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## Spatialising the urban metabolism (AScUS Unconference)

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# Spatialising the urban metabolism

Session organizers: Jean-Baptiste Bahers, Aristide Athanassiadis and Paul Hoekman

## *AScUS Unconference*

*Actionable Science for Urban Sustainability · 3-5 June 2020*

The topic of “spatialising the urban metabolism” has met with growing interest among researchers and has grown significantly in recent years. According to Scopus, we have identified 438 published articles, the majority from 2010s. The scientific landscapes are varied and among 20 communities according to a bibliometric analysis.

This topic can be understood as the idea of opening the “black box” of urban material and energy functioning, but also of considering that the spatial dimension should not be treated as “absolute” and homogeneous, when it can be very politically charged and refers to numerous socioeconomic and territorial processes.

The goal of the discussion session could entail, what can we learn from spatialising metabolic analysis / spatialising flows and actors / linking urban metabolism and spatial planning / territorial ecology / different sub-metabolisms for the same city / relationship between cities and their hinterland / political-industrial ecology / linking metabolic flows and ecosystem services, etc.

Before the discussion, we had 6 introductory contributions:

**Contribution Jean-Baptiste Bahers** (short summary): The presentation will show a bibliometric analysis according from Scopus database. We have identified 483 published articles, the majority from 2010s. The scientific landscapes are varied and among 20 communities. We will show a map of co-citation of cited authors based on bibliographic data and co-occurrence map based of notions from titles, abstracts and key words. Finally, we will discuss the terms of “spatial”, ie the notions, concepts, theories and methods which emerge from it.

**Contribution Sabine Barles** The talk with focus on the urban metabolism, territorial ecology, and technical and environmental history.

**Contribution Ursula Cardenas Mamani and Daniela Perrotti** The presentation provides a short introduction to Ecosystem Services (ES) as potential critical factors in the mitigation of the material and energy demand in cities. Looking into the effects that ES have on the metabolism of cities (through Drivers, Pressures and State indicators) can provide novel alternatives for the mitigation of resource use as well as contribute to an understanding of flows and stocks dynamics within urban systems.

**Contribution Stephan Kampelmann** "The talk with focus on the urban metabolism of wood, tracing the different steps along the value chain from trees to urban woodworking. Due to the focus on global value chains based on fast-growing plantation forests, city trees have long been ignored as local supply of material for

carpentry and construction. This has changed in recent years due to the convergence of local woodworking initiatives and the increase of preemptive cuts of city trees due to insect-related diseases and the toll of climate adaptation."

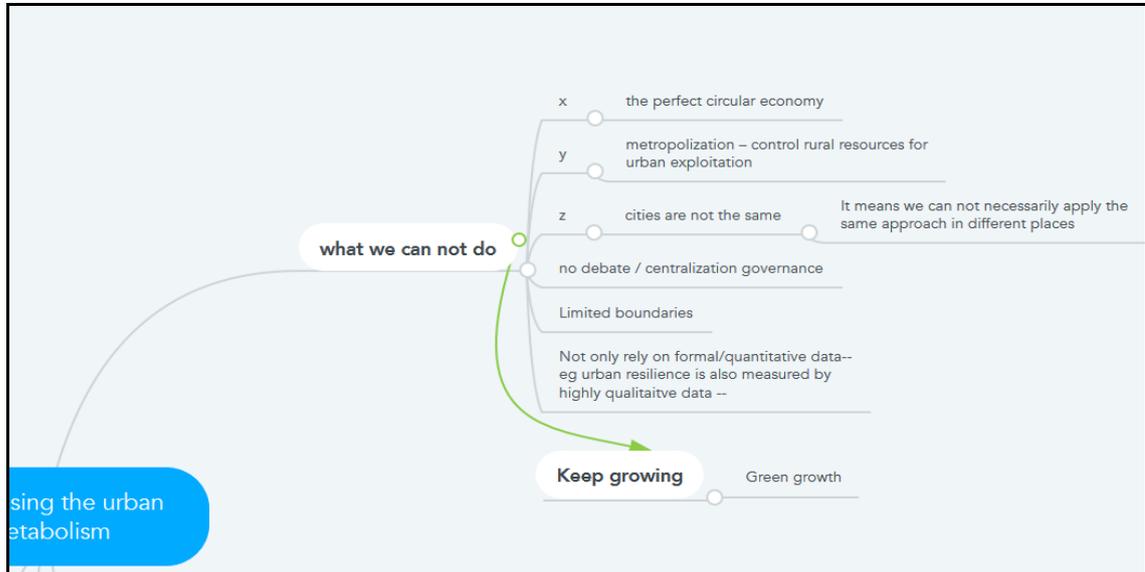
**Contribution Paul Hoekman (short summary):** Presentation of the Metabolism of Cities Data Hub and how this is used to record and visualize material stock and flows data on a finegrained level. Introduction of how territorial subdivision works in the latest version of our system, and how choropleth maps can be generated to gain quick visual insights into differences within areas. Also a look at logging data on individual infrastructure/site level (e.g. individual wastewater treatment plant or food market), and how to use this to "unpack" the black box.

