

Draft Report Concerning Space Data System Standards

**XML FORMATTED DATA UNIT (XFDU)
INTEROPERABILITY TESTING
REPORT**

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1 INTRODUCTION

1.1 PURPOSE AND SCOPE

The CCSDS has developed the XML Formatted Data Unit (XFDU) for the packaging of data and metadata, including software, into a single package (e.g. file or message) to facilitate information transfer and archiving. The scope of application of XFDU is the entire space informatics domain from operational messaging to interfacing with science archives.

To support the development of the structure and construction rules of XFDU in the CCSDS international and cross-supporting environment, an international interoperability test was organized and successfully executed. This test program involved three implementations of the XFDU specifications developed by ESA, NASA and CNES. All implementations have been used for generating XFDU packages that have been exchanged to validate both their coverage of the specifications and their interoperability. This paper is a final report on the process of testing, the test results.

1.2 ACRONYMS AND ABBREVIATIONS

AIP	<i>Archival Information Package</i>
ASCII	American Standard Code for Information Interchange
CCSDS	Consultative Committee for Space Data Systems
CRC	Cyclical Redundancy Check
DIP	<i>Dissemination Information Package</i>
ISO	International Organization for Standardization
MIME	Multipurpose Internet Mail Extensions
MMFI	ESA Multi-Mission Facility Infrastructure
OAIS	<i>Open Archival Information System</i>
PDI	<i>Preservation Description Information</i>
SIP	<i>Submission Information Package</i>
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
W3C	World Wide Web Consortium
XFDU	XML Formatted Data Unit
XML	Extensible Markup Language

1.3 REFERENCES

- [1] *XML Formatted Data Units — Structure and Construction Rules*. Recommendation for Space Data System Standards, CCSDS 620.0-B-1. Blue Book. Issue 1. Washington, D.C.: CCSDS, December 2007.
- [2] *Standard Archive Format for Europe (SAFE) – Control Book Volume 1 – Core Specifications*. PGSI-GSEG-EOPG-FS-05-0001. Issue 1, Revision 4. European Space Agency, ESA October 29, 2006.

- [3] *Standard Archive Format for Europe (SAFE) – Control Book Volume 2 – Recommendation for Specialisations*. PGSI-GSEG-EOPG-FS-05-0002. Issue 1, Revision 4. European Space Agency, ESA October 29, 2006.
- [4] *Standard Archive Format for Europe (SAFE) – I/O Java/C++*. Application Programming Interface. European Space Agency ESA and GAEL Consultant <<http://www.gael.fr/safe>>
- [5] *XML Formatted Data Unit (XFDU) Toolkit*. National Administration for Space and Aeronautics. NASA, <<http://sindbad.gsfc.nasa.gov/xfdu>>
- [6] *XML Formatted Data Unit (XFDU) – I/O Java/C++*. Application Programming Interface. European Space Agency and GAEL Consultant <<http://www.gael.fr/xfdu>>
- [7] *XML Formatted Data Unit (XFDU) – Viewer*. Centre National d’Etudes Spatiales CNES and GAEL Consultant <<http://www.gael.fr/xfdu-view>>

2 THE XML FORMATTED DATA UNIT

A high level view of the XFDU is shown in Figure 2-1. It consists of an interchange file, called the Package Interchange File, that contains an XML structured Manifest Document and possibly other files. However it also logically includes other external objects (typically files) pointed to from within the Manifest Document. The Package Interchange File may also be an XML file, or it may be some type of binary file archive format such as ZIP or JAR.

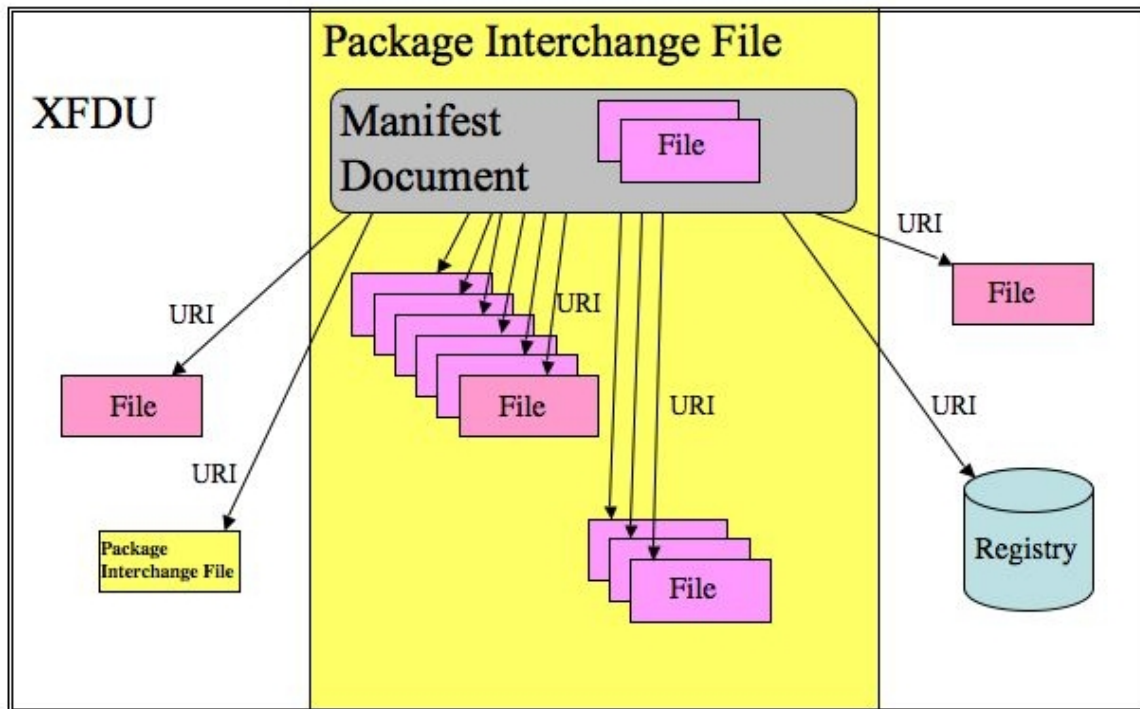


Figure 2-1: An XFDU as a Package interchange File

An XFDU consists of a interchange file containing a Manifest Document and possibly other files, but logically includes other external objects (files) pointed to from the Manifest Document.

The Manifest Document has a few major components whose functions and relationships are shown in the following Figure

The Manifest includes a mandatory structure map section, called an Information Package Map (which may be repeated) that defines one or more Content Units. The Manifest Document has a few major components whose functions and relationships are shown in Figure 2-2. It includes a mandatory structure map section, called Information Package Map (which may be repeated) that defines one or more Content Units.

A Content Unit may contain other Content Units, and each Content Unit has a number of other optional attributes and elements. Its attributes allow reference to associated Metadata Objects by internal pointers to elements in the Metadata Object section. Therefore a Content Unit can be used to associate a Data Object with one or more Metadata Objects, and multiple Content Units can present a hierarchical view of these data/metadata associations.

The attributes of a Data Object in the Data Object section are used to provide information such as mime type, size in bytes, checksum value and type, an internal pointer to associated Representation Information, and an identifier for information registered with a given registration authority. The elements describing a Data Object enable the object to be described as a sequence of one or more byte streams. The location of each byte stream is given either by a pointer (e.g., URL), or it may be included as Base64 octet sequence. Note that each byte stream also has a set of attributes that can be used to provide mime type, size in bytes, checksum value and type. Further, each byte stream may have an associated transformation element giving the type of transformation that has been applied to the byte stream in its current state.

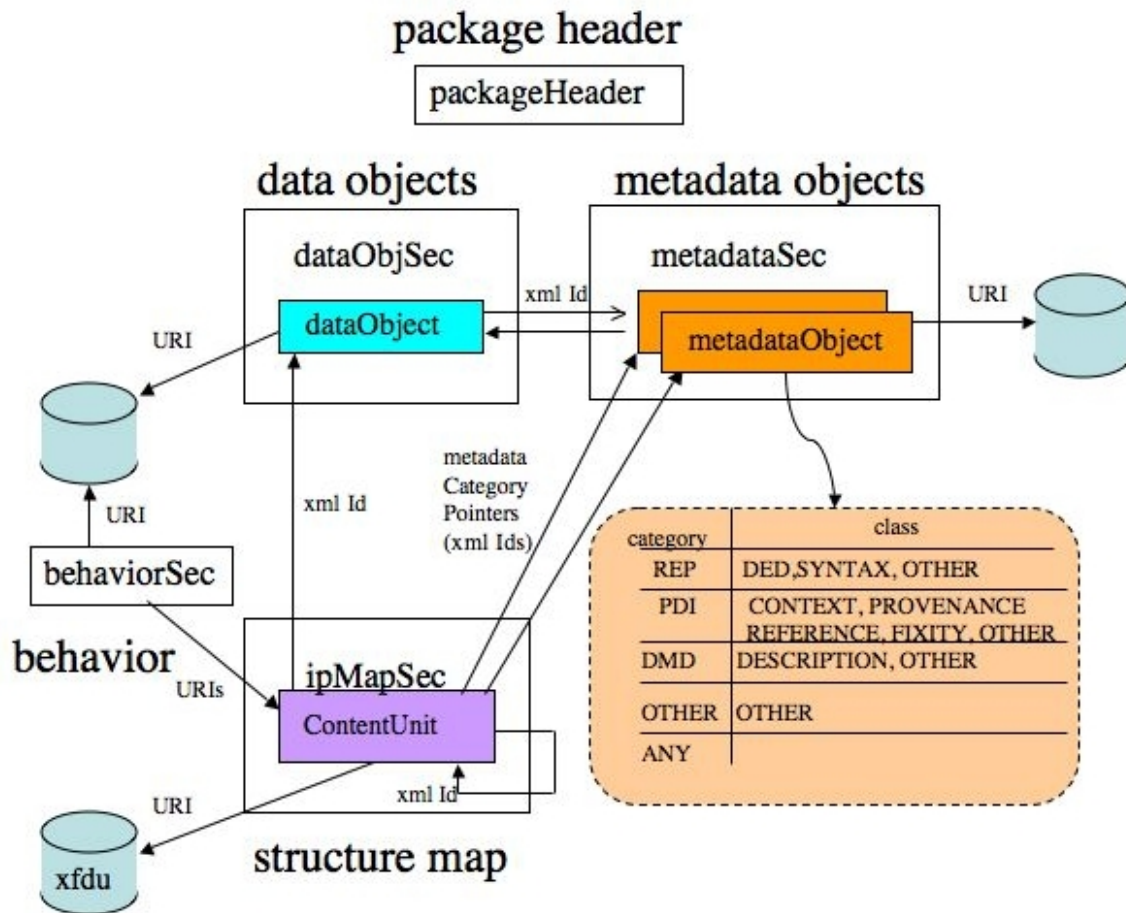


Figure 2-2: XFDU Manifest Document

In the Metadata Object section, the attributes of a Metadata Object, like those of a Content Unit, can be used to categorize and classify the objects, including the ability to distinguish among Representation Information, Preservation Description Information (PDI), and Descriptive Information as shown in Figure 2-2. The elements describing Metadata Objects are used to either encapsulate the actual object in base64, or to point to a Data Object in the Data Object section. This allows a Metadata Object to also be described as Data Object in the Data Objects section.

A Behavior Section contains one or more Behavior Objects (behaviorObject) that associate executable behaviors with content in the XFDU object. A Behavior Object contains an Interface Definition (interfaceDef) that represents an abstract definition of the set of behaviors represented by a particular Behavior Object.

A Package Header contains administrative metadata for the whole XFDU Package, such as version, operating system, hardware, author, etc, and it may contain metadata versions/extensions that must be understood to successfully process the contents of the XFDU. An example of this metadata is a reference to an implementation of an algorithm to reverse a transformation that has been applied to some of the data objects within the containing XFDU

3 IMPLEMENTATIONS IDENTIFICATION

Whether for operational, experimental or specification support purposes, ESA, NASA and CNES have developed and updated three implementations of the XFDU. Among those, the NASA implementing software is independent from the others. The ESA and CNES implementations are based on the same platform but address different areas of the XFDU structure and construction rules. A general description of all these implementations is provided in the remaining sections of the present chapter.

3.1 ESA IMPLEMENTATION

The ESA implementation, called Standard Archive Format for Europe (SAFE) was developed not only for prototyping and validating XFDU concepts but also to become an operational material contemporaneously with the first official issue of the XFDU Blue Book [1]. SAFE is a file format standard that conforms to the XFDU construction rules and adapts it to Earth Observation products. SAFE is a suite of components including:

- A *SAFE Core Control Book* [2] governing the specialization of XFDU structure and construction rules that all SAFE packages shall conform to;
- A *Recommendation for Specializing SAFE Core Control Book* [3] that describes a series of methods and rules that should be used by specialization builders;
- A set of 19 *SAFE Specialized Control Books* that specializes the *SAFE Core Control Book* described above to more than a hundred of product types originating for various Earth Observation spacecrafts and sensors e.g. Landsat series, ALOS, ENVISAT, ERS 1-2, MODIS, NOAA, SPOT, etc.
- A *SAFE I/O Java API* [2] which proposes a Java interface for reading and writing XFDU/SAFE products. The SAFE I/O Java API implements a subset of the XFDU structure and construction rules: the feature coverage of the implementation can be deduced from the left columns of the Interoperability Test Matrix provided in Chapter 5.
- A *SAFE C++ I/O API* [2] which wraps around the SAFE Java API described above, for integration with C++ or native systems.
- *SAFE Transform* software component that is dedicated to the conversion of product from some legacy formats to SAFE, and consequently to XFDU.

The SAFE suite is a free material that can be downloaded from the official ESA Web site <<http://earth.esa.int/safe>>. Source code of software components are currently not made available.

The interoperability tests performed with the SAFE software components are reported in ANNEX A and summarized in chapter 5 below.

3.2 NASA IMPLEMENTATION

The NASA implementation, called XFDU Toolkit, was developed as a reference implementation for XFDU standard. The XFDU Toolkit is a library implementing set of APIs for XFDU manipulation. XFDU API Library conceptually consists of two layers. The first (core) layer is low level API representing each structure in XFDU schema. The second layer is more high level API. It aggregates parts of functionality from the first layer; thus, allowing easier access to constructing and manipulating an XFDU package. The toolkit is implemented in JAVA programming language. The core layer is generated directly from XFDU XML schema using Java API for XML Binding (JAXB). The toolkit implements majority of XFDU defined functionality except dealing with behaviors. The XFDU Toolkit requires java 5+ to operate. The XFDU Toolkit and accompanying documentation are available at <http://sindbad.gsfc.nasa.gov/xfdu>. To download binary and source distribution special login is required and authorized by NASA.

The interoperability tests performed with the NASA software components are reported in ANNEX B and summarized in chapter 5 below.

3.3 CNES IMPLEMENTATION

CNES contributed to the implementation effort by upgrading the ESA software to experiment Behavior Objects that was not covered and by augmenting it with a graphical user interface. This activity led to a desktop application named “XFDU View” [7] and for which the main interface is illustrated in the figure below.

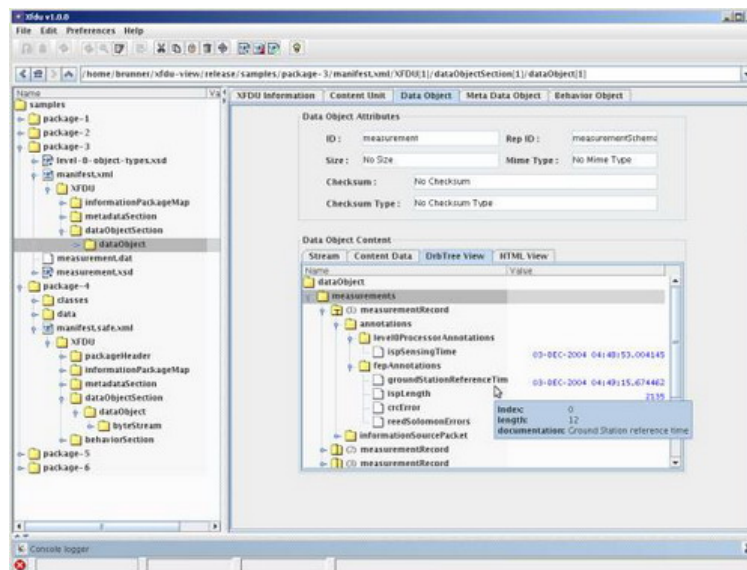


Figure 3-1: XFDU View Main Interface

The XFDU View and accompanying material is free and can be downloaded from <<http://www.gael.fr/xfdu>>. The source code of the software is not Source code of software components are currently not made available.

The interoperability tests performed with the CNES XFDU Viewer software components are reported in ANNEX C and summarized in chapter 5 below.

4 INTEROPERABILITY TEST DEFINITION

The interoperability test activity was driven by the process summarized in the following diagram.

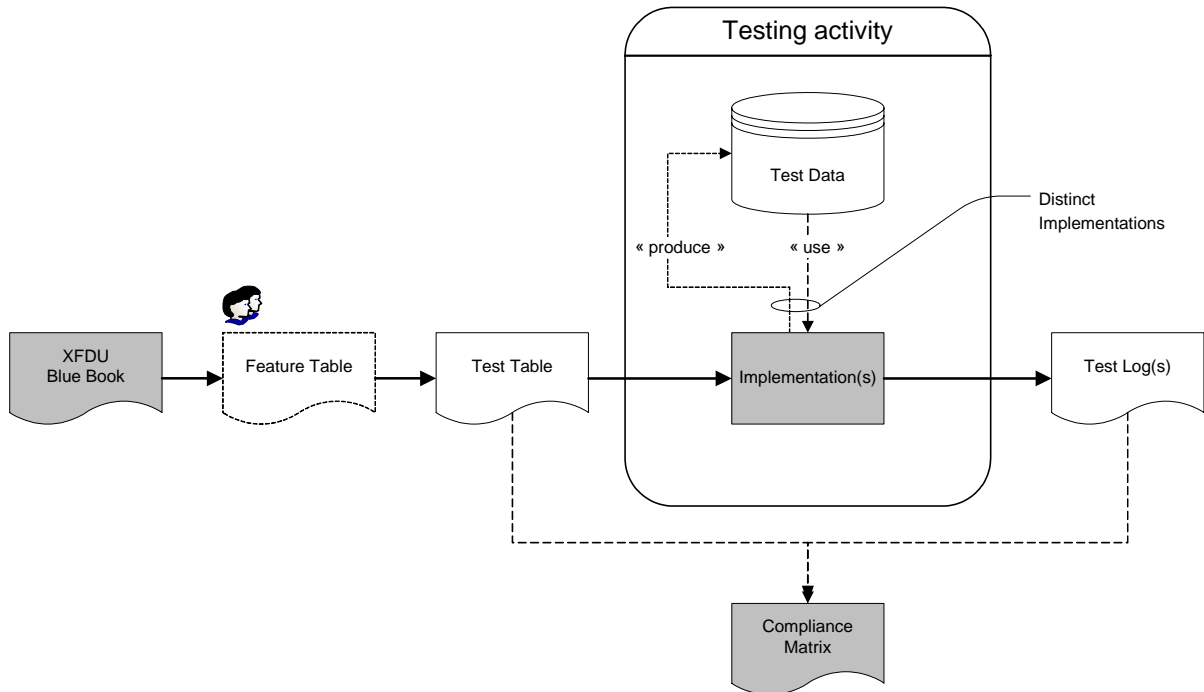


Figure 4-1: Interoperability Testing Process

A first activity conducted during the CCSDS MOIMS meeting held in Heppenheim, Germany was to identify a set of features that should be verified during the interoperability testing. During the same meeting, the resulting feature table led to a set of tests that are summarized in the following table.

It was also decided to use existing XFDU instances based on actual products rather than create artificial test data.

Test Name	Description
Input/Output	
1. Read XML file	The test consists in opening an XFDU Package conforming to [1] from a path locating its Manifest file on the local file system. The test is considered successful if the implementation does not fail, claim to have recognized an XFDU Package and provides pieces of values extracted from the Manifest e.g.

Test Name	Description
	structure of the information package map section, list of metadata objects, etc.
2. Write XML file	The test consists in writing an XFDU Package on the local file system. The test is considered successful if the resulting XFDU Manifest is well-formed and valid according to the reference XFDU XML Schema [1].
3. Read ZIP file	The test consists in opening an XFDU Package conforming to [1] in which XFDU Manifest and accompanying components have been bundled in a ZIP archive. The test does not constraint the means to specify the location of the package e.g. it may be designated by the location of the ZIP file or by a virtual XPath that references the Manifest file within this package. The test is considered successful if the implementation does not fail, claim to have recognized an XFDU Package and provides pieces of values extracted from the Manifest e.g. structure of the information package map section, list of metadata objects, etc.
4. Write ZIP file	The test consists in writing an XFDU Package with its Manifest and accompanying Components bundled in a ZIP file. The test is considered successful if (optionally extracted from the archive) the resulting XFDU Manifest is well-formed and valid according to the reference XFDU XML Schema [1].
Package Header	
5. specificationVersion check	The test consists in accessing the Package Header of a Manifest document and in verifying the version number. The test is considered successful if the version has been successfully retrieved and displayed.
6. sequenceInformation check	The test consists in accessing the package sequence number from the Package Header of a Manifest document. The test is considered successful of the sequence information has been successfully retrieved and displayed.
Information Package Map	
7. contentUnits tree check	The test consists in reading and interpreting the overall Content Units contained in the information package map section of an XFDU package. The test is considered successful if the overall Content Units are

Test Name	Description
	read and displayed, reporting in particular the nesting levels of the units.
Metadata Section	
8. metadata reference access	The test consists in reading and interpreting a Metadata Object that have a URL reference to an external component. The test is considered successful if the reference could be read and displayed. The fact that implemented software supports opening the referenced file is not part of the testing.
9. metadata wrapped	The test consists in reading and interpreting a Metadata Object that have XML wrapped content. The test is considered successful if the content could be read and displayed. The fact that implemented software is being able to interpret the wrapped content is not part of the testing.
Data Object Section	
10. Size check	The test consists in verifying the @size attribute of the Data Objects. The test is considered successful of the implementation was able to read the size, compute the actual size of the wrapped of referenced content and compare the two values.
11. Data object reference access	The test consists in reading and interpreting a Data Object that have a URL reference to an external component. The test is considered successful if the reference could be read and displayed. The fact that implemented software supports opening the referenced file is not part of the testing.
12. Data object wrapped	The test consists in reading and interpreting a Data Object that have XML wrapped content. The test is considered successful if the content could be read and displayed. The fact that implemented software is being able to interpret the wrapped content is not part of the testing.
13. Checksum check	The test consists in verifying the checksum attribute of the Data Objects. The test is considered successful of the implementation was able to read the checksum, compute the actual size of the wrapped of referenced content and compare the two values.
14. Namespace extension	The test consists in verifying that the implementation supports XFDU packages that include elements

Test Name	Description
	defined in separate namespaces. The test is considered successful if the implementation does not fail while reading these packages even if it is not able to handle the externally defined elements.

Table 4-1: Test Table Summary

The results of these tests are discussed further in Section 5.1.

5 TEST ACTIVITIES

5.1 PHASE 1 TESTING

The initial phase of testing consisted of exchanging existing instances of XFDU's that were created for internal agency testing (NASA and CNES) or ESA SAFE XFDU's that described actual data products stored in ESA Earth Observation product Archive (MMFI). These datasets were intended to cover the features and operations described in Section 4. The truncated XFDU Manifests and individual test results can be found in ANNEX A to ANNEX C. The annexes are organized by the Agency that produced the test products. The sections within the annexes are organized by the test product and the first two subsections describing the test XFDU and the following subsections stating the test results by Agency.

The first phase of testing began on 12-Oct-2007 during a CCSDS MOIMS Technical Meeting. Several iterations of the tests were required to resolve the use of different versions of the XFDU Schema at the time of the XFDU production and the need to update the XFDU schemas to the final Blue Book specification. A draft test report was developed by the ESA editor and discussed during several telecons during late December 2007.

The review of the Test Report indicated the need to perform tests with error conditions to better illustrate the interoperability of the validation mechanisms between the implementations.

5.2 PHASE 2 TESTING

The Phase 2 testing was focused on the ESA and NASA implementations in the period from 27-December-2007 to 7-January-2008. The major area that required retesting to prove the interoperability criteria stated in Section was the Package Header due to the fact that the ESA implementations did not use the optional Package Header component so the SAFE reports used as test report output did not indicate the success or failure of validating that area.

Other intentional errors included in the XFDU test instance were included to insure that errors were reported in key areas.

The following tests were re-run with the introduction of intentional errors:

- Package header
 - specificationVersion check
 - sequenceInformation check
- Information Package Map
 - contentUnits tree check - incorrect
- Data Object
 - Checksum check
- Namespace Extension check
 - Additional test of reconstituting manifests

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The results of these tests are presented in Annex D of the XFDUI interoperability Report. The review of these tests found that they did better illustrate the interoperability in these areas and the interoperability testing was completed.

The results of these tests are presented in ANNEX D. The review of these tests found that they did better illustrate the interoperability in these areas and the interoperability testing was completed.

6 INTEROPERABILITY TEST MATRIX

A check (✓) in the implemented columns indicates that the agency implementation supports the operation defined by the row. An "✖" in the implemented columns indicates that the agency implementation does not support the operation defined by the row. A check (✓) in the interoperability columns indicates that the functionality required for interoperability of the operation was proven for the agency pair specified in the column heading. A question mark (?) in the interoperability columns indicates that the functionality required for interoperability of the operation could not be proven due to Agency decisions not to implement optional XFDU functionality

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Functionality/Test	Implemented			Interoperability						Comments
	ESA	NASA	CNES	NASA → ESA	NASA → CNES	ESA → NASA	ESA → CNES	CNES → ESA	CNES → NASA	
Input/Output										
1. read xml file	✓	✓	✓	✓	✓	✓	✓	✓	✓	
2. write xml file	✓	✓	✓	✓	✓	✓	✓	✓	✓	
3. read zip file	✓	✓	✓	✓	✓	✓	✓	✓	✓	
4. write zip file	✗	✓	✗	✓	✓	?	?	?	?	ESA and CNES software do not generate Zipped packages.
Package Header										
5. specificationVersion check	✗	✓	✗	✓	✓	?	?	?	?	ESA and CNES software do not manage the package header. Error checks demonstrated that ESA did report errors in packageHeader supplied by NASA
6. sequenceInformation check	✗	✓	✗	✓	✓	?	?	?	?	ESA and CNES software do not manage the package header. Error checks demonstrated that ESA did report errors in packageHeader supplied by NASA
Information Package Map										
7. contentUnits tree check	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Metadata Section										
8. metadata reference access	✓	✓	✓	✓	✓	✓	✓	✓	✓	
9. metadata wrapped	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Data Object Section										
10. Size check	✓	✓	✓	✓	✓	✓	?	?	✓	Only tested for those packages provided with their accompanying components.
11. Data object reference access	✓	✓	✓	✓	✓	✓	✓	✓	✓	
12. Data object wrapped	✓	✓	✓	✓	✓	✓	✓	✓	✓	
13. Checksum check	✓	✓	✓	✓	✓	✓	✓	✓	✓	
14. Namespace extension	✓	✓	✓	✓	✓	✓	✓	✓	✓	

Table 6-1: Interoperability Test Matrix

7 SUMMARY OF OBSERVATIONS

This section summarizes several observations that occurred during the test period. The detailed reports of each test are presented in ANNEX A to ANNEX D.

