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1 Executive Summary and Report Scope

Scope of the deliverable is to provide a description of the main functionalities developed and available on ECLAP both as portal for users and back-office for automated content production, ingestion, processing and management. For these reason, this report consists of two main parts: i) ECLAP portal functionalities and services for users; ii) ECLAP automated back-office.

The deliverable is structured as following:

Section 2 provides an introductory description and overview of the ECLAP portal focussing on users and automation of services and functionalities, particularly focused on pointing out the advantages of ECLAP for the different actors in the performing arts value chain.

Section 3 reports on ECLAP Portal architecture and functionalities for users and groups. ECLAP provides special services for a wide range of possible interested users (like cultural institutions and archives, opera houses, theatres, cultural foundations, festivals, research and education institutions and also simple users). ECLAP is a best practice network as well, aiming at promoting and enriching culture and performing arts heritage by providing social network and collaborative services. ECLAP aggregates and shares content provided by more than forty different prestigious cultural and international institutions. This kind of content ranges over several fields: theatre, dance, music, cinema and movie and such content items deal with variety show, performances, costumes, sketches, stage designing, texts or posters, lessons, master classes, music scores, didactical materials. This content is available as: audio and video files, documents, images, animations, annotations, 3D, interactive content items, e-book, multimedia content. This section contains a list and description of the main functionalities available for unregistered users, for registered users and for group managers.

Section 4 reports on the infrastructure of ECLAP automated back-office and functionalities that is based on the AXMEDIS AXCP Content Processing Grid platform. The AXCP Content Processing Grid is a massive parallel scalable solution managed by a central scheduler and several AXCP executors for processing rules/processes. Such processes are formalized in an extended java script. The AXCP Rule Scheduler performs the rule firing, executor discovering, error report and management, fail over, etc. The scheduler puts in execution rules with some parameters and it provides reporting information (e.g., notifications, exceptions, logs, etc...) to external workflow and tools by means of WEB services. It is on the back-side of the ECLAP Portal and manages all the “dirty” activities in an automated manner. The ECLAP back-office functionalities are described according to the following activities: content and metadata production, content & metadata ingestion, content management, content and metadata analysis..

Finally, the ECLAP Back Office is a scalable solution for: Content ingestion and integration, database management, processing, formatting, adaptation, transcoding, metadata mapping and processing, connection with other social networks to propagate queries and get content or for posting content; Content and users similarity analysis and clustering, for users and content recommendations; Content aggregation and integration for educational and entertainment productions, etc..

The following deliverables have to be considered as references for technical aspects and details:

- DE3.1: *Infrastructure: ingestion and processing content and metadata:*
<http://www.eclap.eu/drupal/?q=en-US/home&axoid=urn%3Aaxmedis%3A00000%3Aobj%3Aa345a84f-6fdf-4f84-a412-88094ce363e2§ion=metadata>
- DE3.2: *Accessibility and Multilingual support for the ECLAP solution:*
<http://www.eclap.eu/drupal/?q=en-US/home&axoid=urn%3Aaxmedis%3A00000%3Aobj%3A713ff609-aca8-48c0-a324-6c378e67f46d§ion=metadata>
- DE3.3.1 *Infrastructure: Content and Metadata processing and semantification:*
<http://www.eclap.eu/drupal/?q=en->

*DE3.3.2– Content and Metadata processing and semantification
Best Practice Network*

[US/home&axoid=urn%3Aaxmedis%3A00000%3Aobj%3A09064f55-dd3e-49b8-ba57-b8f9e21cdabd§ion=metadata](http://bpnet.eclap.eu/drupal/?q=en-US/home&axoid=urn%3Aaxmedis%3A00000%3Aobj%3A09064f55-dd3e-49b8-ba57-b8f9e21cdabd§ion=metadata)

- For ECLAP User Manual please refer to “ECLAP Best Practice Network User Manual, This portal and services”, ANNEX of DE 3.1: “Infrastructure: ingestion and processing content and metadata”, available at <http://bpnet.eclap.eu/drupal/?q=en-US/home&axoid=urn%3Aaxmedis%3A00000%3Aobj%3Ab828710e-b77c-4074-993c-3efddfbfaad7>

This document has been produced in a publishable manner, as a guideline for public access and spreading out.

2 Introduction

ECLAP is a social Service Portal that provides tools and services for:

- Content aggregation
 - to aggregate and enrich content
 - prepare content for the promotion on Europeana
 - distribute content to ECLAP users
- Working Groups on best practices on performing arts, related to the following arguments:
 - Education and Training
 - Intellectual Property and business models
 - Digital libraries and archiving

Also ECLAP provides services and tools for knowledge sharing and social networking for users and professionals as described in details in the following sections.

The following figure 1 depicts the ECLAP general scenario.

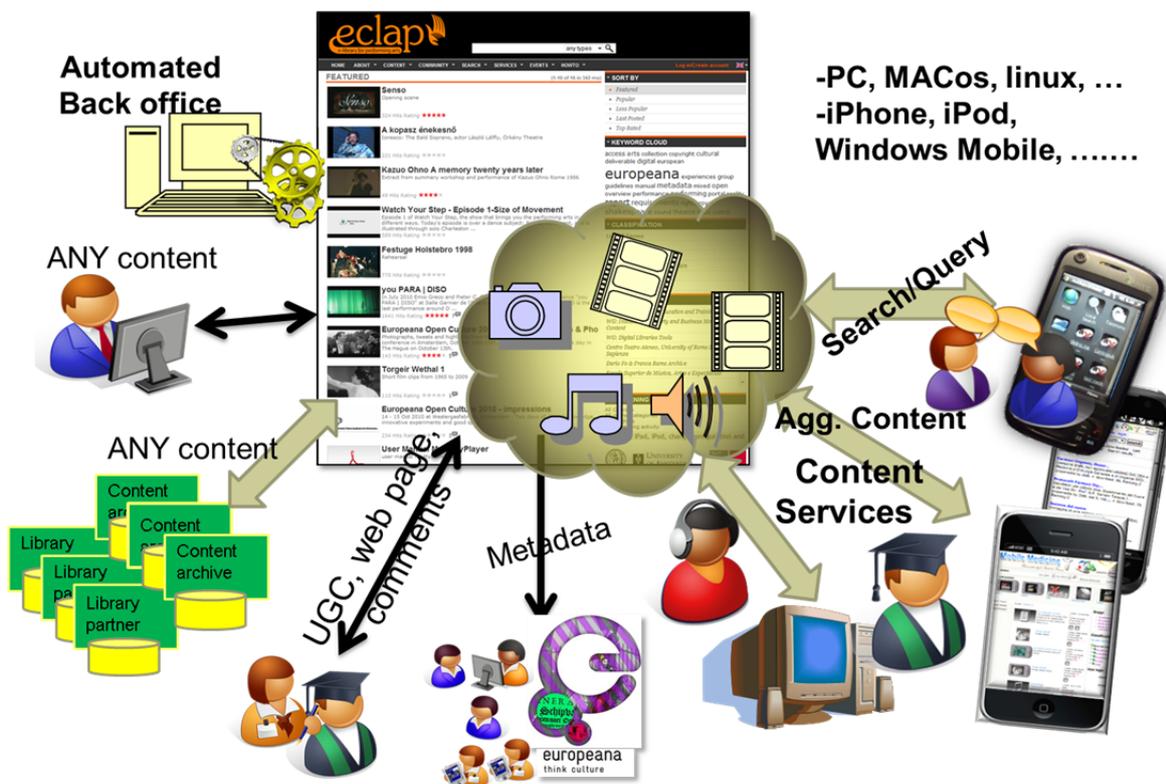


Figura 1 -ECLAP overall scenario

ECLAP users can be simple users of professional content providers. ECLAP users can upload their content and have access to the ECLAP content by accessing to the platform with any device (PC, MAC, Linux, iPhone/iPad, Android, Windows Phone, etc.). ECLAP is also integrated with Europeana. The backoffice of the portal is managed by using an automated content processing platform that allow to automatize many activities for the content management.

ECLAP provides cultural institutions and archives, opera houses, theatres, cultural foundations, festivals, research and education institutions and also simple users with special services and it is a best practice network as well, aiming at promoting and enriching culture and performing arts heritage. ECLAP aggregates and shares content provided by more than forty different prestigious cultural and international institutions. This kind of content ranges over several fields: theatre, dance, music, cinema and movie and such content

items deal with variety show, performances, costumes, sketches, stage designing, texts or posters, lessons, master classes, music scores, didactical materials. This content is available as: audio and video files, documents, images, animations, annotations, 3D, interactive content items, e-book, multimedia content. The ECLAP platform not only provides services and grants access to computer and mobile systems, but it is already integrated with Europeana, the digital library promoted by the European Commission and able to index millions of cultural content items (<http://www.europeana.eu>).

