



# D3.1 SAS1 : Models and Protocols for PrestoSpace Factory Process Report

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ABSTRACT	This report is a single point of reference for the models adopted within the PrestoSpace project for the audiovisual Preservation, Restoration and Access workflows, and the protocols defined or adopted for interoperability between the PrestoSpace Units within the PrestoSpace Factory, and with the outside world.
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# 1 Document Scope

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This report is intended to be a single point of reference for the models adopted within the PrestoSpace project for the audiovisual Preservation, Restoration and Access workflows, and the protocols defined or adopted for interoperability between the PrestoSpace Subsystems, and with the outside world.

The objective of this document is to give a running reference on the status of each Model and Protocol in the project, to allow each development to run in a controlled environment.

Some of the sections of this document replicate parts of Deliverable D3.2. Differences reflect adjustments. D3.1 is the most recent document, and takes precedence over D3.2.

This report partially overlaps with Deliverable 16.4 : D16.4 " MDE1 Delivery models", partly due to the decision of having now a central system for workflow management and archive/PrestoSpace Factory interface, (also known as the PrestoSpace Orchestrator). D16.4 describes more the interfaces between the PrestoSpace factory and the archive, and D3.1 is more focused on the exchanges between the different Units. The two deliverables are prepared in close relationship by a reduced task force, so there should be no discrepancies between them. It is however intended to merge the two documents in a single reference document : D19.0.1 "External and Internal Models and Protocols for the PrestoSpace Factory", planned for delivery before June 2006.

## 2 Executive Summary

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This document is composed of several parts :

In section 3, below, the concept of the PrestoSpace Factory is detailed.

Section 4 gives an overview of the System Architecture for the Preservation Factory.

Section 5 provides for models where the different actors and actions are detailed.

Section 6 represents an overview of Presto Space Factory System interactions

Section 7 documents the interfaces and protocols used between the different Units

Section 8 details the different services provided by the different units.

Section 9 represents models and formats for management of PSO (PrestoSpace Orchestrator) relationships

Section 10 references all the relevant protocols and other documents within the Preservation Factory.

Section 11 is a Glossary

## 3 The PrestoSpace Factory

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The PrestoSpace Project relies on an assumption that, to allow the AudioVisual Archives to progress towards preservation and making accessible their collections, they have to use an industrial approach to massive analogue-to-digital migration plans. The User Requirements phase has demonstrated that this message was well received in most Archives. Even in the specific case of Film Archives, who reserve the 'Preservation' term to long-term storage of physical artefacts, they admit they have an increasing requirement for making their contents accessible, and are interested in an industrial approach for this.

PrestoSpace technical and non-technical developments tend towards an industrial approach of migration, and the Technical Deliverables are expected to facilitate this industrial approach.

The scale of PrestoSpace Factories, is not fully defined yet. It is extremely likely that factories of different scales will coexist, depending on the size of the collections, type and condition of the media, on the results of the technical developments, and on factors such as the difference in labour costs between the different countries. Shipment costs should also be considered. The scales considered up to now span from movable 2-rack units for on-site migration of cassettes, to very large-scale plants, passing by mobile truck or medium-scale facilities.

The actions to be performed in the PrestoSpace Factories have been broadly split into three main categories :

- Preservation (migration)
- Restoration
- Documentation and Access

Of course, there are overlaps between these actions. The user requirements phase have demonstrated an extreme variation between the different requirements, scales, and urgencies for the three functions. The Preservation effort is clearly driven in most cases by urgency considerations, as the media are often deteriorating at a fast pace, playback machines and expertise harder and harder to maintain. Requirements for urgent Restoration and Documentation are variable from one archive to another.

In this document, the following assumption will be made :

A PrestoSpace Factory is a facility where one or several of the functions above, (Preservation, Restoration, Documentation), are performed. These functions are performed in different Units, which are :

- The Preservation Unit
- The Restoration Unit
- The Documentation Unit

Although in some cases all the Units may not be present within the PrestoSpace Factory, it will be assumed here that all three coexist. Given the very different workflows between Units, the interfaces with the outside world and between the Units have to be defined precisely, as it will limit the consequences of changes within each Unit. This definition is the main objective of the current document.

# 4 System Architecture Overview

The general Workflow and general System Architecture for the PrestoSpace Factory are described in the two diagrams below:

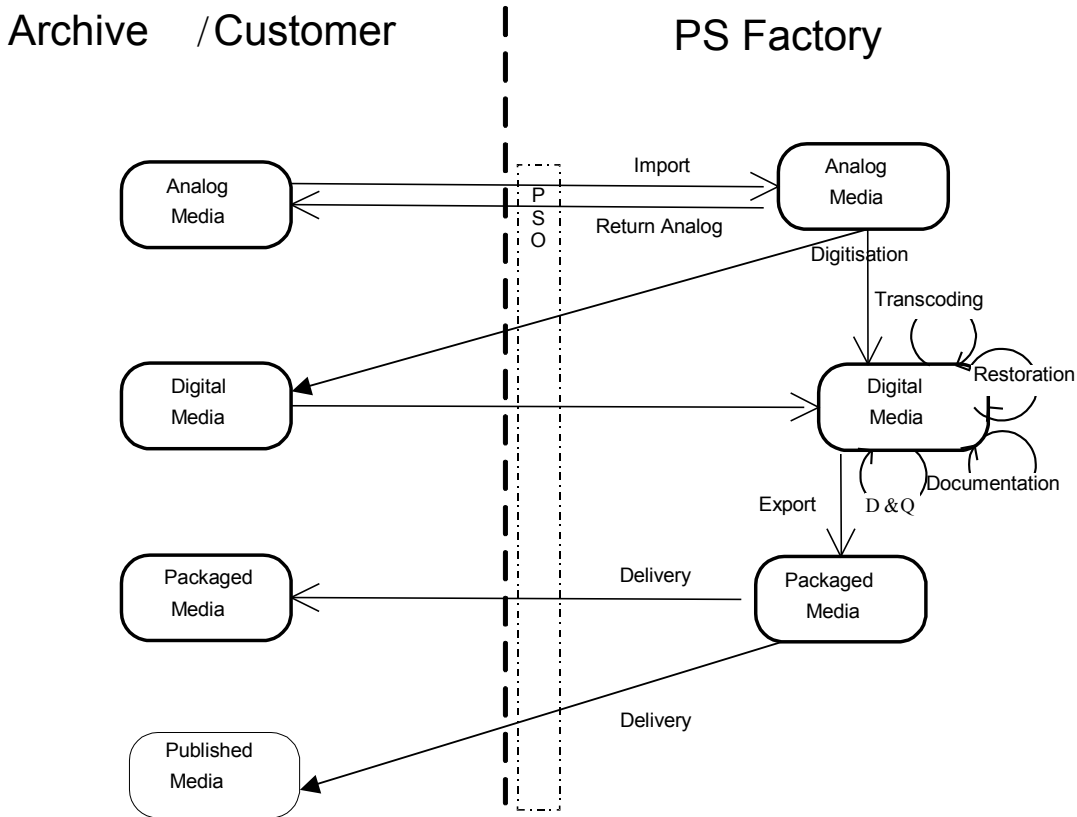


Figure 4-1 : General workflow for the PrestoSpace Factory

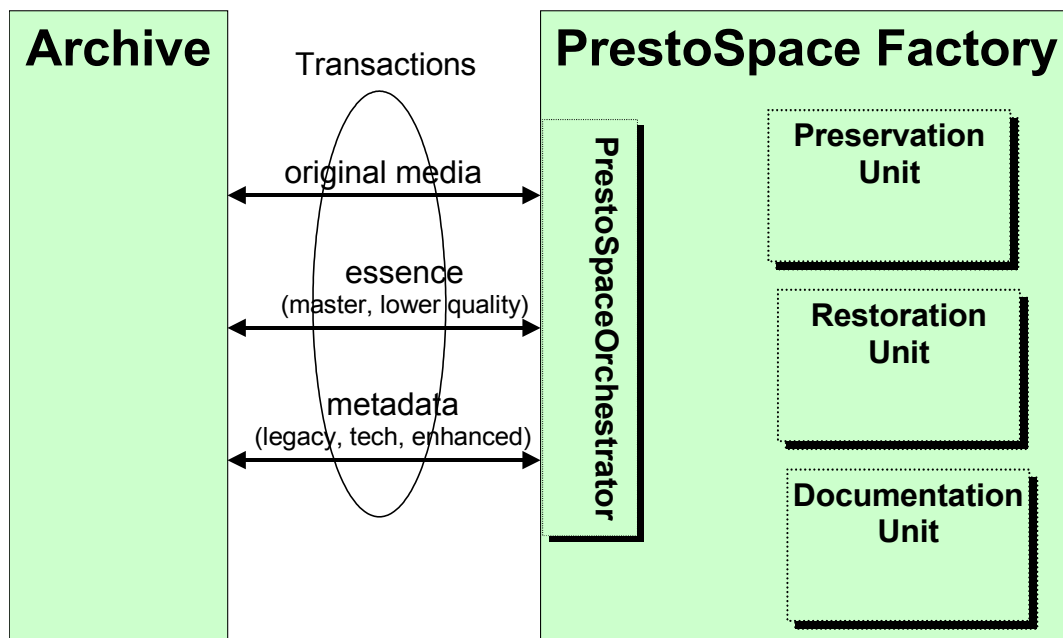


Figure 4-2 : System Architecture Overview

Within this architecture, the four main entities are Archives, Preservation Unit, Restoration Unit, Documentation Unit. The Archive first negotiates with the PrestoSpace Factory the way in which the original carriers will be delivered. This implies agreeing on how exchanges will be made, and on a Metadata Schema: the schema of the

metadata that will be associated with each programme to be migrated. It is worthwhile mentioning that the metadata can be delivered separately from the carriers, and preferably beforehand, so that the elementary information can be checked against the physical carriers labels.