1. The only source of “interoperability errors” was the incorrect schemas in the initial testcases. The errors were due to the fact that the schema versions were from different stages of the XFDU specification lifecycle. Example instances that demonstrate the errors due to inconsistent schemas are shown in Annex E. These problems reinforce the need for an XML Schema Registry and Repository.
2. When the final XFDU Blue Book schema was used in the production and parsing of the test instance there were no errors in the parsing of XFDU's produced by alternate API's.
3. The use of the SAFE tools in the ESA tests was extremely enlightening:
 - a. The validation reports were very mature and provide an excellent example of translating from complex XML instances to a human readable and understandable form.
 - b. The validation reports and the SAFE APIs were oriented towards SAFE products so they were awkward for XFDU features not used in SAFE such as the packageHeader.
 - c. However, the SAFE validator was easily updated to the newest XFDU schema and provided the needed levels of structural interoperability. Also the SAFE parsing did not crash or report any errors on encountering unknown namespaces.
 - d. The “redefine” specialization done by SAFE were effective in that all SAFE instances parsed as valid XFDU's without the SAFE schema being available.
4. The use of “extensionTypes” to allow external bodies to extend the XFDU Schema seems effective since it did not cause any problems in the Interoperability Testing.

ANNEX A

ESA SW OUTPUTS - AGENCIES TEST REPORTS

A1 SAFE ENVISAT MERIS Level 1 Full Resolution Product

The following product has been generated by the SAFE Transform software (*safe-transform-1-0-patch-6*) part of the SAFE Java/C++ API distribution suite [4], from an ESA product of measures acquired by MERIS sensor onboard ENVISAT spacecraft, on 2004-12-07.

A1.1 Package Layout

Although the XFDU Manifest file references several Components, the package provided to NASA and CNES was constituted by this Manifest only.

A1.2 Manifest File (Abstract)

The following sample has been voluntarily truncated to reduce the page number.

```
<xfdu:XFDU version="esa/safe/1.0/envisat/meris/fr/level-1"
  xmlns:gml="http://www.opengis.net/gml"
  xmlns:xfdu="urn:ccsds:schema:xfdu:1">
  <informationPackageMap>
    <xfdu:contentUnit unitType="SAFE Archive Information Package"
      textInfo="ENVISAT MERIS FR Level 1 Package"
      pdilID="processing"
      dmdID="acquisitionPeriod
        platform
        generalProductInformation
        productQualityInformation">
      <xfdu:contentUnit unitType="Measurement Data Unit"
        dmdID="measurementOrbitReference
          measurementFrameSet
          topOfAtmosphereRadiancePhysicalInformation
          summaryQualityAnnotation
          scalingFactorsAnnotation
          tiePointsAnnotation "
          repID="topOfAtmosphereRadianceSchema envisatSchema">
        <dataObjectPointer dataObjectID="topOfAtmosphereRadianceData"/>
      </xfdu:contentUnit>
      <xfdu:contentUnit unitType="Measurement Data Unit"
        dmdID="measurementOrbitReference
          measurementFrameSet
          flagsPhysicalInformation
          summaryQualityAnnotation
          scalingFactorsAnnotation
          tiePointsAnnotation "
          repID="flagsSchema
          envisatSchema">
        <dataObjectPointer dataObjectID="flagsData"/>
      </xfdu:contentUnit>
    </informationPackageMap>
  </xfdu:XFDU>
```

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```

<xfdu:contentUnit unitType="Metadata Unit"
  replID="summaryQualityAnnotationSchema
  envisatSchema">
  <dataObjectPointer dataObjectID="summaryQualityAnnotationData"/>
</xfdu:contentUnit>

<xfdu:contentUnit unitType="Metadata Unit"
  replID="scalingFactorsAnnotationSchema
  envisatSchema">
  <dataObjectPointer dataObjectID="scalingFactorsAnnotationData"/>
</xfdu:contentUnit>

<xfdu:contentUnit unitType="Metadata Unit"
  dmdID="tiePointsAnnotationPhysicalInformation"
  replID="tiePointsAnnotationSchema
  envisatSchema">
  <dataObjectPointer dataObjectID="tiePointsAnnotationData"/>
</xfdu:contentUnit>
</xfdu:contentUnit>
</informationPackageMap>

<metadataSection>
<metadataObject ID="processing" classification="PROVENANCE" category="PDI">
  <metadataWrap textInfo="Processing" vocabularyName="SAFE"
    mimeType="text/xml">
    <xmlData>
      <safe:processing name="Conversion from ENVISAT to SAFE format"
        start="2007-10-02T09:55:03.340000Z"
        xmlns:safe="http://www.esa.int/safe/1.0">
        <safe:facility country="France" name="GAEL Consultant"
          organisation="GAEL Consultant"
          site="Champs-sur-marne">
          <safe:software name="GAEL ENVISAT Level 1 and 2
            Transformer" version=""/>
        </safe:facility>
      </safe:processing>
    </xmlData>
  </metadataWrap>
</metadataObject>

----- [Truncated] -----

  </safe:processing>
</xmlData>
</metadataWrap>
</metadataObject>

<metadataObject ID="acquisitionPeriod" classification="DESCRIPTION"
  category="DMD">
  <metadataWrap textInfo="Acquisition Period" vocabularyName="SAFE"
    mimeType="text/xml">
    <xmlData>
      <safe:acquisitionPeriod xmlns:safe="http://www.esa.int/safe/1.0">
        <safe:startTime>2004-12-07T10:44:02.419313Z</safe:startTime>
        <safe:stopTime>2004-12-07T10:47:36.290396Z</safe:stopTime>
      </safe:acquisitionPeriod>
    </xmlData>
  </metadataWrap>
</metadataObject>

<metadataObject ID="platform" classification="DESCRIPTION" category="DMD">
  <metadataWrap textInfo="Platform Description" vocabularyName="SAFE"
    mimeType="text/xml">
    <xmlData>
      <safe:platform xmlns:safe="http://www.esa.int/safe/1.0">

```

```

<safe:nssdcIdentifier>2002-009A</safe:nssdcIdentifier>
<safe:familyName>ENVISAT</safe:familyName>
<safe:number>1</safe:number>
<safe:instrument xmlns:safe="http://www.esa.int/safe/1.0">
  <safe:familyName abbreviation="MERIS">Medium Resolution
    Imaging Spectrometer</safe:
      familyName>
</safe:instrument>
<safe:timeReference>
  <safe:utc>2004-12-07T10:26:59.524833Z</safe:utc>
  <safe:clock>923101952</safe:clock>
  <safe:clockStep>3906249804</safe:clockStep>
</safe:timeReference>
</safe:platform>
</xmlData>
</metadataWrap>
</metadataObject>

```

----- [Truncated] -----

```

<metadataObject ID="measurementOrbitReference"
  classification="DESCRIPTION" category="DMD">
  <metadataWrap textInfo="Orbit Reference" vocabularyName="SAFE"
    mimeType="text/xml">
    <xmlData>
      <safe:orbitReference xmlns:safe="http://www.esa.int/safe/1.0">
        <safe:orbitNumber type="start">14491</safe:orbitNumber>
        <safe:relativeOrbitNumber type="start">409</safe:
          relativeOrbitNumber>
        <safe:cycleNumber>32</safe:cycleNumber>
        <safe:phaseIdentifier>2</safe:phaseIdentifier>
      </safe:orbitReference>
    </xmlData>
  </metadataWrap>
</metadataObject>

```

----- [Truncated] -----

```

</metadataSection>
<dataObjectSection>
  <dataObject ID="topOfAtmosphereRadianceData"
    repID="topOfAtmosphereRadianceSchema envisatSchema">
    <byteStream mimeType="application/octetstream">
      <fileLocation locatorType="URL" href="top-of-atmosphere-radiance.
        dat"/>
      <checksum checksumName="MD5"/>
    </byteStream>
  </dataObject>
  <dataObject ID="flagsData" repID="flagsSchema envisatSchema">
    <byteStream mimeType="application/octetstream">
      <fileLocation locatorType="URL" href="flags.dat"/>
      <checksum checksumName="MD5"/>
    </byteStream>
  </dataObject>
  <dataObject ID="summaryQualityAnnotationData"
    repID="summaryQualityAnnotationSchema envisatSchema">
    <byteStream mimeType="application/octetstream">

```

```

    <fileLocation locatorType="URL" href="summary-quality.dat"/>
    <checksum checksumName="MD5"/>
  </byteStream>
</dataObject>

<dataObject ID="scalingFactorsAnnotationData"
  repID="scalingFactorsAnnotationSchema envisatSchema">
  <byteStream mimeType="application/octetstream">
    <fileLocation locatorType="URL" href="scaling-factors.dat"/>
    <checksum checksumName="MD5"/>
  </byteStream>
</dataObject>

<dataObject ID="tiePointsAnnotationData" repID="tiePointsAnnotationSchema
  envisatSchema">
  <byteStream mimeType="application/octetstream">
    <fileLocation locatorType="URL" href="tie-points.dat"/>
    <checksum checksumName="MD5"/>
  </byteStream>
</dataObject>

</dataObjectSection>

</xfdu:XFDU>

```

A1.3 ESA Interoperability Test Report

Whether the reentrance of implementations is not major issue of this agency interoperability assessment, the ingestion of the package resulted to the following report: All other

```

[INFO ] ESA XFDU Java I/O library
[INFO ] Version: XFDU Java I/O API - SNAPSHOT (GAEL Consultant)
[INFO ] Execution date: Tue Oct 23 13:55:52 GMT+01:00 2007
[INFO ]
[INFO ] XFDU Package: "null"
[INFO ] File: "meris-fr-1-manifest.safe.xml"
[INFO ] Object Identifier: "null"
[INFO ] Textual Information: "null"
[INFO ] Version: "esa/safe/1.0/envisat/meris/fr/level-1"
[INFO ] Information Package Map:
[INFO ] Content Unit: "null"
[INFO ] Textual Information: "ENVISAT MERIS FR Level 1 Package"
[INFO ] Content Unit Type: "SAFE Archive Information Package"
[INFO ] Order Information: "null"
[INFO ] Descriptive Metadata: "acquisitionPeriod platform
generalProductInformation productQualityInformation"
[INFO ] Preservation Descriptive Metadata: "processing"
[INFO ] Representation Information Metadata: "null"
[INFO ] Other Metadata: "null"
[INFO ] Content Unit: "null"
[INFO ] Textual Information: "null"
[INFO ] Content Unit Type: "Measurement Data Unit"
[INFO ] Order Information: "null"
[INFO ] Descriptive Metadata: "measurementOrbitReference
measurementFrameSet
topOfAtmosphereRadiancePhysicalInformation
summaryQualityAnnotation scalingFactorsAnnotation
tiePointsAnnotation "
[INFO ] Preservation Descriptive Metadata: "null"

```


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[INFO] Representation Information Metadata:
"topOfAtmosphereRadianceSchema envisatSchema"
[INFO] Other Metadata: "null"
[INFO] Data Object Pointer: "topOfAtmosphereRadianceData"

----- [Truncated] -----

[INFO] Content Unit: "null"
[INFO] Textual Information: "null"
[INFO] Content Unit Type: "Metadata Unit"
[INFO] Order Information: "null"
[INFO] Descriptive Metadata:
"tiePointsAnnotationPhysicalInformation"
[INFO] Preservation Descriptive Metadata: "null"
[INFO] Representation Information Metadata:
"tiePointsAnnotationSchema envisatSchema"
[INFO] Other Metadata: "null"
[INFO] Data Object Pointer: "tiePointsAnnotationData"
[INFO] Metadata Objects:
[INFO] Metadata Object: "processing"
[INFO] Metadata Object: "acquisitionPeriod"
[INFO] Metadata Object: "platform"
[INFO] Metadata Object: "measurementOrbitReference"
[INFO] Metadata Object: "measurementFrameSet"
[INFO] Metadata Object: "generalProductInformation"
[INFO] Metadata Object: "productQualityInformation"
[INFO] Metadata Object: "topOfAtmosphereRadiancePhysicalInformation"
[INFO] Metadata Object: "flagsPhysicalInformation"
[INFO] Metadata Object: "tiePointsAnnotationPhysicalInformation"
[INFO] Metadata Object: "summaryQualityAnnotation"
[INFO] Metadata Object: "scalingFactorsAnnotation"
[INFO] Metadata Object: "tiePointsAnnotation"
[INFO] Metadata Object: "topOfAtmosphereRadianceSchema"
[INFO] Metadata Object: "flagsSchema"
[INFO] Metadata Object: "summaryQualityAnnotationSchema"
[INFO] Metadata Object: "scalingFactorsAnnotationSchema"
[INFO] Metadata Object: "tiePointsAnnotationSchema"
[INFO] Metadata Object: "envisatSchema"
[INFO] Data Objects:
[INFO] Data Object: "topOfAtmosphereRadianceData"
[INFO] MIME: "null"
[INFO] Representation Information: "topOfAtmosphereRadianceSchema
envisatSchema"
[INFO] Size: -1 byte(s)
[INFO] Checksum: null (unspecified)
[INFO] Bytestream: "null"
[INFO] MIME: "application/octetstream"
[INFO] Size: -1 byte(s)
[INFO] Checksum: null (unspecified)
[INFO] File Content: None
[INFO] File Locator: "null"
[INFO] Textual Information: "null"
[INFO] Locator Type: "null"
[INFO] Hyperlink Reference: ""
[INFO] Finer Locator: "null"

----- [Truncated] -----

[INFO] Data Object: "summaryQualityAnnotationData"
[INFO] MIME: "null"
[INFO] Representation Information:
"summaryQualityAnnotationSchema envisatSchema"
[INFO] Size: -1 byte(s)

```
[INFO ] Checksum: null (unspecified)
[INFO ] Bytestream: "null"
[INFO ] MIME: "application/octetstream"
[INFO ] Size: -1 byte(s)
[INFO ] Checksum: null (unspecified)
[INFO ] File Content: None
[INFO ] File Locator: "null"
[INFO ] Textual Information: "null"
[INFO ] Locator Type: "null"
[INFO ] Hyperlink Reference: ""
[INFO ] Finer Locator: "null"
```

----- [Truncated] -----

```
[INFO ] Behavior Objects:
[INFO ] Empty Behavior Object Section
[INFO ] Validation:
[INFO ] Validator: "esa.xfd�.XercesSchemaValidator"
[INFO ] XML Schema Location: "/misc/athena_home/mbaye/software/xfdu/target/xfdu-suite-
SNAPSHOT/schemas/org/ccsds/xfdu/xfdu.xsd"
[INFO ] The input package is valid.
```

This report shown that, ESA implementation was reentrant for this package.

A1.4 NASA Interoperability Test Report

The NASA software was able to parse the files, reconstruct the manifest elements as Java objects and rewrite the manifest to the disk.

A1.5 CNES Interoperability Test Report

The following figure reports that XFDU View was able to ingest the XFDU package and interpret its content. Here, the left tree shows the “platform” metadata Object and the right panel, some information extracted from this object.

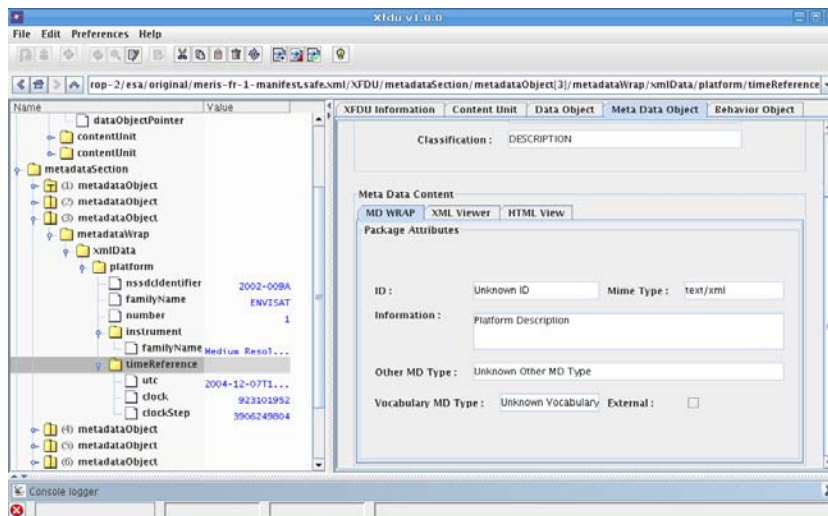


Figure A-1: XFDU View of the SAFE/MERIS package

A2 SAFE AATSR MERIS Level 0 Product

The following product has been generated by the SAFE Transform software (*safe-transform-1-0-patch-6*) part of the SAFE Java/C++ API distribution suite, from an ESA product of measures acquired by AATSR sensor onboard ENVISAT spacecraft on 2004-12-07.

A2.1 Package Layout

Although the XFDU Manifest file references several Components, the package provided to NASA and CNES was constituted by this Manifest only.

A2.2 Manifest File (Abstract)

The following sample has been voluntarily truncated to reduce the page number.

```
<xfdu:XFDU version="esa/safe/1.0/envisat/aatsr/toa/level-1"
  xmlns:gml="http://www.opengis.net/gml"
  xmlns:xfdu="urn:ccsds:schema:xfdu:1">
  <informationPackageMap>
    <xfdu:contentUnit unitType="SAFE Archive Information Package"
      textInfo="ENVISAT AATSR TOA Level 1 Package"
      pdiID="processing" dmdID="acquisitionPeriod
      platform generalProductInformation ">
      <xfdu:contentUnit unitType="Measurement Data Unit"
        dmdID="measurementOrbitReference
        measurementFrameSet
        brightnessTemperatureAndReflectanceNadirPh
        ysicalInformation
        summaryQualityAnnotation
        gridPixelAndTopographicCorrectionAnnotatio
        n scanPixelXYAnnotation
        solarAnglesAnnotation
        visibleCalibrationCoefficientsAnnotation
        scanPixelNumberAnnotation "
        repID="brightnessTemperatureAndReflectance
        NadirSchema envisatSchema
        aatsrLevel12Schema">
        <dataObjectPointer
          dataObjectID="brightnessTemperatureAndReflectanceNadirData"/>
      </xfdu:contentUnit>
      <xfdu:contentUnit unitType="Measurement Data Unit"
        dmdID="measurementOrbitReference
        measurementFrameSet
        brightnessTemperatureAndReflectanceForward
        PhysicalInformation
        summaryQualityAnnotation
        gridPixelAndTopographicCorrectionAnnotatio
        n scanPixelXYAnnotation
        solarAnglesAnnotation
        visibleCalibrationCoefficientsAnnotation
        scanPixelNumberAnnotation "
        repID="brightnessTemperatureAndReflectance
```

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```

ForwardSchema envisatSchema
aatsrLevel12Schema">
<dataObjectPointer
  dataObjectID="brightnessTemperatureAndReflectanceForwardData"/>
</xfdu:contentUnit>

```

----- [Truncated] -----

```

<xfdu:contentUnit unitType="Metadata Unit"
  dmdID="scanPixelNumberAnnotationPhysicalIn
  formation"
  repID="scanPixelNumberAnnotationSchema
  envisatSchema">
  <dataObjectPointer dataObjectID="scanPixelNumberAnnotationData"/>
</xfdu:contentUnit>

</xfdu:contentUnit>
</informationPackageMap>

<metadataSection>

<metadataObject ID="processing" classification="PROVENANCE"
  category="PDI">
  <metadataWrap textInfo="Processing" vocabularyName="SAFE"
  mimeType="text/xml">
  <xmlData>
  <safe:processing name="Conversion from ENVISAT to SAFE format"
  start="2007-10-04T16:33:37.927000Z"
  xmlns:safe="http://www.esa.int/safe/1.0">
  <safe:facility country="France" name="GAEL Consultant"
  organisation="GAEL Consultant"
  site="Champs-sur-marne">
  <safe:software name="GAEL ENVISAT Level 1 and 2
  Transformer" version=""/>
  </safe:facility>

```

----- [Truncated] -----

```

  </safe:processing>
  </xmlData>
</metadataWrap>
</metadataObject>
<metadataObject ID="acquisitionPeriod" classification="DESCRIPTION"
  category="DMD">
  <metadataWrap textInfo="Acquisition Period" vocabularyName="SAFE"
  mimeType="text/xml">
  <xmlData>
  <safe:acquisitionPeriod xmlns:safe="http://www.esa.int/safe/1.
  0">
  <safe:startTime>2004-12-17T02:24:56.482913Z</safe:startTime>
  <safe:stopTime>2004-12-17T04:03:37.713084Z</safe:stopTime>
  </safe:acquisitionPeriod>
  </xmlData>
  </metadataWrap>
</metadataObject>
<metadataObject ID="platform" classification="DESCRIPTION"
  category="DMD">
  <metadataWrap textInfo="Platform Description" vocabularyName="SAFE"
  mimeType="text/xml">

```

```

<xmlData>
  <safe:platform xmlns:safe="http://www.esa.int/safe/1.0">
    <safe:nssdcIdentifier>2002-009A</safe:nssdcIdentifier>
    <safe:familyName>ENVISAT</safe:familyName>
    <safe:number>1</safe:number>
    <safe:instrument xmlns:safe="http://www.esa.int/safe/1.0">
      <safe:familyName abbreviation="AATSR">Advanced Along
        Track Scanning Radiometer<
          /safe:familyName>
    </safe:instrument>
    <safe:timeReference>
      <safe:utc>2004-12-16T22:19:00.483654Z</safe:utc>
      <safe:clock>1133104128</safe:clock>
      <safe:clockStep>3906249804</safe:clockStep>
    </safe:timeReference>
  </safe:platform>
</xmlData>
</metadataWrap>
</metadataObject>

```

----- [Truncated] -----

```

<metadataObject ID="solarAnglesAnnotationPhysicalInformation"
  classification="DESCRIPTION" category="DMD">
  <metadataWrap vocabularyName="SAFE" mimeType="text/xml">
    <xmlData>
      <envisat:componentPhysicalInformation
        xmlns:envisat="http://www.esa.int/safe/1.0/envisat">
        <envisat:dataSet name="nadir" textInfo="Nadir View">
          <envisat:record>
            <envisat:count>1409</envisat:count>
            <envisat:length>216</envisat:length>
          </envisat:record>
        </envisat:dataSet>
        <envisat:dataSet name="forward" textInfo="Forward View">
          <envisat:record>
            <envisat:count>1409</envisat:count>
            <envisat:length>216</envisat:length>
          </envisat:record>
        </envisat:dataSet>
      </envisat:componentPhysicalInformation>
    </xmlData>
  </metadataWrap>
</metadataObject>
<metadataObject ID="scanPixelNumberAnnotationPhysicalInformation"
  classification="DESCRIPTION" category="DMD">
  <metadataWrap vocabularyName="SAFE" mimeType="text/xml">
    <xmlData>
      <envisat:componentPhysicalInformation xmlns:envisat="http:
        //www.esa.
        int/safe/1.
        0/envisat">
        <envisat:dataSet name="nadir" textInfo="Nadir View">
          <envisat:record>
            <envisat:count>1409</envisat:count>
            <envisat:length>2068</envisat:length>
          </envisat:record>
        </envisat:dataSet>
        <envisat:dataSet name="forward" textInfo="Forward View">
          <envisat:record>

```

```

    <envisat:count>1409</envisat:count>
    <envisat:length>2068</envisat:length>
  </envisat:record>
</envisat:dataSet>
</envisat:componentPhysicalInformation>
</xmlData>
</metadataWrap>
</metadataObject>

```

----- [Truncated] -----

```

</metadataSection>
<dataObjectSection>
  <dataObject ID="brightnessTemperatureAndReflectanceNadirData"
    repID="brightnessTemperatureAndReflectanceNadirSchema
    envisatSchema aatsrLevel12Schema">
    <byteStream mimeType="application/octetstream">
      <fileLocation locatorType="URL" href="brightness-temperature-and-
        reflectance-nadir.dat"/>
      <checksum checksumName="MD5"/>
    </byteStream>
  </dataObject>
  <dataObject ID="brightnessTemperatureAndReflectanceForwardData"
    repID="brightnessTemperatureAndReflectanceForwardSchema
    envisatSchema aatsrLevel12Schema">
    <byteStream mimeType="application/octetstream">
      <fileLocation locatorType="URL" href="brightness-temperature-and-
        reflectance-forward.dat"/>
      <checksum checksumName="MD5"/>
    </byteStream>
  </dataObject>
  <dataObject ID="confidenceWordsData" repID="confidenceWordsSchema
    envisatSchema">
    <byteStream mimeType="application/octetstream">
      <fileLocation locatorType="URL" href="confidence-words.dat"/>
      <checksum checksumName="MD5"/>
    </byteStream>
  </dataObject>
  <dataObject ID="cloudFlagsData" repID="cloudFlagsSchema envisatSchema">
    <byteStream mimeType="application/octetstream">
      <fileLocation locatorType="URL" href="cloud-flags.dat"/>
      <checksum checksumName="MD5"/>
    </byteStream>
  </dataObject>

```

----- [Truncated] -----

```

</dataObjectSection>
</xfdu:XFDU>

```

A2.3 NASA Interoperability Test Report

The NASA software was able to parse the files, reconstruct the manifest elements as Java objects and rewrite the manifest to the disk.

A2.4 CNES Interoperability Test Report

The following figure reports that XFDU View was able to ingest the XFDU package and interpret its content. Here, the left tree shows the “platform” metadata Object and the right panel, some information extracted from this object.

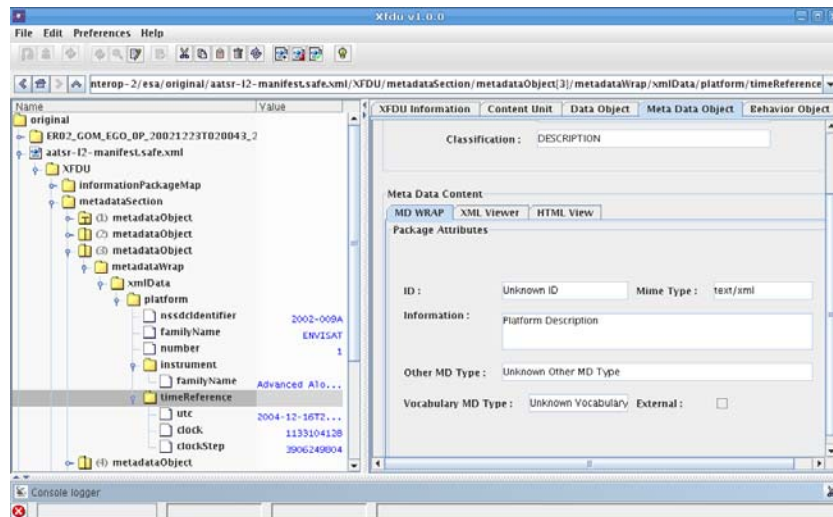


Figure A-2: XFDU View of the SAFE/AATSR package

A3 SAFE ENVISAT SCIAMACHY Level 1 Nominal Product

The following product has been generated by the SAFE Transform software (*safe-transform-1-1-rc-1*) part of the SAFE distribution suite [4], from an ESA product of measures acquired by SCIAMACHY sensor onboard ENVISAT spacecraft, on 2004-09-10.

