Automating Production of Cross Media Content for Multi-channel Distribution

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Abstract:
This document reports the requirements collected for the realization of the AXMEDIS Framework and AXMEDIS tools in general for the automated production, protection and cross channel distribution of digital content.
Keyword List: Requirements, Multimedia, cross media, Cross channel distribution, content production, protection.

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1 Executive Summary and Report Scope

Market and end-users are pressing content industry to reduce prices. This is presently the only solution to setup viable and sustainable business activities with e-content. Production costs have to be drastically reduced while maintaining product quality. Content providers, aggregators and distributors need innovative instruments to increase efficiency. A solution is automating, accelerating and restructuring the production process to make it faster and cheaper. The goals will be reached by: (i) accelerating and reducing costs for content production with artificial intelligence algorithms for content composition, formatting and workflow, (ii) reducing distribution and aggregation costs, increasing accessibility, with a P2P platform at B2B level integrating content management systems and workflows, (iii) providing algorithms and tools for innovative and flexible Digital Rights Management, exploiting MPEG-21 and overcoming its limits, supporting several business and transactions models.

AXMEDIS consortium (producers, aggregators, distributors and researcher) will create the AXMEDIS framework with innovative methods and tools to speed up and optimise content production and distribution, for *production-on-demand*. The content model and manipulation will exploit and expand MPEG-4, MPEG-7 and MPEG-21 and others real and de-facto standards.

AXMEDIS will realize demonstrators, validated by means of real activities with end-user by leading distributor partners: (i) tools for content production and B2B distribution; (ii) content production and distribution for i-TV-PC, PC, kiosks, mobiles, PDAs. The most relevant result will be to transform the demonstrators into sustainable business models for products and services during the last project year. Additional demonstrators will be some associated projects launched as take up actions. The project will be supported by activities of training, management, assessment and evaluation, dissemination and demonstration at conference and fairs.

This deliverable is a revised version of the early requirements and it is related to all the deliverables of WP2 which is devoted to the continuous collection and analysis of user requirements. This activity is performed by setting up a user group of experts and by considering the content production models, educational paradigms, entertainment models, distribution paradigms and protection innovative aspects of the project. The work includes the adoption of interviews and the identification of use cases, description of the test cases, (while the corresponding collection of reference content for stressing key problems and for the eventual verification and validation of corresponding solutions is performed in WP8), collection of current practices (best practices) in using media technologies and solutions (processes, tools, methodologies, equipment, etc), identification of distribution processes and models.

Main deliverables are:

- DE2.3.1.2 – User Group Maintenance (M13) -- responsible UNIVLEEDS -- report on the activity related in the management and improvement of the user group, enlargement of it, analysis of the coverage of the UG with respect to the project topics, etc., activity to be performed in the next months (evolution of DE2.3.1);
- DE2.1.1.2.1 -- User Requirements, first update (M16) – responsible DSI -- this deliverable contains the revised and updated version of the user requirement produced in DE2.1.1; This deliverable has been planned since the Annex I and it has been split in the following two deliverables that initially have been planned to be under the same number. They were too large document to be considered single documents in this phase;
- DE2.1.1.2.2 – Use Cases and Scenarios, first update (M17) – responsible DSI -- this deliverable contains the revised and updated version of the Use cases and scenarios produced in DE2.1.1;
- DE2.2.1.2 – Test cases and content description, first update (M20) – responsible FUPF -- this deliverable contains the revised and updated version of the test cases for research functionalities and AXMEDIS tool validation, starting from the DE2.2.1; In this case, the description of test cases will be more precise since the first results coming from the WP8 will be available and thus effective links from what can be done for testing and which content has to be used will be possible.

- DE2.3.1.3 – User Group Maintenance, first update (M20) – responsible UNIVLEEDS -- report on the activity related in the management and improvement of the user group, its enlargement, analysis of the coverage of the UG with respect to the project topics, etc., activity to be performed in the next months (evolution of DE2.3.1.2);

The main activities that have supported the production of this deliverable are related to:

WP2.3 -- Set up and management of a AXMEDIS User Group -- responsibility UNIVLEEDS -- the established user group of experts will be enlarged and kept informed. The members will receive updated news about project evolution and will constitute a source for requirements and use cases collection and validation; moreover they will contribute to testing and validating produced results. The user group presently presents several experts representing the different users of AXMEDIS tools both at business and consumer levels. They include content producers, content integrators, content designers, usability experts, content distributors, content aggregators, publishers, etc.

WP2.4 -- Updating requirements analysis after first period -- responsibility DSI – (M16-M17) In this WP, the updating of the requirements and of use cases and test cases in the periods after the first is performed. Updating means to revise requirements, use cases and test cases, in order to see if they need to be revised and/or improved and/or deleted and/or added according to changes in the state of the art, needs of the context and users, etc. This process of updating is continuously performed and after each intermediate validation such as that of M14 and during the final validation. Requirements, use cases and test cases will be updated by considering the points of view of content designers, multimedia producers, integrators, final users, taking into account project partners, their experts, and experts of the user group by using specific interview based on guidelines produced by the consortium. Other sources of information will be the monitoring and participation to MPEG-21, DMP, and other groups. The use cases and test cases will be structured according to UML methodology creating and updated also scenarios as performed in the first period. As a result a new version of related deliverables will be produced updating and expanding those collected and reported in the deliverables of the first period. The test cases will be used for validating the functionalities identified by research and development WPs and during the activities of integration and optimisation, and in those of demonstration which is temporally allocated after the M30. In this case, the test cases will be more precise since the first results coming from the WP8 will be available and thus effective links from what can be done for testing and which content has to be used will be possible. The Content for the test cases will be collected and/or produced in WP8. The test cases will be structured according to structure of the AXMEDIS framework and tools as defined and developed in the first 12 months of the project.

Requirements reported in this document have been classified in:

- **MANDATORY (default value), meaning that the requirement have to be supported**
- **DESIRED, meaning that it should be supported**
- **OPTIONAL, meaning that it may be supported**

2 Introduction to AXMEDIS

Market and end-users press content industry to reduce prices. This is presently the only solution to setup viable and sustainable business activities with e-content. Production costs have to be drastically reduced while maintaining product quality. Content providers, aggregators and distributors need innovative instruments to increase efficiency. A solution is automating, accelerating and restructuring the production process to make it faster and cheaper. AXMEDIS will start from the state of the art, taking the industry of content production and integration beyond, reducing the costs of content production and creating an environment in which content providers, producers, integrators and distributors will have access to a huge amount of content at lower cost by exploiting P2P solutions at B2B level.

The ***main*** project objectives of AXMEDIS project are:

- Reducing the costs of cross media production by accelerating the production process with artificial intelligence algorithms for: content composition and formatting, integration and aggregation, and workflow; identification and trial of solutions for accelerating content production and packaging. Supporting the standardization process and contributing to MPEG. The reduction of production costs will be in the order of 30% in the production of "automatic content" and for on-demand production. The corresponding adoption of the new solution and basic technologies in other major publishers and distributors and in several of the minor ones if they arise in the next 5-8 years;
- Reducing the costs of cross media distribution among content producers, aggregators and distributors with a P2P platform at B2B level integrating content management systems and workflows, including digital rights management (DRM) and active protection models supporting different business and transaction models; realization of the AXMEDIS Peer to Peer (P2P) infrastructure and tools for cooperative work on content production;
- Providing algorithms and tools for innovative and flexible Digital Rights Management, exploiting MPEG-21 and overcoming its limits, supporting several business and transactions models. Solving difficulties in creating and distributing cross media content generated by using content components coming from different content providers (supporting different Content Management System) with the support of a suitable interoperable DRM system. Contributing to these aspects to the MPEG-21 standard. (the project does not fix limitation to the content format and DRM);
- Realization of the AXMEDIS framework including research results, algorithms and tools for content production and distribution to stimulate and support the adoption of the new technologies by SMEs and large companies. The framework will be available for the European Industries and research groups. The new technologies will be open and interoperable to be integrated to present technologies and solutions of the production and distribution chains;
- Developing new knowledge at scientific and technological levels by means of research activities and use these innovative results to reinforce the leadership of Europe in the field of cross media production and distribution, acting in several points of the value chain.

2.1 Potential Impact

The AXMEDIS project will have a strong impact on the social objectives of the EC.
The main points are the possibility of exploiting the huge amount of cross media which is present in the hands of the publishers in a secure manner and at low cost and thus at a low price for the final user. This will be performed by taking into account the needs of several relevant actors of the value chain.

The high costs of content production for multiple channels, combined with a lack of a secure model for distributing multimedia objects has limited the production and distribution of a huge amount of content and related investments due to a lack of a sound business case. This has led to a limitation in the creation of new services for the citizens. In addition, today's high production costs create a significant entry barrier for new content creators and owners whose content does not have a high commercial potential, including much work of artistic, educational and cultural importance along with not-for-profit services.

The AXMEDIS has the critical mass to contribute to maintain the leadership in the area of content of European companies and research centres, creating the real environment and standard for attracting in it all other SMEs involved in this sector. The industrial partners will use the AXMEDIS solutions for improving

their production and distribution processes. This means that the AXMEDIS demonstrators will be substantially a trial of the innovation that they will introduce in short time in their business process.

For these reasons AXMEDIS project will be very effective in:

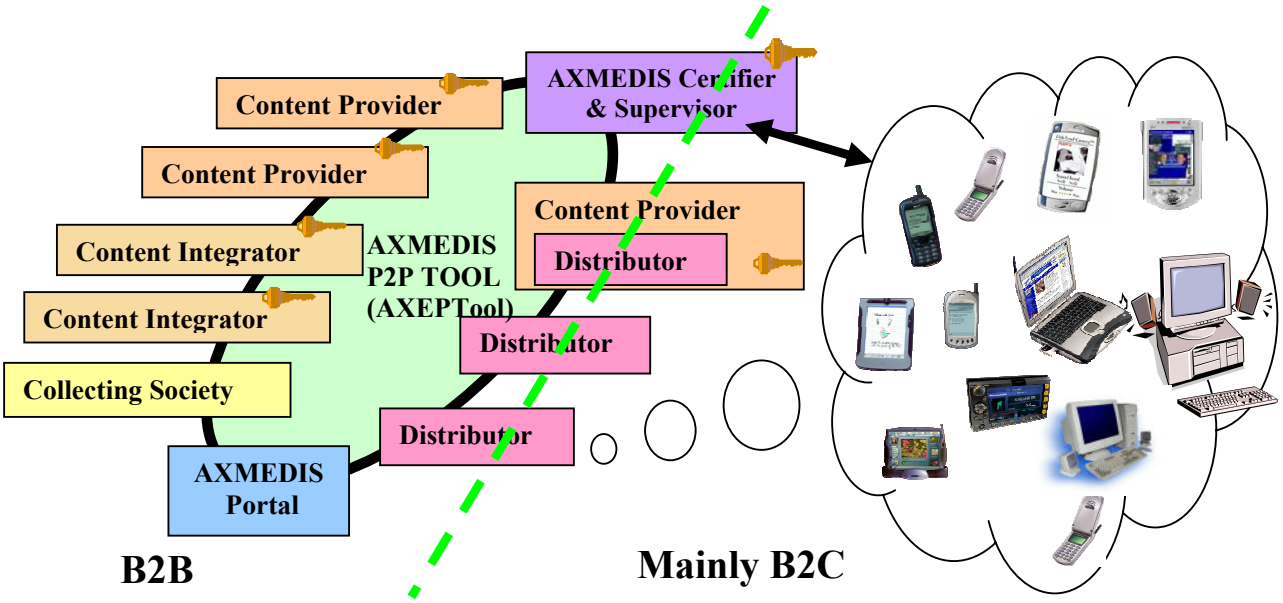
- place the basis for the implementation of a European platform (AXMEDIS) for fast production, distribution and sharing via P2P models of cross media supporting B2B and B2C models, interoperability among Content Management systems and Digital Rights Management models, with multi-channel solution: i-TV, PC, PDA, Cellular phones, Kiosks, etc.
- increasing safety and reliability of protection models bringing them at an absolute level of confidence for the content producers and distributors;
- place the basis for creating a sharing environment for cross media collections making them available for integration and distribution according to DRM mechanisms, towards: content distributors, integrators, aggregators, designers, institutions, etc., to any level actor in the value chain;
- increase the offer of European audio visual content via the newly invented instruments, and give new international business opportunities to medium-sized companies and SMEs in the area of cross media content (production, aggregation, distribution), making the content more accessible for them via the adoption of AXMEDIS model and tools. European SMEs will have the possibility to promote, manage and distribute their content on a global scale with lower effort. As a result, the provided business model will support the growth of the European content industry. They will have access to a considerable amount of multimedia content having the possibility to make their choice on a worldwide base rather than on their local territory base as happens today;
- accessibility to content for final consumers will be increased via the exploitation of the AXMEDIS infrastructure. Opening the path for realising new services for the citizens and for corporate users (archives, schools, etc.);
- Increase the visibility/accessibility of content with the P2P tools of AXMEDIS for B2B content sharing. In that way, the content could reach distant markets, multiplying chances to sell content. The multi channel distribution, allowing additional sales channels, will also make it easier to diffuse content at a reasonable cost.

3 AXMEDIS main tools

The AXMEDIS digital content and content components (in the following, AXMEDIS content in general) have a specific format capable of integration inside any kind of cross media format (video, images, animations, document, audio, etc.), adding metadata, identification, classification, categorization, indexing, descriptors, annotation, relationships and play activities and protection aspects. The AXMEDIS format permits the combination of content components, their secure distribution, etc., in the respect of the copyright laws, supporting a large variety of DRM rules and models according to concepts of interoperability among DRMs (mainly, but not only, based on MPEG-21, with both binary and XML low level formats). Within the AXMEDIS content any type of cross media content can be included from simple multimedia files to games, software components, for leisure and entertainment, infotainment, etc.

The General Architecture of AXMEDIS is represented in the next figure, which highlights both:

- **production** of AXMEDIS digital content and content components in connection with the AXMEDIS P2P tool (AXEPTool) that follows business mechanisms of B2B and support DRM with a certification authority (AXMEDIS Certifier and Supervisor). This can be connected to the Collection Societies as well as to each Content Provider and to Distributors if needed;
- **distribution** of AXMEDIS digital content towards clients via specific distributors that realize the last level of the distribution chain. This last level can also support a B2B transaction if the distribution is targeted at institutions. Also at this level the sharing via mechanisms of P2P is allowed and stimulated. This will not invalidate the protection model of AXMEDIS DRM.

