Progressive enrichment of simple model of Audio-Visual assets

Based on the **AXIS** architecture of **TITAN** and the **MEMORIES** project (European Union R&D project n°053500)

2009 JUNE 26 (11:30 am)

Presented by: Guy Maréchal (TITAN)
The conference focuses on the concepts

A full presentation would require a 2 days workshop

The presentation is based on the experience gained by real users using the prototype of the IPI manager developed by MEMNON in the context of the MEMORIES project

**USERS**

Bournemouth University

Radio Suisse Romande

Norwegian Institute of Recorded Sound

UNESCO

**Main TOOL**

IPI-Manager®

Project explorer

Segmentation editor

Task List

Metadata
KEY MESSAGES (1)

1. Create your information assets in such a way that they can easily be retrieved and understood

Searches must lead to the quick access to the right asset and to navigations to the associated assets with serendipity!

2. For that, organize them as a “Network of Autonomous Semantic Objects”

“Autonomous” means bundling the ‘Instances’ with their ‘Context’ (including their ‘Knowledge’ models up to Open Formats based on Open Standards) and means the capability for each Entity to be loosely coupled with the others.

3. Ensure the upward compatibility of that semantic modeling with the existing “flat model” based assets

4. BONUS: Using that approach constructs “build-ins”:

Interoperability in time: Persistence & Open Controlled Evolutions
Interoperability in space: Heterogeneous systems
Hooks for the ‘integrity’ & ‘authenticity’ & ‘traceability’ & ‘reusability’ & …
AXIS Autonomous eXchanging Indexing & Structuring
AXE Autonomous eXchanged Entities

Dynamic (SNIA)
EXPLOITATIONS
WEB / Broadcast / VPN
POSTGRE-SQL

NAMING & IDENTIFYING
ACQUISITIONS
Structured / Unstructured
Repository of KNOWLEDGE models

BUS of interchange of AXE’s
Passive EXPLOITATIONS
PERSISTENT STORAGE

Fixed ASSETS (SNIA)
FEDORA
SIP / P-DIP
The structural change in modeling

From simple “FLAT” model (Based on RECORDS in DATA BASES)

AXIS upward COMPATIBILITY

To enhanced “FLAT” model (With added metadata and alias)

AXIS upward COMPATIBILITY

To “RICH” semantic model (Based on Networked ENTITIES with Documents & Relations in KNOWLEDGE BASES)

- Ontology based
- Object oriented
- Native persistent

& < Semantic WEB applications >

© Memnon & Titan 2009
KEY MESSAGES (2)

1. Be ‘Semantic’ at creation time!

2. Convert your ‘Flat models’ into ‘Semantic Entities” before archiving!

Example:

At the RSR (Radio Suisse Romande)
One hour of audio interview becomes 12 000 semantic objects

Recommendation of M. Rob SHARPE:

“Go to the conceptual level such to become independent of the technology”
Plan of the presentation

1. The simple “FLAT” model of the ASSETS
2. Enhancing the “FLAT” model of the ASSETS
3. The “RICH” semantic model of the ASSETS
4. The “AXIS” modeling of “Rich Objects”
5. Conclusions
1. The simple “FLAT” model of the ASSETS

2. Enhancing the “FLAT” model of the ASSETS

3. The “RICH” semantic model of the ASSETS

4. The “AXIS” modeling of the “Rich Objects”

5. Conclusions
FLAT MODEL

The FLAT model is based on “RECORDS” representing ‘CATALOGUED’ resources.

RESOURCE / ASSET

CATALOGUING:
- Cataloguing rules (MARC21 / MODS / …)
- Identification & link to the resource

CATALOGING:
- Catalogue record
The “RECORDS” are usually represented as a collection of instances of “TERMS” Stored in “DATA BASES” and linking to “CONTENTS”. 

METADATA FILES

Registration → Data Base → Access System

CONTENT (typically WAV files)

RECORD

© Memnon & Titan 2009
The RECORDS are usually based on domain specific standards

- MARC
- MODS
- ...

