A System of Systems Decision Support Approach

**Decision Support System (ATU-DSS):** Interactive computer system that supports asset management decisions by integrating and reasoning with diverse information sources about assets and their relationships.

**Knowledge Base**
- **Ontology** that defines main concepts and relationships of buried assets, ground conditions, environment, human activities.
- **Real world datasets** that come from existing mapping, geotechnical, utility data bases (Ordnance Survey, BGS, UK Water Industry Research, etc.) or are produced by ATU streams.

**Example Scenario: ‘Small but Mighty’ Pothole**

**Road structure?**
- Surface course
- Sub-base
- Subgrade

**Ground movement beneath road?**
- Failure of subsurface infrastructure
- Geological causes (Hazards)
  - Water increase
  - Drought
  - Landslides
- Karst
- Shrinkage

**Alternatives for investigation?**
- Invasive
- Non invasive (Geophysics)

**Sustainability Model**
- **Cost model** to compare the outcomes of different utility services options with regard to cost efficiency.
- **Alternative practices** to suggest different investigation options for utility assessment, including both invasive and non-invasive methods.

**DSS Functions and Architecture**

**DSS Stakeholder Requirements**
The ATU stakeholder workshop in December 2013:
- Supply one authority to plan and manage underground space;
- Provide knowledge about asset management alternatives;
- Help with quantifying the costs/benefits.

**DSS Provides**
- Contextual information referring to links with other assets;
- Warnings about things that may be overlooked;
- Suggestions about possible actions.

**DSS Architecture**

- **Contextual Information**
- **warnings**
- **Suggestions**

**Intelligent Engine**

**Current State and Future Work**
- Contextual model that captures domain experts’ knowledge of ground, roads, pipes asset management (complete);
- Logical coding of the knowledge base (partially complete);
- Implementing the intelligent engine;
- Collecting and refining scenarios with stakeholders;
- Validation based on the scenarios.