The Archive often runs (implicitly or explicitly) a pre-selection process that will decide on the contents of each migration batch. These batches are delivered (with associated metadata), one after another, to the Preservation Unit.

The Preservation Unit does the digitisation, and generates (automatically and manually) the Migration Metadata that contains all the information that is generated during digitisation, including operators inputs, system diagnostics, and quality reports.

At this point the original carriers and the completed metadata can be delivered back to the Archive. Depending on the agreements, all or part of the Essence (digitised contents), and the original + Migration Metadata, can be handed over to the Restoration Unit or the Documentation Unit.

The Restoration Unit's role is to enhance digitally the quality of the contents (sound and image tracks). It uses the Essence and the original Metadata as inputs. Its outputs are the restored essence (i.e. derived essence) and/or metadata describing the impairments of the input material.

The Documentation Unit's role is to complement and further enhance the documentation associated with the essence, and to deliver to the Archive the Essence, fully completed by the enhanced metadata. It uses the Essence and the original + Migration Metadata as inputs. When applicable, the Documentation Unit is also responsible for delivering the contents to a Publication Platform. When detached from the PrestoSpace Factory, the Publication Platform will become a Turnkey System for Delivery and Access for the Archive (this is applicable only to small archives, as large ones will probably have a long-term migration plan, and their own in-house Delivery and Access System).

The path that processes items go through in the PrestoSpace Factory is ideally determined upfront by the Archive. For example, it may be that the high-quality digitised contents may only be delivered to the Archive and the Restoration Unit. In that case the Documentation will be run on lower-resolution versions of the essence, generated by the Preservation Unit. The path and actions to be done will be specified in a worksheet, attached to the item, or to the batch it belongs to.

The exchanges between the Archives and the Preservation factory will be made through the PrestoSpace Orchestrator (PSO). The PSO will be the interface between the archive and the PrestoSpace factory, and will also play the role of a workflow manager within the PrestoSpace Factory. The PSO will offer to the customers a web interface for input/output, and for verification of the progresses of the batches, and will also implement a notification mechanism for cases that require it (batches completed, major problem on batch...). This interface will be accessible by a human or a computerised system.

A common Essence and Metadata Storage system will be the preferred means for exchanging contents and metadata files between the Units. A versioning subsystem will be used for metadata (not for essence).

# 5 The PrestoSpace Models

At the time being, only an actor has been highlighted because of the high level perspective of the document and particularly because based on preliminary information. It is clear that delving into the details of each work area (Preservation, Restoration, Documentation) others actors and use cases will become necessary, but in this context, the overview level of this model, hides behind the PSO actor all the services and actors required to perform the presented use cases.

Following paragraph depicts the high level use cases and the use cases decomposition based on the different Units. The aim of the two diagrams is giving at first the boundaries interesting the use cases applied respectively to the Archive and the PrestoSpace Factory and then try to give a more detailed representation of the use cases, decomposing it per Units. Both the diagrams still lack of actors and use cases, but anyway represents a reasonable starting point of discussion and further elaboration. The main purpose of the overview diagram is giving the perception that the Archive have a single façade to deal with, wrapping transparently around the services offered by the PrestoSpace the underneath Units, in charge of the actual processing.

## 5.1 Overall System View

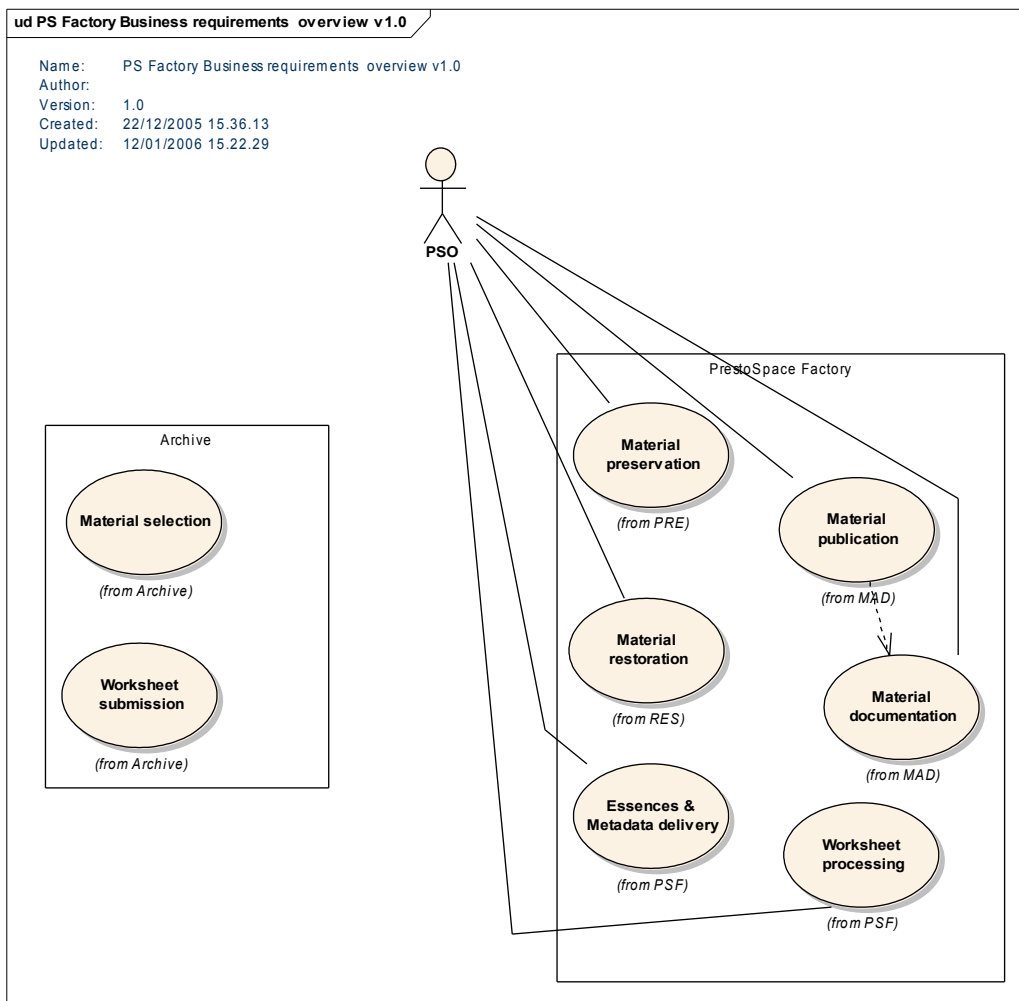


Figure 5-3 – Use cases overview



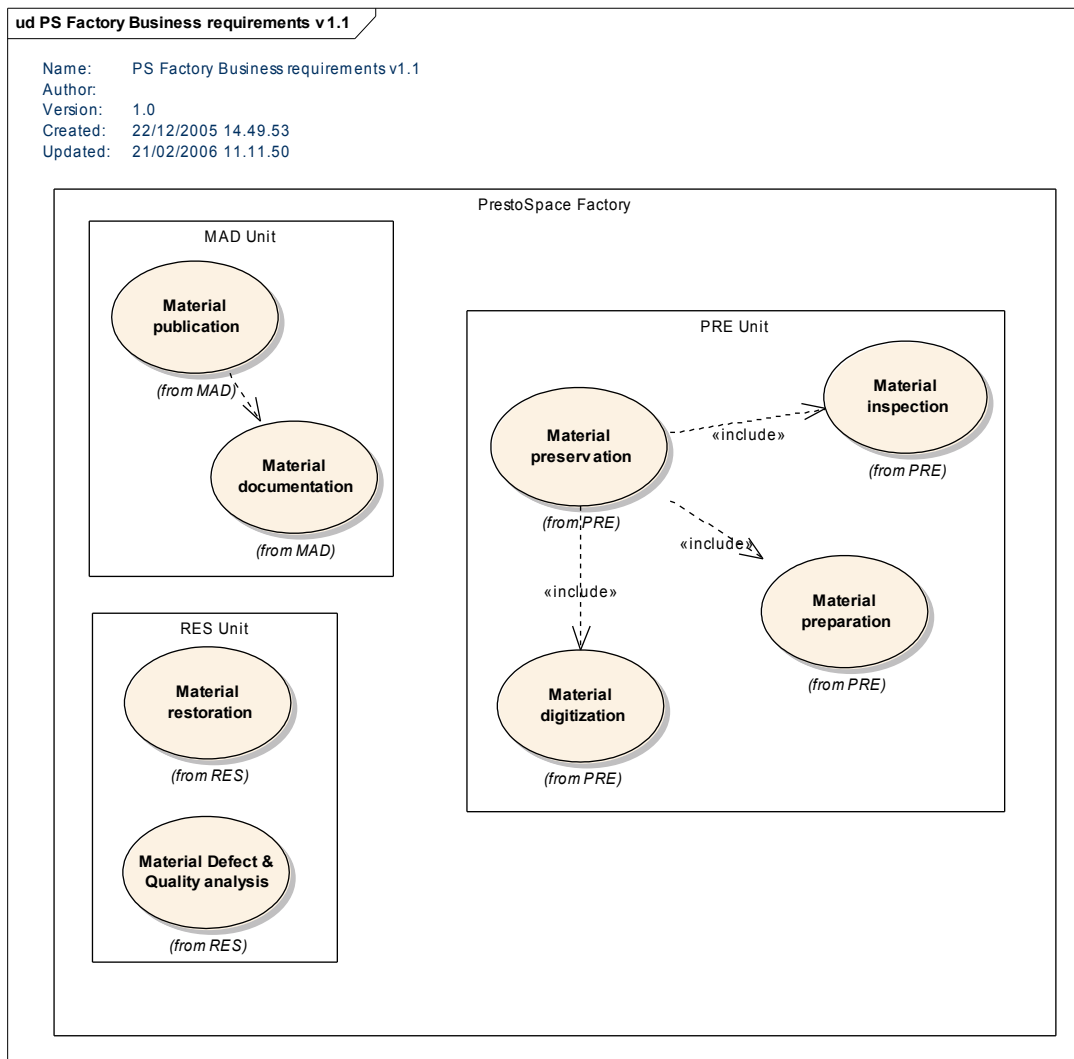


Figure 5-4 – Use cases decomposition

## 5.2 Use Cases

A business requirement use case is a sequence of work steps, performed in a business system that produces a result of perceived and measurable value to an individual actor of the business.