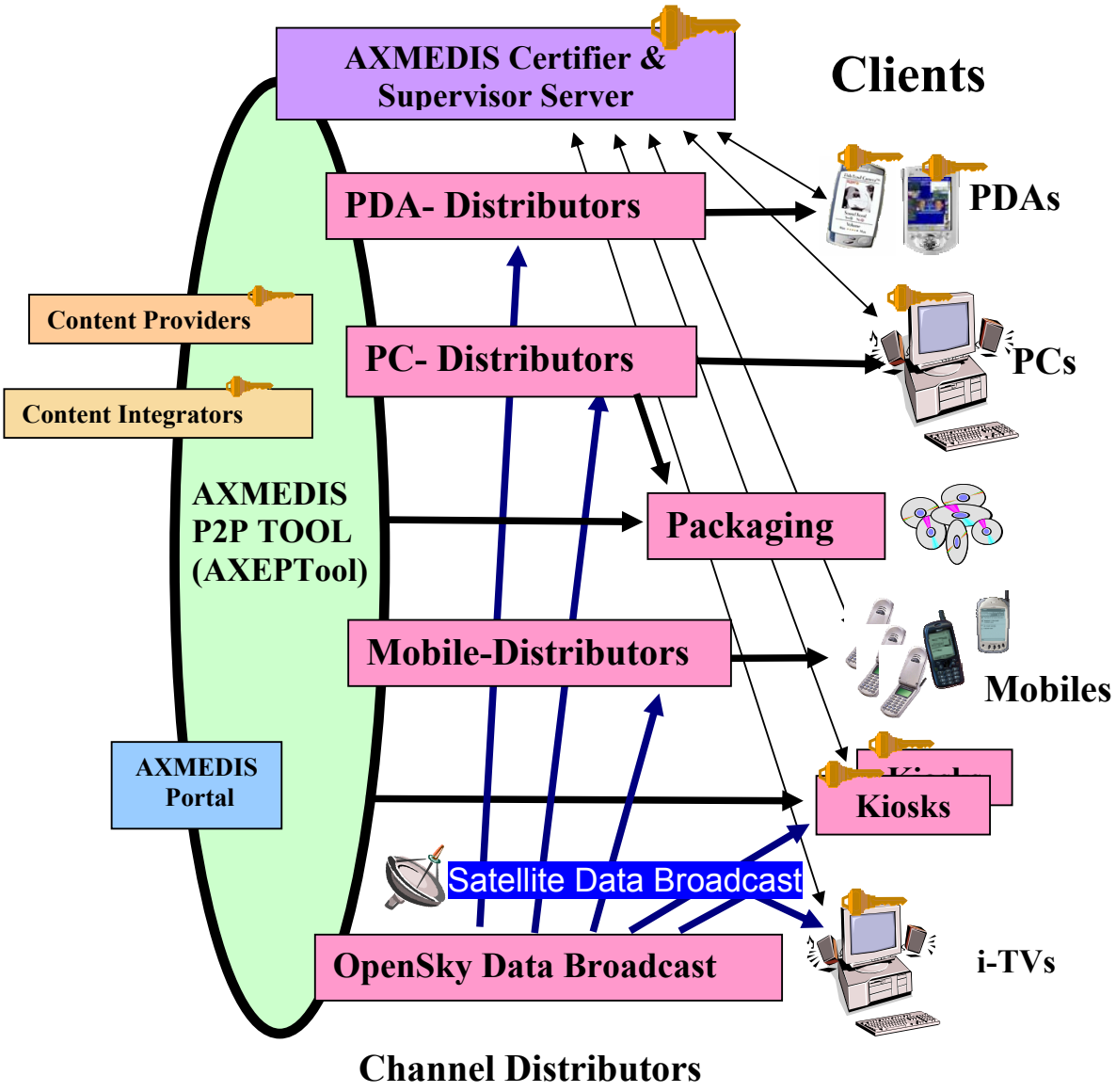


AXMEDIS General Architecture, mainly B2B side

The standard/typical distribution channel is today a single distribution path for each type of content, and often, multiple proprietary systems of representation for the same content. The definition of distribution channel editorial formats would provide one way, unified and rock-solid content format for multipurpose applications. Alternative solutions support multichannel distribution by using an XML model of content into the Content management systems of the content provider that also include multiple Transcoding engines for transforming the XML model of content into the format suitable for the channel. This approach is not flexible enough since the Transcoding of content at the source strictly limits the management of Digital Rights. In fact, in models such as CONTESSA the DRM can be applied only to the content in its final version. This creates key problems for the content providers since the content distributors are entitled to receive unprotected content. This is almost unacceptable in most cases.
In AXMEDIS , the channel distributors may maintain their distribution process. They can continue to use the same format for reaching the final users. In AXMEDIS , the content is distributed by using the P2P tool, namely AXEPTool, by using an evolution of the MPEG-21 format, with the AXMEDIS contribution. This AXMEDIS content may easily contain and deliver MPEG-4, MPEG formats, PDF, HTML, SVG, images, documents, videos, audio file, etc. (in open standard format for continuation, without the use of proprietary technologies) on demand and for all platforms according to the final format produced by the Distributor. The received content can be formatted by using AXMEDIS tools on the basis of specific editorial formats.

Channel Distributors are interested in:

- Getting AXMEDIS content and components from the Content Providers and using them for distributing content via their channels for redistribution for both B2B and B2C transactions.
- Collecting AXMEDIS contents in a local database for preparing the production content Programme that is the agenda/menu proposed to the customers and final users.
- Using AXMEDIS content for creating attractive content for their customers. For this reason, they need to have the possibility of inspecting content in their internal LAN on a client PC.
- Receiving and satisfying requests from their customers for delivering to them the proposed content
- Receiving and satisfying queries performed by their customers that are looking for specific content. This activity is one of the most interesting added value of the AXMEDIS architecture.
- Getting updated information about the possible content that can be recovered from all Content Providers. This activity is performed via a service of the AXMEDIS portal. The updating of the database of the available content is performed in push via satellite data broadcast with specific policies.
- Accessing statistics produced by the AXMEDIS Certifier and Supervisor about the content usage.



AXMEDIS General Architecture, mainly B2C

Satellite Data Broadcast It is a content distribution mechanism that permits the distribution of the AXMEDIS content in a very efficient manner. This improves the quality of service of the data delivery process (dependent on broadband availability in client location), and Distributors and also PC users can also rely on Satellite Broadcast. This technology, provided by EUTELSAT's Opensky platform, allows large quantities of data to be pushed via satellite directly on the user's PC without congesting local networks. The use of this technology is completely transparent with regard to the AXMEDIS process and only acts as a cost effective and efficient transport mechanism. The same technology also allows the content providers to bring live multimedia streaming content directly to the user's PC either for free to air content (mainly for marketing purposes) or paying on-demand channels. The pushing mechanism can be used to renovate the catalogue of the Distributors periodically at low cost.
This platform appears to be ideally suited for distributing AXMEDIS content and components. It represents an excellent opportunity for content providers for new business and for accelerating the distribution decreasing their costs.

The satellite distribution channel can be used for several activities of content distribution for both B2B and B2C business models:

- The push of content
  - updating the AXMEDIS content and components in the databases of the Distributors and of the Providers;
  - updating the general indexing databases of the Distributors with updated information regarding the available AXMEDIS content and components of the Providers;
  - updating the AXMEDIS content on Kiosks;
  - delivering AXMEDIS content on demand directly to the consumers connected to the satellite i-TV according to their interactive requests;
  - delivering AXMEDIS content to the consumers connected to the satellite i-TV-PC according to their selection performed from the programmed content of the day and week.
- The streaming of AXMEDIS content on MPEG-4 on one or more channels for:
  - promoting Content Providers' content;
  - promoting Distributors' services, for example stimulating the acquisition of content in push with a business model based on subscription or pay per view;
  - Creating specific B2B channel with large institutions and consumers.

3.1 AXMEDIS content

The AXMEDIS Content is:

Prepared/Produced by Content Providers. The content can be created with traditional tools and can be packed, protected and enforced with DRM rules to be distributed and reused as components or complete objects automatically by AXMEDIS tools. This can be done by AXMEDIS tools directly interfacing the AXEPTool with the Content Management System of the content provider, integrator or distributor. Components can be reused for creating other content objects adding more detailed DRM rules, etc. These may take into account the production and distribution phases and the different usages for which the content can be built. Contributions to the improvement of MPEG-21 on these aspects will be performed by the AXMEDIS consortium for the project and to the MPEG forum.

Compounded and formatted in an almost automatic way by using specific tools that are created in AXMEDIS by research and industrial activities. Composition is the simple action of putting together content component on the basis of rules, while formatting is the process to exploit the contained components in some integrated visualisation/(editorial)format for their distribution and usage from the end user. A simple compounded object comprised of several parts (e.g., an audio, a video and a document), can be formatted using one of several methods according to different formatting styles (graphic layout, temporal scheduling of the content, speech generation from text, etc.) producing final content for i-TV, mobile, PC usage, etc. These activities can be based on content features, generic user profile and needs, specific user profile (in the case of composition on demand), formatting style, optimisation parameters, end-user device profile, interactivity level and paradigms, content type and features, metadata, categorization, business information (price, localization, etc.), temporal evolution, DRM rules, delivering time, etc. This approach will overcome the problems of simple layout optimisation algorithms that do not take into account contextual aspects and time evolution of content. This will reduce the costs of the production process avoiding trivial repetitive operations. Tools for creating formatting styles and profiles will be produced.

Protected by AXMEDIS tools to be distributed and shared in the AXMEDIS P2P Tool for Collaborative Content Production and Control (AXEPTool). The protection is ensured by using MPEG-21 model for DRM with the support of AXMEDIS Certifier and Supervisors Server and supporting interoperability with other DRMs. The protection technologies are based on encryption, authentication and fingerprint technologies. Fingerprint solutions will be used for controlling and supervising any content on the P2P network controlling the usage of protected and non protected content and content components. The Encryption technology will be used as an active model of protection. DSI, FUPF, and FHGIGD have highly developed skills in this area on several models of passive and active protection.

Distributed and shared at B2B level among Content Providers, designer, integrators and Distributors. Content Providers provide the digital content and/or content components to be used by other Content Providers for further elaboration and processing and/or by Distributors for reaching the end-users. The business to business model among providers and distributors will be based on a P2P (peer to peer) tool for content sharing and cooperative work for production. This tool is called the AXMEDIS P2P Tool for Collaborative Content Production and Control (AXEPTool). Providers and Distributors can be connected to the Internet in any manner. In addition, the AXEPTool keeps track of the available content providers and distributors and of the published/available content for the distribution in the P2P network. The content will be in large part visible (catalogued) from the AXMEDIS portal via a satellite data broadcast. The AXEPTool for P2P activities of content production will also provide a specific user interface for technical queries including business aspects (costs, DRM rules, etc.). DSI, FUPF, AFI and ACIT are highly skilled on these topics.

Certified and supervised by the AXMEDIS Certifier and Supervisors Server, which is the certification/authentication authority for DRM. It certifies and verifies (i) the integrity and authenticity of the AXMEDIS content when it is produced, distributed and used (providing keys, etc.), (ii) the transactions performed providing authorizations, etc.; (iii) the integrity and the security of the distributors and clients, and of all devices that are involved in the manipulation and/or usage of the protected AXMEDIS content (preventing the usage on the AXEPTtool of non authorised content, the authorisation can be simply obtained by any producers via a registered and certified version of an AXEPTtool). The AXMEDIS Certifier and Supervisor keeps trace of the activities performed on each part of the content and components and reports these aspects to the authorized Providers, Distributors and Collecting societies in a sanitized form. This will permit the tracking of the revenues due for each distributed object. Specific statistics and related analyses will be also produced. The AXMEDIS Model will support a large set of different transaction models such as: renting, pay per play, subscription, etc., and the content will have different behaviours according to the DRM rules and user profile.

Distributed toward consumers via the Content Distributors. These distribute AXMEDIS content to their clients via their specific distribution channels (without changing radically their distribution model and tools). Several Distributors can be present in the architecture for distributing content covering different or similar channels. They can cover thematic or territorial areas or groups of clients with specific needs, to also coping with different languages and cultural diversity. For instance impaired people, authors, performers, classic music, jazz music, educational content, cartoons, etc. Each Content Distributor may collect and redistribute content provided by all the Content Providers. The Distributors can distribute content according to the authorization/rules associated with the content itself and may add its specific rules constraining them and changing prices. The protection model will support the distribution via P2P network or via traditional B2C transaction models. The distribution is to:

- PC clients:
  - local/internal clients on PCs connected to the Distributor via a LAN (for covering needs of archives, libraries, production process of distributors, schools, etc.);
  - internet clients on PCs connected to Distributor via Internet (traditional or satellite connection);
- Mobile clients (PDAs or Cellular phones):
  - Remotely connected to a Content Distributor via UMTS, GPRS, etc.;
  - Locally connected to a Content Distributor via Wireless LAN (e.g., WiFi, ….);
- i-TV clients connected via
  - Satellite Data Broadcast (DVBS) with a PC, mainly receiving content in Push on a specific channel;
  - Open Sky distribution on their Set top Box (STB) or other device mainly receiving content in streaming;
  - Terrestrial Data Broadcast (DVBT) with a PC or a STB receiving content in push or streaming respectively;
- In all cases, the content can be also received off-line by the clients via
  - CDs, DVDs produced by some Distributor or friends;

- Simple files from other consumers with other communication mechanisms (e.g., IRDA, LAN, etc.)

Listed and Managed in terms of metadata and content evolution, business and technical information by the AXMEDIS Portal service in conjunction to the AXEPTool. This also collects the description and metadata of all the AXMEDIS content and content components that are published on the P2P architecture and network. A satellite data broadcast will be available for distributing information and content rapidly among Providers and Distributors connected with the AXEPTool. This will reduce the time and costs for downloading. It could work as a proxy for the whole information in the B2B network. The AXEPTool in conjunction with AXMEDIS Certifier and Supervisor will be capable of tracing about the evolution of each single digital object, this allows the workflow monitoring of content production, tracking versioning and digital rights exploitation. The AXMEDIS Portal is also a way to provide a large number of other services for the community and supporting the AXMEDIS Framework construction and management.

Searched into the distributed database managed by AXEPTool allowing the specification of technical/professional query including metadata, technical information, business and licensing aspects, content based, DRM rules, etc. In the demonstrators a more specific query engine will be developed to simplify the access to content for PDAs and Mobiles phones on the B2C side. In those cases, the information needed to identify the single object into a database is more related to the content description and metadata rather than to technical details.

Used and consumed by AXMEDIS clients. They can be of several different natures and according to that delivered in different formats plus encrypted parts (HTML, WAP, SCORM, LMO, MPEG-4, etc.). In some cases, they have to be certified/registered by the AXMEDIS Certifier and Supervisor Server, if they intend to manipulate protected content. In other cases, they are already identified by their internal card, for example in the case of cellular phones. The client tools can be implemented as Viewers that can be integrated in classical browsers with a plug in, Java Applet or ActiveX compliant with the AXMEDIS directives or with specific tools. Standards viewers, provided by the consortium via the portal, can be customized at level of user interface, language and skin for specific purposes.

4 AXMEDIS General Requirements

This section contains all the general requirements regarding the object model, licensing, business model and security aspects.

4.1 AXMEDIS Object Model

Main requirements:

4.1.1) All the AXMEDIS objects have to be MPEG-21 compliant digital objects. Any kind of digital resource can be included in an AXMEDIS object from simple documents, audio, video, text, games, software tools, animations, images, multimedia objects, etc.

4.1.2) Not all the MPEG21 compliant digital objects are AXMEDIS objects.

4.1.3) Any MPEG-21 DI may be converted into AXMEDIS objects if you have the rights to do that and if your have the missing information

AXMEDIS Data model schema has to:

4.1.4) be compliant to MPEG21 DID schema, including the fact that and AXMEDIS object has to include a description of the Protection Tool needed to process the content.

4.1.5) define tags to include AXInfo to represent information related to the AXMEDIS object or to an AXMEDIS Component.

4.1.6) support flexibility so as to add or import tags for particular industries. The usage of each tag should be tightly defined so that there is no ambiguity as to its purpose or content

An AXMEDIS object has to:

4.1.7) support a defined structure

4.1.8) provide general information (AXInfo) about itself

4.1.9) provide information AXInfo for each component of it

4.1.10) provide methods to certify existent metadata and AXInfo; This means that if one reads the metadata in an object and they refer to a given resource, there is the guarantee that the metadata are those enforced by the Object Creator and they have not been changed. This is needed to avoid the distribution of object that could be acquired by final users on the basis of their description and this is not aligned with the real content.

4.1.11) provide protection for the whole object or only for the components where it is needed, or to the external resources

4.1.12) allow hosting the license inside the object or not. Objects that contain the license are called Governed AXMEDIS Object.

4.1.13) support the composition of different components of any possible types (formats)

4.1.14) include digital resources or reference to them, content meta-data, DRM aspects (potential rights user could use), protection processor aspects, content distribution information, content usage information

4.1.15) support sharing of any component or resource between AXMEDIS Objects

4.1.16) include relevant Metadata identifying the characteristics of Content

4.1.17) allow using different metadata for different resources

4.1.18) include Descriptors such as MPEG7 or other metadata formats

4.1.19) include minimal mandatory metadata information (OID, creator, …)

AXInfo included into AXMEDIS objects has to:

4.1.20) be accessible even when the object is protected.

Example: when the digital objects are distributed on the P2P, even if the object is protected AXInfo has to be accessible for the indexing of the objects into the distributed database without the need of opening the object by getting a license and the secret information (e.g. keys).

4.1.21) include information about:

- Creator of the object (AXCID), Distributor of the Object (AXDID)
- Creator of the component (AXCID) in case the AXInfo is associated to an AXMEDIS component
- Specific metadata for the AXMEDIS community and B2B, B2C, etc.

- A number of Identification codes over the simple AXOID and AXWID (Work ID) already supported by industries ISRC code, bar code, number of catalogue, mechanical licence,
- Information regarding workflow: work to be done, who has to do, where has to be done, deadline, etc.
- Fingerprint
- Technical information regarding the format: resolution, duration, type, related processing tool, sample rate, etc.
- AXInfo of components (a copy or a summary)
- A number of fixed metadata (e.g Dublin core)
- History of the object (during B2B lifecycle), version, changes performed, etc.

4.1.22) contain Potential Available Rights, PAR, while the really available rights are stored in the licence that is obtained separately from the object. Potential Available Rights are mainly used for querying. Potential Available Rights are all the rights that some user can acquire with a corresponding licence. provide information about how to use the whole content or a single or a group of component (i.e what is possible to do with and object: play, print, embed in another object, modify, adapt…) the usage could be different in B2B and B2C circuits (Potential Available Rights)

4.1.23) be certified

4.1.24) maintain a state with respect to production and consumption life cycle (published, promotion, original master, label copy …)

4.1.25) contain information about where a licence can be acquired (i.e. Service, URL)

4.1.2 AXMEDIS Object structure

An AXMEDIS Object has to:

4.1.26) organize and associate any Digital Content and to include Digital Resources, Metadata, Rights Expressions, technical Information, Descriptors and Licenses, etc.

