Ontologies and Rules in Business Models

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Two Main Aspects of SBVR

Semantics of Business Vocabulary & Rules
- A metamodel that captures the meaning of vocabulary & rules
- Expressed in “Structured English” or diagram or other forms
- Not a rule implementation language or engine

<table>
<thead>
<tr>
<th>Business Vocabulary</th>
<th>Business Rules</th>
</tr>
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</table>
| • Nouns: object classes  
  e.g. car, person, wheel  
| • Fact types: relationships among concepts  
  e.g. car has wheels  
| • Building blocks for rules | Guidance involving alethic & deontic modalities: necessity, possibility, impossibility, obligation, permission, prohibition. |

An SBVR business vocabulary is an ontology – a reference ontology

These modalities distinguish business-oriented rules from typical implementation-oriented rule engines
SBVR Vocabulary Examples

rental

Definition: contract with a renter specifying use of some car of a car group for a rental period and a car movement.

Dictionary Basis: contract for use of a rental car by a renter for an agreed period under the rental company’s terms and conditions for rental. [CRISG]

rented car

Concept Type: role

Definition: rental car that is assigned a rental.

rented car is assigned to rental

Synonymous Form: rental has rented car

Necessity: A rented car is assigned to a rental if and only if the rented car is the rental car that is assigned to the car movement that is included in the rental.

rented car

Noun with informal definition.

Role with partially-formal definition. A rented car is a kind of rental car.

A synonym for the fact type. The synonym uses has, which indicates attributive semantics.

A fact type (relationship) with two roles.

A structural rule that is always applicable.
SBVR Vocabulary Features

- Nouns
- Fact Types & Roles
- Individuals
- Definitions
  - Intensional & extensional
  - Formal, partially formal, & informal
- Synonyms
- Sources
- Notes
- Examples
- Dictionary Basis
- Language
- Subject Field

- Subsumption Relationships
- Structural Relationships
- Conceptual Relationships
  - Necessary & Implied Characteristics
- Categorizations
- Reference schemes
- Closed & Open World

- Namespaces
- Vocabularies
- Semantic & Speech Communities
## SBVR Rules

<table>
<thead>
<tr>
<th>Modality Type</th>
<th>Modality Operator</th>
<th>Example in SBVR Structured English</th>
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</thead>
<tbody>
<tr>
<td><strong>Structural</strong> (alethic)</td>
<td>necessity</td>
<td>An order always has exactly one customer.</td>
</tr>
<tr>
<td></td>
<td>non-necessity</td>
<td>It is not necessary that an order has a customer.</td>
</tr>
<tr>
<td></td>
<td>possibility</td>
<td>It is possible that an order has more than one line item.</td>
</tr>
<tr>
<td></td>
<td>impossibility</td>
<td>An order never has more than one customer.</td>
</tr>
<tr>
<td></td>
<td>contingency</td>
<td>It is possible but not necessary that an order has a customer.</td>
</tr>
<tr>
<td><strong>Behavioral</strong> (deontic)</td>
<td>obligation</td>
<td>Each order must be processed within one business day.</td>
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<tr>
<td></td>
<td>non-obligation</td>
<td>It is not obligatory that a customer representative approve a credit.</td>
</tr>
<tr>
<td></td>
<td>permission</td>
<td>A customer representative may approve a credit.</td>
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<tr>
<td></td>
<td>prohibition</td>
<td>A clerk must not change the terms and conditions.</td>
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<tr>
<td></td>
<td>optionality</td>
<td>It is permitted but not obligatory that a customer representative approve a credit.</td>
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</tbody>
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SBVR Metamodel

- **Defined in two ways:**
  - SBVR “in terms of itself” – for semantics of SBVR itself
  - As a MOF model – used for XMI-based interchange format
- **Rules based on predicate logic + modalities**
- **Partial mapping to OWL and ISO Common Logic**
  - See section 10.2 of SBVR specification document
Characterizing SBVR Vocabularies

- **As Ontologies per Atkinson criteria – VORTE 2006**
  - Conceived to describe domains in terms of concepts, properties of those concepts, constraints on those properties, and individuals
  - Explicit specification
  - Machine readable
  - Based on first-order logic
  - Shared, accepted by a group
  - Intended to have “universal” scope

- **As Reference Ontologies per Guizzardi, 2006**
  - Conceptual modeling with a “... focus ... on representation adequacy ...”
  - Intended for use “... in an off-line manner to assist humans ...”
  - But also useable for as a basis for implementations
Each <user role> may each <business artifact>, only if <some condition_1> [and/or/xor/…] <some condition_2> …

processing paths (understood as verbs): reject, pass

business operation model created using IBM WebSphere Business Modeler

solution model in UML, using IBM Rational Solution Architect

implementation, using Java, J2EE, JSPs, JavaScript, DDL, SQL, etc.
Implementing a Restricted Permission Rule

Each Clerk may Validate each App only if the App is paid and the test count of the App is greater than 1.

Java method that evaluates the condition and returns a boolean

JSP code that uses the Java method to determine whether to enable or disable the “paid” button for the “clerk” role

State machine guards that use the Java method to determine whether the “paid” state transition is permitted for the “clerk” role