Translucent City

Project 5

Transforming the use of underground space

Benefit to
Smart cities stakeholders

Impact and value
- knowledge transfer
- efficiency and sustainability
- design optimisation

Underground spaces are an increasingly valuable commodity in land-constrained and highly populated cities. Currently, the use of these spaces has been expanding in a piecemeal manner. Constrained access and diverse economics of underground infrastructure for transport, energy, water and waste require an understanding of multiple, overlapping networked industries. It is only by carefully examining the system of systems that cross-sectoral optimisation can be considered.

Translucent City is a collaborative research project that brings focus to the adaptability of underground spaces within densely populated cities. The aim is to engineer a translucent city to radically transform the usage of the subterranean part of a city, with physical infrastructure woven together with virtual infrastructure, while considering the evolution of human behaviour when circumstances or infrastructure changes.

Led by CSIC as part of the Global Alliance (a collaboration between the University of Cambridge/CSIC, the University of California, Berkeley and the National University of Singapore), Translucent City will provide cross-disciplinary study that integrates the subterranean part of a city with the above ground 'visible' systems – an area of research that has, until now, been under examined.

The ultimate goal of this project is to develop new research to support novel, cross-sectoral design and urban standards that enable the seamless optimisation of physical and virtual infrastructure as a whole and the growth of innovation and new technologies in the three Global Alliance cities (London, Singapore and San Francisco) as a precursor to worldwide potential.

The translucent city is a frontier of knowledge that has potentially much wider benefits than improving the efficiency of engineering systems. It has the potential to transform the environmental, social and economic functioning of cities.

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Transitioning cities

Project 6

Enabling the evolution of smart cities

Benefit to
Professionals in cities and infrastructure management, city managers, engineers and urban designers

Impact and value
- foster understanding and collaboration between disciplines
- identify gaps and tools needed to deliver smart cities

The transition to 'smart' presents complex challenges. Many organisations working in Smart Infrastructure are ill equipped to develop and deliver solutions; professionals in cities and infrastructure management have not traditionally been trained in interdisciplinary collaboration. Without a culture of collaboration there can be no integrated solutions. There is a pressing need for built environment professionals who are trained in a broader range of disciplines and tools, bridging infrastructure and city management solutions and developing opportunities presented by the digital economy. CSIC is addressing this need through the Ove Arup Foundation Programme for Transitioning Cities.

Existing methods for assessing and analysing the operational needs of a city and the relationship with physical infrastructure are not 'joined up', and approaches to address them may be in tension. Additionally, industry and city governments lack the tools to understand and interpret the current abundance of data in order to support smart cities' decision-making processes and deliver best value from them.

This programme addresses the disciplinary gulf which currently exists between city managers, engineers and urban designers. It will catalyse and establish a significant ongoing research programme to address gaps and identify the digital tools required to deliver a smart city which benefits the citizens it serves. The four-year programme will result in a series of graduate-level and executive-level educational modules. It will deliver a series of academic and position papers and a research roadmap to bring focus to outstanding challenges. In addition, a competence framework for smart city professionals and an educational programme consisting of two strands – 'methods' and 'case studies' – will be developed.

The programme will be delivered by a team of experts from CSIC and will bring together academic colleagues from the disciplines of Civil Engineering, Land Economy, Architecture, Geography, Manufacturing Engineering and Computer Science to develop capacity and capability within UK industry to design, deliver and sustain smart cities and infrastructure solutions.

CSIC is grateful to the Ove Arup Foundation for providing funding to catalyse this project, enabling CSIC to develop the required research programme and educational outputs.

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