development'

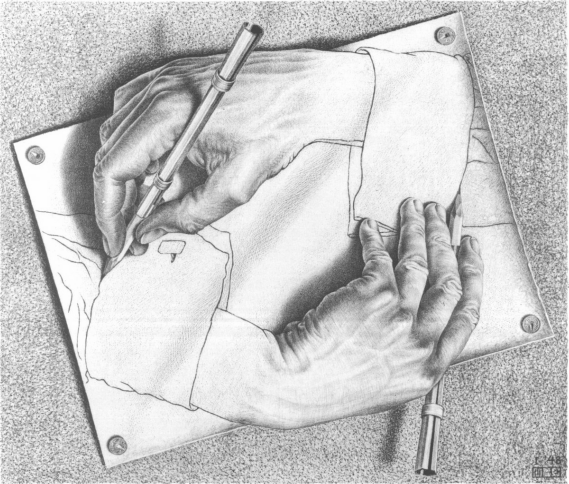


Transfer processes

Four interconnected transfer processes that are largely irreversible, and therefore foreclose future options, need **to be avoided**:

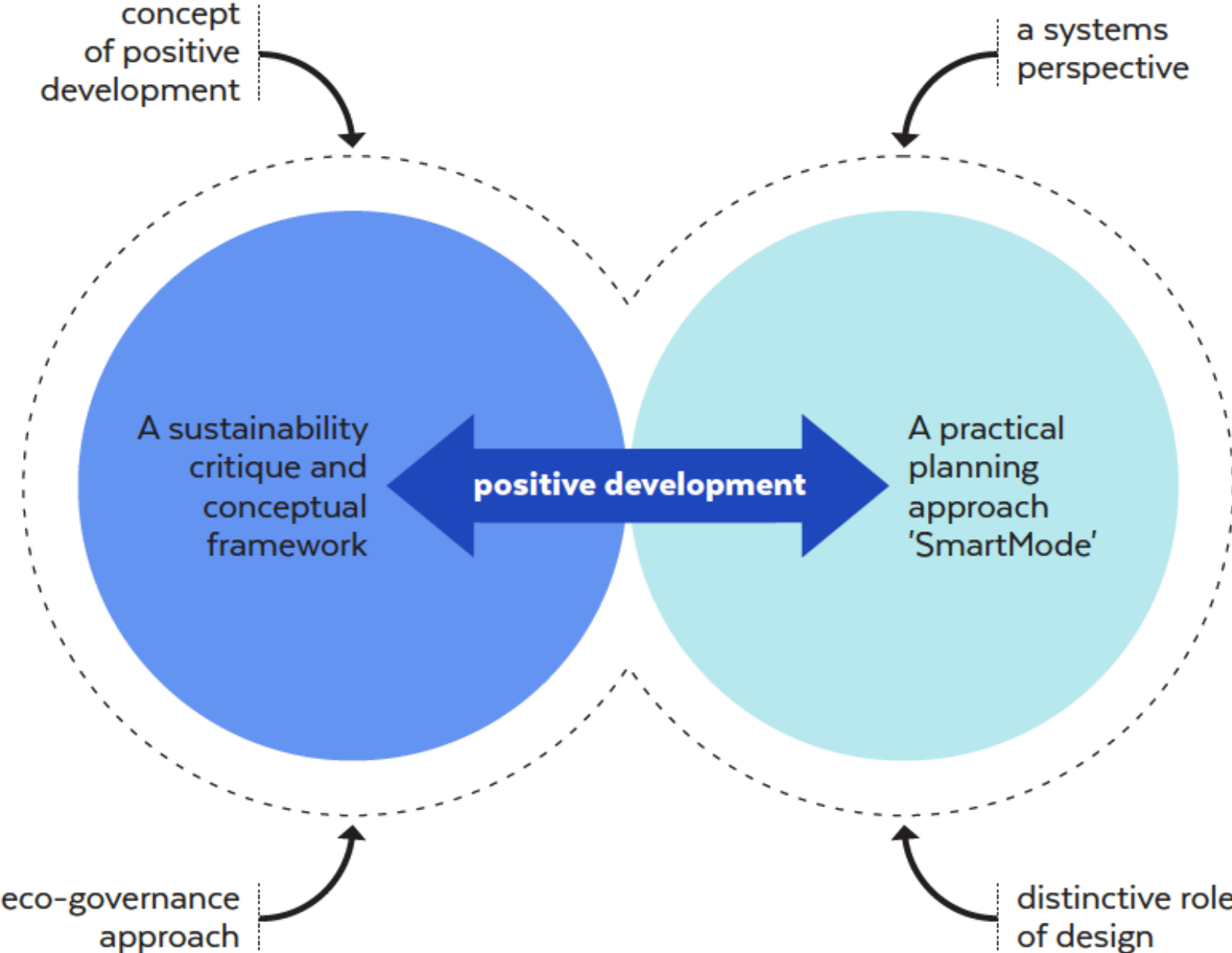


A social learning process



Reconfiguring the appreciative basis for our existence (G. Vickers)

