**RASDS ++ DRAFT TABLE OF CONTENTS**

**1  INTRODUCTION**

1.1  SCOPE (Reference Architecture framework and methodology for space (data) systems)

1.2  PURPOSE (Define method, provide useful set of viewpoints, object types & representations, provide common language & ontology)

1.3  APPLICABILITY (Architecture descriptions for projects, systems, standards, systems of systems)

1.4  RATIONALE (Existing methods for terrestrial systems do not usually have support for space systems that are in motion, at great distance, subject to delays and disruption in communications, or in challenging operational environments. Many methods to do not adequately support description of technical / protocol architectures.)

1.5  MANDATORY SECURITY SECTION (Security will be addressed, as appropriate, in each section.)

1.6  DOCUMENT STRUCTURE (see below)

1.7  REFERENCES (25-30, including some updates and some new ones)

**2  OVERVIEW**

2.1  GENERAL (Reference ISO 42010 as a meta-model, RM-ODP origins)

2.2  VIEWPOINTS AND VIEWPOINT SPECIFICATIONS (Describe relationships among Viewpoint, Views, Correspondence)

2.3  OVERVIEW OF VIEWPOINTS (briefly introduce the 5 existing / modified viewpoints and three new ones, clarify importance of clear definition of terms and consistent use within / across / between viewpoints (correspondence))

2.4  ENTERPRISE VIEWPOINT (organizations, requirements, processes)

2.5  FUNCTIONAL VIEWPOINT (abstract functions)

2.6  Physical VIEWPOINT (Nodes & Connections)

2.6.1  CONNECTIVITY VIEWPOINT (Communicating Nodes & Links)

2.6.2  Structural VIEWPOINT (Components & connectors)

2.7  COMMUNICATIONS VIEWPOINT (protocols)

2.8  INFORMATION VIEWPOINT (information objects)

2.9 Services Viewpoint (services & interfaces)

2.10 Operations Viewpoint (procedures & activities)

2.11  CORRESPONDENCES BETWEEN VIEWPOINTS (new diagram and description, emphasize clear definition of terms and consistent use within / across / between viewpoints)

**3  BASIC CONCEPTS**

3.1  GENERAL (modeling, methods, different representations); **Assignment: Peter**

3.2  DEFINITIONS (define the terms)

3.3  GRAPHICAL REPRESENTATIONS (PPT cartoons, introduce concept of mapping to Ontology & MBSE views)

3.4  CHARACTERISTICS OF OBJECTS (the basic Object abstraction)

**4  ENTERPRISE VIEWPOINT**

4.1  OVERVIEW

4.2  CONCEPTS (architectural methodology, including correspondences, to provide grounds for discussing requirements, processes (engineering, IV&V, mission assurance – 15288)). **Assignment: Fred**

4.3  ENTERPRISE OBJECTS (Organizations & domains, capabilities, resources, people, requirements, agreements, budgets, contracts)

4.4  CHARACTERISTICS OF ENTERPRISE OBJECTS (roles, responsibilities, scope, funding, rules, safety (human rated & other))

4.5  EXAMPLES OF SPACE DATA SYSTEMS DESCRIBED WITH ENTERPRISE VIEWPOINT

4.6  SECURITY ISSUES IN THE ENTERPRISE VIEWPOINT

**5  FUNCTIONAL VIEWPOINT**

5.1  OVERVIEW

5.2  CONCEPTS (including correspondences, implemented functions, information, allocation map to deployment). **Assignment: Peter**

5.3  FUNCTIONAL OBJECTS (abstract functions, functional compositions, abstract behavior, abstract provided interfaces & data flows, abstract information objects,)

5.4  CHARACTERISTICS OF FUNCTIONAL OBJECTS

5.5  EXAMPLE OF A SPACE DATA SYSTEM DESCRIBED FROM THE FUNCTIONAL VIEWPOINT

5.6  EXAMPLE OF SPACE DATA SYSTEM WITH INFORMATION MANAGEMENT INFRASTRUCTURE

5.7  SECURITY ISSUES IN THE FUNCTIONAL VIEWPOINT

**6  PHYSCIAL VIEWPOINT**

6.1  OVERVIEW

6.2  CONCEPTS (the physical and deployment views of objects, including correspondences between different types of Physical Nodes/Components using Links/Connectors). **Assignment: Ramon**

6.3  CHARACTERISTICS OF PHYSCIALOBJECTS (size, mass, location, motion, …), CHARACTERISTICS OF ENVIRONMENT (EMI/EMC, radiation, thermal, gravitational, vacuum, …)

6.4  PHYSICAL NODES/COMPONENTS (any physical system object, from S/C down to a screw)

6.5  PHYSICAL LINKS/CONNECTORS (any kind of physical connection between nodes)

6.6  SPECIALIZATIONS OF SPACE DATA SYSTEMS DESCRIBED IN PHYSICAL VIEWS (connectivity/ communications, energetic, structural, …)