4.1.27) support hierarchical structure of content in order to allow different grouping and semantic associations. Thus supporting association of Composite AXMEDIS Objects

4.1.28) support references to other AXMEDIS objects inside its structure. A given Digital resource can be referenced by a multiplicity of Composing Content without duplication. AXMEDIS Component references can point to local/remote objects.

4.1.29) associate persistent information to Digital Resources. They can be general information, watermark, fingerprint info, etc.

4.1.30) be able to include protected (e.g. encrypted, watermarked, scrambled, …) and unprotected data.

4.1.31) support different grouping of components of the object itself in sub-collections

Example: **'Album vs Single':** Some content will have files batched together as a collection. It must be possible to make certain sub-collections of content within one bundle available separately by following approach defined below:

Approach 1: Separate license rights for sub-collections:

Example:

AXObj		Availability			
Description	File Type	Collection	Sub-collection 1	Sub-collection 2	Sub-collection 3
Sleeve Image	.JPG	✓	✓	✓	✓
Sleeve Notes	.PDF	✓	✓	✓	✓
Audio Track 1	.WMA	✓	✓		
Audio Track 2	.WMA	✓		✓	
Audio Track 3	.WMA	✓			✓

So looking at the table above there is one bundle of content available in four ways. It is available either as a whole, or as three separate tracks sharing a sleeve image and sleeve notes.

4.1.32) be able to organize and associate (i.e. multiplex) Metadata and Content for carriage in broadcast and streaming

4.1.33) support resources as preview of other resources contained in the object.

4.1.3 AXMEDIS Object Identification

AXMEDIS Object Model has to:

4.1.34) provide unambiguous identification of a piece of AXMEDIS Object and Component and internal Digital Resource

4.1.35) support working in conjunction with multiple, existing industry schemes for Digital Content identification (ISBN, ISMN, …) .

4.1.36) be able to extend the total number of identifiers that can be assigned in such a manner that previously assigned identifiers do not become obsolete.

4.1.37) support unambiguous identification of a Work and its parts that are AXMEDIS Objects or AXMEDIS Components

4.1.38) Some organisation has to be capable to assign an ID to AXMEDIS Works, Objects, Components and Resources

4.1.39) A new ID for AXMEDIS Object or Component may be requested only by a certified/authenticated AXMEDIS Object Creator (see definition, it can be integrator, publisher, etc..).

4.1.4 AXMEDIS Object Classification

AXMEDIS Object Model has to:

4.1.40) be able to support and collect in the same AXMEDIS Object or Component several types of information that can be used for classifying AXMEDIS Objects or Components in different contexts. They can support different standards such as MPEG7, Dublin Core, UNIMARC, DIGIMARK, etc. The compatibility with those standards has to be supported by means of plug-in tools implemented by third parties.

4.1.41) include the following **mandatory** fields in at least one language:

- Author,
- Title,
- Genre of Authorship,
- Date of Creation of Work,
- Date of distribution (marketing/protection),
- Creator/Publishers name, ID and web location(s),
- Distributor name, ID and its web location(s),
- etc…

4.1.42) report the Classification language (e.g. using xml:lang)

4.1.43) support the Classification in multiple languages

4.1.44) facilitate search and find of content: AXMEDIS Works, Objects, Components, Resources or even pieces of Content

4.1.45) be able to include any kind of Descriptors that facilitate cataloguing Content for B2B distribution or for verification in terms of Fingerprint. See AXMEDIS Object Technical Features

4.1.46) support efficient communication of Metadata. An End-User should not have to wait for a long time before using Metadata

4.1.5 AXMEDIS Object Technical Features

AXMEDIS Object Model or AXInfo have to include:

4.1.47) unambiguously descriptive information like Fingerprint to a Resource, to an AXMEDIS Component, or an AXMEDIS Object, they can be used to describe the technical aspects of the object.

4.1.48) Relevant parameters profile to understand/estimate if an Object is suitable or not for a given device. This allows verifying if any Adaptation is possible or thanks to the presence of the suitable tools and algorithms. These parameters should include:

- Compression algorithm used
- Bitrate used for encoding
- If it is an image: Video resolution, Size of the image
- If it is a sound: Audio sampling frequency, Number of channels
- Duration,

- Mime type as for the MPEG21 resources
- …

4.2 Licence Model, Rights Expression

An AXMEDIS Object or Component has to:

4.2.1) be usable only by the User and Tools for which license has been produced for the rights enforced into the license. **Example**: Licences for consumption, broadcasting, archival, educational, promotional, demonstration for PDA, for mobile, for PC, for integration, for internal purpose, for Business level only, etc.

4.2.2) be related to at least one AXMEDIS Licence (stored inside the object or not) to be used.

The AXMEDIS License has to

4.2.3) be unambiguously identified, AXMEDIS License ID

4.2.4) unambiguously identify:

- who is granting the Right (licence issuer, licensor)
- who is obtaining the whole licence (licensee)
- for each right expressed in the license it can be defined
  - the user (or the user group) to whom is granted
  - on which Device or Domains it can be used (more than one)
  - the AXMEDIS Object, Component, piece of resource to which the Rights Expression refers
  - in which context it can be used

4.2.5) take into account exceptions to rights according to applicable law (e.g. Unpaired people, Educational Institute, etc…),

4.2.6) be produced containing only as a subset of the rights which are in the PAR of the AXMEDIS Object. In the case of Governed AXMEDIS Object, the rights described in the PAR of the AXInfo have to be aligned to the License included into the Governed AXMEDIS Object (OPTIONAL)

4.2.7) allow the definition if the license itself can be cached or not in the device

4.2.8) be certificated.

4.2.9) be expresses with an open specification rights expression language

4.2.10) be able to map all the possible rights usage conditions (already present in the contracts)

4.2.11) be able to work in conjunction with existing industry schemes to grant and deliver specific Licensed uses.

4.2.12) state that a Right is granted in such a way that there is no ambiguity in the semantics of the Rights Expression and dictionary of terms: see MPEG-21 RDD, Mi3P, etc.

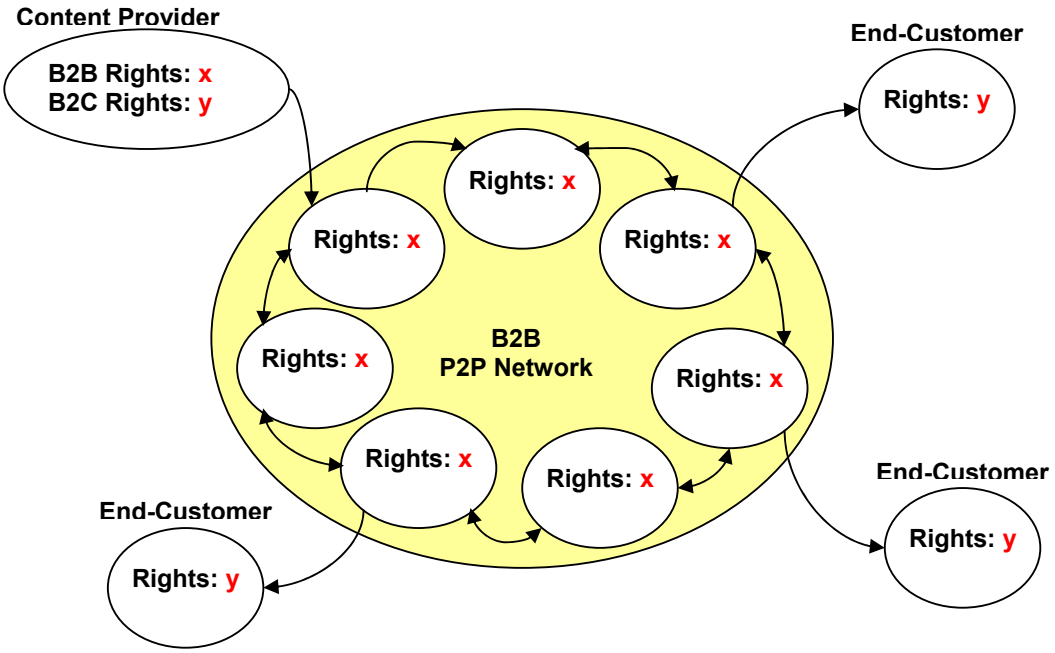
4.2.13) be written in right expression that can be translated/adapted in other models and languages

4.2.14) be able to specify whether a right has to be used only in a given Context

Example Distributor ID, nationality of the distributor, nationality of the user, location of the device, region for DVD etc., religion or political parameters, commercial, promotional, demonstration, preview, impaired people, public performance or private, adult only, over a given age, etc.

4.2.15) support the expression of different subsets of Rights, both for delivering (B2C) and production (B2B) sides

4.2.16) be able to express onward rights for downstream partners. Usage rights must be specified at both a B2B and B2C level, with B2B distribution rights inheriting the B2C rights for onward distribution, supporting definition of new Rights when the need occurs



In the diagram above, the content provider defines two sets of rights. Firstly the B2C rights define the license granted to an end consumer. Secondly, the B2B rights define the license granted to other distributors. The B2C rights are inherited by the distributors for onward grant to end customers.

Example 1:

Party	Content	B2B Rights	B2C Rights
Photographer	Image	Use in publications Use in library archives	View of image Copy of image for personal use only
Publisher	Newspaper containing image	Use in library archives	View of newspaper for personal use only View of image Copy of image for personal use only
Library	Digital newspaper archive		View of archive for personal use only View of newspaper for personal use only View of image Copy of image for personal use only

Example 2: In the music industry, a session musician may record a piece of music, which is licensed for use by a particular party (the artist) in an assembled recording and free distribution by that artist. The artist may combine the original piece with other material to produce a finished master. This may, in turn, be distributed to a number of remixers, who may then re-distribute their interpretation of the recording to the artist. The artist may subsequently approve some of the interpretations and distribute this to his record label, who may combine one or more recordings with artwork and metadata and license a completed product for distribution onto retailers. The final product as purchased by an end-user combines all the rights of the individual elements. If one element does not carry the rights for onward distribution to a customer that is required (such as a sample from another recorded work), then these rights would have to be negotiated with the rights holder. This matches the physical process that may occur in the distribution chain of an audio release.
A content provider may place content into the AXMEDIS P2P network for an aggregator to collect, re-work and replace on the P2P network for the use of B2C distributors. Experience shows that the content provider will want to retain control not only over which aggregators have access to their content, but which B2C distributors then have the onward rights to exploit the content. An

aggregator will not have the right to choose their onward distribution channels. AXInfo may need to be flexible enough to contain information on these approved, downstream, distribution models. In fact, these distribution models may have even more tiers than just Content Provider, Aggregator, Distributor. So an 'n' tier model should be adopted to specify the onward rights.

Example: XYZ Records grants AFI rights to aggregate and distribute digital catalogue through AXMEDIS to only 5 retailers for B2C exploitation.
This restriction (which will change over time – usually adding more and more approved retailers) must be recorded somewhere against the object or license and be easily and rapidly updated for very large sections of catalogue.

Example: At the end of the contracted period, XYZ Records is happy with the business generated through XX and 4 of the approved retailers and wishes to approve the catalogue for distribution through a further 5 retailers. However, one of the retailers has failed to settle their financial liability and XYZ records would like to cease distribution through that retailer. So 5 retailers become 9 retailers. Each of XYZ's catalogue of 300,000 audio tracks needs to be updated with the new information.

Note that this kind of activity can happen daily. A company have found that trying to keep this information updated at object level can be very resource inefficient. We would welcome a proposal for solving this problem. This could be along the lines of maintaining a set of rights 'contracts' between B2B parties which are referenced each time a query on the AXEPTool is run. Updates such as in the example above could be made only at the contract level.

4.2.17) support the reference to a signed contract, where some information which characterized the AXMEDIS license itself is described (in natural language).

Purpose of the contract

Example acquisition of rights with a view to incorporating an extract of an audio content into a CD-ROM on the history of jazz.

- **Assignment or user licence**
  The contract will stipulate whether an assignment or a user license is sought. It should be noted that the owner of the rights cannot transfer more rights than he owns. The owner may be free to refuse permission.
- **Scope of the assignment or the user licence**
  The user of the audio content lists the rights he wishes to have included in the assignment or the user licence - for example, the right to reproduce and adapt an extract of audio with a view to incorporating it in an interactive CD-ROM, communicating it to the public by telecommunication, distributing it and making derivative products.
- **Territory and term**
  The user should specify the territory where the incorporated work will be exploited - for example, the world, North America, Europe, etc. The term of the assignment or the user licence should be stated, as well as the renewal conditions, as the case may be.
- **Financial considerations**
  Since the cost of using the work in a new multimedia context is not, in many cases, set in advance by any generally applicable convention or rate, it will have to be negotiated case by case. Things to be taken into account are the nature of the use, the size of the extract in relation to the original work and in relation to the other works incorporated into the New media product, the territory, the potential revenue to be gained from the exploitation, etc.
  Some right owners or collecting society have established set prices for the use of their work Generally the financial consideration are paid in a lump sum . Note: in case of B2C distribution case by case negotiation is not needed.

4.2.18) Support the reference to the legal terms and conditions of the business contracts (definition, liability, guarantee, jurisdiction etc) that have to be mandatory accepted and signed by contractual parties including:

- **Definitions**
  Legal contracts require the use of precise wording. Thus, where concepts are complex or it might take some time to explain a short phrase, a word is chosen as shorthand to signify them.
- **Licensee Undertakings/obligations**
  When is included this provision states that licensee undertakes that neither it nor its users will infringe copyright or any other proprietary rights by for example, modifying, adapting, transforming, translating and creating derivative works of the Licensed content or parts of it.
- **Warranties and Indemnities**
  A warranty is a statement or representation that certain facts are true. Important warranties include that the goods and/or services will perform as promised in the agreement The warranty provision for example states that the licensor has the rights and the authority to grant the license. If a license has no warranty clause or a warranty clause that is ambiguous. An indemnity is one party's agreement to insure or compensate the other party against losses and expenses resulting from failures in performance under the contract.
- **Force Majeure**
  A force majeure is a condition beyond the control of the parties such as war, strikes, destruction of network facilities, etc. not foreseen by the parties and which prevented performance under the contract. Most licenses states that failure to perform term or condition by any party under the license due to a force majeure will be excused s will not be deemed a breach of the Agreement.
- **Jurisdiction & Venue:**
  Since contracts are governed by state law, they will normally provide that any disputes under the contract are governed by a specific state's laws. A fundamental clause in this section is the national law chosen for the interpretation of the license and the court chosen for submitting a claim. Most licenses choose the national law most suitable for the licensor.

4.2.19) include or refer to information about how to produce new licences for exploiting a new produced content

Example: summarising the consequences of music use for synchronisation and in multimedia content are:

Multiplicity of rights

Multimedia products are composed of multiple protected works. Multimedia exploitation involves a number of restrictive acts. There are a lot of rights to clear.

Multiplicity of right owners

Copyrights and related rights are rarely owned by a single entity. In practice, rights are divided along vertical and horizontal lines, for different models of exploitation and different territories. Some rights are managed directly by collecting societies. The multimedia producer has a lot of right owners to search for.

Overlapping rights

Individual content incorporated in multimedia products are subjected to overlapping rights: copyrights, neighbouring rights, rights of publicity, etc. Even if copyrights have expired, multimedia producers must reckon with surviving rights.

Lack of established licensing practices - Multiplicity of contacts

Copyright owners are inclined to apply royalty schemes developed for traditional media.. In practice, multimedia producers are confronted with a bewildering variety of licensing schemes. Each "family of rights" has its own licensing tradition.

