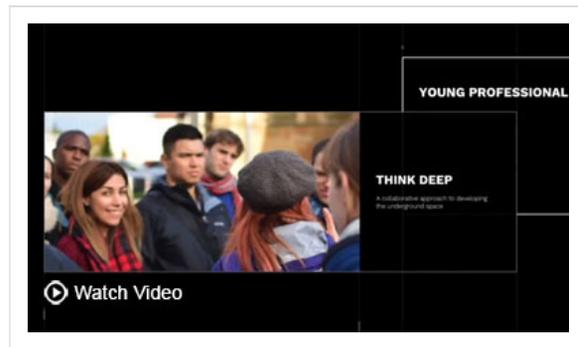


DISCUSSION FORUM

Thinking deep to add another planning dimension 16 Aug 2018

TunnelTalk reporting

Cities of the world are growing fast and only a small part of that expansion is being planned strategically. In recognizing the dilemma, the Think Deep initiative of the Committee on Underground Space of the International Tunnelling and Underground Space Association (ITACUS) has been leading the discussion on how underground space can be harnessed more effectively in the planning and development of more sustainable urban cities for the future. As part of its strategy ITACUS has supported the establishment of Think Deep groups in member nations of the ITA as well as an international group of Think Deep Young Professionals.



Think Deep Young Professionals explain mission and goals

The groups of built-environment professionals, including urban planners, architects, lawyers, geotechnical engineers, tunnellers and geologists, are committed to:

- promoting an awareness of the value of underground space to enable its fair use and to
- providing guidance and information to the public, to decision makers, to politicians and to professionals as to the benefits of using urban underground space.

One of the most active Think Deep national groups is the group established in the UK (TDUK) in September 2015. At a recent reception in London, the group and its guests

celebrated the achievement of the past 12 month period and shared the results of three group workshops that focused on the social value of underground space, the future of transport, and how to plan cities in 3D. In an opening address, Isabel Dedring, Global Transport Leader of Arup and formerly the London Deputy Mayor for Transport, emphasised the importance of cross discipline working to resolve complex urban challenges, adding that the demand for urban underground space is now such that strategic subsurface planning is needed to enable its fair use and to safeguard underground corridors for future infrastructure development.

Speaking for TDUK Petr Salak, said: "We also want to create a common vision for urban underground space to transform our cities for the benefit of society. To do this we need a masterplan for underground space and this needs to be developed by experts across multiple disciplines and the reforming of policy to ensure a proactive, not reactive approach".

To achieve its goals, TDUK aims to:

- Create a three-dimensional spatial planning strategy and define processes for safeguarding spaces underground
- Facilitate the bringing together of interested organisations and individuals with a singular campaigning voice
- Improve plans for future underground infrastructure and help coordinate a multi-disciplinary approach.
- Develop guidance and best practice.



TDUK advances the future use of underground space

Reports for the three TDUK workshops illustrated the scope of the group's activity.

Workshop 1. Social benefits of underground space: moving from cost to value

The UK Public Services (Social Value) Act of 2012 requires that those who commission public services deliver wider social, economic and environmental benefits. Social value itself however is not clearly defined and less still is the understanding of the benefits and values associated with underground space. The workshop therefore began by asking participants, from their professional perspectives, how could consideration of underground space influence the social value of urban development?

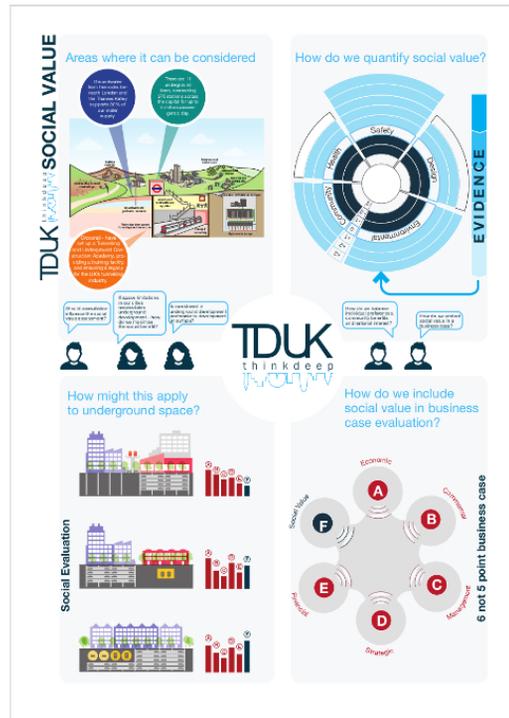
Responses included a need for cities to be strategic with how all space is developed by, for example, relocating car parking below ground to create community space at street level. Participants were asked also where they see the main benefits and challenges of considering underground space in the assessment of social value.

