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Abstract:	**In this deliverable, the fruit of intense collaboration within the Consortium, we describe the four user scenarios that will be implemented in the CONVERGENCE trials and derive requirements for trial tools and applications.**
Keyword List:	**Scenario, use case, requirements, photos, videos, retail, podcasts**

Executive Summary

Goals

In D2.1: Preliminary Use Cases and Requirements (version 2), we described CONVERGENCE's four user scenarios and the advantages of CONVERGENCE with respect to alternative technologies. D2.2 builds on this work. In this deliverable, however, the main focus is on the CONVERGENCE trials. The deliverable provides detailed walkthroughs of the scenarios and use cases that will be tested in the trials (**seen from an end-user perspective**) and describes **requirements** for the applications and tools that will be needed. Work in WP2 has been conducted in parallel with work in WP7 on applications and tools and work in WP8 on the planning and execution of the trials and all three groups have had access to preliminary versions of the deliverables prepared by the other groups. The work performed in WP2 provides the basis for D7.1, which provides more detailed specifications of the scenarios from the point of view of **tools and applications**, and D8.1 which will describe **planning for the trials** and will include a **detailed analysis of the implications for the CONVERGENCE middleware and network**.

Methodology

Scenarios were developed in the following phases:

- Definition of a “scenario description template”;
- Collection of scenarios from partners;
- Scenario Editing and Analysis;
- Generation of final scenarios;
- Generation of requirements for CONVERGENCE tools and applications.

The scenarios

The report describes four scenarios based on the scenarios originally described in D2.1.

- Photos in the cloud and down to earth (Alinari)
- Videos in the cloud and analyses on the earth (FMSH)
- Augmented Lecture Podcast (LMU)
- Smart Retailing (WIPRO/UTI)

For each scenario, we provide a general description of the scenario, followed by detailed descriptions of individual use cases and the requirements they impose on CONVERGENCE tools and applications.

Requirements

Based on the description of the scenarios, the report identifies general requirements shared by all scenarios and requirements specific to individual scenarios. The new requirements replace the applications level requirements formulated in D2.1. Requirements for the VDI, the CONVERGENCE middleware and the CONVERGENCE network remain unchanged and are not repeated.

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Glossary

Term	Definition
Access Rights	Criteria defining who can access a VDI or its components under what conditions.
Advertise	Procedure used by a CoNet user to make a resource accessible to other CoNet users.
Application	Software, designed for a specific purpose that exploits the capabilities of the CONVERGENCE System. Applications may provide access to multiple tools (see below).
Business Scenario	A scenario describing one way in which the CONVERGENCE System may be used by specific users in a specific situation; more narrowly: a scenario describing the commercial products and services bought and sold in such a situation, the actors concerned and, possibly, the associated flows of revenue.
Clean-slate architecture	The CONVERGENCE implementation of the Network Level, totally replacing existing IP functionality. See “Integration Architecture” and ”“Overlay Architecture” and “Parallel Architecture”.
CoApp	The CONVERGENCE Application Level.
CoApp Provider	A user providing Applications running on the Convergence Middleware Level (CoMid).
CoMid	The CONVERGENCE Middleware Level.
CoMid Provider	A user providing access to CoMid services. CoMid services may be offered by a single provider or by a federation of providers.
CoMid Resource	A virtual or physical object or service referenced by a VDI, e.g. media, Real World Objects, persons, internet services. It has the same meaning of “Resource” and it is used only to better specify the term “Resource” when there is a risk of a misunderstanding with the term “CoNet Resource”.
Community Dictionary Service (CDS)	A CoMid Technology Engine that provides all the matching concepts in a user’s subscription, search request and publication.
CoNet Provider	A user providing access to CoNet services, i.e. the equivalent of an

	Internet Service Provider.
CoNet Resource	A resource of the CoNet that can be identified by means of a name; resources may be either a Named data or a Named service access point.
Content-based resource discovery	A user request for resources, either through a subscription or a search request to the CONVERGENCE system. See “subscription” and “search”.
Content-based Subscription	A subscription based on a specification of user’s preferences or interests, (rather than a specific event or topic). The subscription is based on the actual content, which is not classified according to some predefined external criterion (e.g., topic name), but according to the properties of the content itself. See “Subscription” and “Publish-subscribe model”.
Content-centric	A network paradigm in which the network directly provides users with content, and is aware of the content it transports, (unlike networks that limit themselves to providing communication channels between hosts).
CONVERGENCE Applications level (CoApp)	The level of the CONVERGENCE architecture that establishes the interaction with CONVERGENCE users. The Applications Level interacts with the other CONVERGENCE levels on behalf of the user.
CONVERGENCE Computing Platform level (CoComp)	The Computing Platform level comprises key functional blocks providing content-centric networking (CoNet) and secure handling (CoSec) of resources within CONVERGENCE. The Computing Platform level also provides interfaces to access computing resources of peers and nodes.
CONVERGENCE Core Ontology (CCO)	A semantic representation of the CoReST taxonomy. See “CONVERGENCE Resource Semantic Type (CoReST)”
CONVERGENCE Device	A combination of hardware and software or a software instance that allows a user to access Convergence functionalities
CONVERGENCE Engine	A collection of technologies bundled to deliver specific functionality and made available to users and to other Engines via an API
CONVERGENCE Middleware level (CoMid)	The level of the CONVERGENCE architecture that provides the means to handle VDIs and their components.
CONVERGENCE	The Content Centric component of the CONVERGENCE

Network (CoNet)	Computing Platform level. The CoNet provides access to named-resources on a public or private network infrastructure.
CONVERGENCE node	A CONVERGENCE device that implements CoNet functionality and/or CoSec functionality.
CONVERGENCE peer	A CONVERGENCE device that implements CoApp, CoMid, and CoComp (CoNet and CoSec) functionality.
CONVERGENCE Resource Semantic Type (CoReST)	A list of concepts or terms that makes it possible to categorize CONVERGENCE resources, establishing a connection with the resource's semantic metadata.
CONVERGENCE Security element (CoSec)	A component of the CONVERGENCE Computing Platform level implementing basic security functionality such as storage of private keys, basic cryptography, etc.
CONVERGENCE System	A system built by using the technologies specified or adopted by the CONVERGENCE specification. A CONVERGENCE system consists of a set of interconnected CONVERGENCE devices - peers and nodes - connected to each other. See "Node" and "Peer".
Digital forgetting	A system functionality ensuring that VDIs do not remain accessible for indefinite periods of time, when this is not the intention of the user.
Digital Item (DI)	A structured digital object with a standard representation, identification and metadata. A DI consists of resource, resource and context related metadata, and structure. The structure is given by a Digital Item Declaration (DID) that links resource and metadata.
Domain ontology	An ontology, dedicated to a specific domain of knowledge or application, e.g. the W3C Time Ontology and the GeoNames ontology.
Elementary Service (ES)	The most basic service functionality offered by the CoMid.
Entity	An object, e.g. VDIs, resources, devices, events, group, licenses/contracts, services and users, that an Elementary Service can act upon or with which it can interact.
Expiry date	The last date on which a VDI is accessible by a user of the CONVERGENCE System.
Fractal	A semantically defined virtual cluster of CONVERGENCE peers.
Identifier	A unique signifier assigned to a VDI or components of a VDI.

Integration Architecture	An implementation of CoNet designed to integrate CoNet functionality in the IP protocol by means of a novel IPv4 option or by means of an IPv6 extension header, making IP content-aware. See “Clean-state Architecture”, “Overlay Architecture”, “Parallel Architecture”
License	A machine-readable expression of Operations that may be executed by a Principal.
Local named resource	A named-resource made available to CONVERGENCE users through a local device, permanently connected to the network. Users have two options to make named-resources available to other users: 1) store the resource in a device, with a permanent connection to the network; 2) use a hosting service. In the event she chooses the former option, the resource is referred to as a local named-resource.
Metadata	Data describing a resource, including but not limited to provenance, classification, expiry date etc.
MPEG eXtensible Middleware (MXM)	A standard Middleware specifying a set of Application Programming Interfaces (APIs) so that MXM Applications executing on an MXM Device can access the standard multimedia technologies contained in the Middleware as MXM Engines.
MPEG-M	An emerging ISO/IEC standard that includes the previous MXM standard.
Multi-homing	In the context of IP networks, the configuration of multiple network interfaces or IP addresses on a single computer.
Named data	A named-resource consisting of data.
Named resource	A CoNet resource that can be identified by means of a name. Named-resources may be either data (in the following referred to as “named-data”) or service-access-points (“named-service-access-points”).
Named service access point	A kind of named-resource, consisting of a service access point identified by a name. A named-service-access-point is a network endpoint identified by its name rather than by the Internet port numbering mechanism.
Network Identifier (NID)	An identifier identifying a named resource in the CONVERGENCE Network. If the named resource is a VDI, its NID may be derived from the VDI identifier (see “Identifier”).

Overlay architecture	An implementation of CoNet as an overlay over IP. See “Clean-state Architecture” and “Integration Architecture” and “Parallel Architecture”
Parallel architecture	An implementation of CoNet as a new networking layer that can be used in parallel to IP. See “Clean-state Architecture” and “Integration Architecture” and ””Overlay Architecture”
Policy routing	In the context of IP networks, a collection of tools for forwarding and routing data packets based on policies defined by network administrators.
Principal (Rights Expression Language)	The User to whom Permissions are Granted in a License.
Principal (CoNet)	The user who is granted the right to use a *CoNetPrincipal Identifier* for naming its named resources. For example, the principal could be the provider of a service, the publisher or the author of a book, the controller of a traffic lights infrastructure, or, in general, the publisher of a VDI. A Principal may have several Principal Identifiers in the CoNet.
Principal Identifier (CoNet)	The Principal identifier is a string that is used in the Network Identifiers (NID) of a CoNet resource, when the NID has the form: NID = <namespace ID, hash (Principal Identifier), hash (Label)> In this approach, hash (Principal Identifier) must be unique in the namespace ID, and Label is a string chosen by the principal in such a way that hash(Label) is unique for in the context of the Principal Identifier.
Publish	The act of informing an identified subset of users of the CONVERGENCE System that a VDI is available.
Publisher	A user of CONVERGENCE who performs the act of publishing.
Publish-subscribe model	CONVERGENCE uses a content-based approach for the publish-subscribe model in which notifications about VDIs are delivered to a subscriber only if the metadata / content of those VDIs match constraints defined by the subscriber in his Subscription VDI.
Real World Object	An object referenced in a VDI
Resource	A virtual or physical object or service referenced by a VDI, e.g. media, Real World Objects, persons, internet services.
Scope (in the context of	In the context of advertising and routing, the geographical or administrative domain on which a network function operates (e.g.

routing)	a well defined section of the network - a campus, a shopping mall, an airport -, or to a subset of nodes that receives advertisements from a service provider).
Search	The act through which a user requests a list of VDIs meeting a set of search criteria (e.g. specific key value pairs in the metadata, key words, free text etc.).
Service Level Agreement (SLA)	An agreement between a service provider and another user or another service provider of CONVERGENCE to provide the latter with a service whose quality matches parameters defined in the agreement.
Subscribe	The act whereby a user requests notification every time another user publishes or updates a VDI that satisfies user-defined subscription criteria (key value pairs in the metadata, free text, key words etc.).
Subscriber	A user of CONVERGENCE who performs the act of subscribing.
Timestamp	A machine-readable representation of a date and time.
Tool	Software providing a specific functionality to an application. Different applications may use the tool in different ways and provide different interfaces between the tool and the user. Applications will often incorporate more than one tool.
Trials	Organized tests of the CONVERGENCE System in specific business scenarios.
Un-named data	A data resource with no NID.
User	Any person or legal entity in a Value-Chain connecting (and including) Creator and End-User possibly via other Users.
User (in OSI sense)	In a layered architecture, the term is used to identify an entity exploiting the service provided by a layer (e.g. CoNet user).
User ontology	An ontology created by users of CONVERGENCE when publishing a VDI or subscribing to a VDI.
User Profile	A description of the attributes and credentials of a user of the CONVERGENCE System.
Versatile Digital Item (VDI)	A structured, hierarchically organized, digital object containing one or more resources and metadata, including a declaration of the parts that make up the VDI and the links between them.

