How will the Semantic Web support business?

John Hall, Model Systems (john.hall@modelsys.com)

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Rules for the people

I represent the Business Rules Group (BRG) on the governing board of the Business Rules Team, the consortium that has submitted "Business Semantics of Business Vocabulary and Business Rules"[1] (SBVR) in response to the OMG's RFP for "Business Semantics of Business Rules".

So, it should be no surprise that my main focus on rules is at the business end - rules that guide what people do in businesses in the real world[2]. I know that many of these rules can be more-or-less directly executed in rules-based technology, but I'm also interested in what kinds of support technology can provide for rules that can't, or won't, be automated.

What I want to know about the Semantic Web is how it will fit into the business world. What would it do for me if I were a business person in an organization like EU-Rent (the fictitious case study we use in SBVR)? Especially, I want to know how it could work if and when the OMG accepted SBVR for "Business Semantics of Business Rules".

EU-Rent rules

Like most businesses, EU-Rent includes a lot of rules: for example, ""If the actual return date/time of a rental is more than 1 hour after the scheduled return date/time then a late return penalty must be charged". We could automate that one.

We'll be keeping the rental details in a database, and we could have a rules engine automatically recognize the condition, calculate the penalty charge and add it to the database record of the offending rental. We need a mapping from our business vocabulary (where we define what we mean by "rental" and "late return penalty") to our database. Then we need a transformation of the rule as expressed by someone in the business to a rule that can be automatically applied to data items stored in our database. One interesting question is how much of a structural transformation of the rule we are willing to tolerate.

Other rules can't be automated: for example, "If the drop-off location of a rental is not a EU-Rent branch site then the rented car of the rental must be moved to a EU-Rent branch site". Our rules engine won't help here. Someone from the business has to go and fetch the car.

For many such non-automatable rules, the person responsible will need IT support. Some of what is needed will be internal to EU-Rent - "Which branch is closest to this location?" "Who is available there to fetch the car, and when?"

Some may be external - "Where is this place?" "It's an airport car park. How much is it going to cost us to get the car out?" "It's over the border, in a different country. What documentation will the driver need to bring the car back?" This sounds like a job for the semantic web.

And, of course, some automated rules may also refer to external resources.

Life would be easier if this all worked seamlessly, if our employees could use the same interface both to our internal IT support and to the outside world - and if we could use the same technology to build both.

We also have a public web interface. It includes automated rules that guide customers through rental booking. We'd like to add some further services, such as itinerary planning. And we'd like to handle our rules here in the same way as for our internal systems.

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[1] See "Semantics of Business Vocabulary & Business Rules (SBVR)", a position paper submitted to this workshop by the Business Rules Team. The full SBVR submission is available to OMG members in the Business Enterprise Integration Domain Task Force (BEIDTF) workspace.

[2] See "The Business Rules Manifesto", available from www.businessrulesgroup.org

Managing the Business Vocabulary and Rules

There is another aspect of IT support. We need a repository in which to store and maintain our vocabulary and rules. And, as discussed in the following section, we want to adopt as much vocabulary (and in the future, we hope, business rules) as we can from external sources.

So, as well as a common standard for executable rules, we'd also like a common standard for vocabulary and people-oriented business rules, as stored in repositories.

Practical vocabulary management

Our business rules are based on our vocabulary (more precisely, on the concepts represented by our vocabulary). In SBVR we define rules as modalities - necessity, possibility, obligation and permission - on propositions.

The underlying propositions are built from concepts and fact types. For example, the rule "If the drop-off location of a rental is not a EU-Rent branch site then the rented car of the rental must be moved to a EU-Rent branch site" is based on the fact types: "rental has drop-off location"; "EU-Rent branch site is a role of location"; "rented car is a role of car in rental"; "car is moved from $location_1$ to $location_2$".

We want to keep our controlled vocabulary[3] fairly small - hundreds of items rather than tens of thousands. If it grows too large, our employees will stop complying with it ("I can't spend all my time looking up words. I've got work to do. And there's too much of it to keep all in my head). Also, it will become increasingly expensive to police.

Our actual vocabulary is much bigger than our controlled vocabulary. One way of expanding it is to adopt vocabulary from external sources. We approach this by looking at our business from three different perspectives:

1. A 'consensus' model: what we need to do[4] in order to be a car rental company. This is what we have in common with Hertz, Avis and other car rental companies.

2. Adaptation to environment: what else we have to do in order to operate in, say, Germany or France or the UK. This is what we have in common with other service businesses in the same region or country - taxation, customer rights, regulation etc.

3. What is exclusive to us: what differentiates us from other car rental companies. It is where our competitive edge lies, and much of it is confidential.

The first two are supported by special interest groups, which produce standard glossaries. We adopt these glossaries, some wholly and some in part. The benefits are worthwhile. The costs of development and maintenance are shared across the group. We have vocabulary in common with people outside EU-Rent - people in other car rental companies, customer relationship managers in other service companies, and so on. Because of their wider currency, these vocabularies are often familiar to our staff.

At present, we import copies of these adopted vocabularies into EU-Rent. We'd like to access them seamlessly, and use elements of them in our definitions, fact types and rules, without needing to worry about where they are.

