Semantics of Business Vocabulary and Business Rules (SBVR)

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Presented at the BPM Think Tank
Arlington, VA
23 May 2006
Agenda

• Introduction to SBVR
• SBVR and Information System Modeling
• Overview of SBVR
• SBVR Architecture
• Context for Meaning
• Business Vocabulary (vs. Business Rules)
• Integration by Vocabulary Adoption
• Business Rules: Building on Business Vocabulary
• Formal Logics
• What Next?
Introduction to SBVR

• Semantics of Business Vocabulary and Business Rules (SBVR)

• A metamodel for developing semantic models of business vocabularies and business rules
  – Developed in response to OMG RFP “Business Semantics of Business Rules”
  – Team drawn from 17 organizations in 7 countries

• Adopted by OMG in September 2005

• Scheduled for finalization as an OMG specification in September 2006

• Available for comment and issues at www.omg.org/docs/dtc/06-03-02.pdf
EU-Rent Case Study

• EU-Rent is a (fictitious) car rental company, used to provide coherent examples in SBVR, and in this tutorial

• The business requirements are fairly simple:
  – EU-Rent operates in several countries; in each country it has local areas containing branches
  – EU-Rent rents cars to customers from branches; one-way rentals are allowed
  – Rentals may be booked in advance or “walk-in”
  – Cars are owned by local areas and stored at branches
  – Each car is of a given model; car models are grouped into car groups; all the cars in a car group have the same rental tariff
  – Cars are serviced at 5,000 mile intervals
  – EU-Rent notes “bad experiences” with drivers (police action, unpaid parking fines, cars damaged or not returned to EU-Rent branches, etc) and may bar drivers who cause them.
What will SBVR do?

SBVR realizes the ‘Business Rules Mantra’:

“Rules are built on Facts. Facts are built on Terms.”

- Define Concepts
- Associate Concepts to Define Fact Types
- Base Business Rules on Fact Types
- Develop Vocabularies to represent them (starting with terms for the concepts)

... to describe businesses, not the IT systems that serve them

... in language understandable by business people
Preview: making a business rule

Start with a fact type, e.g.

rental has driver

Add a modal operator (from a limited set: “it is obligatory”, “it is necessary” …), e.g.

it is obligatory that rental has driver

Quantify and qualify:

Add quantifiers to roles in the fact type (“each”, “at least one”, “no more than N”, …)

it is obligatory that each rental has at least one driver

it is obligatory that each rental has no more than 4 drivers

Use additional fact types as qualifiers (“the location of the return branch of the rental …”)

Add conditions based on fact types (“if a rental return is more than 4 hours late …”)

What’s in an SBVR Model?

Simplified View

Conceptual Model
- Objects and facts for a specific Business (e.g. EU-Rent)
  - “John Hall rented car 123XC100 on 4-Jun-05”

Conceptual Schema
- Vocabulary & rules for a specific business (e.g. EU-Rent)
  - “Customer rents car”
  - “Customer must have valid driver licence”

V&R Vocabulary
- Vocabulary & rules for creating vocabularies and rules
  - “Business rule is based on fact type”
  - “Adopted definition is adopted from source vocabulary by community”

SBVR “Core”
- Essential concepts and constructs for all vocabulary & rules
  - “Concept incorporates characteristic”
  - “Statement expresses proposition”
What does SBVR deliver?

If your company were modelled using SBVR, what would you get?

Perspective 1

- SBVR built-in Vocabularies
- For your enterprise
  - Business Vocabulary
  - Business Rules
  - Fact instance data? (wasn’t designed for this, but it would work)

Perspective 2

- For all content:
  - Definitions
  - Fact Model
  - Structural rules and projections
- For your enterprise
  - Operative business rules
Why operative business rules only at enterprise level?

- Operative business rules govern what people do.
- For SBVR itself they will be written in methodologies for using SBVR, and built into:
  - tools that support SBVR
  - training material and user manuals
  - project management and quality assurance guidance
- They could be included in the interchanged model, if you wanted to send methodology along with the content – but someone would first have to define the methodology using SBVR, and that requires more than just rules.
- It’s possible it could happen when an SBVR vocabulary for processes has been developed.
What could you do with the model?

With suitable tools:

• Send it to other parts of your company, or to close partners

• Store it in your repository, as guidance for your business and:
  – Manage it over time, as your business vocabulary and rules change
  – Validate and verify its content
  – Use it as a basis for creating consistent, focused guidance for different groups of people in your company, business partners, customers, suppliers …

• Use it as input (with suitable tool support for transformation) to your IT specifications:
  – Business applications
  – Workflow

Wait for other aspects of business modelling to be realised in SBVR tools
What would the model look like?

- MOF/XMI compliant XML
- SBVR Structured English
- Graphical Model:
  - UML
  - ORM
  - Other?
XML (fragment)

<is-obligation-claim obligation-claim="oc"/>
<modal-formulation-embeds-logical-formulation modal-formulation="oc" logical-formulation="n"/>
<logical-negation-has-negand logical-negation="n" negand="eq1"/>
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<quantification-scopes-over-logical-formulation quantification="eq1" logical-formulation="eq2"/>
<is-existential-quantification existential-quantification="eq2"/>
<quantification-introduces-variable quantification="eq2" variable="v2"/>
<variable-has-type variable="v2" type="rt"/>
<quantification-scopes-over-logical-formulation quantification="eq2" logical-formulation="af"/>
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<role-binding-is-of-fact-type-role role-binding="rb1" fact-type-role="ftr1"/>
<atomic-formulation-has-role-binding atomic-formulation="af" role-binding="rb2"/>
<role-binding-is-of-fact-type-role role-binding="rb2" fact-type-role="ftr2"/>
<esbr:thing xmi:id="oc"/> <esbr:thing xmi:id="n"/> <esbr:thing xmi:id="eq1"/> 
<esbr:thing xmi:id="v1"/> <esbr:thing xmi:id="bdt"/> <esbr:thing xmi:id="eq2"/> 
<esbr:thing xmi:id="v2"/> <esbr:thing xmi:id="rt"/> <esbr:thing xmi:id="af"/> 
<esbr:thing xmi:id="ft"/> <esbr:thing xmi:id="rb1"/> <esbr:thing xmi:id="rb2"/> 
<esbr:thing xmi:id="ftr1"/> <esbr:thing xmi:id="ftr2"/>
current contact details

Concept Type: role
Definition: contact details of a rental that have been confirmed by the renter of the rental

rental

contract with renter specifying use of a car of car group for rental period and rental movement

optional extra

Definition: Item that may be added to a rental at extra charge if the renter so chooses
Example: One-way rental, fuel pre-payment, additional insurances, fittings (child seats, satellite navigation system, ski rack)
Source: CRISG [“optional extra”]

rental actual return date/time

Concept Type: role
Definition: date/time when the rented car of a rental is returned to EU-Rent

rental requests car model

Synonymous Form: car model is requested for rental
Necessity: Each rental requests at most one car model.
Possibility: The car model requested for a rental changes before the actual pick-up date/time of the rental.
Necessity: No car model requested for a rental changes after the actual pick-up date/time of the rental
Fragment of Model in UML
Fragment of Model in ORM
Fragment of Model in RuleSpeak™

- A rental may be open only if an estimated rental charge is provisionally charged to the credit card of the renter of the rental.