Requirement use cases give an overview of how the system should work as a whole and how it should support the business processes.

The use cases showed above are detailed in the following paragraphs, and represents high level use cases because each of them hides a ramification of several smaller use cases. This approach helps the reader to understand the discrete goal for the user, capturing some of the user-visible function.

There are different kind of use cases depending on the level they lie on and the way they are realized by either human procedures or systems interactions. In this document we refer to the “Service” concept as the interface that enables the use cases to be realized. Not always a 1:1 relationship between a Use Case and a Service is possible, indeed more often more than one Service contribute in the realization of a Use Case. Chapter 8 describes how Use Cases are related to the available Services.

### 5.2.1 Material selection

#### 5.2.1.1 Objective

To enable the *Archive* to select materials to preserve, grouping them into batches and adding, when necessary, some relevant information about the material set.

## 5.2.2 Worksheet submission

### 5.2.2.1 Objective

To enable the *Archive* to fill and submit a worksheet to the PrestoSpace Factory, depending on the services that are requested to the Factory.

## 5.2.3 Material preservation

### 5.2.3.1 Objective

To enable the preservation of the material in terms of digitization and physical repair of analogue media. Under this general use case are included other use cases applied to the several aspects of a preservation process.

## 5.2.4 Material inspection

### 5.2.4.1 Objective

To visually inspect the batch items, determining whether an item is to be processed through a specific preservation chain depending on media status (e.g. normal chain, expert chain or put aside for further examination).

## 5.2.5 Material preparation

### 5.2.5.1 Objective

To apply the required treatments before media playback, such as cleaning, baking or physical repair. In fact several treatments can be required before material digitization(transfer).

## 5.2.6 Material digitisation

### 5.2.6.1 Objective

To enable the audiovisual material transfer into digital format, through the available preservation tools and subsystems.

## 5.2.7 Material documentation

### 5.2.7.1 Objective:

To enable the documentation of audiovisual material, adding extended information related to the material content.

## 5.2.8 Material publication

### 5.2.8.1 Objective

To enable the archive content exploitation, giving the possibilities to search and retrieve digitised material.

## 5.2.9 Material restoration

### 5.2.9.1 Objective

To enable audio, video and film restoration, when needed, through the available restoration tools and subsystems.

## 5.2.10 Material defect & quality analysis

### 5.2.10.1 Objective

To enable analysis and description of audio/video/film defects and quality measures, adding metadata related to material impairments.

## 5.2.11 Worksheet processing

### 5.2.11.1 Objective

To enable the *PSO* to validate the Archive services request, elaborating it and dispatching to the different Units the proper information to perform the requested tasks.

## 5.2.12 Essences & Metadata delivery

### 5.2.12.1 Objective

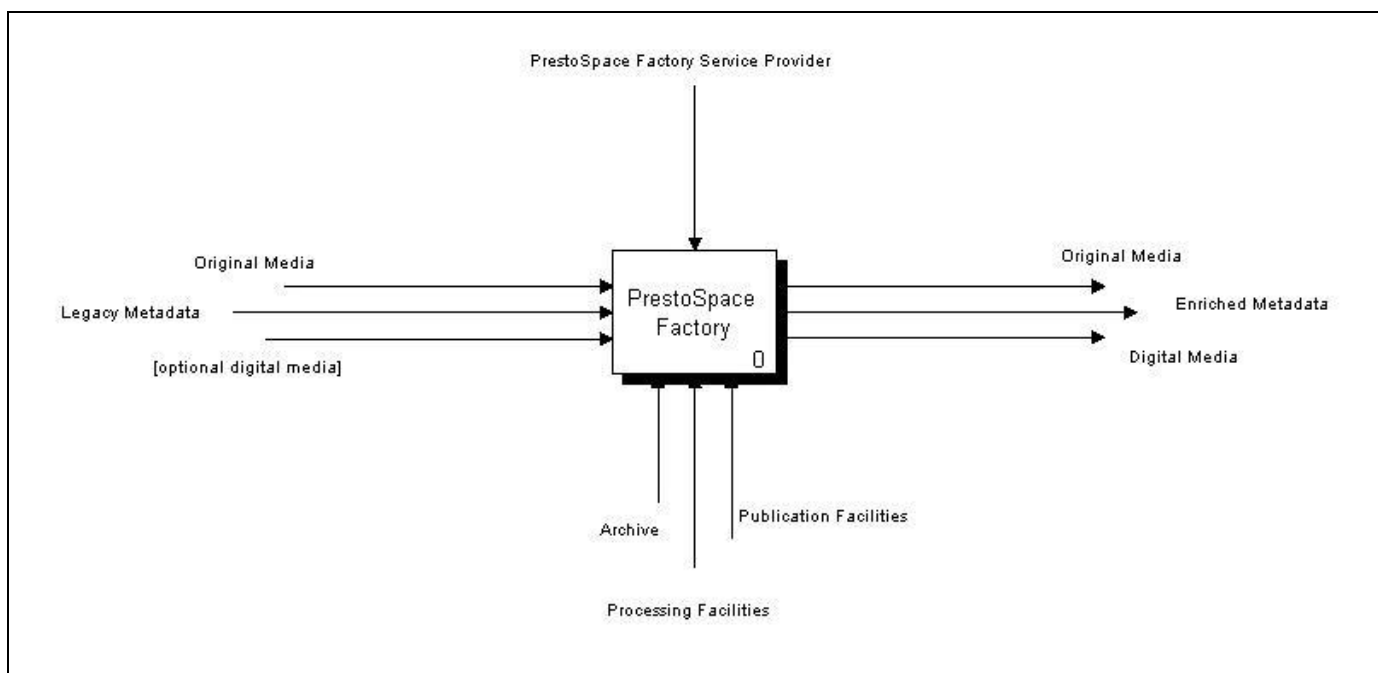
To deliver to the Archive, the digitized materials, composed by essences and metadata.

## 6 System interactions

The following Figure 6-5 and Figure 6-6 represent an overview of Presto Space Factory System interactions. The first one is written in IDEF0 (Integration Definition for Function Modelling) language in order to have a better description and comprehension of the Business Process Model.

Figure 6-5 shows a high level view of the system. In IDEF0, every box has four sides:

- the upper side is connected to the “controllers” and “constraints”
- the left side is connected to the inputs (Original/Analogue Media, Legacy Metadata and optionally a digitized media in order to enrich it
- the right side is connected to the outputs (Original Media to return to the archive, Processed and Enriched Metadata and Digital Media/Essences)
- the bottom side is connected to the “mechanisms” and “resources” involved in the process, as the ingredients of a recipe



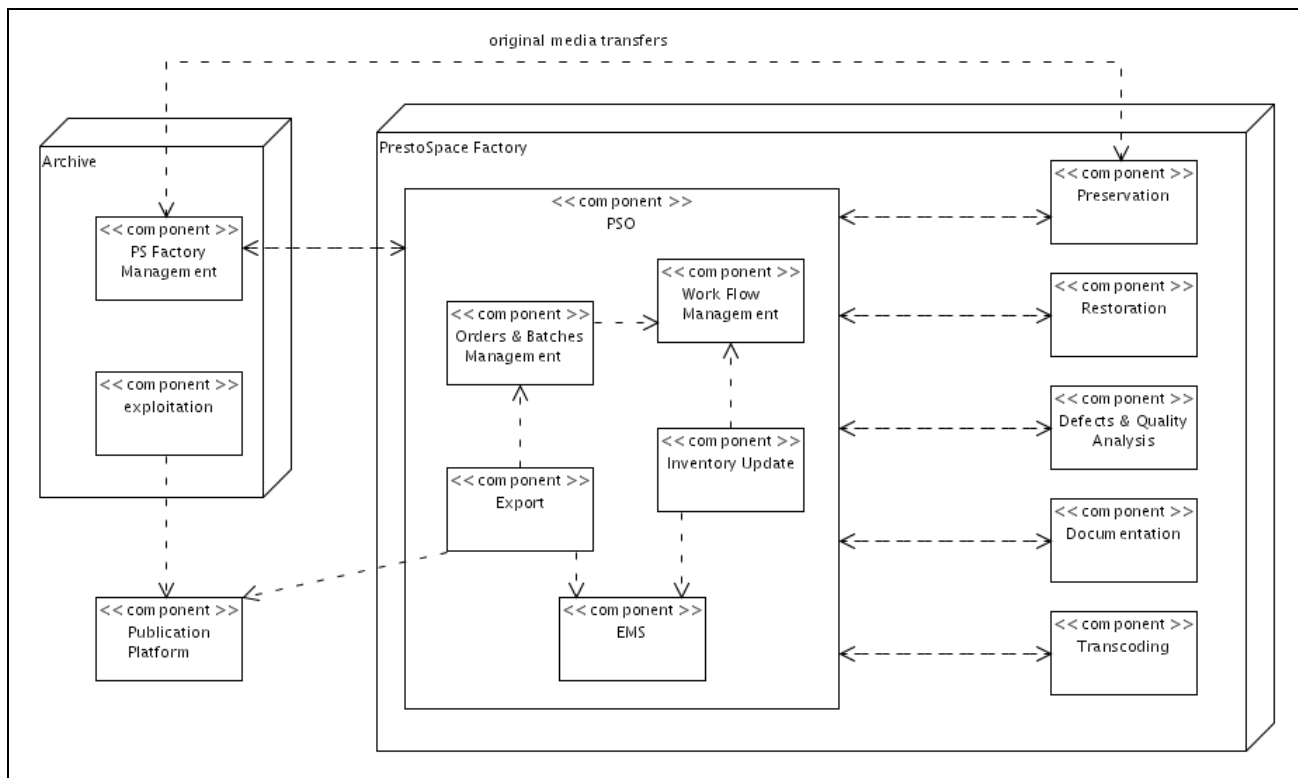
**Figure 6-5 - System interaction - Overview of the PS Factory process model**

