Assessing the Underworld

Introduction

Assessing the Underworld (ATU) is a 4 year research initiative which commenced in June 2013 with 57 project partners, committing over £16 million of in kind support. The aim of ATU is to prove the concept of a single integrated assessment and modelling framework, using a range of different techniques to assess the three infrastructures: surface transport infrastructure (roads); buried utility infrastructures (pipes and cables); and the geotechnical infrastructure (the ground).

The project also sets out to develop a robust decision support system with embedded sustainability requirements, for use in conjunction with the integrated infrastructure assessment framework to inform intelligent streetworks. This project builds on the huge successes achieved by Mapping the Underworld (MTU) project, and ATU will not only utilise the finding from MTU, but build on these by further developing and modifying the sensors in addition to developing bespoke techniques to assess the three infrastructures. The figure below shows the timeline of the overall research initiative and highlights how ATU fits into this.
Assessing the Underworld Inaugural Seminar

The seminar featured a selection of technical presentations from the ATU research team and project partners. The ATU specific presentations given at the seminar included:

- Dissemination of the Mapping the Underworld Final Outcomes by Anthony Cohn
- Assessing the Underworld—The Conceptual Framework by Chris Rogers
- Assessing the Underworld—Novel Sensors Development by Phil Atkins
- Assessing the Underworld—Informing more Sustainable Streetworks by David Chapman

Following the ATU specific presentation, further technical presentations from ATU project partners and affiliated research were given. These presentations included:

- Streetworks Asset Management by Robert Armitage of URS Scott Wilson.
- Raising Industry Standards—Towards a UK Code of Practice for Utility Surveying by Nicole Metje of University of Birmingham (ATU Team) and Nick Zembillas of Subsurface Utility Engineering.
- Uncertain Foundations—Ground Deterioration Modelling in a Changing Climate by Stephanie Glendinning of Newcastle University (ATU Team).
- Material Underworld—the BGS Subsurface Capability by Helen Reeves of British Geological Survey (ATU Academic Partner).
- Underground Space in Cities by Ian Jefferson of University of Birmingham (ATU Team).
- Infrastructure Interdependencies and Novel Business Models by Chris Rogers of University of Birmingham (ATU Team).

These technical sessions provided valuable insight into the potential challenges and considerations for the ATU project. This included thinking on:

1. Infrastructure asset management and management of streetworks.
2. International perspective on subsurface utility management, and how ATU can contribute or benefit from international experiences.
3. Industrial standards, codes of practice and their benefits for utility surveys and streetworks.
4. Condition assessments for infrastructures, considerations for deterioration and climate change.
5. Visualisation of subsurface infrastructures during condition assessment and utility surveys.
6. Sustainable use and management of the urban subsurface for efficient service delivery.
7. Affiliated research that supports ATU objectives.
The seminar featured a number of breakout sessions, designed to capture industry preferences on relevant considerations and provide steer on the research direction for the ATU project. These preferences were broadly themed under:

1. Technology
2. Regulation
3. Other Considerations

The break out sessions served as facilitated discussion platforms, where opinions were captured and put up on flip charts for voting during breaks. To appropriately distil the priority areas and preferences for academia and industry, the voting preferences where colour coded. Green dots showed voting preferences for industry participants, while red showed those for academia. The picture on the right shows a snapshot of voting on technology and regulation at the seminar.

After voting, the priority areas for consideration on the ATU project where distilled, tabulated and presented to participants. These findings are being considered for integration into the core objectives of ATU as best possible, with 6 monthly updates and project steer in collaboration with partners on the ATU steering committee.

**Workshops Voting Outcomes**

**Technology**
- Make it: validated, practical, and affordable
- Confidence and resolution
- Knowledge of existing (in-utility/pipe) technologies
- Crowd / Public Information sourcing (smart phones, etc. and geo-tagging)
- Sensing for novel materials.
- Understanding of utility–soil interactions

**Regulation**
- One authority to plan and manage underground space
- Compulsion to share data by legislation
- Compulsion to record everything during surveys or excavations
- Common data structures and procedures for updating
- Education / training

**Other Considerations**
- What might be in the ground in the future (20 – 50 years)?
- Facilitate coordinated streetworks activities, knowing the integrated – full conditions of the 3 infrastructures – one set of planned works to last for 10+ years
- How to incorporate uncertainty in our outcomes
- How might ATU’s findings influence coring (as well as trenching) practices and trenchless technology practices?
Feedback from practitioners on the potential enablers and challenges for ATU allowed the team to:

• Capture from participants their concerns and opinion on the requirements to move ATU forward.

• Streamline thinking on how best to delivery impact from the project.

• Identify the critical needs to improve streetworks delivery / engineering.

• Co-create ideas on how to deliver intelligent and sustainable streetworks.

The seminar was a huge success and some of the main outcomes of the day included:

1. Technical presentations on considerations for the ATU project
2. Participants (industry and academia) perspectives and industry steer for research on the ATU project
3. A wish list of the requirements on ATU, which are currently being considered by the project with respect to viability within the project
4. A list of enablers and challenges / barriers to the project, which are being followed up
5. The support of a fantastic group of project partners and stakeholders, who gave their time and expertise to ATU

The next ATU annual meeting is on the 11th of December 2014 and will focus on engaging participants, particularly the ATU expert panel and stakeholders to provide steer for the different distinct work streams on the project.

For further information please see the Assessing the Underworld website at: http://assessingtheunderworld.org/
Or contact Mark Hamilton, the ATU project manager, by email at: M.Hamilton.3@bham.ac.uk