

# Semantics of Business Vocabulary & Business Rules (SBVR)

“W3C Workshop on Rule Languages for Interoperability”

Position Paper by the Business Rules Team

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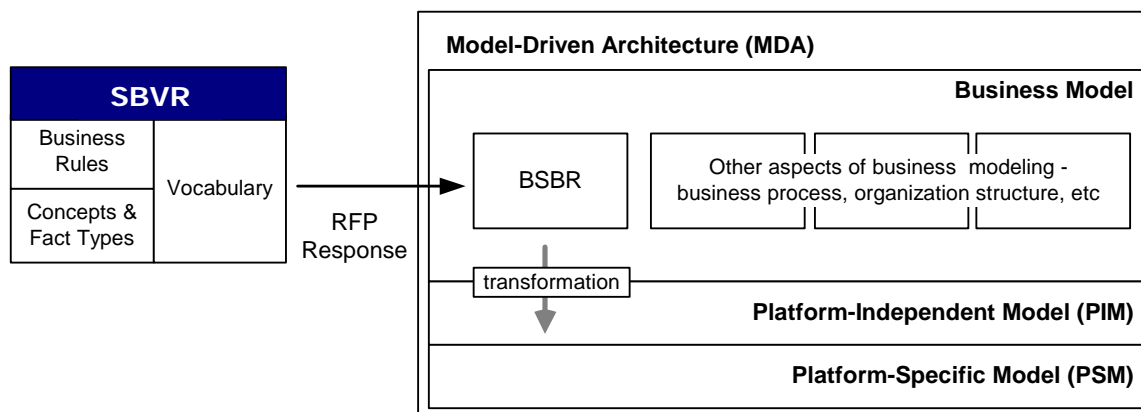
## Business Rules Team

The Business Rules Team was formed to respond to the OMG’s “Business Semantics of Business Rules” RFP. its proposed standard is titled, “Semantics of Business Vocabulary & Business Rules” (SBVR). The Business Rules Team would like to contribute to this W3C Workshop for the following reasons:

- ❖ the interchange of business rules, and the business vocabularies on which their definition is based, is a primary objective of SBVR.
- ❖ the “Logical Formulation of Semantics Vocabulary” (SBVR section 2.3) is a prime candidate to become the W3C standard for the ‘Logic’ layer of the Semantic Web architecture because:
  - the “Meaning and Representation Vocabulary” (SBVR section 2.2) is very similar to RDF and readily mapable to OWL;
  - its Semantic Formulations provide a concise, comprehensive, open-ended and declarative means to specify unambiguously both the semantics of definitions and rules governing actions -- in terms of first order and restricted higher-order predicate logic plus relevant forms of intensional logic including modality;
  - its Semantic Formulations can specify all types of logic relevant to the operation of an organization and to the business meaning of data content.
- ❖ SBVR is independent of both information systems and classes-of-platform, and therefore can be a common bridge between the business and the information system, as well as between classes-of-platform (production rules engine, relational database, business object component).
- ❖ the Business Rules Team is a body of professionals with a very substantial practice in the use of business rules, and in building tools to support the use of business rules by the business.
- ❖ SBVR provides the synergy of its synthesis of four disciplines: business rules practice, the ISO Terminology standard, formal logics and linguistics.

## Positioning of SBVR in Model-Driven Architecture

The Business Rules Team has taken the OMG’s BSBR RFP to be entirely within the business model layer of the OMG’s Model Driven Architecture (MDA) and has developed SBVR as its RFP response on this basis.



This positioning has two implications.

- SBVR is targeted at business vocabulary and business rules. Other aspects of business models also have to be developed, including business process and organization structure, which are being addressed by the OMG in RFPs concurrent with that for BSBR.
- Business models, including the models that SBVR supports, describe businesses and not the IT systems that support them.

In MDA, IT systems are defined in Platform Independent Models (PIMs) and Platform-Specific Models (PSMs). Guidance will be needed for transformation of business models to PIMs. Such guidance is outside the scope of BSBR. The BRT anticipates that the OMG will ensure that the metamodels for different aspects of business modeling form a coherent whole, and then call for development of guidance on the transformation from business model to PIM.

## What is Semantic Interchange?

The SBVR Metamodel is intended to provide for standardized data interfaces and data interchange among tools that collect, organize, analyze and use Business Vocabularies+Rules. The SBVR Metamodel will eventually facilitate many tools from various vendors exchanging Business Vocabularies+Rules along with their semantics.