- The rental charge of a rental is always calculated in the business currency of the rental.

- The rental charge of a rental must be converted to the currency of a price conversion requested by the renter of the rental.
  - Note: RuleSpeak does not recommend the “If ...then...” syntax for operative business rules.

- A cash rental always honors its lowest rental price.
Semantics of Business Vocabulary and Business Rules (SBVR)

SBVR ↔ Information System Modeling
How Business Modeling Relates to Information System Modeling

About the ‘Business’ and ‘Business’ Things’

Business Requirements

External Design Requirements Satisfied

Two-Way Negotiation

Business Customer  IT Supplier

About ‘Recorded Information’ and the ‘Information System’

ABOUT the Business
FOR Business purposes
FROM a Business perspective
IN the language used by Business staff
BY the Business

ABOUT the Business
FOR Business purposes
FROM a Business perspective
IN the language used by Business staff
BY the Business
SBVR and IT Architecture Working Together

Talks about real business things

SBVR

Other Business System Model topics:
- business policy
- business process
- organization & responsibilities
- geography & logistics

Talks about buckets that hold data & processing logic

Business Semantics of
- Data ‘Containers’
- Processing Logic

Other Information System Model topics:
- services / methods
- network
- user interface
- etc.

MOF XMI using SBVR XSD

External Design Requirements Satisfied

Business Customer | IT Supplier

Two-Way Negotiation

Business Model | Information System Model
Rules Standards & Business and Information System Modeling

Talks about real business things

Semantics of Business Vocabulary & Business Rules
(Business Language Resources)

Metamodels that built on:
- UML
- Production Rules
- OCL
- RDBMS Triggers
- W3C RIF

External Design

谈satisfied

Business Requirements

MOF XMI using SBVR XSD

Two-Way Negotiation

Business Customer IT Supplier

Business Model Information System Model

Talks about buckets that hold data & processing logic
Semantics of Business Vocabulary and Business Rules (SBVR)

Overview of SBVR
SBVR Business Vocabulary+Rules: What does it Contain?

SBVR Business Vocabulary+Rules

= Business Glossary
  (Noun Concepts, Definitions & Primary Terms)
  (+)
  Taxonomy
  (General/Specific + Whole/Part Hierarchical Relationships)
  + Thesaurus
  (Synonyms, Acronyms, Abbreviations, etc. + Multilingual)
  (Instances of Concepts e.g. Business Events & Business Entities)
  (Verb Concepts {Business Facts; Relations among Concepts})
  + Ontology
  (Relations among Instances of Concepts)
  (Structural Business Rules)
  (Definitions, Relationships & Rules specified in formal logic)
  + Operative Business Rules
  (Rules Governing Business Actions)
Overview of SBVR

Community
Business Community with sub-communities that may use different natural languages and specialized vocabularies

defines

Business Meaning
Concepts, Facts & Rules (Unique, Discrete Meaning)

formulated as

Forms of Meaning
Forms of Concepts, Facts & Rules (different ways of saying the same thing)

expressed as

Business Expression
Expression of Forms of Concepts, Facts & Rules in a Business Language

underpins

Formal Logic
Semantic Formulations + Formal Logic Grounding

underpins

underpins

underpins
Context, Content and Logical Formality

Context Clause 11
Business Community with sub-communities that may use different natural languages and specialized vocabularies

Content
Business Vocabulary: Clause 8, 11
Business Rules: Clause 12

Business Meaning
Concepts, Facts & Rules (Unique, Discrete Meaning)

Forms of Meaning
Forms of Concepts, Facts & Rules (different ways of saying the same thing)

Business Expression
Expression of Forms of Concepts, Facts & Rules in a Business Language

Structure of Meaning Clause 9
Formal Interpretation Clause 10

Formal Logic
Semantic Formulations + Formal Logic Grounding
## SBVR Audiences

<table>
<thead>
<tr>
<th>Audience</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business people in general</td>
<td>Create the business content (e.g. EU-Rent) in a BV+R</td>
</tr>
<tr>
<td>BV+R integrators/administrators</td>
<td>Integrate and quality assure the business content in a BV+R</td>
</tr>
<tr>
<td>Information system designers</td>
<td>Design information systems that talk and work according to the business content in a BV+R</td>
</tr>
<tr>
<td>BV+R business tool designers</td>
<td>Design BV+R tools for business people to use to define, store and manage business content</td>
</tr>
<tr>
<td>Infrastructure designers for BV+R business tools</td>
<td>Design tools to support interchange of business content in a BV+R among business communities within and between organizations</td>
</tr>
<tr>
<td>Linguists, semanticists and logicians</td>
<td>Provide the semantic and logical foundation for all BV+R</td>
</tr>
</tbody>
</table>

*BV+R: “SBVR Business Vocabulary + Rules”*
Semantics of Business Vocabulary and Business Rules (SBVR)

Context for Meaning
Business Context: Community

Context Clause 11

Community
Business Community with sub-communities that may use different natural languages and specialized vocabularies

Business Meaning
Concepts, Facts & Rules (Unique, Discrete Meaning)

Forms of Meaning
Forms of Concepts, Facts & Rules (different ways of saying the same thing)

Business Expression
Expression of Forms of Concepts, Facts & Rules in a Business Language

Formal Logic
Semantic Formulations + Formal Logic Grounding

underpins

formulated as

expressed as
Communities and Vocabularies

1. community
2. subcommunity
3. speech community
4. body of shared meanings
5. concept
6. body of shared concepts
7. vocabulary
8. symbol
9. language

- community shares understanding of concept
- body of shared meanings contains body of shared concepts
- speech community contains speech community
- language is expressed in symbol
- incorporates
- contains
- targets
- uses
- owns
- shares understanding of
Semantic Community

Definition **community** whose unifying characteristic is a shared understanding (perception) of the things that they have to deal with

- A semantic community defines the scope of an SBVR Business Vocabulary+Rules:
  - what concepts (both noun concepts and verb concepts) are to be included
  - what business rules it needs to build on them

- Usually, the most important semantic community is the organization for which you are building the SBVR Business Vocabulary+Rules, e.g. EU-Rent.