In the next Figure 6-6 is represented a deeper overview of the PS Factory Architecture, showing the several components involved, summarised as:

- PSO, the PrestoSpace Factory Orchestrator which is responsible to manage the work flow and the processing facilities of the Factory
- EMS, Essence and Metadata Storage System which is responsible for managing whatever essences and textual data are exchanged within the PrestoSpace Factory during the elaboration phases
- the Preservation Unit
- the Restoration Unit
- the Defects & Quality analysis component, which provides the service described in section 8.3
- the Transcoding component, which provides the service described in **TOBEADDED**insection9
- the Documentation Unit (Platform) [D18.1]. It is the process by mean the audio visual features are extracted and metadata are enriched
- Export and Delivery features provide the complete bundle of the enriched material, made up of metadata (default mpeg7) and essences. Metadata Access and Delivery (MAD) area is responsible for this facility

- Publication Unit (Platform) [D18.2], which stands for whatever publication platform the Archive wants to deal with. The MAD area is responsible for developing a smart Publication Platform that will be suitable for small size archives. Otherwise, big size archives, will prefer to use their internal publication facility.

Table 7.1 shows the data and metadata formats exchanged between these components.



**Figure 6-6 - PrestoSpace factory system architecture overview**

The PSO (Presto Space Orchestrator) component will publish a Web interface for human being user and a SOAP (Simple Object Access Protocol) interface for other components that want to access it. In this way an archive can integrate its business accessing directly the PS Factory without the need of having a human being standing in front of a personal computer. The Publication Platform is focussed on human being and publishes a web interface. Furthermore it also publishes a SOAP interface in order to perform:

- the automatic upload of the essence and materials that the user wants to make available
- the distributed search that could involve several publication platforms or different archives/databases using a specific web services protocol (SRW-SRU)

Within the PrestoSpace Factory the PSO depends on the three different Units since it makes use of them for elaborating the materials provided by the archive.

In order to figure out how the Units involved in the PrestoSpace Factory are operating, a diagram representing the methods called in the timeline is shown in Figure 6-7.

This Sequence Diagram (the timeline moves from the top to the bottom of the image and the header is filled in with the Object involved, the several Units) depicts the basic flow of events that occur among the archive and the PrestoSpace factory during a typical elaboration process. Warning: there are not all the arrows and possible sequences of exchanged messages. This is a runtime example that let you understand the overall interaction.

The starting point, of course, is in charge to the Archive that submits the request of some preservation services, specifying them on a worksheet.

The batch has a logical meaning, enabling the Archive to abstract the request of services to the Factory, aggregating several details related to the whole preservation process (digitization, documentation, restoration) that can be considered as single services or as part as well.

The PSO object in the sequence diagram acts as a façade design pattern for the Archive and is in charge for dispatching the specific requests to the suitable Unit that is responsible for doing the jobs related to the workflow submitted by the Archive.

Once each Unit has performed its own tasks, it triggers the PSO with an acknowledgment message. As soon as the whole worksheet, with all its jobs, has been completed, the Archive is informed by the PSO manager and then

the archive can ask for a further process and for a delivery of the elaboration results. The “delivery” let the EMS to perform a cleaning of its repository, deleting and purging the versioned files and essences.

The last sequence diagram in Figure 6-8 represents the Publication use case where the Archive is asking for web publishing of the EODs enriched within the PS Factory. They will ask Archive can upload the delivered bundle to the Publication Platform provided [D18.2] which is located in the Factory itself, or can send the material to its own publication engine. The latter is the default scenario for big size archives as they just have their facilities for publishing media.

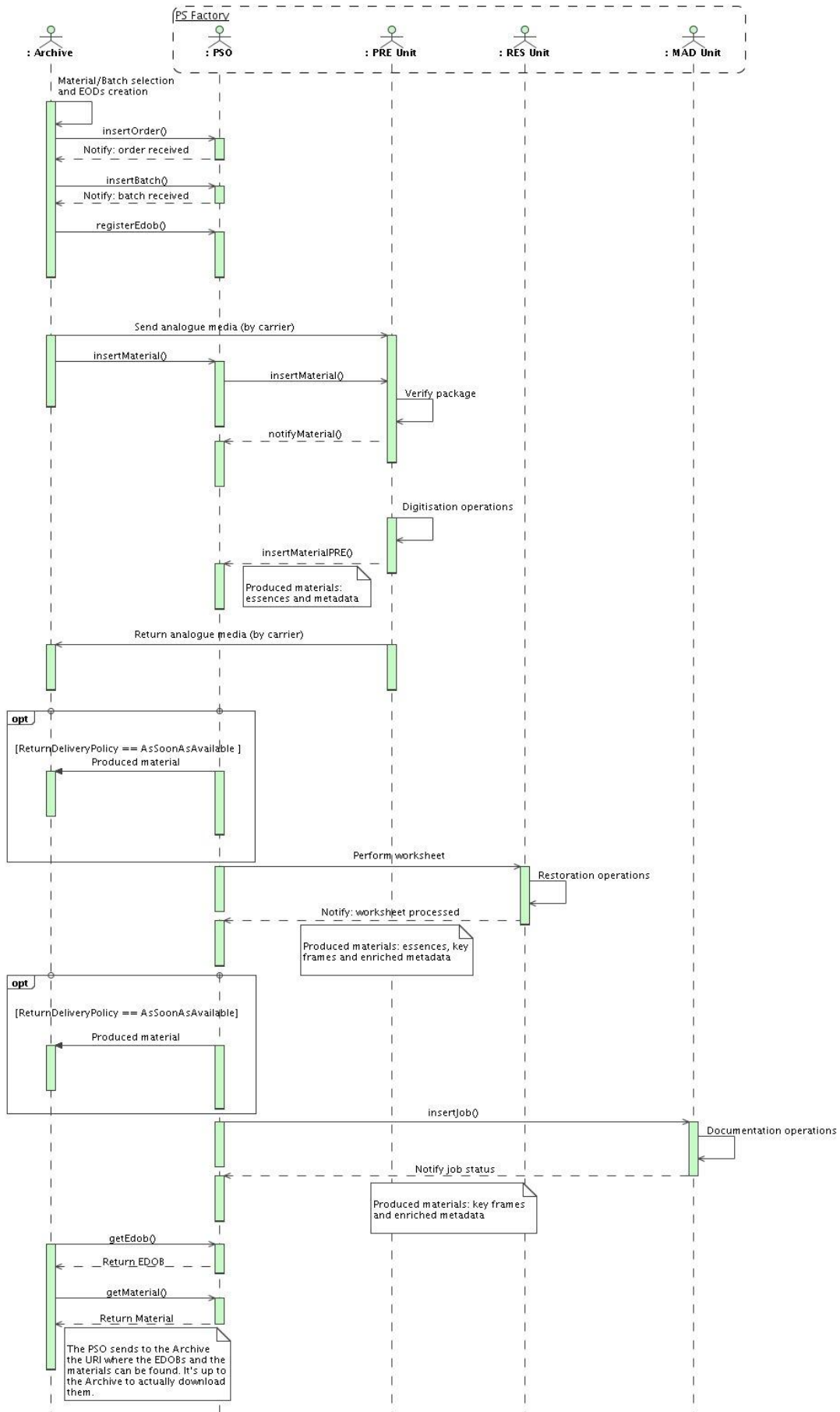


Figure 6-7 - Sequence Diagram representing the messages exchanged between the Units within the PrestoSpace Factory



Figure 6-8 Sequence diagram representing the publication of EODs use case



## 7 PrestoSpace Interfaces

This table represents the list of protocols involved within the interaction between archives and the factory, and between the services within the factory. It is a much more advanced version of the equivalent table the options initially set within Deliverable D3.2 SAS2, General deliverable specifications (1/12/2004), and to reach an agreement on which protocols will be used and at which level.