The use of generic standards, like ‘Dublin-Core’ or ‘VRA-Core’ remains ancillary or not fully mapped
1. The simple “FLAT” model of the ASSETS

2. Enhancing the “FLAT” model of the ASSETS

3. The “RICH” semantic model of the ASSETS

4. The AXIS modeling of the “Rich Objects”

5. Conclusions
Enhancement of the RECORD in the DATABASE

Main enhancement types:
- URN
- Aliases & ‘Authority lists’
- Links to media
- Descriptions
- Refinements
- …
The example of export in METS
The example of export in OAI

```xml
<?xml version="1.0" encoding="UTF-8"?>
<oai_dc:dc >
    xmlns:oai_dc="http://www.openarchives.org/OAI/2.0/oai_dc/"
    xmlns:dc="http://purl.org/dc/elements/1.1/"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://www.openarchives.org/OAI/2.0/oai_dc/
    http://www.openarchives.org/OAI/2.0/oai_dc.xsd">

    <axis:opus>
        <dc:title>Eine kleine Nachtmusik</dc:title>
        <dc:contributor>Mozart</dc:contributor>
    </axis:opus>

</oai_dc:dc>
```
The enhanced “FLAT” model opens the way to:

- Combined metadata standards: MODS + MARC + Dublin Core + VRAC
- Easy export in various formats
- Refinements of metadata
- Dedicated profiles like the AUDIO METS profile of the UNESCO (developed in Australia)
- Easy exploitation through portals OAI // MICHAEL // Europeana …
- More easy SIP transfer to OAIS
- Ready for the construction of “RICH Models’
- …

The enhanced “FLAT” model exists today, it’s proven and robust! It covers most of the current needs or habits!
Accessing to the simple “FLAT” models

Accurate query
Local WEB service
Accessing to the simple “FLAT” models

Many catalogues

Complex query
OAI PORTALS
Accessing to the simple “FLAT” models

Semantic query
Plan of the presentation

1. The simple “FLAT” model of the ASSETS
2. Enhancing the “FLAT” model of the ASSETS
3. The “RICH” semantic model of the ASSETS
4. The AXIS modeling of the “Rich Objects”
5. Conclusions
Accessing, Creating, Enriching, Sharing “RICH SEMANTIC” models
In “FLAT” model:

MOZART is namely a COMPOSER *(The Dublin Core says contributor!)*:

```html
<dc:contributor> Mozart </dc:contributor>
```

Here **Mozart** is a string of characters, not an ENTITY

In “RICH” semantic model:

Wolfgang Amadeus MOZART is first a PERSON modeled independently as an ENTITY: He was born, travelled, played music, composed, conduct, got married, …

The fact that he contributed significantly to the composition of the REQUIEM K.626 *(Süssmayr completed it at the request of Constance, Mozart’s wife)* and his specific contribution can be expressed; the same for the specific contribution of Süssmayr!

In “RICH” model, the contribution as composer of Mozart and the one of Süssmayr are expressed as RELATIONS in a CONTEXT: each has played the role of one of the composers for specific parts of the REQUIEM K.626!

The UPWARD compatibility between “FLAT” and “RICH” implies rich ALIAS mechanisms
An illustration of the differences between the “RICH” models and the “FLAT” models.

The handling of “CONTEXTS” in “RICH” semantic models:
• Human languages (Entries; Values; Qualifications)
• Semiotics
• Time references
• Space references

ILLUSTRATION

A musical opus of « Pyotr Ilyich Tchaikovsky » commonly named the « 1812 overture ».

Composer

Name:
• Pyotr Ilyich Tchaikovsky (english)
• Piotr Ilitch Tchaïkovski (french)
• Пётр Ильич Чайковский (russian)
• …

Born:
• 7 May 1840 ['Gregorian' New style calendar]
• 25 April 1840 ['Julian' Old Style calendar]
• …

Died:
• 6 November 1893 ['Gregorian' New style calendar]
• 25 October 1893 ['Julian' Old Style calendar]
• …

Musical Opus:
• Festival Overture, The Year 1812 (english)
• Ouverture Solennelle, L'Année 1812, Op. 49 (french)
• Торжественная увертюра 1812 года, Toržestvennaja uvertjura 1812 goda (russian)
Why “RICH” modelling?

For representing “KNOWLEDGE” in such a way that:

- EVERYTHING can be covered
- HUMAN can express their visions of the MEANING of things (SEMANTICS)
- ITC MACHINES can ‘understand’, ‘process’, ‘retrieve’ the semantic items
  (Through Intelligent Active Agents)
- Any new semantic item can be added
- The representation can go at any level of detail and accuracy
- Several representations of the same semantic item can coexist
  (multiple point of views and multiple representation formats)
- The representations can be distributed
- The representations are enabled native persistent
The linking of the ASSETS in all domains!