The AXMEDIS License has to support the expression of the following rights (functions):

4.2.20) copy, personal copy management
4.2.21) move on other devices,
4.2.22) move/copy within authorised domain
4.2.23) move/copy within Footprint (e.g. applications may be required to determine the geographic region in which the device running the application is found, particularly when on-line)
4.2.24) signal no copy/move outside Footprint

4.2.25) export/import, transfer from/to an external device/tool **Example**: the media can be transferred to other devices (e.g. an MP3 player), which devices are acceptable (including SDMI standards) and how many times this is allowed in a given, or any period.
4.2.26) Export
4.2.27) export to a movable media
4.2.28) backup/restore
4.2.29) optionally store received content into a CMS by using an agreed exchange format
4.2.30) burn in CD/DVD (red book..)
Example: Physical Copy Protection (allow the user to burn over CD (protected content, content on a copy protection CD no longer supported by AXMEDIS protection, content on a red-book CD or other physical media)
Whether a hard copy can be made of the media (e.g. a Recordable CD in red-book format) and how many times this is allowed in a given, or any period.
4.2.31) edit, change the digital information of the object
4.2.32) modify
4.2.33) associate (audio and video)
4.2.34) including into other new objects
4.2.35) insert/associate, insert as an additional element in another cross media object
4.2.36) embed
4.2.37) compose, use as components
Example: the use of a music pieces with images and video (CD-ROM, film, documentaries, publicity and TV spots, etc.) includes a contract of synchronisation with the following rights owners: the original publisher of the music (compulsory in any case) and the phonographic producer of the sound recording (if the user intend to use the sound recording)
4.2.38) synchronise, use in a synchronised manner with other content
Example: Use of Digital Audio for synchronisation of music with images like in movies, CD-ROM, multimedia contents, interactive games, on tv program, under web pages, etc. To use music in a film, video, or multimedia product, or in any audio-visual production, users will always need to get permission. The type of permission you will require, and the procedures you will need to follow, will depend on where the music owners are. In each case, you must acquire the rights to the musical work. The user needs to get permission (a "licence") if they want to reproduce the whole or any "substantial part" of material in which someone else owns copyright. In copyright law, any part of a work that is important, distinctive, essential or recognizable is likely to be "substantial". A few bars of music may be "substantial" in this sense, and the use of even short excerpts of music in a soundtrack or multimedia product will generally require permission.
4.2.39) Ungroup
4.2.40) extract
4.2.41) Unprotect
4.2.42) streaming
4.2.43) downloading
4.2.44) uploading
4.2.45) Adapt: change technical features, change of coding, change of resolution, format, etc
4.2.46) print
4.2.47) encrypt clear text content
4.2.48) Play: execute for rendering
4.2.49) resell (redistributing)
4.2.50) second hand resell
4.2.51) evaluate metadata
4.2.52) edit metadata
4.2.53) show metadata
4.2.54) export Right Expressions or PAR in a human readable manner (e.g. clear text or HTML)
4.2.55) Free preview
Example: play for X minutes, or listed for the first 30 sec, or print for the first 2 pages, or view for the first 10 minutes, etc.
4.2.56) low-quality play (the same content is played at different qualities depending on the license...)support definition of rights to use digital content in the analogical market

4.2.57) public communication

Example: The transmission of sound to the public by any medium. Within this category the music industry includes the transmission and immediate playback of media (audio and/or video) even for a limited time and not saved for later listening or viewing. Usually called Streaming (by music industry)

4.2.58) support the reference to these resources:

- give a right to one or many AXMEDIS Objects
- give a right to one or many Components
- give many rights each referring to a different Component of a AXMEDIS Object
- give different rights for sub-collections:

Example:

AXObj		Availability			
Description	**File Type**	**Collection**	**Sub-collection 1**	**Sub-collection 2**	**Sub-collection 3**
Sleeve Image	.JPG	✓	✓	✓	✓
Sleeve Notes	.PDF	✓	✓	✓	✓
Audio Track 1	.WMA	✓	✓		
Audio Track 2	.WMA	✓		✓	
Audio Track 3	.WMA	✓			✓

The AXMEDIS License has to support the expression of these conditions:

4.2.59) user identity-based
4.2.60) in a private/public use device
4.2.61) in a commercial content
4.2.62) after the payment of a specific amount
4.2.63) Example: include or refer costs for the usage of the rights as a function of the location, content type, Tool Type, context of fruition (education, impaired, public, integration, redistribution, etc.). These costs can be expressed in several currencies, specifying the vat and the net cost. The same effect can be obtained by producing a complex complete license or several licenses for the OID/WID, specifically for UID, TID, DID, etc.
4.2.64) end-user territory availability (the countries in which the media is distributed and can be accessed). Note: this will be at country level and have to be considered that countries appear and disappear. The ISO standard list of countries is a good base reference. (ISO 3166)
4.2.65) distribution date range (when the media files can physically be distributed B2B)
4.2.66) usage date range (when the media files can physically be accessed and used B2C) (same thing)
4.2.67) period of time (e.g. play as long as the play time is less than a specified period) and based on time/date
4.2.68) time-shifted use has to be supported
4.2.69) for a period of time after initial license / access
4.2.70) expiration of rights after X days/hours from licence delivery
4.2.71) expiration of rights after X days/hours from first play
4.2.72) expiration of rights at a fixed date
4.2.73) until a specified end date
4.2.74) only between two specified dates dd/mm/yyyy hh:mm:ss – dd/mm/yyyy hh:mm:ss
4.2.75) count based (play up to the specified number of times)
4.2.76) counted number of plays/print/ executions, etc. (N=1 only once)
4.2.77) n times in total
4.2.78) n times in period of x days.
4.2.79) unlimited times
4.2.80) unlimited play/print/execute, etc. forever
4.2.81) unlimited play/print/execute, etc. per period (for instance per month, etc.)
4.2.82) on a specified device
4.2.83) on a group of devices identified by a domain
4.2.84) conditional expiry (e.g., loses rights to sheet music if stored in the device for longer than determined period without use)

4.2.85) A condition to enabling the caching of the license on the device or not.

The AXMEDIS License can:

4.2.86) be generated by using the information stored in metadata referring to Potential Available Rights (or other IPR rights) (OPTIONAL)
4.2.87) include protection information to unprotect the object/resource
4.2.88) be cached in the device to work offline
4.2.89) delivered inside the object body
4.2.90) delivered offline as pre-delivery
4.2.91) delivered offline as postdelivering
4.2.92) be re-downloaded/re-delivered if the user has had some problems with his device;
4.2.93) be revoked
4.2.94) be re-activated if revoked

The AXMEDIS solutions and architecture has to provide

4.2.95) an efficient communication of the Licence and protection info when requested for content usage. An End-User should not have to wait for a long time before Using Content
4.2.96) an efficient licence check while consuming the object should not take a long time before answering
4.2.97) tools with functionality for manual negotiation of rights. The manual process would be predominantly B2B and would happen on the P2P network. It would follow the publishing of available works by a content or rights owner, and would follow the placing of works in an active list selection by a content or rights aggregator or distributor. The process of generating a licence from a list that has been selected could often require negotiation of price, details of terms and conditions of use, etc, and that these would need to be an iterative negotiation between the owners and the aggregator/distributor. Since there are no standard contracts at this level, and everything is negotiated. So some sort of mediation process could be provided by AXMEDIS that either allow manual negotiation, or that presents common or previously negotiated licences as a basis for further negotiation to both parties.
4.2.98) tools with functionality for automatic negotiation of rights. The automatic process would be predominantly B2C and would happen across the distribution network. Since frequently in B2C boilerplate licences are used, and not individual ones to each end user.

The AXMEDIS License production has to support

4.2.99) license templates to facilitate license production. Business level Licenses can be produced and provided in terms of templates matching the contracts
4.2.100) Automatic production of the license even when the user is not connected. This is the automatic licensing.
4.2.101) Tools for Dynamic Licensing emulating in a digital form (and across a network) the existing business processes. Licences should be prepared automatically according to business process rules rather than being negotiated manually by people. **Examples** of this type of interaction could include:

- preset-boilerplate licences are made available for frequently requested pieces of content (or types of content)
- media that can have several different sets of content depending on the user's usage can be negotiated for at the moment of usage.
  For example, a 'Spiderman 2' movie application might enable a user to explore additional material like the soundtrack, but the rights to the soundtrack would only need to be acquired if the user requests them as part of the exploration. And if the user then requests the score for part of the soundtrack, then the rights for that would then need to be acquired too. The majority of users will not require these additional rights, and the owners will not want to negotiate each user licence individually, which means that an automatic electronic licensing technique would be very useful. It would also mean that the acquisition of rights would be easy (and transparent) which would remove one of the main justifications for casual piracy.
- media that is made up of a number of discrete items with separate licences can be 'unbundled' in licensing terms, so that if part of it becomes unavailable, then the rights can be altered to

reflect this, without needing to revisit the entire bundle. One example might be in TV, where individual actors might have 'repeat fees' if a programme is shown again as a repeat but where some actors do not have this clause in their contract. A user might then be able to view those parts of the TV programme which contain the 'repeats are ok' actors, but not view those parts with the 'repeats are not ok' embargo. An electronic clearing house for this type of dynamism would be a powerful advantage for AXMEDIS , and would reflect trends within media for increasing atomisation of content (driven by DVD 'extras' and PVR functionality.)

4.2.2 Action Log

An AXMEDIS Action Log has to:

4.2.102) be unambiguously identified
4.2.103) be related to a single AXOID
4.2.104) list and store any right usage attempt on an AXMEDIS object (even if it not succeeds)
4.2.105) list and store any succeeded right usage on an AXMEDIS object
4.2.106) describe the action (when, what, where, how, etc.), and all the related IDs: content, creator, tool, distributor, user, domain, device, etc.
4.2.107) allow the reporting of right uses to provide information of interest to accounting reports
4.2.108) consider law rules and constraints about user Privacy.
4.2.109) detail parameters about content, creator, tool, distributor, user, domain, device, etc.
Example: the Device is used for public transmission, the Domain is an educational institute

The AXMEDIS Tools manipulating the Action Log have to:

4.2.110) support the generation of human readable reports in a format which add clarification of the contextual information and object information
4.2.111) support the making of queries on the list of Action Logs
4.2.112) provide the support to make statistics on the database of Action Logs
4.2.113) protocols to allow negotiating the way Action Log can be utilised/acquired
4.2.114) be managed to guarantee user privacy according to the applicable laws
4.2.115) preserve in any way the usage of content by the final user or B2B customer
4.2.116) protect the Action Logs against unauthorised access. Thus everybody in the distribution chain can get a view of exploitation of only their content.
4.2.117) protect the Action Log against unauthorised modification.

4.2.3 The Domains

A Domain is a set of Devices.
Examples of Domains are: the X company, the tools related to the Domain of Mario Rossi House, etc.

An AXMEDIS Domain

4.2.118) Has to be unambiguously identified.
4.2.119) Can belong to hierarchy of domains (OPTIONAL)
4.2.120) should be configurable to permit a variety of distribution options between Devices belonging to the Domain, e.g. super-distribution of Content and Composite Content to Devices belonging to a sub-Domain within the Domain (e.g., specialized interest groups). (OPTIONAL)

The AXMEDIS Solution for managing a Domain has to provide support to:

4.2.121) maintain a list of the Devices which belongs to it in any time
4.2.122) allow the registration of devices to the domain in an easy manner, each device which request to enter in a Domain has to be certified. Each device which request to enter in a Domain has to be authorised
4.2.123) dynamically change the set of Devices which belong to a Domain.

An AXMEDIS Device:

4.2.124) can have access to more than one Domain, but can join only one Domain at time.

4.2.125) which belongs to a Domain can use AXMEDIS objects licensed for that Domain according to license conditions

Example: people belonging to a family that obtained a License for home domain can consume AXMEDIS objects inside their home Domain with every device registered on that Domain

4.2.126) which belongs to a Domain can request to leave the Domain and it will be unregistered

4.2.127) which moves outside the Domain in which it is registered will have to be unregistered

4.2.128) which belongs to a Domain can be excluded from the Domain manager

4.2.129) should be informed of all the accessible Domains present at certain time,

Other Issues:

4.2.130) An AXMEDIS Object or Component related to a Domain License can be used only in the Domain for which the license has been produced.

4.2.131) The license can be acquired to use the content for more than one Domain

4.2.132) Users with an authorised entitlement shall be able to fully control Domain membership and Content distribution.

4.2.133) Users without an authorised entitlement shall not be able to obtain confidential information related to the Domain

4.3 Business Models for cost charge and price definition

AXMEDIS has to support many Business Models for cost charge:

4.3.1) free preview of content, or limited time/size free access

- 30 second audio / video clips
- Single use
- Thumbnail image etc. etc. etc.

4.3.2) free previews must have some kind of restriction for preventing the use by an unidentified B2B party. For example, if a content owner provides access to 30 second clips of its entire catalogue, this can be abused by placing hyperlinks to these clips leading to millions of streams at great expense and of no promotional value for the content owner.

4.3.3) pay per view (the customers pay a fee for a one-time viewing or use of the content)

4.3.4) pay per download (the customers pay a fee for downloading the content locally so that it can be viewed or used as many times it is preferred, that is forever)

4.3.5) pay per subscription: the customers pay a recurring fee (monthly, weekly, yearly) and can access as much content as they want (the subset of content made available according to this model has to be considered) Access to content can be in download and/or streaming.

4.3.6) unlimited access to some content/objects (all you can consume in a predefined time slot) based on a flat rate. Unlimited access models may not be supported by service providers (such as ISPs). AXMEDIS should have terms and conditions of use but also identify users and restrict access accordingly. 'Unlimited' access is reserved to a single user: it should not allow onward distribution (i.e. to friends, extended family, anybody else)

Example: It must be possible to grant access over a range of content on an unlimited basis. In other words a customer may be granted access to the entire content belonging to a distributor.

4.3.7) pay for obtaining a right on AXMEDIS Objects that will belong to some other user (gift)

4.3.8) pay for a fixed number of copies allowed

4.3.9) pay per day: content is always available on the device but customers pay for every day they access it)

4.3.10) pay per minute

4.3.11) pay per kB downloaded

4.3.12) discount credits: users purchase a set of credits in advance which they can spend for operating all the above business models. Credits would be offered at volume discounts

AXMEDIS has to support the following Business Models of price definition:

4.3.13) different prices for different channels (web sites where the content is distributed);

4.3.14) discounts on bulk purchases;

4.3.15) discounts applied based on customers profile: the distributor can define clusters of customers considered more valuable;

4.3.16) discounts based on the payment system chosen by the customer (i.e. premium numbers has a cost higher than credit cards. In order to push a more profitable payment system, discounts can be helpful);
4.3.17) discounts on content paid with recurring payments (i.e. first 3 months subscription is for free);
4.3.18) consideration about VAT and territorial limitation (OPTIONAL) **Example**: AXMEDIS has to manage issues regarding different VAT applicable in different countries and the limitation of the distribution of content in the different countries

The AXMEDIS solutions and architecture has to provide no limitation in being used in conjunction with

4.3.19) common existing schemes to administer customer/device-specific uses.
4.3.20) common existing payment methods and automated models of payment
- International (e.g. Visa, AMEX, Mastercard, Diners, JCB)
- National Debit Cards: Carte Bleue (France), Carta Si (Italy), Aurore (France, Spain, Italy), Switch (UK), Solo (UK), Maestro (Various), Laser (Ireland)
- Billing relationships (ISP, Telecomms, TelCos, Digital TV)
- Direct Debit: ELV (Germany), Rabobank (Netherlands)
- Mobile/Telephony-based systems (Premium SMS, IVR)
- eWallets (PayPal, Firstgate, BT click&buy)
- Credit notes
- gift vouchers
- discount vouchers
- loyalty schemes
- pre-paid cards
- Future-proof

Example: The payment system applicable depends on the distribution policy used by the distributor payment gateway. The payment methods which are popular vary wildly across Europe. Credit cards which are popular in the UK are much less widespread in France, Germany and Italy What is required to AXMEDIS is to evaluate the opportunity to introduce a gift certificates system (where the customer buys a credit on a web site and gift it to a friends who can use the credits to buy contents on the same web site) and wallet (deposit made by the customer who can be used to buy contents from the affiliate distributors).

4.4 AXMEDIS Model for Content Acquisition for Delivering/Distribution

AXMEDIS B2B Distribution tools have to:

4.4.1) support the commercial models at the base of the relations between distributors and content providers:
- **Royalty**: where the distributor can set autonomously the price but has to pay a fixed fee to the content provider;
- **Revenue Sharing**: where the distributor pays a percentage of the revenues to the content provider. With this model an eventual minimum cost that the content provider can require should be also considered;
- **To Pure Carrier:** where the Content Provider (really sure of his content attractiveness) wants to sell directly to a community of users. He pays for the Satellite Channel capacity and the access to the community;

4.4.2) support partner approval. An owner of digital rights (usually a content producer or provider) must be able to approve and/or deny individual partners in the B2B distribution model. This does not prevent content being made available openly if the producer or provider wishes, however content owners (such as phonographic producers) WILL NOT allow their content to be loaded into the AXMEDIS network unless they are able to retain total control of who is and who is not allowed to exploit it.

Example: record label 'A' has an existing business partnership with retailer 'X'. If retailer 'X' wishes to launch a digital distribution service and takes digital content (directly or indirectly) from record label 'A', Record label 'A' may wish to deny access to this content if there are unpaid debts relating to the existing business partnership.

4.4.3) support exclusivity for individual product. An owner of digital rights (usually a content producer or provider) must be able to load content into the AXMEDIS network that can be exploited, either permanently or temporarily, only by a limited number of partners. 'An exclusive'.

Example: a new release by a popular artist may be awarded to a particular retail network for an initial period of time.

4.4.4) support exclusions for Individual Products. It must be possible for a rights owner to load content that is openly available except for a given partner or number of partners. 'An exclusion'. Just as with exclusives, exclusions can be either temporary or permanent.

Example: An example of where exclusion might be used is alongside an exclusive. A rights owner may wish to provide a special enhanced version of a product to a certain retail network as an exclusive. A normal, non-enhanced version of the product might be made openly available to other partners for exploitation, but the retail network that are entitled to the exclusive, enhanced version are excluded from the normal, non-enhanced version.