ECLAP provides innovative tools and services for the actors in the performing arts value chain. For example, *cultural institutions and archives* can exploit tools for the correct exploitation of their contents, by offering suitable virtual spaces, collections, introduction pages, etc.. It often occurs that an institution has collected and kept alive along the years a large range of different contents which could be made available to other users and to a more general audience, so as to exploit one's work to the best. In such case the publication on the ECLAP platform is associated with a cultural introduction of the available collection, thus using modern technologies like the possibility of hosting on ECLAP several content items and make them accessible from other websites as well.

For *research and education institutions*, ECLAP get access for teachers and researchers to a wide range of high quality materials and they can add more specific digital content to plan and realize didactical activities. It is possible to create lessons, modules and/or courses, so as to make them accessible on the Internet both via mobile or PCs. Teachers can control the students' access and they can launch polls and questionnaires. The ECLAP tools are able to arouse the interest of the students, making them want to take an active part in the lessons; an outstanding example on a digital teaching method is given by the Content Organizer which is accessible free of charge on App Store. Having students more and more involved is a clear way to increase the efficacy and efficiency of the adopted pedagogical method which is kept under the complete control of the teachers. MyStoryPlayer is the tool for multimedia annotations, that is used by research institutions that have many multicamera recordings of a lesson or an event, since it allows to make the latter accessible to students in a simple and interactive way.

ECLAP allows a visibility increase to the affiliated organizations via innovative channels granting promotion at international level and relationships within a wide network of users interested in artistic activities and institutions working on that field. The ECLAP promotion channels exploit automatically both the web communication and email. For instance ECLAP users receive updated information according to their main areas of interest, concerning events, content, news, etc. Our channels include Europeana and the most widespread social networks. The user interested in participating in an event can get access to a complete set of useful information via the Internet in order to view and download promotional content and informative reports; access the event's programme with its related maps on how to reach the event location. Besides, other activities are allowed such as: taking part in discussions, accessing a blog, contacting the event organizing committee, or the involved artists, expressing opinions or asking about the forthcoming exhibitions, inviting friends or colleagues. This is the most reliable way to create a close talk between users and event organizers.

ECLAP users can manage a personal webpage describing their topics of interest, skills, achieved outcomes, employment and carrier expectations and so forth. They can build relationships with other qualified colleagues, they can share content, carry out queries, create collections, drop comments and tags, state their likes and dislikes, participate in workgroups or attend online lessons, they can get in contact with experts and colleagues, organize events, receive customized notices, etc.

On ECLAP, users provide professional and/or user generated content as digital resources & metadata. They can upload them using via a web page providing a content file together with the metadata via a web form, or in event of a great number of content items using an automated content and metadata collection, ingestion and repurposing.

When contents are uploaded through the web page, the user is called to fill a form organized to cope with: i) Dublin Core metadata necessary for indexing and retrieval, ii) taxonomy terms for classifying contents, iii)

Groups association, iv) single or multiple digital resources locations and v) workflow type related to the life-cycle of content.

Content and Metadata Ingestion is the alternative to the web page when a professional user or institution has to upload a great number of content items (i.e. importing metadata and content coming from ECLAP partners and Digital Archives). The Ingestion process allows:

- Harvesting and collecting any kind of content and metadata accessing to a large set of formats and databases.
- Transcoding and adaptation.
- multilingual enrichment of metadata,
- validation of metadata,
- IPR definition.

In ECLAP, Content and Metadata processing, ingestion and semantification has been addressed by adopting the AXMEDIS AXCP Content Processing Grid platform for back-office automation. It is on the back-side of the ECLAP Portal and manages all the “dirty” activities in an automated manner. The AXCP Content Processing Grid is a massive parallel scalable solution managed by a central scheduler and several AXCP executors for processing rules/processes. Such processes are formalized in an extended java script. The AXCP Rule Scheduler performs the rule firing, executor discovering, error report and management, fail over, etc. The scheduler puts in execution rules with some parameters and it provides reporting information (e.g., notifications, exceptions, logs, etc..) to external workflow and tools by means of WEB services.

Finally, the ECLAP Back Office is a scalable solution for: Content ingestion and integration, database management, processing, formatting, adaptation, transcoding, metadata mapping and processing, connection with other social networks to propagate queries and get content or for posting content; Content and users similarity analysis and clustering, for users and content recommendations; Content aggregation and integration for educational and entertainment productions, etc..

3 ECLAP Portal services and tools

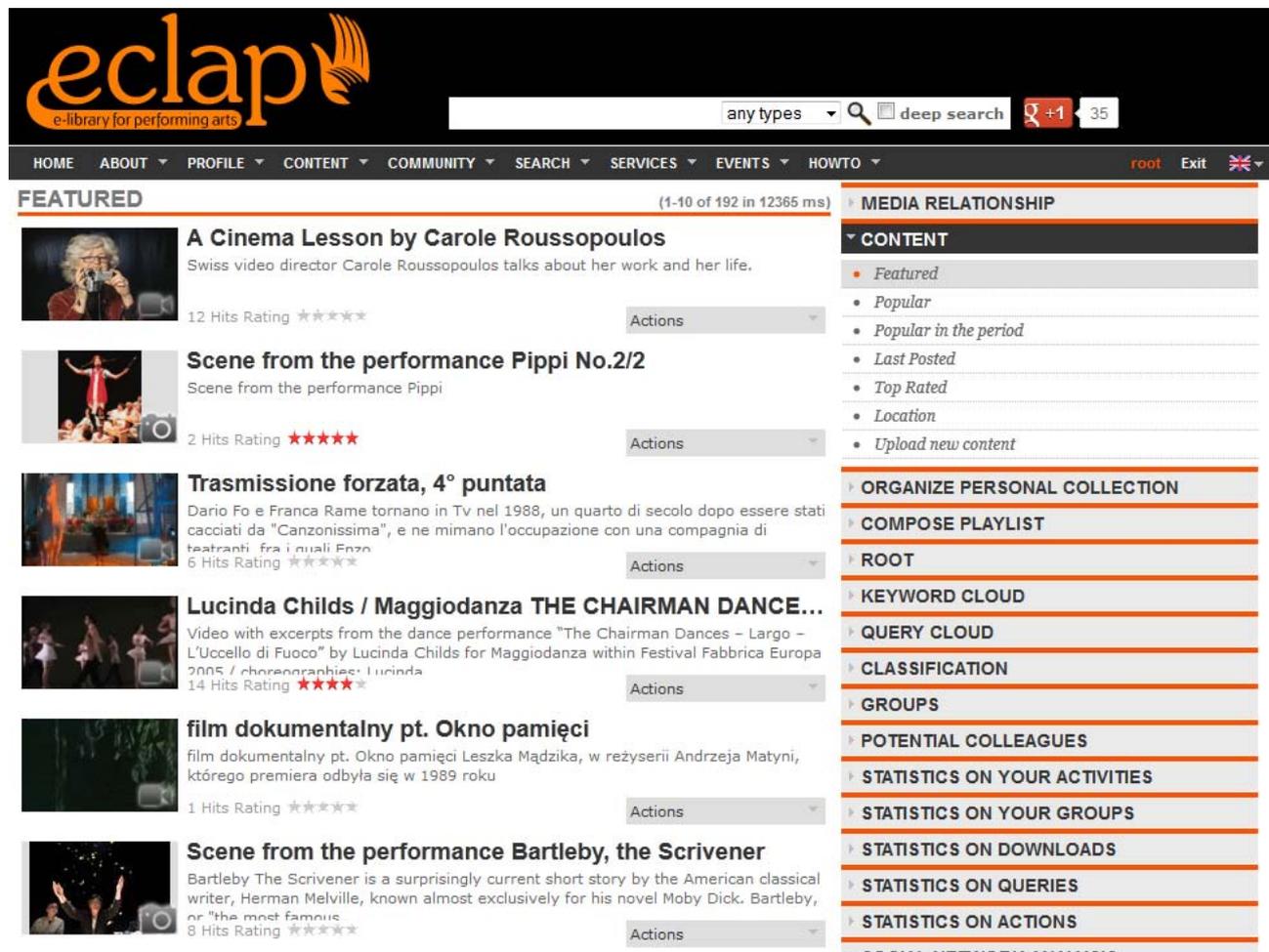


Figura 2 - ECLAP portal

Some of the most innovative services and tools developed in the ECLAP project are described in the following.

