Data and the Urban Underground: Towards an n-dimensional city

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Deep City Project

Reversing the 'needs to resources' paradigm

- (re)source potentials before projects or planning
- think multi-use and in terms of synergies and conflicts: buildable space, groundwater, geothermal energy and geomaterials
- underground: a complement to surface development/preservation



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Some Outputs of Deep City

- Development of an investigative mapping method
- Matrix of interactions between the resources
- Cost/energy simulations of a commercial UG project
- Spatial econometric analysis of surface/subsurface multilevel spaces.



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Resource Potentials

Quantification

- meetings with local actors (planners / geologists)
- survey of geologists / geotechnical engineers via the web.





Urban Centrality

Spatial analytics

- accessibility to built volume (latent centrality potential)
- multiplication of metrics (measures and network radii)
- centrality: can be 'good' or 'bad'







Underground Potential



Characterization of the Urban Volume (Geneva)

All depths; four resources + urban centrality; 'relationships' by Self-Organizing Model Indexing of potentials (similar colors = similar characteristics; ordinal values)





Towards an n-dimensional city

To think of urban data in general as form of heritage, but a natural one (it is 'given' and not always by someone in particular).

- Digitize as much as possible: keep the stable things circulating (the immobile must be mobile)
- Organize the data in a generic form with unique identifiers for cross-comparison (or at least similar geographic projections)

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To think of this urban data as a commons, that which belongs to everyone by belonging to no one in particular (with codes of conduct of course).

- Open access to as much as possible (perhaps not all fields); RAW DATA not PDFs
- Education and entrepreneurship: training sessions or workshops, competitions for application production; with regards to developing a literacy in coding, computer algorithms and data.

Publications

- Doyle, Michael R. "From Hydro/Geology to the Streetscape: Evaluating Urban Underground Resource Potential." Tunnelling and Underground Space Technology 55 (May 2016): 83–95. <u>https://doi.org/10.1016/j.tust.2016.01.021</u>.
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- Parriaux, Aurèle, Pascal Blunier, Pierrick Maire, Guillame Dekkil, and Laurent Tacher. *Projet Deep city : ressources du sous-sol et développement durable des espaces urbains*. Lausanne: vdf Hochschulverlag AG an der ETH Zürich, 2010.