- You will often have to consider other semantic communities that do or could share some of the vocabulary, e.g. the car rental industry, national trade associations, EU-Rent customers

- When you define rules, you do it from the perspective of the owning semantic community

- Two kinds of Semantic Communities in business:
  - Collaborative Community, e.g. A department, cross-function programme team, a internal service
  - Community of Practice, e.g. project managers, operational excellence champions, departmental budget managers

- Two scopes for Semantic Communities:
  - Internal to an organization
  - Among parts of different organizations
Speech Community

**Definition**  
community whose unifying characteristic is the *vocabulary* that it uses

**Example**  
The EU-Rent German Community shares the German-based vocabulary of symbols used in EU-Rent’s business. The symbols include German words for EU-Rent’s concepts plus symbols adopted from other languages

**Note**  
A speech community is a subcommunity of a semantic community. It has the same “body of shared meanings”, but expresses them in a particular, shared vocabulary

**Necessity**  
Each *speech community* is of exactly one *semantic community*.
Vocabulary

• A vocabulary is drawn from one shared language, which may be:
  – A natural language, such as English, German, Dutch
  – Specialised terminology such as that used by lawyers or engineers
  – A constructed language such as the UML (or SBVR Structured English)

• Each vocabulary expresses only one Body of Shared Meanings

• A vocabulary includes
  – terms and names for the noun concepts
  – ‘readings’ for the verb concepts

• SBVR users are strongly encouraged to limit the amount of internally managed vocabulary, and:
  – use everyday natural language as much as possible, backed up with a standard dictionary
  – adopt as much as possible from authoritative sources, such as ISO standards and industry standard glossaries.
Symbolization

- **signifier**
- **representation**
- **concept**

**speech community**
- **symbol**
  - **term**
  - **icon**
  - **fact symbol**
  - **name**

- **regulates its usage of**
- **uses**
- **is understood anywhere within [symbol context]**
- **0..1 is owned by**
Semantics of Business Vocabulary and Business Rules (SBVR)

SBVR Architecture
1: How Rules are Built
How Are Business Rules Built?

SBVR supports realization of the ‘Business Rules Mantra’:

“Rules are built on Facts. Facts are built on Terms.”

- Define Noun Concepts
- Associate Noun Concepts to Define Verb Concepts
- Base Business Rules on Fact Types

Develop Vocabularies to represent them (starting with terms for the concepts)

… to describe businesses, not the IT systems that serve them

… in language understandable by business people
How Are Business Rules Built?

SBVR supports realization of the ‘Business Rules Mantra’:

“Rules are built on Facts. Facts are built on Terms.”

The Mantra is memorable, but is a great simplification.

In SBVR:
- Meaning is separate from expression.
- Fact Types (Verb Concepts) are built on Noun Concepts.
- Noun Concepts are represented by Terms.
- Fact Types are represented by Fact Symbols (verb phrases)

… to describe businesses, not the IT systems that serve them

… in language understandable by business people
A rental may be open only if an estimated rental charge is provisionally charged to the credit card of the renter of the rental.
## Business Rules are built on Verb Concepts

### Unary verb concept (fact type): **Rental** is open

| Supporting Verb Concepts | rental has estimated rental charge  
estimated rental price is provisionally charged to credit card  
renter has credit card  
rental has renter |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Related Factual Connections</td>
<td>‘being open’ is a characteristic of the concept ‘rental’</td>
</tr>
</tbody>
</table>
Verb Concepts are built on Noun Concepts

**rental**

**Definition:** contract with renter specifying use of a car of a car group for a rental period and a rental 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]

**credit card**

**Dictionary Basis:** MWU, 1: a small card (as one issued by hotels, restaurants, stores, or petroleum companies) authorizing the person or company named or its agent to charge goods or services

**estimated rental charge**

**Definition:** rental charge estimated at start of rental

**renter**

**Source:** CRISG [“renter”]

**Concept Type:** role

**Definition:** person contractually responsible for a rental

**Synonym:** customer (car rental responsibility)

**Synonym:** primary driver
Semantics of Business Vocabulary and Business Rules (SBVR)

SBVR Architecture
2: Meaning vs. Form vs. Expression
## SBVR Business Vocabulary & Rules

<table>
<thead>
<tr>
<th>Business Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noun Concepts</td>
</tr>
<tr>
<td>Verb Concepts</td>
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</table>

| Business Rules       |
## Separating Meaning, Form & Expression

### Body of Shared Meanings (informally “SBVR Business Vocabulary+Rules”)

#### Body of Shared Concepts (informally “Business Vocabulary”)

- **Unique, Discrete Vocabulary (Noun & Verb Concepts)**
  - **Meaning**

### Business Rules

- **Unique, Discrete Rule**
  - **Meaning**
Single Discrete Meanings

• Provides to focus for shared understanding of meanings by a community regardless of:
  – Language
  – Grammar syntax or graphic notation
  – Terms (character strings, icons, etc used to refer to meanings)
  – Form in which the meaning is stated

• Enables each discrete meaning to be recorded non-redundantly e.g.
  – \( C = A + B \), \( A = C - B \) and \( B = C - A \) are all entered once as a single discrete meaning

• Enables all statements of meaning to be tied directly or indirectly back to a single discrete meaning

• Supports semantic integration
# Separating Meaning, Form & Expression

**Body of Shared Meanings (informally “SBVR Business Vocabulary+Rules”)**

<table>
<thead>
<tr>
<th>Unique, Discrete Vocabulary (Noun &amp; Verb Concepts)</th>
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<tbody>
<tr>
<td>Meaning</td>
<td>Form(s)</td>
</tr>
<tr>
<td></td>
<td>for each Discrete Vocabulary Meaning</td>
</tr>
</tbody>
</table>

**Body of Shared Concepts (informally “Business Vocabulary”)**

<table>
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<th>Unique, Discrete Rule Meaning</th>
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## Business Rules

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</table>
Single Discrete Meaning ↔ ‘Forms of Meaning’

• C=A+B, A=C-B and B=C-A are each a different form of the same single discrete meaning

• What ‘Forms of Meaning’ add to a Single Discrete Meaning
  – Different ways to say the same thing independent of:
    • Natural Language used
    • Notation, graphics or syntax used
    • A particular speech community’s vocabulary