The major services of ECLAP are:

- an open best practice network and service portal for performing arts institutions, to help them to manage and disseminate digital content and experiment new technologies and tools for performing arts learning and research.
- solutions and services to major performing arts institutions for:
 - bringing content to Europeana, promote content on Internet, and making content widely accessible via the ECLAP portal and on mobile devices
 - managing content: technical content ingestion and treatment, semantic processing, indexing and distribution exploiting the most innovative and consolidated technologies for content valorisation and distribution
 - increasing content visibility via the ECLAP portal with 21 languages in the user interface and 13 different languages on metadata
 - exploiting solution for content aggregation such as playlist, collections, annotations

- managing intellectual property according to relevant legislations
- providing content for learning, education and distance learning
- providing support for live events, museums via mobiles applications, QR and GPS technologies
- solutions and services for a variety of users: teachers, students, performers, researchers, and performing arts lovers for edutainment, infotainment and entertainment.
- support for training institutions and new professional users.

ECLAP Users are able to:

- access to valuable performing art content for entertainment and e-learning;
- access all content via different devices: PCs, iPhone, iPad, tablets and smartphones.
- search, retrieve and play extensive high quality multilingual content;
- comment, annotate, tag, rate and vote on content;
- register and networking with others colleagues via forum and groups;
- perform audiovisual annotations via the MyStoryPlayer tool;
- enrich and contextualize content;
- aggregate content in play lists, collections and e-learning courses;
- upload and share multilingual content, user generated content;
- promote preferred content on social networks such as: YouTube, Facebook, Linkedin, Twitter, etc.
- receive suggestions and recommendations for similar content, on local collections and on Europeana;
- receive feeds and online contents at events and museums;
- assess and monitor activities around their own online collections;
- receive personalized ECLAP newsletters .

3.1 Kind of digital content

ECLAP offers many different kinds of digital content which is indexed and can be searched as information, as community-shared knowledge. To this end ECLAP exploits the Semantic Web technologies, namely Web 2.0/3.0:

- **Web pages**, that are related to groups and can be make accessible for group members only or they can be public. The group coordinator can insert, change and/or cancel the private and/or public web-pages he has produced for a group. Web pages can be translated in different languages and can also be commented or voted by the users.
- **Discussion Forum of a group**: Each group is given a discussion forum with many topics, namely discussion topics; each topic is associated with a given taxonomy. The discussion topics can be started by members of the forum.
- **Forum comments** on the discussion forum topics of a group: Comments left for some topics discussed within a given forum (they are associated to the vote each user can express and votes are very useful to collect opinions to verify the reliability of a topic or a comment). Each topic is therefore linked to a group and it can be produced and made accessible only by the users registered to that group.
- **Objects/mini-applications**: they can be uploaded by registered users thanks to a upload form for (User Generated Content). ECLAP content could be:
 - simple digital resources (audio, video, images, documents, flash animations, slides, etc. in any format);
 - complex objects, mini-applications like calculators, check lists, flows, procedures, audio and video guides, lessons, interactive objects, forms, etc..
 - Applications and tools in EXE, CAB and MSI format
 - Textual comments on objects, which are dropped by registered users;
 - aggregation of different resources, in the form of e-learning courses, playlist with images and videos, collections of different resources.

Objects have metadata (pieces of information related to classification and identification) which are associated to the individual digital resource, to the object itself and hence to the mini application. Such metadata are the very first means of searching objects within the portal database.

ECLAP provides multilingual indexing of the textual content of many different resources like txt, doc, docx, pdf and power point presentations.

A set of extended metadata are included in ECLAP that allow to describe the ECLAP content exhaustively:

- **Dublin Core:** general, multilingual and multi-instances (e.g., title, authors, description, subjects, ..)
- **Semantic:** content description, taxonomy, tags, annotations, etc., multilingual & multi-instances
- **Groups:** association to one or more groups
- **Technical information extracted automatically:** audio and video file duration, file format, dimension, editor, publisher, any IDs, etc.
- **Augmented Reality:** GPS, QR,. Object can have **GPS** localization information that are shown on the Web and used on the mobile. Also all the objects have a **QR code** that can be used to access and download the content from mobile, by using the device camera. (This could be applied on museums, position, objects, user manual, tapes, boxes, etc.)
- **Intellectual Property:** IPR, licences for MD, licences for profiling the conditional access
- **Workflow metadata:** status, dates, versioning, etc.
- Etc.

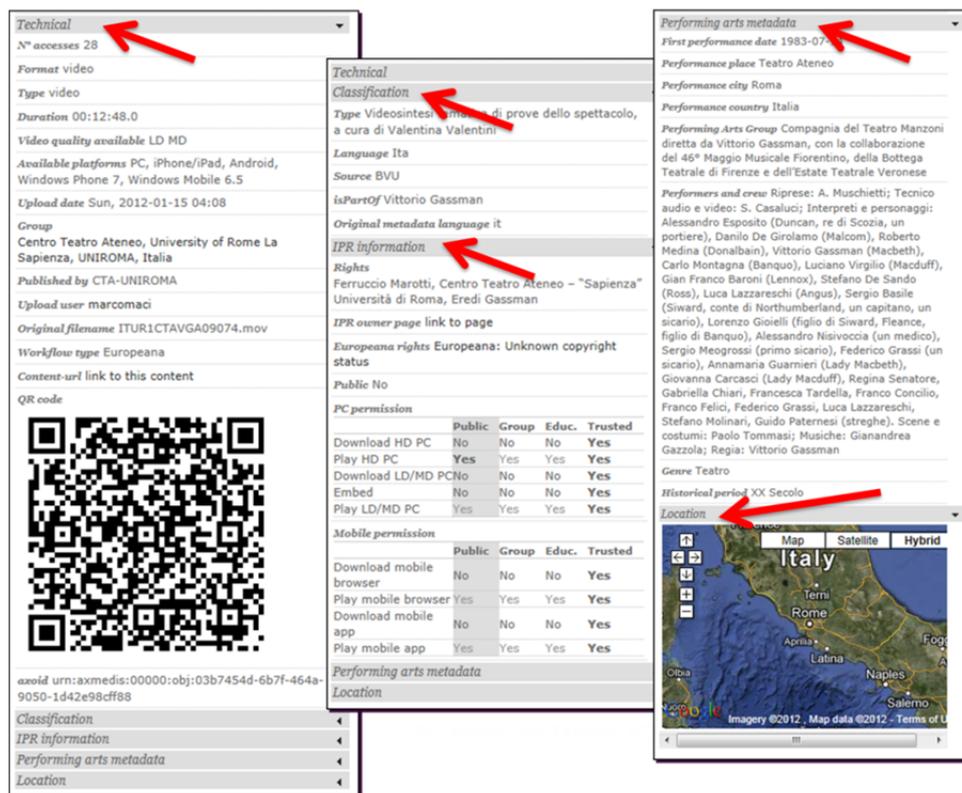


Figura 3 - ECLAP metadata

By accessing to the ECALP portal, the user has different possibilities to access the content. A full text search functionality is available, so that the user can simply specify one or more words to be searched or the user can access to predefined lists of content, that present the list of content grouped according to different methodologies as follow:

- **Featured,** list of recommended objects: this list shown a sequence of casually selected resources promoted by the groups responsible since they have been considered of particularly interest for the

public. There is any preference in the order since the resources are presented in the list in a random order;

- **Popular**, list of the most viewed/downloaded content. This list is sorted on the basis of number of views and downloads of contents. The precise number of play/downloads is visible on the right of the description text of the object;
- **Less popular**, list of the less viewed/downloaded content. This list is sorted on the basis of number of views and downloads of contents. The precise number of play/downloads is visible on the right of the description text of the object;
- A selection of **Last posted**, the last posted item is always visible on the PC as the last object on the right part of the list of last posted contents, while the other posted items are selected among the latest 30 objects being uploaded into the portal;
- **Top rated** content.

ECLAP allows executing queries on the indexed content available on the Portal, but also queries on web pages, comments, discussion forums, etc. Search functionalities are powerful and allow to refine query results by using advanced parameters.

From the technical point of view, in ECLAP the indexing schema includes:

- Dublin Core + DCTerms (multi language)
- Performing Arts metadata
- Technical information (provider, content type, GPS, IPR, duration, quality, ...)
- Groups associations (multi language)
- Taxonomy associations (multi language)
- Comments & multi language tags
- FullText of the textual digital resources (word documents, PDF, txt, etc.)

The **search engine** is based on a *fuzzy* logic that allows to retrieve search results that are not exactly corresponding to the searched term, (e.g. the term to be searched has been incorrectly written, for example due to a typo). Each search results is rendered together a score value, which expresses the matching item's relevance to the search query. Score values are computed taking into account the similarity of the matched strings to the original query string (the so called "edit distance"), and also considering if there are multiple instances of the query term inside the documents. Search results are displayed according to the user language interface or can be filter by a specific language from the advanced query page.