Adopted rules

What we expect to happen is that special interest groups will start to build rules based on their vocabularies. Two possible areas are rules for guidance of business processes in 'consensus' models and extensions to electronic documents for business transactions, as promoted by OASIS.

We'd like to be able to adopt them, if we chose to. This would require that we could handle their syntax and semantics alongside the rules we create internally for EU-Rent. It would be really helpful if they all used (or could be transformed to) the same standard.

We also hope to see shared resources such as an industry database of customers with persistent 'bad behaviour' (late return, failure to return car to branch, car damage etc). We'd like to be able to create rules for using them, e.g. alerting us to a combination of conditions that would cause us to treat a customer as "risky".

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[3] By "controlled vocabulary" I mean, for example, a glossary of terms and verb phrases that employees are encouraged or obliged to use in communications about the business.

[4] "Has to do" in the sense of ongoing activities rather than specific actions

The default vocabulary

Adopted vocabularies are also limited by practicality. Most of the vocabulary we use in EU-Rent is everyday natural language. The terms used stand by themselves. The concepts they refer to are assumed to be understood within the company and by the people it deals with.

For example, when we say "service mileage is measured in miles", we have defined "service mileage" but do not expect to have to define "measured" or "miles". However, we do to want to use "measured" and "miles" (actually the concepts that they represent) in constructing fact types and rules.

In case there is contention or misunderstanding, we have selected the Merriam Webster Unabridged Dictionary as an authority (at least for our English-speaking employees). We expect EU-Rent people to resolve a problem by a combination of dictionary entry and context in which the term is used.

If that is not sufficient, we will create or adopt an explicit definition. So, our controlled vocabulary will grow over time, but slowly, and by exception.

It would be nice to have the default vocabulary also available seamlessly. Maybe WordNet would be a good starting point to think about.

Business Policy

Business processes and business rules need to be incorporated into a coherent business framework. This is provided by the company's goals, courses of action to achieve them and policies to guide the business in getting there.

In EU-Rent, we're looking at the BRG's "Motivation Model"[5], which has also caught the OMG's interest. It proposes that the governing process is driven by reacting to influences and assessing their impact, then defining or modifying goals and formulating policies. So, we have people in EU-Rent who monitor the competition, the markets, regulation, human resources etc., and alert policy-makers to the need to react to change.

One of the opportunities offered by the semantic web is to deploy intelligent agents that can help with (perhaps, in time, take over much of) this monitoring and alerting. They could do other things as well, such as help us evaluate how well we are doing in the outside world.

We'll want to give agents direction, which will include rules. Thinking about this, it seems that formulating these rules has more in common with the way we specify rules for people than the way we specify rules for rules engines to execute.

What we'd like from the technology

To summarise, we'd like:
- A repository in which we can store our vocabulary and (people-oriented) business rules. It should be able to import - or even better, access seamlessly over the web - vocabulary and rules adopted from external bodies. This would be greatly helped by common standards for representing rules and vocabulary.
- A common standard for representing technology-executable rules, so that they are directly executable or easily transformed to executable form
- Tools that help us map vocabulary to IT solutions and transform automatable rules to technology-executable rules.
- Tools that help us create IT support for non-automatable rules
- Intelligent agents that we can direct more-or-less as we can direct people

SBVR

I have expressed all the examples above in English. EU-Rent staff who speak English can understand them. If there are terms or verb phrases they don't understand, there are definitions - specific to EU-Rent, adopted or default - in the English vocabulary within our SBVR model

In SBVR we have separated meaning from representation. Behind the English representations there are semantic formulations[6] that capture their meaning, independent of any representation language. This has two important implications.

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[5] See "The Business Motivation Model", available from www.businessrulesgroup.org
[6] SBVR semantic formulations are described in another position paper submitted for this workshop.

First, the semantic formulations can be mapped to different representation languages. For example, EU-Rent's Swiss company could have German, French, Italian and English vocabularies for the same underlying body of meanings, and represent the rules in all of them. Semantic formulations can also be mapped to specialized vocabularies, such as those used by engineers or lawyers, and to constructed languages such as UML.

Second, the semantic formulations can be processed by programs. This has two important applications:

- Interchange of SBVR models between platforms. They are serialized as MOF/XMI-compliant XML files.

- Support for transformation to representations (such as database schemata and production rules[7]) that are directly executable with rule-based or rule-driven software.

Conclusion

SBVR provides an opportunity for handling business rules in human-understandable form, to map the same semantic content to many vocabularies, including different natural languages, and to interchange business vocabularies and rules between platforms.

Because the rules are machine-processable, SBVR also provides a basis for automated transformation of business-oriented rules to executable rules. The formality of SBVR means that the essential structure of the two forms need not be very different, although the content would be - the executable rules will refer to artefacts in IT systems, while the business-oriented rules will refer to real-world business objects.

The mapping to IT solutions of the concepts and fact types behind the vocabulary will also need considerable work - but that is outside the scope of this paper.

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[7] The OMG is currently discussing the response to its RFP for "Production Rule Representation"