Information and Communications Security – A core issue in modern spacecraft operations

ESA MOI Information Security Management System (ESA MOI ISMS)

Marko Butkovic
Ground Facilities ISMS Manager (HSO-ONO)
ESA/ESOC
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Overview

1. ESA Security Policy & MOI ISMS Strategy
2. ISMS Objectives
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4. MOI ISMS Architecture
5. MOI ISMS – Roadmap
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7. Certification Outcome
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9. Continuous Improvement
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ESA Security Policy & MOI ISMS Strategy

- ESA Security Agreement
  - Member States + ESA
- ESA Security Regulations
  - Member States (SEC)
- ESA Security Directives
  - ESA Corporate Level

QMS

ISMS Policy for ESOC MOI

- Establishments
  - Information Systems
  - Projects

MOI ISMS

- Missions ISMS
- Data Systems ISMS
- Ground Facilities ISMS
- MOI-IT ISMS
- Physical Security
ISMS Objectives

• **Compliance:** To comply with ESA Security Directives whilst following international standard (ISO 27001)  
  **Achieved!**

• **To Protect Current Business:** To remain as a trustworthy partner for Member States, international partners and Industry by protecting our assets against increasing threats  
  **Continuous!**

• **For Future Business:** To provide services for missions with higher security requirements similar to our institutional partners who have already established such schemes and achieved accreditations/ certifications  
  **More Confidence!**
MOI ISMS Scope – ISO 27001 (MOI Infrastructure at ESOC)
MOI ISMS Scope – ISO 27001 (ESTRACK)
MOI ISMS Scope – ISO 27001
(Detailed View)

Scope of Certification for ISO 27001:
The Mission Operations Infrastructure (MOI), its services and supporting processes. The MOI includes:

- The operational ground facilities at ESA's Space Operations Centre in Darmstadt and ESTRACK ground stations
- The ground data systems for mission and ground station control, navigation, flight dynamics, test facilities
- The supporting computer and communication systems
MOI ISMS (I10)

Projects should benefit from MOI ISMS!

MOI ISMS (I10)

Science & Robotic Expl. Programme ISMS (I6)
Earth Observation Programme ISMS (I5)
Telecomms/Nav Programmes ISMS (I7)
Tech. Prog. ISMS (I8)
Human Space Prog. ISMS (I9)

Ground Facilities ISMS (I3)
Data Systems ISMS (I2)
MOI-IT ISMS (I1)
Physical Security

Note: I1,I2..Ix represent ISMS sub-systems. ISMS 10 (I10)=Overall MOI ISMS
MOI ISMS - Roadmap

MOI ISMS Cycle 1 (ESD)
- Corrective Actions
- Control Implementations - Phase 2
- SSRS
- SECOPS
- Training
- Set objectives & establish
- Monitor & review
- Maintain & improve

MOI ISMS Cycle 1 (ISO)
- Prepare for ISO 27K
- Audit
- 04/2012
- ESO Audit
- 06/2012
- ISO Audit
- 04/2013
- 05/2013

MOI ISMS Cycle 2
- Control Implementations - Phase 3
- SSRS
- SECOPS
- Training
- Continuous Cycles...

ESO Certification
- Corrective Actions
- Control Implementations - Phase 2
- SSRS
- SECOPS
- Training
- Set objectives & establish
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ISO Certification
- ESO Certification
- Corrective Actions
- Control Implementations - Phase 3
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- Training
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ESO Audit
- 04/2012
- 06/2012

ISO Audit
- 04/2013
- 05/2013

04/2014

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ESA UNCLASSIFIED - Releasable to the Public
Example Plan-Do-Check-Act (End-to-End)

- **Scope**: Systems in G/S
  - **Risks**: Windows Viruses
    - **Treatment**: Reduce risk
      - **SoA**: InfoSec 141/237, A.10.4.1
        - **SSRS**: SSRS-MOI-GndF-011

- **Coordination**: ESTRACK Deployment
  - **AV Protection Operational**: SECOPS
    - **Training**: Evidence
      - **Evidence**: CCC Incident #110066
Certification Audit Outcome

Audit Passed

Registered with NQA

0 Major NCs

0 Minor NCs

1 positive Observation

8 OFIs

Certification Successful
Lessons Learnt

- The aforementioned layered approach has indeed simplified the definition of the work breakdown structure and its gradual implementation.
- It is based on a close coordination among various domains, which has mainly been achieved by means of a center-wide Business Continuity Management System (BCMS) and by linking ISMS documented procedures with existing QMS procedures.
- Definition of scope, resource allocation and managing operational impact must be carefully considered.
- The people within the organization need to embrace security changes/improvements to their work environment.
- It is crucial to sensitize the affected staff by conducting an awareness campaign before implementing new technical and procedural controls.
Continuous Improvement

Continuous Security Improvement Process!

Contact:
Marko Butkovic (ESA/ESOC)
Ground Facilities ISMS Manager
E-mail: Marko.Butkovic@esa.int
Acronyms

- EGOS Data Dissemination System
- ESA: European Space Agency
- ESOC: ESA's Space Operations Centre
- FDS: Flight Dynamics System
- GSMS: Ground Station Management Systems
- ISMS: Information Security Management System
- MATIS: Mission Automation System
- MCS: Mission Control System
- MOI: Mission Operations Infrastructure
- MPS: Mission Planning System
- NC: Non-Compliance
- NIS: Network Interface System
- OFI: Observation for Improvement
- SIM: Spacecraft Simulator
- TMTCS: TM and TC System