When a search is performed, in case of positive results, a search filter is showed in the right column (faceted search) that allows to refine the results by selecting specific filters listed in the box (see the figure on the left). Also, on the bottom right corner of each search result preview, a relevance score is shown in the form of a grey bar with a numeric value inside.

Also, as shown in the bottom part of the image on the left, queries performed on ECLAP are propagated also on Europeana.

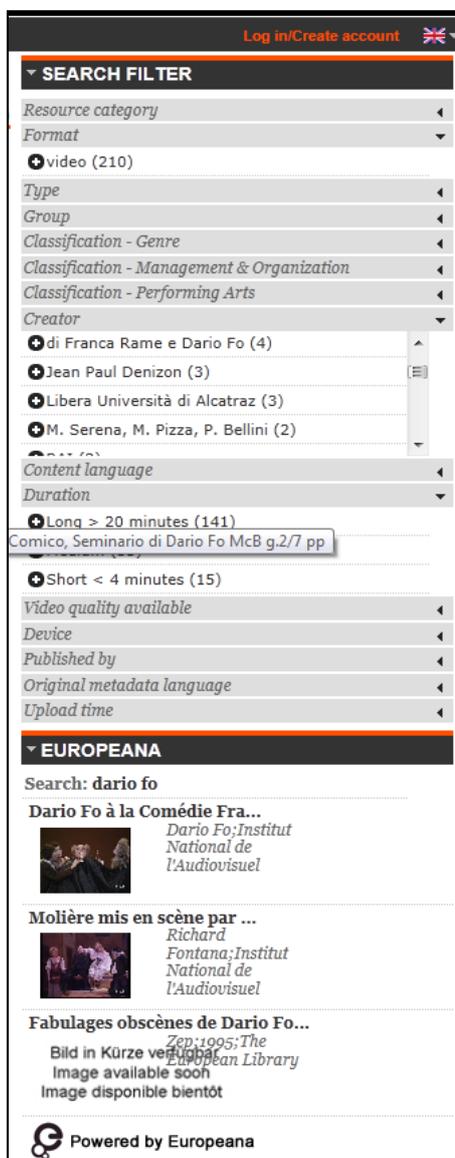


Figura 4- ECLAP faceted search and EUROPEANA query propagation

3.2 Functionalities for users

The registered user is given wider scope and more skills than the unregistered one. Once registered, the user enters and views a web-page which is richer in functionalities and menus both on the left and right. Besides, he can see his registration name written in the upper right corner of the webpage.

The **registered user** on ECLAP can:

- Download the cross media player and install it;
- Examine the online help;
- Read the website Blog;
- Change the default language among the available. Registered users will access to the Web interface based on the language selected in his profile, that obviously can be changed in any moment;
- Ask for a new password, when for instance the previous one went lost;
- Consult the list of groups working on the portal;
- Consult the list of groups the user is member of.
- **For each group** the user is member can:
 - See list of recent group content
 - See list of unread content and activities related to the groups
 - See the list of the last content and activities on the portal
 - Get access to the **Group Forum**
 - View the discussion topics of that group;
 - Browse into several messages;
 - Create a new discussion topic for the forum (new forum topic);
 - Reply/contribute to a topic;
 - Express his own vote for a discussion topic;
 - Access the group's WEB pages
 - Drop comments on such pages;
 - Express his own vote;
 - View how many and which users are registered to the group;
 - Send an email to colleagues already registered to the group;
- Search through the contents of the Portal, as explained in the previous section.:
- Sort and examine various lists of objects;
- Examine and access public objects:
 - Main web-pages of groups, public web-pages of groups;
 - Public objects, they are displayed as clickable icons, with their vote, title, description, etc. and they have also a Download button.

The user can also manage **the list of colleagues** connected to him, import a list of contacts to be invited to join the ECLAP portal from external social networks, and can manage easily its groups subscription by defining the sending interval of the subscribed mailing list.

The registered user also can access to a number of facilities that allow to easily manage objects and resources published on the portal, for example by accessing to a list of favorite content, promoted content, content yet seen, content uploaded by him, etc.

Most of functionalities are accessible for the user, also by using his own iPhone/iPad, Android, Windows Phone and with the same link reported in the PC web-page.

ECLAP allows an advanced management of **content playlists**. By using this functionality a user is able to define a sequence of audio, video and images or select excerpts of audio and video resources arranged into a chained list to be associated to a playlist for a much more effective content consultation, for example to prepare a sequence of content excerpts to be used for educational and promotional purposes. Also, when an image is added to a playlist, the user can set the time duration for the visualization of that image.

ECLAP provides to Registered Users as set of content aggregation facilities. By creating a **Collections** the user may decide to publish the personal collection to the ECLAP community for sharing it with other colleagues, this implies the creation and publication of the Collection. A collection may include any kind of content items, including play lists. The published collections can be updated and used as the primary container and sources for creating ECLAP Courses via the e-learning facility of ECLAP.

The Collection facility allows users to organize their collections as follow:

- create a new collection, specifying the title of the collection and its metadata;
- delete a published collection;
- add/remove cross-media resources in/from the collection;
- publicly publish the collection on the ECLAP portal;
- update the published collection;
- view the list of collections (published and unpublished) and the resources aggregated in each collection.

3.2.1 Recommendations

The registered user can send some recommendations via emails, which are sent out from the ECLAP Portal. The aim of these recommendations is stimulating other users to get access to some information and knowledge, thus promoting and spreading it:

- Invite users not yet registered to access the portal and become member of ECLAP;
- Invite users not yet registered to access the portal and view some example contents;
- Invite users not yet registered to view some contents of the portal (web-pages, forums, objects, etc.), in order to comment, express their opinion and/or vote;

ECLAP is able to automatically propose to the user some recommendations/suggestions. Recommendations are based on a semantic analysis and the user's behavior according to the content seen. This type of recommendation is focused on:

- **Users to users** based on similarity criteria . Such similarity is estimated upon the profile information and activities users carried out: for example which kind of contents they view, they upload and how they vote, etc.
- **Objects to users** based on the similarity with the objects those users have used and bookmarked as preferred and/or with the objects user have clicked on (only for registered users).
- **Objects to objects** based on the objects the user has played. When a user plays an object, a list of similar objects (both for classification criteria and metadata) is proposed. (this functionality can be exploited by unregistered users, as well).



Figure 5 - ECLAP playlist playback

Registered users can access to statistics related to their activities on the portal that are related to the following activities: Content Upload and Access; Content Enrichment; Social Promotion; Networking; and Content issues provided.

3.2.2 Advanced functionalities for content and activities related to groups

To help registered users to take trace of the activities performed by groups he joined, ECLAP provides advanced notification. These functionalities allow to access in a simple and direct manner to useful lists of:

- content recently published and last activities performed in any groups joined by the user;
- content and activities not followed by the user, like unread forum topics or new content posted by the other members;
- content and activities recently posted on the portal.

3.2.3 Messages and notifications management

When a user is registered on the portal, he will receive notifications in the form of a newsletter that will be sent by email automatically, according to the settings defined by the user.

3.2.4 Uploading objects on ECLAP

The registered user can upload a digital content to publish it, which means making such content an object on the ECLAP Portal, for any device.

The upload form has some fields compulsory to complete. The Upload form shows to the user **only the groups he can get access to**, namely the groups the user, who is trying to upload, is member of. Therefore, a user who is not member of a group cannot on any account publish content for that group.

In the upload form, there are two mutually exclusive modalities to specify the resource(s) to be uploaded on the portal. In fact the digital resource to be uploaded can be specified as local file available on the user's computer or as a resource available remotely.

Multiple files selection is permitted, so that the user can select more file in one shot to be uploaded, by selecting them from a unique folder.

3.2.5 Content & metadata edit page

The page is accessible via the Edit Object link in the "Actions" menu as reported in the following picture



Figure 6 - List of actions for a content

The page allows immediate changes such as:

- **Update Content:** The update content section allows the content owner or the administrator to change the digital resource by replacing the existing one. The form is the same of the Resource Section of the Web Upload page; this allows providing a file on user's disk or an URL. The form submission is sent to the server that invokes the content production process on AXCP Grid to update the digital content without changing existing metadata.

- **Change Icon:** The user can change the prebuilt icon by uploading a new image. The system generates and assigns the new icon to the object.
- **Edit workflow:** It allows the content owner or the administrator to change the workflow type associated with the life-cycle of content.