'Rich' semantic models
The RICH model namely ENABLES:

- The modelling according to the FRBR standard
- The modelling according to the CRM standard
- The implementation of the FRBR-CRM OO
- Fits perfectly with the “Object Oriented” programming; the “Ontology” approach
- The implementation of the “Topic maps” and the “Ontology Web language”
Plan of the presentation

1. The simple “FLAT” models of the ASSETS
2. Enhancing the “FLAT” models of the ASSETS
3. The “RICH” semantic models of the ASSETS
4. The “AXIS” modeling of the “Rich Objects”
5. Conclusions
The FOUR categories of “THINGS” of AXIS the “CORE”
Introducing the concept of ENTITY

A concrete example: Wolfgang Amadeus MOZART is a person which is represented by an ENTITY

The “Entity Class” is coded ‘AGENT’ (which is an ‘ELEMENT’)

The “Relation Class” is coded ‘INSTANCE OF’

The “Entity Class” is coded ‘PHYSICAL PERSON’

That ENTITY concept ensures the compatibility between the “Topic maps’ and ‘Ontology’ approaches
The “RICH” semantic model is based on “ENTITIES” holding “DOCUMENTS” & “RELATIONS” in “KNOWLEDGE BASES”

- Identifying the ENTITIES, DOCUMENTS and TERMS
- Enriching the models of the ASSETS
- Enriching the ASSETS with SEMANTIC
- Adding the structures (logical & physical)
- Managing the ASSETS
- Persistence & Interoperability of the ASSETS
- Retrieving the ASSETS
- Representing the ASSETS
  - Semantics: Ontology’s; Topic maps; OWL; …
  - Resources: RDF; URN; URL, URI, …
  - Terms: DCMI; …
SYMBOLISM

ENTITIES

• Bag entities
  ORDER BL-022
  OPUS
  Class of ENTITY

• General entities
  MOZART
  PHYSICAL PERSON

• Media entities
  REQUIEM K626
  LOGICAL CLIP

• Process entities
  DIGITIZATION
  EVENT

DOCUMENTS

Class of the DOCUMENT

RELATIONS

IS PART OF

Class of the RELATION

Media of …

Ontology of …

-wave-

-owl-
Example of an **INSTANCE** of the RICH SEMANTIC MODELS

- **Interview Event**
- **Speech Program**
- **Clip**

**Knowledge Base** of the RICH SEMANTIC MODELS

- **Interview of Otto Preminger**
- **Speech media of interview of Otto Preminger**
- **Speech media of interview of Otto Preminger**
- **Speech Program of interview of Otto Preminger**
- **Broadcast Event**
- **OPUS**

The diagram illustrates the relationships between different types of events and media used in the context of an interview.
The SYMBOLISM illustrated by a concrete example: ‘COMPOSER’ is a ‘SPECIALISATION’ of ‘ROLE’

‘COMPOSER’ is an ‘ENTITY’

The “Entity Name” is coded ‘COMPOSER’

‘COMPOSER’ is defined by ‘Documents’

One of these ‘Documents’ is of the -afp- ‘class of documents’. It includes:

• The fundamental metadata defining the entity (based on RDF and Dublin Core) including the ‘Entity Class’
• The list of documents owned by the entity
• The list of links to documents pertaining to the entity but owned by another entity
• The list of the entities owned by the entity
• The list of the links to the entities pertaining to the entity but owned by another entity or ARE
• The list of the links to other autonomous resources and objects
• The list of ‘ALIAS’: Terms – Entities Terms – Terms Entities – Entities

The other of these ‘Documents’ are of any ‘Classes of document’

The entity ‘COMPOSER’ is a ‘SPECIALISATION’ of the entity ‘ROLE’

The –afp- document expresses that ‘COMPOSER’ is a ‘SPECIALISATION’ of ‘ROLE’ and that ‘SPECIALISATION’ is the type of the ‘RELATION’

Notes:

The ‘class of document’ relates to an abstract concept [the class is represented using the hyphen as separator (such as -afp-)].