Ph. Vandenbroeck



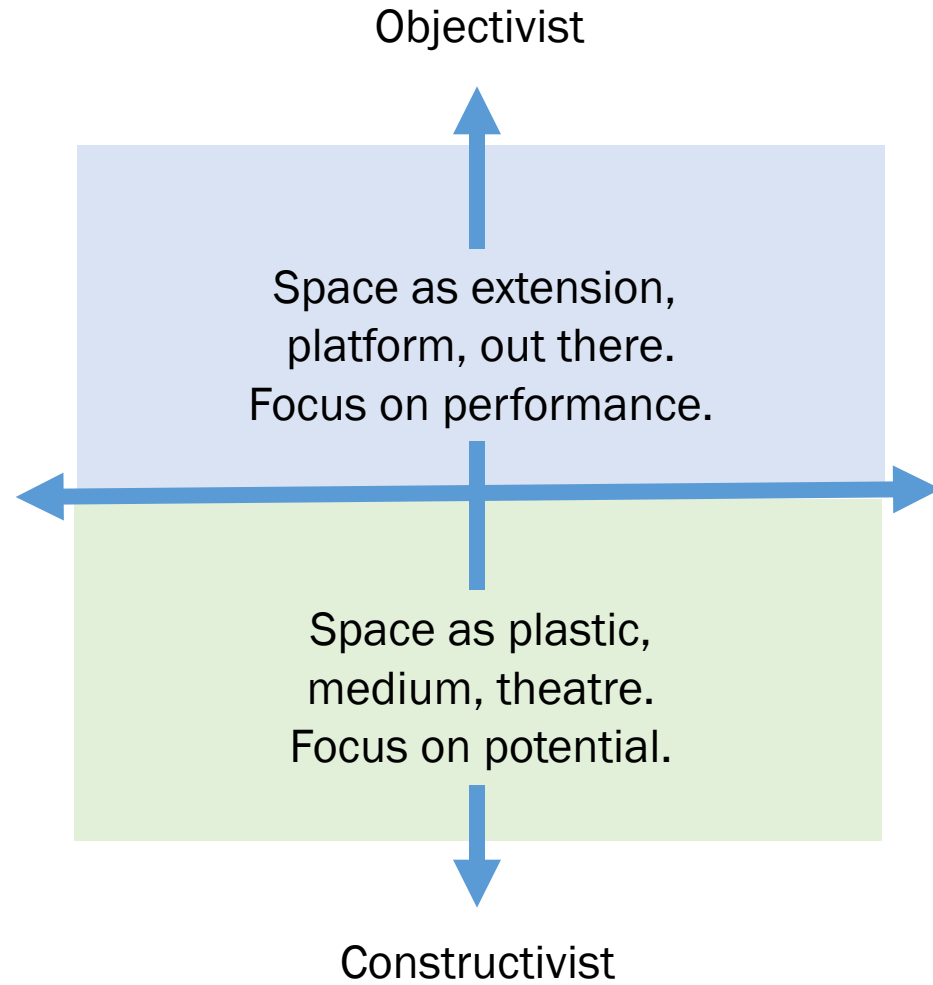
Whither Urban Metabolism?

Narrative metabolisms

- **Focus:** to leverage the city as a carrier for a democratic ideal, as a pretext 'to learn to live together'.
- **Key strategy:** morphogenesis; 'urbanist' as midwife; repeated application of local rules, building up larger patterns over time.
- **Dominant framework:** the city as womb.
- **Constituent elements:** situational resources (material, cultural, temporal, political) + agency.

Secchi & Viganò's Isotropic strategy

- **Isotropy as a spatial concept:** an alternative, anti-hierarchical concept of order, a fractal property crossing all scales, providing a basis for quality of life.
- **Isotropy as a material property:** relying on qualities such as porosity and permeability, with a fine granular mesh which encourages biogenetic flows.
- **Isotropy as a normative concept:** a grand vision, a limiting condition, a democratic ideal that never can be attained.
- **Isotropy as an infrastructural concept:** an omnidirectional, evenly spread out network of infrastructural linkages as opposed to a radioconcentric layout linking centre with certain parts of the periphery.
- **Isotropy as a time-bound concept:** as an instigator of the 'longue durée' in moving through the urban fabric.
- **Isotropy as an intervention strategy:** not a “big urban project” but a series of undertakings and rules acting differently in the different “sponges” or networks of percolation and flows.



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