Developing a universal quantitative methodology for measuring social value was seen as a challenge, with even the definition needing to be better and more consistently articulated. Other challenges included a lack of understanding of what exactly is underground, as without this knowledge it is difficult to understand the potential benefits or disadvantages associated with a proposed development.

Suggested social benefits associated with the subsurface included raising expectations of what infrastructure projects should incorporate to achieve the highest and best return on public investment. Typically, project cost-benefit analyses focus on shorter-term costs and fails to identify the wider, longer term social benefits of underground development. The workshop suggested that:

- a framework be established for defining social value and create a base for early planning discussions;
- the social value framework be flexible enough to incorporate qualitative measures of value, across different timescales, and to allow for broader societal needs of future generations.
- a collection of case studies be compiled, with information about how social benefits are described and accounted for, and for potential objections and concerns to be expressed by stakeholders or the public.
- a strategy be established to assess potential long-term benefits of subsurface interventions and weigh them against short-term considerations

These tools, it was suggested, should allow for more meaningful discussions between all parties, at all stages of a project, and help decide in each case whether underground space utilisation is the best option over the use of surface space.



Assessing the value of underground space

Workshop 2. Future transportation - how will people and freight move in the future?

Hosted by PLP Architecture and attended by about 30 young professionals, the second TDUK workshop of the year speculated on the future developments in transportation within and between cities and how these transportation systems would affect the use of community space, particularly, but not exclusively, the underground space.

Starting from the current transport pressures faced by cities – include addressing poor air quality, over-use, stress associated with using the systems, reliability, capacity, and safety – a new paradigm horizon considers ways to combat these pressures drawing on new data structures, shared models and more passenger focused mobility and considering point to point travel systems and technological advances that change travel expectations. The real step change, it was concluded, will require intervention planning to make best use of the opportunities arising from innovation in order to reach a higher paradigm.

The workshop considered fundamental questions for communities:

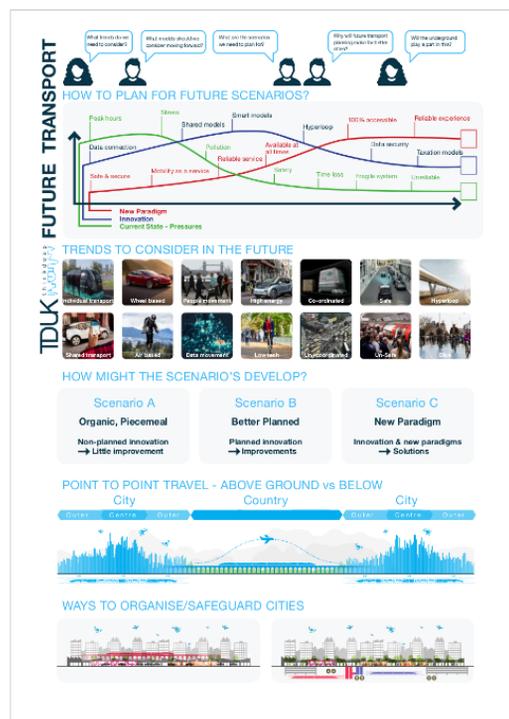
- What trends will we need to consider?
- How will infrastructure be spatially arranged?
- What should we as informed professionals be doing now and what will the key challenges be?

Trends that transport faces include wheel to air competition, new travel modes and level of energy use per mile amongst others. Combining two considerations, time horizons and trends shows us that three models of organisation are possible. An organic piecemeal model, a better planned model and a new paradigm model. The degree of planning control (and predictive future visioning) we wish to consider will relate to how much future proofing we think is necessary to create an improvement to the current organisation. The workshop groups proposed different planning approaches, from a spatial pro-active planned approach, a use class and underground use approach and a safeguarding model that plans for zones and corridors within our cities. The likely direction may involve a combination of these to achieve an innovative outcome.