**Contribution Aristide Athanassiadis (short summary):** The presentation will show what are the additional insights mapping and spatialising the metabolism of cities provide for researchers and policy makers. Indeed the spatialisation can not only show which parts of cities are responsible for resource use, what are the drivers of resource use. This presentation will also show, how depending on the way resource use is measured, other drivers can become apparent. Finally, a comparison between cities will reflect on how context-specific metabolic drivers are.

Then, we **discuss the following questions:** What we can do, what we can not do, and what would be original / not standard /eccentric with the spatialization of urban metabolism. Here are the results of our discussion following the presentations on mind map:



## I. What we can not do



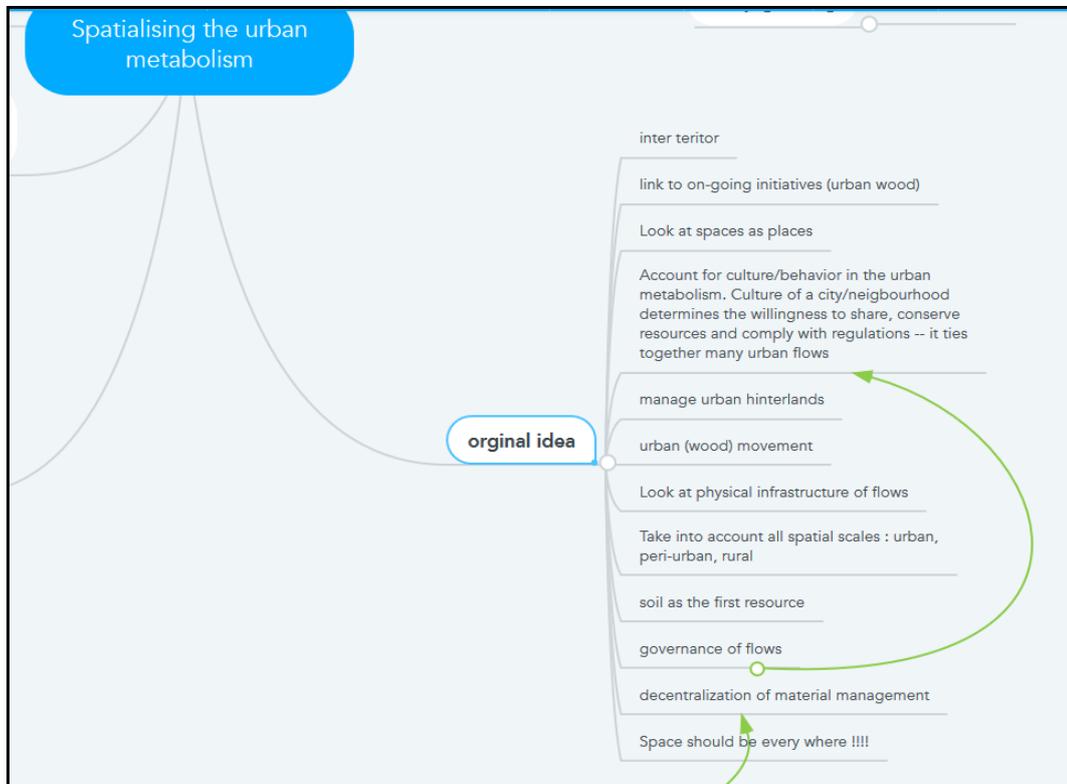
*Text inside the mind map:*

- ✓ the perfect circular economy
- ✓ metropolization – control rural resources for urban exploitation
- ✓ cities are not the same
  - It means we can not necessarily apply the same approach in different places
- ✓ no debate / centralization governance
- ✓ Limited boundaries
- ✓ Not only rely on formal/quantitative data-- eg urban resilience is also measured by highly qualitaive data --