1 Goals and structure of this document

In D2.1: Preliminary Use Cases and Requirements (version 2), we described the main four user scenarios of CONVERGENCE trials. The main goals of this work were to:

1) Create a tool for communicating the goals of CONVERGENCE within and outside the Consortium,
2) Examine the advantages of CONVERGENCE compared to alternative implementation technologies,
3) Extract requirements for the CONVERGENCE system (the VDI, the REL, the CONVERGENCE middleware, the CONVERGENCE network).

The results have been used in the definition of the CONVERGENCE system architecture (WP3), the design of the VDI (WP4) and the design of the CONVERGENCE middleware and network (WP5).

D2.2 builds on the work in D2.1. In this deliverable, however, the main focus is on the CONVERGENCE trials. The deliverable provides detailed walkthroughs of the scenarios and use cases that will be tested in the trials (**seen from an end-user perspective**) and describes **requirements** for the applications and tools that will be needed. Work in WP2 has been conducted in parallel with work in WP7 on applications and tools and work in WP8 on the planning and execution of the trials and all three groups have had access to preliminary versions of the deliverables prepared by the other groups. The work performed in WP2 provides the basis for D7.1, which provides more detailed specifications of the scenarios from the point of view of **tools and applications**, and D8.1 which will describe **planning for the trials** and will include a **detailed analysis of the implications for the CONVERGENCE middleware and network**.

The rest of this document is organized as follows. Chapter 2 provides a brief summary of the methodology used in preparing the scenarios and extracting requirements. Chapter 3 describes the scenarios themselves, providing a general overview of each scenario, detailed descriptions of individual use cases, and requirements for tools and applications. Finally, Chapter 4, identifies general requirements that apply to all the scenarios and summarizes the requirements of specific scenarios. The resulting tables replace the preliminary applications requirements specified in D2.1.

2 Methodology

2.1 Overview

The methodology used to produce the user scenarios and to extract applications requirements was similar to the methodology used in D2.1. Scenarios were developed in the following phases:

- Definition of a "scenario description template";
- Collection of scenarios from partners;
- Scenario Editing and Analysis;
- Generation of final scenarios;
- Generation of requirements for CONVERGENCE tools and applications.

2.2 Definition of a scenario description template

In the first phase of the work, XIW defined a revised template for the collection of information from partners. The new version included new sections in which partners were asked to specify:

- Detailed walkthroughs of individual use cases
- Requirements on CONVERGENCE applications
- New requirements for the CONVERGENCE framework and the CONVERGENCE application

Given the goals of the deliverable, partners were asked to describe scenarios in "dry", technical language omitting narrative details irrelevant to developers. The sections in the previous deliverable dedicated to the advantages of CONVERGENCE technology were omitted.

2.3 Collection of scenarios from partners

In the first phase of the work, the WP coordinator (XIW) circulated the template to each of the partners involved in the trials (Alinari, FMSH, LMU, WIPR) asking them to describe the actual scenario they intend to implement in the trials. Reviewers will note that this request was different from the request in D2.1, in which they were simply asked to "describe a possible application of CONVERGENCE technology, seen from an end-user viewpoint". Partner contributions were returned to XIW, which took responsibility for the following phase of the work.

2.4 Scenario Editing and Analysis

XIW edited the scenarios, simplifying some of the narratives and identifying points of commonality, duplications, and aspects of CONVERGENCE that were not properly described. XIW then distributed the revised scenarios to their original authors, and to the

technical partners, who analyzed their technical feasibility and to CEDEO. After a second round of editing and revision, these scenarios became the final scenarios for the deliverable.

2.5 Extraction of requirements

Analysis of the scenarios showed that none required changes or additions to the requirements for the CONVERGENCE system architecture, the VDI, the CONVERGENCE middleware or the CONVERGENCE network. However the revised scenarios implied many new requirements for tools and applications. XIW therefore proceeded to draft a revised version of the applications requirements that replaces the requirements formulated in D2.1.After review by partners these requirements provided a basis for implementation work in WP7.

3 The Scenarios

3.1 Introduction

This report describes four scenarios based on the scenarios originally described in D2.1.

- Photos in the cloud and down to earth (Alinari)
- Videos in the cloud and analyses on the earth (FMSH)
- Augmented Lecture Podcast (LMU)
- Smart Retailing (WIPRO/UTI)

For each scenario, we provide a general description of the scenario, followed by detailed descriptions of individual use cases and the requirements they impose on CONVERGENCE tools and applications.

3.2 Photos in the cloud and down to earth (Alinari)

3.2.1 General description of scenario

Name of scenario:	**Photos in the cloud and down to earth**

Description of general user population
Researchers and professionals working to produce photography books and other visual content related to cultural history Students and teachers Historians Archivists and librarians. Publishers Architects, interior designers Photographers, visual creators Photo agencies, museums, art galleries Content Providers

Specific classes of user considered in scenario and description of role
Alinari managers and staff Photographers (professional users) and school children (non-professional users) who contribute to the archive Content users (citizens, students, teachers, journalists etc.) Managers and staff working for museums, libraries, news agencies etc.
General description of scenario
Photographs in the collection are represented by VDIs. Each VDI contains the photo itself (or a link to the photo), possibly a low-resolution version of the photo, metadata describing the photo, a licence and an Event Report Request. The metadata schema is defined by Alinari managers and includes the date, time and place where the photo was taken, legal data on the author and owner of the photo, technical data about the photo (camera, lens, shutter time, aperture, ISO etc.), historical data about the site represented in the photo, and other metadata contributed by Alinari staff and third parties and information representing the license granted by the photographer to Alinari and by Alinari to end-users. Licensing information is represented using the CONVERGENCE REL. Alinari manages the server used in the trial and the photo archive using a dedicated server that runs custom applications on top of the CONVERGENCE framework and

the CONVERGENCE network. The dedicated applications provide Alinari staff with a user interface making it easy for them to create, publish, un-publish, describe and update the photos and VDIs. Free-lance photographers can access the Alinari service to create Resource VDIs and Publication VDIs. Alinari personnel and end-users can subscribe to photos, receiving notifications when photos meeting their subscription criteria are published to CoNet. Alinari staff can retouch the photos and add them to the Alinari catalogue. End-users can view and buy photos using a local application connected to the Alinari server.

The CONVERGENCE framework automatically prevents access to photos that have expired and performs garbage collection to purge expired copies from network storage.

Names of use cases considered in scenario

1. Creation of a photographic collection
2. Finding and using photos
3. Creating a personalized exhibition tour

3.2.2 Description of individual use cases

Name of use case:	1) Creating a photographic collection

Classes of users considered in use case and description of role
End user (professional photographer)
Alinari supervisor
Alinari photo retouch expert

Detailed walkthrough of use case

User describes and publishes a photo for the collection

Before submitting a photo to a collection, the user describes the photo with meta information (geo-coordinates and name of location, historical notes etc.) that makes it easy for other users to locate the photo. She therefore:

1. Opens the CONVERGENCE application
2. Uploads the photo to application
3. Defines metadata for the photo
4. Defines licensing conditions for the photo (the application automatically limits access to Alinari staff)
5. Publishes the photo to the CONVERGENCE cloud

Subscription

The supervisor subscribes to all photos relevant to the collection. She therefore:

1. Opens the CONVERGENCE application
2. Fills out an online form describing subscription criteria (e.g. all photos of a given city in a given period)
3. Submits the subscription

From this moment on, she will be notified of all incoming photos meeting the subscription criteria.

Retouching

A photo retouch expert has the same subscription and receives the same notifications as the supervisor. When she receives a notification of a new photo she:

1. Opens the CONVERGENCE application
2. Opens the photo (her privileges give her the right to view/modify photos that are not yet accessible to end users)
3. Enhances or retouches the photo as required
4. Publishes the revised photo (the application automatically limits access to Alinari staff)

Validation: The supervisor verifies that the photo meets Alinari licensing and quality control criteria. To do this she:

1. Opens the CONVERGENCE application (her supervisor privileges give her the right to view/delete photos that are not yet accessible to end users)
2. Checks if the digitized image meets Alinari criteria in terms of image quality (overall look, contrast, colour fidelity, presence of dust on the image, consistency with the indexing thesaurus)

If a photo does not meet quality criteria, the supervisor can remove it or return it to the retouch expert for further work. If she approves the photo she publishes the photo to the CONVERGENCE network using the procedure described below.

Publish

The supervisor publishes the photo, making it available to end users. To do this she uses an external application to add a visible or semi-transparent watermark to the photo. She then uses a CONVERGENCE application to:

- Fix an expiry date after which the photo will be automatically removed from the CONVERGENCE network (optional)
- Update the licensing conditions on the photo so that it becomes accessible to all users
- Move the photo to an online directory – depending on system architecture/database management
- Publish the revised version of the photo to the CONVERGENCE network

Revoke

Supervisors have the possibility to "un-publish" photos (i.e. to revoke them from the CONVERGENCE network). They may use this possibility for many different reasons (e.g. if Alinari's license to use the photo has expired, if it discovers that the photo violates privacy regulations, if Alinari has decided no longer to represent the artist). To revoke the photo the supervisor:

- Opens the Alinari CONVERGENCE application
- Selects the photo
- Issues a command to revoke the photo

The application requests the CONVERGENCE middleware and network to remove all copies of the photo, wherever they are located on the CONVERGENCE network. From this moment on, the photo will no longer be visible to search or subscribe requests and users will no longer be able to download the photo.

Requirements for trial application

- There shall be an application allowing an end-user to describe a photo and to add geolocation information; descriptions and other information shall be stored in the VDI for the photo
- There shall be an application allowing authorized users to define rights to the photo (to be expressed in the CONVERGENCE REL)
- When contributors to the Alinari database publish the VDI representing a photo, access to the VDI shall be automatically restricted to Alinari managers and staff

- There shall be an application allowing Alinari staff to subscribe to photos meeting a set of search criteria
- The application shall provide a list of photos and thumbnails meeting a user's search criteria
- The application shall allow a member of Alinari staff to download a photo on the list
- The application shall allow members of Alinari staff to add tags to the photo showing its status in the publication process (e.g. needs to be retouched, ready for publication)
- There shall be an application with the ability to automatically add a watermark to a photo (or to request an external application to perform the operation)
- There shall be an application providing a simple mechanism allowing a member of Alinari staff to publish a photo to the CONVERGENCE cloud
- There shall be an application allowing a member of Alinari staff to revoke a photo.

