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COST Sub-Urban (TU1206) -Towards better understanding, and sustainable use of the urban subsurface

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Growing global population and increasing urbanization worldwide put sustainable urban development at the forefront of global challenges. This is acknowledged in the United Nations' Sustainable Development [Global] Goals (SDGs), with its "Global Goal 11" of Sustainable Cities and Communities, and "…the 2030 Agenda for Sustainable Development". However, the potential contribution of the subsurface in meeting this challenge is generally under-appreciated at best and planning provision for the subsurface is sporadic, despite most cities around the world facing at last some issues related to geology and urban hydrogeology.

Such issues have been addressed by the COST Action SUB-URBAN (TU1206; http://www.cost.eu/COST_Actions/tud/TU1206), initiated in 2013 to develop "A European network to improve understanding and use of the ground beneath our cities" and to identify and disseminate good practice in subsurface data knowledge throughout Europe and further afield.

SUB-URBAN has promoted greater interaction between subsurface experts and potential users of subsurface knowledge - urban decision- makers, practitioners and researchers. The Action's network spans >30 countries (15 ITCs), >150 researchers (17 Geological Survey Organisations, 22 Research Institutions), and 23 cities. It has brought together disparate subsurface research and good practice from across Europe, and encouraged development of city-scale subsurface model exemplars to inspire others through a lighthouse-follower approach.

Initially, the state-of-the-art was assessed in a selection of cities with respect to urban subsurface knowledge, understanding, and use. 19 City Study reports, and a synthesis report "Out of Sight - Out of Mind", were compiled.

Guided by these, expert sub-groups identified good practice in subsurface data and knowledge locally, nationally, and Europe-wide. This is presented in a synthesis report "Opening up the subsurface for the cities of tomorrow", based in turn on seven thematic reports covering: Subsurface information and planning; Data acquisition and management; 3D/4D urban subsurface modelling and visualisation; Groundwater and geothermal monitoring and modelling; Geotechnical modelling and hazards; (Sub)surface geochemistry; and Cultural heritage.

A new concept, GEOCIM (Geo-City Information Modelling) has been proposed for city quarter to conurbation scales, combining subsurface and above-ground 3D and 4D models. This is comparable to project-specific Building Information Modelling and supports: holistic urban planning; identifying subsurface opportunities, and cost saving by reducing uncertainty in ground conditions.

All the Action's reports and outputs are available for download, and have been assembled within an integrated online Toolbox (https://suburban.squarespace.com). The Toolbox promotes and disseminates the identified good practice, methodologies, workflows, and decision-support tools, and emphasises the key importance of early-stage consideration of the subsurface in planning. Different entry points are available for users with different backgrounds and needs.

As the critical mass of city decision- and policy-makers become better aware of the sub-surface, its opportunities and sustainable use, the potential for higher-level policy consideration of the subsurface will grow. This will be fostered by a Final Action Dissemination publication (2018), aimed at policy makers, and will be supported by Sub-Urban's developing ties with other organisations involved in the subsurface globally.