4.4.5) support update and publishing of elements. It must be possible to update any one of the elements listed below independently of each other, including but not necessarily, from independent sources.

- Media (Audio-visual content)
- Meta Data (Description of content)
- Distribution Rules (B2B)
- Usage Rules (B2C)

Once a product has been updated with any of these elements, it must not be necessary to re-publish the entire product/bundle to the distribution network in order for the changes to be accepted by all distributors.

Example: it should not be necessary to publish an entire product/bundle in the case of the usage rights changing or metadata relating to one file being corrected.

4.4.6) super-distribution of Governed Content when each instance of such Governed Content is encrypted with a different key (the new instances must register with new AXMEDIS Object IDs). This requires that the user who receives the super-distributed content to obtain the protection information to open the content.

4.4.7) scheduling dates for the exploitation of AXMEDIS content on B2B and B2C. Distribution schedules can be set both globally and within each territory. This might be best achieved with a system of overrides.

Example:

Territory	Promotion Date	Release Date	Delete Date
Global	**01/01/2004**	**01/02/2004**	**31/12/2027**
United Kingdom	01/03/2004	01/04/2004	[never]
France	[never]	[never]	[never]

Promotion Date can be defined as the date upon which distributors/retailers can be informed of the existence of content. This might allow advance warning and preparation of a promotional campaign for content (such as a hot new release from a top artist). Promotional material relating to this content (such as 30 second clips) would be made available from this date.

Release Date is the date upon which content is available for distribution to the end customer.

Delete Date is the date from which the content is no longer available for distribution to the end customer.

In the table above, the content is available worldwide between 1st February 2004 and the end of 2027. Retailers and distributors can be informed about the existence of content from 1st January 2004. In the United Kingdom however, an over-ride schedule exists, so that the content is available for a different period. In fact in the UK the retailers/distributors are not to be informed of the existence of the content until 1st March 2004 and cannot begin to sell the content until 1st April 2004. In the UK, the content is available beyond 2027; in fact no end date is set on the availability. The content is not available in France, and never will be.

Note that it may be necessary to provide different filters of available content for each territory in the case of distribution partners based in multiple territories. Thus a multi-national music retailer would need to maintain a separate list of active and available content for each territory in which they operate a service.

AXMEDIS tools have to in principle allow to:

4.4.8) identify of rights and rights owners (could be more than one for each right).

4.4.9) update of right owner data

4.4.10) store the needed information to grant the return of the due revenues to right owner (a predefined percentage of royalties produced by a specific content)

4.4.11) support all existing rights/royalties relations:

- Producers to artists - royalty
- Producers to any other person involved in the production process whose contract foresee royalties: following the number of copies of the recordings sold to the customers
- Authors Collecting Society to Authors and Publishers: following the mechanical licence as number of copies sold; following the mechanical licence made by a sub licensor in another country based on reciprocal agreement the Authors Collecting Society i.e Country X Society and sub licensor mechanical licence, Country X Society reports and statements to the Society of Country Y (country of the original publisher), Society of Country Y royalty to Authors and Publishers; following the diffusion of the recording as public use/performances, radio, tv, web, mobile etc
- Producers Rights Collecting Society to Producer: following the use of the sound recording: public use/performances, radio, tv, web, mobile etc
- Performers Rights Collecting Society to Performer following the use of the recording: public use, radio, tv, web, mobile etc.

4.4.12) support Rights Collecting Societies in

- collecting fees received on behalf of its members from usage of contents (i.e. broadcasting industries)
- licensing of public use of content
- retrieving information to distribute rights revenues to its member on the basis of content utilization
-

4.5 AXMEDIS Models for Content Delivering

AXMEDIS has to support the following Models for content delivery to allow:

4.5.1) a single user the use of a content on a unique Device

Example: It must be possible to provide content to the end-user with no authorisation of usage beyond the target platform. In other words, there must be no further export of the media in a usable form (licensed or unencrypted) to any portable player, external storage device (including CD-R) etc; in this model, a user downloading a recording to a PC can be authorized to use it on that PC, but not authorized to transfer and use it on a portable MP3 player, a recordable CD, etc.;

4.5.2) multiple Users to use the content by sharing a single Device,

4.5.3) the use of a confidential identity

4.5.4) to pre-deliver to the user a big amount of AXMEDIS objects, while the license can be obtained in other ways.

4.5.5) the download of AXMEDIS objects

4.5.6) the re-download any content if the User has had some problems with his Device

4.5.7) a single User to use a content on multiple Devices,

4.5.8) to deliver content to the user that is suitable for the target user Device (device profiling).

4.5.9) the user to get AXMEDIS objects on the basis of a subscription license or in push on the basis of the user profile (e.g. Cartoons, Sport Archives)

4.5.10) the streaming of AXMEDIS objects. **Example**: There is strong evidence to suggest up-sell from streams to downloads. In other words streams are used as a ‘try before buy’ option before committing to a download.

4.5.11) the progressive download of AXMEDIS object. That allows giving at the user the feeling of performing a streaming while it is full download of the object.

4.6 Security details and aspects

AXMEDIS Security solution has to:

4.6.1) Allow to protect AXMEDIS objects during their entire life-time in according to the different rules of the different countries. The precise implementation of it is going to depend on the license formalisation.

Example: Fingerprint or any secure means should follow the audio content during its life-time

Procedures for rights owners to save their audio content should allow saving it as a completely original work and also saving it when is used to make a new multimedia content

This will allow to prevent copyright infringement (i.e. legally downloaded audio content should be prevented from making unauthorized copies of the content both in the digital and analogical environment)

4.6.2) support monitoring and maintenance of content use data by Collecting Societies via AXCS;

4.6.3) be able to trace AXMEDIS objects during their entire life-time. **Example:** In addition the traceability of the ownership could lay the basis to provide an additional "AXMEDIS service" to the right owners through the monitoring and control of the correct use of the contractual and licensing rules of the digital content and to inform rights holders on any infringement.

4.6.4) allow the usage of an AXMEDIS Object only by the User that owns the corresponding License which grants such usage.

4.6.5) enforce the proper utilisation of AXMEDIS objects and Component, which is ruled by the existing AXMEDIS licenses and enforced in the AXMEDIS player

4.6.6) verify that a Tool in a Device is Trusted/Certified (it can process AXMEDIS Object in a safe manner)

4.6.7) verify if a Domain is trusted

4.6.8) verify the User identity (e.g. username and password)

4.6.9) grant that AXMEDIS Object is used by the intended User: secure procedure for the authentication of Users

4.6.10) certify the AXMEDIS Object Information including description, classification, identification, other metadata, fingerprint. This has to allow the verification if the received information for a remote object will effectively lead to download the described object.

4.6.11) certify the content resources in AXMEDIS Objects or Components with respect to associated metadata.

4.6.12) be able to detect corruption or loss of part of an AXMEDIS Object

4.6.13) be able to detect that there is corruption or loss of part of an Action Log

4.6.14) be compatible with data protection and privacy aspects (e.g. to limit the compilation of user profiles by third parties)

AXMEDIS tools and security solution have to be capable of blocking/revoking right usage to content by blocking:

4.6.15) Users

4.6.16) Licenses

4.6.17) Objects

4.6.18) Devices and/or Device Types

4.6.19) Domains

4.6.20) Distributors (revoke license of distributing, more than one license could be revoked, automatic management of end-user licences)

4.6.21) Creators (not capable and registering new object getting a certified ID)

4.6.22) AXEPTools **Example**: This can be done with fingerprint.

4.6.2 Content Protection Technology (Technical Protection Measures)

The AXMEDIS Content Protection Technology has to

4.6.23) be continuously updated and at state-of-the-art (subject to constant scrutiny and evaluation by the worldwide security community)

4.6.24) be suitably flexible for a wide variety of Content Data

4.6.25) be efficiently realisable on a wide range of Devices

4.6.26) be scalable depending on the commercial value of the content and this decision can be taken by the Content Creator, when it protects and publishes the content.

4.6.27) be compliant with the appropriate considerations of export restrictions (e.g. protection algorithm such encryption outside the Europe)

4.6.28) allow the definition of providing multiple phases of encryption/scrambling operations. **Example:** in addition to the encryption, the content can be also scrambled by using several different algorithms.

4.6.29) be achieved by using encryption and/or scrambling techniques. This prevents a unauthorized user from accessing Content Data. **Example:** the scrambling of lines in images or video, the scrambling of audio samples, etc.

4.6.30) based on a solution that does not permit to have in the user device media files in an unencrypted state, unless on a device from which it is not possible to extract it. Such devices must be approved and should be compliant with a measurable standard such as SDMI, and therefore be controllable.

Example: if an MP3 player requires an unencrypted copy of an audio file in order to be able to play it, the device must conform to some recognised security standard such that it can be allowed or disallowed from receiving the media by DRM settings within the license. Thus, if such a device is compromised so that access is subsequently made available to the unencrypted media, the DRM settings for products can be changed to exclude devices of the same type in future. Note that it must be possible for distributors to extract open, unencrypted files if they are granted rights to change the files in any way (for example embedding additional metadata).

4.6.31) Be capable to identify eventual attacks to the devices executing content

4.6.32) Be capable of rapidly deploy a change to the encryption keys, licenses, end-user plug-ins or whatever is necessary to recover the situation in which the Protection Technology used for some AXMEDIS Objects has been compromised or cracked. **Example:** Player individualisation in Microsoft's Windows Media DRM version 7. In the event of a compromise of the DRM, new encryption keys are issued to distributors and all media players are required (by use of an 'individualisation version number check') to contact Microsoft in order to update the public decryption keys.

4.6.33) Be capable to identify analog conversions from devices during content execution, the so called "analogical hole" and provide methods to detect copyright infringement. **Note:** At the present moment all DRM solutions could virtually protect digital content only as long as that content remains in digital form. If the content is converted to analogical form, any protection that has been applied to that content is usually lost. The loss of content protection that this conversion entails means that such devices might facilitate piracy. I can legally purchase a digital sound recording to make a CD compilation. But how could this prevent to make illegal copies or illegal use of that sound recording in the analogical environment?

Achieving a balanced approach to the analogical hole has no easy solution. Millions of consumers already own at least one, and often many, digital devices with analogical inputs and outputs, and tens of thousands more of these devices are being sold every day around the world.

Virtually any existing device can be used to create unprotected analogical or digital copies of content.

Note: measures to protect the analogue copy can have an adverse effect on the quality of the original digital source.

4.6.3 User Identification

Any User in AXMEDIS has to:

4.6.34) be unambiguously identified

4.6.35) be approximately located with respect to its geographic position. In order to perform this the information regarding the nationality of the user has to be associated with the User ID into the AXCS.

Note: It is accepted that the location of a customer cannot always be identified when using certain distribution channels (e.g. Internet) however best endeavours must be made to establish that content is not accessed where it is not cleared for use. Examples of technologies that can be used here are:

- **Network IP address**
  Tables of IP addresses and their allocation can be purchased. These are not highly reliable, though some companies claim to be 95% accurate or more.
- **Credit Card BIN Lists**
  these can identify the location of the issuing bank of a payment card. If an end user is using a credit card from Spain, it is likely (though not certain) that he is domiciled there.
- **End-User registration**
  Simply asking the end-user where they live can be an effective way of ascertaining their location. This is obviously open to abuse, but can be useful when combined with other methods.
- **Regional Distribution**
  More control can be implemented in the B2B environment. Thus, if content cleared for France only is distributed only to French distribution partners, then it is less likely that it will end up on offer in (e.g.) German stores.

4.6.4 Device and Tool Identification and management

A Device or software tool in AXMEDIS has to:

4.6.36) be unambiguously identified

Note: This has to be applicable to any type of device, from PC to mobiles. On the mobiles it can be used the IMEI. While for the PC and other devices it would be better to do not use the IP address or MAC address since they can change frequently (the MAC less than IP), .

4.6.37) be able to provide information regarding its capabilities including those related to HW and SW. however configurations for anonymity and/or confidentiality should be optional

4.6.38) be certified by an AXMEDIS Certification Authority

AXMEDIS Security has to:

4.6.39) identify Device capabilities with respect to Content properties.

4.6.40) provide sufficient flexibility to respect Users' wishes for anonymous use and confidentiality of information not necessary for the purpose of discovery of Device capabilities.

4.6.41) Provide a protocol and a mechanism to certify the creator of AXMEDIS object. Those that put the AXCID into the object and can protect the object itself. At the moment in which the object is created the Object ID can be obtained.

4.6.42) verify the trustiness/integrity of a Device (at any time) even at each Action on the AXMEDIS Object

4.6.43) detect eventual corruption of trusted

4.6.44) verify the trustiness/integrity of a Tool (at any time) even at each Action on the AXMEDIS Object

4.6.45) detect eventual corruption of trusted Tools

4.6.46) allow reliable administration of Device/Tool-based Uses.

4.6.47) support succession strategies in cases where a Device is destroyed or otherwise replaced, or else used only for a period of time after which a different Device will be used.

4.6.48) support succession strategies in cases where a Tool is destroyed or otherwise replaced, or else used only for a period of time after which a different Tool will be used.

4.6.49) identify Device capabilities with respect to Tool minimum requirements, e.g., capability to process (e.g. Render) certain Resource types; capability to process certain Content formats; capability to process certain Rights Expressions; etc.

4.6.50) identify Device capabilities with respect to License Processing (DRM interoperability) Device's Rights Expression interpretation capabilities

4.6.51) identify Device capabilities with respect to AXMEDIS Object uses (actual or potential) (print, audio play…)

4.6.52) suggest to the user to substitute a Device or Tool when this is corrupted or obsolete

4.6.5 Protection Information and their management

Protection Information/Keys Management for AXMEDIS has to

4.6.53) generate new keys and/or protection information
4.6.54) associate keys to certificates
4.6.55) associate protection information to AXMEDIS Objects
4.6.56) store keys/protection information
4.6.57) enable Device/Tools to employ a wide variety of keys/protection information management systems in an interoperable fashion.
4.6.58) lend itself easily to key management implementations that do not interfere with an enjoyable User experience.
4.6.59) Allow to protect an AXMEDIS Object or a Component inside the object
4.6.60) Allow to protect any Component inside an AXMEDIS Object with a Protection Key different from the one used to protect the container Object
4.6.61) protect keys outside of a trusted environment
4.6.62) distributed keys/protection information to AXMEDIS tool/device
4.6.63) install keys/protection information
4.6.64) track keys/protection information usage
4.6.65) validate keys/protection information
4.6.66) update keys/protection information
4.6.67) revoke keys/protection information
4.6.68) destroy keys/protection information
4.6.69) backup keys/protection information
4.6.70) restore keys/protection information

4.7 General Requirements for AXMEDIS tools

For AXMEDIS certified tools it has to be possible to:

4.7.1) verify Conformance of the engine interpreting the Rights Expressions. Conformance shall be assessed and regulated according to industrial compliance regime.
4.7.2) verify Conformance of the engine executing the Rights Expressions. Conformance shall be assessed and regulated according to industrial compliance regime.
4.7.3) verify the robustness of a Device to attacks. Device producers are asked to provide their views on this issue.
4.7.4) verify the robustness of a Tool to attacks. Tool producers are asked to provide their views on this issue.
4.7.5) support the lack of some referred Component into the AXMEDIS Objects without putting in trouble the player or the editors

In AXMEDIS tools:

4.7.6) multiple languages should be supported in user interfaces (English, Italian, French, Spanish, …) (OPTIONAL)

AXMEDIS Content Production tools have to:

4.7.7) address the most relevant requests and issues of content production
4.7.8) take into account the usual workflow and procedures
4.7.9) support different platforms (e.g, from AVID, to Mac…) and working tools (e.g. Maya, Aftereffects, Photoshop, Quark Express, Illustrator, Freehand…)
4.7.10) support the production of promotional material
4.7.11) support the enforcing of in-house workflow production like
- revision of content at different production stages (artistic direction)

- association with in-house production information (audio cd → ISRC code, label copy, cue sheets, bar code)
- content composition (integrating booklet/label in an audio CD)
- clearance of pending rights (dealing with Authors and Publishers Collecting Societies to get mechanical licence rights on any image used in the booklet)

4.7.12) support the production of new content starting from other content (derivative work)

4.7.13) preserve the protection on the objects during their whole life-cycle

4.7.14) enforce AXMEDIS DRM inside external tools allowing to operate directly on the content in a safe manner

4.7.15) provide professional results by automating (or computer aiding) significant post-processing activities;

Example: when dealing with video in order to grant proper transition and uniformity in style and appeal. The need for subtitles to manage the multi-language issue avoiding dubbing (and additional costs and rights related) may impose difficult technical problems to solve as the various technical solutions available have different impact (the length of text may significantly vary from one language to the other and so will the required superposition space on-screen; font readability depends on background image; the author of the video might refuse permission for certain kind of subtitling and require dubbing or vice versa)

AXMEDIS Licence Generation has to:

4.7.16) support rapid, high volume change of rights and conditions to both B2B and B2C. It must be possible for rights over a large portion of the available catalogue to be changed on a regular basis.

