Artificial intelligence (AI) is the theory and development of computer systems able to perform tasks that normally require human intelligence, such as perception, decision-making and, when appropriate, explaining how conclusions are reached – “Explainable AI”, as the latter is called.

At the core of Explainable AI, and human communication, lies semantics, the aspect of linguistics concerned with meaning.

Semantics, at its simplest level, deals with the terminology and symbols used to communicate between parties. INSPIRE, providing semantics through its Code List infrastructure, is a global leader in the standardisation of terminology for general societal use. By using INSPIRE-compliant terminology in the data they collect and publish (possibly with non-standard, problem-specific terminology), public and private organisations, within and outside the European Union, can significantly enhance the value of their data.

This enhancement is achieved through the semantic interoperability the standards provide, and is nowhere more evident than in AI applications intended to be widely applicable, explainable and ethical.

This course will explain the concepts of semantics and AI in the broader context of knowledge engineering. Emphasis will be on how the quality of INSPIRE Code Lists is directly related to the power of AI applications that can be built on top of INSPIRE-compliant data sets.

An ontology is a specification of the meanings of the symbols in an information system and knowledge engineering involves the construction of ontologies to represent knowledge in different domains.

A forty-minute hands-on tutorial will illustrate some of the principles of knowledge engineering and the role INSPIRE Code Lists can play in creating problem-specific ontologies to support AI applications. Participants will be able to import INSPIRE Code Lists directly into their ontologies, thereby seeing for themselves the critical role these lists can play in enabling interoperability between knowledge and data.

From beginning to end the course will refer to two landslide susceptibility applications built on AI technology that uses INSPIRE Code Lists in its reasoning – one in Italy, and one in Canada, both using the same terminology and knowledge models.
The workshop has four main learning objectives for attendees:

• Understand that INSPIRE-compliant data is very valuable to the development of state-of-the-art AI applications
• Understand how feedback from developing explainable AI applications based on INSPIRE-compliant data can lead to improvements and/or extensions to INSPIRE
• Understand the key software and human components of internet-deployed AI systems
• Understand the difference between the knowledge engineering and machine learning sub-disciplines of artificial intelligence

Leveraging INSPIRE Data into Artificial Intelligence Applications

An Online Workshope on June 4th, 2020, starting at 8.00am, PST

Time Period	Section Title	Period	Presenter	Subjects to emphasise
00:00 to 00:05	Workshop Introduction	5 min	Clinton Smyth	
00:05 to 00:20	Artificial Intelligence	15 min	Prof. David Poole (University of British Columbia)	Introduce "Artificial Intelligence"; Distinguish perception and cognition; distinguish models and instances; mention joint roles of logic programming and reasoning with uncertainty (probability) in cognitive AI.
00:20 to 00:30	AI and Semantics	15 min	Clinton Smyth (Minerva Intelligence Inc.)	Define semantics and syntax; Taxonomies and Partonomies; Verbs (actions); Ontologies; Introduce taxonomy (TarmIt and ACE) and ontology editors; Propagation of properties controlled by ontology editor; Different kinds of reasoning; Difference between class-defining properties (eg: grain size for class "granite", and inferred properties useful in AI applications (eg: density range of granites)).
00:30 to 00:45	INSPIRE Semantics	10 min	Clinton Smyth	Focus on INSPIRE tools for managing semantics: VocBench3 and Re3gistry; Show INSPIRE Code Lists which confuse taxononomies with partonomies; Code List curating, discussion forum and versioning.
00:45 to 00:55	INSPIRE and AI	10 min	Clinton Smyth	Show how INSPIRE Code Lists end up in subject-predicate-object triples where they can be used for reasoning and explanations (RDB to RDF conversion tools, including dbConverter); Show link between data in INSPIRE tables and knowledge in scientific papers, EU environmental reports and EU law. Show LEO.
00:45 to 01:00	INSPIRE-based AI Application Example: Landslide Hazard Mapping	15 min	Gio Roberti (Minerva Intelligence Inc.)	Show how subjects discussed above play a role in the real-world Venetto landslide hazards application (mention how same standards and cognitive AI used for our British Columbia application).
01:10 to 01:25	INSPIRE and Global Standards for AI	15 min	Matt Harrison (BRGM)	Show how standard terminologies are being used to achieve interoperability at a global scale (eg: OneGeology.org, Loop3D.org, and any others), commenting on the potential they create for AI applications, and the global leadership role of INSPIRE.
01:25 to 01:30	Conclusion	5 min	Clinton Smyth	Summarise all the above.

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