A3.1 Package Layout

Although the XFDU Manifest file references several Components, the package provided to NASA and CNES was constituted by this Manifest only.

A3.2 Manifest File (Abstract)

The following sample has been voluntarily truncated to reduce the page number.

```
<xfdu:XFDU version="esa/safe/1.0/envisat/sciamachy/nl/level-1"
  xmlns:xfdu="urn:ccsds:schema:xfdu:1"
  xmlns:gml="http://www.opengis.net/gml">
```

```
<informationPackageMap>
```

```
  <xfdu:contentUnit dmdID="acquisitionPeriod platform
    generalProductInformation
    productQualityInformation" pdID="processing"
    textInfo="ENVISAT SCIAMACHY NL Level 1 Package"
    unitType="SAFE Archive Information Package">
```

```
  <xfdu:contentUnit dmdID="measurementOrbitReference
    measurementFrameSet
```

```

summaryQualityAnnotation
geolocationAnnotation
instrumentParametersAnnotation
leakageConstantAnnotation
leakageVariableAnnotation
ppgEtalonAnnotation
spectralBaseAnnotation
spectralCalibrationAnnotation
sunReferenceAnnotation
polarizationSensitivityNadirAnnotation
polarizationSensitivityLimbAnnotation
polarizationSensitivityOccultationAnnotation
radianceSensitivityNadirAnnotation
radianceSensitivityLimbAnnotation
radianceSensitivityOccultationAnnotation
keyDataErrorAnnotation
slitFunctionAnnotation
smallApertureSlitFunctionAnnotation
statesAnnotation
pmdPacketsAnnotation
auxiliaryPacketsAnnotation
darkAverageAnnotation
newSunReferenceAnnotation" repID="nadirSchema
envisatSchema" unitType="Measurement Data Unit">
<dataObjectPointer dataObjectID="nadirData"/>
</xfdu:contentUnit>
<xfdu:contentUnit dmdID="measurementOrbitReference
measurementFrameSet
summaryQualityAnnotation
geolocationAnnotation
instrumentParametersAnnotation
leakageConstantAnnotation
leakageVariableAnnotation
ppgEtalonAnnotation
spectralBaseAnnotation
spectralCalibrationAnnotation
sunReferenceAnnotation
polarizationSensitivityNadirAnnotation
polarizationSensitivityLimbAnnotation
polarizationSensitivityOccultationAnnotation
radianceSensitivityNadirAnnotation
radianceSensitivityLimbAnnotation
radianceSensitivityOccultationAnnotation
keyDataErrorAnnotation
slitFunctionAnnotation
smallApertureSlitFunctionAnnotation
statesAnnotation
pmdPacketsAnnotation
auxiliaryPacketsAnnotation
darkAverageAnnotation
newSunReferenceAnnotation" repID="limbSchema
envisatSchema" unitType="Measurement Data Unit">
<dataObjectPointer dataObjectID="limbData"/>
</xfdu:contentUnit>
<xfdu:contentUnit dmdID="measurementOrbitReference
measurementFrameSet
summaryQualityAnnotation
geolocationAnnotation
instrumentParametersAnnotation
leakageConstantAnnotation
leakageVariableAnnotation
ppgEtalonAnnotation

```



```

spectralBaseAnnotation
spectralCalibrationAnnotation
sunReferenceAnnotation
polarizationSensitivityNadirAnnotation
polarizationSensitivityLimbAnnotation
polarizationSensitivityOccultationAnnotation
radianceSensitivityNadirAnnotation
radianceSensitivityLimbAnnotation
radianceSensitivityOccultationAnnotation
keyDataErrorAnnotation
slitFunctionAnnotation
smallApertureSlitFunctionAnnotation
statesAnnotation
pmdPacketsAnnotation
auxiliaryPacketsAnnotation
darkAverageAnnotation
newSunReferenceAnnotation"
repID="occultationSchema envisatSchema"
unitType="Measurement Data Unit">
<dataObjectPointer dataObjectID="occultationData"/>
</xfdu:contentUnit>

<xfdu:contentUnit repID="summaryQualityAnnotationSchema envisatSchema"
unitType="Metadata Unit">
<dataObjectPointer dataObjectID="summaryQualityAnnotationData"/>
</xfdu:contentUnit>

<xfdu:contentUnit repID="geolocationAnnotationSchema envisatSchema
sciamachyLevel12Schema" unitType="Metadata
Unit">
<dataObjectPointer dataObjectID="geolocationAnnotationData"/>
</xfdu:contentUnit>

<xfdu:contentUnit repID="instrumentParametersAnnotationSchema
envisatSchema" unitType="Metadata Unit">
<dataObjectPointer dataObjectID="instrumentParametersAnnotationData"/
>
</xfdu:contentUnit>

<xfdu:contentUnit repID="leakageConstantAnnotationSchema envisatSchema"
unitType="Metadata Unit">
<dataObjectPointer dataObjectID="leakageConstantAnnotationData"/>
</xfdu:contentUnit>

```

----- [Truncated] -----

```

</xfdu:contentUnit>
</informationPackageMap>
<metadataSection>
<metadataObject ID="processing" category="PDI" classification="PROVENANCE">
<metadataWrap mimeType="text/xml" textInfo="Processing"
vocabularyName="SAFE">
<xmlData>
<safe:processing name="Conversion from ENVISAT to SAFE format"
start="2007-10-02T10:19:00.024000Z" xmlns:
safe="http://www.esa.int/safe/1.0">
<safe:facility country="France" name="GAEL Consultant"
organisation="GAEL Consultant"
site="Champs-sur-marne">
<safe:software name="GAEL ENVISAT Level 1 and 2
Transformer" version=""/>

```

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```

</safe:facility>
<safe:resource name="SCI_NL__1PNPDE20040910_034648_000061332030
_00147_13227_3294.N1" role="Input data">
  <safe:processing name="Level 1 processing" start="2004-09-
10T05:51:04.000000Z">
    <safe:facility country="Italy" name="PDHS-E"
      organisation="ESA" site="ESRIN">
      <safe:software name="SCIA" version="5.04"/>
    </safe:facility>
  <safe:resource name="SCI_NL__0PNPDE20040910_034648_000060
922030_00147_13227_0637.N1"
    role="Level 0 Data">
    <safe:processing name="Downlink">
      <safe:facility country="Italy" name="PDHS-E"
        organisation="ESA"
        site="ESRIN"/>
    </safe:processing>
  </safe:resource>
  <safe:resource name="SCI_LK1_AXVIEC20040909_173958_200409
09_070824_20040916_085054"
    role="Auxiliary Data"/>
  <safe:resource name="SCI_PE1_AXVIEC20040604_103811_200406
02_000000_20900101_000000"
    role="Auxiliary Data"/>
  <safe:resource name="SCI_SP1_AXVIEC20040805_085909_200408
01_000000_20050101_000000"
    role="Auxiliary Data"/>
  <safe:resource name="SCI_SU1_AXVIEC20040910_000242_200409
07_022447_20040914_034133"
    role="Auxiliary Data"/>
  <safe:resource name="SCI_KD1_AXVIEC20040309_092921_200203
01_000000_20991231_235959"
    role="Auxiliary Data"/>
  <safe:resource name="SCI_MF1_AXVIEC20020809_094925_200202
06_173831_20991231_235959"
    role="Auxiliary Data"/>
  <safe:resource name="SCI_LI1_AXVIEC20040330_162931_200207
18_030000_20991231_235959"
    role="Auxiliary Data"/>
  <safe:resource name="AUX_FPO_AXVPDS20040909_232226_200409
09_182407_20040919_213054"
    role="Auxiliary Data"/>
  <safe:resource name="AUX_ATT_AXVIEC20020924_131534_200207
03_120000_20781231_235959"
    role="Auxiliary Data"/>
</safe:processing>
</safe:resource>
</safe:processing>
</xmlData>
</metadataWrap>
</metadataObject>
<metadataObject ID="acquisitionPeriod" category="DMD"
  classification="DESCRIPTION">
  <metadataWrap mimeType="text/xml" textInfo="Acquisition Period"
    vocabularyName="SAFE">
    <xmlData>
      <safe:acquisitionPeriod xmlns:safe="http://www.esa.int/safe/1.0">
        <safe:startTime>2004-09-10T03:46:48.377551Z</safe:startTime>
        <safe:stopTime>2004-09-10T05:29:01.267872Z</safe:stopTime>
      </safe:acquisitionPeriod>
    </xmlData>
  </metadataWrap>
</metadataObject>

```

```

</metadataWrap>
</metadataObject>
<metadataObject ID="platform" category="DMD" classification="DESCRIPTION">
  <metadataWrap mimeType="text/xml" textInfo="Platform Description"
    vocabularyName="SAFE">
    <xmlData>
      <safe:platform xmlns:safe="http://www.esa.int/safe/1.0">
        <safe:nssdcIdentifier>2002-009A</safe:nssdcIdentifier>
        <safe:familyName>ENVISAT</safe:familyName>
        <safe:number>1</safe:number>
        <safe:instrument xmlns:safe="http://www.esa.int/safe/1.0">
          <safe:familyName abbreviation="SCIAMACHY">Scanning Imaging
            Absorption Spectrometer for
            Atmospheric Chartography<
            /safe:familyName>
        </safe:instrument>
        <safe:timeReference>
          <safe:utc>2004-09-09T21:58:13.905939Z</safe:utc>
          <safe:clock>3260148992</safe:clock>
          <safe:clockStep>3906249805</safe:clockStep>
        </safe:timeReference>
      </safe:platform>
    </xmlData>
  </metadataWrap>
</metadataObject>
<metadataObject ID="measurementOrbitReference" category="DMD"
  classification="DESCRIPTION">
  <metadataWrap mimeType="text/xml" textInfo="Orbit Reference"
    vocabularyName="SAFE">
    <xmlData>
      <safe:orbitReference xmlns:safe="http://www.esa.int/safe/1.0">
        <safe:orbitNumber type="start">13227</safe:orbitNumber>
        <safe:relativeOrbitNumber type="start">147</safe:
          relativeOrbitNumber>
        <safe:cycleNumber>30</safe:cycleNumber>
        <safe:phaseIdentifier>2</safe:phaseIdentifier>
      </safe:orbitReference>
    </xmlData>
  </metadataWrap>
</metadataObject>
<metadataObject ID="measurementFrameSet" category="DMD"
  classification="DESCRIPTION">
  <metadataWrap mimeType="text/xml" textInfo="Frame Set"
    vocabularyName="SAFE">
    <xmlData>
      <safe:frameSet xmlns:safe="http://www.esa.int/safe/1.0">
        <safe:frame>
          <safe:footPrint srsName="http://www.opengis.
            net/gml/srs/epsg.xml#4326">
            <gml:coordinates xmlns:gml="http://www.opengis.net/gml">-
              61.959556,66.06623&#10;
              -59.834397,44.575661</gml:
              coordinates>
          </safe:footPrint>
        </safe:frame>
      </safe:frameSet>
    </xmlData>
  </metadataWrap>
</metadataObject>

```

----- [Truncated] -----

```

</metadataSection>
<dataObjectSection>
  <dataObject ID="nadirData" repID="nadirSchema envisatSchema">
    <byteStream mimeType="application/octetstream">
      <fileLocation href="nadir.dat" locatorType="URL"/>
      <checksum checksumName="MD5"/>
    </byteStream>
  </dataObject>
  <dataObject ID="limbData" repID="limbSchema envisatSchema">
    <byteStream mimeType="application/octetstream">
      <fileLocation href="limb.dat" locatorType="URL"/>
      <checksum checksumName="MD5"/>
    </byteStream>
  </dataObject>
  <dataObject ID="occultationData" repID="occultationSchema envisatSchema">
    <byteStream mimeType="application/octetstream">
      <fileLocation href="occultation.dat" locatorType="URL"/>
      <checksum checksumName="MD5"/>
    </byteStream>
  </dataObject>

```

----- [Truncated] -----

```

</dataObjectSection>
</xfdu:XFDU>

```

A3.3 NASA Interoperability Test Report

The NASA software was able to parse the files, reconstruct the manifest elements as Java objects and rewrite the manifest to the disk.

A3.4 CNES Interoperability Test Report

The following figure reports that XFDU View was able to ingest the XFDU package and interpret its content. Here, the left tree shows the “platform” metadata Object and the right panel, some information extracted from this object.

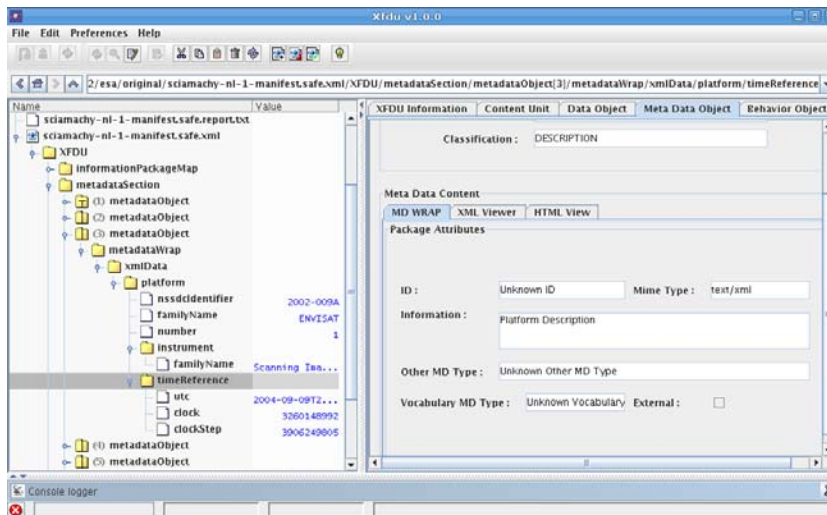


Figure A-3: XFDU View of the SAFE/SCIAMACHY package

ANNEX B

NASA SW OUTPUTS - AGENCIES TEST REPORTS

B1 External Validation Package

The package is XFDU manifest used in NASA validation testing. It has nested content unit structure, wrapped xml information in the package header, data and metadata pointed via reference.

B1.1 Package Layout

Although the XFDU Manifest file references several Components, the package provided to ESA and CNES was constituted by this Manifest only.

B1.2 Manifest File (Abstract)

The following sample has been voluntarily truncated to reduce the page number.

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<xfdu:XFDU xmlns:xfdu="http://www.ccsds.org/xfdu/2004" xmlns:ns3="xfdu:http://www.ccsds.org/xfdu/2004">
  <packageHeader>
    <environmentInfo>
      <xmlData>
        <PACKAGE_IDENTIFICATION>
          <PRIMARY_COLLECTION_ID>PSPG-00729</PRIMARY_COLLECTION_ID>
          <ATTRIBUTE_OBJECT_CRC>c876bcf7</ATTRIBUTE_OBJECT_CRC>
          <ARCHIVAL_STORAGE_ID>TPDS0000000001</ARCHIVAL_STORAGE_ID>
          <END_OBJECT>PACKAGE_IDENTIFICATION</END_OBJECT>
          <CRC_TYPE>NSSDC_A:V0</CRC_TYPE>
          <DATE_TIME_OF_GENERATION>2005-10-25T10:36:49<
            /DATE_TIME_OF_GENERATION>
        </PACKAGE_IDENTIFICATION>
      </xmlData>
    </environmentInfo>
  </packageHeader>
  <informationPackageMap>
    <xfdu:contentUnit textInfo="usa_nasa_pds_mgst_1230"
      ID="contentUnit_5414316a-cce8-11db-a9b5-a3cc3b344141">
    <xfdu:contentUnit ID="contentUnit5411c062-cce8-11db-a9b5-a3cc3b344141">
      <dataObjectPointer dataObjectID="dataObject1"/>
    </xfdu:contentUnit>
    <xfdu:contentUnit anyMdlID="OTHER_OTHER" ID="contentUnit5411e773-cce8-11db-a9b5-a3cc3b344141">
      <dataObjectPointer dataObjectID="dataObject3"/>
    </xfdu:contentUnit>
    <xfdu:contentUnit anyMdlID="OTHER_OTHER" ID="contentUnit5411e774-cce8-11db-a9b5-a3cc3b344141">
      <dataObjectPointer dataObjectID="dataObject5"/>
    </xfdu:contentUnit>
  </informationPackageMap>
</xfdu:XFDU>
```

```
<xfdu:contentUnit anyMdlID="OTHER_OTHER" ID="contentUnit54120e85-cce8-
11db-a9b5-a3cc3b344141">
  <dataObjectPointer dataObjectID="dataObject7"/>
</xfdu:contentUnit>
```

----- [Truncated] -----

```
<xfdu:contentUnit textInfo="SOFTWARE" ID="contentUnit54178cec-cce8-
11db-a9b5-a3cc3b344141">
  <xfdu:contentUnit anyMdlID="OTHER_OTHER" ID="contentUnit541765db-
cce8-11db-a9b5-a3cc3b344141">
    <dataObjectPointer dataObjectID="dataObject65"/>
  </xfdu:contentUnit>
  <xfdu:contentUnit textInfo="SRC" ID="contentUnit54208dc7-cce8-
11db-a9b5-a3cc3b344141">
    <xfdu:contentUnit anyMdlID="OTHER_OTHER"
      ID="contentUnit5417b3fd-cce8-11db-
a9b5-a3cc3b344141">
      <dataObjectPointer dataObjectID="dataObject67"/>
    </xfdu:contentUnit>
    <xfdu:contentUnit anyMdlID="OTHER_OTHER"
      ID="contentUnit5417db0e-cce8-11db-
a9b5-a3cc3b344141">
      <dataObjectPointer dataObjectID="dataObject69"/>
    </xfdu:contentUnit>
```

----- [Truncated] -----

```
</xfdu:contentUnit>
</xfdu:contentUnit>
</xfdu:contentUnit>
</informationPackageMap>
<metadataSection>
  <metadataObject ID="globalmeta1" mimeType="text/xml" category="OTHER"
    otherCategory="XSD" classification="OTHER">
    <dataObjectPointer dataObjectID="dataObject_globalmeta1"/>
  </metadataObject>
  <metadataObject ID="globalmeta2" mimeType="text/xml" category="OTHER"
    otherCategory="XSD" classification="OTHER">
    <dataObjectPointer dataObjectID="dataObject_globalmeta2"/>
  </metadataObject>
  <metadataObject ID="globalmeta3" mimeType="text/xml" category="OTHER"
    otherCategory="XSD" classification="OTHER">
    <dataObjectPointer dataObjectID="dataObject_globalmeta3"/>
  </metadataObject>
  <metadataObject ID="globalmeta4" mimeType="text/xml" category="OTHER"
    otherCategory="XSD" classification="OTHER">
    <dataObjectPointer dataObjectID="dataObject_globalmeta4"/>
  </metadataObject>
```

----- [Truncated] -----

```
<metadataObject classification="OTHER" category="OTHER" ID="OTHER_OTHER">
  <dataObjectPointer dataObjectID="dataObject328"/>
</metadataObject>
</metadataSection>
<dataObjectSection>

  <dataObject ID="dataObject_globalmeta1" checksum="f5bec905">
    <byteStream mimeType="text/xml" size="3938909">
```



```

    <fileLocation href="file:/home/sergey/temp_testing/test1.xsd"
      locatorType="URL"/>
    <checksum checksumName="CRC32">f5bec905</checksum>
  </byteStream>
</dataObject>
<dataObject ID="dataObject_globalmeta2" checksum="f5bec905">
  <byteStream mimeType="text/xml" size="3938909">
    <fileLocation href="file:/home/sergey/temp_testing/test2.xsd"
      locatorType="URL"/>
    <checksum checksumName="CRC32">f5bec905</checksum>
  </byteStream>
</dataObject>
<dataObject ID="dataObject_globalmeta3" checksum="f5bec905">
  <byteStream mimeType="text/xml" size="3938909">
    <fileLocation href="file:/home/sergey/temp_testing/test3.xsd"
      locatorType="URL"/>
    <checksum checksumName="CRC32">f5bec905</checksum>
  </byteStream>
</dataObject>
<dataObject ID="dataObject_globalmeta4" checksum="f5bec905">
  <byteStream mimeType="text/xml" size="3938909">
    <fileLocation href="file:/home/sergey/temp_testing/test4.xsd"
      locatorType="URL"/>
    <checksum checksumName="CRC32">f5bec905</checksum>
  </byteStream>
</dataObject>
<dataObject ID="dataObject_globalmeta5" checksum="f5bec905">
  <byteStream mimeType="text/xml" size="3938909">
    <fileLocation href="file:/home/sergey/temp_testing/test5.xsd"
      locatorType="URL"/>
    <checksum checksumName="CRC32">f5bec905</checksum>
  </byteStream>
</dataObject>

```

----- [Truncated] -----

```

<dataObject ID="dataObject329">
  <byteStream size="3938909" mimeType="text/plain">
    <fileLocation locatorType="URL" href="file:
      usa_nasa_pds_mgst_1230/DATA/MARS/BOL230
      06.TAB"/>
    <checksum checksumName="CRC32">f5bec905</checksum>
  </byteStream>
  <checksum checksumName="NSSDC_A:V0">f5bec905</checksum>
</dataObject>
</dataObjectSection>
</xfd:XFDU>

```

B1.3 ESA Interoperability Test Report

This report shows that ESA Implementation successfully browsed the Manifest file i.e. without failure, and demonstrates the interoperability of the XFDU concepts: goals of the testing activity. However, some errors emerged from the XML Schema validation phase but those could easily be fixed in the implementation by referencing the latest XFDU XML Schema. The final report generated as the following:

CCSDS REPORT CONCERNING XFDU INTEROPERABILITY TESTING

[INFO] ESA XFDU Java I/O library
[INFO] Version: XFDU Java I/O API - 1-1-rc-1 (GAEL Consultant)
[INFO] Execution date: Wed Dec 19 04:39:58 CET 2007
[INFO]
[INFO] XFDU Package: "null"
[INFO] File: "ag_sip_with_extension_1.xml"
[INFO] Namespace: "urn:ccsds:schema:xfdu:1"
[INFO] Object Identifier: "null"
[INFO] Textual Information: "null"
[INFO] Version: "null"
[INFO] Information Package Map:
[INFO] Content Unit: "ag_chem_sdts_to_cu"
[INFO] Textual Information: "null"
[INFO] Content Unit Type: "null"
[INFO] Order Information: "1.1"
[INFO] Descriptive Metadata: "null"
[INFO] Preservation Descriptive Metadata: "null"
[INFO] Representation Information Metadata: "null"
[INFO] Other Metadata: "null"
[INFO] Content Unit: "ag_chem_sdts_toc_cu"
[INFO] Textual Information: "null"
[INFO] Content Unit Type: "null"
[INFO] Order Information: "1.1.1"
[INFO] Descriptive Metadata: "null"
[INFO] Preservation Descriptive Metadata: "null"
[INFO] Representation Information Metadata: "null"
[INFO] Other Metadata: "null"
[INFO] Content Unit: "ag_chem_do_cu"
[INFO] Textual Information: "null"
[INFO] Content Unit Type: "null"
[INFO] Order Information: "1.1.1.1"
[INFO] Descriptive Metadata: "null"
[INFO] Preservation Descriptive Metadata: "null"
[INFO] Representation Information Metadata: "null"
[INFO] Other Metadata: "null"
[INFO] Data Object Pointer: "ag_chem_sdts"

----- [Truncated] -----

[INFO] Data Object: "ag_chem_arcinfo_context_meta"
[INFO] MIME: "text/plain"
[INFO] Representation Information: "null"
[INFO] Size: 1193 byte(s)
[INFO] Checksum: 89086f17 (CRC32)
[INFO] Bytestream: "null"
[INFO] MIME: "null"
[INFO] Size: (unspecified)
[INFO] Checksum: null (unspecified)
[INFO] File Content: None
[INFO] File Locator: "null"
[INFO] Textual Information: "null"
[INFO] Locator Type: "URL"
[INFO] Hyperlink Reference: "file:ag_chem/ag_chem_arcinfo_context.txt"
[INFO] Finer Locator: "null"
[INFO] Data Object: "ag_chem_stds_context_meta"
[INFO] MIME: "text/plain"
[INFO] Representation Information: "null"
[INFO] Size: 18458 byte(s)
[INFO] Checksum: 19db55d0 (CRC32)
[INFO] Bytestream: "null"
[INFO] MIME: "null"

```

[INFO ] Size: (unspecified)
[INFO ] Checksum: null (unspecified)
[INFO ] File Content: None
[INFO ] File Locator: "null"
[INFO ] Textual Information: "null"
[INFO ] Locator Type: "URL"
[INFO ] Hyperlink Reference: "file:ag_chem/ag_chem_sdts_context.txt"
[INFO ] Finer Locator: "null"
[INFO ] Behavior Objects:
[INFO ] Empty Behavior Object Section
[INFO ] Validation:
[INFO ] Validator: "esa.xfd�.XercesSchemaValidator"
[INFO ] XML Schema Location: "jar:file:/misc/athena_home/mbye/workspace/safe/target/safe-suite-1-1-rc-1-
bin.dir/safe-suite-1-1-rc-1/lib/java/xfdu-core-1-1-rc-1.jar!/xsd/org/ccsds/xfdu/xfdu.xsd"
[INFO ] The input package is valid.
    
```

This final test report shows that the package could successfully be loaded, interpreted and validated.

B1.4 CNES Interoperability Test Report

The following figure reports that XFDU View was able to ingest the XFDU package and interpret its content. Here, the left tree shows the Content Units and the right panel, some information extracted from the Information Package Map.

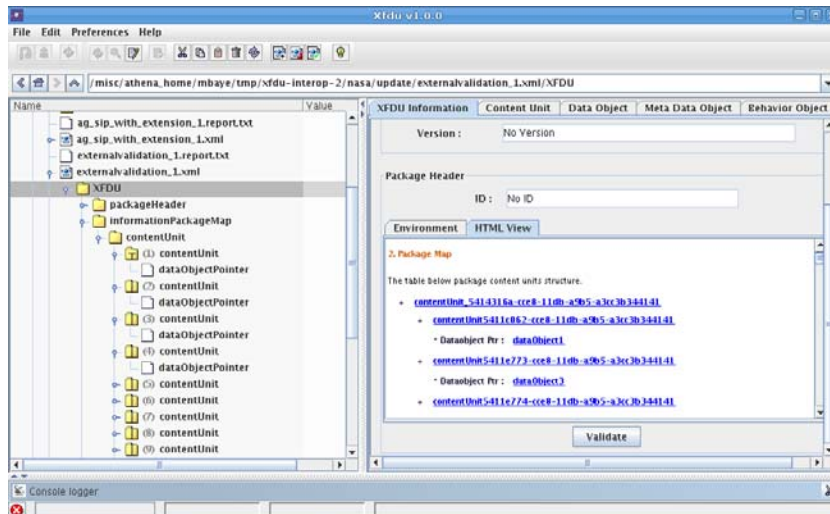


Figure B-1: XFDU View of the SAFE/AATSR package

B2 SIP With Extensions Package

The following XFDU package has been generated by NASA for verifying the concept of <extension/> and externally <anyAttribute/> introduced in the latest version of the XFDU structure and construction rules document. The manifest illustrates these mechanisms as a Submission information package (SIP) currently under specification of the CCSDS MOIMS Data Archive and Ingestion working group.

