

COST

Domain Committee "Transport and Urban Development"

COST Action (TU1206)

Start Date (start date of the Action)

Title SUB-URBAN - A European network to improve understanding and use of the ground beneath our cities

MONITORING PROGRESS REPORT

Reporting Period: from 8 April 2013
to 25th February 2014.

This Report is presented to the relevant Domain Committee.
It contains three parts:

- I. Management Report** prepared by the COST Office/Dr Seumas Campbell
- II. Scientific Report** prepared by the Chair of the Management Committee of the Action

Executive summary :

In its first 10 months, the Action has grown strongly from 9 to 18 participations, with three intentions to participate, one near neighbour and two international parties. Other COST country and international parties are also keen to participate. With expansion, the Action has made progress in drawing together previously fragmented, and sometimes little known, research on the urban sub-surface, in partner geological survey organisations and research institutes.

The Action has also had significant early success in involving stakeholders representing several European cities, and in forging working relationships between them and local researchers. The city-partners – the most important potential end-users of the Action's research - are aligning the Action's activities with their needs. Targeted STSMs (5 done, 2 planned) and workshops have also helped to establish city-partner needs and requirements, and enable the Action to evolve in an integrated and multidisciplinary fashion.

The 'authority' and backing of a European network has meant that external parties have paid serious attention to our participants when they have presented their research, and provided a 'kick start' for initiatives that would otherwise have been impossible. Major projects focused on improved understanding, planning, and development of the subsurface, are underway in Oslo and Odense, in parallel with the Action; others will follow.

Working Group (WG) 1 is furthest advanced of the 4 planned WGs, and has identified key cities as exemplars of the current state-of-the-art in sustainable development of the subsurface. These exemplars and reporting of WG1 will be disseminated via the Action's webpage (www.sub-urban.eu).

I. Management Report prepared by the COST Office/Grant Holder



I.A. COST Action Fact Sheet

- **COST Action TU1206-SUB-URBAN** - A European network to improve understanding and use of the ground beneath our cities
- **Domain** *Transport and Urban Development (TUD)*

- **Action details:**

CSO Approval: (21 November 2012) **End date:** (8 April 2017)
Entry into force: (18 December 2012) **Extension:** (day/month/year) *Not applicable*

- **Objectives**

Increasing urbanisation throughout the world challenges the sustainable development and resilience of cities. Despite this, the importance of the ground beneath cities is under-recognised and often overlooked. The main aim of the Action is to provide a long-needed contribution to greater interaction and networking, and so transform the relationship between experts who develop urban subsurface knowledge and those who can benefit most from it - urban decision makers, practitioners and the wider research community. The Action will establish a network to co-ordinate, integrate and accelerate the world-leading research into modelling the subsurface taking place in European institutions and to develop a Toolbox to enable subsurface knowledge to be widely disseminated. Thus, to maximise the economic, social and environmental benefits of urban subsurface resources and ecosystem services on which cities depend, the Action will:

- Draw together collective research capabilities in 3D/4D characterisation, prediction and visualisation of the subsurface
- Deliver this in appropriate forms
- Provide training and continuing support and advice to better inform and empower decision makers and other end-users
- Foster development of policy which reflects the importance of the urban subsurface
- Recommend the basis for improved availability, initial use and re-use of subsurface data.

- **Parties:** *list of countries (18) and date of acceptance*

Croatia (11 January 2013)	Italy (13 September 2013)	Slovakia (20 March 2013)
Denmark (29 November 2012)	Netherlands (18 December 2012)	Slovenia (13 August 2013)
Finland (30 January 2013)	Norway (28 November 2012)	Spain (7 February 2013)
France (5 July 2013)	Poland (21 January 2013)	Sweden (4 September 2013)
Germany (17 January 2013)	Portugal (9 November 2013)	Turkey (28 May 2013)
Ireland (7 December 2012)	Serbia (29 October 2013)	United Kingdom (27 November 2012)