While the embodiment of a document as a file, or into a file, uses the dot as end separator called ’extensions’ (such as .odt).

-afp- means: ‘aaxis foot print’
A composite concrete example:

**AXIS CORE PROFILE**

- **PHYSICAL PERSON**: Wolfgang Amadeus Mozart

**MUSIC PROFILE**

- **COMPOSER**
  - **ROLE**: Specialize
  - **EVENT**: Produces
  - **OPUS**: Ein kleine Nachtmusik
  - **IClip**

**ALIAS**: “TERM” to “ENTITY”

The meaning of “composer”

Involves acting as “composer”

Composing ‘Ein kleine Nachtmusik’

Produced by

Manifested by

© Memnon & Titan 2009
Example of the *afp* document at the Norwegian Institute of Recorded Sound (FULL document)
Example of the -afp- document at the Norwegian Institute of Recorded Sound (ENTITY level)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NIRIS14-7356782 (OPUS)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DGR 427 811-2 &amp; POL 924 (Original Matrice)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NIRIS14-45586620 (EVENT)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**REFERENCES**

**NAME of the ENTITY**: Eine kleine Nachtmusik

**TYPE of ENTITY**: IClip

**RIGHTS OWNER(s)**: Deutsche Grammophon

**KEY WORDS**: Classical Music; Chamber Music; Serenade

<table>
<thead>
<tr>
<th>ENTITY</th>
<th>Refinement of the Dublin Core Element</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>dc:title</td>
</tr>
<tr>
<td></td>
<td>dc:type</td>
</tr>
<tr>
<td></td>
<td>dc:rights</td>
</tr>
<tr>
<td></td>
<td>dc:subject</td>
</tr>
</tbody>
</table>

**Description of the ENTITY**: Famous Chamber music by W. A. MOZART played by the Wiener Philharmoniker (recorded in 1953 by Polydor in the recording studio, Hamburg)

**Comments**: *Eine kleine Nachtmusik* was completed on 10 August 1767, while Mozart was in the middle of work on *Don Giovanni*. Why did he write it? The obvious answer would be a commission, but no details survive. Albert Einstein claimed that "All the riddles presented by this work would be solved by the assumption that Mozart wrote it for himself, to satisfy an inner need". We need not be so skeptical: the sonata certainly presents a strange contrast with the gross parody of *Ein musikalischer Spass* ("A Musical Joke"). K. 322, completed a couple of months before, was the first piece Mozart wrote down after his father's death. (From Sir Nicholas Kenyon)

**URN System**

**URN of the ENTITY**: NIRSO2-87654321-&&-&&&1

**URN of the current version of the AXIS FOOT PRINT DOCUMENT**: NIRSO2-87654321-&&-&&&6 eng-atp-iclip.xml

**Date of the current RELEASE of the ENTITY**: 2008-05-10

**Köchels Verzeichnis**: K. 525

**Date of the current VERSION of the AFP**: 2008-05-10

**Configuration manager**: Jacqueline von Abb

**Page number**: 1

**Total number of pages**: 1

**Stiftelsen Norsk Lydinstittut Stavanger**

Bjorgsted Terrasse 5, 4007 STAVANGER (Norway)
Example of the document at the Norwegian Institute of Recorded Sound (Document list)