B2.1 Package Layout

Although the XFDU Manifest file references several Components, the package provided to ESA and CNES was constituted by this Manifest only. The Manifest declares a large set of nested Content Units, one Metadata Object and a large number of Data Objects. This file was accompanied with an XML Schema controlling the non XFDU markups and attributes used in the Manifest i.e. defined and referenced with a SIP dedicated namespace.

B2.2 Manifest File (Abstract)

The following sample has been voluntarily truncated to reduce the page number.

```
<?xml version="1.0" encoding="UTF-8"?>
<xfdu:XFDU xmlns:sip="sip" xmlns:dip="dip"
  xmlns:xfdu="urn:ccsds:schema:xfdu:1"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="urn:ccsds:schema:xfdu:1 /home/sergey/jbproject/xfdu.
  jxb2/schema/xfdu.xsd sip sipcommon1.xsd">
  <packageHeader ID="ph">
    <volumeInfo>
      <specificationVersion>1.0</specificationVersion>
      <!-- sip sequence information is accomodated by XFDU
      sequenceInformation -->
      <sequenceInformation sequencePosition="3" sequenceSize="5"/>
    </volumeInfo>
    <environmentInfo>
      <extension>
        <!-- SIP Global attributes -->
        <sip:sipOtherGlobalInformation
          sip:producer_id="USGS"
          sip:project_id="ag_data (ag_chem)"
          sip:sip_sequence_number="0001"/>
      </extension>
    </environmentInfo>
  </packageHeader>

  <!-- shows how sip logical global attributes (sip_id and sip_type_id) can
  be also put on the informationPackageMap level
  (besides or along with package header)
  -->
  <informationPackageMap sip:sip_id="isee-sip-001"
    sip:sip_type_id="NSSD1234">
    <!-- 1 -->
    <xfdu:contentUnit ID="ag_chem_sdts_to_cu" order="1.1">
      <extension>
        <sip:sipTransferObject sip:transfer_object_id="ag-chem1" sip:
          descriptor_id="usgs-ag_data_ag_chem-sdts-transfer-object"/>
      </extension>

      <xfdu:contentUnit ID="ag_chem_sdts_toc_cu" order="1.1.1">
        <extension>
          <sip:sipTransferObjectContent sip:
            transfer_object_group_id="usgs-ag_data_ag_chem-sdts-transfer-
            object-content"/>
        </extension>
        <xfdu:contentUnit ID="ag_chem_do_cu" order="1.1.1.1">
          <extension>
            <sip:sipDataObject sip:data_object__type_id="usgs-
            ag_data_ag_chem-sdts-data-object"/>
          </extension>
        </xfdu:contentUnit>
      </xfdu:contentUnit>
    </informationPackageMap>
  </xfdu:XFDU>
```

```

    </extension>
    <dataObjectPointer dataObjectID="ag_chem_sdts"/>
  </xfdu:contentUnit>
</xfdu:contentUnit>

<!-- 2 -->
<xfdu:contentUnit ID="ag_sdts_meta_to_cu" order="1.2">
  <extension>
    <sip:sipTransferObject sip:transfer_object_id="ag-chem2" sip:
      descriptor_id="sdts-logical-spec-transfer-object"/>
  </extension>
  <xfdu:contentUnit ID="ag_sdts_meta_toc_cu" order="1.2.1">
    <extension>
      <sip:sipTransferObjectContent sip:
        transfer_object_group_id="sdts-logical-spec-transfer-object-
        content"/>
    </extension>
    <xfdu:contentUnit ID="ag_sdts_meta_do_cu" order="1.2.1.1">
      <extension>
        <sip:sipDataObject sip:data_object__type_id="sdts-
          logical-spec-data-object"/>
      </extension>
      <dataObjectPointer dataObjectID="ag_sdts_meta"/>
    </xfdu:contentUnit>
  </xfdu:contentUnit>
</xfdu:contentUnit>

<!-- 3 -->
<xfdu:contentUnit ID="ag_chem_arcinfo_to_cu" order="1.3">
  <extension>
    <sip:sipTransferObject sip:transfer_object_id="ag-chem3" sip:
      descriptor_id="usgs-ag_data_ag_chem-arcinfo-transfer-object"/>
  </extension>
  <xfdu:contentUnit ID="ag_chem_arcinfo_toc_cu" order="1.3.1">
    <extension>
      <sip:sipTransferObjectContent sip:
        transfer_object_group_id="usgs-ag_data_ag_chem-arcinfo-
        transfer-object-content"/>
    </extension>
    <xfdu:contentUnit ID="ag_chem_arcinfo_do_cu" order="1.3.1.1">
      <extension>
        <sip:sipDataObject sip:data_object__type_id="usgs-
          ag_data_ag_chem-arcinfo-data-object"/>
      </extension>
      <dataObjectPointer dataObjectID="ag_chem_arcinfo"/>
    </xfdu:contentUnit>
  </xfdu:contentUnit>
</xfdu:contentUnit>

```

----- [Truncated] -----

```

</informationPackageMap>

<metadataSection>
  <metadataObject ID="fgdc-std-001-1998_mo" category="REP">
    <dataObjectPointer dataObjectID="fgdc-std-001-1998_meta"/>
  </metadataObject>
</metadataSection>

```

```

<dataObjectSection>
  <dataObject ID="archival_creator_rcd">
    <byteStream mimeType="text/xml">
      <fileContent>
        <xmlData>
          <naraArchCreator xmlns:xsi="http://www.w3.
            org/2001/XMLSchema-instance">
            <entity>Archival Creator Record</entity>
            <organizationName> Department of the Interior. U. S.
              Geological Survey. Water Resources Division<
                /organizationName>
            <abolishDate>9999</abolishDate>
            <establishDate>1949</establishDate>
          </naraArchCreator>
        </xmlData>
      </fileContent>
    </byteStream>
  </dataObject>

  <dataObject ID="rcd_grp_description">
    <byteStream mimeType="text/xml">
      <fileContent>
        <xmlData>
          <naraMetadata>
            <entity>RG 057</entity>
            <title>Records of the U.S. Geological Survey</title>
            <inclusiveStartDate>1839</inclusiveStartDate>
            <inclusiveEndDate>1990</inclusiveEndDate>
            <recordGroupNumber>57</recordGroupNumber>
          </naraMetadata>
        </xmlData>
      </fileContent>
    </byteStream>
  </dataObject>

  <dataObject ID="ag_sdts_meta" mimeType="application/pdf" size="821">
    <byteStream mimeType="application/pdf">
      <fileLocation locatorType="URL" href="file:stdslogicals.spec.pdf"/>
    </byteStream>
    <checksum checksumName="CRC32">5f7cf43d</checksum>
  </dataObject>

  <dataObject ID="ag_arcinfo_meta" mimeType="text/html" size="16127">
    <byteStream mimeType="text/html">
      <fileLocation locatorType="URL" href="file:arcinfoe00.html"/>
    </byteStream>
    <checksum checksumName="CRC32">e6485b15</checksum>
  </dataObject>

  <dataObject ID="fgdc-std-001-1998_meta" mimeType="text/plain"
    size="2494">
    <byteStream mimeType="text/plain">
      <fileLocation locatorType="URL" href="file:fgdc-std-001-1998.
        txt"/>
    </byteStream>
    <checksum checksumName="CRC32">4dd87b4f</checksum>
  </dataObject>

  <dataObject ID="ag_chem_sdts" size="34212">
    <byteStream mimeType="application/octetstream">
      <fileLocation locatorType="URL" href="file:ag_chem/SDTS/ag_chem.
        sdts.tgz"/>
    </byteStream>
  </dataObject>

```

```

</byteStream>
<checksum checksumName="CRC32">f5bec905</checksum>
<transformObject transformType="COMPRESSION" order="1">
  <algorithm>application/x-tar</algorithm>
</transformObject>
<transformObject transformType="COMPRESSION" order="2">
  <algorithm>application/x-gzip</algorithm>
</transformObject>
</dataObject>
<dataObject ID="ag_chem_arinfo" size="1151">
  <byteStream mimeType="application/octetstream">
    <fileLocation locatorType="URL" href="file:
      ag_chem/ArcINFO/ag_chem.e00.gz"/>
  </byteStream>
  <checksum checksumName="CRC32">f0141c10</checksum>
  <transformObject transformType="COMPRESSION">
    <algorithm>application/x-gzip</algorithm>
  </transformObject>
</dataObject>
<dataObject ID="ag_chem_browse_meta" mimeType="image/gif" size="1607">
  <byteStream>
    <fileLocation locatorType="URL" href="file:
      ag_chem/Documentation/ag_chem.gif"/>
  </byteStream>
  <checksum checksumName="CRC32">d0bfaa70</checksum>
</dataObject>
<dataObject ID="ag_chem_documentation" repID="fgdc-std-001-1998_mo"
mimeType="text/xml" size="733">
  <byteStream mimeType="text/xml">
    <fileLocation locatorType="URL" href="file:
      ag_chem/Documentation/ag_chem.xml"/>
  </byteStream>
  <checksum checksumName="CRC32">f57331a</checksum>
</dataObject>
<!--ag_chem meta provided by Mark-->
<dataObject ID="ag_chem_desc_meta" mimeType="text/plain" size="4773">
  <byteStream>
    <fileLocation locatorType="URL" href="file:
      ag_chem/ag_chem_series_description.txt"/>
  </byteStream>
  <checksum checksumName="CRC32">b4d9a36b</checksum>
</dataObject>
<dataObject ID="ag_chem_doc_desc_meta" mimeType="text/plain" size="592">
  <byteStream>
    <fileLocation locatorType="URL" href="file:
      ag_chem/ag_chem_doc_fu_desc.txt"/>
  </byteStream>
  <checksum checksumName="CRC32">fd72a6d7</checksum>
</dataObject>
<dataObject ID="ag_chem_arinfo_desc_meta" mimeType="text/plain"
size="80479">
  <byteStream>
    <fileLocation locatorType="URL" href="file:
      ag_chem/ag_chem_arinfo_fu_desc.txt"/>
  </byteStream>
  <checksum checksumName="CRC32">6fd7e3f5</checksum>
</dataObject>
<dataObject ID="ag_chem_sdts_desc_meta" mimeType="text/plain"
size="33902">

```

```

<byteStream>
  <fileLocation locatorType="URL" href="file:
    ag_chem/ag_chem_sdto_fu_desc.txt"/>
</byteStream>
<checksum checksumName="CRC32">0ae6737b</checksum>
</dataObject>

<!-- context metadata proposed and provided by Don-->
<dataObject ID="ag_chem_doc_context_meta" mimeType="text/plain"
size="142">
  <byteStream>
    <fileLocation locatorType="URL" href="file:
      ag_chem/ag_chem_doc_context.txt"/>
  </byteStream>
  <checksum checksumName="CRC32">25dcc961</checksum>
</dataObject>
<dataObject ID="ag_chem_arcinfo_context_meta" mimeType="text/plain"
size="1193">
  <byteStream>
    <fileLocation locatorType="URL" href="file:
      ag_chem/ag_chem_arcinfo_context.txt"/>
  </byteStream>
  <checksum checksumName="CRC32">89086f17</checksum>
</dataObject>
<dataObject ID="ag_chem_sdto_context_meta" mimeType="text/plain"
size="18458">
  <byteStream>
    <fileLocation locatorType="URL" href="file:
      ag_chem/ag_chem_sdto_context.txt"/>
  </byteStream>
  <checksum checksumName="CRC32">19db55d0</checksum>
</dataObject>

</dataObjectSection>
</xfdu:XFDU>

```

B2.3 ESA Interoperability Test Report

The package has been submitted to the ESA implementation further a mirror change of namespace. Actually, the submitted package was also referencing the <http://www.ccsds.org/xfdu/2004> namespace that is considered obsolete by the ESA implementation and that, in the last version of the software, is used to segregating former or progress XFDU construction rules from the recommended ones in the XFDU Blue Book. Finally, the document was referencing SIP XML Schema at a specific location that was not available in the ESA context. One all these minor elements fixed, the following report has been produced.

```

[INFO ] ESA XFDU Java I/O library
[INFO ] Version: XFDU Java I/O API - SNAPSHOT (GAEL Consultant)
[INFO ] Execution date: Thu Oct 25 14:16:33 GMT+01:00 2007
[INFO ]
[INFO ] XFDU Package: "null"
[INFO ] File: "ag_sip_with_extension_1.xml"
[INFO ] Object Identifier: "null"
[INFO ] Textual Information: "null"
[INFO ] Version: "null"

```


CCSDS REPORT CONCERNING XFDU INTEROPERABILITY TESTING

[INFO] Information Package Map:
[INFO] Content Unit: "ag_chem_sdts_to_cu"
[INFO] Textual Information: "null"
[INFO] Content Unit Type: "null"
[INFO] Order Information: "1.1"
[INFO] Descriptive Metadata: "null"
[INFO] Preservation Descriptive Metadata: "null"
[INFO] Representation Information Metadata: "null"
[INFO] Other Metadata: "null"
[INFO] Content Unit: "ag_chem_sdts_toc_cu"
[INFO] Textual Information: "null"
[INFO] Content Unit Type: "null"
[INFO] Order Information: "1.1.1"
[INFO] Descriptive Metadata: "null"
[INFO] Preservation Descriptive Metadata: "null"
[INFO] Representation Information Metadata: "null"
[INFO] Other Metadata: "null"
[INFO] Content Unit: "ag_chem_do_cu"
[INFO] Textual Information: "null"
[INFO] Content Unit Type: "null"
[INFO] Order Information: "1.1.1.1"
[INFO] Descriptive Metadata: "null"
[INFO] Preservation Descriptive Metadata: "null"
[INFO] Representation Information Metadata: "null"
[INFO] Other Metadata: "null"
[INFO] Data Object Pointer: "ag_chem_sdts"
[INFO] Content Unit: "ag_sdts_meta_to_cu"
[INFO] Textual Information: "null"
[INFO] Content Unit Type: "null"
[INFO] Order Information: "1.2"
[INFO] Descriptive Metadata: "null"
[INFO] Preservation Descriptive Metadata: "null"
[INFO] Representation Information Metadata: "null"
[INFO] Other Metadata: "null"
[INFO] Content Unit: "ag_sdts_meta_toc_cu"
[INFO] Textual Information: "null"
[INFO] Content Unit Type: "null"
[INFO] Order Information: "1.2.1"
[INFO] Descriptive Metadata: "null"
[INFO] Preservation Descriptive Metadata: "null"
[INFO] Representation Information Metadata: "null"
[INFO] Other Metadata: "null"
[INFO] Content Unit: "ag_sdts_meta_do_cu"
[INFO] Textual Information: "null"
[INFO] Content Unit Type: "null"
[INFO] Order Information: "1.2.1.1"
[INFO] Descriptive Metadata: "null"
[INFO] Preservation Descriptive Metadata: "null"
[INFO] Representation Information Metadata: "null"
[INFO] Other Metadata: "null"
[INFO] Data Object Pointer: "ag_sdts_meta"

----- [Truncated] -----

[INFO] Content Unit: "ag_chem_context_to_cu"
[INFO] Textual Information: "null"
[INFO] Content Unit Type: "null"
[INFO] Order Information: "1.7"
[INFO] Descriptive Metadata: "null"
[INFO] Preservation Descriptive Metadata: "null"
[INFO] Representation Information Metadata: "null"
[INFO] Other Metadata: "null"

CCSDS REPORT CONCERNING XFDU INTEROPERABILITY TESTING

[INFO] Content Unit: "ag_chem_context_toc_cu"
 [INFO] Textual Information: "null"
 [INFO] Content Unit Type: "null"
 [INFO] Order Information: "1.7.1"
 [INFO] Descriptive Metadata: "null"
 [INFO] Preservation Descriptive Metadata: "null"
 [INFO] Representation Information Metadata: "null"
 [INFO] Other Metadata: "null"
 [INFO] Content Unit: "ag_chem_stdts_context_meta_do_cu"
 [INFO] Textual Information: "null"

[INFO] Content Unit Type: "null"
 [INFO] Order Information: "1.7.1.1"
 [INFO] Descriptive Metadata: "null"
 [INFO] Preservation Descriptive Metadata: "null"
 [INFO] Representation Information Metadata: "null"
 [INFO] Other Metadata: "null"
 [INFO] Data Object Pointer: "ag_chem_stdts_context_meta"
 [INFO] Content Unit: "ag_chem_arcinfo_context_meta_do_cu"
 [INFO] Textual Information: "null"
 [INFO] Content Unit Type: "null"
 [INFO] Order Information: "1.7.1.2"
 [INFO] Descriptive Metadata: "null"
 [INFO] Preservation Descriptive Metadata: "null"
 [INFO] Representation Information Metadata: "null"
 [INFO] Other Metadata: "null"
 [INFO] Data Object Pointer: "ag_chem_arcinfo_context_meta"
 [INFO] Content Unit: "ag_chem_doc_context_meta_do_cu"
 [INFO] Textual Information: "null"
 [INFO] Content Unit Type: "null"
 [INFO] Order Information: "1.7.1.3"
 [INFO] Descriptive Metadata: "null"
 [INFO] Preservation Descriptive Metadata: "null"
 [INFO] Representation Information Metadata: "null"
 [INFO] Other Metadata: "null"
 [INFO] Data Object Pointer: "ag_chem_doc_context_meta"

[INFO] Metadata Objects:
 [INFO] Metadata Object: "fgdc-std-001-1998_mo"

[INFO] Data Objects:
 [INFO] Data Object: "archival_creator_rcd"
 [INFO] MIME: "null"
 [INFO] Representation Information: "null"
 [INFO] Size: -1 byte(s)
 [INFO] Checksum: null (unspecified)
 [INFO] Bytestream: "null"
 [INFO] MIME: "text/xml"
 [INFO] Size: -1 byte(s)
 [INFO] Checksum: null (unspecified)
 [INFO] File Content: "null" (XML Data)
 [INFO] Data Object: "rcd_grp_description"
 [INFO] MIME: "null"
 [INFO] Representation Information: "null"
 [INFO] Size: -1 byte(s)
 [INFO] Checksum: null (unspecified)
 [INFO] Bytestream: "null"
 [INFO] MIME: "text/xml"
 [INFO] Size: -1 byte(s)
 [INFO] Checksum: null (unspecified)
 [INFO] File Content: "null" (XML Data)
 [INFO] Data Object: "ag_sdts_meta"
 [INFO] MIME: "application/pdf"
 [INFO] Representation Information: "null"

[INFO] Size: 821 byte(s)
 [INFO] Checksum: null (unspecified)
 [INFO] Bytestream: "null"
 [INFO] MIME: "application/pdf"
 [INFO] Size: -1 byte(s)
 [INFO] Checksum: null (unspecified)
 [INFO] File Content: None
 [INFO] File Locator: "null"
 [INFO] Textual Information: "null"
 [INFO] Locator Type: "null"
 [INFO] Hyperlink Reference: ""
 [INFO] Finer Locator: "null"

----- [Truncated] -----

[INFO] Data Object: "ag_chem_stds_context_meta"
 [INFO] MIME: "text/plain"
 [INFO] Representation Information: "null"
 [INFO] Size: 18458 byte(s)
 [INFO] Checksum: null (unspecified)
 [INFO] Bytestream: "null"
 [INFO] MIME: "null"
 [INFO] Size: -1 byte(s)
 [INFO] Checksum: null (unspecified)
 [INFO] File Content: None
 [INFO] File Locator: "null"
 [INFO] Textual Information: "null"
 [INFO] Locator Type: "null"
 [INFO] Hyperlink Reference: ""
 [INFO] Finer Locator: "null"
 [INFO] Behavior Objects:
 [INFO] Empty Behavior Object Section
 [INFO] Validation:
 [INFO] Validator: "esa.xfd�.XercesSchemaValidator"
 [INFO] XML Schema Location: "/misc/athena_home/mbaye/software/xfdu/target/xfdu-suite-SNAPSHOT/resources/xsd/org/ccsds/xfdu/xfdu.xsd"
[INFO] The input package is valid.

This report shows that ESA Implementation successfully browsed the Manifest file i.e. without failure, and demonstrates the interoperability of the XFDU concepts: goals of the testing activity.

B2.4 CNES Interoperability Test Report

The following figure reports that XFDU View was able to ingest the XFDU package and interpret its content. Here, the left tree shows the “extension” entries that demonstrate the ability to handle these elements without failing.

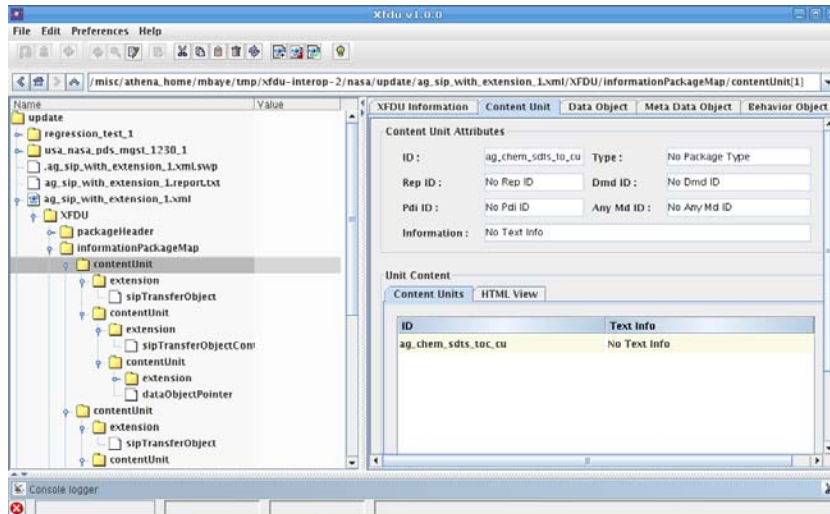


Figure B-2: XFDU View of the SIP/Extension package

B3 XFDU Regression Test Package

The following XFDU zipped package has been generated by NASA as part of a regression testing from SDFU packaging format.

B3.1 Package Layout

The package is a ZIP file including the XFDU Manifest file and a referenced Component. The Manifest is a very simple package that declares one Content Unit, one Metadata Object and one Data Object, all these object referencing the same file.

B3.2 Manifest File (Abstract)

The following sample has been voluntarily truncated to reduce the page number.

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<xfdu:XFDU xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="urn:ccsds:schema:xfdu:1 file:/home/sergey/jbproject/xfdu.
  jxb2/schema/xfdu.xsd"
  xmlns:ns3="urn:ccsds:schema:xfdu:1"
  xmlns:xfdu="urn:ccsds:schema:xfdu:1">

  <packageHeader ID="ph">
    <volumeInfo>
      <specificationVersion>1.0</specificationVersion>
    </volumeInfo>
    <environmentInfo>
      <xmlData>
        <os>Linux2.6.22.7-57.fc6</os>
      </xmlData>
    </environmentInfo>
  </packageHeader>

  <informationPackageMap>
    <xfdu:contentUnit anyMId="OTHER_OTHER_dea7e8b2-81b2-11dc-862d-
```

```

a1d13cd4673c" ID="contentUnit_de682091-81b2-11dc-862d-a1d13cd4673c">
  <dataObjectPointer dataObjectID="dataObject1"/>
</xfdu:contentUnit>
</informationPackageMap>

<metadataSection>
  <metadataObject category="OTHER" classification="OTHER"
ID="OTHER_OTHER_dea7e8b2-81b2-11dc-862d-a1d13cd4673c">
  <metadataReference mimeType="text/plain" vocabularyName="OTHER"
locatorType="URL" href="file:tmp/xfdutests/de411090-81b2-11dc-862d-
a1d13cd4673c.txt"/>
</metadataObject>
</metadataSection>
<dataObjectSection>
  <dataObject size="30" ID="dataObject1">
    <byteStream size="30" mimeType="text/plain">
      <fileLocation locatorType="URL" href="file:
tmp/xfdutests/de411090-81b2-11dc-862d-a1d13cd4673c.txt"/>
    </byteStream>
  </dataObject>
</dataObjectSection>

</xfdu:XFDU>

```

B3.3 ESA Interoperability Test Report

The package has been submitted to the ESA implementation further a mirror change of namespace. Actually, the submitted package was also referencing the <http://www.ccsds.org/xfdu/2004> namespace that is considered obsolete by the ESA implementation and that, in the last version of the software, is used to segregating former or progress XFDU construction rules from the recommended ones in the XFDU Blue Book. Finally, the manifest document was named “xfdumanifest.xml” according to the convention introduced in 2003 by IPR working group. This convention is stated in the XFDU structure and construction rules recommendation and the ESA software had to be updated to recognize the manifest file automatically within the ZIP archive.