• **Intentions to accept:** *list of countries and date*

Belgium

Bosnia and Herzegovina

Greece

• **Other participants:**

St Petersburg City Government, Russian Federation, St Petersburg

Geological Survey of Bangladesh, Bangladesh

Hong Kong Geological Survey, Hong Kong

Chair: *(Dr S D G Campbell, British Geological Survey, Murchison House, West Mains Road, Edinburgh EH9 3LA, UK (+44 131 650 0215, sdgc@bgs.ac.uk)*

DC Rapporteur: *(Dr Terje Kleven, Norwegian Institute for Urban and Regional Research, address, +4722958962, (terje.kleven@nibr.no)*

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Administrative Officer: *(Ms Svetlana Voinova, svetlana.voinova@cost.eu)*

• **Action Web site:** <http://www.sub-urban.eu>

Grant Holder Representative: *(Scientific and Management – Dr S Diarmad Campbell sdgc@bgs.ac.uk; Legal and Financial -Ms Amanda Clewes aclewes@bgs.ac.uk)*

• **Working Groups**

WG1 Compile inventories of existing methods, practices and case studies

WG2 Evaluation and integration of techniques

WG3 Preparation of guidelines and a Toolbox

WG4 Dissemination and Training

I.B. Management Committee member list

<i>Name</i>	<i>Country</i>	<i>E-mail</i>
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I.C. Overview activities and expenditure

(year) Budget

**Total Action Budget:
139000.00**

Meetings

Meeting Type	Date	Place	Cost	Total
Kick off	9 April 2013	Brussels		0
MC & WG	27-28 June 2013	Rotterdam	20355.04	20355.04
WG4	25-26 September 2013	Edinburgh	3543.90	23898.94
MC & Workshop	28-29 November 2013	Hamburg	21758.77	45657.71
WG1 Meeting and workshop	18-19 February 2014	Amsterdam (Schiphol)	About 15000	60000.00

STSM

Beneficiary	Date	From	To	Cost	Total
Ms Helen Bonsor	21-25 October 2013	Edinburgh	Hamburg	1300.00	1300.00
Ms Stephanie Bricker	21-25 October 2013	Nottingham	Hamburg	1300.00	2600.00
Dr Michiel van der Meulen	02-08 February 2014	Utrecht	Santiago de Compostela	1300.00	3900.00
Ms Helen Bonsor	03-07 February 2014	Edinburgh	Odense	1300.00	5200.00
Mr Andrew Riddick	24-28 February 2014	Nottingham	Trondheim	1300.00	6500.00