<table>
<thead>
<tr>
<th>DOCUMENTS</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CREATION ARE</th>
<th>ROOT ID</th>
<th>ROOT INDEX</th>
<th>COMPO ID</th>
<th>DPLI ID</th>
<th>EVOLUTION (DOCUMENTS)</th>
<th>NATURAL LANGUAGE</th>
<th>FORMAT</th>
<th>QUALIFIER</th>
<th>SUFFIX</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIRS02</td>
<td>73760974'A</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0 1 2 3 4 5 6</td>
<td>afp</td>
<td>IClip</td>
<td>rdf</td>
<td></td>
<td>Intro: Allegro</td>
</tr>
<tr>
<td>NIRS02</td>
<td>73760974'A</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0 1</td>
<td>aci</td>
<td>xml</td>
<td></td>
<td></td>
<td>Romance: Andante</td>
</tr>
<tr>
<td>NIRS02</td>
<td>73760974'A</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0 0</td>
<td>bwf</td>
<td>96k24</td>
<td>wav</td>
<td></td>
<td>Menuetto: Allegretto - Trio</td>
</tr>
<tr>
<td>NIRS02</td>
<td>73760974'A</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0 1</td>
<td>bwf</td>
<td>96k24</td>
<td>wav</td>
<td></td>
<td>Rondo: Allegro</td>
</tr>
<tr>
<td>NIRS02</td>
<td>73760974'A</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>0 1</td>
<td>bwf</td>
<td>96k24</td>
<td>wav</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NIRS02</td>
<td>73760974'A</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>0 1</td>
<td>bwf</td>
<td>96k24</td>
<td>wav</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NIRS02</td>
<td>73760974'A</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0 0</td>
<td>jpg</td>
<td>600dpi</td>
<td>jpg</td>
<td></td>
<td>Label</td>
</tr>
<tr>
<td>NIRS02</td>
<td>73760974'A</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0 0</td>
<td>jpg</td>
<td>600dpi</td>
<td>jpg</td>
<td></td>
<td>Box (Face)</td>
</tr>
<tr>
<td>NIRS02</td>
<td>73760974'A</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0 0</td>
<td>jpg</td>
<td>600dpi</td>
<td>jpg</td>
<td></td>
<td>Box (Back)</td>
</tr>
<tr>
<td>NIRS02</td>
<td>73760974'A</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0 0</td>
<td>jpg</td>
<td>600dpi</td>
<td>jpg</td>
<td></td>
<td>Detailed label for Classical Music</td>
</tr>
<tr>
<td>NIRS02</td>
<td>73760974</td>
<td>0</td>
<td>D</td>
<td>D</td>
<td>0 0</td>
<td>cmp</td>
<td>192k</td>
<td>ogg</td>
<td></td>
<td>Proxy of the whole (Serenade + two Symphonies)</td>
</tr>
<tr>
<td>NIRS02</td>
<td>73760974</td>
<td>1</td>
<td>D</td>
<td>D</td>
<td>0 0</td>
<td>cmp</td>
<td>64k</td>
<td>mp3</td>
<td></td>
<td>Proxy of the whole (Serenade + two Symphonies)</td>
</tr>
</tbody>
</table>

Indexes of the RELEASES of the ENTITY

<table>
<thead>
<tr>
<th>ENTITY Class</th>
<th>RELATION Class</th>
<th>ENTITY Name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

© Memnon & Titan 2009
# Example of the document at the Norwegian Institute of Recorded Sound (RELATIONS level)