	PRE	RES	MAD
<b>Metadata inputs</b>	PreservationBatch XML Document Samples and Schema are given in [PXML]	EOD ([MDF])	<b>EOD [MDF]</b> More precisely requirements are: EDOB ID, Duration and whatever <REALIZATION> node (defining the associated Materials).
<b>Metadata outputs</b>	in EOD ([MDF]) format.  MaterialAccessDocument defined in [MDF], the examples and Schema of which are provided in [PXML] Migration MD (Media-Matters MD ([PSAM]), Rich Digitisation MD ([D8.3]), ....), contained in EOD format ([MDF]).	Restoration Documentation (proprietary format) + Defect&Quality description specified in [D8.3], contained in EOD format ([MDF]).	<b>EOD</b> providing the enhanced metadata ([MDF][D16.4]) Export format: EOD.
<b>Essence inputs</b>	None	<b>Audio:</b> BWF PCM 48kHz or 96kHz, 24bits, up to 2 tracks per file, more files if more tracks <b>AV:</b> As PRE output  Optional: digital video tape.	<b>Audio:</b> BWF PCM 48kHz or 96kHz, 24bits, up to 2 tracks per file, more files if more tracks <b>AV:</b> MPEG2 4-8 Mbps
<b>Essence outputs</b>	<b>Audio:</b> BWF PCM 48kHz or 96kHz, 24bits, up to 2 tracks per file, more files if more tracks <b>AV:</b> One or several of the following <ul style="list-style-type: none"> <li>• MJPEG2000 lossless (SD, HD, higher...) + BWF files, PCM 48kHz, 16bits</li> <li>• MPEG2 4:2:2 CBR from 15 long GOP to 50I (programme stream, to be confirmed) (audio 48 kHz 16bits uncompressed (to be confirmed) 4 tracks (to be confirmed))</li> <li>• MP4 AVC</li> <li>• MPEG2 4-8 Mbps for DOC/CA quality</li> </ul> Optional: digital video tape.	Same as Essence inputs.	Jpg/png/gif images provided by the content analysis modules (key frame extraction). Optional: video copy at web browsing quality for the Publication Platform
<b>Original media inputs</b>	Tapes, film rolls, disks, in batch boxes.	Not applicable	Not applicable
<b>Original media outputs</b>	Tapes, film rolls, disks, + affixed labels and barcodes, in batch boxes.	Not applicable	Not applicable
<b>Transactions</b>	The preservationBatch XML Document is defined according to the model given in Figure 9-12 and includes the working options and parameters. Methods exposed 1. importBatch Methods required 2. insertMaterial	To be defined. See RES/MAD integration draft in [RADS], section 4.1.6	XML Document reporting the <b>profile</b> for the jobs to be done and the identifier of the EOD to be elaborated Methods exposed registerEDOB insertJob insertMaterial deleteEDOB purgeEDOB getAllMaterials
<b>Workflow (Tracking, Consistency)</b>	Input: Batch identifier or Item identifier. Methods exposed: 1. getBatchStatus 2. getItemStatus 3. search	To be defined. See RES/MAD integration draft in [RADS], section 4.1.6	Input: JOB identifier or EDOB identifier Methods exposed: getJob search

**Table 7.1 - Interfaces between PRE, RES and Documentation Units**

# 8 PrestoSpace Services

A PrestoSpace service is modular function within the PS factory which can be utilised (ordered) by an archive, e.g. digitisation, restoration, documentation, transcoding, D&Q analysis,....

The following sheets specify for a certain service the needed input parameters, the needed/produced data input/output qualities and needed/produced metadata input/output information. It not specifies how data, metadata and service parameters are represented (encoded).

There is a relationship among Use Cases and Services, it depends on the way a Service on its implementation realizes a Use Case. Services are to be intended as logical interface available at PS factory level in a way that also other Services can interoperate together performing completely or partially the Use Cases objectives. Depending on the granularity of a Service, more than one Services could be necessary to accomplish a Use Case. The following figure depicts the described relationship.

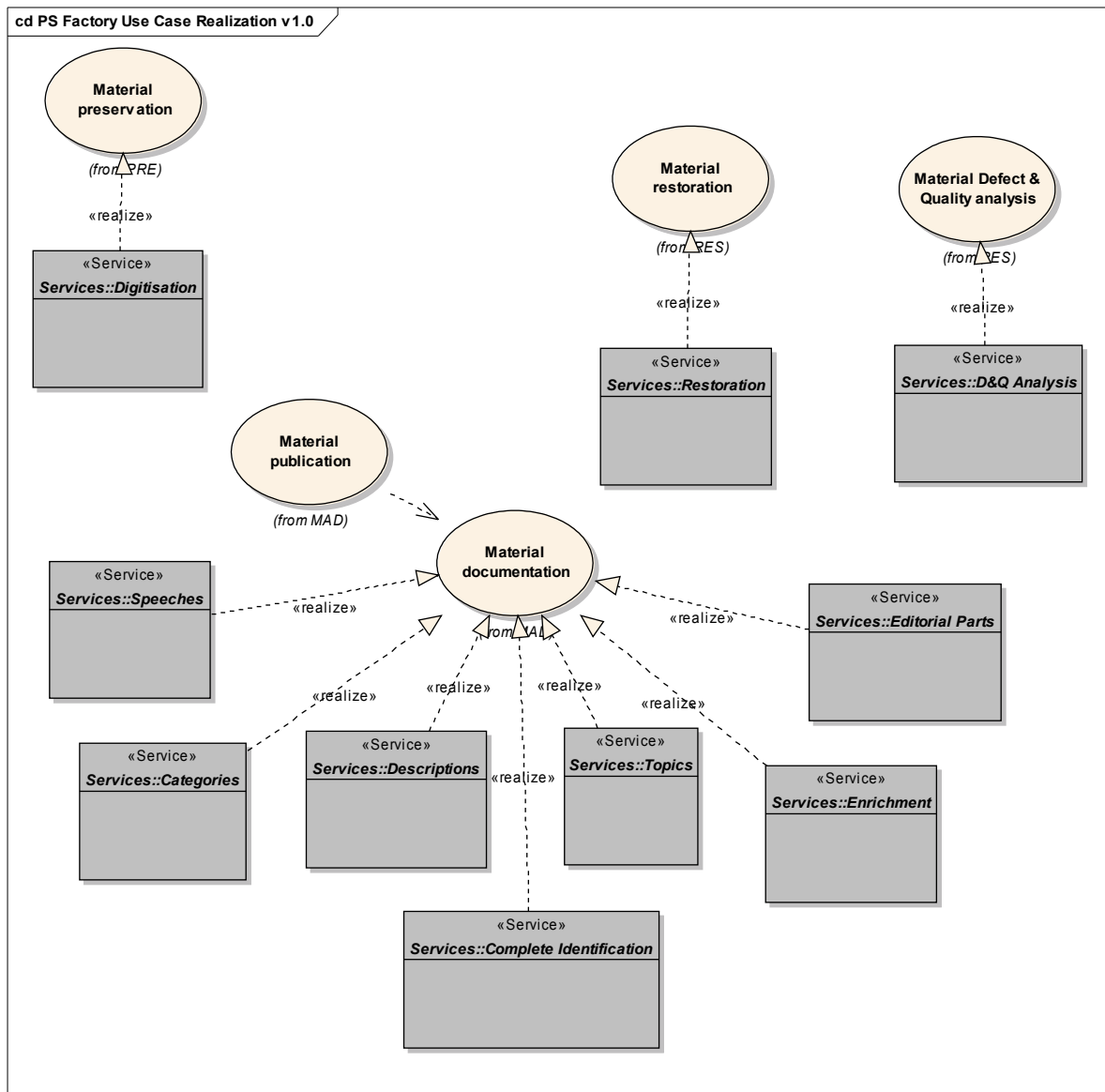


Figure 8-9 Use Cases realization through Services

## 8.1 Digitisation

<b>Service Name</b>	<b>Digitisation</b>		
<b>Function Overview</b>	Digitisation of A/V analogue material.		
<b>Data Input Quality</b>	<ul style="list-style-type: none"> <li>Original media (cd, tapes, disks, in batch boxes)</li> </ul>	<b>Data Output Quality</b>	<ul style="list-style-type: none"> <li>Audio: BWF files</li> <li>Video/Film: under discussion</li> <li>Original media</li> </ul>
<b>Service Input Parameters</b>	<ul style="list-style-type: none"> <li>Batch</li> <li>Item identifier (UMID)</li> <li>Workflow type</li> <li>Quality of digitised material</li> </ul>		
<b>Metadata Input</b>	<ul style="list-style-type: none"> <li>Program identifier</li> <li>production/creation MD (optional)</li> </ul>	<b>Metadata Output</b>	<ul style="list-style-type: none"> <li>Technical MD contained in EOD format</li> </ul>
<b>Other Input Required</b>		<b>Other Output Produced</b>	