### **Keep growing**

Green growth

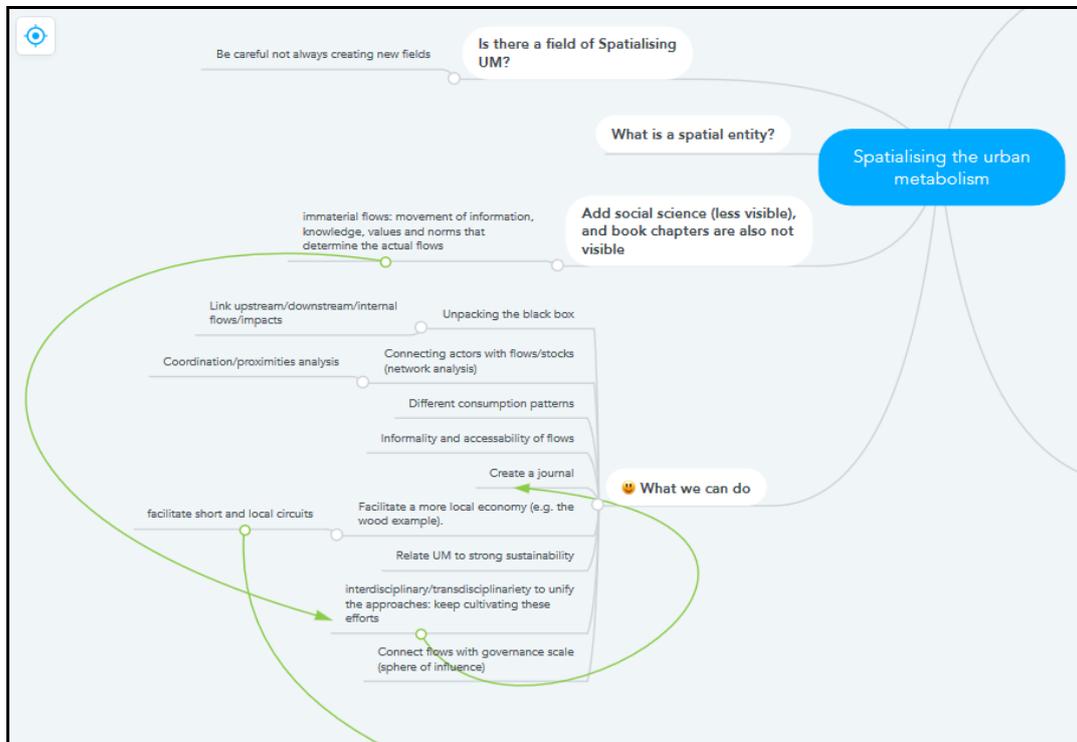
## II. Original idea



*Text inside the mind map:*

- ✓ inter territorial
- ✓ link to on-going initiatives (urban wood)
- ✓ Look at spaces as places
- ✓ Account for culture/behavior in the urban metabolism. Culture of a city/neighbourhood determines the willingness to share, conserve resources and comply with regulations -- it ties together many urban flows
- ✓ manage urban hinterlands
- ✓ urban (wood) movement
- ✓ Look at physical infrastructure of flows
- ✓ Take into account all spatial scales : urban, peri-urban, rural
- ✓ soil as the first resource
- ✓ governance of flows
- ✓ decentralization of material management
- ✓ Space should be every where !!!!