<table>
<thead>
<tr>
<th>Indexes of the RELEASES of the ENTITY</th>
<th>ENTITY Class</th>
<th>RELATION Class</th>
<th>ENTITY Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIRS 737609741</td>
<td></td>
<td>Manifestation</td>
<td>Eine kleine Nachtmusik</td>
</tr>
<tr>
<td>AXIS 12964</td>
<td></td>
<td>Role</td>
<td>Eine kleine Nachtmusik</td>
</tr>
<tr>
<td>WWERD 214589215</td>
<td></td>
<td>opus</td>
<td>Eine kleine Nachtmusik</td>
</tr>
<tr>
<td>NIRS11 564329847</td>
<td></td>
<td>phP</td>
<td>Wolfgang Amadeus MOZART</td>
</tr>
<tr>
<td>UNESCO 234390075</td>
<td></td>
<td>role</td>
<td>Eine kleine Nachtmusik</td>
</tr>
<tr>
<td>WWERD 21458921523</td>
<td></td>
<td>opus</td>
<td>Eine kleine Nachtmusik</td>
</tr>
<tr>
<td>NIRS11 786584780</td>
<td></td>
<td>phP</td>
<td>James LEVINE</td>
</tr>
<tr>
<td>UNESCO 276541436</td>
<td></td>
<td>role</td>
<td>Eine kleine Nachtmusik</td>
</tr>
<tr>
<td>WWERD 21458921523</td>
<td></td>
<td>opus</td>
<td>Alfred Capoulou</td>
</tr>
<tr>
<td>NIRS11 423023945</td>
<td></td>
<td>moP</td>
<td>Weiner Philharmoniker</td>
</tr>
<tr>
<td>UNESCO 236541423</td>
<td></td>
<td>role</td>
<td>Eine kleine Nachtmusik</td>
</tr>
<tr>
<td>WWERD 21458921523</td>
<td></td>
<td>opus</td>
<td>Eine kleine Nachtmusik</td>
</tr>
<tr>
<td>NIRS11 786854109</td>
<td></td>
<td>phP</td>
<td>Alfred Capoulou</td>
</tr>
<tr>
<td>UNESCO 435654143</td>
<td></td>
<td>role</td>
<td>Eine kleine Nachtmusik</td>
</tr>
<tr>
<td>WWERD 21458921523</td>
<td></td>
<td>opus</td>
<td>Eine kleine Nachtmusik</td>
</tr>
<tr>
<td>NIRS11 786584780</td>
<td></td>
<td>phP</td>
<td>Concert Gebouw</td>
</tr>
<tr>
<td>UNESCO 276541436</td>
<td></td>
<td>role</td>
<td>Eine kleine Nachtmusik</td>
</tr>
<tr>
<td>WWERD 214589215</td>
<td></td>
<td>opus</td>
<td>Eine kleine Nachtmusik</td>
</tr>
<tr>
<td>NIRS11 786517896</td>
<td></td>
<td>period</td>
<td>1963-06-22 @ 1963-06-25</td>
</tr>
<tr>
<td>UNESCO 21265414</td>
<td></td>
<td>role</td>
<td>Eine kleine Nachtmusik</td>
</tr>
<tr>
<td>WWERD 21458921523</td>
<td></td>
<td>opus</td>
<td>Eine kleine Nachtmusik</td>
</tr>
<tr>
<td>NIRS11 786584780</td>
<td></td>
<td>event</td>
<td>Eine kleine Nachtmusik</td>
</tr>
<tr>
<td>UNESCO 27547216</td>
<td></td>
<td>rolo</td>
<td>Eine kleine Nachtmusik</td>
</tr>
<tr>
<td>WWERD 21458921523</td>
<td></td>
<td>opus</td>
<td>Eine kleine Nachtmusik</td>
</tr>
</tbody>
</table>

## Dates of EVOLUTION

|------------|------------|------------|------------|------------|------------|------------|------------|

© Memnon & Titan 2009
The FOUR categories of “THINGS” of AXIS the “CORE”
The CORE ELEMENTARY CONCEPTS of AXIS

1. CONCEPT
   A CONCEPT is an abstract model.

2. INSTANCE of an ENTITY, DOCUMENT, RELATION, TERM
   An instance of one of these ITEMS is the resource applying the characteristics of its ‘model’ / ‘type’.

3. OCCURRENCE of an ENTITY, DOCUMENT, RELATION, TERM
   An occurrence of one of these ITEMS refers to each of the resource instances having the same ‘model’ / ‘type’
   
   Mozart, Brahms, Beethoven, Roger Roberts are various occurrences of instances of “Physical Person”
   Three copies of the same files written onto hard disks are three occurrences of the same item

4. CLASS
   An CLASS refers to an ontology entry

5. PROPERTY
   The PROPERTIES are attached to classes

6. ATTRIBUTE
   The ATTRIBUTES are attached to TERMS and specialisations of TERMS

7. REFINEMENT
   The REFINEMENTS are relations between specialisation of TERMS
1. TERMS

The TERM is the concept wrapping the information related to the vocabulary required for modelling.

The Dublin Core Metadata Initiative has introduced methodology for defining ‘Types of TERMS’. In the DCMI each term is a property which can receive a value. The TERMS can be refined. The context and coding rules of the definitions have also to be defined.

Examples: defining the moment of events in reference to the ‘Gregorian Calender’:

‘DATE’ is the property having, for example, the value of ‘2008-12-10’

‘BIRTH-DATE’ is a refinement of ‘DATE’

The SKOS methodology allows concrete implementation of the representation of the TERMS and other concepts.
1. The CORE ELEMENTARY **TERMS** of AXIS

An elementary concepts is directly linked to TERM, DOCUMENT, ENTITY & RELATION.

The elementary TERMS proposed by AXIS are those of the Dublin Core plus the terms defining the elementary concepts and their refinements introduced before *(Entities; Documents; Relations and terms required for the Configuration Documents)*.