The page provides also the access to specific editing tools such as:

- Metadata Editor for metadata enrichment
- Metadata Editor for metadata validation
- IPR Wizard page
- Workflow administration page (available only for Administrator)

3.2.6 Metadata Editing, Metadata Editor

Metadata editor is the tool for enriching and validating metadata. Since enrichment and validation activities are governed by ECLAP Workflow, the Metadata Editor is a workflow-drive tool.

It allows:

- Opening/Closing workflow session
- Modifying the metadata values (proposed during the content upload)
- Filling metadata in other languages
- Adding more fields and values
- Validating/ Invalidating metadata
- Comparing metadata in different languages
- Manual translation of metadata in other languages
- Easy recognition of made changes by means of text highlighting
- Undo changes
- Viewing current workflow status of content, metadata counters (i.e. number of current metadata, number of validated metadata, number of native metadata)
- Viewing the name of user who made last change on metadata
- Applying all made changes by saving changed metadata into databases
- Updating index archive in event of changes
- Checking for made changes before leaving session
- Accessing in read-only mode if user has not the permission to edit (ECLAP workflow permission missing or content already in use by another user)

Only users with ECLAP workflow permission can work fully with the editor. However, according to the user role, the editor works in Enrichment mode for the Enricher user and in Validation mode for Validation user. Users without a workflow role access anyway to the editor only in read-only mode. Metadata editor allows editing different type of metadata. They are organized in specific panels as reported below.

DCMI Metadata Panel

The DCMI metadata panel provides two sub-panels: Reference and Changes.

The Reference fields show the current metadata values in read-only mode and for each of them the username who made the last change/edit. The Changes panel show a copy of reference set where the user can edit/adding values. Both Reference and Changes panels are grouped by languages.

Taxonomy Metadata Panel

This panel shows the current taxonomy and allows adding/removing terms.

Groups Metadata Panel

The panel shows the list of available groups and those associated with the content. The panel allows adding/removing a group.

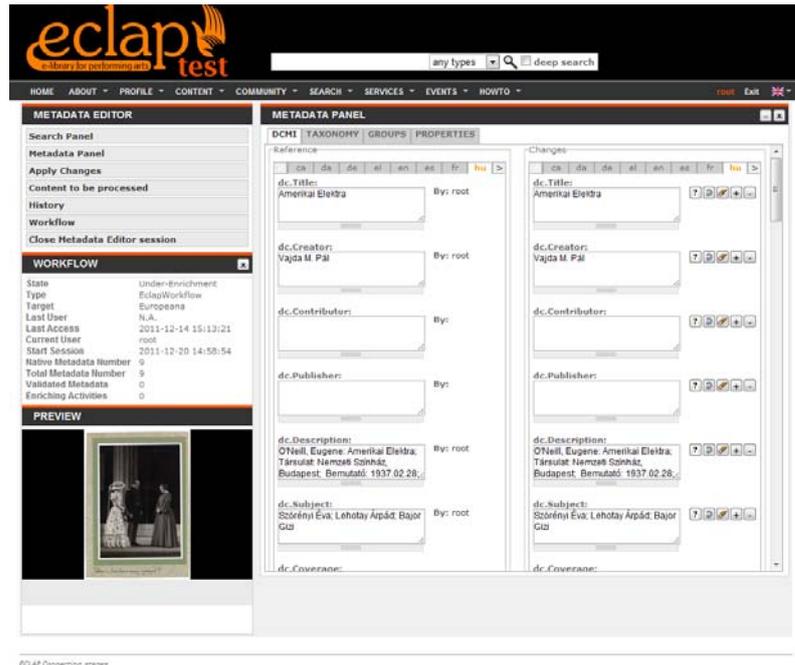


Figure 7 - ECLAP metadata editor

Properties Metadata Panel

The Properties metadata panel shows the technical information related to the digital content (such as original file location, type of content, size, identifier...). This panel is available only for the administrator.

Performing Arts Metadata Panel

This panel shows all metadata related to Performing Arts and allows adding/removing them.

3.2.7 Indexing of content metadata

When a new resource is published on ECLAP by using the upload functionality, the system performs an indexing of both the inserted metadata and of the internal textual content of the resource (if available). This means that the textual content of documents in TXT, DOC, DOCX, PDF, PPT and PPTX formats are “recognized” automatically and indexed by the system to allow the queries of terms contained also inside the uploaded document [9], [10], [11].

Metadata and textual content are indexed in the main language selected during the upload procedure; the system is able to index automatically the same resource also in the other available languages. Consequently, a user will be able to make queries by using terms in his mother tongue, but will receive results also referred to content available in other languages.

3.2.8 Functionalities for group manager

If a portal user is a group/forum coordinator as well, besides being able to do everything a register user is allowed to, he can also:

- Create WEB pages for each group he is coordinator of;
- Cancel a discussion topic in the group’s discussion forum he chairs;
- Send specific invitations to users and acquaintances to suggest registration to the Portal and/or group membership;
- Perform direct registration to the group on behalf of ECLAP Portal’s registered users via their nickname, only provided they have already registered to the portal;

- Cancel users and/or put them in a black list, block a user from accessing the group;
 - Accept or deny group membership requests from portal users;
- A user can become group coordinator only whether such role is assigned to him by the administrator of ECLAP Portal or by another coordinator. There could be more than one coordinator for each group.

A registered user can ask the administrator (support group) to create a new group. Such requests should be screened and examined by the **ECLAP Management Committee**.

A group coordinator/responsible can simply introduce him on the **main web page of the group** and empower a second person he trusts to create web-pages for the group. For each web-page:

- There is an associated taxonomy (please refer to the Appendix);
- Comments can be associated as well;
- A language can be associated as well (currently the available languages are Italian and English);
- The nature of the group web-pages can be either public or private.

There are three permission modes to view a web-page: 1) WEB pages only for groups, 2) Public WEB pages and 3) Public WEB pages that are associated to one group or more.

The administrator user/group coordinator can **manage group users**. After the log in, the group coordinator can select one group he joined and select the following activities:

- Invite one or more colleagues to join the group;
- See the list of subscribers
- Manage the group forum
- manage the group objects
- create e new Forum topic
- Create a new web page associated to the group
- Manage his membership to the group

The group coordinator can **access to statistics related to his group(s)**. To this scope, two different blocks are available on the right column that is shown only if the user is logged in the portal and has a role a group administrator.

The statistics block allows the user to select the group and the statistics metrics. The following statistics are shown in the form of histograms or pie charts: content upload and access, content enrichment, social promotion, networking.

3.3 Manage annotations via MyStoryPlayer

MyStoryPlayer allows users to be the central part in fruition of multimedia objects annotating them, and offers new solutions for educational and infotainment purposes. As we are in a performing arts environment, let us show you some examples of application of such a tool.

For example: if a teacher wants to prepare a lesson for his students, synchronizing slides and video in the same environment, or adding some pictures or audios examples that can explain better the concepts of his lesson, with MyStoryPlayer he can do that!



Figure 8 - My Story Player annotation tools

If a user is owner of many multimedia objects of the same event, for example taken from different views, and want to relate each other and play them synchronously and in parallel on the same player, with MyStoryPlayer he can do that!

If a user want to connect events each other following some particular aspects like the characters, the dancers, the theatres, the music, the moviemakers, etc., creating a package of multimedia annotated objects connected by a leitmotif and visible in interactive way, with MyStoryPlayer he can do that!

The innovative part of MyStoryPlayer lies in the fact that no difference between media and the user's annotation exists, because both categories are referred to multimedia objects and they are temporally connected.

Moreover, as annotations are audio-visual, the possibility of both multiple contemporary views and multiple choices on what to watch is provided to the user, thus giving him a sensation of freedom in building his personal narrative experience. Every time the user chooses a video to be played, rectangles appear just below the temporal line to indicate the length of annotations according to the duration of the main playing video.

When the main video is running, another video or more media (which can be video, audio or images) start to play by level with a rectangle aside from the main video.

An annotation on MyStoryPlayer is composed mainly by three elements:

- A text description, as in other annotation tools,
- A link between two media, related through a time relation,
- A classification of annotation.

For example a user can annotate a part of a video that lasts one minute, with a slice of another video that lasts 30 seconds. In the MyStoryPlayer interface, these two media will be reproduced synchronously according to their temporal lines.

This kind of annotation allows the user to connect two media that in his opinion are related by topics or events, characters in the scene, music, moviemaker, or they are different visuals of the same event and he want to see them synchronously.

Many reasons could be valid to relate some parts or entire media each other.

It's up to the user the choice on what to annotate, MyStoryPlayer gives him freedom to be a producer of his history.