New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)

None

Name of use case:	2) Finding and using photos

Classes of users considered in use case and description of role
End user (journalist)
Detailed walkthrough of use case
The journalist is a registered user of Alinari services and as such has a distinct set of rights (e.g. the right to download high resolution photographs). The CONVERGENCE subscription function allows the journalist to subscribe to all photos to which he has access rights. This involves the same steps as when the Alinari supervisor subscribes to a set of photos. Photographs found by the system are displayed as a list or panel of thumbnails (see previous use case). If the journalist finds a photo that interests him he may purchase the photo for use by his newspaper. He therefore: • Selects the photo • Buys the photo When he has chosen all the photos he wishes to purchase/download he clicks on a "Proceed to exit" button. He can then complete any required payment procedure and download the photos.
Requirements for trial application
In addition to the subscription-related requirements in the previous use case: • Application shall support a shopping basket for selected photos • Application shall support a mechanism to pay for photos that are not available free of charge.
New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
At the time of writing, it is not yet clear whether support for payment will impose new requirements on the CONVERGENCE system

Name of use case	3) Creating a personalized exhibition tour

Classes of users considered in use case and description of role

Visitor to museum

General description of scenario

This scenario describes a CONVERGENCE application designed to improve the user experience for visitors to a photo exhibition. The services provided will allow users of CONVERGENCE to:

- Search for images using terms defined in a specific ontology defined by Alinari
- Create catalogues with proposed exhibition tours (i.e. catalogues showing a sequence of exhibits) and share them with other users
- Enrich the tours with images and annotations
- View tours created by other users

Detailed walkthrough of use case

Before coming to the exhibition, the user:

1. Registers with the CONVERGENCE system
2. Downloads the Exhibition tour application for his device
3. Searches and views exhibition tours created by other users

Once he is at the museum he can:

1. Use a touch screen device (one per exhibition room) which runs an Exhibition Browser Application presenting the exhibits.
2. Select a photo and view notes on the history of the photo, information on the photographer and the techniques used etc.

After the visit, he can use the Exhibition tour application to:

1. Create a new exhibition tour by selecting exhibition photos, adding annotations and metadata
2. Publish the tour so it can be viewed by other users

Requirements for trial application

- There shall be an Exhibition Tour application running on a user device and an Exhibition Browser application running on touch screen devices inside the museum
- The Exhibition Tour application shall allow a user to author and publish an exhibition tour in the form of a VDI with links to other VDIs representing photos in the exhibition.
- The Exhibition Tour application shall allow a user to search for, subscribe to, view and navigate through an exhibition tour created by another user
- The Exhibition Browser application shall allow a user to select photos and view all related information (no user registration required).

New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

3.3 Videos in the Cloud and Analyses on Earth (FMSH/ESCoM)

3.3.1 General description of scenario

Name of scenario:	**Videos in the Cloud and Analyses on the Earth**

Description of general user population:
Researchers and professionals working to produce audiovisual documentation of community cultural heritage. Teaching staff (at university). Students (at university). "Community members": people from Andean nations (Peru, Bolivia or Ecuador). Archivists and librarians. Journalists, documentary film makers. Computer engineers.
Specific classes of user considered in scenario and description of role
Video Channel Owner: researcher or university lecturer who manages a video channel. The scenario involves two channels, the *"Quechua Intangible Cultural Heritage Archives" (QICHA)* Channel and the *"Intercultural Dialog Archives" (IDA)* Video Channel which sometimes includes material from QICHA. **Video Material Owner:** an owner of video material (e.g. an anthropologist) who provides video material for QICHA. **Analysts:** people who analyze video materials for use on the channels, in this case students working with a university lecturer. **Video channel users:** people who use video materials provided via video channels – in this case students, potentially also community members. **Administrator**: a computing engineer at FMSH/ESCoM, who manages the technological infrastructure and provides technical support to users during the trials.
General description of scenario
Video material for the trial will be provided by FMSH/ESCoM and by INC (Peruvian National Institute). In the trial scenario **Video Material Owners** will: - Authenticate themselves with a smart card - Encrypt Videos - Create and Publish Videos - Revoke Videos - Receive notifications when their Videos are analyzed or posted **Analysts** (15 students following a course by a university lecturer) will describe, interpret and adapt the content of video materials. They will thus:

- Authenticate themselves with a smart card
- Subscribe to Videos
- Download and Decrypt Videos
- Create and Publish Analyses
- Revoke Analyses
- Receive notifications when their Analyses are posted

Video Channel Owners are responsible for Web Video Channels - web sites where users can browse Analyses and stream Videos on specific topics ("subjects").In these role they will:

- Authenticate themselves with a smart card
- Subscribe to Analyses
- Create their Channel VDI
- Post Analyses on the Channel
- Unpost (revoke) Analyses

Video Channel Users browse Web Video Channels by reading analyses and watching videos. In the Video Channel use case, users will:

- Authenticate themselves with a smart card
- Subscribe to posted Analyses
- Browse Video Channel web sites

The Administrator will:

- Register users
- Configure and deploy Video Channels
- Manage the FMSH/ESCoM database

Names of use cases considered in scenario

1. Registration and Authentication
2. Creation and Publishing of a Video
3. Subscription to a Video
4. Revocation of a Video
5. Downloading a Video
6. Creating and Publishing an Analysis
7. Subscription to Analyses
8. Revocation of an Analysis
9. Creation of a Channel VDI
10. Posting an Analysis on a Channel
11. Subscription to posted Analyses
12. Unposting (revoking) an Analysis
13. Browsing an Analysis on a Channel

3.3.2 Description of individual use cases

Name of use case	1) Registration and Authentication

Classes of users considered in use case and description of role
All users and roles
Detailed walkthrough
Registration 1) User receives a smart card holding the following data: a) User identifier b) Secret key c) An automatically generated PIN d) A Signature key i) Smart cards implement digital signature schemes that comply with current regulations and standards ii) The user's signature key is *generated* on the card, and *certified* during registration (this is achieved without revealing the corresponding secret key) iii) The user's private key *never* leaves the smart card, and is not known to *any* entity outside the smart card (not even to the user herself) iv) The certificate containing the user's public key is kept for subsequent distribution. e) A Group Signature key 2) User launches the **Registration Tool**, then: a) Inserts smart card on his device b) Fills in a user form containing fields for First name, Last Name, Email, Company c) Sends a registration request 2) System a) Identifies the user b) Stores the identity of the user in the system **Authentication** 1) User launches the **Authentication Tool** a) Inserts her smart card in her device b) Enters her PIN 2) System performs user authentication 3) User authenticates herself to the network

Requirements for trial application
• CONVERGENCE shall have a Registration Tool and an Authentication Tool • Users shall receive a smart card including a user identifier, a secret key, a PIN, a signature key and a group signature key • Registration Tool shall enable a User to describe his/her First Name, Last Name, Email and Company. • Registration Tool shall enable a user to be identified and stored in the system. • Authentication Tool shall enable the User to enter her PIN. • Authentication Tool shall enable mutual authentication with smart card between User and Device. • Authentication Tool shall enable authentication of a User in the system.
New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

Name of use case:	2) Creation and Publishing of a Video

Classes of users considered in use case and description of role

Video Material Owners

Detailed walkthrough of use case

1) Video Material Owner launches the **Video Creation Tool**, then**:**
   a) Authenticates herself (as described in "Registration and Authentication" use case, using the **Authentication Tool**).
   b) Encrypts a video resource:
      i) Selects the video file to encrypt
      ii) Selects the location of the new file to be created and clicks on the "Encrypt" button causing an encrypted video file (a new file) to be generated at the specified location; the decryption key is embedded in the smart card and can only be released by authorized users
   c) Fills in main form:
      i. Title of the video ; sub-title ; type of video; author(s) ; producer(s); date ; location ; spoken language(s) ; short description (free text)
      ii. Location in local device of the previously encrypted video file
   d) Creates licenses for
      i. FMSH/ESCoM to stream the video
      ii. Analysts to subscribe to, decrypt, download and analyze the video
      iii. Video Channels Owners to subscribe and post the video
      iv. Video Channel Users to subscribe and watch the video
   e) Creates requests for notification when:
      i. The video is analyzed
      ii. A Video Analysis referencing the Video Resource is unpublished
      iii. The video is posted
      iv. The video is unposted
      v. The video is decrypted and downloaded
   f) Clicks on the "create & publish" button:
2) System
      a. Creates a Video VDI, including the encrypted video resource
      b. Embeds licenses & notification requests
      c. Signs the VDI
      d. Checks the correctness of the VDI
      e. Uploads the VDI and stored it on the network
      f. Injects and stores on the network a Publication VDI referencing the Video VDI
      g. Notifies Analysts that the new Video has been published

Requirements for trial application

- CONVERGENCE shall have a Video Creation Tool
- Video Creation Tool shall enable the Video Material Owner to encrypt a video file, at least in MPEG format

- Smart cards shall embed decryption key
- Video Creation Tool shall embed the Authentication Tool
- Video Creation Tool shall enable the Video Material Owner to select an encrypted video file and enter the Title of the video; Sub-title; Type of video; Author(s); Producer(s); Date; Location; spoken language(s); Short description.
- Video Creation Tool shall enable the Video Material Owner to create licenses
- Video Creation Tool shall enable the Video Material Owner to create notification requests
- Video Creation Tool shall create a Video VDI, including video resource file, information filled in, licenses and notification requests
- Video Creation Tool shall enable Video Material Owner to sign a VDI
- Video Creation Tool shall enable System to check the correctness of a VDI
- Video Creation Tool shall upload a Video VDI in CoNet
- Video Creation Tool shall create a Publication VDI and inject it in a peer
- Peer shall notify users when a Publication VDI matches their subscription conditions

New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)

None

Name of use case:	3) Subscription to a Video

Classes of users considered in use case and description of role
Analysts (15 students in intercultural communication)
Detailed walkthrough of use case
1) Analyst launches the **Subscription Tool**: a) Authenticates himself/herself b) Fills in a form, with one of the following subscription criteria: i. Title of the video; sub-title; author(s); producer(s); date; location; spoken language(s) and/or short description ii. Or owner(s) of the video c) Clicks on the "send subscription" button i. A Subscription VDI is created ii. The Subscription VDI is injected into and stored on the network iii. When a video matching the subscription conditions is published, the Analyst receives a notification
Requirements for trial application
• CONVERGENCE shall have a Subscription Tool • Subscription Tool shall include the Authentication Tool • Subscription Tool shall enable the Analyst to indicate subscriptions conditions by filling in Title of the video; sub-title; type of video; author(s); producer(s); date; location; spoken language(s); short description • Subscription Tool shall enable the Analyst to indicate the owner of a VDI as a subscription criterion • Subscription Tool shall create a Subscription VDI including the subscription criteria • Subscription Tool shall inject a Subscription VDI in a peer • Peer shall notify Analyst when his/her subscription conditions are matched by a Publication VDI
New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

Name of use case	4) Revocation of a Video

Classes of users considered in use case and description of role
Video Material Owners
Detailed walkthrough of use case
1) Video Material Owner launches the **Revocation Tool,** then: a) Authenticates herself b) Browses the Video VDIs she published c) Selects a Video and clicks on the "Revoke" button 2) System checks the license to check if the Video Material Owner has the right to revoke the Video Resource 3) A Revoke request is sent to the network 4) The corresponding Video VDI is revoked 5) The following Users are notified of the revocation of the Video: a) Analysts who have subscribed to the Video b) Analysts who have published an Analysis referencing the Video c) Video Channel Owners who have posted an Analysis referencing the Video
Requirements for trial application
• CONVERGENCE shall have a Revocation Tool • Revocation Tool shall embed the Authentication Tool • Revocation Tool shall make it possible to browse Video VDIs published by the identified User • Revocation Tool shall check with the license of a specific Video VDI for the identified User to revoke it • Revocation Tool shall send an Revoke request to a peer • Peer shall revoke the VDI
New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

