• First edition published in 2010.
• Objectives
  – Facilitate cross-mapping between ISO/TC 211 terminology and technical vocabularies that have been adopted by industry-oriented geospatial communities for routine usage.
  – Establish a consistent approach to cross-mapping.
  – Facilitate semantic interoperability.
• Placed a strong emphasis on collaboration between vocabulary owners.
  – Cross-mapping should not be done unilaterally
Content of ISO 19146:2010

- Contextual information (informative)
- Principles for cross-mapping
- Cross-mapping methodology
- Register (based on ISO 19135:2005)
• ISO 19146:2010 is currently being revised.
  – CD ballot closed on 2017-04-04.
• The revised document retains the basic content of ISO 19146:2010.
• Main changes:
  – Addition of conformance classes and requirements
  – Modifications to cross-mapping principles.
  – Addition of Cross-Map Register to the conceptual schema.
  – Modification of the conceptual schema to include classes from ISO 19104:2016 and ISO 19135-1:2015.
  – Relocation of informative content to annexes.
Principles for Cross-Mapping

• **Recommendations rather than requirements**
  – Provide context for the normative content.

• **Emphasis on reconciling the cultures, processes and viewpoints of participating communities.**
  – Proceed as a collaborative venture.
  – Take place in an open and transparent environment.
  – Authority of each community should be acknowledged.
  – A stable reference vocabulary should be adopted.
  – Cross-mapping should not circumvent established processes.
  – Terminology should be consolidated rather than proliferated.
  – Cross-mapping should be published in a register.
  – Cross-mapping should lead to an expanded knowledge base.
  – Cross-mapping should accommodate continuous change.
Vocabulary Cross-Mapping Methodology

• Four stages
• Governance framework stage
  – Operating relationship between participating vocabulary owners is formalized.
• Reference vocabulary stage
  – A consistent reference vocabulary for cross-mapping is selected.
• Cross-mapping stage
  – The terms and definitions of cross-mapped terminological entries are classified.
• Registration and publication stage
  – An authoritative repository for cross-mapping outcomes is provided.
• The participating communities shall co-sponsor any initiative to cross-map their vocabularies.
  – Establish an open and transparent governance regime to provide oversight of the project.
• The governance regime shall be incorporated in a formal agreement between the participating communities specifying:
  – The establishment and membership of a steering committee and a project team;
  – The dispute resolution process;
  – The publication arrangements for the completed cross-mapping;
  – The ownership of any existing registers and sub-registers;
  – The ownership of any new registers and sub-registers.
Stage 2 - Reference Vocabulary Stage

- Reference vocabulary - Vocabulary that is the basis for terminological comparisons with one or more other vocabularies
- Each participating community shall identify and adopt its preferred reference vocabulary prior to commencing cross-mapping.
- There are two options, being:
  - Agreement by all participants to recognise a single reference vocabulary (for example, a vocabulary published by an ISO Technical Committee);
  - Each participant adopting its community vocabulary as its reference vocabulary, the cross-mapping being documented differently by each of the participants.
- The first option should be adopted wherever possible.
• Implement processes to:
  – identify candidate vocabulary entries, and
  – undertake term, concept and domain comparisons.

• Identification of candidate vocabulary entries
  – The process adopted for identifying candidate vocabulary records shall be at the discretion of the participating communities
Techniques for Identifying Candidate Mappings

- Traditionally the identification of mappings is an intellectual process.
- It needs one or more experts familiar with the relevant subject field(s), fluent in the language(s) of the vocabularies to be mapped, and having a good understanding of the structure and conventions of the vocabularies.
  - The expert should work systematically concept by concept, looking up the target vocabulary to establish the appropriate mapping(s).
- If automation is used, it is important to enable the expert to over-ride wrong term selections that were automatically entered.
- If mappings in the opposite direction are needed, the roles of source and target vocabulary should be reversed, and the same procedure repeated.
The development of a terminological entry requires the simultaneous resolution of three issues, being:

- the identification of the concept;
- the nomination of a designation (usually a term) for that concept;
- the construction of a definition, associated with the designation, that unambiguously describes the concept.

Ideally, the consistent resolution of the three will be guided by the principle that:

- for each concept there is a single term (and vice-versa); and
- for each concept there is a single definition (and vice versa).

The relationship of a concept to other concepts is reflected through its position in a concept system.

The ability to systematically relate concepts, both within and across concept systems is a precursor to the cross-mapping of vocabularies.
Term Comparisons and Domain Specification

- Term Comparisons
  - identical
  - synonymic
  - polysemic
  - homonymic
  - none

- Domain Specification
  - Where there is a polysemic or homonymic relationship between cross-mapped terms, the domain to which each of the respective terminological entries belong shall be specified.
  - For other term relationships, the domain to which each of the respective terminological entries belong shall be specified if it is not clearly inferred from the respective term.
  - The domain names shall be drawn from a controlled list to ensure consistent usage.
**Concept Relationships**

- **Equivalence** - matching concepts are found in two or more different vocabularies.
  - Exact when the concepts can be used interchangeably
  - Many be partial or inexact if the most closely matching concepts in two or more vocabularies are not exactly the same.

- **Hierarchical** - established between concepts when one is clearly broader than the other.

- **Associative** - established between concepts when they do not qualify for equivalence or hierarchical mappings, but are semantically associated
  - The dividing line between an associative mapping and inexact equivalence is ill-defined and subjective, but may be made pragmatically according to the context in which the mappings are to be use.
Concept Comparison Classifications

- Identical – reference concept and operating concept are identical (i.e. each phrase in the operating definition has a phrase of identical meaning in the reference definition and vice-versa),
- Generalization – reference concept is a generalization of the operating concept,
- Specialization – reference concept is a specialization of the operating concept,
- Peer – reference concept and operating concept share characteristics inherited from a common superordinate concept,
- Component – reference concept is a component of the operating concept,
- Aggregation – reference concept is an aggregation of two or more operating concepts,
- User-defined – community-specific relationship between the reference and operating concepts is defined by the vocabulary owners
- None – where there is no relationship between the concepts.
Stage 4 - Documentation and Publication Stage

• Recommendations regarding additions or amendments to the content of either the reference or operating vocabularies.

• The term and concept relationships, together with the domain identifiers, shall be published in a register that can be accessed by the participating communities of interest.
• ISO 19146:2010
  – Included separate sub-registers for the reference and operating vocabularies.
  – Included a class TR_TermCrossMap to include the cross-mapping information. This would have been better as a sub-register!

• ISO 19146:20xx (Revision of ISO 19146:2010)
  – For each cross-mapping project included in the register, there shall be:
    • a separate subregister containing the reference vocabulary,
    • a separate subregister containing the operating vocabulary,
    • a separate subregister containing cross-map entries.
Questions?