```

[INFO ] ESA XFDU Java I/O library
[INFO ] Version: XFDU Java I/O API - 1-1-rc-1 (GAEL Consultant)
[INFO ] Execution date: Wed Dec 19 07:41:48 CET 2007
[INFO ]
[INFO ] XFDU Package: "null"
[INFO ] File: "regression_test_1/xfdumanifest.xml"
[INFO ] Namespace: "urn:ccsds:schema:xfdu:1"
[INFO ] Object Identifier: "null"
[INFO ] Textual Information: "null"
[INFO ] Version: "null"
[INFO ] Information Package Map:
[INFO ] Content Unit: "contentUnit_de682091-81b2-11dc-862d-a1d13cd4673c"
[INFO ] Textual Information: "null"
[INFO ] Content Unit Type: "null"
[INFO ] Order Information: "null"
[INFO ] Descriptive Metadata: "null"
[INFO ] Preservation Descriptive Metadata: "null"
[INFO ] Representation Information Metadata: "null"
[INFO ] Other Metadata:
"OTHER_OTHER_dea7e8b2-81b2-11dc-862d-a1d13cd4673c"

```

```

[INFO ] Data Object Pointer: "dataObject1"
[INFO ] Metadata Objects:
[INFO ] Metadata Object:
"OTHER_OTHER_dea7e8b2-81b2-11dc-862d-a1d13cd4673c"
[INFO ] Classification: "OTHER"
[INFO ] Other Classification: "null"
[INFO ] Category: "null"
[INFO ] Other Category: "null"
[INFO ] Reference: "null"
[INFO ] Textual Information: "null"
[INFO ] Vocabulary Name: "OTHER"
[INFO ] MIME Type: "text/plain"
[INFO ] Locator Type: "URL"
[INFO ] Other Locator Type: "null"
[INFO ] Hyperlink Reference:
"file:tmp/xfdutests/de411090-81b2-11dc-862d-a1d13cd4673c.txt"
[INFO ] Data Objects:
[INFO ] Data Object: "dataObject1"
[INFO ] MIME: "null"
[INFO ] Representation Information: "null"
[INFO ] Size: 30 byte(s)
[INFO ] Checksum: null (unspecified)
[INFO ] Bytestream: "null"
[INFO ] MIME: "text/plain"
[INFO ] Size: 30 byte(s)
[INFO ] Checksum: null (unspecified)
[INFO ] File Content: None
[INFO ] File Locator: "null"
[INFO ] Textual Information: "null"
[INFO ] Locator Type: "URL"
[INFO ] Hyperlink Reference:
"file:tmp/xfdutests/de411090-81b2-11dc-862d-a1d13cd4673c.txt"
[INFO ] Finer Locator: "null"
[INFO ] Behavior Objects:

[INFO ] Empty Behavior Object Section
[INFO ] Validation:
[INFO ] Validator: "esa.xfd�.XercesSchemaValidator"
[INFO ] XML Schema Location: "jar:file:/misc/athena_home/mbaye/workspace/safe/target/safe-suite-1-1-rc-
1/lib/java/xfdu-core-1-1-rc-1.jar!/xsd/org/ccsds/xfdu/xfdu.xsd"
[INFO ] The input package is valid.

```

This report shows that ESA Implementation successfully located, browsed the Manifest file i.e. without failure, and demonstrates the interoperability of the XFDU concepts: goals of the testing activity.

B3.4 CNES Interoperability Test Report

The following figure reports that XFDU View was able to ingest the XFDU package and interpret its content. Here, right panel shows that the referenced file from the Metadata Object was correctly handled.

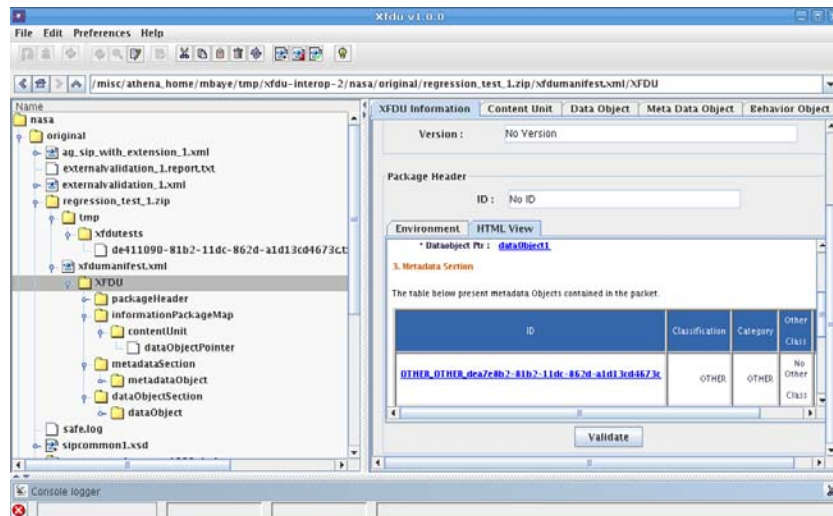


Figure B-3: XFDU View of the NASA Regression package

B4 NASA PDS MGST Package

The following XFDU package has been generated by NASA during JPL/XFDU testing from MGS Thermal Emission Spectrometer Data.

B4.1 Package Layout

The package is a ZIP file of more than 400Mb that contains nested content units referencing a large number of Metadata and Data Objects.

B4.2 Manifest File (Abstract)

The following sample has been voluntarily truncated to reduce the page number.

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<xfdu:XFDU xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="urn:ccsds:schema:xfdu:1 file:/home/sergey/jbproject/xfdu.
  jxb2/schema/xfdu.xsd"
  xmlns:ns3="urn:ccsds:schema:xfdu:1"
  xmlns:xfdu="urn:ccsds:schema:xfdu:1">
```

```
<packageHeader ID="ph">
  <volumeInfo>
    <specificationVersion>1.0</specificationVersion>
    <sequenceInformation sequencePosition="1" sequenceSize="1"/>
  </volumeInfo>
  <environmentInfo>
    <xmlData>
      <PDS_DATASET>
        <RECORD_TYPE>STREAM</RECORD_TYPE>
        <DATA_SET_COLLECTION_MEMBER_FLG>N<
        /DATA_SET_COLLECTION_MEMBER_FLG>
        <DATA_SET_DESC>
```

Data Set Overview

=====

The TES-TSDR data product contains the raw and calibrated thermal IR radiance spectra, the visual and thermal bolometric radiance measurements, and several atmospheric and surface properties derived from this data. Also included are the parameters that describe each observations, some downlinked diagnostic information, and the pointing and positional information derived from the project's SPICE kernels.

The TES data is divided into 10 tables (OBS, RAD, BOL, GEO, POS, TLM, IFG, CMP, ATM, LMB). Each table is stored in a separate file as a PDS TABLE structure, using fixed-length binary records, with extensions to handle the variable length spectra. Every record is stored with the spacecraft time, and related records can be retrieved from each table using time as a common key. In some tables, up to 6 records can be stored for a given time, one for each detector. In these cases the records also include a field named 'detector', which with the time field, uniquely identifies the record.

The data products on this volume may be reprocessed at the end of the mission.

Modification History

=====

Version 1 data volumes include MGST_0001 through MGST_0226, released between June 1999 and October 2001. These volumes contain TES data collected August 1997 through March 2001.

The version 2 data set release began January 2002; version 2 supersedes version 1. The version 2 release is necessitated by several improvements that the TES Team has made to the version 1 data set throughout the mapping phase of the MGS mission. The most significant of these improvements include:

- MGST_0100 (Oct 1999) - classification and quality fields added to the OBS and RAD tables;
- MGST_0162 (Oct 2000) - thermal inertia fields added to the BOL and RAD tables;
- MGST_0188 (Apr 2001) - ATM table replaces SRF table and is filled with atmospheric products;
- MGST_0213 (Oct 2001) - geometry and position fields are calculated using new calibration software (V003a).

Since previously released volumes were not re-released with each improvement, incompatibility problems developed between data volumes released at different times. The version 2 data release incorporates all of the above changes and is a uniform collection of all available TES mapping data.

Data

=====

Each table is stored in a PDS TABLE structure using fixed-length binary records sorted time-sequentially. Each table file is prefixed with an ASCII header that describes the contents and format of the table, and a pointer that indicates where the binary table data starts. The description identifies each column in the table, detailing its name, starting position (in bytes), size (in bytes), data type, description and scaling

factors if applicable. In some cases the column being described is a fixed-length array of related, homogeneous values, in which case the column description also includes the number of items in the array, and the size of each item.

Four tables (RAD, ATM, CMP, IFG) store variable length data. These variable length records are stored in a file separate from the fixed length records, and are addressed from the fixed-length records with a pointer column. Pointer columns contain the position of the variable length data, in bytes, from the start of the file it is in.

Fixed-length records are stored in files with a .DAT extension. The variable length records that are referenced by an individual .DAT file are found in a file with the same name, but with a .VAR extension.

Coordinate System

=====

Mars areocentric, west positive

Software

=====

The TES project has produced a software tool that not only reads the PDS table and variable length records, but is also capable of joining the related records among multiple tables. This piece of software is called 'vanilla', and is provided on this cd.

'Vanilla' is also available via anonymous ftp from <ftp://east.la.asu.edu/pub/software/vanilla/vanilla.tar.Z>. The vanilla program works on UNIX machines with integers in MSB_INTEGER format and on PC platforms.

Media/Format

=====

```
CD-ROM </DATA_SET_DESC>
  <DETAILED_CATALOG_FLAG>N</DETAILED_CATALOG_FLAG>
  <DATA_OBJECT_TYPE>TABLE</DATA_OBJECT_TYPE>
  <DATA_SET_RELEASE_DATE>2002-01-01</DATA_SET_RELEASE_DATE>
  <PRODUCER_FULL_NAME>PHILIP R. CHRISTENSEN<
  /PRODUCER_FULL_NAME>
  <START_TIME>1998-04-02T10:04:56</START_TIME>
  <CONFIDENCE_LEVEL_NOTE>
```

Please refer to the MGS Thermal Emission Spectrometer Data Processing User's Guide (CHRISTENSEN1999), which is included in this data set archive. </CONFIDENCE_LEVEL_NOTE>

```
  <DATA_SET_NAME>MGS M THERMAL EMISSION SPECTROMETER
    3 TSDR V2.0</DATA_SET_NAME>
  <DATA_SET_ID>MGS-M-TES-3-TSDR-V2.0</DATA_SET_ID>
  <STOP_TIME>UNK</STOP_TIME>
  <PDS_VERSION_ID>PDS3</PDS_VERSION_ID>
  <LABEL_REVISION_NOTE>P. Christensen, 1999-02-28
    K. Murray, 2001-04-01
    K. Murray, 2002-01-01 <
  /LABEL_REVISION_NOTE>
  </PDS_DATASET>
</xmlData>
```

```

</environmentInfo>
</packageHeader>
<informationPackageMap>

<xfdu:contentUnit textInfo="usa_nasa_pds_mgst_1230"
ID="contentUnit_1f2e311e-b7a1-11db-bf43-2fc255c78bfe">
  <xfdu:contentUnit ID="contentUnit1f059a74-b7a1-11db-bf43-
2fc255c78bfe">
    <dataObjectPointer dataObjectID="dataObject1"/>
  </xfdu:contentUnit>
  <xfdu:contentUnit ID="contentUnit1f26b705-b7a1-11db-bf43-
2fc255c78bfe">
    <dataObjectPointer dataObjectID="dataObject2"/>
  </xfdu:contentUnit>
  <xfdu:contentUnit ID="contentUnit1f2864b6-b7a1-11db-bf43-
2fc255c78bfe">
    <dataObjectPointer dataObjectID="dataObject3"/>
  </xfdu:contentUnit>
  <xfdu:contentUnit anyMdlID="meta_xml_1f2b98ee-b7a1-11db-acb1-
157d5f6325af meta_1f2b98ed-b7a1-11db-acb1-157d5f6325af"
ID="contentUnit1f2b9907-b7a1-11db-bf43-2fc255c78bfe"/>
  <xfdu:contentUnit ID="contentUnit1f2d46ba-b7a1-11db-bf43-
2fc255c78bfe">
    <dataObjectPointer dataObjectID="dataObject6"/>
  </xfdu:contentUnit>
  <xfdu:contentUnit ID="contentUnit1f2d6dcb-b7a1-11db-bf43-
2fc255c78bfe">
    <dataObjectPointer dataObjectID="dataObject7"/>
  </xfdu:contentUnit>
  <xfdu:contentUnit ID="contentUnit1f2d94dc-b7a1-11db-bf43-
2fc255c78bfe">
    <dataObjectPointer dataObjectID="dataObject8"/>
  </xfdu:contentUnit>
  <xfdu:contentUnit ID="contentUnit1f2e311d-b7a1-11db-bf43-
2fc255c78bfe">
    <dataObjectPointer dataObjectID="dataObject9"/>
  </xfdu:contentUnit>
  <xfdu:contentUnit textInfo="DOCUMENT" ID="contentUnit1f489705-
b7a1-11db-bf43-2fc255c78bfe">
    <xfdu:contentUnit ID="contentUnit1f2f90af-b7a1-11db-bf43-
2fc255c78bfe">
      <dataObjectPointer dataObjectID="dataObject10"/>
    </xfdu:contentUnit>
    <xfdu:contentUnit ID="contentUnit1f3276e0-b7a1-11db-bf43-
2fc255c78bfe">
      <dataObjectPointer dataObjectID="dataObject11"/>
    </xfdu:contentUnit>
    <xfdu:contentUnit anyMdlID="meta_xml_1f33d652-b7a1-11db-acb1-
157d5f6325af meta_1f33d651-b7a1-11db-acb1-157d5f6325af"
ID="contentUnit1f33d671-b7a1-11db-bf43-2fc255c78bfe"/>
    <xfdu:contentUnit ID="contentUnit1f344ba4-b7a1-11db-bf43-
2fc255c78bfe">
      <dataObjectPointer dataObjectID="dataObject14"/>
    </xfdu:contentUnit>
    <xfdu:contentUnit ID="contentUnit1f369595-b7a1-11db-bf43-
2fc255c78bfe">
      <dataObjectPointer dataObjectID="dataObject15"/>
    </xfdu:contentUnit>
    <xfdu:contentUnit ID="contentUnit1f36bca6-b7a1-11db-bf43-
2fc255c78bfe">
      <dataObjectPointer dataObjectID="dataObject16"/>
    </xfdu:contentUnit>
  </xfdu:contentUnit>

```

```

</xfdu:contentUnit>
<xfdu:contentUnit ID="contentUnit1f38b877-b7a1-11db-bf43-
2fc255c78bfe">
  <dataObjectPointer dataObjectID="dataObject17"/>
</xfdu:contentUnit>
<xfdu:contentUnit ID="contentUnit1f3bc5b8-b7a1-11db-bf43-
2fc255c78bfe">
  <dataObjectPointer dataObjectID="dataObject18"/>
</xfdu:contentUnit>
<xfdu:contentUnit ID="contentUnit1f3c8909-b7a1-11db-bf43-
2fc255c78bfe">
  <dataObjectPointer dataObjectID="dataObject19"/>
</xfdu:contentUnit>
<xfdu:contentUnit ID="contentUnit1f3cd72a-b7a1-11db-bf43-
2fc255c78bfe">
  <dataObjectPointer dataObjectID="dataObject20"/>
</xfdu:contentUnit>
<xfdu:contentUnit ID="contentUnit1f40cecb-b7a1-11db-bf43-
2fc255c78bfe">
  <dataObjectPointer dataObjectID="dataObject21"/>
</xfdu:contentUnit>
<xfdu:contentUnit anyMdlID="meta_xml_1f431896-b7a1-11db-acb1-
157d5f6325af meta_1f431895-b7a1-11db-acb1-157d5f6325af"
ID="contentUnit1f4318bc-b7a1-11db-bf43-2fc255c78bfe"/>
<xfdu:contentUnit anyMdlID="meta_xml_1f44782a-b7a1-11db-acb1-
157d5f6325af meta_1f447829-b7a1-11db-acb1-157d5f6325af"
ID="contentUnit1f44784f-b7a1-11db-bf43-2fc255c78bfe"/>
<xfdu:contentUnit ID="contentUnit1f4821d2-b7a1-11db-bf43-
2fc255c78bfe">
  <dataObjectPointer dataObjectID="dataObject26"/>
</xfdu:contentUnit>
<xfdu:contentUnit ID="contentUnit1f486ff3-b7a1-11db-bf43-
2fc255c78bfe">
  <dataObjectPointer dataObjectID="dataObject27"/>
</xfdu:contentUnit>
<xfdu:contentUnit ID="contentUnit1f489704-b7a1-11db-bf43-
2fc255c78bfe">
  <dataObjectPointer dataObjectID="dataObject28"/>
</xfdu:contentUnit>
</xfdu:contentUnit>

```

----- [Truncated] -----

```

</xfdu:contentUnit>
</informationPackageMap>
<metadataSection>
  <metadataObject category="OTHER" classification="OTHER"
ID="meta_xml_1f2b98ee-b7a1-11db-acb1-157d5f6325af">
    <dataObjectPointer dataObjectID="meta_data_xml_1f2b23bb-b7a1-11db-
acb1-157d5f6325af_1f2c0e38-b7a1-11db-bf43-2fc255c78bfe"/>
  </metadataObject>
  <metadataObject category="OTHER" classification="OTHER"
ID="meta_1f2b98ed-b7a1-11db-acb1-157d5f6325af">
    <dataObjectPointer dataObjectID="meta_data_1f2b23bc-b7a1-11db-acb1-
157d5f6325af_1f2c0e39-b7a1-11db-bf43-2fc255c78bfe"/>
  </metadataObject>
  <metadataObject category="OTHER" classification="OTHER"
ID="meta_xml_1f33d652-b7a1-11db-acb1-157d5f6325af">
    <dataObjectPointer dataObjectID="meta_data_xml_1f33d64f-b7a1-11db-
acb1-157d5f6325af_1f33fd82-b7a1-11db-bf43-2fc255c78bfe"/>
  </metadataObject>

```

```

<metadataObject category="OTHER" classification="OTHER"
ID="meta_1f33d651-b7a1-11db-acb1-157d5f6325af">
  <dataObjectPointer dataObjectID="meta_data_1f33d650-b7a1-11db-acb1-
157d5f6325af_1f33fd83-b7a1-11db-bf43-2fc255c78bfe"/>
</metadataObject>
<metadataObject category="OTHER" classification="OTHER"
ID="meta_xml_1f431896-b7a1-11db-acb1-157d5f6325af">
  <dataObjectPointer dataObjectID="meta_data_xml_1f431893-b7a1-11db-
acb1-157d5f6325af_1f4366dd-b7a1-11db-bf43-2fc255c78bfe"/>
</metadataObject>
<metadataObject category="OTHER" classification="OTHER"
ID="meta_1f431895-b7a1-11db-acb1-157d5f6325af">
  <dataObjectPointer dataObjectID="meta_data_1f431894-b7a1-11db-acb1-
157d5f6325af_1f4366de-b7a1-11db-bf43-2fc255c78bfe"/>

```

----- [Truncated] -----

```

</metadataSection>
<dataObjectSection>
  <dataObject ID="dataObject1">
    <byteStream size="1151" mimeType="text/plain">
      <fileLocation locatorType="URL" href="file:
home/sergey/jbproject/xfdu-
ps/target/usa_nasa_pds_mgst_1230/VOLDESC.CAT.xml"/>
      <checksum checksumName="CRC32">f0141c10</checksum>
    </byteStream>
  </dataObject>
  <dataObject ID="dataObject2">
    <byteStream size="15977" mimeType="text/plain">
      <fileLocation locatorType="URL" href="file:
home/sergey/jbproject/xfdu-
ps/target/usa_nasa_pds_mgst_1230/AAREADME.HTM"/>
      <checksum checksumName="CRC32">7467e4a9</checksum>
    </byteStream>
  </dataObject>
  <dataObject ID="dataObject3">
    <byteStream size="13182" mimeType="text/plain">
      <fileLocation locatorType="URL" href="file:
home/sergey/jbproject/xfdu-
ps/target/usa_nasa_pds_mgst_1230/AAREADME.TXT"/>
      <checksum checksumName="CRC32">bb7ad17</checksum>
    </byteStream>
  </dataObject>

```

----- [Truncated] -----

```

</dataObjectSection>
</xfdu:XFDU>

```

B4.3 ESA Interoperability Test Report

The package has been submitted to the ESA implementation further a mirror change of namespace. Actually, the submitted package was also referencing the <http://www.ccsds.org/xfdu/2004> namespace that is considered obsolete by the ESA implementation and that, in the last version of the software, is used to segregating former or progress XFDU construction rules from the recommended ones in the XFDU Blue Book. Finally, the manifest document was named “`xfdumanifest.xml`” according to the convention introduced in 2003 by IPR working group. This convention is stated in the XFDU structure

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and construction rules recommendation and the ESA software had to be updated to recognize the manifest file automatically within the ZIP archive.

```
[INFO ] ESA XFDU Java I/O library
[INFO ]   Version: XFDU Java I/O API - 1-1-rc-1 (GAEL Consultant)
[INFO ]   Execution date: Wed Dec 19 07:53:23 CET 2007
[INFO ]
[INFO ] XFDU Package: "null"
[INFO ]   File: "usa_nasa_pds_mgst_1230_1/xfdumanifest.xml"
[INFO ]   Namespace: "urn:ccsds:schema:xfdu:1"
[INFO ]   Object Identifier: "null"
[INFO ]   Textual Information: "null"
[INFO ]   Version: "null"
[INFO ] Information Package Map:
[INFO ]   Content Unit: "contentUnit_1f2e311e-b7a1-11db-bf43-2fc255c78bfe"
[INFO ]     Textual Information: "usa_nasa_pds_mgst_1230"
[INFO ]     Content Unit Type: "null"
[INFO ]     Order Information: "null"
[INFO ]     Descriptive Metadata: "null"
[INFO ]     Preservation Descriptive Metadata: "null"
[INFO ]     Representation Information Metadata: "null"
[INFO ]     Other Metadata: "null"
[INFO ]   Content Unit: "contentUnit1f059a74-b7a1-11db-bf43-2fc255c78bfe"
[INFO ]     Textual Information: "null"
[INFO ]     Content Unit Type: "null"
[INFO ]     Order Information: "null"
[INFO ]     Descriptive Metadata: "null"
[INFO ]     Preservation Descriptive Metadata: "null"
[INFO ]     Representation Information Metadata: "null"
[INFO ]     Other Metadata: "null"
[INFO ]     Data Object Pointer: "dataObject1"
[INFO ]   Content Unit: "contentUnit1f26b705-b7a1-11db-bf43-2fc255c78bfe"
[INFO ]     Textual Information: "null"
[INFO ]     Content Unit Type: "null"
[INFO ]     Order Information: "null"
[INFO ]     Descriptive Metadata: "null"
[INFO ]     Preservation Descriptive Metadata: "null"
[INFO ]     Representation Information Metadata: "null"
[INFO ]     Other Metadata: "null"
[INFO ]     Data Object Pointer: "dataObject2"
[INFO ]   Content Unit: "contentUnit1f2864b6-b7a1-11db-bf43-2fc255c78bfe"
[INFO ]     Textual Information: "null"
[INFO ]     Content Unit Type: "null"
[INFO ]     Order Information: "null"
[INFO ]     Descriptive Metadata: "null"
[INFO ]     Preservation Descriptive Metadata: "null"
[INFO ]     Representation Information Metadata: "null"
[INFO ]     Other Metadata: "null"
[INFO ]     Data Object Pointer: "dataObject3"
[INFO ]   Content Unit: "contentUnit1f2b9907-b7a1-11db-bf43-2fc255c78bfe"
[INFO ]     Textual Information: "null"
[INFO ]     Content Unit Type: "null"
[INFO ]     Order Information: "null"
[INFO ]     Descriptive Metadata: "null"
[INFO ]     Preservation Descriptive Metadata: "null"
[INFO ]     Representation Information Metadata: "null"
[INFO ]     Other Metadata: "meta_xml_1f2b98ee-b7a1-11db-acb1-157d5f6325af meta_1f2b98ed-b7a1-11db-
acb1-157d5f6325af"
[INFO ]   Content Unit: "contentUnit1f2d46ba-b7a1-11db-bf43-2fc255c78bfe"
[INFO ]     Textual Information: "null"
```

CCSDS REPORT CONCERNING XFDU INTEROPERABILITY TESTING

[INFO] Content Unit Type: "null"
[INFO] Order Information: "null"
[INFO] Descriptive Metadata: "null"
[INFO] Preservation Descriptive Metadata: "null"
[INFO] Representation Information Metadata: "null"
[INFO] Other Metadata: "null"
[INFO] Data Object Pointer: "dataObject6"
[INFO] Content Unit: "contentUnit1f2d6dcb-b7a1-11db-bf43-2fc255c78bfe"
[INFO] Textual Information: "null"
[INFO] Content Unit Type: "null"
[INFO] Order Information: "null"
[INFO] Descriptive Metadata: "null"
[INFO] Preservation Descriptive Metadata: "null"
[INFO] Representation Information Metadata: "null"
[INFO] Other Metadata: "null"
[INFO] Data Object Pointer: "dataObject7"
[INFO] Content Unit: "contentUnit1f2d94dc-b7a1-11db-bf43-2fc255c78bfe"
[INFO] Textual Information: "null"
[INFO] Content Unit Type: "null"
[INFO] Order Information: "null"
[INFO] Descriptive Metadata: "null"
[INFO] Preservation Descriptive Metadata: "null"
[INFO] Representation Information Metadata: "null"
[INFO] Other Metadata: "null"
[INFO] Data Object Pointer: "dataObject8"

----- [Truncated] -----

[INFO] Metadata Objects:
[INFO] Metadata Object: "meta_xml_1f2b98ee-b7a1-11db-acb1-157d5f6325af"
[INFO] Classification: "OTHER"
[INFO] Other Classification: "null"
[INFO] Category: "null"
[INFO] Other Category: "null"
[INFO] Pointed Data Object: "meta_data_xml_1f2b23bb-b7a1-11db-acb1-157d5f6325af_1f2c0e38-b7a1-11db-bf43-2fc255c78bfe"
[INFO] Metadata Object: "meta_1f2b98ed-b7a1-11db-acb1-157d5f6325af"
[INFO] Classification: "OTHER"
[INFO] Other Classification: "null"
[INFO] Category: "null"
[INFO] Other Category: "null"
[INFO] Pointed Data Object: "meta_data_1f2b23bc-b7a1-11db-acb1-157d5f6325af_1f2c0e39-b7a1-11db-bf43-2fc255c78bfe"
[INFO] Metadata Object: "meta_xml_1f33d652-b7a1-11db-acb1-157d5f6325af"
[INFO] Classification: "OTHER"
[INFO] Other Classification: "null"
[INFO] Category: "null"
[INFO] Other Category: "null"
[INFO] Pointed Data Object: "meta_data_xml_1f33d64f-b7a1-11db-acb1-157d5f6325af_1f33fd82-b7a1-11db-bf43-2fc255c78bfe"
[INFO] Metadata Object: "meta_1f33d651-b7a1-11db-acb1-157d5f6325af"
[INFO] Classification: "OTHER"
[INFO] Other Classification: "null"
[INFO] Category: "null"
[INFO] Other Category: "null"
[INFO] Pointed Data Object: "meta_data_1f33d650-b7a1-11db-acb1-157d5f6325af_1f33fd83-b7a1-11db-bf43-2fc255c78bfe"
[INFO] Metadata Object: "meta_xml_1f431896-b7a1-11db-acb1-157d5f6325af"
[INFO] Classification: "OTHER"
[INFO] Other Classification: "null"
[INFO] Category: "null"
[INFO] Other Category: "null"

CCSDS REPORT CONCERNING XFDU INTEROPERABILITY TESTING

[INFO] Pointed Data Object: "meta_data_xml_1f431893-b7a1-11db-acb1-157d5f6325af_1f4366dd-b7a1-11db-bf43-2fc255c78bfe"
[INFO] Metadata Object: "meta_1f431895-b7a1-11db-acb1-157d5f6325af"
[INFO] Classification: "OTHER"
[INFO] Other Classification: "null"
[INFO] Category: "null"
[INFO] Other Category: "null"
[INFO] Pointed Data Object: "meta_data_1f431894-b7a1-11db-acb1-157d5f6325af_1f4366de-b7a1-11db-bf43-2fc255c78bfe"
[INFO] Metadata Object: "meta_xml_1f44782a-b7a1-11db-acb1-157d5f6325af"
[INFO] Classification: "OTHER"
[INFO] Other Classification: "null"
[INFO] Category: "null"
[INFO] Other Category: "null"
[INFO] Pointed Data Object: "meta_data_xml_1f447827-b7a1-11db-acb1-157d5f6325af_1f44c670-b7a1-11db-bf43-2fc255c78bfe"
[INFO] Metadata Object: "meta_1f447829-b7a1-11db-acb1-157d5f6325af"
[INFO] Classification: "OTHER"
[INFO] Other Classification: "null"
[INFO] Category: "null"
[INFO] Other Category: "null"
[INFO] Pointed Data Object: "meta_data_1f447828-b7a1-11db-acb1-157d5f6325af_1f44c671-b7a1-11db-bf43-2fc255c78bfe"

----- [Truncated] -----

[INFO] Data Objects:
[INFO] Data Object: "dataObject1"
[INFO] MIME: "null"
[INFO] Representation Information: "null"
[INFO] Size: (unspecified)
[INFO] Checksum: null (unspecified)
[INFO] Bytestream: "null"
[INFO] MIME: "text/plain"
[INFO] Size: 1151 byte(s)
[INFO] Checksum: f0141c10 (CRC32)
[INFO] File Content: None
[INFO] File Locator: "null"
[INFO] Textual Information: "null"
[INFO] Locator Type: "URL"
[INFO] Hyperlink Reference: "file:home/sergey/jbproject/xfdu-ps/target/usa_nasa_pds_mgst_1230/VOLDESC.CAT.xml"
[INFO] Finer Locator: "null"
[INFO] Data Object: "dataObject2"
[INFO] MIME: "null"
[INFO] Representation Information: "null"
[INFO] Size: (unspecified)
[INFO] Checksum: null (unspecified)
[INFO] Bytestream: "null"
[INFO] MIME: "text/plain"
[INFO] Size: 15977 byte(s)
[INFO] Checksum: 7467e4a9 (CRC32)
[INFO] File Content: None
[INFO] File Locator: "null"
[INFO] Textual Information: "null"
[INFO] Locator Type: "URL"
[INFO] Hyperlink Reference: "file:home/sergey/jbproject/xfdu-ps/target/usa_nasa_pds_mgst_1230/AAREADME.HTM"
[INFO] Finer Locator: "null"
[INFO] Data Object: "dataObject3"
[INFO] MIME: "null"
[INFO] Representation Information: "null"

