Exchange and Integration of Road Assets:
A Semantic Web Solution to Interoperability in the V-Con Project

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Bringing together overlapping or complementing information from various sources, applications, and perspectives has been a major issue in both commercial and scientific domains. Several aspects can be identified that complicate the realisation of a solution to the problem one of the largest being the way in which information is offered. Differences in formats or structures of information as well as differences in vocabulary provide hurdles for the interoperability and integration of information.

The aforementioned problem for integration and exchange of information also comes to the fore for national road authorities. These are in need of solutions to bring about a unified view of asset management information over its various life cycles. In order to stimulate the market to provide such a solution, the Dutch and Swedish national road authorities (i.e. Rijkswaterstaat and Trafikverket) have issued a European project by the name of Virtual Construction for Roads (V-Con). Within this project, the focus lies on data exchange and integration on the construction of roads and asset management specifically. The desired solution will have to incorporate, align, and integrate various pieces of information on construction objects. This includes design (CAD), geospatial (GIS), and systems engineering (SE) information.

Semmtech, partnering with the engineering firm Arcadis and one of the four remaining parties contending in the V-Con project, has produced a working prototype. This solution to integrate information into a coherent and cohesive set utilises Semantic Web technology to overcome differences in format and vocabulary. In order to overcome differences in formats, the prototype translates the structure of information between native data formats (such as STEP for CAD information) and the Semantic Web structure (i.e. triples). Subsequently, logic is applied to transform the available information which is now available in a shared format to be expressed in a common vocabulary. Once information is available in a shared format and expressed in a common vocabulary, overlapping and complementing information can be integrated into a single coherent and cohesive set.

What makes our V-Con prototype unique is the employment of control models. With the term control model we refer to an information model, conforming to Semantic Web standards, that facilitates a system process by supplying it with a set of rules to perform its business logic. In using control models, the need to hardcode logic and decisions into the code of the software can be significantly reduced or even done away with. The operations of our integration solution will as a result be easier to analyse, adjust, share, and maintain. Moreover, this also entails that the technical components in place will themselves be easier to reuse in other systems, as they can be made to work for other data integration situations by supplying them with control models that are specific to those contexts.

In this demonstration session, we will present the design of our integration solution as well as the operational prototype. In the final phase of the V-Con project, starting June 2016, the participating companies will further develop their solution into a functional pilot. The pilot, which will be tested with data from existing road projects in the field, is to be completed in March 2017.

KEY REFERENCES

Semmtech. http://www.semmtech.com/en/

Virtual Construction for Roads (V-Con). *Rijkswaterstaat*.   https://www.rijkswaterstaat.nl/english/about-us/doing-business-with-rijkswaterstaat/v-con/

TARGETED SESSION

The intention is to present the design of our solution as well as demo/showcase our prototype in a hands-on/tutorial session.

Facilities required: projector with HDMI cable to allow our laptops to be used in the demonstration, internet connection. No further requirements for attendees.

ABOUT THE AUTHORS

Nic Roest, MSc:
Nic is Head of Semantic Consultancy, operating as a dedicated and knowledgeable professional with proven track record in consultancy, software engineering and entrepreneurship. He studied Industrial Engineering and Management Sciences (MSc, TU Eindhoven) with a focus on Process Design and Information management.

After working 5 years in Management Consulting at Accenture, he continued his career for more than 10 years as entrepreneur and consultant in the area of product data management, gradually moving to innovative technologies like the Semantic Web. The last 5 years his focus has been on further exploring, developing and implementing Semantic Web-solutions with a focus on improving business processes by ensuring better access to relevant information.

Sander Stolk, MSc MA:
Sander has obtained a Master's degree in both Computer Science and in Literary Studies (which included courses on linguistics) with honour. He now focusses on combining the knowledge from both studies computer tooling and theory on the one hand, and linguistics and its historical developments on the other to create working, sustainable solutions. As the Semantic Web technology has a solid foundation in linguistics and set theory, it has become of great interest to Sander, who has been working with the technology for 2-3 years now on both the technical side and the content side at Semmtech.

Sander is currently also finalizing his application as PhD-candidate at Leiden University Centre for the Arts in Society (LUCAS), with as subject sharing and reusing topical thesauri, having a strong focus on using Linked Data-mechanisms to facilitate the distributed, collaborative development and maintenance of thesauri and dictionaries.

Related scientific publications

S. S. Stolk, D. Oostinga, N. Roest, Data Clouds for Product Life-cycle Management. *5th International Symposium on Life-Cycle Civil Engineering - IAL-CCE 2016* (forthcoming).

S. S. Stolk
Finalizing application as PhD-candidate at Leiden University Centre for the Arts in Society (LUCAS)
- Title: Semantic Treasure Troves: Sharing and Reusing Topical Thesauri on Historical Periods