Example: Digital rights are not represented in all historical artist contracts. Most major record labels are currently going through an exercise of revisiting all contracts to make provision for new, digital formats. Often changes to distribution rights are made as the legal position is clarified over an artist contract. This may result in content needing to be removed from clearance ('taken down') with immediate effect. Typically a 24 hour deadline is placed upon this activity.

Other examples:

- A major rights holder may wish to adjust rights for end-users (such as the number of CD burns of an audio track) across their entire catalogue.
- A distributor may sign a deal with a major rights holder for a new territory, so the new territory may need to be added to the B2B distribution rights across the whole catalogue.
- A recording artist may negotiate ownership of his/her digital rights and the label may be operating on an 'assumed' ownership. Distributors may need to take down content from that artist with immediate effect and disease from selling it to end users

4.7.17) support fast track / priority updates. With a great deal of changes to distribution and usage rights happening, it is expected that there will be a backlog of updates at any given time. As such there needs to be a process for marking certain changes (usually those with a legal or strong commercial implication) as priority so that they 'jump the queue' and are processed ahead of others.

4.7.18) allow verifying inconsistencies among the licenses of the several digital resource against the intention of the producer or integrator for the (re)distribution of the object under licensing.

4.8 General Requirements for distribution tools

4.8.1) The function of searching and selecting content of interest to an End-User. To let the End-User make the best choice of content

4.8.2) Access to certified AXInfo

4.8.3) When publishing an AXMEDIS object on the B2B/B2C distribution channel some metadata (e.g. Workflow metadata, …) has to be removed.

AXMEDIS Content Distribution has to:

4.8.4) support voting feedback on AXMEDIS Objects from consumers. This voting feedback has to be accessible to all AXMEDIS B2B actors involved in the creation, aggregation and distribution of the object. The voting feedback management has to take care of privacy policies. (DESIRED)

4.8.5) support audio and video streaming

4.8.6) be implementable on different platforms with the lowest possible effort, i.e. it must be based on a portable design.

4.8.7) support low footprint (memory/CPU) clients

4.8.8) support short and text-encodable authorization requests/messages during the licensing phase (and only few steps) (maybe licensing could be transported over SMS)

4.8.9) support integration with Customer Care Systems. Exporting strings generated for each transaction to SIEBEL (most common Customer Relationships Management (CRM) software used by telecom operator) is required. With this functionality the customer care agent is able to provide information about the transaction and the content sold.

4.8.10) support reduced registration procedures. AXMEDIS has to reduce the registration procedure the customer has to do facilitating the transmission of the personal information needed between the different partners instead of requiring double registration to the customer. This purpose has to be achieved in respect of the privacy. We suggest a system based on the email authentication instead of generating new accounts or personal code.

4.8.11) Permit at the final user to use some simple and accessible media player in order to exploit media distributed through the AXMEDIS framework. Media should be available for use in common operating systems and applications on each of the target platforms. There should be no cost to the consumer for application plug-in and/or codec if required, and the installation procedure should be very simple, requiring the minimum intervention from the user (DESIRED).

4.8.12) Be supported by a player that provide features such as those of Windows Media Player:

- Cross fading
- Auto volume setting
- Play list integration
- Burn to CD
- Transfer to / synchronise with a portable device

AXMEDIS Distribution on mobile devices has to:

4.8.13) unambiguously identify the device

4.8.14) enforce content protection and avoid copyright infringement

4.8.15) take into account present technologies about mobile device identification (i.e. UMTS/GPRS → IMEI and WiFi → MAC)

4.8.16) provide anytime anyplace services

4.8.17) take into account mobility aspects such as not stable connections and provide robust or recoverable services

Example: A user travelling by train requests the viewing of a pay-per-use movie clip on his mobile device. Before he is able to watch this clip the train enters a tunnel and hence the mobile looses the network connection. By the time the train is in tunnel the server returns the requested clip and charges him for the required amount. As the train is in tunnel the network may not know where to deliver the clip and hence may discard it after few trails. When the train exists the tunnel, the user's mobile device reconnects to the network expecting the clip. In this case the user will either be charged twice or will not receive any requested clip.

5 AXMEDIS Object Authoring

5.1 AXMEDIS Editors, as authoring tools

AXMEDIS Editor, also called Authoring tool will support MPEG-21 with AXMEDIS addition with related composition and the nesting of levels; it will support the navigation in AXMEDIS objects, mainly derived from MPEG-21.

AXMEDIS Editor must meet the following requirements:

Model and Load/save

5.1.1) Supporting MPEG21 standard plus additions for AXMEDIS
5.1.2) Supporting downloading
5.1.3) Loading and saving AXMEDIS objects on file and into the database
5.1.4) Load and save in XML encoded/encrypted mode
5.1.5) Export MPEG21 digital item and parts thereof
5.1.6) Supporting streaming
5.1.7) Supporting modular or segmented downloading
5.1.8) Supporting progressive download
5.1.9) Supporting modularization to be reused in the viewers, editors, plug-ins, etc.
5.1.10) Load and save in binary encoded/encrypted mode
5.1.11) Export AXMEDIS components, protected or not.
5.1.12) save AXMEDIS components, protected or not.
5.1.13) load of AXMEDIS components, protected or not.
5.1.14) import of MPEG21 digital item and parts thereof

Navigation/editing

5.1.15) Adding AXMEDIS components with traditional and drag and drop modalities
5.1.16) Creating of AXMEDIS objects
5.1.17) Creation of some temporary AXMEDIS Object ID
5.1.18) Adding, managing and modifying plain resources. At least, AXMEDIS Editor shall support, in its basic implementation, the most common formats of: text document (doc, pdf, rtf), image (jpg, gif, bmp), audio (wav, mp3), video (mpeg2, avi), animation (mpeg4), etc…
5.1.19) Support multi-document, i.e. "simultaneous" management of different AXMEDIS objects shall be possible (e.g. MS Office® application, etc…). In such a way, various operations such as comparison (or cut and paste among different documents) will be implement able;
5.1.20) Presenting the AXMEDIS objects by means of a set of different views: highlighting the hierarchy, the point of view of the final users, the relationships among elements, DRM aspects, etc…
5.1.21) The AXMEDIS Object Viewer is of major importance to allow the user, who is working with the AXMEDIS Editor, to visualize/play/execute the AXMEDIS object as it will be shown to the end-user
5.1.22) Activating external editors/viewers for modifying/executing digital objects included via ActiveX. In such way, AXMEDIS Editor (and then AXMEDIS Object Viewer) guarantees to be capable to face new content types and new actions (applicable both on new and old content types)
5.1.23) Using/activating of internal players/editor to allow simple changing and visualization of the most used non-proprietary media formats
5.1.24) Exploiting functionalities developed in external AXMEDIS plug ins for digital resources adaptation
5.1.25) Navigating into AXMEDIS objects
5.1.26) extracting AXMEDIS components with traditional and drag and drop modalities
5.1.27) Extract from an AXMEDIS Editor a rule to generate other similar objects with the same sequence of commands used by the user in the editor
5.1.28) Configuring the editors/viewers to be activated, and other parameters, providing them with AXMEDIS plug ins to guarantee the protection level and the content object access.

Protection

5.1.29) Managing the registration of the user access, authentication, user id and password (only for database access)
5.1.30) Protecting AXMEDIS objects Creating protected objects by using encryption and scrambling tools. This can be performed by exploiting the features of the protection processor that use the IPMP of MPEG-21
5.1.31) Enforcing DRM rules, verifying the consistency of the Possible Available Right of the whole object with those of the resources and AXMEDIS components included. This verification allows to see if the PAR of the whole object is in conflict with the PAR of the single resources. For example the whole PAR can be estimated on the basis of the PAR of the single resources, while some of them can have the rights to use the object in Italy and other only in Germany. Thus the user has to be supported in verifying which are the problems if he like for example to deliver the object in Italy. The results have to be the list of possible conflicts on the basis of the PAR and a potential License or a simple statement of the user.
5.1.32) Navigating and understanding by simulation DRM rules
5.1.33) Verifying the protection of the loaded object
5.1.34) Respecting protection rules of AXMEDIS objects and components
5.1.35) Estimating and enforcing fingerprint inside the objects
5.1.36) Connection with AXMEDIS certification and Supervisor for the Action Log by means of the Protection Manager Support

Configuration and general support

5.1.37) Providing trace of the most recent opened AXMEDIS files (DESIRED)
5.1.38) Conforming to AXMEDIS Editor Configuration Manager requirements. Moreover, each configurable AXMEDIS Editor module shall have access to a set of default settings in order to continue working also in case of AXMEDIS Editor Configuration Manager missing or erroneous;
5.1.39) Accepting third party plug-ins for AXMEDIS object data processing via a specific interface respecting DRM rules, etc., for example it is a way to
    a) accept workflow commands and controls or messages
    b) accept special views for metadata, including those of the Workflow for instance
    c) accept specific viewers/players for AXMEDIS objects, for example for navigating on DRM, composing DRM visually, testing DRM aspects.
    d) accept algorithms for digital content processing
5.1.40) Providing support for printing information related to the structure of the AXMEDIS object, visual diagrams, textual information, relationships, etc…
5.1.41) Providing mechanisms for the AXMEDIS Editor Workflow Plug-in to interact with the AXMEDIS Workflow Manager. In particular it shall:
    - permit to receive settings from external entities (e.g. a supervisor);
    - log user operations;
    - submit logs to a centralized collector (e.g. it should be the same supervisor above);
    - allow to receive commands from the AXMEDIS Workflow Manager
5.1.42) Managing user profiles. A profile will be a container of user preferences, AXMEDIS Editor settings, saved query, composite object templates, etc…;
5.1.43) Providing a multilingual support (OPTIONAL)
5.1.44) Providing an interactive help. AXMEDIS Editor shall include a help which, at least, contains AXMEDIS Editor function explanations and user interface description. Such help should also contains some use case descriptions in order to better explain AXMEDIS Editor usage (DESIRED);

5.1.2 AXMEDIS Editor and View Modules

View modules are those parts of AXMEDIS Editor GUI which show some aspects of the actual AXMEDIS object and parts thereof. In the following sub-sections the most important aspects (and the corresponding views) thought about till this moment will be analyzed, i.e.:

- Hierarchy;
- DRM;
- Spatial;

- Functional/Behavioural;
- Descriptions and comments;
- Metadata;

5.1.2.1 AXMEDIS Hierarchy Editor and Viewer

Hierarchy View should show hierarchical relationship among elements of an object. Because of linearity of MPEG-21/AXMEDIS relationship among elements (i.e. each element has one, and only one, parent element), tree-like view (similar to the one of explorer) is the most suitable solution. Such view should permit cut and paste operation and, moreover, it should permit specific operations (through contextual-menu usage) on showed elements.

Hierarchy view shall

5.1.45) be an explorer-like view. For example, the view may contain two different panes: one pane showing a tree which represents element relationships, and the other pane showing the list (or something equivalent) of the sub-elements of the element currently selected in the first pane.

5.1.46) allow copy, cut and paste actions on structure of AXMEDIS object, i.e. not on piece of content contained in an object but on the structural elements of the object.

5.1.47) allow copy, cut and paste operation among different kind of views and different AXMEDIS objects (in different views) if, and only if, that action is semantically valid

5.1.48) enable the most common usage of add, cut and paste operations (e.g. by keyboard, mouse, etc…)

5.1.49) allow use of mouse right-click on showed elements to permit contextual menu usage.

5.1.50) represent each element by a specific icon. Icons of resources (i.e. the assets contained within the object) shall be obtained by OS file association, while the others shall be chosen .in some other ways

5.1.51) allow double-click on showed elements to permit execution of default actions

5.1.52) (partial) be fully configurable, e.g. visualization granularity, visualization style, context-menu operations, default operations, etc….

5.1.2.2 AXMEDIS DRM Editor and Viewer

DRM view shall

5.1.53) permit to browse and manage all license DRM-related aspects.

5.1.54) permit to add new rules, remove and change existing rules/conditions on the whole object or parts thereof;

5.1.55) graphically show DRM relationships among the AXMEDIS object, components, others object and licences. Relationships should be represented with a graph structure, in which arrows and links will have given meaning/semantic;

5.1.56) be able to test an AXMEDIS object and components usage, in a given context. Such context could be a set of fake licenses and a set of constraints (place of consumption, time instant or interval, etc…). DRM View shall answer in two ways: true or false. In latter case, DRM View shall give a set of clauses that explain why not, e.g. a specific license is needed or a specific time interval is partially covered by the set of licenses owned by the user;

5.1.57) be able to show the dictionary of all those grants/actions feasible for a given resource, component or element, and, for example, to insert one of those grant in a license

5.1.58) be able to show the list of all grant conditions implemented by the AXMEDIS framework, and, for example, to insert one of those condition in a license possibly giving a reference service for those conditions which need external information to be evaluated

5.1.59) Be able to test a license under construction against PAR and eventual licenses related to the usage of the components used in the referred object.

5.1.2.3 AXMEDIS Visual Editor and Viewer

Spatial View shall show object placement in a 2-D (or possibly 3-D) environment. Moreover, Spatial View shall permit managing (i.e. moving, deleting, adding, etc…) object subparts which have spatial properties or constraints.

5.1.60) Spatial View shall be able to proportionally represent components in all significant spatial directions;
5.1.61) Simulation of the execution and preview of results
5.1.62) Spatial View shall permit to modify spatial properties and constraints by means of graphical actions such as drag-and-drop, contextual menu, etc…
5.1.63) Component spatial properties should be relative to the comprising container or to other items. Otherwise, those properties should be absolute respects to the entire object;
5.1.64) Relations between visual entities could represent:
- Rights relationships
- Execution relationships (e.g. sequence of tracks to be played or tracks to be simultaneously played)
- Dependencies (e.g. HTML and linked resources)
- …

5.1.2.4 AXMEDIS Behaviour and Functional Editor and Viewer

Behavior and Functional View is intended first as a View where the main modalities and layers of the Editor can be activated. The AXMEDIS Object can be a heterogeneous, multi-layer piece of information for which different modalities of exploration/manipulation are possible and for which different layers may be accessible according to preferences. In this sense the Functional View displays the available possibilities and allows selecting a text view, other than composed media view (scene layer) or a media-by-media view. The functional view may also allow displaying available modes of operation, like the selection between file / broadcast (save later, transmit immediately) and related configuration.

Behaviour and Functional View may also be an interfacing view to external editors affecting synchronization and timing among different media objects. An AXMEDIS object may include multimedia and cross-media scenes like those that can be produced by MPEG-4 BIFS, SMIL, etc. Through suitable plug-ins and interfaces the AXMEDIS Editor may allow inserting and taking out portions or elements of these composed elements. Direct internal editing through internal functions and menus could be limited to a minimum of simple straightforward cases. Overall, the Behaviour and Functional View shall:

5.1.65) Allow the production and modification of behavioural and functional parts of the AXMEDIS Objects. These parts are the functional parts of the MPEG-21 object. They are used to describe the behaviour of the object when it is open, played, etc. It is possible in this way to describe the execution sequence and the buttons to activate them, etc. Such a description can be formalized in a standard way by means of MPEG-21 Digital Item Processing descriptors specifying Digital Item Methods.
5.1.66) Allow switching by one touch tabs among different views such as text view (XML text view), composite media scene view, single media view (video, audio, hyperlinks, animations, etc.), media delivery view (embedded elements, streaming elements, etc.).
5.1.67) For aggregated composed objects, allow activating different windows with different view modalities for different subparts of the object.
5.1.68) Support plug-ins to show and manage specific composite media types that are to be reasonably expected for these elements, given the complex nature that these elements may have. At least a few of the major formats and tools for multimedia synchronization and timing (BIFS, SMIL), including maybe also QT, avi (divx) and the like.
5.1.69) Permit the visualization of simple time diagrams and/or spatial layouts from AXMEDIS objects to permit selection of some parts (on the base of annotations, etc.) to activate related editing tools for the supported functionality and formats (e.g. editing a single frame in an animated sequence)
5.1.70) Permit the rendering for preview of what is defined for the object in terms of behaviour and functional aspects.
5.1.71) Be configurable, i.e. user should be able to select, for each kind of components, which view to activate by default.

5.1.2.5 AXMEDIS Annotations Editor and Viewer

Annotations View will permit to display information including annotations and comments within AXMEDIS objects or parts of them. Annotations and Comments will be logically included as elements in AXMEDIS

objects without actually modifying their contents. Such View will be user customizable, i.e. users will be able to select which types of media have to be made accessible for each component. Annotations and Comments View should:

5.1.72) Permit to add/edit/delete annotations and comments by means of graphical actions such as drag-and-drop, contextual menus, etc

5.1.73) Be configurable, i.e. user should be able to select, for each kind of components, which annotations and comments types (textual, audio, alternatives, etc…) have to be made accessible; this shall be implemented by means of a user-friendly GUI.