## 8.2 Restoration

<b>Service Name</b>	<b>Restoration</b>		
<b>Function Overview</b>	Film, video and audio restoration of digital essence with respect to specified defects.		
<b>Data Input Quality</b>	<ul style="list-style-type: none"> <li>Digital Master</li> <li>Optional: Doc/CA (for viewing)</li> </ul>	<b>Data Output Quality</b>	<ul style="list-style-type: none"> <li>Digital Master</li> </ul>
<b>Service Input Parameters</b>	<p>Audio Restoration</p> <ul style="list-style-type: none"> <li>Yes/No (Boolean)</li> <li>From, To (Media Timepoint)</li> <li>Restoration Job Description (Text)</li> </ul> <p>Visual Restoration</p> <ul style="list-style-type: none"> <li>Yes/No (Boolean)</li> <li>From, To (Media Timepoint)</li> <li>Restoration Job Description (Text)</li> </ul>		
<b>Metadata Input</b>	<ul style="list-style-type: none"> <li>ID(s) and media file(s) location of essence input</li> <li>Optional: technical MD (resol., length,...)</li> <li>Optional: production/creation MD</li> </ul>	<b>Metadata Output</b>	<ul style="list-style-type: none"> <li>Restoration report (Text)</li> <li>Optional: D&amp;Q properties, see D&amp;Q Analysis service</li> </ul>
<b>Other Input Required</b>		<b>Other Output Produced</b>	<ul style="list-style-type: none"> <li>Optional: keyframe and temporal overview images (see D&amp;Q Analysis service)</li> </ul>

### 8.3 D&Q Analysis

<b>Service Name</b>	<b>D&amp;Q Analysis</b>		
<b>Function Overview</b>	Fully automatic film and video defects and quality analysis of digital essence. Defects and quality measures are described and can be visualised by the D&Q Summary Player		
<b>Data Input Quality</b>	<ul style="list-style-type: none"> <li>Digital Master</li> <li>Optional: Doc/CA (for viewing)</li> </ul>	<b>Data Output Quality</b>	No data output
<b>Service Input Parameters</b>	Visual D&Q Analysis <ul style="list-style-type: none"> <li>Yes/No (Boolean)</li> <li>From, To (Media Timepoint)</li> <li>Analysis Job Description (Text)</li> </ul> Audio D&Q Analysis <ul style="list-style-type: none"> <li>Yes/No (Boolean)</li> <li>From, To (Media Timepoint)</li> <li>Analysis Job Description (Text)</li> </ul>		
<b>Metadata Input</b>	<ul style="list-style-type: none"> <li>ID(s) and media file(s) location of input essence</li> <li>Optional: technical MD (resol., length,...)</li> </ul>	<b>Metadata Output</b>	<ul style="list-style-type: none"> <li>D&amp;Q properties, e.g. noise/grain level, dust level, big distortions (dropouts and missing frames), blocking level, sharpness level....</li> <li>Optional: cuts, dissolves, motion activity, camera motion</li> </ul>
<b>Other Input Required</b>		<b>Other Output Produced</b>	<ul style="list-style-type: none"> <li>Key-frame and temporal overview images</li> </ul>

### 8.4 Content Analysis

<b>Service Name</b>	<b>Content Analysis</b>		
<b>Function Overview</b>	Provides several information on audiovisual features and content indexing. Requires Digitisation		
<b>Service Input Parameters</b>	<ul style="list-style-type: none"> <li><i>VideoAnalysis</i> –                             <ul style="list-style-type: none"> <li><i>ShotBoundaries</i> –</li> <li><i>ShotSimilarities</i> –</li> <li><i>KeyFrames</i> – extracted from shots</li> <li><i>StripImages</i> –</li> <li><i>CameraMotion</i> –</li> <li><i>MotionActivity</i> –</li> <li><i>VisualFeatures</i> – from keyframes</li> <li><i>SmallerPictures</i> – applies to keyframes, stripe images</li> <li><i>HigherRecall / HigherPrecision</i> -</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li><i>AudioAnalysis</i> –                             <ul style="list-style-type: none"> <li><i>HigherRecall / HigherPrecision</i> -</li> </ul> </li> </ul>
<b>Essence Input Quality</b>	Broadcast quality (according to the definition of D16.4)	<b>Essence Output Quality</b>	None
<b>Metadata Input</b>	EOD	<b>Metadata Output</b>	EOD enriched (Reference MAD Data Formats))
<b>Other Input Required</b>		<b>Other Output Produced</b>	KeyFrames, StripImages

## 8.5 Documentation

### 8.5.1 Speeches

<b>Service Name</b>	<b>Documentation/Speeches</b>		
<b>Function Overview</b>	Provide text from audio		
<b>Service Input Parameters</b>	ForceLanguage <languageCode>		
<b>Essence Input Quality</b>	Audio mono PCM 16kHz 16bit WAVE or BWF	<b>Essence Output Quality</b>	None
<b>Metadata Input</b>	EOD	<b>Metadata Output</b>	EOD enriched with text (Reference MAD Data Formats)
<b>Other Input Required</b>		<b>Other Output Produced</b>	Audio segments classification (music, noise, speech and silence)

### 8.5.2 Editorial Parts

<b>Service Name</b>	<b>Documentation/Editorial Parts</b>		
<b>Function Overview</b>	Find Editorial Parts within EOD		
<b>Service Input Parameters</b>	<ul style="list-style-type: none"> <li>• <i>NewsItem</i> – ask to find specifically news items as for within Newscast</li> <li>• <i>UseLegacy</i> – ask to try matching with legacy information</li> <li>• <i>HigherRecall</i> –</li> <li>• <i>HigherPrecision</i> –</li> </ul>		
<b>Essence Input Quality</b>	Broadcast quality (according to the definition of D16.4)	<b>Essence Output Quality</b>	None
<b>Metadata Input</b>	EOD	<b>Metadata Output</b>	EOD enriched (Reference MAD Data Formats)
<b>Optional Input</b>	Optional legacy information	<b>Other Output Produced</b>	

### 8.5.3 Complete Identification

<b>Service Name</b>	<b>Documentation/Complete Identification</b>		
<b>Function Overview</b>	Add identification information which was missing or lacking from legacy		
<b>Service Input Parameters</b>	These following options are available and can be explicitly requested <ul style="list-style-type: none"> <li>• <i>Titles</i></li> <li>• <i>Publications</i></li> <li>• <i>Credits</i></li> <li>• <i>Awards</i></li> <li>• <i>Collections</i></li> <li>• <i>OriginalClassification</i></li> </ul>		
<b>Essence Input Quality</b>	Broadcast quality (according to the definition of D16.4)	<b>Essence Output Quality</b>	None
<b>Metadata Input</b>	EOD	<b>Metadata Output</b>	EOD enriched
<b>Optional Input</b>	Ancillary data (ex: teletext, other legacy ...)	<b>Other Output Produced</b>	None

### 8.5.4 Categories

<b>Service Name</b>	<b>Documentation/Categories</b>		
<b>Function Overview</b>	Provides subject classification		
<b>Service Input Parameters</b>	<ul style="list-style-type: none"> <li>• <i>NoEditorialParts</i> – enable classification on the Editorial Object as a whole</li> <li>• <i>CategorySet</i> &lt;categorySet&gt; - ask to use the given defined category value set</li> </ul>		
<b>Essence Input Quality</b>	Broadcast quality (optional)	<b>Essence Output Quality</b>	
<b>Metadata Input</b>	EOD with speech and Editorial Parts	<b>Metadata Output</b>	EOD enriched
<b>Other Input Required</b>	None	<b>Other Output Produced</b>	None

### 8.5.5 Topics

Service Name	Documentation/Topics		
<b>Function Overview</b>	Provides the subject of content. Requires Editorial Parts (default)		
<b>Service Input Parameters</b>	<ul style="list-style-type: none"> <li>• <i>NoEditorialParts</i> – enable subject to be found independently from Editorial Parts basis.</li> <li>• <i>HigherRecall</i></li> <li>• <i>HigherPrecision</i></li> </ul>		
<b>Essence Input Quality</b>	Broadcast quality (optional)	<b>Essence Output Quality</b>	None
<b>Metadata Input</b>	EOD with speech and Editorial Parts	<b>Metadata Output</b>	EOD enriched
<b>Other Input Required</b>	None	<b>Other Output Produced</b>	None

### 8.5.6 Descriptions

Service Name	Documentation/Description		
<b>Function Overview</b>	Provides synopsis or itemised description of Video and/or Audio content		
<b>Service Input Parameters</b>	<ul style="list-style-type: none"> <li>• <i>OnlyVideo</i></li> <li>• <i>Synopsis</i></li> <li>• <i>Itemised</i></li> <li>• <i>OnEditorialParts</i></li> </ul>		
<b>Essence Input Quality</b>	Broadcast quality (optional)	<b>Essence Output Quality</b>	None
<b>Metadata Input</b>	EOD with speech and Editorial Parts	<b>Metadata Output</b>	EOD enriched
<b>Other Input Required</b>	None	<b>Other Output Produced</b>	None

### 8.5.7 Enrichment

Service Name	Documentation/Enrichment		
<b>Function Overview</b>	Provides reference to related published documents. Requires Editorial Parts (default)		
<b>Service Input Parameters</b>	<ul style="list-style-type: none"> <li>• <i>NoEditorialParts</i> – enable subject to be found independently from Editorial Parts basis.</li> </ul>		
<b>Essence Input Quality</b>	Broadcast quality (optional)	<b>Essence Output Quality</b>	None
<b>Metadata Input</b>	EOD with speech and Editorial Parts	<b>Metadata Output</b>	EOD enriched
<b>Other Input Required</b>	None	<b>Other Output Produced</b>	None

# 9 Models and formats for management of PSO relationships

## 9.1 PSO-Archive relationship

The data model for the main entities concerned in the relationship between PSO and Archive is defined in deliverable D16.4, from which is taken Figure 9-10 that shows it with a PSO-centric data structure.