Workshops

Title	Date		
	From	To	
			0

General Support Grants

Beneficiary	Date			Cost

Schools

Title	Date	Place		Cost

Dissemination

Title	Date	Place		Cost

Others

II. Scientific Report

II.A. Innovative networking

- *The Action has had significant early success in innovative networking by putting the strongest emphasis on encouraging the involvement within the Action of stakeholders who represent cities within Europe and further afield. These stakeholders are typically those directly involved in the planning, development, regeneration, and management of cities, so are typically senior representatives of city authorities/municipalities.*
- *The City-partners are seen as the most important potential end-users of the Action's research and the Action's activities will be aligned with their needs.*
- *Existing and new colleagues have been encouraged to establish, or where they already exist to further develop, working relationships between themselves and local City-partners. As a result, several European cities are newly represented within the Action, e.g. Ljubljana, Nantes, Bergen, A Coruña; others are expected to join, e.g. Antwerp, Novi Sad, Zagreb.*
- *Networking with City-partners has been nurtured through targeted STSMs (5 done, 2 planned) and workshops with the emphasis on establishing City-partner needs.*
- *The 'authority' and backing of a European network has meant that external parties have paid serious attention to our participants when they have presented their research, and provided a 'kick start' for initiatives that would otherwise have been impossible.*
- *The Action has also been addressed by invited experts in planning and city management in order to identify direct and early opportunity to test and apply its research and to encourage partners to consider why our research is needed. The Action is therefore making excellent progress in bringing together a disparate group of practitioners, managers and subsurface knowledge providers in an innovative virtuous circle of knowledge exchange.*
- *A tangible measure of medium term socio-economic impacts already being achieved, and expected to increase significantly as the Action develops, is in relation to major new projects focused on improved understanding, planning, and development of the subsurface. Two major flagship projects are already underway in Oslo and Odense, in parallel with the Action; and there is clear evidence that others are following this lead.*
- *The Oslo and Odense projects are collaborative efforts, funded, and staffed, substantially by the municipalities themselves, in conjunction with geological survey organisations, water companies, transport authorities and researchers.*
- *The inception of the Oslo and Odense projects was in turn influenced by recent major projects in Glasgow and Hamburg, resulting in the development of comprehensive and high resolution subsurface 3D, and 4D models of the subsurfaces of those two cities.*
- *In the case of Hamburg, this has resulted in the new unified Hamburg urban groundwater model, produced jointly by the water company Hamburg Wasser, and the State Geological Survey of Hamburg (BSU). This is used to underpin licensing applications. The groundwater model also takes advantage of an exemplar groundwater monitoring network, studied by one of the Action's ESRs through and STSM. This will be a key component of advice on the establishment of such networks to be developed by the Action.*
- *In the case of Glasgow, this has resulted in a 3D model of the subsurface of the city which is provided to a knowledge exchange network, ASK (Accessing Subsurface Knowledge) which brings together the city authorities, the national geological survey, private sector practitioners and university-based researchers. An additional benefit of the Glasgow work has been the development of a new subsurface digital data transfer protocol (GSPEC) which is attracting the interest of several of the Action's City-partners as a potential mechanism to resolve long-standing problems of data capture and management which have undermined efforts to manage and deliver major urban infrastructure projects successfully, within budget and on time. The Action will facilitate trials of this approach, potentially initially in Odense, following a highly successful STSM there by an ESR.*
- *A further impressive example of innovative networking which Action partners may take up is the 'special game' developed by City-partners in Rotterdam. This decision support tool*

brings together in a highly interactive way, urban planners and those with specialist subsurface knowledge (engineers etc) to enable the planners to become aware at the earliest stages of project planning, of the importance of key subsurface issues. This initiative has already attracted the attention of previously sceptical colleagues in the City of Amsterdam, who have now joined the Action.

- *The Action is also linking with other groups who are using different cutting edge technologies to address research the addresses a range of challenges faced by city managers. This scientific advance will provide the basis for decision support tools at a later stage in the action and create a holistic surface-subsurface environment and visualisation for Building Information Modelling (BIMs) and 3D subsurface planning.*

II.B. Inter-disciplinary networking

- *The Management Committee (MC) Chair is also an MC substitute on the MCs of two broadly related COST Actions: TU1208 (Civil Engineering Applications of Ground Penetrating Radar and TU1204 (People Friendly Cities in a Data Rich World). The MC Chairs of both of these actions are in turn members of the MC of this Action, and the Chair of TU1208 has made a presentation at the TU1206 Hamburg workshop and areas of common interest and research overlap have been discussed and will be pursued (see IIc below).*
- *The MC Chair will give a presentation at a special session associated with TU1208 at the forthcoming EGU Conference in Vienna (April-May 2014) highlighting the potential importance of Ground Penetrating Radar in the effective characterisation of anthropogenic deposits in urban areas, which is a current deficiency in urban subsurface 3D modelling.*
- *The MC Chair has also been approached by COST Action TU1003 (MEGAPROJECT) on the Effective Design and Delivery of Megaprojects in the European Union, which has direct relevance to the development of large-scale subsurface infrastructure.*
- *The level of inter-disciplinarity already achieved by the Action is encouraging, and is particularly so between the Action's subsurface experts and its growing group of urban geographers and city planners. Further growth and exploitation of this wider group should provide the basis for significant advance in terms of policy and good practice in relation to urban subsurface planning in general, and potentially provide the platform for development of volumetric/3D subsurface planning guidance. In relation to this, the Chair WG1 undertook a highly successful STSM to Santiago de Compostela, specifically to broaden his understanding of a different facet of expertise to his own (urban geography) in order to guide selection of case-study cities within WG1. This will have wider benefits to the Action.*
- *Plans are in hand to organise a day of activities linked to the Action at the International Architecture Biennale Rotterdam (IABR) 2014 – Urban by Nature, to open the eyes of architects to the urban subsurface, a world that is virtually unknown to most of them.*
- *The Action is co-sponsoring and will be contributing extensively to, a conference which brings together a wide range of geosciences and related urban subsurface research in the Glasgow (UK) area. This work has been carried out in close co-operation with Glasgow City Council (the local municipality). This accumulated research, in turn, has helped to support a successful bid for c. 10 million Euros to integrate urban 'Big Data' led by the School of Social and Political Sciences, Glasgow University and provides an excellent example of inter-disciplinary networking. This will contribute to efforts in Scotland and at UK level to develop new ways of using big data in urban policy and urban management and contribute also to the body of international knowledge, which will in turn have wider benefits for the Action's participants.*
- *The Action will also co-sponsor two further activities in Glasgow in March 2014, both with considerable potential for developing inter-disciplinary links: the AGI Scotland Future Cities day-long Conference at which two of the Action's participants will speak, in part about the Action, will bring together GIS and data management experts. The ASK (Accessing Subsurface Knowledge) subsurface knowledge exchange workshop will draw together a range of local and regulatory authority representatives, together with private sector practitioners and researchers all specializing in the sub-surface.*