Once an user has annotated a media, the interface will allow him to view in parallel all the media related each other, just as in the example below.

In the portal, the main actions that user can do are:

- Add an annotation
- Load an annotation from ECLAP to MyStoryPlayer
- Navigate on MyStoryPlayer

3.4 IPR Management

The IPR Wizard can be used by partners (affiliated or contractors) only. Those partners have in charge one groups/channel at which their content is associated with, any institution and/or company may get affiliated with ECLAP. The groups coordinator may ask to have among its affiliated people one or more IPR

Managers that people enabled to use the IPR Wizard to set up permissions and restrictions about the usage of the published content on ECLAP portal and related mobile devices according to the *ECLAP terms of use* (<http://bpnet.eclap.eu/drupal/?q=node/3730>).

The permissions and rights that can be granted and controlled are those reported in the Terms of Use of the portal. The IPR Manager may access to the IPR Wizard tools and facilities

- via the his/her profile by clicking on menu item called "My IPR Models".
- from the Edit Object of the menu Action of the objects associated to its group/channel. In that case, the IPR Wizard can be open by clicking to the IPR Wizard link in the Edit Object web page below to the object in editing.

The main mechanisms of the IPR Wizard are based on the set up of one or more IPR Models. Any IPR Manager can create personal IPR Models to be reused on a large range of media content. An IPR Model helps the IPR Manager to define the:

- rights/permissions intended to be granted for the different kind of users of the portal as explained and detailed in the Terms of Use and technically formalized in the DE3.1 of ECLAP (<http://bpnet.eclap.eu/drupal/?q=home&axoid=urn:axmedis:00000:obj:a345a84f-6fdf-4f84-a412-88094ce363e2>).
- values of the *European.right* that have to be communicated in the EDM and/or ESE metadata set in providing them the partners content metadata.

The defined IPR Models can be used to enforce permissions/restriction and *Europeana.rights* values to objects by:

- associating the IPR Model to the object with the IPR Wizard
- uploading an object in which the IPR model is already defined in the metadata when they passed on the ECLAP Metadata Ingestion Service.

The IPR Models defined can be changed and deleted. The changes to an IPR Model implies to change the IPR Model applied to all the object at which the model has been associated with. The delete of an IPR Model is possible only if it is not associated with objects on the system.

3.5 E-learning functionalities in ECLAP

The Moodle integration allows users of the ECLAP social network to publish educational content and to exploit all the advantages provided by the use of a complete and effective tool for creation and management of on-line courses in an integrated manner. The main characteristic of Moodle is in the support of effective pedagogical notions, based on a *social constructionist* education method, adapted and interpreted with the aim to bring out the pedagogical potentialities in the use of Internet.

4 The ECLAP automated back office

The ECLAP automated BackOffice is on the back-side of the ECLAP Portal and manages all the “dirty” activities in an automated manner. It is derived from AXMEDIS AXCP (content processing grid platform) plus additional tools required to have the necessary capabilities in content processing ([6], [7], [8]). In the following the architecture of ECLAP integrated with the AXCP back-office is reported.

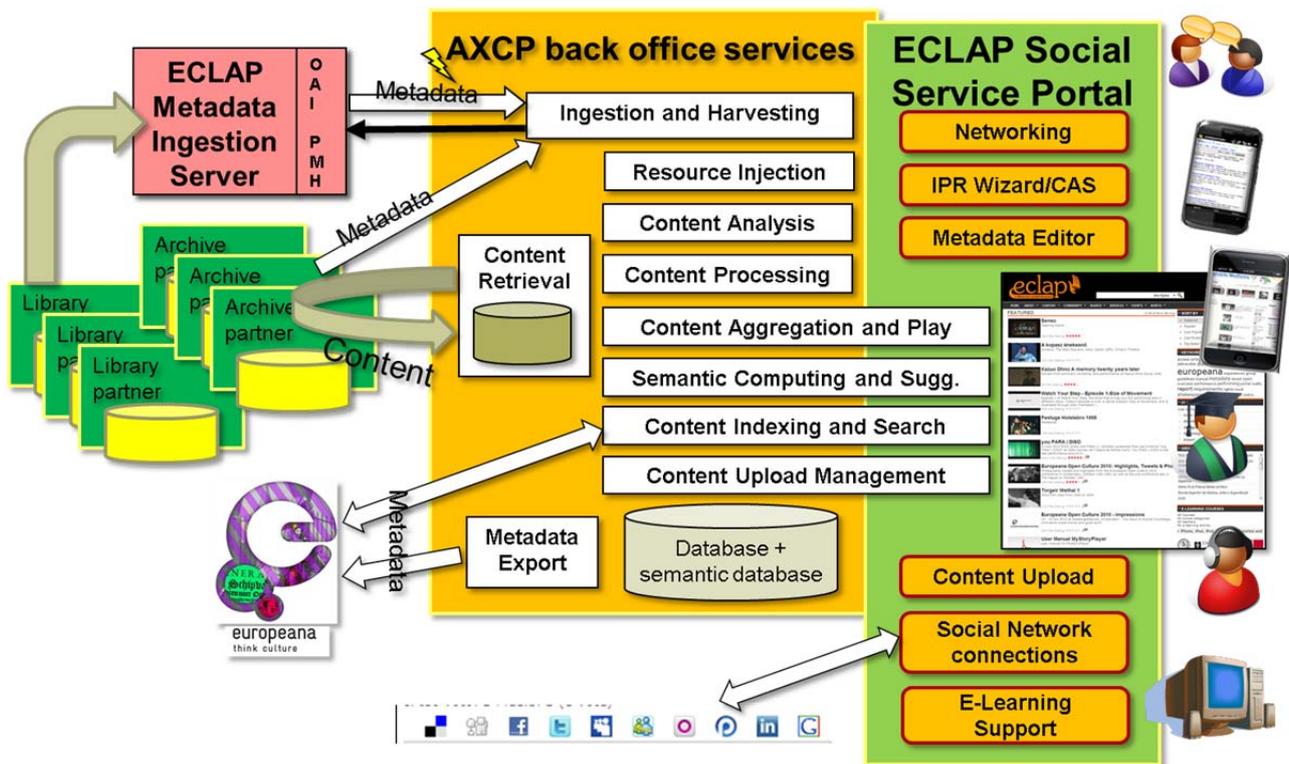


Figure 9 - ECLAP Automated back-office

4.1 The AXMEDIS AXCP content processing grid platform

AXCP is the perfect tool to automate the media and huge data set management and processing: repurposing, adaptation, reformatting, reconciliation, etc. It automates and optimizes back office activities of: social networks (semantic computing of the recommendations, suggestions, symbolic similarities, user generated content, user behaviour analysis), content production and delivering networks (for p2p, web based, broadcast, mobile), e-commerce and digital rights management portals, content production factories, etc. The AXCP consists in a simple language for the media grid computing and related production and management tools, allowing to integrate/enforce in any architecture and workflow: artificial intelligence and semantic computing solutions.

4.1.1 AXCP GRID solution main elements

The AXCP solution is grounded on the concept of Rule. AXCP Rules formalize activities of processing on a single processor and may activate other Rules on other processors/computers in the cloud computing architecture. AXCP Rules are formalized in an Extended JavaScript language to formalize jobs, logic, deadlines, periodicity, parameters, communication, storage, time, capabilities, etc. The AXCP is endowed of an integrated development environment, IDE, to create Rules. Moreover, any executable program can be put in execution on an AXCP Node and controlled by the AXCP Scheduler.

AXCP Rules can be:

- executed on any AXCP Node, single computer, virtual machine;

- parameterized for automating management activities;
- activated according to different policies: periodic, sporadic or on demand;
- activated in synchronous and asynchronous manner and by other AXCP Rules;
- activated to return back any kind of results and error codes;
- activated by other AXCP Rules, third parties external tools, web services, ...;
- dynamically produced, sent to the AXCP Scheduler and thus activated;
- set up to detect changes in the file system, local database, in the P2P, etc.;
- activated by Workflow Management Systems (Open Flow and BizTalk), PHP, JSP, JAVA, Web Service clients, etc.;
- used to schedule other AXCP Rules and AXCP Schedulers;

AXCP Rule Editor is used to produce, debug, test, activate and validate AXCP Rules to execute them on AXCP Nodes via AXCP Scheduler. The Editor assists the developers with debug, monitoring and intellisense (word completion, suggestion, user and java script function list, etc.). The AXCP Rule editor can access to the database or Rules of a Scheduler and change them without stopping the AXCP Scheduler and thus the computing. Thus the AXCP tools support the hot plug replacements of AXCP Rules.