5.1.74) Support plug-ins to show and manage specific media types that are to be reasonably expected for these elements, given the different nature that annotations and comments may have. Other than normal text support, at least audio annotations/comments and possibly text-to-speech should be included; still pictures should also be available in at least one common format.

5.1.75) Support for printing and visualising the metadata in a human readable format.

5.1.76) Have access to the file system in order to save annotations on a file.

5.1.77) load and apply annotations on an object.

5.1.2.6 AXMEDIS Metadata Editor and Viewer

Metadata Editor and Viewer will permit to adequately display/edit information contained within metadata associated with AXMEDIS object or parts thereof. Metadata will be contained within description and statement MPEG-21 elements. Such elements could contain user-defined XML code which will be correctly displayed by Metadata View. Such view will be user customizable, i.e. user will be capable to select which fields have to be displayed for each components. Metadata View shall:

5.1.78) The system (AXMEDIS Metadata Viewer) provides a default visualization model (i.e. tree structure) which shall be able to adapt itself (e.g. by analyzing the data-related XML schema) automatically to the metadata structure;

5.1.79) The Actor can controls/configures the Metadata Viewer/Editor which metadata section to display or hide, i.e. user shall be able to select, for each metadata type (e.g. by schema identification or namespace);

5.1.80) The Metadata editor provides GUI to allow editing of metadata.

5.1.81) The Metadata editor can export in edited metadata in machine readable format.

5.1.82) Due to the metadata versatility (MPEG-7, user custom, etc…), Metadata View shall support plug-ins to show and manage specific sets of metadata in a "user" definable manner, e.g. by schema identification or namespace;

5.1.83) The Metadata editor/viewer can provide support for a specific set of valuable metadata, such as MPEG-7 metadata, should be included into AXMEDIS Editor basic release;

5.1.84) The Metadata editor/viewer may support plug-ins for metadata automatic production, e.g. a plug-in for music genre estimation, summary generation, etc

5.1.85) The Metadata editor/viewer can provide support for printing and visualising the metadata in a human readable format.

5.1.86) The Metadata editor can convert and export the Metadata files for viewing using normal web browser (in HTML)

5.1.87) The Metadata editor provide support to add new Metadata models (with a set of template) with a set of default values based on the vocabularies/taxonomies (e.g. IEEE LOM)

5.1.2.7 AXMEDIS Workflow Editor and Viewer

Workflow Editor and Viewer will permit the user to adequately display/edit information related to workflow management.

Workflow Editor & Viewer shall:

5.1.88) visualize the current status of the object/component (e.g. status, what have to be done, who have to do it, …);

5.1.89) allow the user to change some information

5.1.90) support for printing and visualising the workflow information in a human readable format.

5.1.91) Allow the User to see workflow status in the AXMEDIS Object Editor/Viewer.

5.1.3 AXMEDIS Editor Configuration

AXMEDIS Editor Configuration Manager will be the unique access point to AXMEDIS Editor modules configurations. Each configurable AXMEDIS Editor modules (and sub-modules) will respect AXMEDIS Editor Configuration Manager requirements. AXMEDIS Editor Configuration Manager will be flexible enough to manage the widest range of settings possible. That should be possible by means of plug-in support. Further, AXMEDIS Editor Configuration Manager will manage and provide AXMEDIS Editor general configurations, such as multi-language.

AXMEDIS Editor Configuration Manager shall:

5.1.92) Be the unique configuration access point
5.1.93) Permit to group settings by some kind of identification
5.1.94) Support the most common parameter type, e.g. integer, float, colour, etc…
5.1.95) Provide an user interface to allow configuration access and modification
5.1.96) Show configurations grouped by categories and by software modules
5.1.97) Managing configuration for the main modules and the additional viewers according to a mechanism of VARIABLE NAME = VALUE (string).
5.1.98) Support XML as parameter type to allow developers to define their own
5.1.99) Include a default setting visualization module which shall be configurable. In such a way, every AXMEDIS Editor module shall specify it's own settings and AXMEDIS Editor Configuration Manager will be capable to correctly display it
5.1.100) Provide an interface to allow development of plug-ins for customized visualization of specific settings, e.g. a developer, who develops a plug-in, should give also a custom user interface to set the plug-in parameter

5.1.4 AXMEDIS Editor Plug-in Manager

AXMEDIS Editor has been thought to be as versatile and flexible as possible. In order to achieve this goal, various AXMEDIS Editor modules need to support plug-in technology. Hence, a AXMEDIS Editor Plug-in Manager is needed, such manager will be able to support installation/registration of plug-ins, to load such plug-ins for AXMEDIS Editor modules which request it and to maintain/manage relationship among plug-ins and related entities or actions, e.g. AXMEDIS Editor Plug-in Manager shall maintain relation among a specific set of metadata and the corresponding production or visualization plug-ins.

AXMEDIS Editor Plug-in Manager shall

5.1.101) manage the following kind of plug-ins:
- Data-manipulation plug-ins shall be able to modify AXMEDIS object structure, i.e. plug-ins which shall be able to delete or move existing components, insert new components, etc…
- Metadata production (as descriptors) shall be able, through AXMEDIS object (and parts thereof) analysis, to produce metadata to be included into the object;
- Protection tools
- Metadata show/manage plug-ins shall be used by Metadata View to adequately display and modify user-defined sets of metadata;
- Configuration plug-ins shall be used by AXMEDIS Editor Configuration Manager to manage and display specific configuration information;

5.1.102) provide standard interface definition for the above mentioned plug-ins family; The standard interface has to provide service for:
- dynamically attach plug ins,
- managing confirmation of plug ins,
- supporting the security and certification of the plug ins,
- allowing the plug in to insert menu items in the general menu and in the contextual menu of the objects according to the views.

5.1.103) Avoid the direct interaction among plug in or to change the behaviour imposed by other plug ins.
5.1.104) Provide support for mapping the basic functionalities of Composition and formatting and making them available for the composition and formatting engines
5.1.105) dynamically reload the list of plug in if a new plug in is accessible in the right location.

5.1.106) provide an interface to allow related AXMEDIS Editor modules to access to the associated plug-ins.

5.1.107) store all those information required to classify and sort plug-ins, such as:

- Kinds of component or actions associated;
- Mime type association;
- Etc…

5.2 AXMEDIS Internal Editors/Viewers

Internal AXMEDIS Resource Editors/Viewers are internal tools that supply the AXMEDIS Editor with a range of basic functionality involving the digital resource management.

Such Internal Editors and Viewer shall

5.2.1) be invoked by the AXMEDIS Editor;

5.2.2) allow managing the digital resource by respecting the DRM and protection mechanism associated with the resource;

5.2.3) allow visualising the digital resource if it is a document or an image;

5.2.4) allow playing/execute the digital resource if it is a video, or an audio or animation, or a multimedia resource, etc…;

5.2.5) allow manipulating the digital resource by means of basic editing functions. For example zooming in or out the image resource, excerpt extraction, etc..

5.3 AXMEDIS tools for using/producing AXMEDIS Objects in other Content tools

The possibility to interface the AXMEDIS Editor with external applications for content production (such as Adobe Photoshop®, Adobe Premier®, etc…) will allow the user working on digital resources by continuing to use own tools. At the same time this solution will provide the opportunity to manage a wide range of digital contents and formats such as:

- Multimedia: MPEG-4, HTML, ……
- Animations: FLASH, etc….
- Audio: WAV, MP3, AIFF, ….
- Video: MPEG, AVI, H264/AVC….
- Document: DOC, PDF, PS, etc..
- Images and Graphics: TIFF, JPG, PNG, PIC, SVG, etc.
- others: music scores, excel sheets, power point presentations, games, etc.

To obtain that:

5.3.1) The AXMEDIS Editor shall activate external applications for Digital Content manipulation (editors/viewers for editing/viewing such as Adobe tools, Microsoft tools, etc.).

5.3.2) The AXMEDIS Editor shall provide interfacing mechanisms for communicating with external applications.

5.3.3) In case of external application supporting ActiveX/COM technology, the AXMEDIS Editor shall host an ActiveX/COM Manager and the relative ActiveX application shall be equipped with an External Editor/View AXMEDIS Plug-in

5.3.4) In case of external application not supporting ActiveX/COM technology, the AXMEDIS Editor shall host an External View/Editor Activation Manager (via console) and the relative external application shall be equipped with an AXMEDIS Object Handler as Plug-in and provide a communication via socket or other inter process communication technologies.

5.3.5) Both plug-in technologies shall provide mechanisms for

- Accessing AXMEDIS objects;
- Navigating into AXMEDIS objects;
- Creating AXMEDIS objects;
- Modifying and manipulating AXMEDIS objects according to DRM rules;
- Protecting and respecting the protection of AXMEDIS objects, by means of the Protection Support module.

- Verify DRM and protection info related to objects and their components both in terms of PAR and available licenses chains (DESIRED especially for governed objects),
- Allow availability of fine graded licensing scheme for objects, where for each foreseen action a specific generic license is available so to allow aggregation of operation through aggregation of licenses at sale time (DESIRED especially for governed objects. E.g play, print, store, save… each with a specific licence so that user can buy play and print or play, print and store or just play…).

6 AXMEDIS Object Production

6.1 Compositional and formatting tools

Compositional and formatting tools of digital content production tools have to aid the content designer to:

6.1.1) efficiently collect the components needed, using advanced query options
6.1.2) find/produce alternatives for the components that present potential distribution problems (files too big).
6.1.3) structure the components, highlighting the semantic relations between them.
6.1.4) bind the structure content to some presentation styles.
6.1.5) Define rules, to allow an automatic and customizable composition process.
6.1.6) Define for each rule deadlines and other constraints that can be satisfied.
6.1.7) Support in the process of composition and formatting the DRM, in the sense that all the activities performed on the object has to be performed in the respect of the IPR and DRM licenses of the objects manipulated.
6.1.8) Rules of the content processing have to include capabilities of: accessing to the database, crawling content from external resources, delivering content, publication of content via different channels, managing different datatype, etc.
6.1.9) allowing to process rules produced by other editors by example

The problems of automatic content production is decomposed in two separate phases: composition and formatting. Such phases can be performed by AXMEDIS Content Processing **Engine**.

6.1.2 Composition

The composition is the action of putting together content component to create a new digital item in an almost automatic manner. The final result is a new composite AXMEDIS object. The compositional activity should allow composing different kinds of raw assets such as Text, Images, Audio, Video (actual shot), Animation (synthetic), etc… coming from the AXMEDIS database.

6.1.10) The composition could generate any kind of combination of digital resources and metadata according to the AXMEDIS format. For Example:
- Texts + Image
- Texts + Audio
- Texts + Image + Audio
- Audio + Texts
- Animation + Texts
- Video + Texts
- Video compilations
- Audio compilations
- Image compilations
- All other different combinations of raw assets
- Multimedia presentation embedding sets of raw assets such as MPEG4, etc.
- Multimedia presentations composed of basic combined objects, **such as HTML,**

Example:

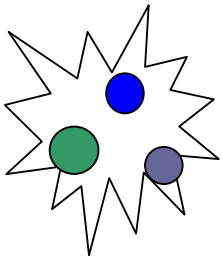
Let suppose to get a Selection of digital documents from a large database of content. The Selection can be a the identification of a AXMEDIS components (digital objects) Italian singer Eros Ramazzotti, that is:

- 100 Audio, 50 Documents, 30 Images

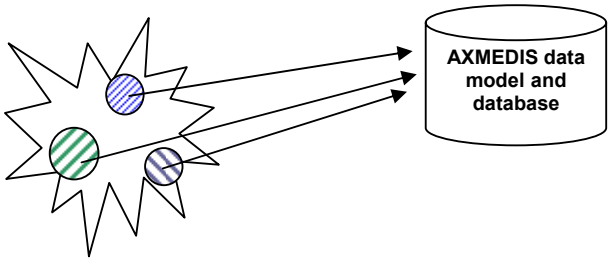
Some solutions for different compositions could be:

- Any composition of 2 audio, 2 images and 4 documents
- Collection year by year with audio, documents and images of the same year
- Any two audio ordered by time, take these images and the doc number 45 which is the biography
- Any combination of 2 over the 100, plus put in any new object a specific document (for instance a given version of the bio plus its image, that could be the cover).

All solutions listed in the example generate composite AXMEDIS objects that embed digital resources (audio, texts, images, etc…). A double mechanism for embedding digital resources should be available: (i) composition by references and (ii) physical composition. In the former case, digital resources are embedded in the composite object by using their reference (i.e. the ID of the single digital resource, the URL of the database where the resource is stored, etc…), whereas in the latter case digital resources are embedded physically in the new composite object. The first solution allows avoiding digital resource duplication and excessive wastage for disk storage space.



Physical Composition



Composition by References

6.1.11) A composition rule has to:

- describe what kind of information (metadata and licensing) to use in AXMEDIS objects retrieval. Such information defines selection mechanism based on queries built on metadata and licensing information for extracting digital resources from the AXMEDIS database;
- describe how to combine different objects (i.e. how many objects, what kind of objects, organising them by type, embedding them by reference or physically, etc…);
- describe how to manage and combine DRM rules for the new composite item;
- describe operations or actions that have to be performed during the composition process: (i) Fingerprint estimation and application for the new composite item and (ii) Object ID assignment for the new composite item.

For example, a compositional rule could be described as a function in the following way:

$$C = f(S1,S2,..,Sn,P1,...,Pm)$$

Where:

- S_i – It defines a selection. It is a set of queries and/or a set of identified objects created by the user by using the AXMEDIS Query Support and that can be sent to the AXMEDIS Query Support to provide the list of AXMEDIS objects references into the database. This feature is needed only if the query is symbolic and not actualised with the name/references of the objects;
- P_i – It is a parameter (basic type as integer, string, Boolean);
- f is the identifier of rule (name of rule or other);
- C is the resultant of rule application. It is the new composite AXMEIDS object.

Considering the role of the composition engine in the AXMEDIS object creation and distribution, the engine could be controlled by AXMEDIS Workflow Manager. In this scenario, a composition rule could be used by the AXMEDIS Workflow Manager to realise a composition schedule to be sent to the Composition Engine. Such as schedule could contain information regarding:

- *Object ID* – It is the name of the new AXMEDIS object
- *Activation* – When the composition engine has to activate the rule (scheduling of the composition rule activation): time and date or period (from-to, weekly, monthly, synchronised with the reception of a signal from the WORKFLOW etc…)
- *Message* – A specific message coming from external tools.
- *Active Rule* ID or Name – It defines the identifier of the rule to be used
- *Selections Applied* – A set of one or more Sequences to be used with the composition rule
- *Parameter* – Parameters to be used with the composition rule. Each parameter is described by the name, the type and the value.

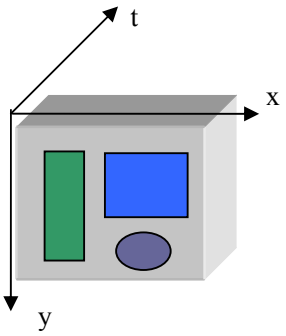
The *Activation* and the *Message* could be two mutual exclusive conditions for rule activation.

6.1.3 Formatting

Formatting is the process to exploit the digital resources in a combined AXMEDIS object in some integrated visualisation (editorial) format for their distribution and usage by the end user. A simple compounded object comprised of several parts (e.g., an audio, a video and a document) could be formatted in several different ways according to different formatting styles (graphic layout, spatial constrains, temporal scheduling of the content, speech generation from text, synchronisation between audio and images, etc.) and adapted for producing the final content (Digital Item Adaptation) to be distributed in different channels such as i-TV, mobile, PC usage, etc…

Generally, a formatted multimedia object could be considered as a unique object characterised mainly by:

- *Spatial relationships* – They are defined in the spatial domain and describe how visible resources are organised in the visible space (layout, margins, etc…)
- *Time relationships* – They are defined in the time domain and describe not only the basic orchestration (i.e. specification of when media items appear on and disappear from the screen), but also which synchronization relations need to be maintained (e.g. for audio streams that need to play lip sync with a video stream) and for controlling the speed and other basic behaviour of animated content (Temporal domain).



A formatted AXEMDIS object: *X* and *Y* axes represent the spatial domain, *t* represents the time domain

All the formatting activity shall be based on content features, categorization, metadata and DRM rules, profiles that describe user preferences, device capabilities and specific context informations (in case of formatting on demand); these elements will be used to determine formatting style, optimisation parameters, interactivity level and paradigms, content type and format, temporal evolution, delivery time, etc…

The presentation style (e.g. Bloomberg TV, classic style) can be created based on the content designed or adapted/modified using an existing presentation style. Variants have to be considered depending on the content play/usage/product scenario (e.g. PDA, I-TV, PC, phone). Some generic presentation styles can be provided (e.g. a sequence, a video with text, an image with text) which can be reused for other styles with different details. The presentation style may be described using a graphic rule based language to aid the novel user in the creation/customisation of a style.