- Overall, therefore, the level of inter-disciplinarity achieved to date, and the potential to expand this substantially further within the remainder of the Action should be more than sufficient to potentially provide substantial socio-economic benefits.

II.C. New networking

- 55 new members have joined the Action during its life
- 9 participant countries at kick off – 12 more have joined including 1 near neighbour and 2 Non COST. 3 further countries are pending approval.
- Total number of individual participants involved to date in the Action is 70. Of these 34% are female and 21% are Early Stage Researchers.
- Early Stage Researchers in the Action have undertaken 60% of the STSMs, and have played a particularly strong role in the Action's network, and in presentations at workshops. Of these, the STSM undertaken by one of the ESRs to BSU Hamburg provides a benchmark example to COST cities as to how subsurface data should be managed to support decision making within cities by both the public and private sectors.
- There are currently three researchers from three non-COST Countries engaged with the Action from outside of COST Countries (and approved by the CSO). None are from countries with reciprocal agreements. The main role of these researchers will be in facilitating trialling of the toolkit developed by the Action.
- The Action's participants have, and will be promoting, and disseminating the outputs, of the Action through a range of outreach activities, and especially invited presentations at meetings, workshops, and conferences. Several of these presentations have been, or will be, in SE/E Asia including presentations to governmental urban construction-related organisations in Singapore and Hong Kong, and to the South Korean Geoscience Institute.
 - ACUUS 2014 (1) (Numbers in brackets refer to the Annex)
 - GAC-MAC 2014 (2)
 - EGU 2014 (3)
 - Article for the Swedish magazine "Arkitekten" (4)
 - Geotechnical Engineering Office Hong Kong (5)
 - Building and Construction Authority Singapore (6)
 - Geological Society Regional Group Hong Kong (7)
 - KIGAM (Korean Institute of Geoscience and Mineral Resources) (South Korea) (8)
 - ASK (Assessing Subsurface Knowledge) Network (9)
 - AGI (Association for Geographic Information) Scotland (10)
 - The Geoscience Context for Europe's urban sustainability - Lessons from Glasgow and beyond (11)
- The 'authority' and backing of the COST network has meant that external parties have paid serious attention to our participants when they have presented their research, and provided a 'kick start' for initiatives that would otherwise have been impossible. Major projects focused on improved understanding, planning, and development of the subsurface, are underway in Oslo and Odense, in parallel with the Action; others will follow.
- Ingelov Eriksson (Norway) is liaising with TU1208 about possible cooperation to do a test with GPR in central Oslo in order to reinforce the 3D model over infrastructure.
- Members are in discussion with the SNOWMAN Network (www.snowmannetwork.com), a transnational group of research funding organizations and administrations in the field of developing and sharing relevant knowledge for the sustainable use of soil and groundwater in Europe.
- The Oslo and Odense projects have been financed by combinations of resources from the municipalities, national geological survey organisations, water companies, transport authorities etc.
- The Action's participants have been considering potential proposals in relation to Horizon2020 and to opportunities for national funding linked to JPI UrbanEurope.