• What a Single Discrete Meaning adds to multiple ‘Forms of Meaning’
  – Ability to know that different ‘Forms of Meaning’ mean the same thing
  – Ability to automatically translate from one ‘Form of Meaning’ to another
### Separating Meaning, Form & Expression

#### Body of Shared Meanings (informally “SBVR Business Vocabulary+Rules”)

<table>
<thead>
<tr>
<th>Unique, Discrete Vocabulary (Noun &amp; Verb Concepts) Meaning</th>
<th>Unique, Discrete Vocabulary (Noun &amp; Verb Concepts) Form(s) for each Discrete Vocabulary Meaning</th>
<th>Language/Notation &amp; Community-specific Expression(s) for each Discrete Vocabulary Form</th>
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#### Business Rules

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‘Form of Meaning’ ⇔

Expressions in a Language / Notation

• Example language and optional notation combinations:
  – English
  – French
  – English + SBVR Structured English
  – ORM + English

• What ‘Expressions in a Language/Notation’ add to a ‘Form of Meaning’
  – The particular terms and names used by a given Speech Community
  – A natural or artificial language used by the Speech Community
  – A graphics notation

• What a ‘Form of Meaning’ adds to multiple ‘Expressions in a Language/Notation’
  – Ability to know that different ‘Expressions in a Language/Notation’ have the same ‘Form of Meaning’ (and through ‘Form of Meaning’ the same of different discrete meanings)
  – Ability to automatically translate from one ‘Expressions in a Language/Notation’ to another using
    • a common ‘Form of Meaning’ or
    • the ability to also translate between different forms of meaning.
Semantics of Business Vocabulary and Business Rules (SBVR)

SBVR Architecture
3: Propositional Content + Performatives
Propositional Content + Performative

• Propositional Content:
  – a mental picture of a possible state of the world that is expressed in some communication (for example, expressible by arranging certain words: car at location)
  – is INDEPENDENT of how you use it!
    • Statement: car at location – The car is at the location.
    • Command: car at location – Let the car be at the location!
    • Question: car at location – Is the car at the location?
    • Stipulation: car at location – The car must be at the location.

• Example SBVR Propositional Content:
  – customer wants kind of car

• SBVR supports these kinds of Performatives
  – Assertion (Statement)
    • (It is taken to be true that) customer wants kind of car
      NOTE: The ‘it is taken to be true that’ is implied from the formal logic grounding of SBVR
  – Stipulation (Rule)
    • It is obligatory that customer wants kind of car if the customer places an order
  – Question
    • What kind of car the customer wants? … from within the rule:
      – An agent must ask each new customer what kind of car the customer wants.
Semantics of Business Vocabulary and Business Rules (SBVR)

Business Vocabulary (vs. Business Rules)
Business Vocabulary: Business Meaning of Concepts

Community
Business Community with sub-communities that may use different natural languages and specialized vocabularies

Content
Business Vocabulary: Clause 8, 11

Business Meaning
Concepts, Facts & Rules (Unique, Discrete Meaning)

Forms of Meaning
Forms of Concepts, Facts & Rules (different ways of saying the same thing)

Business Expression
Expression of Forms of Concepts, Facts & Rules in a Business Language

Formal Logic
Semantic Formulations + Formal Logic Grounding

underpins
formulated as
expressed as
defines
uses

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BPM Think Tank, 23 May 2006: SBVR Tutorial
Noun Concepts (Discrete Meaning) --
(represented by Terms, Names & Definitions)

• The ‘noun concept’ that denotes the set of cars EU Rent has for renting to customers:
  – DEFINITION:
    • vehicle owned by EU-Rent and rented to its customers
  – TERM:
    • rental car
    • car

• The ‘noun concept’ that denotes all the specific agreements EU Rent makes with customers to rent cars:
  – DEFINITION:
    • contract with renter specifying use of a car of a car group for a rental period and a car movement
  – TERM:
    • rental
Noun Concepts

Fundamental Concepts

- Implicitly-understood terms
- Individual concepts
- Adopted definitions
- Local definitions

Derived Concepts – categories, roles, facets ...

Synonyms

Preferred terms Used as reference scheme
Forms of Noun Concept Definition

- Intensional (based on ISO 1087):
  - More general concept
  - Delimiting characteristics to define category within more general concept
    - E.g. additional driver: “qualified driver who is not the renter of a rental and who is permitted to drive the rented car of the rental ”

- Extensional (based on ISO 1087):
  - List of concepts (not necessarily individual concepts)
    - E.g. European operating country: EU member state or Norway or Switzerland

- Individual concept (based on ISO 1087):
  - Is named
  - May not need any additional definition
    - E.g. Switzerland, US Dollar, IRS, Ford Motor Company

- Adopted definition
  - Reference to source
Noun Concepts in practice

• Choose a default dictionary (SBVR uses MWU and ODE)
  – If a formally-identified term does not have an explicit definition, it is taken to be “everyday language, implicitly understood”
  – If vocabulary users are in doubt, they should use the default dictionary to find a definition
  – Use implicitly-understood terms as much as possible

• Make pragmatic decisions about individual concepts, e.g. “90 days” vs “maximum rental duration”

• Create “predefined populations” (extensional definitions) where needed, e.g. business currency: US Dollar or Euro or Swiss Franc

• Adopt from standard glossaries as much as possible

• Minimise the number of locally defined concepts:
  – Reduces maintenance
  – Increases ease of use
**Noun Concept** (Discrete Meaning -- ISO 1087-1)

**rental car**

- **Source:**
- **Definition:** vehicle owned by EU-Rent and rented to its customers
- **Synonym:** car

---

**Noun Concepts**

- **General Concept**
  - Car
- **General Concept**
  - Country
- **Individual Concept**
  - Switzerland

---

**Things in the real world**

- **Countries**
  - France
  - Germany
  - UK
  - Switzerland
  - Netherlands

- **Cars**
  - VIN# 12345
  - VIN# 13872
  - VIN# 13991
  - VIN# 16277
  - VIN# 17002
  - VIN# 17456
  - VIN# 19334
  - VIN# 20113

---

**Pre-defined population** – represented in **vocabulary**

**General population** – represented in **database**
Verb Concepts

• AKA “fact types”, “associations”
• Represented by “Fact Symbols” (verb phrases)
• Verbs are taken to have no meaning except in fact types (“manager runs company”, “horse runs race”) – definitions are for entire verb concepts, not for verbs in isolation
• Trade off simple synonyms against simplicity of verb concepts,
  – e.g. if currency in which rental is charged is used in lots of verb concepts, consider defining “currency of rental” as a synonym for “currency of operating country of EU-Rent site that is base for pick-up branch of rental”
## Verb Concepts (Discrete Meaning)

| Supporting Verb Concepts | rental has estimated rental charge  
estimated rental price is provisionally charged to credit card  
renter has credit card  
rental has renter |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Related Factual Connections</td>
<td>‘being open’ is a characteristic of the concept ‘rental’</td>
</tr>
</tbody>
</table>
Business Vocabulary: Forms of Meaning