CCSDS REPORT CONCERNING XFDU INTEROPERABILITY TESTING

[INFO] Size: (unspecified)
 [INFO] Checksum: null (unspecified)
 [INFO] Bytestream: "null"
 [INFO] MIME: "text/plain"
 [INFO] Size: 13182 byte(s)
 [INFO] Checksum: bb7ad17 (CRC32)
 [INFO] File Content: None
 [INFO] File Locator: "null"
 [INFO] Textual Information: "null"
 [INFO] Locator Type: "URL"
 [INFO] Hyperlink Reference: "file:home/sergey/jbproject/xfdu-
 ps/target/usa_nasa_pds_mgst_1230/AAREADME.TXT"
 [INFO] Finer Locator: "null"
 [INFO] Data Object: "meta_data_xml_1f2b23bb-b7a1-11db-acb1-157d5f6325af_1f2c0e38-b7a1-11db-bf43-
 2fc255c78bfe"
 [INFO] MIME: "null"
 [INFO] Representation Information: "null"
 [INFO] Size: (unspecified)
 [INFO] Checksum: null (unspecified)
 [INFO] Bytestream: "null"
 [INFO] MIME: "text/plain"
 [INFO] Size: 140 byte(s)
 [INFO] Checksum: null (unspecified)
 [INFO] File Content: None
 [INFO] File Locator: "null"
 [INFO] Textual Information: "null"
 [INFO] Locator Type: "URL"
 [INFO] Hyperlink Reference: "file:home/sergey/jbproject/xfdu-
 ps/target/usa_nasa_pds_mgst_1230/AAREADME.LBL.met"
 [INFO] Finer Locator: "null"
 [INFO] Data Object: "meta_data_1f2b23bc-b7a1-11db-acb1-157d5f6325af_1f2c0e39-b7a1-11db-bf43-
 2fc255c78bfe"
 [INFO] MIME: "null"
 [INFO] Representation Information: "null"
 [INFO] Size: (unspecified)
 [INFO] Checksum: null (unspecified)
 [INFO] Bytestream: "null"
 [INFO] MIME: "text/plain"
 [INFO] Size: 734 byte(s)
 [INFO] Checksum: null (unspecified)
 [INFO] File Content: None
 [INFO] File Locator: "null"
 [INFO] Textual Information: "null"
 [INFO] Locator Type: "URL"
 [INFO] Hyperlink Reference: "file:home/sergey/jbproject/xfdu-
 ps/target/usa_nasa_pds_mgst_1230/AAREADME.LBL"
 [INFO] Finer Locator: "null"
 [INFO] Data Object: "dataObject6"
 [INFO] MIME: "null"
 [INFO] Representation Information: "null"
 [INFO] Size: (unspecified)
 [INFO] Checksum: null (unspecified)
 [INFO] Bytestream: "null"
 [INFO] MIME: "text/plain"
 [INFO] Size: 4773 byte(s)
 [INFO] Checksum: 82a67e5f (CRC32)
 [INFO] File Content: None
 [INFO] File Locator: "null"
 [INFO] Textual Information: "null"
 [INFO] Locator Type: "URL"


```
[INFO ]      Hyperlink Reference: "file:home/sergey/jbproject/xfdu-
ps/target/usa_nasa_pds_mgst_1230/ERRATA.TXT"
[INFO ]      Finer Locator: "null"
[INFO ]      Data Object: "dataObject7"
[INFO ]      MIME: "null"
[INFO ]      Representation Information: "null"
[INFO ]      Size: (unspecified)
[INFO ]      Checksum: null (unspecified)
[INFO ]      Bytestream: "null"
[INFO ]      MIME: "text/plain"
[INFO ]      Size: 139 byte(s)
[INFO ]      Checksum: f50246f (CRC32)
[INFO ]      File Content: None
[INFO ]      File Locator: "null"
[INFO ]      Textual Information: "null"
[INFO ]      Locator Type: "URL"
[INFO ]      Hyperlink Reference: "file:home/sergey/jbproject/xfdu-
ps/target/usa_nasa_pds_mgst_1230/AAREADME.LBL.met"
[INFO ]      Finer Locator: "null"
[INFO ]      Data Object: "dataObject8"
[INFO ]      MIME: "null"
[INFO ]      Representation Information: "null"
[INFO ]      Size: (unspecified)
[INFO ]      Checksum: null (unspecified)
[INFO ]      Bytestream: "null"
[INFO ]      MIME: "text/plain"
[INFO ]      Size: 2075 byte(s)
[INFO ]      Checksum: 8e1cd3a0 (CRC32)
[INFO ]      File Content: None
[INFO ]      File Locator: "null"
[INFO ]      Textual Information: "null"
[INFO ]      Locator Type: "URL"
[INFO ]      Hyperlink Reference: "file:home/sergey/jbproject/xfdu-
ps/target/usa_nasa_pds_mgst_1230/VOLDESC.CAT"
[INFO ]      Finer Locator: "null"
```

----- [Truncated] -----

```
[INFO ] Behavior Objects:
[INFO ]   Empty Behavior Object Section
[INFO ] Validation:
[INFO ]   Validator: "esa.xfd�.XercesSchemaValidator"
[INFO ]   XML Schema Location: "jar:file:/misc/athena_home/mbaye/workspace/safe/target/safe-suite-1-1-rc-
1/lib/java/xfdu-core-1-1-rc-1.jar!/xsd/org/ccsds/xfdu/xfdu.xsd"
[INFO ]   The input package is valid.
```

This report shows that ESA Implementation successfully browsed the Manifest file i.e. without failure, and demonstrates the interoperability of the XFDU concepts: goals of the testing activity.

B4.4 CNES Interoperability Test Report

The following figure reports that XFDU View was able to ingest the XFDU package and interpret its content. Here, the left tree shows the “extension” entries that demonstrate the ability to handle these elements without failing.

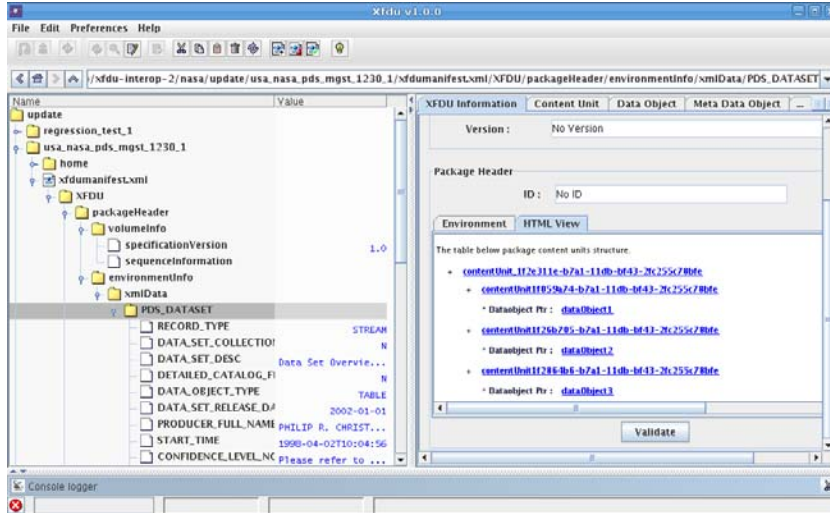


Figure B-4: XFDU View of the NASA/MGST package

ANNEX C

CNES SW OUTPUTS - AGENCIES TEST REPORTS

C1 Referenced Data Object - Package

The following package has been generated by CNES for testing references to external file location from Metadata and/or Data Objects.

C1.1 Package Layout

The package is composed of a single Manifest file named "listing01.xml" and that contains referenced file location to external URL

C1.2 Manifest File (Abstract)

```
<?xml version="1.0" encoding="UTF-8"?>
<xfdu:XFDU xmlns:xfdu="urn:ccsds:schema:xfdu:1">
  <informationPackageMap>
    <xfdu:contentUnit ID="singleContent" textInfo="This is a single content unit">
      <dataObjectPointer dataObjectID="myData"/>
    </xfdu:contentUnit>
  </informationPackageMap>
  <dataObjectSection>
    <dataObject ID="myData">
      <byteStream>
        <fileLocation href="test.data" locatorType="OTHER"/>
      </byteStream>
    </dataObject>
  </dataObjectSection>
</xfdu:XFDU>
```

C1.3 ESA Interoperability Test Report

```
[INFO ] ESA XFDU Java I/O library
[INFO ] Version: XFDU Java I/O API - SNAPSHOT (GAEL Consultant)
[INFO ] Execution date: Tue Oct 23 14:00:37 GMT+01:00 2007
[INFO ]
[INFO ] XFDU Package: "null"
[INFO ] File: "listing01.xml"
[INFO ] Object Identifier: "null"
[INFO ] Textual Information: "null"
[INFO ] Version: "null"
[INFO ] Information Package Map:
[INFO ] Content Unit: "singleContent"
[INFO ] Textual Information: "This is a single content unit"
[INFO ] Content Unit Type: "null"
[INFO ] Order Information: "null"
[INFO ] Descriptive Metadata: "null"
[INFO ] Preservation Descriptive Metadata: "null"
[INFO ] Representation Information Metadata: "null"
[INFO ] Other Metadata: "null"
```

```

[INFO ] Data Object Pointer: "myData"
[INFO ] Metadata Objects:
[INFO ] Empty Metadata Object Section
[INFO ] Data Objects:
[INFO ] Data Object: "myData"
[INFO ] MIME: "null"
[INFO ] Representation Information: "null"
[INFO ] Size: -1 byte(s)
[INFO ] Checksum: null (unspecified)
[INFO ] Bytestream: "null"
[INFO ] MIME: "null"
[INFO ] Size: -1 byte(s)
[INFO ] Checksum: null (unspecified)
[INFO ] File Content: None
[INFO ] File Locator: "null"
[INFO ] Textual Information: "null"
[INFO ] Locator Type: "null"
[INFO ] Hyperlink Reference: ""
[INFO ] Finer Locator: "null"
[INFO ] Behavior Objects:
[INFO ] Empty Behavior Object Section
[INFO ] Validation:
[INFO ] Validator: "esa.xfd�.XercesSchemaValidator"
[INFO ] XML Schema Location: "/misc/athena_home/mbaye/software/xfdu/target/xfdu-suite-
SNAPSHOT/schemas/org/ccsds/xfdu/xfdu.xsd"
[INFO ] The input package is valid.

```

This report shows that ESA Implementation successfully browsed the Manifest file i.e. without failure, and demonstrates the interoperability of the XFDU concepts: goals of the testing activity.

C1.4 NASA Interoperability Test Report

The NASA software was able to parse the files, reconstruct the manifest elements as Java objects and rewrite the manifest to the disk.

C2 Wrapped XML Data - Package

The following package has been generated by CNES for testing wraps around of xml data defined in a different namespace.

C2.1 Package Layout

The package is composed of a single Manifest file named “listing01.xml” and file contains wrapped XML data from another namespace.

C2.2 Manifest File (Abstract)

```

<?xml version="1.0" encoding="UTF-8"?>
<xfdu:XFDU xmlns:xfdu="urn:ccsds:schema:xfdu:1">
  <informationPackageMap>
    <xfdu:contentUnit ID="XMLContent" textInfo="This is embedded XML Data">
      <dataObjectPointer dataObjectID="myXmlData"/>
    </xfdu:contentUnit>
  </informationPackageMap>
</xfdu:XFDU>

```

```

</xfdu:contentUnit>
</informationPackageMap>
<dataObjectSection>
  <dataObject ID="myXmlData">
    <byteStream>
      <fileContent>
        <xmlData>
          <open:item id="4056404" xmlns:open="http://openuri.org/">bicycle<
            /open:item>
        </xmlData>
      </fileContent>
    </byteStream>
  </dataObject>
</dataObjectSection>
</xfdu:XFDU>

```

C2.3 ESA Interoperability Test Report

```

[INFO ] ESA XFDU Java I/O library
[INFO ] Version: XFDU Java I/O API - SNAPSHOT (GAEL Consultant)
[INFO ] Execution date: Tue Oct 23 14:00:57 GMT+01:00 2007
[INFO ]
[INFO ] XFDU Package: "null"
[INFO ] File: "listing02.xml"
[INFO ] Object Identifier: "null"
[INFO ] Textual Information: "null"
[INFO ] Version: "null"
[INFO ] Information Package Map:
[INFO ] Content Unit: "XMLContent"
[INFO ] Textual Information: "This is embedded XML Data"
[INFO ] Content Unit Type: "null"
[INFO ] Order Information: "null"
[INFO ] Descriptive Metadata: "null"
[INFO ] Preservation Descriptive Metadata: "null"
[INFO ] Representation Information Metadata: "null"
[INFO ] Other Metadata: "null"
[INFO ] Data Object Pointer: "myXmlData"
[INFO ] Metadata Objects:
[INFO ] Empty Metadata Object Section
[INFO ] Data Objects:
[INFO ] Data Object: "myXmlData"
[INFO ] MIME: "null"
[INFO ] Representation Information: "null"
[INFO ] Size: -1 byte(s)
[INFO ] Checksum: null (unspecified)
[INFO ] Bytestream: "null"
[INFO ] MIME: "null"
[INFO ] Size: -1 byte(s)
[INFO ] Checksum: null (unspecified)
[INFO ] File Content: "null" (XML Data)
[INFO ] Behavior Objects:
[INFO ] Empty Behavior Object Section
[INFO ] Validation:
[INFO ] Validator: "esa.xfd�.XercesSchemaValidator"
[INFO ] XML Schema Location: "/misc/athena_home/mbaye/software/xfdu/target/xfdu-suite-
SNAPSHOT/schemas/org/ccsds/xfdu/xfdu.xsd"
[INFO ] The input package is valid.

```

This report shows that ESA Implementation successfully browsed the Manifest file i.e. without failure, and demonstrates the interoperability of the XFDU concepts: goals of the testing activity.

C2.4 NASA Interoperability Test Report

The NASA software was able to parse the files, reconstruct the manifest elements as Java objects and rewrite the manifest to the disk.

C3 Wrapped Binary Data - Package

The following package has been generated by CNES for testing wraps around of binary data.

C3.1 Package Layout

The package is composed of a single Manifest file named "listing03.xml" and file contains wrapped binary data.

C3.2 Manifest File (Abstract)

```
<?xml version="1.0" encoding="UTF-8"?>
<xfdu:XFDU xmlns:xfdu="urn:ccsds:schema:xfdu:1">
  <informationPackageMap>
    <xfdu:contentUnit ID="BinaryContent" textInfo="This is embedded binary Data">
      <dataObjectPointer dataObjectID="myBinaryData"/>
    </xfdu:contentUnit>
  </informationPackageMap>
  <dataObjectSection>
    <dataObject ID="myBinaryData">
      <byteStream>
        <fileContent>
          <binaryData>c29tZSBieXRlcyB0byBpbmNlcnQ= </binaryData>
        </fileContent>
      </byteStream>
    </dataObject>
  </dataObjectSection>
</xfdu:XFDU>
```

C3.3 ESA Interoperability Test Report

```
[INFO ] ESA XFDU Java I/O library
[INFO ] Version: XFDU Java I/O API - SNAPSHOT (GAEL Consultant)
[INFO ] Execution date: Tue Oct 23 14:01:21 GMT+01:00 2007
[INFO ]
[INFO ] XFDU Package: "null"
[INFO ] File: "listing03.xml"
[INFO ] Object Identifier: "null"
[INFO ] Textual Information: "null"
[INFO ] Version: "null"
[INFO ] Information Package Map:
[INFO ] Content Unit: "BinaryContent"
```

```
[INFO ] Textual Information: "This is embedded binary Data"
[INFO ] Content Unit Type: "null"
[INFO ] Order Information: "null"
[INFO ] Descriptive Metadata: "null"
[INFO ] Preservation Descriptive Metadata: "null"
[INFO ] Representation Information Metadata: "null"
[INFO ] Other Metadata: "null"
[INFO ] Data Object Pointer: "myBinaryData"
[INFO ] Metadata Objects:
[INFO ] Empty Metadata Object Section
[INFO ] Data Objects:
[INFO ] Data Object: "myBinaryData"
[INFO ] MIME: "null"
[INFO ] Representation Information: "null"
[INFO ] Size: -1 byte(s)
[INFO ] Checksum: null (unspecified)
[INFO ] Bytestream: "null"
[INFO ] MIME: "null"
[INFO ] Size: -1 byte(s)
[INFO ] Checksum: null (unspecified)
[INFO ] File Content: "null" (XML Data)
[INFO ] Behavior Objects:
[INFO ] Empty Behavior Object Section
[INFO ] Validation:
[INFO ] Validator: "esa.xfd�.XercesSchemaValidator"
[INFO ] XML Schema Location: "/misc/athena_home/mbaye/software/xfdû/target/xfdû-suite-
SNAPSHOT/schemas/org/ccsds/xfdû/xfdû.xsd"
[INFO ] The input package is valid.
```

This report shows that ESA Implementation successfully browsed the Manifest file i.e. without failure, and demonstrates the interoperability of the XFDU concepts: goals of the testing activity.

C3.4 NASA Interoperability Test Report

The NASA software was able to parse the files, reconstruct the manifest elements as Java objects and rewrite the manifest to the disk.

C4 Wrapped Binary Data with Checksum - Package

The following package has been generated by CNES for testing wraps around of binary data with a checksum to be verified.

C4.1 Package Layout

The package is composed of a single Manifest file named "listing04.xml" and file contains wrapped binary data.

C4.2 Manifest File (Abstract)

```
<?xml version="1.0" encoding="UTF-8"?>
<xfdû:XFDU xmlns:xfdû="urn:ccsds:schema:xfdû:1">
  <informationPackageMap>
```

```

<xfdu:contentUnit ID="BinaryContentWithChecksum" textInfo="This is embedded
binary Data with checksum">
  <dataObjectPointer dataObjectID="myBinaryData"/>
</xfdu:contentUnit>
</informationPackageMap>
<dataObjectSection>
  <dataObject ID="myBinaryData">
    <byteStream>
      <fileContent>
        <binaryData>c29tZSBieXRlcyB0byBpbmNlcnQ= </binaryData>
      </fileContent>
      <checksum checksumName="CRC32">2418991762 </checksum>
    </byteStream>
  </dataObject>
</dataObjectSection>
</xfdu:XFDU>

```

C4.3 ESA Interoperability Test Report

```

[INFO ] ESA XFDU Java I/O library
[INFO ] Version: XFDU Java I/O API - SNAPSHOT (GAEL Consultant)
[INFO ] Execution date: Tue Oct 23 14:01:37 GMT+01:00 2007
[INFO ]
[INFO ] XFDU Package: "null"
[INFO ] File: "listing04.xml"
[INFO ] Object Identifier: "null"
[INFO ] Textual Information: "null"
[INFO ] Version: "null"
[INFO ] Information Package Map:
[INFO ] Content Unit: "BinaryContentWithChecksum"
[INFO ] Textual Information: "This is embedded binary Data with checksum"
[INFO ] Content Unit Type: "null"
[INFO ] Order Information: "null"
[INFO ] Descriptive Metadata: "null"
[INFO ] Preservation Descriptive Metadata: "null"
[INFO ] Representation Information Metadata: "null"
[INFO ] Other Metadata: "null"
[INFO ] Data Object Pointer: "myBinaryData"
[INFO ] Metadata Objects:
[INFO ] Empty Metadata Object Section
[INFO ] Data Objects:
[INFO ] Data Object: "myBinaryData"
[INFO ] MIME: "null"
[INFO ] Representation Information: "null"
[INFO ] Size: -1 byte(s)
[INFO ] Checksum: null (unspecified)
[INFO ] Bytestream: "null"
[INFO ] MIME: "null"
[INFO ] Size: -1 byte(s)
[INFO ] Checksum: null (unspecified)
[INFO ] File Content: "null" (XML Data)
[INFO ] Behavior Objects:
[INFO ] Empty Behavior Object Section
[INFO ] Validation:
[INFO ] Validator: "esa.xfd�.XercesSchemaValidator"
[INFO ] XML Schema Location: "/misc/athena_home/mbaye/software/xfdu/target/xfdu-suite-
SNAPSHOT/schemas/org/ccsds/xfdu/xfdu.xsd"
[INFO ] The input package is valid.

```


This report shows that ESA Implementation successfully browsed the Manifest file i.e. without failure, and demonstrates the interoperability of the XFDU concepts: goals of the testing activity.

C4.4 NASA Interoperability Test Report

The NASA software was able to parse the files, reconstruct the manifest elements as Java objects and rewrite the manifest to the disk.

ANNEX D

TESTS ON ERROR HANDLING

D1 PACKAGEHEADER ERROR TESTING

This test was motivated by the fact the the ESA test reports did not include any information on the correct packageHeaders due to the SAFE API standard validation reports.

The following errors were introduced;

- The specificationVersion element was removed
- The sequencePosition attribute was removed

D1.1 ORIGINAL NASA PACKAGEHEADER

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<xfdu:XFDU xmlns:sip="sip" xmlns:dip="dip"
  xmlns:xfdu="urn:ccsds:schema:xfdu:1"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="urn:ccsds:schema:xfdu:1 /home/sergey/jbproject/xfdu.
  jxb2/schema/xfdu.xsd sip sipcommon1.xsd">
  <packageHeader ID="ph">
    <volumeInfo>
      <specificationVersion>1.0</specificationVersion>
      <!-- sip sequence information is accomodated by XFDU
      sequenceInformation -->
      <sequenceInformation sequencePosition="3" sequenceSize="5"/>
    </volumeInfo>
    <environmentInfo>
      <extension>
        <!-- SIP Global attributes -->
        <sip:sipOtherGlobalInformation
          sip:producer_id="USGS"
          sip:project_id="ag_data (ag_chem)"
          sip:sip_sequence_number="0001"/>
      </extension>
    </environmentInfo>
  </packageHeader>
```

----- [Truncated] -----

D1.2 PACKAGEHEADER WITH ERROR

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<xfdu:XFDU xmlns:sip="sip" xmlns:dip="dip"
  xmlns:xfdu="urn:ccsds:schema:xfdu:1"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="urn:ccsds:schema:xfdu:1 /home/sergey/jbproject/xfdu.jxb2/schema/xfdu.xsd sip
  sipcommon1.xsd">
  <packageHeader ID="ph">
```

```

<volumeInfo>
  <!-- <specificationVersion>1.0</specificationVersion> -->
  <!-- sip sequence information is accomodated by XFDU sequenceInformation -->
  <sequenceInformation sequenceSize="5"/>
</volumeInfo>
<environmentInfo>
  <extension>
    <!-- SIP Global attributes -->
    <sip:sipOtherGlobalInformation
      sip:producer_id="USGS"
      sip:project_id="ag_data (ag_chem)"
      sip:sip_sequence_number="0001"/>
  </extension>
</environmentInfo>
</packageHeader>

```

----- [Truncated] -----

D1.3 ESA REPORT

```

[INFO ] ESA XFDU Java I/O library
[INFO ] Version: XFDU Java I/O API - 1-1-rc-1 (GAEL Consultant)
[INFO ] Execution date: Wed Jan 02 14:17:55 CET 2008
[INFO ]
[INFO ] XFDU Package: "null"
[INFO ] File: "ag_sip_with_extension_1.xml"
[INFO ] Namespace: "urn:ccsds:schema:xfdu:1"
[INFO ] Object Identifier: "null"
[INFO ] Textual Information: "null"
[INFO ] Version: "null"
[INFO ] Information Package Map:
[INFO ] Content Unit: "ag_chem_sdts_to_cu"
[INFO ] Textual Information: "null"
[INFO ] Content Unit Type: "null"
[INFO ] Order Information: "1.1"
[INFO ] Descriptive Metadata: "null"
[INFO ] Preservation Descriptive Metadata: "null"
[INFO ] Representation Information Metadata: "null"
[INFO ] Other Metadata: "null"

```

----- [Truncated] -----

```

[INFO ] Validation:
[INFO ] Validator: "esa.xfd�.XercesSchemaValidator"
[INFO ] XML Schema Location: "jar:file:/misc/athena_home/mbaye/validation/safe/safe-suite-1-1-rc-2/lib/java/xfdu-core-1-1-rc-1.jar!/xsd/org/ccsds/xfdu/xfdu.xsd"

```

[ERROR] cvc-complex-type.2.4.a: Invalid content was found starting with element 'sequenceInformation'. One of '{specificationVersion}' is expected. @(line 10, column 53)

[ERROR] cvc-complex-type.4: Attribute 'sequencePosition' must appear on element 'sequenceInformation'. @(line 10, column 53)

[ERROR] The input package is not valid.

D1.4 NASA REPORT

cvc-complex-type.2.4.a: Invalid content was found starting with element 'sequenceInformation'. One of '{specificationVersion}' is expected. @see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-complex-type.4: Attribute 'sequencePosition' must appear on element 'sequenceInformation'. @see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

D2 NASA ERROR INSTANCE

This test was to better illustrate the linkages between data objects and content units. The JPL XFDU from Annex B4 was used as the basis for this test.

The following errors were introduced;

- The dataObjectID="dataObject194" was removed from the dataObjectPointer in the first content unit (ID = contentUnit0235f609-ba46-11dc-95da-15747182e6c1)
- The ID attribute in the second data object (ID was dataObject195) was removed
- The checksum in the last dataObject (ID=dataObject196,) was modified from f5bec905 to f5bec906.

