

Appendix 2

S.4.1. Knowledge Management of Space Systems Study Group Status Report

Responsible Commission:

- IAA Commission 4: Space Systems Operations and Utilization

Study Number and Title:

- S.4.1. Knowledge Management of Space Systems

Short Study Description

- Define the organizational and inter-organizational issues that support or inhibit knowledge sharing amongst aerospace organizations (including capturing knowledge of our key experts and aging workforce)
- Identify and recommend standards for knowledge management activities and initiatives to promote interoperability of key systems (such as lessons learned or publications)
- Create, through consensus, a position on the recommended approaches for an aerospace organization to investigate to excel at knowledge management

Website Study Information up to date?

- No

Issues requiring resolution?

- Status of IAF application for partner KM group?

Progress and Product Deliveries on Schedule?

- **Plan:** Support a better understanding among member and aerospace organizations of the ways in which they can share knowledge
 - **Action (ongoing):** Held second *International Conference on Knowledge Management for Aerospace* at Pepperdine University, Malibu, California, September 9-11, 2008. Papers were solicited from government, academia, and industry. Last year, there were 125 attendees. More at <http://bschool.pepperdine.edu/newsevents/kmforum/>
 - **Action (ongoing):** Scheduled third *International Conference on Knowledge Management for Aerospace* at Pepperdine University, Malibu, California, August 5-6, 2009.
 - **Action (ongoing):** Continue to co-lead a consortium of US aerospace industry, academia, and government space organization meetings on knowledge management. Team meets face-to-face 4-6 times a year. Participants include Northrop Grumman, The Aerospace Corporation, Boeing, Pratt Whitney Rocketdyne, Lockheed Martin, Raytheon, Computer Sciences Corporation, University of California at Irvine, Pepperdine University, California State University at Northridge, and NASA.
- **Plan:** Ensure that there is a set of related papers from workshop participants at the 2009 IAF conference that exemplifies excellent knowledge management practices at aerospace organizations.
 - **Action:** Continue to have combined Knowledge Management and Quality Management tracks.
 - **Action:** 12 papers submitted for the KM track for Daejeon.
 1. A Process of Code Inspection for Space Software
 - Mr. Marcos Romani <mromani@iae.cta.br>

- Instituto de Aeronautica e Espaço (IAE)
 - 2. A Refined Quality Control Method for Shenzhou-7 Manned Flight Mission
 - Mr. Jin yong <zhaozhigang077@yahoo.com.cn>
 - China Academy of Space Technology (CAST)
 - 3. Apollo: Learning From the Past, For the Future
 - Mr. Michael Grabois <michael.r.grabois@nasa.gov>
 - United Space Alliance, LLC
 - 4. Capturing Tacit Knowledge for Spacecraft Operations in ESOC
 - Ms. Roberta Mugellesi-Dow <Roberta.Mugellesi.Dow@esa.int>
 - European Space Agency (ESA)
 - 5. Development and evaluation of a prototype cross-search system for aerospace technical data management
 - Mr. Yoshikazu Miyano <miyano.yoshikazu@jaxa.jp>
 - Japan Aerospace Exploration Agency (JAXA)
 - 6. Learning from Space Operations: Lessons Learned as Drivers for Improvement
 - Mr. Stefano Scaglioni <stefano.scaglioni@esa.int>
 - European Space Agency (ESA)
 - 7. Status of the IAA Knowledge Management Working Group
 - Mrs. Jeanne Holm <jholm@jpl.nasa.gov>
 - NASA/Jet Propulsion Laboratory
 - 8. SWIFTER - Space Weather Informatics, Forecasting, and Technology through Enabling Research and Virtual Organizations
 - Mrs. Jeanne Holm <jholm@jpl.nasa.gov>
 - NASA/Jet Propulsion Laboratory
 - 9. Taxonomy for Space: Knowledge Sharing Amongst Countries
 - Mrs. Jeanne Holm <jholm@jpl.nasa.gov>
 - NASA/Jet Propulsion Laboratory
 - 10. The Implementation of Risk Management into the Concurrent Engineering Process
 - Mr. Andre Weiss <Andre.Weiss@dlr.de>
 - German Aerospace Center (DLR)
 - 11. Knowledge Management for ESA's Planetary Missions
 - Mr. G.H. Schwehm and Joe Zender, et al.
 - ESA-ESAC, Spain and The Netherlands
 - 12. Understanding and Implementing Knowledge Management Applied to the ESA Rosetta Mission
 - Mr. V. Dhiri, G. Schwehm, and J. Brinkmann <viney.dhiri@sciops.esa.int>
 - ESA-ESAC, Spain
- **Plan:** Ensure that there is a set of related papers from workshop participants at the 2010 IAC that exemplifies excellent knowledge management practices at aerospace organizations.
 - **Action:** Continue to combine Quality and Knowledge Management Track for track to be submitted for Daejeon.
 - **Plan:** Information will be posted on a web site for each of communication and status reference.
 - **Action:** Group has an online collaboration workspace and discussion forums.
 - **Action:** Expanded online community to ~135 members.