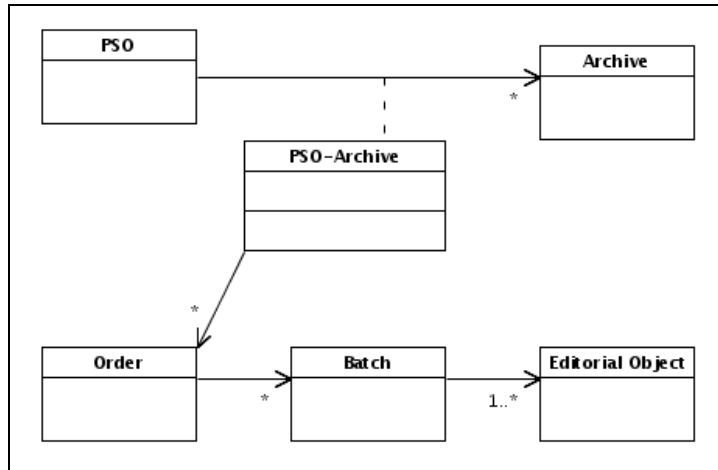


Figure 9-10 - Diagram of PSO-Archive model

The model is completed by the relationships between Editorial Objects and Materials, and between Materials and Material Sources (see MAD data model [MDM] for class diagrams). Figure 9-11, taken also from D16.4, provides an explanatory example in the form of object diagram.

On one hand the PSO component has to manage the information related to this model internally, on the other hand it has to exchange the same information with the Archives through its interfaces.

[AXML] provides the reference to the necessary format definitions.

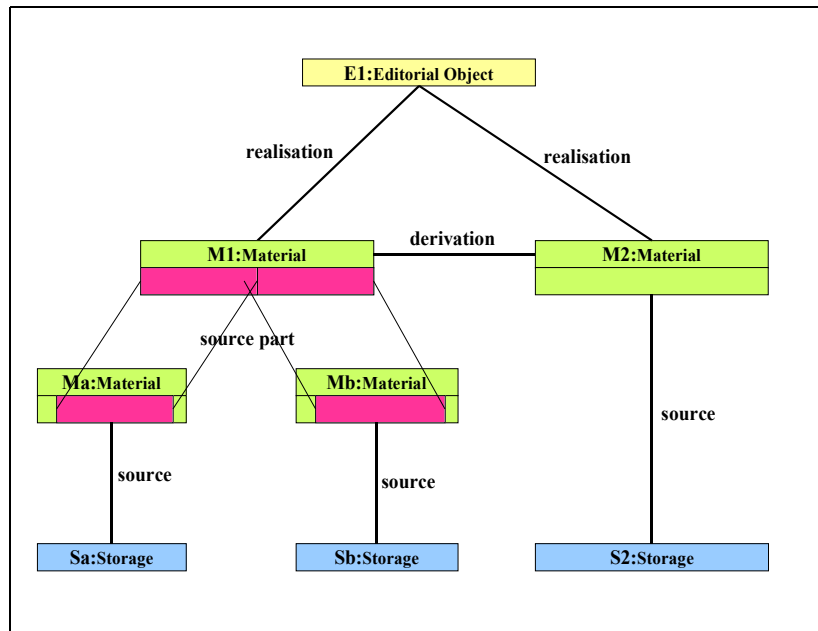


Figure 9-11- Objects diagram with Editorial Object, Materials and Storages



Entity	Entity description (from D16.4)	Exchanged information Set (defined in D16.4)	PSO methods offered to the Archive (from D16.4)	Format definition
Archive	PSO is not directly interested in the archive entity, but in its relationship with the PS Factory.  The PS-Factory may have several Archive organisation as customers.	ArchiveInfoSet	Register Inquire Update	To be added reference to XML Schema
		ArchiveKnowledge	GetKnowledge	RDF (Resource Description Format – W3C)
			Close Delete	Only PSO web service
Order	For each archive relationship there may several Orders, which define a work process with all relevant details.	OrderInfoSet	Register Inquire Update	To be added reference to XML Schema
			Close	Only PSO web service
Batch	For each Order there may be several Batches, which group working units according to Archive criteria.	BatchInfoSet	Register Inquire Update	To be added reference to XML Schema
			Close Clear	Only PSO web service
		List of EODs	Get	Only PSO web service
EditorialObject	For each Batch there must be one or many Editorial Objects, which are defined to be the logical working unit of the PS-Factory.	EditorialObject Document	Register Get	EOD
			Clear Inquire	Only PSO web service
Material	Editorial Objects are related to their “Realisations” by Materials, the source of which are at the very end either physical storages (cassettes) or electronic media files	Material Access Document	Insert Get	Included in MAD data format document that defines the EOD.  [6]

Table 9.2 - pso-archive interfaces

## 9.2 PSO-Preservation relationship

The PSO-Preservation interaction is based on the following steps:

- The PSO inserts into the Preservation Unit a specific Batch document, which is made of a list of Material instances the sources of which are the original media. The model of the Preservation Batch is shown in Figure 9-12. Each storage may have a reference to a Shipment by which the storage itself was carried to the Preservation Unit from the Archive. The Preservation Batch instance includes an identifier and optionally the working options and parameters in input to the Preservation Unit.
- The Preservation Unit checks the availability of the Material sources and for each of them it sends back to the PSO a notification message containing a code associated to one among the following meaning:
  - got storage – the storage instance is present at the preservation unit
  - missing storage – the storage instance was not found at the preservation unit
- Then the Preservation Unit goes on with digitisation of got storages, action that generates new material instances. For each input Material instance:
  - In case of success it sends back to the Preservation an insertMaterial information, including the information on the Derivation process. This is according to the MAD data format specification [MDF].
  - In case of failure it sends back a notification

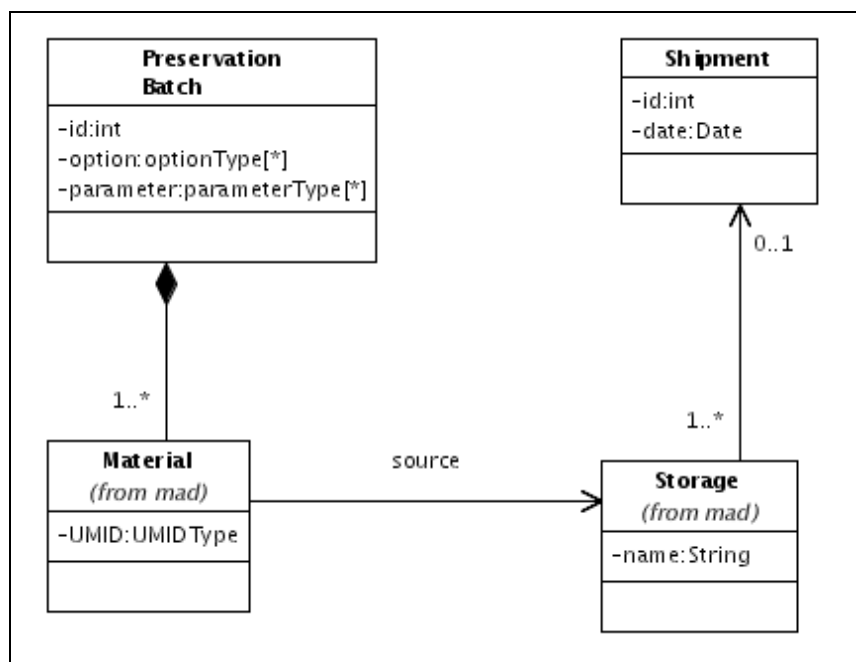


Figure 9-12 – class diagram of the preservation batch

The overall impletation requires:

- PSO uses a Preservation Unit interface for inserting the Batch. Input is PreservationBatchDocument
- The Preservation Unit uses a PSO interface for notification about Material instances. Input parameters are: UMID, notification code, and optional notification message
- The Preservation Unit uses a PSO interface for inserting the newly created Master quality materials. Input is MaterialAccessDocument

[PXML] provides the reference to the necessary format definitions.

# 10References on Protocols

Following are documents which contain more detailed information about mentioned models, formats and standards, if they are developed or customised within PrestoSpace, with the status of the development or customisation:

Ref.	Document name and URL	Status
[D15.1]	Deliverable D15.1MDS1: Analysis of current audiovisual documentation models, Mapping of current standards <a href="http://prestospace.ina.fr/groups/MAD/maddeliverables/PS_WP15_ORF_D15.1_Documentation_Models_v1.6.pdf">http://prestospace.ina.fr/groups/MAD/maddeliverables/PS_WP15_ORF_D15.1_Documentation_Models_v1.6.pdf</a>	Final Deliverable
[MDM]	MAD Data Model Consolidation: Consolidation of the data model definition. <a href="http://prestospace.ina.fr/groups/MAD/TF_MAD/TF2/datamodel05/datamodel05_03_2005-06-10.doc">http://prestospace.ina.fr/groups/MAD/TF_MAD/TF2/datamodel05/datamodel05_03_2005-06-10.doc</a>	Draft
[MDF]	EOD metadata format specification, MAD area metadata format <a href="http://prestospace.ina.fr/groups/MAD/TF_MAD/TF2/dfspect/dfspect096.doc">http://prestospace.ina.fr/groups/MAD/TF_MAD/TF2/dfspect/dfspect096.doc</a>	Final Draft, partially implemented
[AVEF]	AV Data Exchange Formats in PS, Requirements Investigation and Discussion Proposal <a href="http://prestospace.ina.fr/groups/SYS/AV_Data_Exchange/PS_Data_Exchange_Formats_V2.1">http://prestospace.ina.fr/groups/SYS/AV_Data_Exchange/PS_Data_Exchange_Formats_V2.1</a>	Discussion Proposal
[D8.3]	D8.3 RST3 Defect Description Scheme Report, MPEG-7 extension for Film/Video/Audio Defect&Quality description. <a href="http://prestospace.ina.fr/groups/RES/Deliverables_Final/D8.3_Defect_Descr_Scheme_Report">http://prestospace.ina.fr/groups/RES/Deliverables_Final/D8.3_Defect_Descr_Scheme_Report</a>	Final Deliverable, implemented
[RADS]	RES/MAD workflow, essence and metadata integration architecture, section 4.1.6 of WA RES System Architecture Document. <a href="http://prestospace.ina.fr/groups/RES/specsheets/WA_RES_ArchitectureAndDeliverableSpecification_2004_12">http://prestospace.ina.fr/groups/RES/specsheets/WA_RES_ArchitectureAndDeliverableSpecification_2004_12</a>	RES/MAD Draft
[RMDR]	WA RES data/metadata/workflow input/output requirements, sections 2.1 and 2.2. <a href="http://prestospace.ina.fr/groups/RES/Architecture/WA_RES_MetaData_Req_V2">http://prestospace.ina.fr/groups/RES/Architecture/WA_RES_MetaData_Req_V2</a>	Final Draft
[BPM]	MAD business process model v04 <a href="http://prestospace.ina.fr/groups/MAD/TF_MAD/MAD-BMA/madbpm.v04.2005-07-04.doc">http://prestospace.ina.fr/groups/MAD/TF_MAD/MAD-BMA/madbpm.v04.2005-07-04.doc</a>	Draft
[PSAM]	SAMMA Metadata Report schema <a href="http://prestospace.ina.fr/groups/PRE/workpackages/WP05_PRE_robotics_and_automation/WP05_Tsk1_Cassette_Automation/MMatters_Model/SAMMA_Metadata_Report_PrestoSpace.xsd">http://prestospace.ina.fr/groups/PRE/workpackages/WP05_PRE_robotics_and_automation/WP05_Tsk1_Cassette_Automation/MMatters_Model/SAMMA_Metadata_Report_PrestoSpace.xsd</a>	Partial contribution to Migration Metadata output
[D16.4]	D16.4 MDE1 Delivery models <a href="http://prestospace.ina.fr/groups/MAD/maddeliverables/d16n4/">http://prestospace.ina.fr/groups/MAD/maddeliverables/d16n4/</a>	Final draft Version 0.5 (2006-02-01)
[PXML]	XML document samples and schema for communications between the PSO and the Preservation Unit <a href="http://prestospace.ina.fr/groups/MAD/PSO/interfaces/preservation/xml/">http://prestospace.ina.fr/groups/MAD/PSO/interfaces/preservation/xml/</a>	Draft (2006-03-02)
[AXML]	XML document samples and schema for communications between the PSO and the Archive <a href="http://prestospace.ina.fr/groups/MAD/PSO/interfaces/archive/xml/">http://prestospace.ina.fr/groups/MAD/PSO/interfaces/archive/xml/</a>	Place holder
[D18.1]	D18.1 MTI1 Documentation Platform for the MAD Factory <a href="http://prestospace.ina.fr/groups/MAD/specsheets/D18.1_MTI1_Documentation_Platform_for_the_MAD_Factory.doc">http://prestospace.ina.fr/groups/MAD/specsheets/D18.1_MTI1_Documentation_Platform_for_the_MAD_Factory.doc</a>	
[D18.2]	D18.2 MTI2 Publication Platform for the Results of Digitization and Documentation <a href="http://prestospace.ina.fr/groups/MAD/specsheets/D18.2_MTI2_Publication_Platform_for_the_Results_of_Digitization_and_Documentation_v2.doc">http://prestospace.ina.fr/groups/MAD/specsheets/D18.2_MTI2_Publication_Platform_for_the_Results_of_Digitization_and_Documentation_v2.doc</a>	

# 11 Glossary

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Term	Description
<b>Access&amp;Coding Metadata</b>	Metadata that are needed for accessing and interpreting the encoding of file based content.
<b>Broadcast Quality</b>	Encoding quality which is appropriate for publication through current audiovisual publication media. According to the Deliverable D16.4 <i>Video: MPEG-2 - ISO/IEC 13818 – provides appropriate quality at 4-8 Mbps for standard definition</i> <i>Audio: MPEG2. It may also be MPEG-1 ISO/IEC 11172</i>
<b>CVS</b>	Concurrent Version System, a system able to manage different version of the same artefact, keeping track on changes. It provides the methods for checking-out and checking-in documents.
<b>Doc/CA Quality</b>	Digital documentation/content analysis encoding quality, medium encoding quality, no visible encoding defects, full spatial resolution, bit rate in the range of 3-10 Mbit/s (SD) and 15-50 Mbit/s (HD)
<b>Documentation Unit</b>	Facilities where massive documentation, metadata enhancement, and preparation of publication for audiovisual contents are performed (earlier known as Documentation Factory or Unit).  This Unit can manage digitized audiovisual items from <b>preservation</b> and <b>restoration</b> areas and provides the software <b>modules</b> for documenting and delivering them. It is made up of pluggable <b>GAMPs</b> (Generic Activity MAD Processor) connected to the core Platform for <b>automatic features extraction</b>
<b>EMS</b>	Essence and Metadata Storage System, the system which is responsible for storing the essence and metadata within the MAD Factory sharing these resources between the several Units, according to a STANDARD interface (CVS like).
<b>Enhanced Metadata</b>	Metadata and structured information that are generated within the MAD Unit, in the view of improving the accessibility to digitised contents.
<b>EDOB</b>	Editorial Object
<b>EOD</b>	Editorial Object Document; document containing metadata describing EDOB properties; utilises P-Meta and MPEG-7 standard.
<b>GAMP</b>	This label stands for Generic Activity MAD Processor, which represents the Generic Client communicating to the MAD Core Unit (Platform), using SOAP (and WebServices) protocol
<b>HD</b>	High definition; 1920x1080 Pixel per frame/two fields
<b>MAD Core Platform</b>	This software component represents the middleware which is publishing web services interfaces. It has a built in work flow engine and a concurrent version system for managing all the activities done within the MAD platform (content analysis, semantic analysis, annotation, delivery).
<b>MAD Unit</b>	Facilities where massive documentation, metadata enhancement, and preparation of publication for audiovisual contents are performed
<b>Mass Storage</b>	Storage solution in which all the assets (programs, recordings etc.) are kept on common media (disks, tapes etc.) and access is managed through a file management system

<b>Master Quality</b>	Digital master quality, highest encoding quality, mathematically or visually lossless over multiple generations, bitrate in the range of 50-250 Mbit/s (SD) and 200-1000 Mbit/s(HD)
<b>MD</b>	Metadata
<b>Migration Batch</b>	A set of programmes or items stored on analogue media that are prepared and delivered to a Preservation Unit for migration, associated with the relevant metadata.
<b>Migration Metadata</b>	Metadata that are generated during the migration process. These include reports automatically generated by playback equipment and measurement tools, as well as any other input filled in by operators in the Preservation Unit.
<b>Pre-selection</b>	The process, usually run by Archives, that consist of selecting the items or programmes to be migrated, and setting up priorities for the order in which migration has to be performed.
<b>Preservation Unit</b>	Facilities where massive A-to-D migration of audiovisual contents is performed (earlier known as Preservation Factories)
<b>PrestoSpace Factory</b>	Facilities that are one or more of the following: Preservation Unit, Restoration Unit, Documentation Unit.
<b>PSO</b>	This is the Presto Space Orchestrator, which is the logical layer between the archive and the Units of the PrestoSpace Factory and it is responsible for accounting all information about the processes on working units, and for dispatching activity tasks. The PSO provides the interfaces for accessing the Factory, based on web services for machine to machine communication and web applications for the human being users. The PSO has an internal work flow engine in order to process the jobs to be done and for resolving their dependencies.
<b>Publication Unit</b>	The <b>Publication Unit</b> (also called Platform) will provide <b>retrieval</b> and <b>browsing</b> functionalities regarding the essence elaborated within the MAD Unit (Platform). This unit will support Complex Multiple search on <b>distributed Archives</b> . It is not a built within the PrestoSpace Factory in order to provide a tailored feature for different size of multimedia archives.
<b>Restoration Unit</b>	Facilities where massive digital restoration of audiovisual contents is performed (earlier known as Restoration Factories)
<b>SD</b>	Standard definition; PAL ...720x576 Pixel per frame/two fields; NTSC.. 720x480 Pixel per frame/two fields
<b>Turnkey system</b>	Complete name: Turnkey system for delivering to small archives. The <b>TKS</b> is a <b>lightweight</b> System specifically tailored for <b>small size archives</b> . A “small scale stand alone production quality system” suitable for small archives and already configured for the publication of the preserved material. Given the intrinsic modularity of the MAD Platform, the functionalities deployed in a Turnkey System installation can be modulated according to the user needs. The Turnkey System will be derived from the PrestoSpace Factory and the Publication Platform that the project is setting up to run all the experiments needed to define the specifications of the final platform.
<b>Web</b>	Web encoding quality, low encoding quality, half or quarter resolution, bitrate in the range of 100–1000 Mbit/s (SD)
<b>Worksheet</b>	A set of instructions, attached to a Batch or an item, describing the operations on this Batch or item, that are expected from the PrestoSpace Factory. Indeed the worksheet is included in Order, as defined in [D16.4] (specifically the part described in section 4.4).