D2.1 ORIGINAL NASA PDS INSTANCE

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<xfdu:XFDU xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:ccsds:schema:xfdu:1 file:/home/sergey/jbproject/xfdu.jxb2/schema/xfdu.xsd"
xmlns:xfdu="urn:ccsds:schema:xfdu:1">
<informationPackageMap>
```

----- [Truncated] -----

```

<xfdu:contentUnit ID="contentUnitf3876a94-ba45-11dc-95da-15747182e6c1">
  <xfdu:contentUnit ID="contentUnit0235f609-ba46-11dc-95da-15747182e6c1">
    <dataObjectPointer dataObjectID="dataObject194"/></dataObjectPointer/>
  </xfdu:contentUnit>
  <xfdu:contentUnit ID="contentUnit026ff1ca-ba46-11dc-95da-15747182e6c1">
    <dataObjectPointer dataObjectID="dataObject195"/>
  </xfdu:contentUnit>
  <xfdu:contentUnit ID="contentUnit0296176b-ba46-11dc-95da-15747182e6c1">
    <dataObjectPointer dataObjectID="dataObject196"/>
  </xfdu:contentUnit>
</xfdu:contentUnit>
</informationPackageMap>
</dataObjectSection>
```

----- [Truncated] -----

```

<dataObject size="80457599" ID="dataObject194">
  <byteStream size="80457599" mimeType="text/plain">
    <fileLocation locatorType="URL" href="file:/home/sergey/jbproject/xfdu-
ps/target/usa_nasa_pds_mgst_1230/DATA/MARS/RAD23003.VAR"/>
    <checksum checksumName="CRC32">4ef9c6f2</checksum>
  </byteStream>
</dataObject>
<dataObject size="1123415" ID="dataObject195">>
```

```

    <byteStream size="1123415" mimeType="text/plain">
      <fileLocation locatorType="URL" href="file:home/sergey/jbproject/xfdu-
ps/target/usa_nasa_pds_mgst_1230/DATA/MARS/POS23005.TAB"/>
      <checksum checksumName="CRC32">97a76e3f</checksum>
    </byteStream>
  </dataObject>
  <dataObject size="3938909" ID="dataObject196">
    <byteStream size="3938909" mimeType="text/plain">
      <fileLocation locatorType="URL" href="file:home/sergey/jbproject/xfdu-
ps/target/usa_nasa_pds_mgst_1230/DATA/MARS/BOL23006.TAB"/>
      <checksum checksumName="CRC32">f5bec9056</checksum>
    </byteStream>
  </dataObject>
</dataObjectSection>
</xfdu:XFDU>

```

D2.2 PDS INSTANCE WITH ERRORS

```

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<xfdu:XFDU xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:ccsds:schema:xfdu:1 file:/home/sergey/jbproject/xfdu.jxb2/schema/xfdu.xsd"
xmlns:xfdu="urn:ccsds:schema:xfdu:1">
  <informationPackageMap>

```

----- [Truncated] -----

```

  <xfdu:contentUnit ID="contentUnitf3876a94-ba45-11dc-95da-15747182e6c1">
    <xfdu:contentUnit ID="contentUnit0235f609-ba46-11dc-95da-15747182e6c1">
      <dataObjectPointer/>
    </xfdu:contentUnit>
    <xfdu:contentUnit ID="contentUnit026ff1ca-ba46-11dc-95da-15747182e6c1">
      <dataObjectPointer dataObjectID="dataObject195"/>
    </xfdu:contentUnit>
    <xfdu:contentUnit ID="contentUnit0296176b-ba46-11dc-95da-15747182e6c1">
      <dataObjectPointer dataObjectID="dataObject196"/>
    </xfdu:contentUnit>
  </xfdu:contentUnit>
</informationPackageMap>
<dataObjectSection>
  <dataObject size="80457599" ID="dataObject194">
    <byteStream size="80457599" mimeType="text/plain">
      <fileLocation locatorType="URL" href="file:home/sergey/jbproject/xfdu-
ps/target/usa_nasa_pds_mgst_1230/DATA/MARS/RAD23003.VAR"/>
      <checksum checksumName="CRC32">4ef9c6f2</checksum>
    </byteStream>
  </dataObject>
  <dataObject size="1123415">
    <byteStream size="1123415" mimeType="text/plain">
      <fileLocation locatorType="URL" href="file:home/sergey/jbproject/xfdu-
ps/target/usa_nasa_pds_mgst_1230/DATA/MARS/POS23005.TAB"/>
      <checksum checksumName="CRC32">97a76e3f</checksum>
    </byteStream>
  </dataObject>
  <dataObject size="3938909" ID="dataObject196">
    <byteStream size="3938909" mimeType="text/plain">
      <fileLocation locatorType="URL" href="file:home/sergey/jbproject/xfdu-
ps/target/usa_nasa_pds_mgst_1230/DATA/MARS/BOL23006.TAB"/>
      <checksum checksumName="CRC32">f5bec906</checksum>
    </byteStream>
  </dataObject>

```

```

</dataObject>
</dataObjectSection>
</xfdu:XFDU>

```

D2.3 ESA TEST REPORT

```

[INFO ] Version: XFDU Java I/O API - 1-1-rc-2 (GAEL Consultant)
[INFO ] Execution date: Mon Jan 07 16:45:27 CET 2008
[INFO ]
[INFO ] XFDU Package: "null"
[INFO ] File: "usa_nasa_pds_mgst_1230_2/xfdumanifest.xml"
[INFO ] Namespace: "urn:ccsds:schema:xfdu:1"
[INFO ] Object Identifier: "null"
[INFO ] Textual Information: "null"
[INFO ] Version: "null"
[INFO ] Information Package Map:
[INFO ] Content Unit: "contentUnit_f38dac2e-ba45-11dc-95da-15747182e6c1"
[INFO ] Textual Information: "usa_nasa_pds_mgst_1230"
[INFO ] Content Unit Type: "null"
[INFO ] Order Information: "null"
[INFO ] Descriptive Metadata: "null"
[INFO ] Preservation Descriptive Metadata: "null"
[INFO ] Representation Information Metadata: "null"
[INFO ] Other Metadata: "null"
[INFO ] Data Object Pointer: "dataObject193"
[INFO ] Content Unit: "contentUnit0235f609-ba46-11dc-95da-15747182e6c1"
[INFO ] Textual Information: "null"
[INFO ] Content Unit Type: "null"
[INFO ] Order Information: "null"
[INFO ] Descriptive Metadata: "null"
[INFO ] Preservation Descriptive Metadata: "null"
[INFO ] Representation Information Metadata: "null"
[INFO ] Other Metadata: "null"
[ERROR] Content Unit "contentUnit0235f609-ba46-11dc-95da-15747182e6c1" has a null pointer to a Data
Object (skipped).
[INFO ] Content Unit: "contentUnit026ff1ca-ba46-11dc-95da-15747182e6c1"
[INFO ] Textual Information: "null"
[INFO ] Content Unit Type: "null"
[INFO ] Order Information: "null"
[INFO ] Descriptive Metadata: "null"
[INFO ] Preservation Descriptive Metadata: "null"
[INFO ] Representation Information Metadata: "null"
[INFO ] Other Metadata: "null"
[ERROR] Cannot get DataObject identifier
[ERROR] No Data Object "dataObject195" matches the Content Unit "contentUnit026ff1ca-ba46-11dc-95da-
15747182e6c1" poitner (skipped).
[INFO ] Content Unit: "contentUnit0296176b-ba46-11dc-95da-15747182e6c1"
[INFO ] Textual Information: "null"
[INFO ] Content Unit Type: "null"
[INFO ] Order Information: "null"
[INFO ] Descriptive Metadata: "null"
[INFO ] Preservation Descriptive Metadata: "null"
[INFO ] Representation Information Metadata: "null"
[INFO ] Other Metadata: "null"
[ERROR] Cannot get DataObject identifier
[ERROR] No Data Object "dataObject196" matches the Content Unit "contentUnit0296176b-ba46-11dc-95da-
15747182e6c1" poitner (skipped).
[.TAB"
[INFO ] Finer Locator: "null"

```

CCSDS REPORT CONCERNING XFDU INTEROPERABILITY TESTING

[INFO] Data Object: "dataObject194"
 [INFO] MIME: "null"
 [INFO] Representation Information: "null"
 [INFO] Size: 80457599 byte(s)
 [INFO] Checksum: null (unspecified)
 [INFO] Bytestream: "null"
 [INFO] MIME: "text/plain"
 [INFO] Size: 80457599 byte(s)
 [INFO] Checksum: 4ef9c6f2 (CRC32) (OK)
 [INFO] File Content: None
 [INFO] File Locator: "null"
 [INFO] Textual Information: "null"
 [INFO] Locator Type: "URL"
 [INFO] Hyperlink Reference: "file:home/sergey/jbproject/xfdu-
 ps/target/usa_nasa_pds_mgst_1230/DATA/MARS/RAD23003.VAR"
 [INFO] Finer Locator: "null"
 [INFO] Data Object: "null"
 [INFO] MIME: "null"
 [INFO] Representation Information: "null"
 [INFO] Size: 1123415 byte(s)
 [INFO] Checksum: null (unspecified)
 [INFO] Bytestream: "null"
 [INFO] MIME: "text/plain"
 [INFO] Size: 1123415 byte(s)
 [INFO] Checksum: 97a76e3f (CRC32) (OK)
 [INFO] File Content: None
 [INFO] File Locator: "null"
 [INFO] Textual Information: "null"
 [INFO] Locator Type: "URL"
 [INFO] Hyperlink Reference: "file:home/sergey/jbproject/xfdu-
 ps/target/usa_nasa_pds_mgst_1230/DATA/MARS/POS23005.TAB"
 [INFO] Finer Locator: "null"
 [INFO] Data Object: "dataObject196"
 [INFO] MIME: "null"
 [INFO] Representation Information: "null"
 [INFO] Size: 3938909 byte(s)
 [INFO] Checksum: null (unspecified)
 [INFO] Bytestream: "null"
 [INFO] MIME: "text/plain"
 [INFO] Size: 3938909 byte(s)
 [INFO] Checksum: f5bec906 (CRC32) (NOK)
 [INFO] File Content: None
 [INFO] File Locator: "null"
 [INFO] Textual Information: "null"
 [INFO] Locator Type: "URL"
 [INFO] Hyperlink Reference: "file:home/sergey/jbproject/xfdu-
 ps/target/usa_nasa_pds_mgst_1230/DATA/MARS/BOL23006.TAB"
 [INFO] Finer Locator: "null"

[INFO] Validation:
 [INFO] Validator: "esa.xfd�.XercesSchemaValidator"
 [INFO] XML Schema Location: "jar:file:/misc/athena_home/mbaye/validation/safe/safe-suite-1-1-rc-
 2/lib/java/xfdu-core-1-1-rc-2.jar!/xsd/org/ccsds/xfdu/xfdu.xsd"

**[ERROR] cvc-complex-type.4: Attribute 'dataObjectID' must appear on element 'dataObjectPointer'.
 @(line 661, column 45)**

**[ERROR] cvc-complex-type.4: Attribute 'ID' must appear on element 'dataObject'. @(line 1900, column
 36)**

[ERROR] cvc-id.1: There is no ID/IDREF binding for IDREF 'dataObject195'. @(line 1913, column 13)

[ERROR] The input package is not valid.

D2.4 NASA TEST REPORT

cvc-complex-type.4: Attribute 'dataObjectID' must appear on element 'dataObjectPointer'.

@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-complex-type.4: Attribute 'ID' must appear on element 'dataObject'.

@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-id.1: There is no ID/IDREF binding for IDREF 'dataObject195'.

@see: <http://www.w3.org/TR/xmlschema-1/#cvc-id>

Checksum check failed at Data object: dataObject196

D3 ESA INSTANCE WITH ERRORS

The changes regarding the previously sent sample may be summarized as follow:

- a) The @dataObjectPointer attribute of a Content Unit has been removed
- b) An @ID attribute has been removed from the first Metadata Object
- c) The Checksum of the first Data Object has been corrupted i.e. becomes "falsesum"

D3.1 ESA MERIS ORIGINAL INSTANCE

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- ENVISAT MERIS FR Level 0 (Source Packets) archive.
      This document is a sample manifest file of a SAFE archive. -->
<xfdu:XFDU xmlns:xfdu="urn:ccsds:schema:xfdu:1"
           xmlns:safe="http://www.esa.int/safe/1.1"
           xmlns:gml="http://www.opengis.net/gml"
           version="esa/safe/1.1/envisat/meris/fr/level-0">
  <!-- =====
        INFORMATION PACKAGE MAP SECTION
        ===== -->
  <informationPackageMap>
    <xfdu:contentUnit unitType="SAFE Archive Information Package"
                     textInfo="ENVISAT MERIS FR Level 0"
                     pdiID="processing"
                     dmdID="acquisitionPeriod platform">
      <!-- The unique ENVISAT MERIS FR Level 0 measurement data set -->
      <xfdu:contentUnit unitType="Measurement Data Unit"
                       textInfo="Measurement Data Unit"
```

CCSDS REPORT CONCERNING XFDU INTEROPERABILITY TESTING

```

        dmdID="measurementOrbitReference
        measurementFrameSet
        measurementQualityInformation
        measurementIndexAnnotation"
        repID="measurementSchema
        envisatLevel0Schema">
    <dataObjectPointer dataObjectID="measurementData"/>
</xfdu:contentUnit>

<!-- An index to the measurement data set for access efficiency -->
<xfdu:contentUnit unitType="Metadata Unit"
    textInfo="Index for Measurement Data"
    repID="measurementIndexAnnotationSchema">

    <dataObjectPointer dataObjectID="measurementIndexAnnotationData"/>

</xfdu:contentUnit>

</xfdu:contentUnit>

</informationPackageMap>

<!-- =====
METADATA OBJECT SECTION
===== -->
<metadataSection>

<!-- Processing -->
<metadataObject ID="processing" classification="PROVENANCE" category="PDI">
    <metadataWrap textInfo="Processing" vocabularyName="SAFE"
        mimeType="text/xml">
        <xmlData>
            <safe:processing name="Conversion from ENVISAT to SAFE format"
                start="2007-10-10T11:09:07.063000Z">
                <safe:facility country="France" name="GAEL Consultant"
                    organisation="GAEL Consultant"
                    site="Champs-sur-marne">
                    <safe:software name="GAEL ENVISAT Transformer" version="1.1"/>
                </safe:facility>
                <safe:resource name=
                    "MER_FR_OPNPDE20050110_200929_000001812033_00400_14983_4491.N1"
                    role="Level 0 data">
                    <safe:processing name="Level 0 processing"
                        start="2005-01-10T20:31:19.000000Z">
                    <safe:facility name="PDHS-E" organisation="ESA"
                        site="ESRIN" country="Italy">
                        <safe:software name="PFHS" version="5.32"/>
                    </safe:facility>
                    <safe:resource name="UNKNOWN" role="Raw Data">
                    <safe:processing name="Downlink">
                        <safe:facility name="PDHS-E" organisation="ESA"
                            site="ESRIN" country="Italy"/>
                    </safe:processing>
                    </safe:resource>
                <safe:resource name=
                    "AUX_CN0_AXVPDS20020123_121901_20020101_000000_20200101_000000"
                    role="Auxiliary Data"/>
                <safe:resource name=
                    "AUX_FPO_AXVPDS20050109_224012_20050109_193008_20050119_205624"
                    role="Auxiliary Data"/>
            </safe:processing>
        </xmlData>
    </metadataWrap>
</metadataObject>

```

CCSDS REPORT CONCERNING XFDU INTEROPERABILITY TESTING

```

    </safe:resource>
  </safe:processing>
</xmlData>
</metadataWrap>
</metadataObject>

<!-- Acquisition Period -->
<metadataObject ID="acquisitionPeriod"
  classification="DESCRIPTION" category="DMD">
  <metadataWrap textInfo="Acquisition Period" vocabularyName="SAFE"
    mimeType="text/xml">
    <xmlData>
      <safe:acquisitionPeriod>
        <safe:startTime>2005-01-10T20:09:29.859132Z</safe:startTime>
        <safe:stopTime>2005-01-10T20:12:31.831779Z</safe:stopTime>
      </safe:acquisitionPeriod>
    </xmlData>
  </metadataWrap>
</metadataObject>

<!-- Platform description -->
<metadataObject ID="platform"
  classification="DESCRIPTION" category="DMD">
  <metadataWrap textInfo="Platform Description" vocabularyName="SAFE"
    mimeType="text/xml">
    <xmlData>
      <safe:platform>
        <!-- Platform identification -->
        <safe:nssdcIdentifier>2002-009A</safe:nssdcIdentifier>
        <safe:familyName>ENVISAT</safe:familyName>
        <safe:number>1</safe:number>
        <!-- Instrument identification -->
        <safe:instrument>
          <safe:familyName abbreviation="MERIS"
            >Medium Resolution Imaging Spectrometer</safe:familyName>
        </safe:instrument>
        <safe:timeReference>
          <safe:utc>2005-01-10T19:10:19.374938Z</safe:utc>
          <safe:clock>1683165952</safe:clock>
          <safe:clockStep>3906249801</safe:clockStep>
        </safe:timeReference>
      </safe:platform>
    </xmlData>
  </metadataWrap>
</metadataObject>

<!-- Orbital reference of the measurements -->
<metadataObject ID="measurementOrbitReference"
  classification="DESCRIPTION" category="DMD">
  <metadataWrap textInfo="Orbit Reference" vocabularyName="SAFE"
    mimeType="text/xml">
    <xmlData>
      <safe:orbitReference>
        <safe:orbitNumber
          type="start">14983</safe:orbitNumber>
        <safe:relativeOrbitNumber
          type="start">400</safe:relativeOrbitNumber>
        <safe:cycleNumber>33</safe:cycleNumber>
        <safe:phaseIdentifier>2</safe:phaseIdentifier>
      </safe:orbitReference>
    </xmlData>
  </metadataWrap>

```

</metadataObject>

----- [Truncated] -----

</metadataSection>

```
<!-- =====
DATA OBJECT SECTION
===== -->
```

<dataObjectSection>

<!-- Measurement -->

```
<dataObject ID="measurementData"
  replID="measurementSchema
    envisatLevel0Schema">
  <byteStream mimeType="application/octetstream">
    <fileLocation locatorType="URL" href="measurement.dat"
      textInfo="Measurement Data Set File"/>
    <checksum
      checksumName="MD5">f3ff2d8b835d1de963c1a31ceef090d2</checksum>
  </byteStream>
</dataObject>
```

<!-- Measurement Index -->

```
<dataObject ID="measurementIndexAnnotationData"
  replID="measurementIndexAnnotationSchema">
  <byteStream mimeType="application/octetstream">
    <fileLocation locatorType="URL" href="measurement-index.dat"
      textInfo="Measurement Data Set Index File"/>
    <checksum
      checksumName="MD5">366296d31df57e85c5417493045f4804</checksum>
  </byteStream>
</dataObject>
```

</dataObjectSection>

</xfdu:XFDU>

D3.2 ESA MERIS SCHEMA WITH ERRORS

```
<?xml version="1.0" encoding="UTF-8"?>
```

```
<!-- ENVISAT MERIS FR Level 0 (Source Packets) archive.
This document is a sample manifest file of a SAFE archive. -->
```

```
<xfdu:XFDU xmlns:xfdu="urn:ccsds:schema:xfdu:1"
  xmlns:safe="http://www.esa.int/safe/1.1"
  xmlns:gml="http://www.opengis.net/gml"
  version="esa/safe/1.1/envisat/meris/fr/level-0">
```

```
<!-- =====
INFORMATION PACKAGE MAP SECTION
===== -->
```

```
<informationPackageMap>
  <xfdu:contentUnit unitType="SAFE Archive Information Package"
    textInfo="ENVISAT MERIS FR Level 0"
    pdiID="processing"
```

```

        dmdID="acquisitionPeriod platform">
<!-- The unique ENVISAT MERIS FR Level 0 measurement data set -->
<xfdu:contentUnit unitType="Measurement Data Unit"
    textInfo="Measurement Data Unit"
    dmdID="measurementOrbitReference
        measurementFrameSet
        measurementQualityInformation
        measurementIndexAnnotation"
    repID="measurementSchema
        envisatLevel0Schema">
    <dataObjectPointer dataObjectID="measurementData"/>
</xfdu:contentUnit>

<!-- An index to the measurement data set for access efficiency -->
<xfdu:contentUnit unitType="Metadata Unit"
    textInfo="Index for Measurement Data"
    repID="measurementIndexAnnotationSchema">

    <dataObjectPointer "/>
</xfdu:contentUnit>

</xfdu:contentUnit>
</informationPackageMap>

<!-- =====
METADATA OBJECT SECTION
===== -->
<metadataSection>

<!-- Processing -->
<metadataObject ID="processing" classification="PROVENANCE" category="PDI">
<metadataWrap textInfo="Processing" vocabularyName="SAFE"
    mimeType="text/xml">
    <xmlData>
    <safe:processing name="Conversion from ENVISAT to SAFE format"
        start="2007-10-10T11:09:07.063000Z">
    <safe:facility country="France" name="GAEL Consultant"
        organisation="GAEL Consultant"
        site="Champs-sur-marne">
    <safe:software name="GAEL ENVISAT Transformer" version="1.1"/>
    </safe:facility>
    <safe:resource name=
"MER_FR_0PNPDE20050110_200929_000001812033_00400_14983_4491.N1"
        role="Level 0 data">
    <safe:processing name="Level 0 processing"
        start="2005-01-10T20:31:19.000000Z">
    <safe:facility name="PDHS-E" organisation="ESA"
        site="ESRIN" country="Italy">
    <safe:software name="PFHS" version="5.32"/>
    </safe:facility>
    <safe:resource name="UNKNOWN" role="Raw Data">
    <safe:processing name="Downlink">
    <safe:facility name="PDHS-E" organisation="ESA"
        site="ESRIN" country="Italy"/>
    </safe:processing>
    </safe:resource>
    <safe:resource name=
"AUX_CN0_AXVPDS20020123_121901_20020101_000000_20200101_000000"

```

CCSDS REPORT CONCERNING XFDU INTEROPERABILITY TESTING

```

        role="Auxiliary Data"/>
      <safe:resource name=
        "AUX_FPO_AXVPDS20050109_224012_20050109_193008_20050119_205624"
        role="Auxiliary Data"/>
    </safe:processing>
  </safe:resource>
</safe:processing>
</xmlData>
</metadataWrap>
</metadataObject>

<!-- Acquisition Period -->
<metadataObject classification="DESCRIPTION" category="DMD">
  <metadataWrap textInfo="Acquisition Period" vocabularyName="SAFE"
    mimeType="text/xml">
    <xmlData>
      <safe:acquisitionPeriod>
        <safe:startTime>2005-01-10T20:09:29.859132Z</safe:startTime>
        <safe:stopTime>2005-01-10T20:12:31.831779Z</safe:stopTime>
      </safe:acquisitionPeriod>
    </xmlData>
  </metadataWrap>
</metadataObject>

```

----- [Truncated] -----

```

<!-- Measurement Data Set Index Representation Information -->
<metadataObject ID="measurementIndexAnnotationSchema"
  classification="SYNTAX" category="REP">
  <metadataReference locatorType="URL" href="index.xsd"
    vocabularyName="SDF" mimeType="text/xml"/>
</metadataObject>

</metadataSection>

<!-- =====
  DATA OBJECT SECTION
  ===== -->
<dataObjectSection>

  <!-- Measurement -->
  <dataObject ID="measurementData"
    replID="measurementSchema
      envisatLevel0Schema">
    <byteStream mimeType="application/octetstream">
      <fileLocation locatorType="URL" href="measurement.dat"
        textInfo="Measurement Data Set File"/>
      <checksum
        checksumName="MD5">falsesum</checksum>
    </byteStream>
  </dataObject>

  <!-- Measurement Index -->
  <dataObject ID="measurementIndexAnnotationData"
    replID="measurementIndexAnnotationSchema">
    <byteStream mimeType="application/octetstream">
      <fileLocation locatorType="URL" href="measurement-index.dat"
        textInfo="Measurement Data Set Index File"/>
      <checksum
        checksumName="MD5">366296d31df57e85c5417493045f4804</checksum>
    </byteStream>
  </dataObject>

```

</dataObjectSection>

</xfdu:XFDU>

D3.3 ESA TEST REPORT

[INFO] ESA XFDU Java I/O library
 [INFO] Version: XFDU Java I/O API - 1-1-rc-2 (GAEL Consultant)
 [INFO] Execution date: Mon Jan 07 16:29:50 CET 2008
 [INFO]
 [INFO] XFDU Package: "null"
 [INFO] File: "MER_FR__0P-corrupted-sample/manifest.safe"
 [INFO] Namespace: "urn:ccsds:schema:xfdu:1"
 [INFO] Object Identifier: "null"
 [INFO] Textual Information: "null"
 [INFO] Version: "esa/safe/1.1/envisat/meris/fr/level-0"
 [INFO] Information Package Map:
 [INFO] Content Unit: "null"
 [INFO] Textual Information: "ENVISAT MERIS FR Level 0"
 [INFO] Content Unit Type: "SAFE Archive Information Package"
 [INFO] Order Information: "null"
 [INFO] Descriptive Metadata: "acquisitionPeriod platform"
 [INFO] Preservation Descriptive Metadata: "processing"
 [INFO] Representation Information Metadata: "null"
 [INFO] Other Metadata: "null"
 [INFO] Content Unit: "null"
 [INFO] Textual Information: "Measurement Data Unit"
 [INFO] Content Unit Type: "Measurement Data Unit"
 [INFO] Order Information: "null"
 [INFO] Descriptive Metadata: "measurementOrbitReference measurementFrameSet
 measurementQualityInformation measurementIndexAnnotation"
 [INFO] Preservation Descriptive Metadata: "null"
 [INFO] Representation Information Metadata: "measurementSchema envisatLevel0Schema"
 [INFO] Other Metadata: "null"
 [INFO] Data Object Pointer: "measurementData"
 [INFO] Content Unit: "null"
 [INFO] Textual Information: "Index for Measurement Data"
 [INFO] Content Unit Type: "Metadata Unit"
 [INFO] Order Information: "null"
 [INFO] Descriptive Metadata: "null"
 [INFO] Preservation Descriptive Metadata: "null"
 [INFO] Representation Information Metadata: "measurementIndexAnnotationSchema"
 [INFO] Other Metadata: "null"
 [ERROR] Content Unit "null" has a null pointer to a Data Object (skipped).
 [INFO] Metadata Objects:
 [INFO] Metadata Object: "processing"
 [INFO] Classification: "PROVENANCE"
 [INFO] Other Classification: "null"
 [INFO] Category: "null"
 [INFO] Other Category: "null"
 [INFO] Wrapped Data: "null" (XML)
 [INFO] Textual Information: "Processing"
 [INFO] Vocabulary Name: "SAFE"
 [INFO] MIME Type: "text/xml"
 [INFO] Data: "<?xml version='1.0' encod..."

----- [Truncated] -----

```
[INFO ] Metadata Object: "measurementIndexAnnotationSchema"
[INFO ] Classification: "SYNTAX"
[INFO ] Other Classification: "null"
[INFO ] Category: "null"
[INFO ] Other Category: "null"
[INFO ] Reference: "null"
[INFO ] Textual Information: "null"
[INFO ] Vocabulary Name: "SDF"
[INFO ] MIME Type: "text/xml"
[INFO ] Locator Type: "URL"
[INFO ] Other Locator Type: "null"
[INFO ] Hyperlink Reference: "index.xsd"
[INFO ] Data Objects:
[INFO ] Data Object: "measurementData"
[INFO ] MIME: "null"
[INFO ] Representation Information: "measurementSchema envisatLevel0Schema"
[INFO ] Size: (unspecified)
[INFO ] Checksum: null (unspecified)
[INFO ] Bytestream: "null"
[INFO ] MIME: "application/octetstream"
[INFO ] Size: (unspecified)
[WARN ] Working directory not set using default: /tmp
[INFO ] Checksum: falsesum (MD5) (NOK)
[INFO ] File Content: None
[INFO ] File Locator: "null"
[INFO ] Textual Information: "Measurement Data Set File"
[INFO ] Locator Type: "URL"
[INFO ] Hyperlink Reference: "measurement.dat"
[INFO ] Finer Locator: "null"
[INFO ] Data Object: "measurementIndexAnnotationData"
[INFO ] MIME: "null"
[INFO ] Representation Information: "measurementIndexAnnotationSchema"
[INFO ] Size: (unspecified)
[INFO ] Checksum: null (unspecified)
[INFO ] Bytestream: "null"
[INFO ] MIME: "application/octetstream"
[INFO ] Size: (unspecified)
[WARN ] Working directory not set using default: /tmp
[INFO ] Checksum: 366296d31df57e85c5417493045f4804 (MD5) (OK)
[INFO ] File Content: None
[INFO ] File Locator: "null"
[INFO ] Textual Information: "Measurement Data Set Index File"
[INFO ] Locator Type: "URL"
[INFO ] Hyperlink Reference: "measurement-index.dat"
[INFO ] Finer Locator: "null"
[INFO ] Behavior Objects:
[INFO ] Empty Behavior Object Section
[INFO ] Validation:

[INFO ] Validator: "esa.xfd�.XercesSchemaValidator"
[INFO ] XML Schema Location: "jar:file:/misc/athena_home/mbaye/validation/safe/safe-suite-1-1-rc-2/lib/java/xfdu-core-1-1-rc-2.jar!/xsd/org/ccsds/xfdu/xfdu.xsd"

[ERROR] cvc-complex-type.4: Attribute 'dataObjectID' must appear on element 'dataObjectPointer'.
@(line 40, column 33)

[ERROR] cvc-complex-type.4: Attribute 'ID' must appear on element 'metadataObject'. @(line 95,
column 67)

[ERROR] cvc-id.1: There is no ID/IDREF binding for IDREF 'acquisitionPeriod'. @(line 270, column 13)
```


[ERROR] The input package is not valid.