Name of use case:	5) Downloading a Video

Classes of users considered in use case and description of role
Analysts (15 students in intercultural communication)
Detailed walkthrough of use case
1) Analyst launches the **Video Downloading Tool**. a) Authenticates himself/herself b) Browses Video VDIs he subscribed to (as described in "Subscription to Videos" use case) c) Selects a Video to download d) Analyst indicates the location in his device where to store the video 2) System checks the license of the Video VDI the analyst wishes to download 3) The Video is downloaded as an encrypted video file 4) System checks the analyst's right to decrypt the video 5) The video is decrypted, using the decryption key embedded in the smart card 6) The analyst plays the video file which will work on any media player
Requirements for trial application
• CONVERGENCE shall have a Video Downloading Tool • Video Downloading Tool shall include the Authentication Tool • Video Downloading Tool shall allow analysts to browse Video VDIs they have subscribed to • Video Downloading Tool shall check with the license of the Video VDI for the user to download and decrypt a Video • Video Downloading Tool shall download a Video from CoNet and store it on local device • Video Downloading Tool shall decrypt a video using the decryption key embedded in a smart card
New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

Name of use case	6) Creating and Publishing of an Analysis

Classes of users considered in use case and description of role
Analysts
Detailed walkthrough of use case
1) Analyst downloads a Video he/she wants to analyze (as described in "Downloading a Video" use case) 2) Analyst launches the existing FMSH/ESCoM Video Analysis Application 3) Analyst launches the downloaded video resource 4) Analyst proceeds to the analysis of the video resource: a) Watches the video and creates a virtual segmentation (Segments are identified by time codes: start and end time, duration) b) Selects the relevant user ontology from the local device, in FMSH/ESCoM xml format[1]. c) Fills in the forms, providing for each segment i. Title, sub-title, spoken language(s), date, location, short description, long description, additional resources, video resource url for streaming; ii. Producers, contributors, authors, individual and/or institutional actors, etc. , iii. Subjects (topics), visual and audiovisual framing, pragmatic profiling and (verbal, cultural) versioning. 5) System saves the metadata in owl format, referencing classes in the domain ontologies stored on the CDS Server 6) Analyst launches the Analysis Creation Tool 7) Analyst authenticates himself/herself 8) Analyst selects the OWL file containing the Analysis metadata 9) Analyst creates Licenses for: a) FMSH/ESCoM to store the Analysis b) Video Channel Owners to subscribe, post the Analysis c) Video Channel Users to subscribe, browse the Analysis 10) Analyst creates notification requests, specifying when she wants to be notified: a) When the Analysis is posted b) When the Analysis is unposted 11) Analyst clicks on the "Publish Analysis" button: 12) System creates an Analysis VDI that: a) References the Video b) Embeds the OWL metadata c) Includes the created licenses 13) Analyst signs the VDI 14) System checks the correctness of the VDI

[1] The ontology is composed of a library of description models that the tool presents to the analysts as interactive forms.

15) System checks the Analyst right to analyze the Video
16) System uploads the video and stores it on the network
17) System injects a Publication VDI referencing the Analysis VDI and stored it on the network
18) System notifies Video Channel Owners and Video Channel Users of the new Analysis

Requirements for trial application

- FMSH/ESCoM shall provide domain ontologies in OWL format
- FMSH/ESCoM domain ontologies shall be stored in CDS Server
- An existing FMSH/ESCoM Video Analysis Application shall be provided to Analysts
- FMSH/ESCoM Video Analysis Application shall create Video Analysis metadata in OWL
- Metadata shall reference classes of the domain ontologies stored in CDS Server
- CONVERGENCE shall have an Analysis Creation Tool
- Analysis Creation Tool shall embed the Authentication Tool
- Analysis Creation Tool shall enable the Analyst to select an Analysis metadata file
- Analysis Creation Tool shall enable the Analyst to create licenses
- Analysis Creation Tool shall enable the Analyst to create notification requests
- Analysis Creation Tool shall create an Analysis VDI, including Analysis metadata, licenses, notification requests and a reference to a Video
- Analysis Creation Tool shall check the right of the identified User for analyzing the referenced Video
- Analysis Creation Tool shall enable to sign a VDI
- Analysis Creation Tool shall enable to check the correctness of a VDI
- Analysis Creation Tool shall upload an Analysis VDI in CoNet
- Analysis Creation Tool shall create a Publication VDI and inject it in a peer
- Peer shall notify users when a Publication VDI matches with their subscription conditions

New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)

None

Name of use case	7) Subscription to Analyses

Classes of users considered in use case and description of role

Video Channel Owners

Detailed walkthrough of use case

Video Channel Owner launches the **Subscription Tool,** then:

1. Authenticates himself/herself
2. Fills in a form, where she can indicate subscription criteria including:
    a. Owner(s) of the analysis
    b. Semantic conditions that metadata of an Analysis should match and that can be applied to
        i. Free text inside specific parts of the metadata (for example, *Analyses where Title contains 'Quechua'*)
        ii. Terms belonging to a predefined, domain-dependent thesaurus (e.g., *names of Andean places and regions – Huancavelica, Acomayo, Lambayeque, … -, names of music instruments – Charango, Walaychu, Tijeras, … -, names of Andean rituals and festivities - Corpus Christi, Chukcha rutukuy, Todos santos, Wasichakuy,* …) Categories defined in the domain ontology (for example, *"Andean Native Language", "Andean oral traditions", "Andean living arts traditions", "Andean musical traditions", etc.*)
3. Clicks on the "send subscription" button
    a. A Subscription VDI is created
    b. The Subscription VDI is injected into and stored on the network
    c. When an Analysis matching the subscription conditions is published, the Video Channel Owner receives a notification

Requirements for trial application

- CONVERGENCE shall have a Subscription Tool
- Subscription Tool shall include the Authentication Tool
- Subscription Tool shall enable the Video Channel Owner to indicate the owner of a VDI as a subscription criterion
- Subscription Tool shall enable the Video Channel Owner to indicate subscriptions conditions by building semantic queries on Analyses metadata
- Subscription Tool shall create a Subscription VDI including the subscription conditions
- Subscription Tool shall inject a Subscription VDI in a peer
- Peer shall notify Video Channel Owner when her subscription conditions are matched with a Publication VDI

New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

Name of use case	8) Revocation of an Analysis

Classes of users considered in use case and description of role
Analysts (15 students in intercultural communication)
Detailed walkthrough of use case
1) Analyst launches the **Revocation Tool,** then: a) Authenticates himself/herself b) Browses the Analysis VDIs he/she published c) Selects a Analysis and clicks on the “Revoke” button 2) System checks the license of the Analysis VDI and verifies that the analyst has the right to revoke the analysis 3) The corresponding Analysis VDI is revoked 4) The following users receive notification of the revocation of the Analysis: a) Video Channel Owners who subscribed to the Analysis b) Video Channel Owners who posted the Analysis c) Video Channel Users who subscribed to the Analysis
Requirements for trial application
• CONVERGENCE shall have a Revocation Tool • Revocation Tool shall include the Authentication Tool • Revocation Tool shall allow a user to browse Analysis VDIs published by the identified User • Revocation Tool shall check with the license of an Analysis VDI for the User to revoke an Analysis • Revocation Tool shall send a Revoke request to a peer • Peer shall revoke the Analysis VDI • Peer shall notify Users of the revocation of the Analysis VDI
New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

Name of use case	9) Creation of a Channel VDI

Classes of users considered in use case and description of role
Video Channel Owners. Administrator.
Detailed walkthrough of use case
1) Administrator deploys a Channel, using the existing **FMSH/ESCoM Video Channel Application**: a) Configures and deploy a web application b) Registers the Channel in FMSH/ESCoM database 2) Video Channel Owner launches the **Channel Creation Tool**, then: a) Authenticates herself b) Fills in main form: i. Title of the channel ; Alias ; URL ; Short description (free texts) c) Creates licenses for: i. FMSH/ESCoM to store the Channel ii. Video Channel Users to subscribe to and browse the Channel d) Clicks on the "Create Channel" button: 3) System creates the Channel VDI 4) The VDI embeds created licenses 5) The VDI is signed 6) System checks the correctness of the VDI 7) The VDI is uploaded and stored on the network
Requirements for trial application
• An existing FMSH/ESCoM Video Channel Application shall be provided to Administrators • FMSH/ESCoM Video Channel Application shall register Channels in FMSH/ESCoM database • CONVERGENCE shall have a Channel Creation Tool • Channel Creation Tool shall embed the Authentication Tool • Channel Creation Tool shall enable the Video Channel Owner to enter the title of the channel; alias; URL and short description • Channel Creation Tool shall enable the Video Channel Owner to create licenses • Channel Creation Tool shall create a Channel VDI, provided by Video Channel Owner and licenses • Channel Creation Tool shall allow the Video Owner to sign the VDI • Channel Creation Tool shall have the capability to check the correctness of a VDI • Channel Creation Tool shall have the capability to upload a Channel VDI to CoNet
New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

Name of use case	10) Posting an Analysis on a Channel

Classes of users considered in use case and description of role

Video Channel Owner

Detailed walkthrough of use case

1) Video Channel Owner launches the existing **FMSH/ESCoM Video Channel Application** and selects an Analysis to post
2) System checks the right of FMSH/ESCoM to store the analysis in a channel
3) System updates the FMSH/ESCoM database
4) Video Analysis can now be browsed in the FMSH/ESCoM Video Channel
5) Video Channel Owner launches the **Analysis Posting Tool**, then:
   a) Authenticates herself
   b) Browses Analysis VDIs she subscribed to (as described in "Subscription to Analyses" use case)
   c) Selects a Analysis she wants to post on her Channel
   d) Clicks on the "Post Analysis" button
6) System creates a new Channel VDI referencing the selected Analysis VDI
7) System checks the rights of the Video Channel Owner to post the analysis and the referenced video
8) System checks the right of the Video Channel Owner to revoke the Channel VDI
9) Channel owner signs the Channel VDI
10) System checks the correctness of the VDI
11) The new VDI is uploaded and stored on the network
12) The old VDI is revoked
13) A Publication VDI referencing the Channel VDI and the Analysis VDI is injected into the network
14) Video Channel Users are notified of the new post in the Channel

Requirements for trial application

- An existing FMSH/ESCoM Video Channel Application shall be provided to Video Channel Owners
- FMSH/ESCoM Video Channel Application shall make it possible to update the FMSH/ESCoM database so that a Video Analysis can be browsed on a Video Channel
- FMSH/ESCoM Video Channel Application shall check FMSH/ESCoM rights to store an analysis on a channel
- CONVERGENCE shall have an Analysis Posting Tool
- Analysis Posting Tool shall include the Authentication Tool
- Analysis Posting Tool shall make it possible to browse Analysis VDIs the Video

Channel Owner has subscribed to • Analysis Posting Tool shall create a Channel VDI, including existing information of the VDI, plus a reference to an Analysis VDI • Analysis Posting Tool shall check with the license of an Analysis VDI for the identified User to post an Analysis. Analysis Posting Tool shall check with the license of a Video VDI for the identified User to post an Analysis referencing a Video • Analysis Posting Tool shall check the license of the User to check whether she has the right to revoke Channel VDI • Analysis Posting Tool shall enable Video Channel owner to sign a VDI • Analysis Posting Tool shall have the capability to check the correctness of a VDI • Analysis Posting Tool shall have the capability to upload a Channel VDI to CoNet • Analysis Posting Tool shall have the capability to send a Revoke Channel VDI request to CoNet • Analysis Posting Tool shall have the capability to create a Publication VDI and inject it in a peer • Peers shall notify users when a Publication VDI matches their subscription criteria
New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