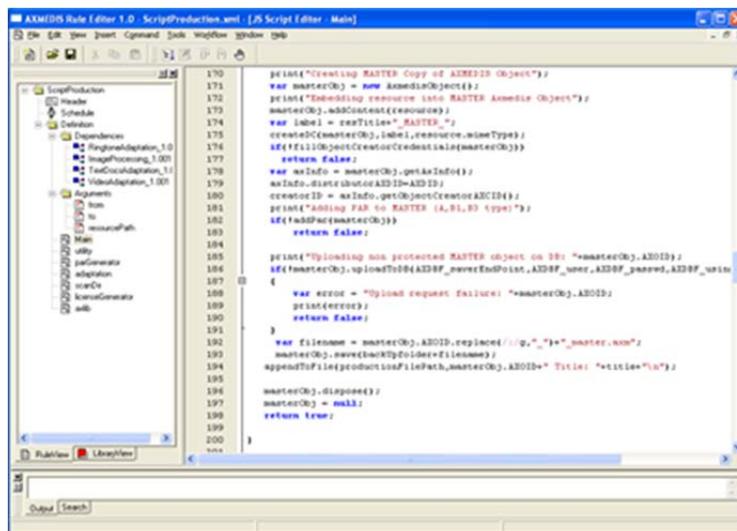


Figure 10 - AXCP Rule Editor

AXCP Nodes are controlled by the AXCP Scheduler, and can be

- industrial computers or desktop computers in your offices delegating at the AXCP a part of their CPU power detailing the CPU percentage left to AXCP for each single hour of the week, 24/7;
- executed alone (with the AXCP standalone node) for executing sporadic AXCP Rules for ad-hoc processing and activation without demanding their allocation to the AXCP Scheduler;

AXCP Standalone Node allows putting in execution a single AXCP Rule from your applications and servers via a simple shell command, it is an AXCP Rule which can be used without the AXCP Scheduler. It is an easy way to access to the whole functionalities of the AXCP language for executing asynchronous processes without calling the Web Service AXCP Scheduler.

AXCP Scheduler allocates and manages AXCP Rules on GRID Nodes:

- scheduling and balancing jobs/processes on AXCP Nodes according to the Rule processing needs in terms of plug-ins, time and resources: balancing nodes workloads, Deadline Monotonic, starting time, optimization;
- activating jobs as sporadic and periodic tasks, controlled by other tools and/or web services;
- monitoring progress of production processes and their status, via logs and in real time, etc.;

Rule Name	ASID	Rule Version	Rule Status	Job ID	Executor ID	Start Time	Start Date	Priority	Number of Runs
searchInfo_...	9	-1	completed	1	-1	16-05-11	09:23:05	0	1
searchInfo_...	10	-1	completed	11	-1	16-05-11	09:23:05	0	1
searchInfo_...	11	-1	completed	12	-1	16-05-11	09:23:05	0	1
searchInfo_...	12	-1	completed	13	-1	16-05-11	09:23:05	0	1
searchInfo_...	13	2	running	14	-1	16-05-11	09:23:05	0	1
searchInfo_...	14	-1	completed	15	-1	16-05-11	09:23:05	0	1
searchInfo_...	15	-1	completed	16	-1	16-05-11	09:23:05	0	1
searchInfo_...	16	3	running	17	-1	16-05-11	09:23:05	0	1
searchInfo_...	17	-1	completed	18	-1	16-05-11	09:23:05	0	1
searchInfo_...	18	-1	completed	19	-1	16-05-11	09:23:05	0	1
searchInfo_...	19	-1	completed	20	-1	16-05-11	09:23:05	0	1
searchInfo_...	20	-1	completed	21	-1	16-05-11	09:23:05	0	1
searchInfo_...	21	-1	completed	22	-1	16-05-11	09:23:05	0	1
searchInfo_...	22	-1	completed	23	-1	16-05-11	09:23:05	0	1
searchInfo_...	23	-1	completed	24	-1	16-05-11	09:23:05	0	1
searchInfo_...	24	8	running	25	-1	16-05-11	09:23:05	0	1
searchInfo_...	25	-1	completed	26	-1	16-05-11	09:23:05	0	1
searchInfo_...	26	-1	completed	27	-1	16-05-11	09:23:05	0	1
searchInfo_...	27	-1	completed	28	-1	16-05-11	09:23:05	0	1
searchInfo_...	28	-1	completed	29	-1	16-05-11	09:23:05	0	1
searchInfo_...	29	-1	completed	30	-1	16-05-11	09:23:05	0	1
searchInfo_...	30	-1	completed	31	-1	16-05-11	09:23:05	0	1
searchInfo_...	31	-1	completed	32	-1	16-05-11	09:23:05	0	1
searchInfo_...	32	-1	completed	33	7	16-05-11	09:23:05	0	0
searchInfo_...	33	-1	completed	34	-1	16-05-11	09:23:05	0	0
searchInfo_...	34	-1	completed	35	9	16-05-11	09:23:05	0	0
searchInfo_...	35	6	running	36	-1	16-05-11	09:23:05	0	0
searchInfo_...	36	-1	completed	37	-1	16-05-11	09:23:05	0	0
searchInfo_...	37	-1	completed	38	-1	16-05-11	09:23:05	0	0
searchInfo_...	38	-1	completed	39	-1	16-05-11	09:23:05	0	0
searchInfo_...	39	-1	completed	40	-1	16-05-11	09:23:05	0	0

Executor No.	IP	CPU	Disk	OS	Transfer Rate	IPC Speed	Status	Rule ID	Executor ID	Workload %	Start Time	End S
0027-01	192.168.0.107	99%	100%	Windows N...	-1	1072741624	Stair	2	1	0.000000	15:04:38	15:04
0027-04	192.168.0.105	99%	100%	Windows N...	-1	452049632	Stair	13	2	0.000000	15:04:05	15:04
0027-03	192.168.0.102	99%	100%	Windows N...	-1	892399492	Stair	16	3	0.000000	15:27:53	15:27
0027-02	192.168.0.43	99%	100%	Windows N...	-1	84934068	Stair	5	4	0.000000	15:45:09	15:45
PR09CPM02	192.168.0.04	99%	100%	Windows N...	-1	1072741624	Stair	6	5	0.000000	15:53:06	15:53
PR09CPM01	192.168.0.103	99%	100%	Windows N...	-1	2247463648	Stair	36	6	0.000000	16:01:28	16:01
PR08	192.168.0.49	99%	100%	Windows N...	-1	2247463648	Stair	33	7	0.000000	16:05:11	16:05
0027-05	192.168.0.102	99%	100%	Windows N...	-1	0	Stair	24	8	0.000000	16:25:49	16:25
PR09R	192.168.0.101	99%	100%	Windows N...	-1	2247463648	Stair	35	9	0.000000	16:25:48	16:25

Figure 11 - AXCP Rule Scheduler

4.1.2 AXCP GRID functionalities

The AXCP allows the intelligent and integrated management of content distribution channels, formats, devices, business models, services, etc. AXCP can be used for the automated management, of data and content processing, pre-/post-production processing and for distribution of a large range of content formats, for automatically producing, processing, packaging, adapting, transcoding, formatting, and/or repurposing content, metadata, files, user registrations, profiles, licensing, etc., of content and data of any kind.

The AXCP offers functionalities to support and set up integrated activities of:

- content Ingestion and gathering, database management, crawling, indexing, archiving, gathering from OAI, etc.;
- query, download and publication on social networks: YouTube, Flickr, XMF (<http://xmf.axmedis.org>);
- content storage and retrieval, active querying;
- content processing, repurposing, adaptation, transcoding, transcoding for text, docs, images, audio, video, multimedia, XML, SMIL, HTML, styles, MXF, newsML, MPEG-4, MPEG-21, etc.;
- metadata repurposing, adaptation, transcoding, integration, enrichment, validation;
- content descriptors, extraction and comparison, fingerprint, MPEG-7, MPEG-21, etc.;
- content composition, formatting, layout, styling;
- communication with databases, FTP, HTTP, P2P and distribution servers via several protocols;
- content packaging: MPEG-21, MXF, OMA, newsML, ZIP, etc.;
- content protection via several algorithms;
- content DRM with MPEG-21 and OMA, with tracking and reporting rights exploitation;
- content licensing, licensing the production of licenses;
- content publication and distribution toward multiple channels;
- workflow management integration with BizTalk and OpenFlow;
- user management: registration, licensing, profiling, advertising.