Different Ways of Saying the Same Thing

Community

Business Community with sub-communities that may use different natural languages and specialized vocabularies

uses

Content

Business Vocabulary: Clause 8, 11

Forms of Meaning

Forms of Concepts, Facts & Rules (different ways of saying the same thing)

expressed as

Business Expression

Expression of Forms of Concepts, Facts & Rules in a Business Language

underpins

Formal Logic

Semantic Formulations + Formal Logic Grounding

underpins

Business Meaning

Concepts, Facts & Rules (Unique, Discrete Meaning)

formulated as

underpins
Multiple Definition Forms for One Noun Concept (Discrete Meaning)

• The Definition of one Concept
  • E.g. The sales tax rate for a rental is the sales tax rate at the pick-up branch of the rental on the drop-off date of the rental.

can be structured in many ‘Forms of Meaning’:
  – Intensional Form
    • E.g. sales tax rate for a rental: sales tax rate at the pick-up branch of the rental on the drop-off date of the rental.
  – Extensional Form
    • E.g. 1%, 2.5%, 4%, 7%

• The meaning of a concept is structured (formulated) into a ‘Form of Meaning’ by using a Semantic Formulation
  – One Semantic Formulation for each Form of Meaning
    (see section explaining Semantic Formulations)
Multiple Verb Concept Forms for One Verb Concept (Discrete Meaning)

- **One Verb Concept** (e.g. Associative Verb Concept)
  - E.g. Drivers licenses have expiration dates can be put together in many forms:
    - **Sentential Forms**
      - driver's license expires on date (semantics in verb)
      - driver's license has expiration date (semantics in role name)
    - **Noun Forms**
      - driver's license expiring on date
      - driver's license having expiration date
    - **Multiple orderings**
      - **Sentential Form**
        - driver's license expires on date (active)
        - date is expiration of driver's license (passive)
      - **Noun Form**
        - expiration date of driver's license
        - driver's license having expiration date
Business Vocabulary: Business Expression

Community

Business Community with sub-communities that may use different natural languages and specialized vocabularies

Business Meaning

Concepts, Facts & Rules (Unique, Discrete Meaning)

Forms of Meaning

Forms of Concepts, Facts & Rules (different ways of saying the same thing)

Business Expression

Expression of Forms of Concepts, Facts & Rules in a Business Language

Semantic Formulations + Formal Logic Grounding

Business Vocabulary: Clause 8, 11
Multiple Definition Statements
Expressing One Definition Form

- One Definition Form (e.g. Intentional)
  - The sales tax rate for a rental is the sales tax rate at the pick-up branch of the rental on the drop-off date of the rental.

  can be expressed in many language, notation & speech community combinations:

  - Expressed in English
    - The sales tax rate for a rental is the sales tax rate at the pick-up branch of the rental on the drop-off date of the rental.

  - Expressed in French
    - Le taux de taxe de vente pour une location de voiture est le taux de taxe de vente à l'agence de départ de la location à la date de retour de la voiture

  - Expressed in SBVR Structured English
    - The sales tax rate for a rental is the sales tax rate at the pick-up branch of the rental on the drop-off date of the rental.

  - Expressed in ORM (“ActiveQuery” notation)
    - (see next slide)
Expressed in ORM
(“ActiveQuery” notation)

Outline View

<table>
<thead>
<tr>
<th>Rental Sales Tax Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓1 Sates Tax Rate</td>
</tr>
<tr>
<td>(definitely) is determined at ✓2 Pickup Branch from Date1 to Date2</td>
</tr>
<tr>
<td>(definitely) provides ✓3 Rental</td>
</tr>
<tr>
<td>(definitely) is for use of ✓4 Rented Car</td>
</tr>
<tr>
<td>(definitely) is returned on ✓5 DateTime ( &gt;= Date1 and &lt;= Date2 )</td>
</tr>
</tbody>
</table>

Verbalization View

List each sates tax rate, pickup branch, rental, rented car, and date time
where for some date1 and date2:

- sales tax rate is determined at pickup branch from date1 to date2,
- pickup branch provides rental that is for use of rented car that is returned on date time that is greater than or equal to Date1,
- and date time is less than or equal to Date2.
Multiple Fact Symbols
Expressing One Verb Concept Form

- One Verb Concept Form (e.g. Sentential Form)
  - *driver's license* expires on *date*

  can be expressed in many language, notation & speech community combinations:

  - Expressed in English
    - *driver's license* expires on *date*
  
  - Expressed in French
    - *le permis de conducteur* expire *la date*
  
  - Expressed in SBVR Structured English
    - *driver's license* expires on *date*

  - Expressed in ORM (“Object Role Modeling” notation)
SBVR Structured English Notation

SBVR Structured English is defined using styled fonts in MS Word.

**term**

The ‘term’ font is used for a designation for a noun concept (other than an individual concept), e.g. rental car, branch

**Name**

The ‘name’ font is used for a designation of an individual concept — a name. Names tend to be proper nouns, e.g. Ford, San Jose

**verb**

The ‘verb’ font is used for designations for verb concepts — usually a verb, preposition or combination thereof. Such a designation is defined in the context of a form of expression, e.g. local area owns rental car, rental has pick-up branch

**keyword**

The ‘keyword’ font is used for linguistic symbols used to construct statements – the words that can be combined with other designations to form statements and definitions, e.g., ‘each’ and ‘it is required that’.

Quotation marks are also in the ‘keyword’ font. Single quotation marks are used (among other purposes) to mention a concept — to refer to the concept itself rather than to the things it denotes. In this case, a quoted designation or form of expression is preceded by the word ‘concept’ or by a term for a kind of concept, e.g. the concept ‘walk-in rental’ is a category of the concept ‘rental’.
Semantics of Business Vocabulary and Business Rules (SBVR)

Integration by Vocabulary Adoption
Owned & Adopted Concepts

• Adoption is important:
  – Reduces work in maintaining business vocabulary
  – Supports communication with organizations that have interests in common
  – Creates consistency across vocabularies

• Concepts are adopted two ways:
  – By reference – via an adopted vocabulary, e.g. rental, rental car (from ‘Car Rental Industry Standard Glossary’)
  – By name – Individual concept, e.g. Switzerland

• Adoption by reference is about adopting definitions:
  – The terms from the source are used as a reference scheme for the adopted definitions.
  – They do not have to be adopted as terms in the SBVR vocabulary (although in practice they usually are)

• When a vocabulary that has been adopted by others is revised,
  – all the “users” of the vocabulary have to be considered –
  – this is a good thing!