Name of use case	11) Subscription to posted Analyses

Classes of users considered in use case and description of role
Video Channel Users
Detailed walkthrough of use case
1) Video Channel User launches the **Subscription Tool** 2) Video Channel User authenticates himself/herself 3) Video Channel User fills in a form, where he/she can indicate subscription criteria including a) The Channel b) Conditions that metadata of posted Analysis should match and that can be applied to: i. Free text in specific parts of the metadata (for example, Analyses where Title contains 'Quechua') ii. Terms belonging to a predefined, domain-dependent thesaurus (for example, names of Andean places and regions –names of musical instruments 4) Video Channel User clicks on the "send subscription" button 5) System creates a Subscription VDI 6) The Subscription VDI is injected and stored in the network 7) System notifies video channel user when an Analysis matching their subscription criteria is posted in the Channel
Requirements for trial application
• CONVERGENCE shall have a Subscription Tool • Subscription Tool shall include the Authentication Tool • Subscription Tool shall enable the Video Channel User to indicate subscriptions criteria by identifying a Channel • Subscription Tool shall enable the Video Channel User to indicate subscriptions criteria by building semantic queries on Analyses metadata • Subscription Tool shall have the capability to create a Subscription VDI including the subscription conditions • Subscription Tool shall have the capability to inject a Subscription VDI in a peer • The Peer shall notify Video Channel User when her subscription conditions are matched by a Publication VDI
New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

Name of use case	12) Unposting (Revoking) an Analysis

Classes of users considered in use case and description of role

Video Channel Owner

Detailed walkthrough of use case

1) Video Channel Owner launches the existing **FMSH/ESCoM Video Channel Application** and selects an Analysis to revoke
2) System updates the FMSH/ESCoM database
3) The Video Analysis can no longer be browsed through the FMSH/ESCoM Video Channel
4) Video Channel Owner launches the **Analysis Posting Tool,** then:
   a) Authenticates himself/herself
   b) Browses the Video Analysis VDIs he/she posted on her Channel
   c) Selects an Analysis and clicks on the "Unpost" button
5) System creates a new Channel VDI where the reference to the selected Analysis VDI is removed
6) The license of the Video Channel Owner for storing a new Channel and revoking the Analysis are checked
7) Video Channel Owner signs the new VDI
8) System checks the correctness of the VDI
9) The new VDI is stored on the network
10) The old VDI is revoked
11) The corresponding Publication VDI is revoked
12) Video Channel Users who subscribed to the Analysis are notified that the Video Analysis has been revoked

Requirements for trial application

- An existing FMSH/ESCoM Video Channel Application shall be provided to Video Channel Owners
- FMSH/ESCoM Video Channel Application shall have the capability to update FMSH/ESCoM database so that a Analysis no longer be browsed on a given Channel
- CONVERGENCE shall have an Analysis Posting Tool
- Analysis Posting Tool shall include the Authentication Tool
- Analysis Posting Tool shall have the capability to browse Analysis VDIs posted by the Video Channel Owner
- Analysis Posting Tool shall have the capability to create a new Channel VDI, including all information in the previous Channel VDI except the reference to the Analysis VDI
- Analysis Posting Tool shall check with the license of an Analysis VDI for the User to revoke an Analysis
- Analysis Posting Tool shall check with the license of a Channel VDI for the User to update a Channel
- Analysis Posting Tool shall allow a channel owner to sign a Channel VDI

• Analysis Posting Tool shall have the capability to check the correctness of a VDI • Analysis Posting Tool shall have the capability to upload a Channel VDI to CoNet • Analysis Posting Tool shall have the capability to send a Revoke Channel VDI request to CoNet • Analysis Posting Tool shall have the capability to create a Publication VDI and inject it in a peer • Peer shall notify users when a Publication VDI matches their subscription criteria
New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

Name of use case	13) Browsing an Analysis on a Channel

Classes of users considered in use case and description of role
Video Channel Users
Detailed walkthrough of use case
1) Video Channel User launches the **Browsing Tool,** then: a) Authenticates himself/herself b) Browses Publication VDIs she has subscribed to (as described in "Subscription to posted Analyses" use case) c) Selects a Analysis she wants to browse on a Channel d) Inputs information on the Publication VDI i. Title or URL of the Channel VDI ii. Title, sub-title, spoken language(s), date, location, short description, long description of the analysis 2) System redirects user to web channel, where he/she can read analysis metadata and watch video.
Requirements for trial application
• Web channels deployed by FMSH/ESCoM shall be accessible without constraint to Video Channel Users • Web channels provided by FMSH/ESCoM shall enable end users to navigate through analyses, read metadata and watch videos • CONVERGENCE shall have a Browsing Tool • Browsing Tool shall include the Authentication Tool • Browsing Tool shall enable users to browse Publication VDIs matching Video Channel User subscriptions • Browsing Tool shall present content included in the Publication VDI • Browsing Tool shall have the capability to redirect User to web URLs embedded in VDI metadata
New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

3.4 Augmented lecture podcast (LMU)

3.4.1 General description of scenario

Name of scenario:	**Augmented Lecture Podcast**

Description of general user population:
Lecturers who wish to provide students with up to date learning materials and to encourage student participation in the learning process. Students who use augmented podcasts to revise and discuss course content.
Specific classes of user considered in scenario and description of role
Lecturers involved in publishing and updating the podcast. Computer science students from two different universities who both use the same lecture podcast.
General description of scenario
One approach to Internet-based learning is to use "lecture podcasts", consisting of video or audio recordings of lectures, possibly accompanied by synchronized presentations. The material is often distributed over a special website, but there are also other possibilities. One is to use podcasts, augmented with additional features such as annotations and group-work functionalities. In this scenario, a University uses CONVERGENCE technology to implement such a system. Each podcast consists of several "episodes", each containing a recorded lecture and synchronized slides. The students in the scenario are attending a course on "algorithms and data structures". The course is complemented by a lecture podcast delivered through CONVERGENCE. All the students on the course subscribe to the podcast. CONVERGENCE notifies them when new episodes become available, allows them to download episodes to their smart phones or PCs, updates the episodes when necessary and supports student discussion and annotation of individual episodes in a Web2.0 environment.
Names of use cases considered in scenario
1. User registration to augmented lecture podcast service 2. Publication and update of lecture podcast 3. Download of lecture podcast episodes and components of a lecture podcast 4. Search for a lecture podcast or one of its components 5. Subscription to a lecture podcast or to one of its components with notification of updates and new releases

6. Individual and collaborative learning with the augmented lecture podcast
7. Event Report Statistics
8. Digital Forgetting

3.4.2 Description of individual use cases

Name of use case	1) User registration to augmented lecture podcast service

Classes of users considered in use case and description of role
As in general scenario
Detailed walkthrough of use case
To use the augmented lecture podcast service, students and lecturers have to register. CONVERGENCE provides two registration mechanisms: 1) Registration with smartcard-based authentication 2) Registration with username/password authentication **Registration with smartcard-based authentication** 1) Students and lecturers are registered by a trustworthy authority 2) Students present their credentials (e.g. passport) 3) Students receive a personalized smartcard 4) Students use the smartcard to authenticate themselves **Registration with username/password authentication** Registration with username/password authentication can be completed online. The procedure is the same for students and for lecturers. The user: 1) Opens a CONVERGENCE-enabled browser 2) Enters the application's VDI identifier in a text field or clicks on the corresponding bookmark in the browser 3) Enters the application via her browser 4) Clicks on the button to register a new account 5) Fills out a form with her personal information 6) Agrees to the terms of service 7) Submits the registration form 8) Receives confirmation of registration In both cases, lecturers and students have to agree to the terms of service of the augmented lecture podcast provider. This prevents students from publishing inappropriate annotations and allows the service provider to delete annotations that do not correspond to the terms of service, without the consent of the author of an annotation.

Requirements for trial application
• The trial shall require user registration
New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

Name of use case	2) Publication and update of lecture podcast

Classes of users considered in use case and description of role
Lecturers
Detailed walkthrough of use case
Creation of slides, videos and synchronization To publish slides, videos or lecture podcast as VDIs to the CONVERGENCE network, lecturers have to prepare the necessary resources: • Slides in PDF-format exported from PowerPoint or Keynote • Videos in mp4-format • Synchronization information in XML-format Synchronization information is generated by an application that runs during the recording of a lecture. The application manages a table that stores the information. Every time the lecturer moves to the next slide, she clicks on a shortcut button that creates a new entry in the table with a timestamp and the slide number. At the end of the lecture the information is exported to a XML-File. To publish the resources and the podcast to the CONVERGENCE network, lecturers use a Podcast VDI-creator application, as described below: 1) Lecturers register with the lecture podcast service 2) Lecturers use their credentials to authenticate themselves with the Podcast VDI-creator application 3) Lecturers create VDIs for each lecture podcast component (video, slides) 4) For each resource lecturers: a) Obtain an identifier for the resource b) Describe the resource c) Obtain a VDI-identifier for the VDI d) Sign the VDI e) Package and store the VDI f) Publish the VDI 5) Lecturers use these VDIs to create the actual lecture podcast episode. This involves the following steps: a) Inclusion of the synchronization information as metadata b) Inclusion of the Sequence Identifier for the video-VDI and the slides-VDI. c) Description of the episode d) Creation of licenses e) Inclusion of event reports (*see use case: Event Report Statistics)* f) Obtain a VDI-identifier for the VDI g) Signature of VDI

h) Packaging and storage of VDI
i) Publishing of VDI to the Network

Update of Lecture Podcast or one of its components

Teaching material needs to be constantly updated (addition of new materials, correction of mistakes). Updating involves the following steps:

1) Lecturers make changes to a resource (e.g. editing the content of slides)
2) Lecturers save modifications made to a resource
3) Lecturers create a new VDI for each modified resource as is previously described
4) Lecturers revoke older VDIs from the network
5) Subscribers are notified of the update

Requirements for trial application

- The trial shall have a Podcast VDI-creator application
- The Podcast VDI-creator application shall support mutual authentication
- The Podcast-VDI-creator application shall parse XML-information and transform it into metadata to be included in the VDI.
- The Podcast-VDI-creator application shall retrieve the Sequence Identifier of video-VDIs and slide-VDIs to be included in the VDI for the podcast episode
- The Podcast-VDI-creator application shall help lecturers to create a description for the podcast episode
- The Podcast VDI-creator application shall obtain identifiers for resources
- The Podcast VDI-creator shall obtain identifiers for VDIs
- The Podcast VDI-creator application shall publish VDIs

New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)

None

Name of use case	3) Download of lecture podcast episodes and components of a lecture podcast

Classes of users considered in use case and description of role

Students.

Detailed walkthrough of use case

Download lecture podcast

Students who wish to revise lectures without additional features like reading and writing annotations can download lecture podcast episodes, videos or slides to their local device using a CONVERGENCE-enabled browser. The walkthrough consists of the following steps:

1) Students enter the VDI identifier into a text field or click on the appropriate bookmark in the browser
2) Students receive the requested VDI
3) Students preview the content of the VDI received in their browser
4) Students request to store the VDI
5) Students download VDI and store it on their local device

Requirements for trial application

- The trial shall have a CONVERGENCE-enabled browser
- The browser shall offer users an interface to enter a VDI identifier
- The browser shall have the capability to request a VDI by its identifier from the CONVERGENCE network
- The browser shall have the capability to display the content of a retrieved VDI
- The browser shall support download of VDIs

New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)

None

Name of use case	4) Search for a lecture podcast or one of its components

Classes of users considered in use case and description of role

Students

Detailed walkthrough of use case

CONVERGENCE allows students to search for a lecture podcast or podcast components:

- In a CONVERGENCE-enabled browser
- Using the lecture podcast application.