4.2 The ECLAP back-office activities

The ECLAP back-office activities can be grouped as the following:

- Content and metadata production
- Content & metadata ingestion
- Content management
- Content and metadata analysis

4.2.1 Content and metadata production

This is the main activity that allows producing content and metadata and adapting digital content for different purposes. The production process is divided in following sub activities:

Content production: This is main process in the AXMEDIS AXCP GRID involved in content production and adaptation. It is the starting point every time a digital content is uploaded in the ECLAP Portal. The final result is an mp21 AXMEDIS object. This object is the PC version and is considered the father/main-object. The process works in two modalities: UPLOAD and UPDATE mode. The UPLOAD mode is used when content is uploaded for the first time together with metadata. The UPDATE mode is used when the content has to modify by providing a new version that will replace the previous.

Content adaptation for mobile devices: This process produces and adapts the content for different devices such as PDA, MOBILE, and STB. It works in two modalities: UPLOAD and UPDATE mode. The UPLOAD mode is used when content is uploaded for the first time together with metadata. The UPDATE mode is used when the content has to modify by providing a new version that will replace the previous.

Content adaptation in different resolution: This produces different resolution and formats raw files. Such files are generated from the original uploaded digital resource and they are accessible by different devices not supporting mp21 format (PDA, I-Phone, I-Pad, and Smartphone). In event of video, the rule generates the iPhone video version and invokes the LD/MD/HD video production.

LD/MD/HD video production: The LD/MD/HD video production is executed to generate the Low, Medium and High Definition versions of a video. The LD, MD and HD video are generated using the uploaded video file, and the MD/HD version is generated only if the height of the original video it is greater or equal to 480 for MD and 720 for HD.

	LD	MD	HD
Video size	(320)x288	(852)x480	(1280)x720
Video codec	h264	h264	h264
Video bitrate	300kb	800kb	2Mb
Audio codec	aac 96kb	aac 96kb	aac 96kb
Output format container	flv	flv	flv

Metadata Translation: The automatic metadata translation produces the translation of missing metadata in different languages automatically by using tool or web service for text translation. The rule translates original metadata according to the languages managed by the ECLAP portal.

Publish Validated Content: Digital content uploaded by un-trusted users are stored in the Administrative archive in order to be validated. Validated content can be made visible on the portal by means of the Publish Content process.

4.2.2 Content & metadata ingestion

Content and Metadata Ingestion allows importing metadata and content coming from ECLAP partners and Digital Archives. The process allows ingesting both massively and singularly metadata and digital resources. It could be happen that some digital resource since too big to get via Internet has to be provided by using physical device, so that we have the need to start producing ECLAP content just with metadata and then when the digital resource is available injecting it off-line in the corresponding ECLAP content.

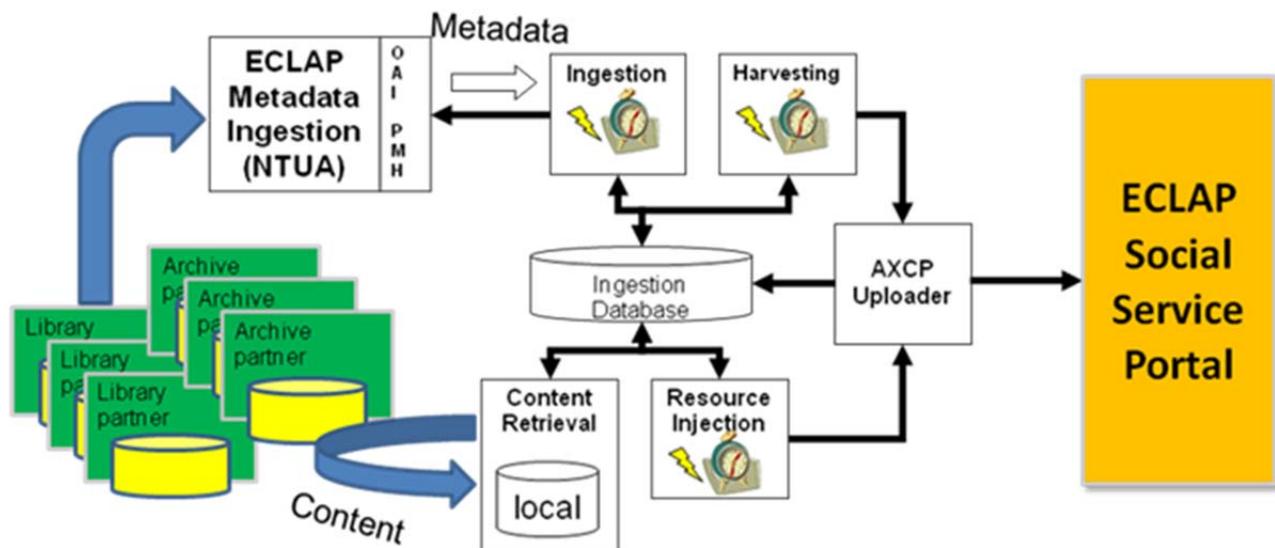


Figure 12 - Content and Metadata ingestion

The activities are divided as following:

- **Content and Metadata Retrieval:** retrieving the metadata from the EMIS service
 - **Ingestion** is the process that monitors and gets metadata of new content or a new version of metadata for just retrieved contents.
 - **Harvesting ECLAP Upload (Harvesting):** it is the process that monitors for new retrieved metadata. It calls the content production and posting on ECLAP portal.
- **Content Retrieval:** is the process that retrieves and organizes contents coming from the partners via internet or via physical devices
- **Harvesting ECLAP Update (resource injection):** it is the process that monitors for digital contents availability. It calls the content production to update the existing ECLAP contents just created only with metadata in order to inject/fill with the digital resource.

All processes share and update a Database of metadata (Ingestion Database) where all metadata and other information are stored and used to manage the whole life cycle of contents ingestion.

4.2.3 Content management

During the life-cycle of content, it could happen that metadata was modified or has to be deleted. Specific actions are needed for that and are listed below:

- **Update Metadata** If metadata has been edited (i.e. using Metadata Editor), the mp21 format of digital content has to be updated by replacing existing metadata with the new set.
- **Delete Object** The delete object removes content from ECLAP and AXMEDIS databases when required.
- **Produce Icon** An icon is generated for the digital content starting from the original digital raw resource.

4.2.4 Content and metadata analysis

Content and related metadata are processed to provide recommendations to user. There are three types of recommendations:

- User to user: each user is presented a list of “similar user” based on profile information and on content viewed information.
- Content to user: each user is presented a list of content he/she may like, based on content viewed by the user.
- Content to content: each time a user accesses content a list of “related objects” is shown.

User to user

The user to user recommendations consist in proposing a list of potential friends to each user. This list is realized taking into account both static information and dynamical behaviors of users. The former takes into account the user profile (i.e. spoken languages, nationality, skills, groups where user is registered), and the latter extracts information by analyzing the actions that users perform on contents (i.e. Viewing/downloading/marking/voting). The static and dynamical information is been used to define two proximity metrics that combined together allow to estimate a near total value between two users.

The list of potential friends, proposed to each user, contains the following types of users:

- similar users: users having similar habits both in terms of actions done into the portal and in static information declared in their user profile;
- strategic users: are those with the opposite features (i.e. suggest to a user that has many friends, a one without friends with the aim to help the second user to socialize);
- random users: are shown, in a little percentage, to intrigue users and push them to widen their interests.

Content to content

Content to content recommendations are generated by using information in the ECLAP indexing system (i.e.: title, description, subject, body of HTML pages, text inside PDF documents, and so on).

There are two ways currently implemented to provide content to content recommendation:

- Cluster based: this method finds clusters of similar objects. Each time a user views an object, related objects are presented choosing randomly some other objects belonging to the same cluster.
- Non-cluster based: this method uses the vector of words representation of the object, and feeds as a query it to the indexing system, which returns an ordered list of similar objects.

The site administrator can choose which recommendation method to use in the administration section of the portal.

Content to user

Content to user rely on the cluster-based method for content to content recommendation. The taxonomy and the digital format of contents viewed by user are compared with each cluster of objects to detect the list of related contents to suggest to the user.

5 Conclusion

The deliverable provides a description of the main functionalities developed and available on ECLAP both as portal for users and back-office for automated content production, ingestion, processing and management. ECLAP Portal functionalities for users and groups have been described focussing on kinds of digital content offered by ECALP, functionalities available on the portal for registered/unregistered users and group's coordinators, the annotations system through the MyStoryPlayer tool, the statistics to recover information about contents fruition, IPR management and E-learning platform.

Regarding the automated back-office and its functionalities, the AXMEDIS AXCP Content Processing Grid platform and capabilities have been described. The AXMEDIS AXCP Grid is the core of ECLAP back-office and thanks to processing and programming capabilities it allowed developing functionalities for content and metadata production, content & metadata ingestion, content management, content and metadata analysis.

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