6.7  CHARACTERISTICS OF PHYSICAL/CONNECTIVITY (communicating) OBJECTS

6.7.1  NODES (communicating nodes, location, motion, environment)

6.7.2  LINKS (RF, Optical, cable, fiber, distances, noise, availability)

6.7.3 EXAMPLES OF SPACE DATA SYSTEMS DESCRIBED WITH PHYSICAL/CONNECTIVITY VIEWS (communications deployment diagrams)

6.7.4 SECURITY ISSUES IN THE PHYSICAL/ CONNECTIVITY VIEWPOINT

6.8  CHARACTERISTICS OF PHSYCIAL/STRUCTURAL OBJECTS

6.8.1  COMPONENTS (connected structures, location, motion, environment, physical forces, coatings, flammability,…)

6.8.2  CONNECTORS (weldments, rotational, bolted, magnetic, electrical, gravitational, vibrational, thermal, …)

6.8.3  EXAMPLES OF SPACE DATA SYSTEMS DESCRIBED WITH PHYSICAL/STRUCTURAL VIEWS (physical deployment diagrams)

6.8.4 SECURITY ISSUES IN THE PHYSICAL/STRUCTURAL VIEWPOINT

**7  COMMUNICATIONS VIEWPOINT**

7.1  OVERVIEW

7.2  CONCEPTS (including correspondences to connectivity/deployment and information). **Assignment: Peter**

7.3  CHARACTERISTICS OF COMMUNICATIONS OBJECTS (protocols, PDUs, reqd/provided/peer interfaces, behavior, applicability)

7.4  PROTOCOL ENTITIES (protocol layers, stacks, standards)

7.5  EXAMPLES OF SPACE DATA SYSTEMS DESCRIBED WITH COMMUNICATIONS VIEWPOINT

7.6  PROTOCOL REPRESENTATIONS IN THE COMMUNICATIONS VIEWPOINT (stacks, single node deployments, end-to-end deployments)

* 1. SECURITY ISSUES IN THE COMMUNICATIONS VIEWPOINT

**8  INFORMATION VIEWPOINT**

8.1  OVERVIEW

8.2  CONCEPTS (including correspondences to enterprise, functional, communications, operations, services). **Assignment: Costin**

8.3  CHARACTERISTICS OF INFORMATION OBJECTS (type, semantics, syntax, representation, structures, relationships, rules, constraints)

8.4 OBJECT VIEWS (data items, structures, taxonomy, ontology)

8.5 EXAMPLE OF SPACE DATA SYSTEM FUNCTIONS WITH
INFORMATION VIEWPOINT

**9 Services Viewpoint (services & interfaces)**

9.1  OVERVIEW

9.2  CONCEPTS (including correspondences to enterprise/capabilities, functions, operational, deployment). **Assignment: Fred**

9.3  SERVICES OBJECTS (services, related functions, operations, interfaces binding & data flows)

9.4  CHARACTERISTICS OF SERVICES OBJECTS

9.5  EXAMPLE OF A SPACE DATA SYSTEM DESCRIBED FROM THE SERVICES VIEWPOINT

9.6  EXAMPLE OF SPACE DATA SYSTEM WITH SERVICE VIEWS

9.7  SECURITY ISSUES IN THE SERVICES VIEWPOINT

**10 Operational Viewpoint (procedures & activities)**

10.1  OVERVIEW

10.2  CONCEPTS (including correspondences to enterprise, functions, information, deployment). **Assignment: Costin**

10.3  OPERATIONAL OBJECTS (process, procedure, activity, task, …)

10.4  CHARACTERISTICS OF OPERATIONAL OBJECTS

10.5  EXAMPLE OF A SPACE DATA SYSTEM DESCRIBED FROM THE OPERATIONS VIEWPOINT

10.6  EXAMPLE OF SPACE DATA SYSTEM WITH OPERATIONAL VIEWS

10.7  SECURITY ISSUES IN THE OPERATIONAL VIEWPOINT

**11 DERIVING OTHER VIEWS FROM THE BASIC VIEWPOINTS** .

11.1  GENERAL

~~11.2  CROSS SUPPORT SERVICE VIEWS (Now Services VP, not needed)~~

11.3  LAYERED VIEW EXAMPLE (really a protocol stack mapping to deployment view)

11.4  EXAMPLE MAPPING FUNCTIONAL TO CONNECTIVITY VIEW (functional mapping to deployment view, with engineering trades shown)

Process / activity flow mapped to System design allocations / swimlanes???

Relationships of architecture to engineering / dev / IV&V / Launch / ops / retirement lifecycle???

**ANNEX A ANNEX B ANNEX C ANNEX D**

Figure

**NOTES ON USE OF RASDS** ....................................................................... **A-1**

**FORMAL METHODS AND TOOLS**..(MBSE, SysML, OML)...................**B-1**

**RASDS AND DODAF COMPARISON**....................................................... **C-1**

**GLOSSARY AND ACRONYMS** ................................................................. **D-1**