Search with CONVERGENCE-enabled browser

1) Students enter their search query in a text field
2) Students receive a series of candidate VDIs
3) Students preview the content of VDI of interest
4) Students download a VDI of interest (optional)
5) Students subscribe to a VDI of interest (optional)

Search with the augmented lecture podcast application

1) The lecture podcast application provides students with two different search mechanisms:
   a) Free text search
   b) Ontology-based search (students fill in fields in a form related to the podcast domain)
2) Students receive a series of candidate VDIs
3) Students view VDI of interest
4) Students subscribe to VDI of interest (optional)

Requirements for trial application

- The trial shall have a CONVERGENCE-enabled browser
- The trial shall have an augmented lecture podcast application
- The browser shall provide a text field for free search
- The browser shall show a list of results from the search
- The browser shall allow users to preview VDIs
- The browser shall provide users with subscription functionalities
- The podcast application shall provide free text search
- The podcast application shall provide ontology-based search functionality
- The augmented lecture podcast application shall support users with subscription functionalities

New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

Name of use case	5) Subscription to a lecture podcast or to one of its components with notification of updates and new releases

Classes of users considered in use case and description of role

Students

Detailed walkthrough of use case

Students interested in a lecture podcast can subscribe to podcast episodes or components of a podcast. Using the augmented lecture podcast application, students can decide whether to be notified about updates and new releases or not. In the latter case updates and downloads are completed transparent to the user. Subscription options can be changed any time in the podcast application.

Subscription

1) Students select VDI of interest
2) Students subscribe to selected VDI

Notification of updates and new releases

The system sends notifications either through the podcast application or through normal email.

Notification using the augmented lecture podcast application (only if option to be notified was selected during subscription)

Students:

1) Log into the podcast application
2) See a list of lecture podcasts they have subscribed to
3) See notifications for:
   a) New annotations to the podcast
   b) New episodes
   c) Updates to the podcast
4) Select a notification and jump to the annotation/episode referenced in the annotation

Notification using standard email-Client

Students

1) Receive an email containing the notification
2) Click on a link contained in the notification
3) Preview information on the annotation episode referenced in the notification
4) Choose whether to download content / update content to the latest version

5) Download content / the update 6) Work with the latest version
Requirements for trial application
• The trial shall have a standard email-Client • The trial shall have an augmented lecture podcast application • The augmented lecture podcast application shall provide a subscription mechanism • The augmented lecture podcast applications shall notify students about updates • The augmented lecture podcast applications shall show students the updated content
New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

Name of use case:	6) Individual and collaborative learning with the augmented lecture podcast

Classes of users considered in use case and description of role

Students

Detailed walkthrough of use case

Watch Lecture Podcast Online

When students want to revise a lecture and make annotations, they go through the following steps:

1) Open a CONVERGENCE-enabled browser
2) Enter the application's VDI identifier in a text field or clicks on the corresponding bookmark in the browser
3) See the retrieved application in their browser
4) Login to the application
5) Search for a podcast of interest
6) See a list of results
7) Select podcast of interest
8) Watch the podcast which the application retrieves and streams from the CONVERGENCE Network
9) View slides synchronized with the streamed video

Read Annotations to Lecture Podcast

Students watching the lecture podcast can see other students' annotations, which can be restricted or public. Restricted annotations can be personal (only visible to the author) or shared within a certain group. Public annotations are visible to all users registered to the system. Public annotations may be anonymous. To read the annotations, students go through the following steps.

1) Choose whether to view all annotations or only annotations to the current slide.
2) Choose whether or not to display:
   a) Personal annotations
   b) Shared annotations
   c) Public annotations
3) Students select an annotation and view the content
   a) Author (when annotations are non-anonymous)
   b) Text of annotation
   c) Replies to annotation

Creation/publishing of annotation related to another annotation

While watching the lecture podcast, students can make own annotations or reply to

other public annotations. To do this they go through the following steps:

1) Click on slide to make annotation
2) Write content of annotation
3) Select publishing options:
   a) Personal
   b) Shared
   c) Public/non-anonymous
   d) Public/anonymous
4) Enter expiry date for annotation
5) Sign their annotation [2]
6) Publish their annotation

Edit Annotation

The author of an annotation has the right to change her/his annotation. To do this she

1) Selects the annotation to be changed (only possible for authors)
2) Make changes to
   a) The content (text)
   b) The license
3) Save the changes
4) Publish the annotation

If the annotation is public or shared other students are notified of the change.

Delete Annotation

See Use Case: Digital Forgetting

Requirements for trial application

- The trial shall have a CONVERGENCE-enabled browser
- The trial shall have an augmented podcast application
- The podcast application shall be retrieved by its VDI Identifier
- The podcast application shall require students to login
- The podcast application shall provide free text search and ontology-based search
- The podcast application shall stream the video for the lecture podcast
- The podcast application shall display slides synchronized with a video fragment
- The podcast application shall display all annotations made to a podcast
- The podcast application shall enable filtering of annotations
- The podcast application shall allow the creation and modification of annotations
- The augmented lecture podcast application shall sign annotations before publishing

[2] If the annotation is published anonymously a group signature key replaces the student's private key. This allows the author of a comment to remain anonymous while still allowing outsiders to check the signature

• The augmented lecture podcast application shall allow students to delete annotations • The podcast application shall hide the identity of the author of an anonymous annotation
New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

Name of use case	7) Event Report Statistics

Classes of users considered in use case and description of role

Lecturers

Students

Detailed walkthrough of use case

Collect and Retrieve Statistics

CONVERGENCE automatically collects statistics when:

- Students download a lecture podcast or a component of it
- Students watch the streamed podcast
- Students make annotations to a podcast

On each such event:

- The server receives an Event Report
- The server stores the reports in a Database

An application retrieves the information from the Database and presents it to Lecturers. In this process lecturers:

1) Authenticate themselves to the application
2) Select the lecture podcast that interests them
3) View statistics on the podcast

Requirements for trial application

- The trial shall have an application for statistical information
- The application shall require lecturers to authenticate themselves
- The application shall retrieve statistical information from a database on the Server
- The application shall present the statistical information to lecturers

New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)

None

Name of use case	8) Digital Forgetting

Classes of users considered in use case and description of role
As in general scenario
Detailed walkthrough of use case
Revocation of annotation at the authors discretion The author of an annotation can revoke a published annotation. Revoked annotations are removed from the system and are no longer accessible to users. Annotations connected to the revoked annotation (e.g. replies to an annotation) are also removed. When a student revokes an annotation she: 1) Selects the annotation 2) Clicks on the delete button Assuming the student has the appropriate authorization, the annotation is removed. *Revocation of annotation without the author's consent* If an annotation is found to violate the terms of service defined by the service provider, it can be removed from the system, even without the consent of the author. The removal is carried out by a trusted third party (TTP). The TTP: 1) Selects the annotation to be removed 2) Authenticates herself to the podcast application 3) TTP uses a master key to delete the annotation 4) The author of the deleted annotation is notified about its removal.
Requirements for trial application
• The augmented lecture podcast application shall allow the removal of annotations by a trusted third party when the terms of service of the podcast service are violated • The augmented lecture podcast application shall allow the removal of annotations by authorized persons.
New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

3.5 Smart Retailing (WIPRO/UTI)

3.5.1 General description of scenario

Name of scenario:	**Smart Retailing**

Description of general user population:
Manufacturers wishing to sell their products without investing heavily in marketing Retailers Customers
Specific classes of user considered in scenario and description of role
Manufacturer Retailer Sales clerk Customer Relative of customer
General description of scenario
This scenario describes CONVERGENCE applications that help manufacturers and retailers to create and maintain self-contained packages of information (VDIs) describing the products they sell to customers. The scenario describes how the use of VDIs makes it easier for them to serve customers and also easier for that customers to find, purchase and use products. The CONVERGENCE platform allows manufacturers and retailers to transmit information about their products to customers. The network and middleware ensure that the information provided is always accurate and up to date, *even when it is provided via a third party retailer or broker*. CONVERGENCE also makes it easier for manufacturers and retailers to reach customers who have bought their products (e.g. for market research, advertising safety recalls etc.) CONVERGENCE allows customers to look for products whose VDIs have been published on the network, without relying on any specific manufacturer or retailer site (whose addresses they would have to know). This makes it easier for them to find products from small manufacturers who cannot spend heavily on advertising. It also makes it easier for small manufacturers to reach customers. During shopping, the retailer provides customers with shopping carts enhanced with a

tablet screen (PC). The tablet acts as a client for the retail Convergence application. Once the user activates the tablet and is authenticated, the tablet notifies her about products she is interested in, promotions, discounts, sales and other things going on in the store. Alternatively, the customer can use her own mobile phone endowed with a CONVERGENCE application.

Customers can use the tablet / mobile phone to search for products and to retrieve information about the manufacturer of the product, price, location, and other marketing data.

Customers will also be able to "subscribe to products" so they can receive new information about the product when it becomes available (e.g. information about the arrival of a product that is temporarily unavailable). Once at home, customers will be able to access the same functions from their home PCs. The manufacturers and the retailers can define their marketing and advertising events, concerning: discounts, advertising of new brands, products or models.

Names of use cases considered in scenario

1. A manufacturer launches a product and a retailer orders the product
2. A customer checks product information
3. The customer buys the product
4. The customer returns the product
5. Repairing the product
6. A safety recall
7. Giving away the product – second hand sales
8. The retailer launches a new product or updates an existing one
9. The customer manages her shopping preferences
10. The customer receives an alert about a sales event while she is shopping
11. The retailer analyses aggregated data about the products searched for / subscribed to by customers and about their activity in the store

3.5.2 Description of individual use case

Name of use case:	1) A manufacturer launches a product and a retailer orders the product

Classes of users considered in use case and description of role
Manufacturers Retailers
Detailed walkthrough of use case
Creation of product VDIs Manufacturers who release new products to the market create VDIs for the products and publish them to the CONVERGENCE network. This involves the following steps: 1) User authentication: before creating and publishing products VDIs, the manufacturer has to login to the application, with a username and a password 2) Creation of Manufacturer product type VDI (MPT-VDI) a) Identification of resources (documents, images, videos) used to describe the product b) Description of resources c) Definition of the product metadata information, using the CDS d) Creation of license iii. Grant rights to issue a child VDI (update) iv. Grant rights to access VDI information e) Identification and Signature of VDI f) Packaging and Storage of VDI 3) Publishing of VDI to the Network **Subscription to products VDIs and notification about updates** Retailers who want to add new products to their portfolio and to be periodically informed about the products manufacturers are releasing, can subscribe to product VDIs and receive notifications about products, even before they are ready to be ordered. This involves the following steps: 1) Subscribe to VDI(s) a) Subscribe to a specific product type VDI

b) Subscribe to products with characteristics that interest the retailer

2) Receive notifications and updates of product VDIs that match the subscription criteria (for example notifications about products that are ready to be ordered)
   a) Via the CONVERGENCE application
   b) Via email

Once a retailer receives a notification that a product is ready to be ordered, he orders the product and its VDI is automatically transferred to his ERP system, avoiding the need to input product details.

Integration with ERP systems

After a retailer orders a product, the product VDI data is automatically transferred to the database of the retailer ERP system. This involves the following steps:

1) Store VDI in database
   a) The product VDI is stored in the ERP system database
2) Extract product data
   a) The product data is extracted from the VDI making it accessible to all applications in the ERP system

Requirements for trial application

- Manufacturers shall be able to create product VDIs
- Manufacturers shall be able to publish product VDIs they have created
- Retailers shall be able to subscribe to product VDIs
- Retailers shall be able to receive notifications and updates about products VDIs to which they have subscribed
- Retailers shall be able to automatically transfer information in product VDIs to their ERP systems

New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)

None

Name of use case:	2) A customer checks product information

Classes of users considered in use case and description of role

Retailers

Customers

Detailed walkthrough of use case

Search and subscribe to products VDIs

Customers can search for products using a VDI search application, without having to go to the store. This involves the following steps

1) Search for products by:
   a) Free text search
   b) VDI identifier
   c) Filling in a form based on concepts in the manufacturer and retailer ontologies
2) Receive the list of VDIs matching the search criteria (as with a search engine)
3) Consult the product VDI[3]
4) Subscribe to product VDIs of interest (optional)

Consult products VDIs information in-store

In the retailer's store, customers can access a product VDI by using their smartphones to read the barcode of the product. This involves the following steps:

1) Consult the VDI for the product
   a) Use a smartphone to read the product's barcode. The smartphone accesses the retailer VDI associated with the product
   b) The customer can check all information available about the product including related VDIs, promotions, etc.

