The Tale of Two Semantics & How They Relate to ISO Standards

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Two Kinds of Semantics

There are two kinds of semantics that are *confused with each other, or simply not distinguished between,* most of the time. They are:

- the human semantics of natural language sentences and definitions, vs.

- the technical semantics of IT system designs, e.g. data dictionaries /data structure models, processing function models, reasoning engine logic models

Human Semantics of Natural Language Sentences and Definitions

Human semantics is all about human communication. Human semantics is the meanings authors intend, documented as definitions, for the terms they use in natural language sentences in the business/legal documents they write, as well as the meaning of each sentence taken as a whole. Their purpose is for clear human understanding and unambiguous communication.

Technical Semantics of Data, Processing Function, and Reasoning Logic Models

Technical semantics are all about data and IT systems. Technical semantics is the formal logic interpretations of IT system constructs and the relations between, usually expressed using data elements of some data structure as terms. Their purpose is to support code generation or automatic execution, and to maximize the quality of the data, its processing, and its transmission.

Two Kinds of ISO Standards

ISO Standards for One of Two Kinds of Things

ISO Standards have as their subject usually one of two quite different kinds of things:

1. Standards for **actual things themselves** such as products, buildings, organizations, business processes, business risks, etc.

2. Standards for **data and systems for storing, processing, and communicating the data about** the actual things referred to in 1. above.

The semantics needed for standards of the type described in 1. above are the Human Semantics of Natural Language Sentences and Definitions.

The semantics needed for standards of the type described in 2. above are the Technical Semantics of Data, Processing Function, and Reasoning Logic Models.

The official titles of the ISO Technical Committees relevant to this discussion, and the kind of ISO standard they create, are follows:

ISO Technical Committee	Kind of Standard	Standards Subject Field
ISO TC 37 "Language and terminology"	Standards for actual things	Natural Language standards
ISO TC 68 "Financial services"	Standards for data and systems	Financial Service Data standards *(currently)*
	Standards for actual things	Financial Service Business Glossary/Ontology standard *(future)*
ISO/IEC JTC 1 "Information Technology"	Standards for data and systems	Standards for specifying IT systems and data

What SBVR is

SBVR is an Object Management Group standard (https://www.omg.org/spec/SBVR/) that was designed to enable:

➢ business/legal authors to write natural language sentences that are unambiguous in their use of grammar and defined terms;

➢ the specification of the unambiguous meaning that business/legal authors intend for the terms they use; and

➢ the computer to understand, under the covers by SBVR authoring software, the human meaning of the terms and sentences in an interpretation in formal logic.

SBVR operates in the field of unambiguous natural language meaning and expression in business/legal communication, including regulations and standards. Everything to do with data and IT system designs is explicitly out of scope for SBVR. Good quality SBVR Terminological Dictionaries/Ontologies and Rulebooks maintained independently by the business, not IT, can add much value to data dictionaries and IT systems designs.

SBVR and ISO Standards

ISO/IEC Directives Part 2 requires every ISO standard to define the terms it uses in Clause 3 "Terms and definitions", either directly within the clause, or by reference to ISO terminology standards that contain those terms and definitions. It also requires that terminological entries in the "Terms and definitions" clause shall be drafted in accordance with ISO 10241-1, which in turn references ISO 704 for its details.

SBVR adopts its foundational concepts from ISO 1087 "Terminology work and terminology science — Vocabulary" and follows the terminology principles and methods in ISO 704, for which ISO 1087 provides standardized terminology. SBVR builds on the adopted ISO 704 and ISO 1087 foundation by adding:

- consistency with natural language grammar and the rigor of formal logic to the concepts it adopts from ISO 1087,
- many rich semantic features to the concepts that it adopts from ISO 1087, and
- an interpretation in formal logic to the whole.

Because SBVR is effectively a semantic extension to ISO 704 and ISO 1087, SBVR's relationship with all ISO standards would be the same as ISO 704/1087's relationship. Put simply, SBVR terminological entries can be fully unambiguous versions of ISO 704/1087 terminological entries. Terminological entry natural language content compliant with SBVR would go in Clause 3 "Terms and definitions" of ISO standards, as well as in an SBVR compliant terminological database, which contains the full semantics behind the natural language text in Clause 3.

ISO 20022 as an Example

SBVR could provide unambiguous, multilingual definitions and terms for the concepts in the ISO 20022 "Business Model" in a way that complies with ISO 704. SBVR could also be used to clarify definitions in Clause 3 "Terms and definitions" in all the ISO 20022 standards so that they are not only unambiguous to people, but also are unambiguous under the covers in formal logic.