SBVR provides strong support for adoption
Vocabulary Adoption

• EU-Rent English Vocabulary - built using SBVR - contains:
  – The symbols EU-Rent has assigned as term and fact symbols, and has assumed responsibility for maintaining; e.g.
    • bad experience: damage to car or moving traffic offence or unauthorized late return or car not returned to EU-Rent or …
    • barred driver: driver who has at least three bad experiences on rentals

– Adopted vocabularies:
  • Car Rental Industry Standard Glossary [fictitious]
    – Note: the EU-Rent German speech community has adopted equivalent “Glossar für Autovermietungsgeschäft” [also fictitious] – consistency issue to be managed
  • ISO Dictionary of International Symbols – adopted across all languages [does not exist yet]
  • Merriam-Webster Unabridged Dictionary – default vocabulary for English
Synonyms and Homonyms

• Required for local ease of use
• Especially important when dealing with closely-involved semantic communities, e.g.
  – After merger/acquisition
  – Working with outsourcers and value chain partners
• Noun concepts are referenced by preferred terms
  – Business can require that ‘official’ communications use preferred terms
  – In practice, is impossible to enforce preferred terms for all business discourse
• Synonyms reference preferred terms
• Homonyms need a disambiguating context, e.g.
  – Customer (car rental)
  – Customer (car sales)
Semantics of Business Vocabulary and Business Rules (SBVR)

Business Rules:
Building on Business Vocabulary
Business Rules

• (Surprisingly) small part of SBVR
  – Business Vocabulary is much bigger (and reusable for other aspects of business modelling)

• Operational Business Rules
  – Govern what the business does
    • “It is obligatory that …”
    • “It is permitted that …” (and its negation, “It is forbidden that …”)
  – Intended for people:
    • Actionable, but not necessarily automatable
    • Can be broken
    • Need enforcement

• Structural Business Rules
  – true by definition
    • “It is necessary that …”
    • “It is possible that …” (and its negation, “It is impossible that …”)

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Enforcement

• Operative business rules can be broken, and need to be enforced. This requires a regime:
  – To detect breaches
  – To take remedial action, if required
  – To impose penalties, if required

• Enforcement action is outside SBVR’s scope. It will be resolved in integration with other OMG business modelling specifications

• SBVR does include enforcement level – how strictly the rule will be enforced. This is quite independent of what the enforcement action is. Examples are:
  – Strictly enforced: no escape from the consequences
  – Pre-authorized exceptions permitted
  – Consequences if exceptions are not logged and justified
Sample Language of Business Rules

<table>
<thead>
<tr>
<th>Quantification</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>each</td>
<td>universal quantification</td>
</tr>
<tr>
<td>some</td>
<td>existential quantification</td>
</tr>
<tr>
<td>at least ( n )</td>
<td>at-least-( n ) quantification</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Logical Operations</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>it is not the case that ( p )</td>
<td>logical negation</td>
</tr>
<tr>
<td>( p ) and ( q )</td>
<td>conjunction</td>
</tr>
<tr>
<td>( p ) or ( q )</td>
<td>disjunction</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Modal Operations</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>it is obligatory that ( p )</td>
<td>obligation claim</td>
</tr>
<tr>
<td>it is prohibited that ( p )</td>
<td>obligation claim embedding a logical negation</td>
</tr>
<tr>
<td>it is necessary that ( p )</td>
<td>necessity claim</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other Keywords</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>the</td>
<td>who</td>
</tr>
<tr>
<td>a, an</td>
<td>is of</td>
</tr>
<tr>
<td>another</td>
<td>what</td>
</tr>
<tr>
<td>a given</td>
<td>that</td>
</tr>
</tbody>
</table>
Business Rules: Business Meaning of Rules

Community
Business Community with sub-communities that may use different natural languages and specialized vocabularies

Content
Business Rules: Clause 12

Business Meaning
Concepts, Facts & Rules (Unique, Discrete Meaning)

Forms of Meaning
Forms of Concepts, Facts & Rules (different ways of saying the same thing)

Business Expression
Expression of Forms of Concepts, Facts & Rules in a Business Language

Formal Logic
Semantic Formulations + Formal Logic Grounding

defines
formulated as
expressed as
underpins
underpins
underpins
Defining a Business Rule

Underlying verb concept (in SBVR’s Vocabulary for Business Rules):
- element of guidance is based on verb concept

We know that (also in SBVR’s Vocabulary for Business Rules):
- element of guidance introduces an obligation or necessity
- business rule is a category of element of guidance

So, in the SBVR Business Vocabulary+Rules for a specific business (e.g. EU-Rent)

- Start with a verb concept, e.g.
  rental has driver
- Apply an obligation or necessity to it, e.g.
  it is obligatory that rental has driver.
- Add qualifications, quantifications and conditions, if necessary e.g.
  it is obligatory that each rental has at most 4 drivers.
Supporting Verb Concepts

The structural business rule:

\[ \text{it is necessary that the rental charge of each rental is calculated in the business currency of the rental.} \]

… is based on the verb concept

\[ \text{rental charge is calculated in business currency} \]

But it needs two supporting verb concepts (also defined in the EU-Rent Business Vocabulary)

\[ \text{rental has rental charge} \]

\[ \text{rental has business currency} \]
Additional factual connections

The operative business rule

it is obligatory that the rented car of each assigned rental is stored at the pick-up branch of the rental.

… is based on the verb concept

rental car is stored at branch

It needs support from these additional factual connections:

– the concept ‘rented car’ is a role of the concept ‘rental car’
– the concept ‘assigned rental’ is a category of the concept ‘rental’
– the concept ‘pick-up branch’ is a role of the concept ‘branch’

Supporting factual connections are based on characteristics, roles and categories.
Adding Conditions

The operative business rule:

It is obligatory that the rental incurs a location penalty charge.

... is based on the verb concept

rental incurs location penalty charge

The added condition:

if the drop-off location of a rental is not the EU-Rent site of the return branch of the rental.

... uses these supporting verb concepts

rental has drop-off location
rental has return branch
branch is located at EU-Rent site
thing₁ is thing₂

... to produce this conditioned rule:

It is obligatory that the rental incurs a location penalty charge if the drop-off location of a rental is not the EU-Rent site of the return branch of the rental.
Trade-off with Vocabulary

The business rule:

\[
\text{it is necessary that the rental charge of each rental is calculated in the business currency of the rental.}
\]

… was defined simply, and supported by the verb concept

\[
\text{rental has business currency}
\]

This was possible only because this verb concept had been defined in the EU-Rent Business Vocabulary.

