Fairtrace
Tracing the textile industry

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During the EURO 2012, Europe's consumer watchdog revealed high concentrations of dangerous chemical substances in some team shirts that could potentially be harmful to fans' health. Independent tests highlighted high levels of lead, nickel and organotin, a chemical which can irreversibly damage the nervous system.

This is just one example among many others, but it truthfully shows off the failure of major clothing brands to fully capture or even understand their external manufacturing processes. When a problem is finally discovered, it's often already too late.

Our talk is about Fairtrace, a project leveraging semantic technologies and advanced web standards to allow tracing manufacturing chains and its products. Fairtrace allows every actor in the chain to enter related data in such a way that it enables users and consumers to track data at every step of the product's manufacturing process. If a problem occurs, for example dangerous chemicals are detected, the order issuer can react in a timely fashion. The proposed talk consists of three parts: modeling decisions, implementation and testing, lessons and research.

In the first part, we will show how we used Semantic Web technologies to model all the business requirements in terms of processes and product modeling. We will present our approach, which consisted in using different ontologies to model the manufacturing chain (called value chain), the products and derivatives that are created in the process. We will also introduce a patented web formular creation system backed by a semantic store that allows hooking dynamically user-created formulars to any step of the manufacturing chain. We will also show how we can immediately start to submit real data thanks to our dynamic binding system. More generally, we are going to discuss how the uncertainty about the domain modeling conditioned our technological choices.

We will also discuss about our choice to leverage Linked Data in the

presentation layer to propose a more comprehensible view of the stored data. We will then demonstrate how we collect product data on the custom formulars, how the storage works, how it is presented to the end user as a informational tree and how inference rules compensate for missing links (missing data).

Finally, in this point we will comment on how Semantic Web and Linked Data technologies provided a real competitive advantage. We will present how it allowed for greater modeling flexibility in comparison to other database technologies and how it enables tracing completely different manufacturing chains (i.e: clock industry, cocoa, ...) without having to redeploy the infrastructure.

The second part of the talk concentrates on concrete implementation aspects. We will discuss some of the problems we've encountered specifically tied to the semantic technologies used. We will describe how we managed to solve some specific problems with simple solutions and what aspects need further research. We will present some simple solutions. For example, since we were concerned with the speed of the SPARQL request, we've tried different approaches and we've selected a method consisting in using specific inference rules to gather data at specific points to enable very simple and fast queries on it.

Our prototype has already undergone real testing in India. We've managed to trace the complete manufacturing process of a textile order. In this part we will share our experience of the field, and show how during the testing phase, some formulars had to be readjusted in order to better capture the requirements of the local partners and how we were able to modify the back-end ontologies and update the formulars on demand and almost immediately.

In the third part we will talk about the lessons we've learned. We will start first to show why semantic technologies are well suited in scenarios where the schema is not necessarily fixed and where agility is a strong requirement. We will also show how the acquired experience is taking us towards new research areas.

Our prototype is currently operational and is usable for demonstration purposes, but there are still many areas left to improve. At the end of the talk, we will discuss how we are planning to rely on Semantic Web technologies to provide further customization aspects to the platform, such as user-customizable metrics about the stored data and intelligent queries, for instance. To finish, we will provide some pointers on what directions we would like the current research to go.