Two Meanings of the Term "Domain Specific Language" (DSL)

Domain Specific Languages are defined to be in the realm of IT data and systems. Domain Specific Languages are designed for use by software developers. However, the term "domain specific language" is used in the IT industry with two different meanings:

1. Domain Specific Language *for documenting* Data / Data Processing Semantics; e.g.:

   - SQL,
   - XML,
   - UML/OCL,
   - OWL/RDF,
   - ISDA CDM *Metamodel*
2. Domain Specific Language *as* Data / Data Processing Semantic *content*; e.g."

   - FpML,
   - XBRL,
   - ISDA CMD

Domain Specific Languages contrast with Business Glossaries and Policy Manuals

Business Glossaries and Policy Manuals are defined to be in the realm of the design and operation of organizations by business people. Business Glossaries are designed to enable business people to communicate unambiguously, orally and in writing. Policy Manuals are designed to govern the actions of the organization. The two distinctions are just as important for Business Glossaries and Policy Manuals:

1. Business Glossary and Policy Manual Language *for documenting* Natural Language Semantics: e.g.:

- Natural language grammar,
- Lexicographical notation,
- ISO 300042 TermBase eXchange using semantics from ISO terminology standards,
- SBVR XMI XML Schema *(SBVR Clause 25.3)* using semantics from the SBVR Terminological Dictionary/Ontology *(SBVR Clauses 7-21)*

2. Business Glossaries and Policy Manual *as* Natural Language Semantic *content*; e.g.:

- SBVR Annex G "EU Rent Example";
- Sample SBVR Terminological Dictionary/Ontology for MiFID II / EMIR
- SBVR-disambiguated version of the FCA Handbook Provisions and Glossary

Where the ISDA CDM and SBVR Fit into ISO Standards-making

Kind of Language / Kind of Semantics	Language *for Documenting* a Kind of Semantics	Language *as* a Kind of Semantic *Content*
Business Glossaries and Policy Manuals for Natural Language Semantics	1. Natural Language 2. Lexicographical Notation 3. ISO 10241-1, 704, 1078 and 30042 (TBX: TermBase eXchange) 4. SBVR XMI XML Schema for interchange of SBVR Terminological Dictionary/Ontology and Rulebook content SBVR to have International Standardization by ISO TS 37/SC 1/WG 5 "Concept modelling in terminology work"	"Shared Financial Services Glossary/Ontology" that uses SBVR to synthesize, *and reverse engineer where necessary*, into meanings intended by business/legal authors for terms they use when they write business/legal documents: • Original, business meaning version of FIBO content, • SBVR-disambiguated FCA Handbook Glossary, • BIAN Business Object Model, • ISO TC 68 Business Model, • ISDA CDM data dictionary *(reverse engineered)* International Standardization probably by ISO TC 68, *new WG probably needed*
Domain Specific Languages (DSL) for Data / Data Processing Semantics	Regnosys / ISDA CDM Metamodel International Standardization probably by ISO/IEC JTC1 SC32 WG2 "Metadata"	Content of ISDA CDM (derivative data and processing rules) International Standardization probably by ISO/TC 68/SC 9/WG 1

Build a Semantic Bridge between Unambiguous Regulation Glossaries and Data Dictionaries by using Semantic Anchors

Semantic Anchor URLs provide the business semantics for IT data structure elements

The idea of Semantic Anchors was introduced by David Frankel over eight years ago in the context of early work on the ISO 20022 standards and BIAN; see:

David Frankel's presentation (see slide 37):