Further discussion centered on:

- the last mile of travel,
- the zoning of journey speeds between cities, and
- how the transport modes compliment and link between current and future systems.

The balance of these future transport types and how they link between the use of above and underground space is an area that the workshop agreed needs more careful consideration. Some global cities safeguard oversized transport



The study of future transportation needs

corridors in anticipation of future use. A consensus that the group reached was that underground space would be needed to improve transportation in cities in the future for both demand and to improve the urban quality of life.

Workshop 3: Planning our cities in 3D

The workshop, hosted by UK architecture practice Weston Williamson, brought together speakers and participants from around the world to discuss the questions should, and how could, we masterplan the subsurface?

Key lines of enquiry fell into three topics:

- What should we prioritise in our cities, both above and below ground?
- How do we create a masterplan that includes the subsurface?
- What processes should be followed for successful masterplan implementation?

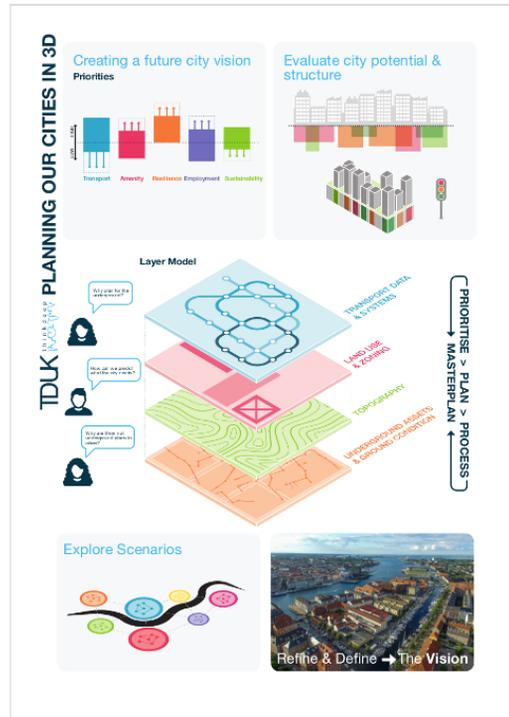
In attempting to prioritise the competing demands often placed on cities, workshop participants ranked various urban issues by relevance and priority. Recurrent themes included flooding; car parking; installation of utilities; and population density.

In response to these priorities, hypothetical cities were used to prompt ideas for spatial planning of the subsurface. In one group, layers of the earth were suggested as zones of different land uses, with actively used spaces closer to the surface, and passive storage or major services in utility tunnels at greater depths.

An alternative approach to current zoning practices, subsurface was divided into a 3D grid and the value or potential of different sections categorized based on land values, geological conditions, environmental function and location.

When considering the processes needed to support the spatial planning of the subsurface, suggestions were varied. These included development of a process to:

- Undertake comprehensive topographical and land use surveys.
- Have a mayoral taskforce in cities prepare a strategy for planning consents at a subsurface level.
- Engage the public when preparing a spatial vision for urban development.
- Create innovative forms of finance to enable construction of infrastructure that supports the long-term needs of users.
- Consider financial and taxation models to capture value from infrastructure projects and share the benefits associated with private sector development of the subsurface.



Planning cities in 3D

A current model discussed was the property tax relief offered by the Government of Singapore for creating underground pedestrian walkways.

Guests at the 2018 summer reception celebrations were able to share their own professional experiences of the subsurface, from major construction projects to innovative uses of emerging technologies and applied research of international urban trends. Among the guests, Han Admiraal and Antonia Cornaro discussed their new book titled *Underground Spaces Unveiled*, which explores the emerging study and promotion of underground space as the fourth dimension of urban planning into the future.

Looking ahead to its next operating year, TDUK announced that it would be taking forward a second stage of Project Iceberg, currently led by the British Geological Survey and the national Ordnance Survey. The project seeks to explore methods to better capture and share data about underground assets, geological conditions, and the risks they present beneath our cities. Alongside this applied research, the group will also be hosting further workshops on the architecture of underground spaces and the potential legal frameworks for governing the subsurface. As part of the project it will work closely with industry bodies including the Royal Town Planning Institute to advance the study of this emerging topic.

For further information about TDUK and about joining the group, contact Petr Salak at thinkdeep@tduk.org and find details of the [Think Deep programme](#) at the ITACUS website.

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