The **15 DC ELEMENTS** are elementary properties of classes:

1. **TITLE**
2. **CREATOR**
3. **SUBJECT**
4. **DESCRIPTION**
5. **PUBLISHER**
6. **CONTRIBUTOR**
7. **DATE**
8. **TYPE**
9. **FORMAT**
10. **IDENTIFIER**
11. **SOURCE**
12. **LANGUAGE**
13. **RELATION**
14. **COVERAGE**
15. **RIGHTS**

Other TERMS and their REFINEMENTS could be added for specific target domains.
1. Specific CORE TERMS of AXIS

In AXIS “CORE” specific terms have been defined for:

• Naming and identifying all the Terms; Documents; Entities & Relations
• Defining the terms required for the construction of the “Core” Documents, Entities and Relations
• A specific NAMESPACE has been created for naming the terms according to the DCMI methodology.
• Ensuring the handling of several human languages
2. DOCUMENTS

The DOCUMENT is the concept wrapping the information related to one way of representing one of the aspects of the TOPIC/ENTITY. The documents are embodied in the form of a FILE or embedded within a file. The metadata associated to an ENTITY are expressed in document(s).
Example of a type of DOCUMENT: ‘PDF/A’ which is a standardised (ISO) way of representing a printable document according to platform independent format.

Notes:

The ‘class of document’ relates to an abstract concept [the class is represented using the hyphen as separator (such as -afp-)].
While the embodiment of a document as a file, or into a file, uses the dot as end separator called ’extensions’ (such as .odt).
2. The CORE ELEMENTARY DOCUMENTS of AXIS

An elementary concepts is directly linked to TERM, DOCUMENT, ENTITY & RELATION

The ELEMENTARY DOCUMENTS proposed by AXIS are:

1. EXCHANGE CONFIGURATION WRAPPER - axe-
2. OPERATIONS CONFIGURATION WRAPPER - alg-
3. ENTITY CONFIGURATION WRAPPER - afp-
4. DOCUMENT CONFIGURATION WRAPPER - aci-

Other ELEMENTARY & SPECIALISATION DOCUMENTS have to be added for specific target domains
3. ENTITY

The ENTITY is the concept wrapping the information related to a TOPIC. To be closer with the FRBR and EARE modelling frames, in AXIS, we have preferred the term ‘ENTITY’ to the term ‘TOPIC’. One of the possible embodiments of an ENTITY is the FOLDER. Example of a type of ENTITY: ‘Physical Person’.

Each ENTITY is defined by documents. One of them is mandatory: the document of the type –afp–
3. The CORE ELEMENTARY ENTITIES of AXIS

An elementary concepts is directly linked to TERM, DOCUMENT, ENTITY & RELATION

The ELEMENTARY ENTITIES proposed by AXIS are:

1. UID SYSTEM
2. AGENT
   1. PHYSICAL PERSON
   2. MORAL PERSON (Corporate body)
   3. Proxy Facility
3. EVENT (the segment aspect of a process)
4. MOMENT (the punctual aspect of a process)
5. PLACE
6. ROLE
7. OPUS (WORK)
8. Logical CLIP
9. Physical CLIP
10. CONTAINER
11. PROFILE
12. OPERATION FACILITY (process resource)
13. EXCHANGE FACILITY (communication / copy resource)

Other ELEMENTARY & SPECIALISATION ENTITIES could be added for specific target domains
4. RELATIONS

The RELATION is the concept expressing the links existing between ENTITIES or between ENTITIES and DOCUMENTS or other AXIS constructs.

Example of a type of RELATION: the entity ‘COMPOSER’ could be said ‘IS A SPECIALIZATION’ of the entity ‘ROLE’
4. The **CORE ELEMENTARY RELATIONS** of AXIS

An elementary concepts is directly linked to ENTITY, DOCUMENT, RELATION or TERM. The **ELEMENTARY RELATIONS** proposed by AXIS are the following and their reverse:

- `<X>` **IS A SPECIALIZATION** `<Y>`
  - `<Y>` **IS SPECIALIZED BY** `<X>`
- `<X>` **REFINES** `<Y>`
  - `<Y>` **IS REFINED BY** `<X>`
- `<X>` **INSTANCIATES** `<Y>`
  - `<Y>` **IS an INSTANCE OF** `<X>`
  - **FRBRoo** *(Instance of WORK)*
- `<X>` **IS AN OCCURRENCE OF** `<Y>`
  - `<Y>` **OCCURS IN** `<X>`
- `<X>` **IS PART OF** `<Y>` [**IS OWNED BY**]
  - `<Y>` **OWNS** `<X>` [**HAS PART IN**]
- `<X>` **USES** `<Y>`
  - `<Y>` **IS USED BY** `<X>`
- `<X>` **REPLACES** `<Y>`
  - `<Y>` **IS REPLACEB BY** `<X>`
- `<X>` **PRODUCES** `<Y>`
  - `<Y>` **IS PRODUCED BY** `<X>`
- `<X>` **IS DERIVED FROM** `<Y>`
  - `<Y>` **HAS DERIVATION IN** `<X>`
- `<X>` **IS AN ALIAS OF** `<Y>`
  - `<Y>` **IS AN ALIAS OF** `<X>`
- `<X>` **MAKES REFERENCE TO** `<Y>`
  - `<Y>` **IS REFERED IN** `<X>`
- `<X>` **IS CONFORMED TO** `<Y>`
  - `<Y>` **HAS CONFORMED IN** `<X>`
- `<X>` **IS AN ALTERNATIVE OF** `<Y>`
- `<X>` **IS A VERSION OF** `<Y>`
  - `<Y>` **HAS VERSION IN** `<X>`
- `<X>` **REQUIRES** `<Y>`
  - `<Y>` **IS REQUIRED BY** `<X>`
- `<X>` **HAS ITS FORMAT ACCORDING TO** `<Y>`
  - `<Y>` **GIVES THE FORMAT OF** `<X>`
- `<X>` **IS A MANIFESTATION OF** `<Y>`
  - `<Y>` **IS MANIFESTATED IN** `<X>` **FRBRoo**
- `<X>` **IS A EXPRESSION OF** `<Y>`
  - `<Y>` **IS EXPRESSED IN** `<X>` **FRBRoo**
- `<X>` **IS AN ITEM OF** `<Y>`
  - `<Y>` **IS ITEMIZED IN** `<X>` **FRBRoo**
- `<X>` **INVOLVES** `<Y>` **PLAYING THE ROLE OF** `<Q>`
  - `<Y>` **IS INVOLVING** `<X>` **PLAYING THE ROLE OF** `<Q>`
- `<X>` **CONTROLS** `<Y>` **THROUGH** `<Q>`
  - `<Y>` **IS CONTROLED BY** `<X>` **THROUGH** `<Q>`

Other **ELEMENTARY RELATIONS** and **SPECIALISATION RELATIONS** could be added for specific target domains
An example of application of AXIS
The MediaMap project
Plan of the presentation

1. The simple “FLAT” models of the ASSETS
2. Enhancing the “FLAT” models of the ASSETS
3. The “RICH” semantic models of the ASSETS
4. The “AXIS” modeling of the “Rich Objects”

5. Conclusions
The AXIS architecture delivers:

Open Interchange format based on ‘Profiles’: AXE (Autonomous eXchange Entities) *(Release planned mid-2009 on the UNESCO open repository)*

Full compatibility between FLAT and RICH semantic models

Build-in Persistence & Interoperability through the same mechanisms: *(The inclusion of the Ontologies in the AXE; the T-E-D-R approach; …)*
KEY characteristics and tools conformed to the “AXIS” architecture exist already

Full range implementation will follow soon!
The MEMORIES project

MEMNON  
Project coordinator

UNESCO  
User

Radio Suisse Romande  
User

Norwegian Institute of Recorded Sound  
User

Technion (University of Haifa)  
Audio coding and processing

MIST  
Single Sensor Source Separation

PubGene  
Advanced Searches by association
TITAN will present the “AXIS” architecture and will illustrate it by concrete examples and tools (namely for the MediaMap project) at the:

**European Media Wrappers Round Table “IV”**
Amsterdam Friday September 11th
(On the site of the IBC; at its opening day)

Interested? Please register: rro@rtbf.be

Roger Roberts (President of TITAN)

Or contact me (Guy Maréchal) during the PASIG 2009 (Malta)

g.marechal@skynet.be
Progressive enrichment of simple models of Audio-Visual assets

Presented by: Guy Maréchal on behalf of TITAN
g.marechal@skynet.be

THANK YOU!
Questions?

Coordinator of the MEMORIES project
michel.merten@memnon.eu