An important feature of the SBVR Metamodel is how it is created. It starts with the SBVR Vocabularies. SBVR's Vocabulary-to-MOF/XMI Rule Set governs how a business vocabulary is mapped to a MOF 2 model. An XML Schema is then generated based on XMI 2.1.

The resulting SBVR Metamodel is intended, not for business people, but for software engineers that build tools for business people. The SBVR metamodel is includable and extendable in models that address various business domains. Generation of the SBVR Metamodel guarantees its consistency and accuracy in representing the concepts of the SBVR Vocabularies.

The rules that govern generation of the SBVR Metamodel apply a fact-oriented approach, which provides important advantages for business-level interchange:

1. Fine control over exactly what is communicated to the level of individual facts.
2. Communication of facts about facts.
3. Support for multidimensional categorization.
4. Support for things changing over time, such as a thing with one identity being reclassified over time.
5. Communication for many purposes that cannot be predicted.
6. Extensibility and reuse in other business vocabularies.

## Separating 'What We Talk About', Defined Meanings & Representations of Meaning

The BRT is deeply interested in interoperability of modeling tools and in integration of many kinds of models. These models range from business mission and vision to business vocabulary, rules and processes; to IT models of components and databases; and to models of system deployment and administration. The SBVR Metamodel is well suited to the broad requirements for integration and traceability.

The primary subjects of the [Meaning and Representation Vocabulary](#) fit between two other relevant subject areas described below.

1. **Expression** – things used to communicate (e.g. sounds, text, diagrams, gestures), but apart from their meaning — one expression can have many meanings
2. **Representation** – the connection between expression and a meaning. Each representation ties one expression to one meaning
3. **Meaning** – what is meant by a word (a concept) or by a statement (a proposition) – how we think about things
4. **Extension** – the things we think and talk about, which can be anything (even expressions, representations and meanings when they are the subjects of our discourse)

Following are examples of how some things, like "driver", cross through each subject area.

Extension	Meaning	Representation	Expression
The actual drivers of motor vehicles	Concept 'driver' — how we think of drivers, what characterizes them	Designation of the concept 'driver' by the word "driver"	The character sequence "driver"
		Definition of the concept 'driver' as "operator of a motor vehicle"	The character sequence "operator of a motor vehicle"
The actual City of Los Angeles, California – a real place	Individual concept 'Los Angeles' — how we think of that city, what distinguishes it from other places	'Los Angeles' as a designation for the individual concept of 'Los Angeles'	The character sequence "Los Angeles"
For each car that is out of service, its actually being out of service	Characteristic applicable to a car, what is meant by a car being out of service	Form of expression 'car is out of service' as a template for the characteristic with 'car' being a placeholder	The text "car is out of service"
The actual obligation in the EU-Rent business that it must not rent to a barred driver	Modal proposition — the meaning of the statement "EU-Rent must not rent to a barred driver"	A statement of "EU-Rent must not rent to a barred driver" meaning the modal proposition	The character sequence "EU-Rent must not rent to a barred driver"

Another subject area of this vocabulary is reference schemes, which are ways people use information about something to identify it. For example, a city in the United States is identified by a name combined with the state it is in. The state is identified by its name or by a two-letter state code.

Representations provide a reference scheme for concepts and propositions because they are always tied to exactly one expression and to exactly one meaning. On the other hand, a single expression can have multiple meanings, a concept can have multiple expressions, a thing can be an instance of many concepts, and a proposition can be meant by many equivalent expressions. A single representation can be tied to many speech acts, or to a single speech act, depending on how its expression is identified. For example, if the expression is a text or a sequence of words independent of any particular act of writing or speaking, the representation is independent in the same way. Conversely, if the expression is identified as belonging to a specific speech act, then the representation is tied to that speech act also.

## Typical Rules in SBVR Structured English

- 1 Structural business rule      **It is necessary that each rental specifies exactly one car group.**  
Supporting fact type      rental specifies car group.
- 2 Operative business rule      **It is obligatory that the duration of each rental is at most 90 days.**  
Supporting fact type      rental has duration.
- 3 Operative business rule      **It is obligatory that each driver of a rental is a qualified driver.**  
Supporting fact types      rental has driver.