D3.4 NASA TEST REPORT

cvc-complex-type.4: Attribute 'dataObjectID' must appear on element 'dataObjectPointer'.

@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-complex-type.4: Attribute 'ID' must appear on element 'metadataObject'.

@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-id.1: There is no ID/IDREF binding for IDREF 'acquisitionPeriod'.

@see: <http://www.w3.org/TR/xmlschema-1/#cvc-id>

Checksum check failed at Data object: measurementData

D4 RECONSTITUTION OF ORIGINAL XFDU

This test was inspired by the ESA reports in the ESA Interoperability reports shown in the previous Annexes. The ESA tests cases were completely reconstituted: however many changes occurred in term of attribute orders and formatting, the output Manifest document remained valid.

D4.1 ESA MERIS ORIGINAL SCHEMA

```
<xfdu:XFDU version="esa/safe/1.0/envisat/meris/fr/level-1"
  xmlns:gml="http://www.opengis.net/gml"
  xmlns:xfdu="urn:ccsds:schema:xfdu:1">
<!-- The unique ENVISAT MERIS FR Level 0 measurement data set -->
  <xfdu:contentUnit unitType="Measurement Data Unit"
    textInfo="Measurement Data Unit"
    dmdID="measurementOrbitReference
      measurementFrameSet
      measurementQualityInformation
      measurementIndexAnnotation"
    repID="measurementSchema
      envisatLevel0Schema">
    <dataObjectPointer dataObjectID="measurementData"/>
  </xfdu:contentUnit>
<!-- An index to the measurement data set for access efficiency -->
  <xfdu:contentUnit unitType="Metadata Unit"
    textInfo="Index for Measurement Data"
    repID="measurementIndexAnnotationSchema">
    <dataObjectPointer dataObjectID="measurementIndexAnnotationData"/>
  </xfdu:contentUnit>
</xfdu:contentUnit>
```

</informationPackageMap>

<!-- =====
 METADATA OBJECT SECTION
 ===== -->

<metadataSection>

<!-- Processing -->

<metadataObject ID="processing" classification="PROVENANCE" category="PDI">

<metadataWrap textInfo="Processing" vocabularyName="SAFE"

 mimeType="text/xml">

 <xmlData>

 <safe:processing name="Conversion from ENVISAT to SAFE format"

 start="2007-10-10T11:09:07.063000Z">

 <safe:facility country="France" name="GAEL Consultant"

 organisation="GAEL Consultant"

 site="Champs-sur-marne">

 <safe:software name="GAEL ENVISAT Transformer" version="1.1"/>

 </safe:facility>

 <safe:resource name=

 "MER_FR_0PNPDE20050110_200929_000001812033_00400_14983_4491.N1"

 role="Level 0 data">

 <safe:processing name="Level 0 processing"

 start="2005-01-10T20:31:19.000000Z">

 <safe:facility name="PDHS-E" organisation="ESA"

 site="ESRIN" country="Italy">

 <safe:software name="PFHS" version="5.32"/>

 </safe:facility>

 <safe:resource name="UNKNOWN" role="Raw Data">

 <safe:processing name="Downlink">

 <safe:facility name="PDHS-E" organisation="ESA"

 site="ESRIN" country="Italy"/>

 </safe:processing>

 </safe:resource>

 <safe:resource name=

 "AUX_CNO_AXVPDS20020123_121901_20020101_000000_20200101_000000"

 role="Auxiliary Data"/>

 <safe:resource name=

 "AUX_FPO_AXVPDS20050109_224012_20050109_193008_20050119_205624"

 role="Auxiliary Data"/>

 </safe:processing>

</safe:resource>

</safe:processing>

</xmlData>

</metadataWrap>

</metadataObject>

----- [Truncated] -----

</metadataSection>

<!-- =====
 DATA OBJECT SECTION
 ===== -->

<dataObjectSection>

```

<!-- Measurement -->
<dataObject ID="measurementData"
  repID="measurementSchema
    envisatLevel0Schema">
  <byteStream mimeType="application/octetstream">
    <fileLocation locatorType="URL" href="measurement.dat"
      textInfo="Measurement Data Set File"/>
    <checksum
      checksumName="MD5">f3ff2d8b835d1de963c1a31ceef090d2</checksum>
    </byteStream>
  </dataObject>

<!-- Measurement Index -->
<dataObject ID="measurementIndexAnnotationData"
  repID="measurementIndexAnnotationSchema">
  <byteStream mimeType="application/octetstream">
    <fileLocation locatorType="URL" href="measurement-index.dat"
      textInfo="Measurement Data Set Index File"/>
    <checksum
      checksumName="MD5">366296d31df57e85c5417493045f4804</checksum>
    </byteStream>
  </dataObject>

</dataObjectSection>

</xfdu:XFDU>

```

D4.2 RECONSTITUTED MERIS INSTANCE

The following object was generated from the parsed object tree in the NASA implementation using the standard interfaces to write the XFDU Manifest.

```

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<xfdu:XFDU xmlns:xfdu="urn:ccsds:schema:xfdu:1" version="esa/safe/1.1/envisat/meris/fr/level-0">
  <informationPackageMap>
    <xfdu:contentUnit pdid="processing"
      dmdID="acquisitionPeriod platform"
      textInfo="ENVISAT MERIS FR Level 0"
      unitType="SAFE Archive Information Package">
      <xfdu:contentUnit dmdID="measurementOrbitReference measurementFrameSet
        measurementQualityInformation measurementIndexAnnotation"
        repID="measurementSchema envisatLevel0Schema"
        textInfo="Measurement Data Unit"
        unitType="Measurement Data Unit">
        <dataObjectPointer dataObjectID="measurementData"/>
      </xfdu:contentUnit>
      <xfdu:contentUnit repID="measurementIndexAnnotationSchema"
        textInfo="Index for Measurement Data"
        unitType="Metadata Unit">
        <dataObjectPointer dataObjectID="measurementIndexAnnotationData"/>
      </xfdu:contentUnit>
    </xfdu:contentUnit>
  </informationPackageMap>
</xfdu:XFDU>

```

```

</informationPackageMap>
<metadataSection>
  <metadataObject category="PDI"
    classification="PROVENANCE"
    ID="processing">
    <metadataWrap vocabularyName="SAFE" textInfo="Processing" mimeType="text/xml">
      <xmlData>
        <safe:processing xmlns:safe="http://www.esa.int/safe/1.1"
          name="Conversion from ENVISAT to SAFE format"
          start="2007-10-10T11:09:07.063000Z">
          <safe:facility country="France" name="GAEL Consultant"
            organisation="GAEL Consultant" site="Champs-sur-marne">
            <safe:software name="GAEL ENVISAT Transformer" version="1.1"/>
          </safe:facility>
          <safe:resource
            name="MER_FR_0PNPDE20050110_200929_000001812033_00400_14983_4491.N1"
            role="Level 0 data">
            <safe:processing name="Level 0 processing" start="2005-01-10T20:31:19.000000Z">
            <safe:facility country="Italy" name="PDHS-E" organisation="ESA" site="ESRIN">
            <safe:software name="PFHS" version="5.32"/>
            </safe:facility>
            <safe:resource name="UNKNOWN" role="Raw Data">
            <safe:processing name="Downlink">
            <safe:facility country="Italy" name="PDHS-E" organisation="ESA" site="ESRIN"/>
            </safe:processing>
            </safe:resource>
          </safe:resource>
          name="AUX_CN0_AXVPDS20020123_121901_20020101_000000_20200101_000000"
          role="Auxiliary Data"/>
          <safe:resource
            name="AUX_FPO_AXVPDS20050109_224012_20050109_193008_20050119_205624"
            role="Auxiliary Data"/>
          </safe:processing>
        </safe:resource>
      </safe:processing>
    </xmlData>
  </metadataWrap>

```

----- [Truncated] -----

```

</metadataSection>
<dataObjectSection>
  <dataObject repID="measurementSchema envisatLevel0Schema" ID="measurementData">
    <byteStream mimeType="application/octetstream">
      <fileLocation locatorType="URL" href="file:measurement.dat" textInfo="Measurement Data Set File"/>
      <checksum checksumName="MD5">f3ff2d8b835d1de963c1a31ceef090d2</checksum>
    </byteStream>
  </dataObject>
  <dataObject repID="measurementIndexAnnotationSchema" ID="measurementIndexAnnotationData">
    <byteStream mimeType="application/octetstream">
      <fileLocation locatorType="URL"
        href="file:measurement-index.dat"
        textInfo="Measurement Data Set Index File"/>
      <checksum checksumName="MD5">366296d31df57e85c5417493045f4804</checksum>
    </byteStream>
  </dataObject>
</dataObjectSection>
</xfdu:XFDU>

```

D4.3 OBERVATIONS

The NASA XFDU toolkit reconstituted SAFE instance contained all the XML elements and attributes from the original SAFE instance. The differences included

- No comments were reconstituted
- Order of attributes was not maintained
- The elements of namespaces not known to the XFDU Toolkit (GML and SAFE) were not included in the namespace declaration of the root node but in each top level foreign elements wrapped around;

These differences do not affect the information content of an XML instance so the input and output Manifest are equivalent

ANNEX E

EARLY TEST RESULTS ERRORS DUE TO SCHEMA
INCONSISTENCIESE1 ESA TEST RESULT OF NASA INSTANCE WITH INCORRECT SCHEMA
VERSION

```

[INFO ] ESA XFDU Java I/O library
[INFO ]   Version: XFDU Java I/O API - SNAPSHOT (GAEL Consultant)
[INFO ]   Execution date: Tue Oct 23 13:29:11 GMT+01:00 2007
[INFO ]
[INFO ] XFDU Package: "null"
[INFO ]   File: "externalvalidation.xml"
[INFO ]   Object Identifier: "null"
[INFO ]   Textual Information: "null"
[INFO ]   Version: "null"
[INFO ] Information Package Map:
[INFO ]   Content Unit: "contentUnit_5414316a-cce8-11db-a9b5-a3cc3b344141"
[INFO ]     Textual Information: "usa_nasa_pds_mgst_1230"
[INFO ]     Content Unit Type: "null"
[INFO ]     Order Information: "null"
[INFO ]     Descriptive Metadata: "null"
[INFO ]     Preservation Descriptive Metadata: "null"
[INFO ]     Representation Information Metadata: "null"
[INFO ]     Other Metadata: "null"
[INFO ]   Content Unit: "contentUnit5411c062-cce8-11db-a9b5-a3cc3b344141"
[INFO ]     Textual Information: "null"
[INFO ]     Content Unit Type: "null"
[INFO ]     Order Information: "null"
[INFO ]     Descriptive Metadata: "null"
[INFO ]     Preservation Descriptive Metadata: "null"
[INFO ]     Representation Information Metadata: "null"
[INFO ]     Other Metadata: "null"
[INFO ]     Data Object Pointer: "dataObject1"
[INFO ]   Content Unit: "contentUnit5411e773-cce8-11db-a9b5-a3cc3b344141"
[INFO ]     Textual Information: "null"
[INFO ]     Content Unit Type: "null"
[INFO ]     Order Information: "null"
[INFO ]     Descriptive Metadata: "null"
[INFO ]     Preservation Descriptive Metadata: "null"
[INFO ]     Representation Information Metadata: "null"
[INFO ]     Other Metadata: "OTHER_OTHER"
[INFO ]     Data Object Pointer: "dataObject3"
[INFO ]   Content Unit: "contentUnit5411e774-cce8-11db-a9b5-a3cc3b344141"
[INFO ]     Textual Information: "null"
[INFO ]     Content Unit Type: "null"
[INFO ]     Order Information: "null"
[INFO ]     Descriptive Metadata: "null"
[INFO ]     Preservation Descriptive Metadata: "null"
[INFO ]     Representation Information Metadata: "null"
[INFO ]     Other Metadata: "OTHER_OTHER"
[INFO ]     Data Object Pointer: "dataObject5"
[INFO ]   Content Unit: "contentUnit54120e85-cce8-11db-a9b5-a3cc3b344141"
[INFO ]     Textual Information: "null"
[INFO ]     Content Unit Type: "null"
[INFO ]     Order Information: "null"

```

CCSDS REPORT CONCERNING XFDU INTEROPERABILITY TESTING

[INFO] Descriptive Metadata: "null"
[INFO] Preservation Descriptive Metadata: "null"
[INFO] Representation Information Metadata: "null"
[INFO] Other Metadata: "OTHER_OTHER"
[INFO] Data Object Pointer: "dataObject7"
[INFO] Content Unit: "contentUnit5413e346-cce8-11db-a9b5-a3cc3b344141"
[INFO] Textual Information: "null"
[INFO] Content Unit Type: "null"
[INFO] Order Information: "null"
[INFO] Descriptive Metadata: "null"
[INFO] Preservation Descriptive Metadata: "null"
[INFO] Representation Information Metadata: "null"
[INFO] Other Metadata: "OTHER_OTHER"
[INFO] Data Object Pointer: "dataObject9"
[INFO] Content Unit: "contentUnit54140a57-cce8-11db-a9b5-a3cc3b344141"
[INFO] Textual Information: "null"
[INFO] Content Unit Type: "null"
[INFO] Order Information: "null"
[INFO] Descriptive Metadata: "null"
[INFO] Preservation Descriptive Metadata: "null"
[INFO] Representation Information Metadata: "null"
[INFO] Other Metadata: "null"
[INFO] Data Object Pointer: "dataObject10"
[INFO] Content Unit: "contentUnit54140a58-cce8-11db-a9b5-a3cc3b344141"
[INFO] Textual Information: "null"
[INFO] Content Unit Type: "null"
[INFO] Order Information: "null"
[INFO] Descriptive Metadata: "null"
[INFO] Preservation Descriptive Metadata: "null"
[INFO] Representation Information Metadata: "null"
[INFO] Other Metadata: "OTHER_OTHER"
[INFO] Data Object Pointer: "dataObject12"
[INFO] Content Unit: "contentUnit54143169-cce8-11db-a9b5-a3cc3b344141"
[INFO] Textual Information: "null"
[INFO] Content Unit Type: "null"
[INFO] Order Information: "null"
[INFO] Descriptive Metadata: "null"
[INFO] Preservation Descriptive Metadata: "null"
[INFO] Representation Information Metadata: "null"
[INFO] Other Metadata: "null"
[INFO] Data Object Pointer: "dataObject13"
[INFO] Content Unit: "contentUnit5416063b-cce8-11db-a9b5-a3cc3b344141"
[INFO] Textual Information: "DOCUMENT"
[INFO] Content Unit Type: "null"
[INFO] Order Information: "null"
[INFO] Descriptive Metadata: "null"
[INFO] Preservation Descriptive Metadata: "null"
[INFO] Representation Information Metadata: "null"
[INFO] Other Metadata: "null"
[INFO] Content Unit: "contentUnit5414316b-cce8-11db-a9b5-a3cc3b344141"
[INFO] Textual Information: "null"
[INFO] Content Unit Type: "null"
[INFO] Order Information: "null"
[INFO] Descriptive Metadata: "null"
[INFO] Preservation Descriptive Metadata: "null"
[INFO] Representation Information Metadata: "null"
[INFO] Other Metadata: "null"
[INFO] Data Object Pointer: "dataObject14"
[INFO] Content Unit: "contentUnit54147f8c-cce8-11db-a9b5-a3cc3b344141"
[INFO] Textual Information: "null"
[INFO] Content Unit Type: "null"
[INFO] Order Information: "null"

CCSDS REPORT CONCERNING XFDU INTEROPERABILITY TESTING

[INFO] Descriptive Metadata: "null"
[INFO] Preservation Descriptive Metadata: "null"
[INFO] Representation Information Metadata: "null"
[INFO] Other Metadata: "OTHER_OTHER"
[INFO] Data Object Pointer: "dataObject16"

----- [Truncated] -----

[INFO] Content Unit: "contentUnit584dbc1f-cce8-11db-a9b5-a3cc3b344141"
[INFO] Textual Information: "null"
[INFO] Content Unit Type: "null"
[INFO] Order Information: "null"
[INFO] Descriptive Metadata: "null"
[INFO] Preservation Descriptive Metadata: "null"
[INFO] Representation Information Metadata: "null"
[INFO] Other Metadata: "OTHER_OTHER"
[INFO] Data Object Pointer: "dataObject329"

[INFO] Metadata Objects:

[INFO] Metadata Object: "globalmeta1"
[INFO] Metadata Object: "globalmeta2"
[INFO] Metadata Object: "globalmeta3"
[INFO] Metadata Object: "globalmeta4"
[INFO] Metadata Object: "globalmeta5"
[INFO] Metadata Object: "OTHER_OTHER"
[INFO] Metadata Object: "OTHER_OTHER"
[INFO] Metadata Object: "OTHER_OTHER"
[INFO] Metadata Object: "OTHER_OTHER"
[INFO] Metadata Object: "OTHER_OTHER"
[INFO] Metadata Object: "OTHER_OTHER"
[INFO] Metadata Object: "OTHER_OTHER"
[INFO] Metadata Object: "OTHER_OTHER"
[INFO] Metadata Object: "OTHER_OTHER"

----- [Truncated] -----

[INFO] Metadata Object: "OTHER_OTHER"
[INFO] Metadata Object: "OTHER_OTHER"
[INFO] Metadata Object: "OTHER_OTHER"
[INFO] Data Objects:
[INFO] Data Object: "dataObject_globalmeta1"
[INFO] MIME: "null"
[INFO] Representation Information: "null"
[INFO] Size: -1 byte(s)
[INFO] Checksum: null (f5bec905)
[INFO] Bytestream: "null"
[INFO] MIME: "text/xml"
[INFO] Size: 3938909 byte(s)
[INFO] Checksum: null (unspecified)
[INFO] File Content: None
[INFO] File Locator: "null"
[INFO] Textual Information: "null"
[INFO] Locator Type: "null"
[INFO] Hyperlink Reference: ""
[INFO] Finer Locator: "null"
[INFO] Data Object: "dataObject_globalmeta2"
[INFO] MIME: "null"
[INFO] Representation Information: "null"
[INFO] Size: -1 byte(s)
[INFO] Checksum: null (f5bec905)
[INFO] Bytestream: "null"
[INFO] MIME: "text/xml"
[INFO] Size: 3938909 byte(s)

CCSDS REPORT CONCERNING XFDU INTEROPERABILITY TESTING

[INFO] Checksum: null (unspecified)
[INFO] File Content: None
[INFO] File Locator: "null"
[INFO] Textual Information: "null"
[INFO] Locator Type: "null"
[INFO] Hyperlink Reference: ""
[INFO] Finer Locator: "null"
[INFO] Data Object: "dataObject_globalmeta3"
[INFO] MIME: "null"
[INFO] Representation Information: "null"
[INFO] Size: -1 byte(s)
[INFO] Checksum: null (f5bec905)
[INFO] Bytestream: "null"
[INFO] MIME: "text/xml"
[INFO] Size: 3938909 byte(s)
[INFO] Checksum: null (unspecified)
[INFO] File Content: None
[INFO] File Locator: "null"
[INFO] Textual Information: "null"
[INFO] Locator Type: "null"
[INFO] Hyperlink Reference: ""
[INFO] Finer Locator: "null"

----- [Truncated] -----

[INFO] Data Object: "dataObject329"
[INFO] MIME: "null"
[INFO] Representation Information: "null"
[INFO] Size: -1 byte(s)
[INFO] Checksum: null (unspecified)
[INFO] Bytestream: "null"
[INFO] MIME: "text/plain"
[INFO] Size: 3938909 byte(s)
[INFO] Checksum: null (unspecified)
[INFO] File Content: None
[INFO] File Locator: "null"
[INFO] Textual Information: "null"
[INFO] Locator Type: "null"
[INFO] Hyperlink Reference: ""
[INFO] Finer Locator: "null"
[INFO] Behavior Objects:
[INFO] Empty Behavior Object Section
[INFO] Validation:
[INFO] Validator: "esa.xfd�.XercesSchemaValidator"
[INFO] XML Schema Location: "/misc/athena_home/mbaye/software/xfdu/target/xfdu-suite-SNAPSHOT/schemas/org/ccsds/xfdu/xfdu.xsd"

[ERROR] cvc-complex-type.4: Attribute 'ID' must appear on element 'packageHeader'. @(line 3, column 20)

[ERROR] cvc-complex-type.2.4.a: Invalid content was found starting with element 'environmentInfo'. One of '{volumeInfo}' is expected. @(line 4, column 26)

[ERROR] cvc-complex-type.3.2.2: Attribute 'mimeType' is not allowed to appear in element 'metadataObject'. @(line 583, column 122)

[ERROR] cvc-complex-type.3.2.2: Attribute 'mimeType' is not allowed to appear in element 'metadataObject'. @(line 586, column 122)

[ERROR] cvc-complex-type.3.2.2: Attribute 'mimeType' is not allowed to appear in element 'metadataObject'. @(line 589, column 122)

[ERROR] cvc-complex-type.3.2.2: Attribute 'mimeType' is not allowed to appear in element 'metadataObject'. @(line 592, column 122)

[ERROR] cvc-complex-type.3.2.2: Attribute 'mimeType' is not allowed to appear in element 'metadataObject'. @(line 595, column 122)

[ERROR] cvc-id.2: There are multiple occurrences of ID value 'OTHER_OTHER'. @(line 602, column 82)
 [ERROR] cvc-attribute.3: The value 'OTHER_OTHER' of attribute 'ID' on element 'metadataObject' is not valid with respect to its type, 'ID'. @(line 602, column 82)
 [ERROR] cvc-id.2: There are multiple occurrences of ID value 'OTHER_OTHER'. @(line 605, column 82)
 [ERROR] cvc-attribute.3: The value 'OTHER_OTHER' of attribute 'ID' on element 'metadataObject' is not valid with respect to its type, 'ID'. @(line 605, column 82)
 [ERROR] cvc-id.2: There are multiple occurrences of ID value 'OTHER_OTHER'. @(line 608, column 82)
 [ERROR] cvc-attribute.3: The value 'OTHER_OTHER' of attribute 'ID' on element 'metadataObject' is not valid with respect to its type, 'ID'. @(line 608, column 82)
 [ERROR] cvc-id.2: There are multiple occurrences of ID value 'OTHER_OTHER'. @(line 611, column 82)

----- [Truncated] -----

[ERROR] cvc-attribute.3: The value 'OTHER_OTHER' of attribute 'ID' on element 'metadataObject' is not valid with respect to its type, 'ID'. @(line 1040, column 82)
 [ERROR] cvc-complex-type.3.2.2: Attribute 'checksum' is not allowed to appear in element 'dataObject'. @(line 1046, column 69)
 [ERROR] cvc-complex-type.3.2.2: Attribute 'checksum' is not allowed to appear in element 'dataObject'. @(line 1052, column 69)
 [ERROR] cvc-complex-type.3.2.2: Attribute 'checksum' is not allowed to appear in element 'dataObject'. @(line 1058, column 69)
 [ERROR] cvc-complex-type.3.2.2: Attribute 'checksum' is not allowed to appear in element 'dataObject'. @(line 1064, column 69)
 [ERROR] cvc-complex-type.3.2.2: Attribute 'checksum' is not allowed to appear in element 'dataObject'. @(line 1070, column 69)
 [ERROR] The input package is not valid.

E2 NASA TEST REPORT ON ESA INSTANCE WITH INCORRECT SCHEMA

cvc-complex-type.3.2.2: Attribute 'otherMdType' is not allowed to appear in element 'metadataWrap'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-complex-type.3.2.2: Attribute 'vocabularyMdType' is not allowed to appear in element 'metadataWrap'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-complex-type.3.2.2: Attribute 'otherMdType' is not allowed to appear in element 'metadataWrap'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-complex-type.3.2.2: Attribute 'vocabularyMdType' is not allowed to appear in element 'metadataWrap'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

complex-type.3.2.2: Attribute 'otherMdType' is not allowed to appear in element 'metadataWrap'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type> \

cvc-complex-type.3.2.2: Attribute 'vocabularyMdType' is not allowed to appear in element 'metadataWrap'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-complex-type.3.2.2: Attribute 'otherMdType' is not allowed to appear in element 'metadataWrap'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>
 cvc-complex-type.3.2.2: Attribute 'vocabularyMdType' is not allowed to appear in element 'metadataWrap'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-complex-type.3.2.2: Attribute 'otherMdType' is not allowed to appear in element 'metadataWrap'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-complex-type.3.2.2: Attribute 'vocabularyMdType' is not allowed to appear in element 'metadataWrap'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-complex-type.3.2.2: Attribute 'locType' is not allowed to appear in element 'metadataReference'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-complex-type.3.2.2: Attribute 'otherMdType' is not allowed to appear in element 'metadataReference'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-complex-type.3.2.2: Attribute 'vocabularyMdType' is not allowed to appear in element 'metadataReference'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-complex-type.3.2.2: Attribute 'xlink:href' is not allowed to appear in element 'metadataReference'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-complex-type.4: Attribute 'locatorType' must appear on element 'metadataReference'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-complex-type.3.2.2: Attribute 'locType' is not allowed to appear in element 'metadataReference'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-complex-type.3.2.2: Attribute 'otherMdType' is not allowed to appear in element 'metadataReference'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-complex-type.3.2.2: Attribute 'vocabularyMdType' is not allowed to appear in element 'metadataReference'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-complex-type.3.2.2: Attribute 'xlink:href' is not allowed to appear in element 'metadataReference'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-complex-type.4: Attribute 'locatorType' must appear on element 'metadataReference'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-complex-type.3.2.2: Attribute 'checksum' is not allowed to appear in element 'byteStream'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-complex-type.3.2.2: Attribute 'checksumType' is not allowed to appear in element 'byteStream'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-complex-type.3.2.2: Attribute 'locType' is not allowed to appear in element 'fileLocation'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-complex-type.3.2.2: Attribute 'xlink:href' is not allowed to appear in element 'fileLocation'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>

cvc-complex-type.4: Attribute 'locatorType' must appear on element 'fileLocation'.@see: <http://www.w3.org/TR/xmlschema-1/#cvc-complex-type>