Industrial Semantics

I read with great interest the article “Industrial Semantics and Magic” in the July/August issue of IEEE Internet Computing. This was the first article in which the current state-of-the-art in that area and its problems were laid out in a manner understandable to an industry practitioner.

I would like to add that besides plain “administrative” processes, command and control (C&C) processes could also benefit from the service-orchestration approach, as well as AI and process approaches. The AI approach will allow the pre- and post-conditions of the state to be expressed. This is frequently possible in C&C systems because they can express such conditions in terms of external world constraints. For example, an identification process (determining the friendly/hostile intent of the external object) could have its precondition expressed as “none of the objects observed has been identified,” while the postcondition would be “all of the external objects have been identified.”

I also completely share the authors’ view that disparate data semantics is a large problem. It’s also a problem in the C&C world, where it has traditionally been solved by creation of standardized “unified models.” These models frequently take years to develop and, being a compromise, frequently aren’t implemented. They’re also a solution if we know a priori which systems will take part in the collaboration. However, in the real world of C&C, that assumption can’t be valid because, frequently, we can’t restrict the set of component systems a priori. We therefore need to look for solutions allowing runtime, dynamic integration of disparate semantics.

In the article, the authors say that “Several academic solutions to this issue actually exist, and some have been fielded in industry.” I would be very interested to know more about those solutions. Could they provide some references if possible?

Once more, thanks for the excellent article.

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Charles Petrie responds:
Thank you for your kind comments. I hope we made it clear in this article that there are many problems that academic solutions don’t address. I regret that we didn’t make clearer the issue that you address in your request for solution references.

The issue to which there are solutions is that of heterogeneous data schemas. One academic solution is the computational logic of “Infomaster” (http://infomaster.stanford.edu/infomaster-info.html), which was used to develop a commercial product for answering product queries to a set of online catalogs. There are other heterogeneous database solutions going back to at least the MCC CARNOT project (http://citeseer.ist.psu.edu/231644.html).

The issue that you describe is the dynamic integration of previously unknown systems. Automating this is the impossible Holy Grail of modern semantic technologies. This is why in the Semantic Web Services Challenge (http://sws-challenge.org), we attempt to qualitatively measure the minimal amount of programming required to adapt the semantics of a given system to new services and problems, acknowledging that complete automation is impossible. We realize that the problems we’re starting with in the SWS Challenge pale beside those of the real world. But our mission is to compare and evaluate the semantic technologies, which, if industry were to adopt them in the future, would facilitate the dynamic integration of new services sufficiently to at least dramatically improve industrial software engineering, if not e-commerce.

Email your letters to lead editor Rebecca Deuel, rdeuel@computer.org.