### III. What we can do...



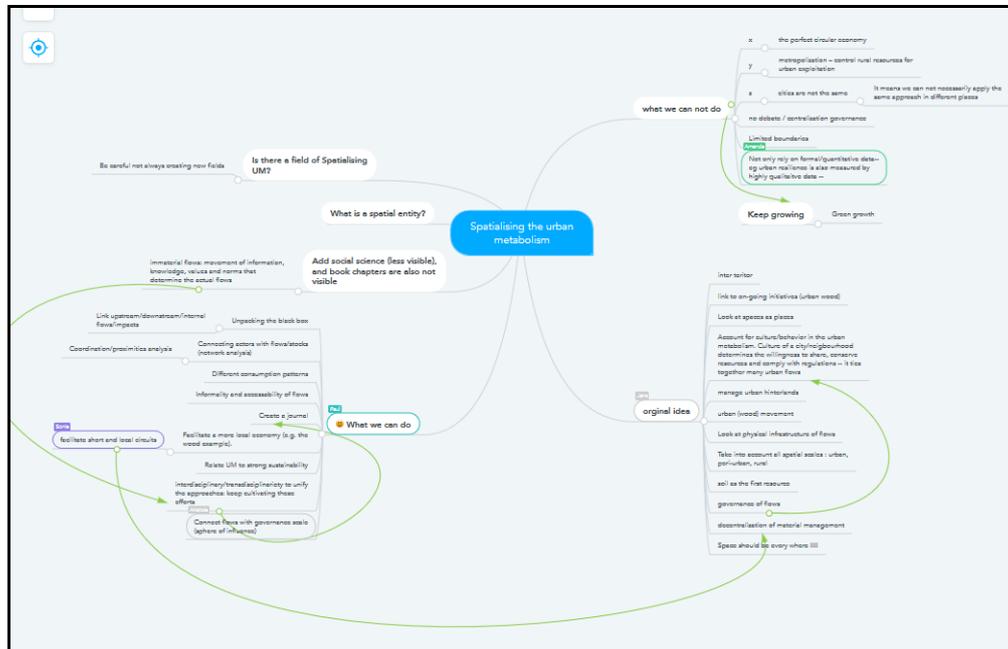
*Text inside the mind map:*

- ✓ Unpacking the black box
- ✓ Link upstream/downstream/internal flows/impacts
- ✓ Connecting actors with flows/stocks (network analysis)
- ✓ Coordination/proximities analysis
- ✓ Different consumption patterns
- ✓ Informality and accessibility of flows
- ✓ Create a journal
- ✓ Facilitate a more local economy (e.g. the wood example).
- ✓ facilitate short and local circuits
- ✓ Relate UM to strong sustainability
- ✓ interdisciplinary/transdisciplinarity to unify the approaches: keep cultivating these efforts
- ✓ Connect flows with governance scale (sphere of influence)

### IV. ... and research perspective:

- ✓ Add social science (less visible), and book chapters are also not visible
- ✓ immaterial flows: movement of information, knowledge, values and norms that determine the actual flows
- ✓ What is a spatial entity?
- ✓ Is there a field of Spatialising UM?
- ✓ Be careful not always creating new fields

## V. The global mind map



## Next steps

From the presentations and discussions we see that there are numerous opportunities to spatialising of the urban metabolism forward. However, there are also limitations and there is a lot to be better understood. As next steps we think about to take the following five steps:

1. Firstly, the literature review that was done on 438 articles will be made available in an accessible format and shared with the participants of the session.
2. All of the articles will be indexed in the Metabolism of Cities library, and a new section will be embedded dedicated to spatialising the urban metabolism. This will also provide background information to people not familiar with the concept, and options to filter the literature by publication date as well as location.
3. An online discussion board dedicated to this topic will be set up. Participants of the session as well as other interested parties will be invited to join an online discussion to take the conversation forward.
4. In order to encourage conversation and to drive interest, we will select a number of visualisations from the literature that we think are inspiring, and we will hold an online voting contest (similar to a previous general data

visualisation competition that took place). We hope that this can help kickstart additional discussion.

5. Lastly, we plan to write a discussion / forum type article based on bibliometric analysis and proposing a real theory of space in urban metabolism. Indeed, we believe that the call for debate and policy in space in urban metabolism research is essential. This new theoretical approach to urban metabolism could account for the plurality of meanings and conceptualizations of which the term falls, and at the same time manage to bring together several disciplines that can serve the cause of urban metabolism.