Annex
COST Action TU1206 - April 2013 to February 2014.

1. **'Sub-Urban' – Transforming relationships between geoscientists and urban decision-makers (COST Action TU1206).** Campbell, Johannes de Beer, David Lawrence, Michiel van der Meulen, Susie Mielby, David Hay, Ray Scanlon, Ignace van Campenhout, Renate Taug, Ingelov Eriksson.

Accepted for ACUUS 2014 SEOUL "Underground Space: Planning, Administration and Design Challenges"

2. **Optimising geoscience data and information for sustainable urban design and development.** Simon Price, Helen Bonsor, Diarmad Campbell, Hugh Barron and Ken Lawrie

Invited presentation to GAC-MAC 2014 New Brunswick

3. **COST Action TU1206 "SUB-URBAN - A European network to improve understanding and use of the ground beneath our cities"** Diarmad Campbell, British Geological Survey, Johannes de Beer, Geological Survey of Norway, David Lawrence, British Geological Survey, Michiel van der Meulen, Geological Survey of the Netherlands, Susie Mielby, Geological Survey of Denmark and Greenland, David Hay, Glasgow City Council, Ray Scanlon, Geological Survey of Ireland, Ignace van Campenhout, Municipality of Rotterdam, Renate Taug, Geological Survey of Hamburg, Ingelov Eriksson, City of Oslo.

Accepted for EGU 2014 VIENNA

4. Article for the Swedish magazine "Arkitekten" (aimed at introducing subsurface concepts to architects).

5. **Geological and geotechnical characterisation of the shallow urban subsurface for planning and development. SDG Campbell**

Invited lecture to GEO Seminar, Geotechnical Engineering Office, Civil Engineering and Development Department, Hong Kong SAR Government, GEO Hong Kong, 19 July 2013. About 40 attended and very lively Q&A with significant interest. Several senior GEO figures present.

6. **Geological and geotechnical characterisation of the shallow urban subsurface for planning and development. SDG Campbell**

Invited presentation to BCA Singapore, 11 December 2013.

7. **From geological maps to 3D and 4D models - transforming the delivery and relevance of geological knowledge for practitioners. SDG Campbell.**

Invited lecture to Hong Kong Regional Group of the Geological Society of London. At the Mariners' Club, Hong Kong, 18 July 2013. About 50 attended, many of whom are senior figures in the Hong Kong Geological and engineering geological community (public and private sectors).

8. **3D modelling, the ASK network, and European COST ACTION TU1206 – Sub-Urban. SDG Campbell.**

KIGAM Visit to BGS Edinburgh, September 2013.

9. *Series of invited presentations. From Action members at ASK Network Partnership 2014 Workshop –Glasgow City Chambers, George Square, Glasgow G2 1DU 4th March, 2014*

10 Glasgow setting the standard for Europe: an innovative public-private partnership encouraging better use and re-use of subsurface data through digital standards. SDG Campbell and D Hay.

Invited presentation AGI (Association for Geographic Information) Scotland

11. ASK Knowledge Exchange Network for Glasgow and beyond. Helen Bonsor, Hugh Barron (BGS), David Hay and Donald Linn (GCC)

BRO National Key Register of the Netherlands. Michiel van de Meulen (TNO/Geological Survey of the Netherlands)

A European network to improve understanding and use of the ground beneath our cities (COST (European Cooperation on Science and Technology) Sub-Urban Action). Diarmad Campbell (BGS)/ Hans deBeer (NGU (Geological Survey of Norway))

National to urban scales of subsurface modelling in the Netherlands. Michiel van de Meulen/Jan Safleu TNO/GSN (Keynote)

Ignace van Campenhout (Rotterdam Municipality) (Keynote)

Urban Groundwater monitoring, and modelling in Hamburg. Lothar Moosmann and Paul Meyer from Consulaqua. (Keynote)

Invited presentations to The Geoscience Context for Europe's urban sustainability - Lessons from Glasgow and beyond; 29th-30th May 2014, Glasgow Science Centre, Glasgow UK.