Requirements for trial application

- Customers shall be able to search for product VDIs
- Customers shall be able to subscribe to product VDIs
- Customers can be able to consult information in product VDIs
- Retailers shall be able to associate other VDIs and promotions with product VDIs (create new versions of the manufacturer's product VDI)

[3] The product VDI includes a list of retailers selling the product

New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

Name of use case	3) The customer buys the product

Classes of users considered in use case and description of role
Retailers Customers
Detailed walkthrough of use case
Create customers product VDIs When a customer buys a product at the POS in a retailer's store, the system creates a new version of the product VDI, associating the customer with the product VDI and other purchase data. This involves the following step; 1) Creation of Retailer product instance VDI (RPI-VDI) a) Create RPI-VDI (child of MPT-VDI) b) Identify product resources i. Product serial number ii. Warranty (data of purchase) iii. Consumer id (Smartcard, ID card, fidelity card or other token) c) Describe resources d) Describe product metadata e) Create license i. Granting the customer rights for the RPI-VDI f) Identify VDI g) Sign VDI h) Store VDI After the customer has bought the product and the VDI for the product has been created, the POS generates a digital receipt for the purchase.
Requirements for trial application
• Retailers shall be able to create customer product VDIs at the POS • It shall be possible to associate a customer with VDIs using a token to identify him/her
New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

Name of use case:	4) The customer returns the product

Classes of users considered in use case and description of role
Retailers Customers
Detailed walkthrough of use case
Consult and revoke products VDIs When a customer wants to return a product, all she has to do is to consult the product VDI information and check the retailer's return policy. She doesn't need to search for the receipt, because the system generated a digital receipt when she bought the product. In the store the retailer will check the product VDI to see if everything is okay. If the return is accepted, she will revoke the customer product VDI created when the product was purchased. This process involves the following steps: 1) Consult the product VDI 2) User authentication 3) Check license (only the creator of the VDI can revoke it) 4) Revoke existing VDI a) Revoke license b) Revoke event request c) Revoke VDI
Requirements for trial application
• Retailers shall be able to consult product VDIs • Retailers shall be able to revoke VDIs
New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

Name of use case:	5) Repairing the product

Classes of users considered in use case and description of role
Retailers/Repairers Customers
Detailed walkthrough of use case
Consult product VDI for associated repairers If a customer needs to repair a product, he starts by checking if the product VDI contains information about repair shops (see previous use cases). **Search product repairers** If the product VDI has no information on repair shops, the customer can search for a repairer using a VDI search tool. This involves the following steps: 1) Search for repairers for a product using: a) Free text search b) The VDI identifier for the product 2) Receive a list of repairers 3) Consult the VDI for the repairer VDI (contact information, prices, etc.) As an alternative, the customer can take the product to the retailer store where he bought it. The retailer will check the warranty details in the product VDI and if everything is okay send it for repair. When the product is repaired, the retailer updates its VDI with a description of the repair and returns it to the customer, who can consult the VDI to check what the problem was.

Requirements for trial application
• Customers shall be able to consult product VDIs • Customers shall be able to search for VDIs associated with a product VDI • Retailers shall be able to update product VDIs with repair data
New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

Name of use case:	6) A safety recall

Classes of users considered in use case and description of role
Retailers Customers
Detailed walkthrough of use case
Notification of updates on products VDIs If a retailer discovers that one of the products he is selling is defective, he can update the VDI for the product with an emergency recall notification. To do this he creates a new version of the product VDI, as described in previous use cases. When the update has been completed, all customers who have bought the product receive a notification about the recall. The notification is associated with the customer product VDI, which the customer can consult as described in previous use cases.
Requirements for trial application
CONVERGENCE shall have a means of displaying an emergency notification to owners of a VDI, without any action on the part of the owner.
New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

Name of use case:	7) Giving away the product – second hand sales

Classes of users considered in use case and description of role
Customers
Detailed walkthrough of use case
Update of product VDI or one of its resources When a customer decides to give away a product to another person, she uses a CONVERGENCE application to update the ownership field in the product VDI. This involves the following steps: 1) Update the resource (edit the ownership of the product and license) 2) Save modified resource 3) Create a new VDI for modified resource 4) Publish the new VDI (optional) 5) Revoke older VDI from network (optional)
Requirements for trial application
Customers shall be able to update product VDIs Customers shall be able to revoke product VDIs
New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

Name of use case:	8) The retailer launches a new product or updates an existing one

Classes of users considered in use case and description of role

Retailers

Detailed walkthrough of use case

Import of retailer data

The retailer needs to create / update product information. He therefore imports the new data into the Retail Application. Depending on the retailer's IT system, the import can be done via:

- Import of a data file
- Integration with web services

To maintain the association between the product from the retailer system and the corresponding CONVERGENCE VDI, the product VDI stores an identifier generated by the retailer, which uniquely identifies a product in his system.

Creation and update of products VDIs

The CONVERGENCE application validates the data received. If the parsing is successful the application determines which part of the information concerns new product VDIs and which parts concerns product VDIs that already exist. It then creates / updates the product VDIs. This involves the following steps:

1) Validation of the retailer data - if the parsing generates errors, the system generates an error report.

2) Saving the data to CONVERGENCE – if the parsing is correct, the application saves the data to convergence, updating existing VDIs or creating new ones.

Requirements for trial application

- Retailers shall be able to import data concerning their products into CONVERGENCE
- Retailers shall be able to create and publish product VDIs using imported data
- Retailers shall be able to update their product VDIs using imported data
- Retailers shall be able to receive error reports generated by the import

New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)

None

Name of use case:	9) The customer manages her shopping preferences

Classes of users considered in use case and description of role
Customers
Detailed walkthrough of use case
Subscription to products The Customer decides to define her shopping preferences so she can take advantage of real-time notifications about certain products and sales events. This involves the following steps: 1) User authentication – the Customer authenticates herself with the application using: • Username / password • A digital certificate contained in a token (optional) 2) User notification delivery management – the Customer can specify different means for the delivery of notifications: • Email; • SMS/MMS. 3) Definition of a Subscription VDI – the Customer defines her subscriptions **Definition of shopping list** The Customer wants to speed-up her daily shopping. She defines a shopping list with the products and events she wants to be notified about when she is in the store. This involves the following steps: 1) Definition of shopping item – the Customer chooses one of her previously defined Subscription VDIs and specify the stores where she wants to receive notification about the item, 2) Using the shopping list – when she is in the store, the Customer: • Authenticates herself with the tablet integrated in the shopping cart • Consults the information shown by the application • Reads the alerts generated by the application based on her shopping list and real-time events in the store.

Requirements for trial application
• Customers shall be able to define Subscription VDI • Customer shall be able to define shopping lists • Retailers shall be able to notify users through different means of events about products • Retailers shall be able to suggest products / sales events to the Customer based on his shopping preferences and the store in which he is shopping
New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

Name of use case:	10) The customer receives an alert about a sales event while she is shopping

Classes of users considered in use case and description of role
Customers
Detailed walkthrough of use case
Notification While she is inside the store, the customer receives a notification about events in the store. This involves the following steps: 1) User authentication – the customer authenticates with the application, as described in the previous use case 2) User gets notification – the tablet generates an audio/ visual signal for a "New Alert!". 3) Consulting the alert – the Customer views the details of the notification, which specifies: • What triggered the notification • Details of the product(s) / sales event concerned • Details of how to reach the location of the product/event.
Requirements for trial application
• Customers shall be able to consult notification details (trigger, products / sales events / location) • Retailers shall be provide notifications to customers, in real time, based on their shopping preferences and the store in which they are shopping
New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

Name of use case:	11) The retailer analyses aggregated data about the products searched for / subscribed to by customers and about their activity in the store

Classes of users considered in use case and description of role
Retailers
Detailed walkthrough of use case
Data capture The CONVERGENCE application captures information about customer actions with the application and about the movement of the shopping cart through the store. This involves the following steps: 1) Capture of user actions with the application: • Product searches • Product views • Subscriptions • Reading of product bar codes • Viewing of alerts • Definition of Shopping list 2) Analysis of cart movement through the store. **Analysis of the aggregated data** The Retailer can analyse aggregated data using various statistics, reports and indicators generated by the application.
Requirements for trial application
• Retailers should be able to gather data about use of CONVERGENCE applications by customers • Retailers shall be able to analyze aggregated data.
New requirements for CONVERGENCE (architecture, definition of VDI, framework, network, other)
None

4 Requirements

4.1 Introduction

The tables below describe provisional requirements for the tools and applications to be used in the CONVERGENCE trials. Requirements for the VDI, the CONVERGENCE middleware and the CONVERGENCE network remain unchanged and are not repeated.

The first table shows general requirements shared by all scenarios. The subsequent tables show requirements that are scenario-specific. The requirements expressed in these tables replace the applications level requirements formulated in D2.1. Reviewers are asked to note that the current formulation of requirements does not specify the way specific functionalities will be grouped into applications and tools. These groupings will be specified in WP7, which is likely to add additional requirements, not identified at this stage of the work. They are asked to note that there is still an open issue concerning CONVERGENCE support for electronic payment. This will be resolved during the design of tools and applications in WP7.

4.2 Applications level requirements

Scenario/Trial	Area	Code	Requirement
All	Registration and authentication[4]	APP-ALL1	CONVERGENCE shall have a Registration Tool
-		APP-ALL2	Registration Tool shall embed a secured authentication feature for Administrators
-		APP-ALL3	Registration Tool shall enable the Administrator to create a User VDI by indicating First Name, Last Name Email and Company
-		APP-ALL4	Registration Tool shall embed a secured authentication feature for system administrators
-		APP-ALL5	Registration Tool shall generate a PIN invisible to the Administrator
-		APP-ALL6	Registration Tool shall configure a smart card for embedding User information and PIN
-		APP-ALL7	Registration Tool shall upload a User VDI to CoNet
-		APP-ALL8	Administrator shall receive a significant number of empty smart cards and smart card readers
-		APP-ALL9	CONVERGENCE shall have an Authentication Tool
-		APP-ALL10	Authentication Tool shall enable the User to enter her PIN, Login and Password

[4]These requirements are explicitly stated only in the FMSH scenario. However, they apply to all scenarios

-		APP-ALL11	Authentication Tool shall enable mutual authentication with smart card between User and Device
-		APP-ALL12	Authentication Tool shall enable authentication of a User in CoNet
-	Creation of VDI	APP-ALL13	Trial applications should provide a VDI Creation and Publishing Tool
-		APP-ALL14	The tool should allow users both a create a VDI *ab initio*, or to derive a VDI from an existing VDI
-		APP-ALL15	The tool shall allow users to incorporate links to other VDIs
-		APP-ALL16	The tool shall allow a user to sign a VDI
-	Introduction of metadata	APP-ALL17	The tool shall provide facilities allowing users to add metadata to VDIs using an application-specific input form
-		APP-ALL18	The tool shall allow users to use the input form to reference classes of domain ontologies stored in CDS Server
-	Licensing	APP-ALL19	The tool shall provide facilities allowing authorized users to define licensing terms for VDIs
-	Security and privacy	APP-ALL20	The tool shall make it possible to encrypt and decrypt a VDI
-		APP-ALL21	The tool shall make it possible to sign a VDI
-		APP-ALL22	The tool shall make it possible to publish a VDI anonymously
-		APP-ALL23	The tool shall make it possible to check the signature of a VDI
-		APP-ALL24	The tool shall make it possible to define an expiry-date for a VDI
-	Publication	APP-ALL25	The tool shall allow authorized users to publish a VDI to the CoNet