Related factual connections	<u>the concept 'qualified driver' is a category of the concept 'driver'.</u>
4 Operative business rule	<u>If the drop-off location of a rental is not the EU-Rent site of the return branch of the rental, then it is obligatory that the rental incurs a location penalty charge..</u>
Supporting fact types	<u>rental has drop-off location.</u> <u>rental has return branch.</u> <u>branch is located at EU-Rent site.</u> <u>rental incurs location penalty charge.</u>
5 Operative business rule	<u>It is obligatory that the rental charge of a rental is denominated in the business currency of the rental..</u>
Supporting fact types	<u>rental has rental charge.</u> <u>rental charge is denominated in business currency.</u> <u>rental has business currency.</u>
Related factual connections	<u>rental has pick-up branch.</u> <u>branch has country.</u> <u>the concept 'pick-up branch' is a role of the concept 'branch'.</u> <u>the concept 'operating country' is a role of the concept 'country'.</u> <u>the role 'country' of a branch is the role 'operating country' of the operating company of the local area of the branch'.</u> <u>country has currency.</u> <u>the role 'business currency' of a rental' is the role 'currency' of the country of the pick-up branch of the rental'.</u>
6 Operative business rule	<u>It is permitted that a rental is open only if an estimated rental charge is provisionally charged to the credit card of the renter of the rental..</u>
Supporting fact types	<u>rental has estimated rental charge.</u> <u>estimated rental charge is provisionally charged to credit card.</u> <u>renter has credit card.</u> <u>rental has renter.</u> <u>rental is open.</u>
Related factual connections	<u>'being open' is a characteristic of the concept 'rental'.</u>
7 Operative business rule	<u>It is obligatory that at the actual return date/time of each rental, if the country of registration of the rental car that is assigned to the rental is the country of the return branch of the rental, then the local area of the return branch of the rental owns the rental car..</u>

Supporting fact types	<u>rental</u> has <u>actual return date/time</u> . <u>rental</u> has <u>return branch</u> . <u>branch</u> has <u>country</u> . <u>rental car</u> has <u>country of registration</u> . <u>rental car</u> is assigned to <u>rental</u> . <u>branch</u> is included in <u>local area</u> . <u>local area</u> owns <u>rental car</u> .
Built in fact type	at <u>date/time</u> <u>actuality</u> .
Related factual connections	<u>'return branch'</u> is a <u>role</u> of <u>'branch'</u> . the <u>concept</u> <u>'country of registration'</u> is a <u>role</u> of the <u>concept</u> <u>'country'</u> . the <u>role</u> <u>'country of a branch'</u> is the <u>role</u> <u>'operating country'</u> of the <u>operating company</u> of the <u>local area</u> of the <u>branch</u> '.
8 Operative business rule	At the <u>start date/time</u> of each <u>rental</u> it is obligatory that the <u>fuel level</u> of the <u>rental car</u> that is assigned to the <u>rental</u> is <u>full</u> ..
Supporting fact types	<u>rental</u> has <u>start/date time</u> . <u>rental car</u> is assigned to <u>rental</u> . <u>rental car</u> has <u>fuel level</u> .
Built in fact type	at <u>date/time</u> <u>actuality</u> .
Related factual connections	<u>fuel level</u> is one of <u>(full 7/8 3/4 5/8 1/2 3/8 1/4 1/8 empty)</u> .
9 Structural business rule clarification	It is possible that the <u>notification date/time</u> of a <u>bad experience</u> that occurs during a <u>rental</u> is after the <u>actual return date/time</u> of the <u>rental</u> ..
Supporting fact types	<u>bad experience</u> occurs during <u>rental</u> . <u>bad experience</u> has <u>notification date/time</u> . <u>rental</u> has <u>actual return date/time</u> .
Built-in fact types	<u>date/time</u> <sub>-1</sub> is after <u>date/time</u> <sub>-2</sub> .
Related factual connections	the <u>concept</u> <u>'notification date/time'</u> is a <u>role</u> of the <u>concept</u> <u>'date/time'</u> . the <u>concept</u> <u>'actual return date/time'</u> is a <u>role</u> of the <u>concept</u> <u>'date/time'</u> .
10 Operative business rule clarification	It is permitted that the <u>drop-off branch</u> of a <u>rental</u> is not the <u>return branch</u> of the <u>rental</u> .
Supporting fact types	<u>rental</u> has <u>drop-off branch</u> . <u>rental</u> has <u>return branch</u> .
Built-in fact types	<u>thing</u> <sub>-1</sub> is <u>thing</u> <sub>-2</sub> .

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# Addendum

## SBVR Developers

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