6b - Update on ISO 20022, BIAN, and XB

SBVR Business Terminological Dictionaries/Ontologies Provide Semantic Anchors for Data
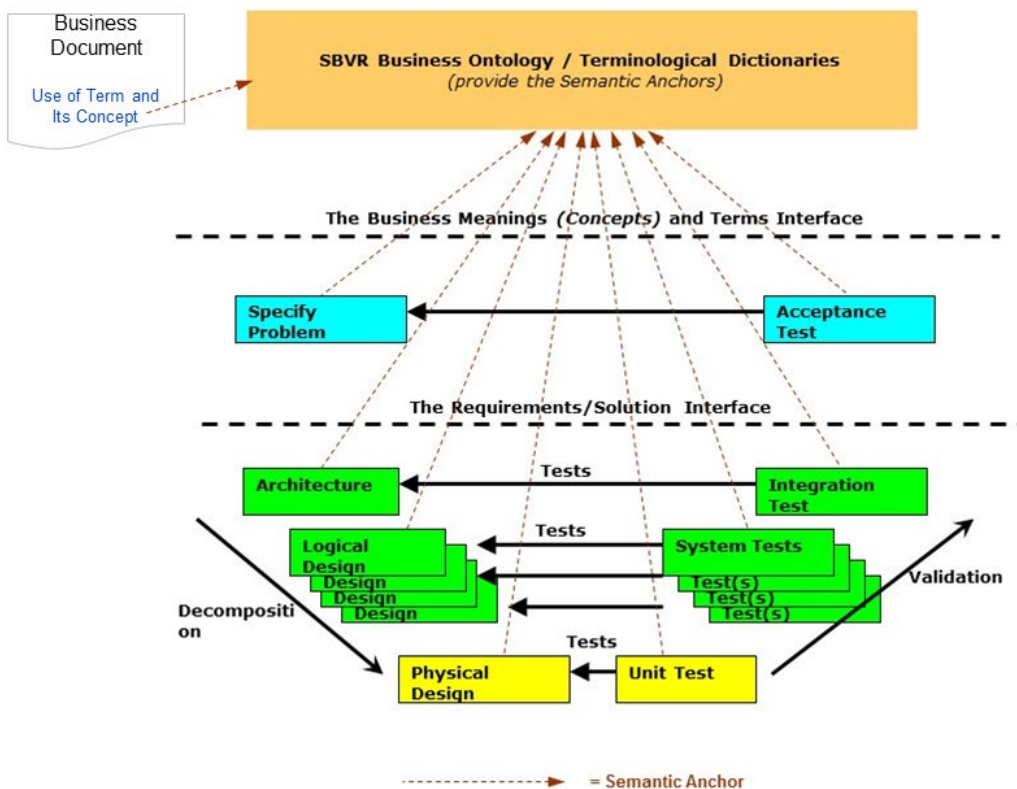
A Semantic Anchor is a URL on a given IT system design construct in some IT system design or implementation artefact that points back to a terminological/ontological entry in a human business meaning dictionary/ontology, like the ones standardized by SBVR, which contains the meanings used in human communication in the organization.

The following is an example of a Semantic Anchor. It points to an entry that hypothetically disambiguates the entry for 'director function' in the FCA Handbook Glossary. Terminological Dictionary is an incomplete demonstration dictionary without any SBVR concept relations, so the diagram is mostly empty. Just CTRL + Click on "director function" below to display the terminological entry and its semantic context.

[director function](#)

> NOTE: This dictionary is marked "allow anonymous access"; otherwise a fully secure login would have been required to access the terminological entry and its context.

Semantic Anchors can be easily used in any software tool that supports URL hyperlinks.

By providing the meanings and terms used in human communication to each data element, or other IT system construct, Semantic Anchors, along with the SBVR Terminological Dictionaries/Ontologies they point to, enable IT systems to talk the language of the business.

How the Original, Business Meaning version of FIBO relates to SBVR

The original, business meaning version of FIBO was developed by Mike Bennett working with communicators from financial service firms to create unambiguous meanings for terms used in business communication. Its contents are human semantics *(see item 1. at the beginning)*.   The original, business meaning version of FIBO is best thought of as starting content for an SBVR FIBO Terminological Dictionary/Ontology.

This contrasts with the IT system reasoning engine logic version of FIBO published by the Object Management Group in conjunction with the Enterprise Data Council, whose content is technical semantics for OWL reasoning engines *(see item 2. at the beginning)*.

Practical use of SBVR in ISO Standards-making

Because SBVR simply adds richer semantics and semantic rigor to ISO 704 and ISO 1087, SBVR can be used as a supplement to any existing ISO standards-making process. Rather than requiring changes to existing standards-making processes, an SBVR-enabled document authoring tool can be used for the natural language text in the standard, and an SBVR terminological dictionary authoring tool with its supporting SBVR terminology database can be used to author the content of Clause 3 "Terms and definition' of the standard.

Excellent Book on Creating Business Glossaries/Ontologies and Policy Manuals

There is a new, excellent, and easy to read book on this topic, "Business Knowledge Blueprints: Enabling Your Data to Speak the Language of the Business" (ISBN 978-0-941049-17-7), by Ronald G Ross. While this book features proprietary approaches of the author's firm that are not part of SBVR, this book was independently verified, before it was published, to assure that nothing in the book is inconsistent with the SBVR specification. The book's glossary maps its entries to the SBVR specification.