Strictly, it is redundant. The business rule could have been defined as:

\[
\text{it is necessary that the rental charge of each rental is calculated in the national currency of the operating country of the operating company that contains the local area that contains the pick-up branch of the rental.}
\]

Getting the right trade-off in the enterprise Business Vocabulary is important in having manageable and understandable vocabulary and rules.
Rules based in time

(1) The operative business rule

It is obligatory that the fuel level of the rented car of each rental is full at the actual start date/time of the rental.

… is supported by the verb concept

rental car has fuel level (synonymous form: fuel level is of rental car)

Its point in time is supported by the verb concept

state of affairs occurs at date/time

(2) The operative business rule

It is obligatory that each driver of each rental is qualified after the booking date/time of the rental and before the actual return date/time of the rental.

… is supported by the verb concept

rental has driver (synonymous form: driver is of rental)

The duration of its effect is supported by the verb concepts

state of affairs occurs after date/time

state of affairs occurs before date/time

date/time₁ is before date/time₂
Business Rules: Forms of Meaning

Different Ways of Saying the Same Thing

Community
Business Community with sub-communities that may use different natural languages and specialized vocabularies

defines

Content
Business Rules: Clause 12

Business Meaning
Concepts, Facts & Rules (Unique, Discrete Meaning)

formulated as

Forms of Meaning
Forms of Concepts, Facts & Rules (different ways of saying the same thing)

expressed as

Business Expression
Expression of Forms of Concepts, Facts & Rules in a Business Language

underpins

Formal Logic
Semantic Formulations + Formal Logic Grounding

underpins

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BPM Think Tank, 23 May 2006: SBVR Tutorial

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Multiple Rule Forms for One Rule (Discrete Meaning)

- One Rule Meaning (e.g. Obligation)
  - Don’t rent a car to a drunk!

can be put together in many forms:
  - Obligatory Forms
    - It is obligatory that an intoxicated person is not accepted for a walk-in rental
    - An intoxicated person should not be accepted for a walk-in rental
  - Prohibitive Forms
    - It is prohibited that an intoxicated person is accepted for a walk-in rental
    - No intoxicated person may be accepted for a walk-in rental
  - Conditional Permissive Form
    - A person may be accepted for a walk-in rental only if that person is not intoxicated

- The meaning of a rule is structured (formulated) into a ‘Form of Meaning’ by using a Semantic Formulation
  - One Semantic Formulation for each Form of Meaning
    (see section explaining Semantic Formulations)
Business Rules: Business Expression

Community
Business Community with sub-communities that may use different natural languages and specialized vocabularies

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Business Rules: Clause 12

Business Meaning
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underpins

Formal Logic
Semantic Formulations + Formal Logic Grounding

underpins
Multiple Rule Statements
Expressing One Rule Form

- One Rule Form (e.g. Obligatory Form)
  - It is required that the drop-off date of a rental precedes the expiration date on the driver's license of the customer reserving the rental.

can be expressed in many language, notation & speech community combinations:

- Expressed in English
  - The drop-off date of a rental must precede the expiration date on the driver's license of the customer reserving the rental.

- Expressed in French
  - La date de retour d'une location de voiture doit précéder la date d'échéance sur le permis de conducteur du client réservant la location de voiture.

- Expressed in Structured English
  - It is obligatory that the drop-off date of each rental precedes the expiration date on the driver's license of the customer who reserves the rental.

- Expressed in RuleSpeak
  - The drop-off date of a rental must precede the expiration date on the driver's license of the customer who reserves the rental.

- Expressed in ORM ("ActiveQuery" notation)
  - (see next slide)
Expressed in ORM
("ActiveQuery" notation)

Outline View

"Rental Drop-off Date Validation"

1. Rental

   - (definitely) is for use of 2. Rented Car

      - (definitely) is returned on 3. DateTime < Date

      and (definitely) is contractual responsibility of 4. Customer

         - (definitely) is authorized to drive under 5. Drivers License

            - (definitely) expires on 6. Date

Verbalization View

List each rental, rented car, date time, customer, drivers license, and date
where

- rental is for use of rented car that is returned on date time that is less than Date
- and rental is contractual responsibility of customer that is authorized to drive under drivers license that expires on date.
Semantics of Business Vocabulary and Business Rules (SBVR)

Semantic Formulation
Meaning Structured and Interpreted within a Formal Logic Theory

Community
Business Community with sub-communities that may use different natural languages and specialized vocabularies

Business Meaning
Concepts, Facts & Rules (Unique, Discrete Meaning)

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Formal Logic
Semantic Formulations + Formal Logic Grounding

Structure of Meaning Clause 9
Formal Interpretation Clause 10
From Business Rule Statement to XML

1. Start with a business rule statement.  
   It is prohibited that a barred driver is a driver of a rental.

2. Identify symbols in vocabulary.  
   It is prohibited that a **barred driver** is a **driver** of a **rental**.

3. Parse according to language rules.  
   ![Diagram of parse rules]

4. Restate as facts of logical formulation.  
   An **obligation claim** embeds a **logical negation**....

5. Represent facts of logical formulation as objects.  
   ![Diagram of object representation]

6. Write objects as XML.  
   `<is-obligation-claim .../>`
Logical Formulation of Semantics

• Provides a vocabulary to describe the formal semantic structures of business discourse.
  – Not for discussing business
  – For discussing the semantic structures underlying business communications of concepts, facts and rules.

• A typical business person:
  – does not talk about quantifications – but expresses quantifications in almost every statement he makes
  – doesn’t talk about conjuncts, disjuncts, negands, antecedents and consequents - but these are all part of the formulation of his thinking.

• Logical formulation of Semantics is about explicitly using these conceptual devices (that people use unconsciously all the time) to capture the semantics of their discourse.

This is new – one of the unique features of SBVR
What is a Semantic Formulation?

• What it’s NOT:
  – A *language* for stating business rules
  – A *language* for stating constraints
  – About software design
  – Intended for use by business people in general
  – Intended to parse free-form natural language

• What it is
  – Language for talking about meanings of concepts and rules
    • regardless of the languages or notations used to state them
  – A way of *structuring* the *meaning* of:
    • Definitions
    • Rules that govern the operation of an organization
    • Questions (Queries)
  – *Optimized for people and natural language* – not for machine processing
  – Interpretable in formal logics: first order and restricted higher order
  – Recursive

• Scope: Whatever business people mean by the vocabularies they use and the rules they make
It is prohibited that a **barred driver** is a **driver** of a **rental**.
Logical Formulation

It is prohibited that a **barred driver** is a **driver** of a **rental**.