-		APP-ALL26	The tool shall have the capability to obtain an identifier for a VDI that is to be published to the network
-		APP-ALL27	On request from an authorized user, the tool shall inject a publication VDI into a CONVERGENCE tool
-	Search and subscribe	APP-ALL28	Trial applications shall provide a Search/Subscribe Tool that allows users to search for/ subscribe to VDIs by defining a set of search criteria in an application-specific form
-		APP-ALL29	Search/Subscribe Tool shall allow users to perform free-text searches for VDIs
-		APP-ALL30	Search/Subscribe Tool shall allow users to search for/subscribe to a VDI with a known identifier (introduced directly by the user or via a bookmark)
-		APP-ALL31	Search/Subscribe Tool shall support the use of domain ontologies to define search criteria
-		APP-ALL32	Search/Subscribe Tool shall allow a user to request notification every time a VDI meeting his/her search criteria is published or updated
-		APP-ALL33	Search/Subscribe Tool shall inject a subscription VDI into a CONVERGENCE peer
-		APP-ALL34	The Search/Subscribe Tool shall ensure that users who have requested notifications receive them every time a VDI meeting his/her search criteria is published or updated
-		APP-ALL35	It shall be possible to send notifications both to the trial application and to a normal e-mail client, according to options chosen by the user
-		APP-ALL36	Search/Subscribe Tool should support display of a set of search results and

			necessary accompanying information (e.g. thumbnails of photos)
-		APP-ALL37	Search/Subscribe Tool shall support download of a selected result
-	Browsing	APP-ALL38	Trial applications shall have a Browsing Tool
-		APP-ALL39	Browsing Tool shall incorporate the Authentication Tool
-		APP-ALL40	Browsing Tool shall enable authorized users to browse Publication VDIs
-		APP-ALL41	Browsing Tool shall present content included in the Publication VDI
-		APP-ALL42	Browsing Tool shall have the capability to redirect User to web URLs embedded in VDI metadata
-		APP-ALL43	Browsing Tool should provide access to the Search/Subscribe Tool (see above)
-	Download	APP-ALL44	Browsing Tool shall allow users to download VDIs
-		APP-ALL45	Browsing Tool shall only download VDIs to users authorized to download the VDI
-		APP-ALL46	Where necessary and where the user has the necessary rights, the Browsing Tool shall decrypt the VDI using a decryption key embedded in a smart card
-	Unpublishing	APP-ALL47	Trial applications shall include a Revocation Tool
-		APP-ALL48	Revocation Tool should allow authorized users to unpublish (revoke) a VDI
-		APP-ALL49	Revocation Tool shall embed the Authentication Tool
-		APP-ALL50	Revocation Tool shall send a revocation request to a CONVERGENCE peer
-		APP-ALL51	On receiving a revocation request the peer shall revoke the VDI from the network
-	Notification	APP-ALL52	It shall be possible for an authorized user to send a notification to all users of a

			VDI
-		APP-ALL53	Notifications may be sent by email and/or using the trial application
-		APP-ALL54	Trial applications will include mechanisms ensuring that notifications are displayed to users
-	Statistics	APP-ALL55	Trial applications should allow authorized users to request and display statistics on the use of VDIs

Scenario/Trial (Responsible partner)	Area	Code	Requirement
Photos in the cloud and down to earth (Alinari)	Support for publication	APP-AL1	When a contributor (e.g. a photographer) publishes the VDI representing a photo; access to the VDI shall be automatically restricted to Alinari managers and staff
-		APP-AL2	The application shall allow members of Alinari staff to add tags to the photo showing its status in the publication process (e.g. needs to be retouched, ready for publication)
-		APP-AL3	There shall be an application making it possible to automatically add a watermark to a photo (or to request an external application to perform the operation)
-	Purchase of photos	APP-AL4	The application shall support a shopping basket for selected photos
-		APP-AL5	The application shall support a mechanism to pay for photos that are not available free of charge.
-	Virtual tour	APP-AL6	There shall be an Exhibition Tour application running on a user device and an Exhibition Browser application running on touch screen devices inside the museum
-		APP-AL7	The Exhibition Tour application shall allow a user to author and publish an exhibition tour in the form of a VDI with links to other VDIs representing photos in the exhibition..
-		APP-AL8	The Exhibition Tour application shall allow a user to search for, subscribe to, view and navigate through an exhibition tour created by another user
-		APP-AL9	The Exhibition Browser application shall allow a user to select photos and view all related information (no user registration required).

Scenario/Trial (Responsible partner)	Area	Code	Requirement
Videos in the Cloud and Analyses on Earth (FMSH/ESCoM)	Creation of VDI	APP-FMSH1	CONVERGENCE shall have a Video Creation tool
-		APP-FMSH2	Video Creation Tool shall embed the Authentication Tool
-		APP-FMSH3	Video Creation Tool shall enable the Video Material Owner to select an encrypted video file and enter the Title of the video; Sub-title; Type of video; Author(s); Producer(s); Date; Location; spoken language(s); Short description.
-	Security and privacy	APP-FMSH4	CONVERGENCE shall have a Video Encryption Tool
-		APP-FMSH5	Video Encryption Tool shall enable the Video Material Owner to encrypt a video file, at least in MPEG format
-		APP-FMSH6	Smart cards shall embed decryption key
-	Ontology support	APP-FMSH7	FMSH/ESCoM shall provide domain ontologies in OWL format
-		APP-FMSH8	FMSH/ESCoM domain ontologies shall be stored in CDS Server
-		APP-FMSH9	FMSH/ESCoM Video Analysis Application shall create Video Analysis metadata in OWL
-	Analysis of	APP-FMSH10	The trial application shall include an Analysis Creation Tool with all the

	videos		capabilities described in the general requirements for VDI creation and publication
-		APP-FMSH11	Analysts will be provided with an existing FMSH/ESCoM Video Analysis Application
-	Creation of video channels	APP-FMSH12	Administrators shall be provided with an existing FMSH/ESCoM Video Channel Application
-		APP-FMSH13	FMSH/ESCoM Video Channel Application shall register Channels in FMSH/ESCoM database
-		APP-FMSH14	CONVERGENCE shall have a Channel Creation Tool with all the capabilities described in the general requirements for VDI creation and publication
-		APP-FMSH15	Channel Creation Tool shall enable the Video Channel Owner to enter the title of the channel alias, URL and short description
-	Analysis posting	APP-FMSH16	CONVERGENCE shall have an Analysis Posting Tool with all the capabilities described in the general requirements for VDI creation and publication
-	Search/subscription	APP-FMSH17	The trial application shall have a search/subscription tool with all the capabilities described in the general requirements for search and subscription
-	Browsing a video channel	APP-FMSH18	Web channels deployed by FMSH/ESCoM shall be accessible without constraint to Video Channel Users
-		APP-FMSH19	Web channels provided by FMSH/ESCoM shall enable end users to navigate through analyses, read metadata and watch videos
-		APP-FMSH20	The trial application shall have a browsing tool with all the capabilities described in the general requirements for browsing

Scenario/Trial (Responsible partner)	Area	Code	Requirement
Augmented lecture podcast (LMU)	Podcast creation	APP-LMU1	The trial application shall have a Podcast VDI-Creator Application with all the general capabilities defined in the general requirements for VDI creation
-		APP-LMU2	The Podcast-VDI-Creator Application shall parse XML-information and transform it into metadata to be included in the VDI.
-		APP-LMU3	The Podcast-VDI-Creator Application shall retrieve the Sequence Identifier of video-VDIs and slide-VDIs to be included in the VDI for the podcast episode
-		APP-LMU4	The Podcast-VDI-Creator Application shall help lecturers to create a description for the podcast episode
-		APP-LMU5	The Podcast VDI-Creator Application shall obtain identifiers for resources
-	Browsing	APP-LMU6	The trial application shall include a browsing tool with the capabilities identified under the general requirements for browsing
-		APP-LMU7	The browsing tool shall enable users to search for a podcast by its VDI identifier or the corresponding bookmark
-	Special Podcast application	APP-LMU8	The trial shall have an Augmented Lecture Podcast Application
-		APP-LMU9	Users shall be able to retrieve the application via its VDI identifier
-		APP-LMU10	Podcast Application shall require students to login
-		APP-LMU11	Podcast Application shall provide free text search and ontology-based search
-		APP-LMU12	Podcast Application shall stream the video for the lecture podcast
-		APP-LMU13	Podcast Application shall display slides synchronized with a video fragment

-		APP-LMU14	Podcast Application shall display all annotations made to a podcast
-		APP-LMU15	Podcast Application shall enable filtering of annotations
-		APP-LMU16	Podcast Application shall allow the creation and modification of annotations
-		APP-LMU17	Podcast Application shall sign annotations before publishing
-		APP-LMU18	Podcast Application shall allow students to delete annotations
-		APP-LMU19	Podcast Application shall hide the identity of the author of an anonymous annotation
-		APP-LMU20	Podcast Application shall allow the removal of annotations by a trusted third party when the terms of service of the podcast service are violated
-		APP-LMU21	Podcast Application shall allow the removal of annotations by other authorized persons

Scenario/Trial (Responsible partner)	Area	Code	Requirement
Smart Retailing (WIPRO/UTI)	Creation of VDIs	APP-WIPRO1	The trial application shall have a Product VDI Creator Tool with all the general capabilities defined in the general requirements for VDI creation
-		APP-WIPRO2	The Product VDI Creator Tool shall allow retailers to derive their own VDIs from the product VDI adding retailer specific information; the tool shall have all the general capabilities defined in the general requirements for VDI creation
-		APP-WIPRO3	There shall be a tool with the ability to create a VDI for a product at the POS and to associate the VDI with the customer (identified by a user VDI)
-	Integration with ERP systems	APP-WIPRO4	There shall be a tool allowing a retailer to automatically transfer information contained product type VDI into their ERP system
-	Display of product information to customers	APP-WIPRO5	The trial application should have a tool that allows customers to read the bar code for a product and to search for and display information about the product. The tool should be designed to function on a tablet integrated in the shopping cart
-	Revoke VDIs	APP-WIPRO6	There shall be a tool allowing a retailer to revoke a VDI; the tool shall have all the general capabilities defined in the general requirements for VDI revocation
-		APP-WIPRO7	There shall be a tool allowing a customer to revoke a VDI; the tool shall have all the general capabilities defined in the general requirements for VDI revocation
-	Shopping lists	APP-WIPRO8	The trial application shall include a tool allowing a customer to define a “shopping list” of products that interest him/her and to associate individual items with the shop where she should receive notifications

-	Notifications	APP-WIPRO9	CONVERGENCE shall have a means of displaying an emergency notification to owners of a VDI, without any action on the part of the owner
-		APP-WIPRO10	The trial application shall allow retailers to provide personalized notifications to customers based on their shopping lists
-	Capture of customer information	APP-WIPRO11	The trial application shall allow the automated capture of information on the way the customer uses the tools integrated in the shopping cart
-		APP-WIPRO12	The trial application shall allow the automated capture of information about the movement of the shopping cart
-	Analysis of customer information	APP-WIPRO13	The trial application shall include tools for the statistical analysis and visualization of aggregated data on customer behaviour