- **Plan:** Establish a forum for the ESA/ESOC community to discuss current activities in KM and share best practices
 - **Action (ongoing):** Strengthen relationship with Contractors Companies doing business with D/OPS Directorate. One-day Workshop on KM for Spacecraft Operations on the 18 February 2009 in ESOC. Approximately 30 participants from different companies have attended including AIS. The workshop's focus was specifically on Knowledge Management (KM) topics relevant to ESOC, however the findings and recommendations have a high potential of application beyond ESOC and could contribute to the development of the ESA-wide KM system as well as be of benefit to the participating companies. The companies explained how they have organized KM generally within the company and also in their support to D/OPS and the processes they are using. Learning how KM issues are addressed by them should also help to improve the mutual understanding of knowledge management.
 - **Action (ongoing):** Establish a D/OPS community of practice to discuss current activities in KM and share best practices involving the interested contractors companies, and also applicable to other ESA Directorates like D/LEX and D/TEC (especially interested is the Concurrent Design Facility, to increase the synergy with ongoing study on real-time knowledge capture).
 - **Action (ongoing):** Clarify and resolve the ESA internal open issues emerged during the Workshop: KM incentives, simplifying wiki access procedure, sharing knowledge from ESA studies, addressing KM obligations in SoW, clarify IPR situation.
 - **Action (ongoing):** Strengthen relationship with between ESA and NASA to share standard practices on KM, ontologies, and lessons learned methodologies.

- **Plan:** Information on KM activities will be posted on the external ESA web site for communication and status reference.

- **Plan:** Coordination with other key working groups to understand issues and share lessons learned.
 - **Action:** NASA has formalized an Information and Data Management Program that will support the coordination of knowledge management standards and interfaces with other space organizations. Study Group Chair leads that area of the new program.
 - **Action:** NASA and U.S. Air Force are funding work to formalize an ontology for aerospace internationally. Meetings have been held with U.S. industry, ESA, U.S. government organizations, Airbus, Rolls Royce Aerospace to test validity of concept.
 - **Action:** U.S. Federal Knowledge Management Working Group has broadened it's membership to include those interested in government issues for knowledge sharing globally. This group will be identifying emerging standards in the KM area and best practices in the field, with a focus area on space-related organizations. These will be brought up as part of the IAA group discussions for any potential applicability.

- **Plan:** A position paper on the recommended approaches for an aerospace organization to follow in knowledge management that would promote knowledge sharing and interoperability with other organizations
 - **Action (delayed):** Discussions have begun, paper has been outlined for draft review.

Study Team Member Changes?

- New members
 - Dr. Panagiotis Bamidis (Greece)
 - Dr. Roger Launius (US)
 - Dr. Sorosh Sorooshian, (US)
 - Mr. Stephan Ulamec (Germany)
- Online community to supplement working group—~135 members.

Name of Person Providing Study Group Status

- Jeanne Holm, Chief Knowledge Architect, NASA, Jet Propulsion Laboratory

Status Report Date

- 17 March 2009