- obligation claim
  - embeds a logical formulation that is a logical negation
  - has a negand that is an existential quantification
  - introduces a variable
    - has the type **barred driver**
    - scopes over an existential quantification
    - introduces a variable
      - has the type **rental**
      - scopes over an atomic formulation
      - is based on the verb concept: 'rental has driver'
        - has a role binding
          - is of the fact type role that is 'rental' of 'rental has driver'
          - binds to the variable that has the type **rental**
            - has a role binding
              - is of a fact type role that is 'driver' of 'rental has driver'
                - binds to the variable that has the type **barred driver**
XML (for Logical Formulation)

<is-obligation-claim obligation-claim="oc"/>
<modal-formulation-embeds-logical-formulation modal-formulation="oc" logical-formulation="n"/>
<logical-negation-has-negand logical-negation="n" negand="eq1"/>
<is-existential-quantification existential-quantification="eq1"/>
<quantification-introduces-variable quantification="eq1" variable="v2"/>
<variable-has-type variable="v1" type="bdt"/>
<quantification-scopes-over-logical-formulation quantification="eq1" logical-formulation="eq2"/>
<is-existential-quantification existential-quantification="eq2"/>
<quantification-introduces-variable quantification="eq2" variable="v2"/>
<variable-has-type variable="v2" type="rt"/>
<quantification-scopes-over-logical-formulation quantification="eq2" logical-formulation="af"/>
<is-atomic-formulation atomic-formulation="af"/>
<atomic-formulation-is-based-on-fact-type atomic-formulation="af" fact-type="ft"/>
<atomic-formulation-has-role-binding atomic-formulation="af" role-binding="rb1"/>
<role-binding-is-of-fact-type-role role-binding="rb1" fact-type-role="ftr1"/>
<atomic-formulation-has-role-binding atomic-formulation="af" role-binding="rb2"/>
<role-binding-is-of-fact-type-role role-binding="rb2" fact-type-role="ftr2"/>
Semantics of Business Vocabulary and Business Rules (SBVR)

Formal Logic Grounding
Formal Logic Basis of SBVR

• Oriented to logicians’ perspective

• Documented in an Appendix to the submission, as the “Authoritative Source”

• Aligned with “Common Logic” – draft standard 24707, currently being fast-tracked by ISO

• Validated with Pat Hayes, consultant to ISO on Common Logic
Formal Logic

• Underpins Body of Shared Meanings and Semantic Formulation

• Required:
  – To ensure formal basis for automated processing in repositories and for interchange
  – For alignment with other OMG specifications

• Typed predicate logic:
  – First order
  – Restricted higher order

• Modal Operators – needed for business rules:
  – Alethic: “It is necessary that …”, “It is possible that …”
  – Deontic: “It is obligatory that …”, “It is permitted that …”

• Grounded in Common Logic (draft ISO standard 24707)
  – Needed to allow “irregular expressions” to handle modal operators
Modality

SBVR needs two kinds of modality in order to create business rules:

- **Alethic**, for *Structural Business Rules* with two operators:
  - “It is necessary that …”
  - “It is possible that …” (and its negation, “It is impossible that …”)

They are used in the sense of ‘logically necessary’ and ‘logically possible/impossible’

Alethic operators, when introduced into verb concepts, define “Structural” Business Rules.

*Structural business rules* are always true, by definition.

- **Deontic**, for *Operative Business Rules* with two operators:
  - “It is obligatory that …”
  - “It is permitted that …” (and its negation, “It is forbidden that …”)

Deontic operators, when introduced into verb concepts, define “Operative” Business Rules, rules that govern activity in the business.

*Operative business rules* can be broken, and require enforcement

These operators are the only elements of modal logic included in SBVR
Full (and possibly controversial) modal logics are not necessary
Semantics of Business Vocabulary and Business Rules (SBVR)

What Next?
SBVR Progress

• Submission to OMG:
  – Accepted September 2005
  – Available for comment until July 24 2006
    www.omg.org/docs/dtc/06-03-02.pdf
  – Finalization scheduled September 2006

• Release as OMG specification

• Industry and vendor take-up (has already started):
  – Tools: repository and interchange
  – Best practice and methodology

• OMG vertical task forces and Special Interest Groups (financial, health care, telco …) develop BV+R for their industries
OMG SBVR-related activity

- **Business Motivation Model:**
  - Accepted September 2005 for consideration as existing standard to be adopted

- Completion of related OMG specifications: BPDM, OSM, PRR, BRM:

- Alignment across OMG business-oriented specs:
  - Interfaces
  - Common vocabulary
  - Business Architecture emerges

- Transforms to MDA CIM and PIM

- Submission of RFP responses in SVBR? (Has been done for OSM)

- Interest from Regularity Compliance SIG
Reusing “Business Vocabulary”

• Take SBVR specification, excluding “Business Vocabulary for Business Rules”

• Use it to define vocabularies for other aspects of business modelling, e.g.
  – “Business Vocabulary for Business Process”
  – “Business Vocabulary for Organization Structure” (already done in OMG RFP submission)

These are examples of SBVR’s self-extensibility

• Then have consistency for vocabulary definition – and for MOF/XMI-compliant interchange

• When creating a business model for a specific business, use the same vocabulary for all aspects
World Wide Web Consortium

• See rules as a major part of Semantic Web and Web services

• Has established Rule Interchange Format (RIF) Working Group
  – http://www.w3.org/2005/rules/wg
  – Chartered in 2005 for 2 years
  – First draft document (Use Cases) made publicly available in March 2006
  – SBVR is one of the major inputs: ongoing liaison with OMG (also for ODM and PRR)
SBVR mapping: MDA & Semantic Web Architecture

- **Definitions**
  - SBVR -- Business Vocabulary (about Business Things)
  - RDF / OWL -- (about Business Things)
  - RDF / OWL -- (about Content / Data)

- **Rules Governing Actions**
  - SBVR -- Business Rules (Semantic Formulation structures optimized for people)
  - Semantic Formulations (Structures optimized for machine processing)
  - Semantic Formulations (Structures optimized for machine processing)
  - Rules structured for Class of Platform e.g. Production Rules

**Business Model** (Optimized for People)

**IT System**

- Computation Independent Model (CIM) (Optimized for Machines)
- Platform Independent Model (PIM)
- Class of Platform Model (PIM)
Thank you

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... and the S-beaver