

SYMPOSIUM ON SAFETY, QUALITY AND KNOWLEDGE MANAGEMENT IN SPACE  
ACTIVITIES (D5)

Knowledge Management and Collaboration in Space Activities (2)

Author: Ms. Roberta Mugellesi-Dow  
European Space Agency (ESA), United Kingdom, Roberta.Mugellesi.Dow@esa.int

Prof. Jeanne Holm  
University of California, Los Angeles, United States, Jeanne.Holm@jpl.nasa.gov

Mr. Gert Villemos  
Logica, Germany, gert.villemos@logica.com

DEVELOPMENT OF THE IAA SPACE ONTOLOGY ENABLING KNOWLEDGE EXCHANGE

**Abstract**

Introduction – This presentation describes the state of the IAA Space Ontology group, defining an ontology to enable the exchange of knowledge across organizational bounds. The group follows an 8 step approach; call for participation, identification of stakeholder, establishment of community, identify best practices, define high level requirements, identify ontologies and standards for inclusion, develop ontology and validate the ontology.

Background – Space missions are increasingly an international effort. Large programs such as the current suite of space situational awareness undertaken by international agencies require accurate discovery and exchange of information between many different providers. To be correlated the information must uniquely identify information such as location, provider and subject. For this an agreed ontology must be used.

The space ontology will facilitate: • Categorization of organizational knowledge. • Discovery of knowledge across organization boundaries. • Development of standardized tools based on the ontology structure.

Summary – The space ontology is based on a collaboration effort between the knowledge management organizations at ESA, NASA and DLR, as well as space industry. The ontology has been aligned with international space standard, including the CCSDS recommendations.

Following the call for participation, the identification of the core use cases and the establishment of the community, the group have reviewed existing ontologies and standards, identifying common elements.

Most space agencies and organizations have already defined specific ontologies and taxonomies. The aim of the IAC ontology is not to attempt to replace these, but to provide a common ground for knowledge detection and an exchange format. Each organization can define a mapping from the IAC ontology to the internal ontology. Using any two such mappings, a mapping between the organizations are established; from a class in organization A, to a class in IAC, to a class in organization B.

The analysis identifies common elements of the ontologies, such as: • Locations. The physical location related to a piece of information. • Organisational Structure. The structure of the organization. • Missions. The type of mission. • Instruments. The instruments carried on the mission.

The usage of the ontology is enabled through semantically rich technologies. Formal ontology languages such as the Rich Definition Language [RDF] and Web Ontology Language [OWL] provides the means to define the ontology and taxonomy. Using extensions such as the Ontology Mapping Language [OML] supports the required mapping between ontologies.