

UNDERGROUND SPACE AS A RESOURCE FOR METROPOLITAN AREAS: how to help urbanized areas in planning the underground space in order to reach best results?

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GENERAL ISSUES

With the growth of the world's population and the worldwide urbanization process, the urban future increasingly depends on the **urban underground potential**.

The systematic use of the underground space is a solution, maybe the last one, which can enhance the quality of life and boost competitiveness of modern cities. Emphasis is given on the contribution of the use of the underground space to the problems of mega-cities. **Mega-cities** display with clarity and more intensely the sustainability problems of the urban areas in general. Moreover, underground solutions applied to them is more easier spread to the other urban areas.

Many governments and municipal governments have abandoned the out-of-sight-out-of-mind approach, typical of past practices regarding the underground space and an increasing number of metropolises subscribe to **long-term policies & coordinated actions as regards the development of the urban underground space (the 3rd dimension)**; at the same time more and more professionals and research centres are better trained and aware of the challenges to use the underground, including in developed countries.

Underground space plays a significant role either to assure the energy systems operation as well as to offer suitable opportunities for every day life (**metro systems, storage and parking facilities, road and rail tunnels, mall, ...**) through solutions that are more sustainable from the energy and environment point of view than those above ground.

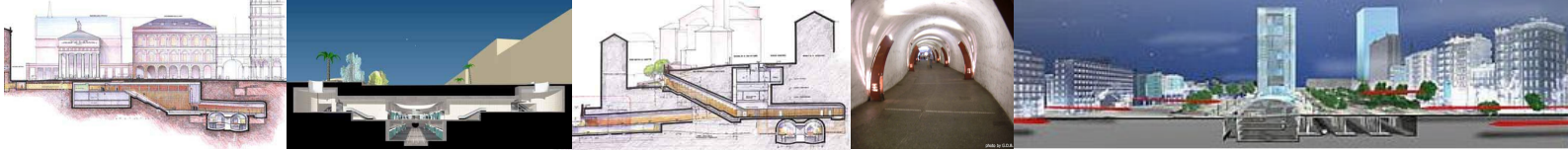
ACTIVITIES

- **research** in general themes related to the **underground space** and **underground urbanism**;
- ACUUS (Associated research Centres for Urban Underground Space) activities
- management of initiatives aimed at promoting activities (seminars and short courses on uses and potentialities of urban underground spaces) supplementary to the biennial ACUUS conferences;
- **monitoring** of the communitarian, European, and national **regulations** for the use of underground spaces and identification of their main characteristics;
- **research** in general themes related to the technological grids in urban areas (technologies, sizing, layout, multi-utility tunnels, safety, indoor quality, GIS, etc.);
- development of initiatives on **rational use of underground space** and on PUGSS (urban plans for the management of underground services).
- "Laboratory on Underground Space" Project

In addition to existing underground space utilisations, other innovative opportunities have been recently proposed as **GIS case studies** and **new underground destinations** (commercial underground malls, leisure centres, multi-utility tunnels, good transportation systems).

OPEN POINT QUESTIONS AND PROJECT IDEAS

- development of underground space: tips and tricks?
- which are priority actions?
- suggestions for long-term policies & coordinated actions?
- 3D GIS tools are the future?



REFERENCES

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- “The evaluation of buildings energy consumption and the optimization of district heating networks. a GISbased model”*, C. Delmastro, G. Mutani, L. Schranz, *International Journal of Energy and Environmental Engineering*, Springer Open Ed., ISSN: 2008-9163 (print version), in press 2014.