Interoperability

(from a SCOPE version 2 perspective)

2026 Ontology Summit

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SCOPE – Systems, Capabilities, Operations, Processes and Enterprises

Version 1 of the SCOPE Model for Interoperability Assessment -

https://www.engineeringsemantics.com/scope.html

Interoperability - Definitions

New Oxford American Dictionary

- The ability of computer systems or software to exchange and make use of information: *interoperability between devices made by different manufacturers*.
- The ability of military equipment or groups to operate in conjunction with each other

SCOPE Perspective (Version 2)

- *Interoperability is the ability to **communicate** 'effectively'*

Interoperability – Communication Paths

People -to- People - using natural languages, images, sound, physical gestures or contact

People -to- Machines - using natural languages, image, sounds or symbols translated (with potential content corruption) to (one or more) formal languages and representations

Machines -to- Machines - using formal languages and representations, images or symbols, perhaps with translations (with potential content corruption)

People -to- Machines -to- People - using natural languages, images, sounds or symbols to formal languages and representations, images or sounds and back to natural languages, images, sounds, or symbols with translations (with potential content corruption)

Machines -to- People - using formal languages, image, sounds, symbols, natural languages, or haptic mechanisms

Interoperability - Semantic

Interpretation - the particular way in which something is understood or explained

Mis-Interpretation - done by the receiver of a communication

Semantic Interoperability (SCOPE Version 2)

The ability to use the information communicated by a sender so that receivers' interpretation of the information is sufficiently similar to the intended interpretation of the sender for the purposes of the communication based on sufficient (a priori) context(s) shared among sender and receivers.

Interoperability – Language, Ontologies

- Natural language terms and definitions are (usually) ambiguous
    - But *critical for human communication*
- In many cases natural language terms are used (as non-logical symbols) for ontological constructs
- Well constructed (computational) ontologies constrain interpretation of (non-logical) symbols to the intended models

Interoperability - Scope

How much interoperability?

- Interoperability has costs
- What is the scope?

As with ontologies – What is the scope?

- The scope also entails the context(s) of the receiver
  - Which impacts (their) interpretation
- “We should never build an ontology unless we have some recognizable use for it.” (Barry Smith)
  - i.e. Need to know the scope.