6.1.12) The formatting should have to take into account also the specific problems of the distribution channel:

- location of the content and time to delivering;
- model of delivering: streaming, download, off-line distribution, etc.;
- format for delivering: SMIL, MPEG-4, simple audio files, documents, video, etc.

For example: if an user, who is working on a PDA or a mobile, wants to play a video clip which requires a broad band to be played, the formatting process has to adapt this video clip so to satisfy transmission constraint and to provide to the user a service with an adequate quality.
To this end a wide set of formatting algorithms are needed.

6.1.13) Formatting algorithms should be based on:

- AXMEDIS components description , with content type, categorization, metadata;
- different content usage paradigms, which are the editorial formats:
  - page or formatting style/layout;
  - evolution of page style along the time;
  - final format to be produced: SMIL, MPEG-4, WAP, HTML, AXMEDIS integrated format, etc….
- formatting rules based on:
  - user profile and preferences, channel profile, interactivity level;
  - availability of the content components and their costs;
  - capabilities of the device on which the content has to be received and used;
  - duration and complexity of each content component combined for creating the page;
- shaping details for each content type, for instance:
  - video: time, size, frame rate, compression;
  - audio: time, sample rate, compression;
  - image: size, complexity, size;
  - text: #words, size of text (proportionally scalable), language;
  - music: #measures, time, voices;
  - animation: size and time.

The formatting process could be executed both in the AXMEDIS environment by using the set of formatting algorithms developed during the project life or out of the AXMEDIS environment by delegating the external tools. Such tools could be the same content formatting tools used by the content producer. In this scenario, the external formatting process has to be described by means of the set of formatting operations and functions (a kind of function mapping) that the external tool has to perform. At the end of the external formatting process, the external tool returns the new formatted object to apply protection or/and fingerprint on it or/and execute others operations. Anyway, the formatting process produces a new object which satisfies user needs and provides a mechanism by which is possible to have a platform/network independent cross-media distribution framework.

6.1.14) A formatting rule has to:

- describe what resources are involved in the formatting process
- use the description of distribution channel properties, user device features, user profile, etc… ;
- describe the final output using a specific integration format (MPEG-4, SMIL,…) or using DIP capabilities provided by MPEG-21 objects;
- describe how to combine different digital resources and create relationships in terms of:
  - spatial relationships (for graphic layout, resource adaptation, …);
  - time relationships (for synchronisation, transitions effect, fitting (shrinking or stretching, cutting,)…);
- describe operations or actions that have to be performed during the formatting process, for example:
  - which formatting algorithms have to be used (synchronisation, image scaling, resolution scaling, format conversion, etc…);
  - which external functionalities (by dynamic call to services provided by external tools) have to be used;
  - fingerprint estimation and application for the new composite item;
  - object ID assignment for the new composite item.
  - support the representation of temporal constraints (i.e. in case of a synchronisation some images could have a definite temporal sequence, or an audio related to a specific video);
  - support the representation of spatial constraints (i.e., overlap of images as a background with some buttons);

Considering the role of the formatting engine in the AXMEDIS object creation and distribution, the engine could be used by other tools as an on demand or time scheduled service. For example, the AXMEDIS Workflow Manager could ask to the Formatting Engine for the execution of a formatting rule on specific set of AXMEDIS objects. Moreover, the formatting could execute the specified rule at a specific date and time or periodically (weekly, monthly, etc…).

6.1.15) To extend the capabilities of the formatting engine, solution based on artificial intelligence could be adopted to perform and solve:

- problem for graphic layout, spatial fitting (Genetic Algorithms, Taboo Search, etc.);
- text distribution on the page;
- positioning of images on the pages;
- selection, ordering and positioning of the images along the document;
- time fitting;
- application of heuristic rules for the content composition and/or formatting;
- automatic synchronisation;
- etc…

Possible actions primitives:

- time fitting;
- stretching, shrinking;
- taking excerpt in space and time;
- resizing
- reformatting;
- reshaping
- ROI (region of interest) application;
- etc...

The formatting activity is performed in three principal steps:

1. determining (or writing, if not already available) a template suitable for the given resource set and profiles;
2. determining (or writing, if not already available) a style-sheet associated to the template, and suitable for the given resource set and profiles;
3. optimizing the result, to fit profiles.

6.1.16) Templates define the basic structure and behaviour of the document. The Templates

- are written in (a subset of) SMIL, a W3C standard that allows to fully express spatial and temporal relationships. The choice of a standard language also allows the use of external tools;
- allow the definition of language extensions, to add new expressive possibilities;
- allow to specify optional informations about template characteristics, target devices, resources required;
- implement a format paradigm, that is a general category for the document (see below for examples);
- are automatically selected on the basis of their correspondence with the given resources and profiles: best resulting templates are proposed to the choice of the author, or automatically applied during the execution of a rule.

Some examples of format paradigm are reported below, for each paradigm the set of digital resources and the main characteristics and formatting operations to perform (listed after the "→") are reported:

- Karaoke:
  audio and text → synchronization of words highlighting with the song.
- Slide show:
  1. Images and audio → time scheduling and synchronisation of images showing and with

audio, transitions effects.
2. Images and texts → time scheduling and synchronisation of images showing with text displaying, layout definition between images and text, transitions effects in sequence change.
3. Images, texts and audio → time scheduling and synchronisation of images showing with text displaying and audio, layout definition for images and text, transitions effects in sequence change, time fitting for audio, audio shrinking or stretching.

- Video Subtitling:
  video and text (dialogs in a specific language) → synchronisation of sentences while actors are speaking, overlapping of text on frames, adaptation of text font.
- Video Clip:
  video sequences, audio, texts, image → scheduling of sequences, synchronisation with audio track, transitions effects in the sequence change, titling composition, titling layout and animation, logo position.
- Running text:
  texts → scrolling of text (horizontal or vertical), different colours, fonts, etc.
- Interactive TV:
  videos, images, text, hyper text → definition of screen layout (video area, static text areas, images area), refresh conditions for static text area, resources adaptation according to the displaying area geometry. Definition of actions and links with video resources.
- "Bloomberg" TV:
  video, texts, running texts, images → definition of screen layout (video area, static text areas, running text area, images area), time refresh for static text area, resources adaptation according to the displaying area geometry.
- "Interactive hypertext" such as HTML:
  texts, images, audios, animations, video → definition of screen layout, actions, hyper link.
- Animation:
  images → sequence of images, rendering parameters, animation effects.
- Presentation:
  texts, images, audios, video → definition of screen layout, actions, hyper link, transition effects, text and image animation, time fitting.

6.1.17) Style-sheets complete templates with additional look-and-feel:

- they are written in XSLT, a W3C standard for transforming the XML (and thus SMIL). The choice of a standard language also allows the use of external tools;
- they contains information about the template for which have been written;
- they allow to specify optional informations about style-sheet characteristics and target devices;
- they allow to parameterize some attributes, which will be defined during the optimization.

6.1.18) The final optimization performs a fine tuning to adapt, as much as possible, the document to the profiles:

- heuristic algorithms (e.g.: Genetic Algorithms) are used to produce a good level of adaptation within a reasonable time; to reduce computational time, they could be executed in parallel;
- resources have to be adapted (e.g.: scaled, resized, looped, rotated, etc.) to cope with the optimized layout;
- optimization is applied to several aspects: position, dimensions and proportions of the document components, text properties, duration and repetition of media playback.

The output of the above formatting process can be:

- in a digital format different from the original resource, in which the original digital resources are transcoded, such as using a sliding show with audio file to produce a video.
- in a digital format keeping the resources in their original format and organising them in space and time such as: power point presentation, HTML, WEDELMUSIC, etc…
-

6.2 AXMEDIS Content Processing Engine

The AXMEDIS Content Processing Engine should be a parser and an executor of rules; it should be supported by a rules repository.

Content Processing Engine shall:

6.2.1) work in respect of AXMEDIS Data Model Schema;
6.2.2) load, parse, activate and execute rules
6.2.3) have an internal clock for rule activation
6.2.4) be accessible from other modules (workflow Manager or other tools)
6.2.5) generate logs related to the performed activities
6.2.6) provide backup mechanism to restore the activity if some failure occurs
6.2.7) schedule rules activation at specific time instants or periodically (weekly, monthly, daily, etc…)
6.2.8) plan rules execution rationally respecting their needs in terms of computational resources (CPU, Disk Space, RAM, network speed, etc…) and temporal constrains.
6.2.9) receive activation messages from the AXMEDIS Workflow Manager and P&P and notify the end of execution
6.2.10) send acknowledgement at the completion of the process by returning the new object ID (in case of the P&P) or a confirmation message (in case of the AXMEDIS Workflow Manager)
6.2.11) allow grouping AXMEDIS objects obtained from queries by type (i.e., video, audio, image, textual, document, combined objects, etc.);
6.2.12) obtain AXMEDIS objects by querying the AXMEDIS Database (using AXMEDIS Query Support)
6.2.13) retrieve AXMEDIS objects from AXMEDIS Database by means of their Object ID;
6.2.14) produce a new AXMEDIS object;
6.2.15) assign to the composite object a new Object ID provided by AXMEDIS Object ID Generator;
6.2.16) store in the AXMEDIS Database the new AXMEDIS object;
6.2.17) accept a reference to a specific rule. Such reference is provided by the user or other modules (i.e. the AXMEDIS Workflow Manager) on the basis of the kind of work to be done (audio plus images, or audio collections, etc…)
6.2.18) provide a composition/formatting service, that means: Engine shall accept (i) rule, (ii) a set of components to be composed together and/or formatted (also in AXMEDIS queries form), (iii) a set of parameters;
6.2.19) be able to merge/embed AXMEDIS objects to create a new AXMEDIS object;
6.2.20) permit to embed digital resources physically or by reference
6.2.21) notify errors deriving from rule application
6.2.22) consider profiles (i.e. user, device and context profile) for optimal format and quality;
6.2.23) use metadata to reduce the number of AXMEDIS objects involved;
6.2.24) require the fingerprint estimation of the new AXMEDIS object produced by a rule. The fingerprint could be based on the fingerprint of components or a new one;
6.2.25) use adaptation tools and algorithms:
  (i) synchronize different media, for example: video with audio or video with text (subtitles);
  (ii) synchronize different languages media (text and/or audio) with a same video;
  (iii) image scaling, transcoding
  (iv) audio and ringtones transcoding;
  (v) multimedia transcoding
  (vi) document processing for document adaptation and descriptor extractor,
  (vii) video scaling, transcoding
  (viii) descriptors extractors for audio, video, images, etc.
  (ix) etc.
6.2.26) check if the rule, chosen or created by user, is feasible;
6.2.27) simulate a rule
6.2.28) Debug a rule
6.2.29) operate in respect of AXMEDIS DRM model
6.2.30) be able to merge licenses/DRM rules of components into the new AXMEDIS object in such a way that all rights are respected
6.2.31) permit the introduction of new DRM rules to licenses

6.2.32) be able to automatically choose the "better" composition rule among the set of all composition rules stored in the repository if any composition rule is not specified by the user
6.2.33) allow setting up the Adaptation tool plug-ins on the basis of the client (End User) capabilities: for example supported multimedia formats, screen dimension, resolution, etc.;
6.2.34) use services provided Fingerprint tool, Adaptation tool, Protection tool, external formatting tools
6.2.35) use a set of generic rules for formatting AXMEDIS objects based on client-device-profile and distribution-profile, to produce new AXMEDIS objects.

6.3 AXMEDIS Content Processing Rule Language

The Content Processing process should be described by means of a rule. It could be seen as an automatic procedure where it is specified what and how to combine digital resources and formatting them.

For example, in case of an audio collection creation may be necessary to group automatically a set of audio resources related to a singer in order to compose an audio compilation whose total duration is not greater than a specific value, to apply new specific DRM rules to the new AXMEDIS object and to request a fingerprint estimation and application. This example of composition requires metadata associated with each digital resource (i.e. the name of singer, year of composition of songs, duration), conditions (i.e number of digital audio resources to be used for the collection, total duration) and actions (applying or combining DRM rules, fingerprint estimation and application). More in general the composition rule should be described by means of a script language called AXMEDIS Content Processing Rule Language. In this way, the user could specify the operations to be performed in the composition process by writing a new composition rule or modifying an existing one. The script language should be based on syntax rules and should provide the way for writing and describing: declarations, directives, comments, instructions (assignments), actions, selections, operators (logical, arithmetical), control and iterative structures, and so on. Such language could be based for example on ECMA script or JavaScript language and it should provide the way to write general and different procedures and extend the language dynamically (i.e. plugins). The parsing and the execution of a composition procedure should be performed by artificial intelligence engines inside the AXMEDIS Content Processing Engine. The AXMEDIS Content Processing Rule Language should be also supported by a representation format (e.g.TXT, XML, etc…) in this way a rule could be stored into a rules repository and it could be used when building other similar rules, at the same time it could also be shared with the other content designers of the P2P network.

AXMEDIS Content Processing Rule Language shall:

6.3.1) provide the way to write general and different composition/formatting/processing procedures.
6.3.2) be based on a script language
6.3.3) be supported by syntax rules.
6.3.4) be able to call base operations.
6.3.5) support strings, Boolean and numerical variables.
6.3.6) support flow control (e.g., loops, for, do-while) and conditionals (e.g., if-then-else, switch).
6.3.7) support the unique identification of a rule
6.3.8) support event and exception handling.
6.3.9) support dynamic call to external services provided by other tools (e.g. Fingerprint, Adaptation, Protection) and external formatting tools (for example the formatting tools used by the content producer).
6.3.10) be specified by an XML Schema (In such a way, the syntax will be extendable and easily controllable);
6.3.11) support metadata regarding temporal constrains (schedule, deadline) and use them for planning and scheduling
6.3.12) support metadata regarding computational constrains (profiling metadata), and use them for controlling the workload on the GRID nodes.
6.3.13) be represented by a format (TXT, XML, etc…) in order to store a rule inside a Rules Repository.
6.3.14) provide mechanisms for automatic creation of selection and conditional mechanism among composite object components;
6.3.15) provide selection from metadata and values of metadata;
6.3.16) perform processing on text or metadata;

6.3.17) be extensible by defining additional operations using external or additional functions or procedures.
6.3.18) provide mechanism for selecting and automatically invoking formatting algorithms (synchronisation algorithm, resource adaptation, resolution scaling, etc…)
6.3.19) be specified by an XML Schema (In such a way, the syntax will be extendable and easily controllable)
6.3.20) allow a given number of standardised functionalities that can be recovered by several different tools for content adaptation, formatting, etc. This allow formatting script that can be ported and executed on different content factories even if the content factory does not contain the same additional tools:

```
If ! Mpeg4Tool Then
        Standard.Animation (obj1, from …, to ….., “fast”, from left);
Else
        Mpeg4Tool.Animation (Obj1, from…, to….., “fast”, curve….);
```

6.3.21) optimise memory consumption and CPU cycles. (low)
6.3.22) invoke other rules by means of a direct or indirect call (DESIDERED)
6.3.23) allow definitions for animations, transitions among images and video, and their combinations in terms of spatial, temporal, and functional behaviour, etc.
6.3.24) allow conditional expressions in the script language depending on:
- the values of information such as Metadata, Fingerprint, etc. in the AXInfo,
- the Object Structure,
- the viewer or distributor profile
- the configuration of the currently available tools for content production, adaptation, protection, fingerprint estimation, etc.

6.3.25) support operations on sets such as: union, intersection, combinations, etc.
6.3.26) have the ability to express concurrency.(low)
6.3.27) support safety checking and protection mechanisms.
6.3.28) be marginally supported by some user interface for producing script by examples
6.3.29) be lightweight in terms of footprint, memory consumption and CPU cycles. (DESIRED)
6.3.30) be marginally supported by some visual tool for the production of the script (DESIRED)
6.3.31) provide mechanisms for describing or referring or producing licenses and PARs
6.3.32) provide mechanisms for describing or referring or producing protection information
6.3.33) provide mechanisms for describing and specifying the automatic creation of protection information
6.3.34) allow to specify actions that may include:
- Metadata processing and estimation (translations, etc.)
- Fingerprint estimation
- Fingerprint processing
- DRM Possible Access Rights production and processing
- Protection, integration or not of License
- License production and processing, verification, etc.
- Etc.

6.4 AXMEDIS Rules Editor

AXCP Engine works on the basis of rules. Such rules could be written by using the AXCP Rules Editor. This editor is an user interface or a tool that should permit to obtain well formed rules (i.e. rules that match a specified syntax) by the means of both graphic and scripting tools.
AXCP Rules Editor is also used to create specific rules for distribution channel and devices. Rules allow adaptation of the digital content automatically.

Rules Editor shall:

6.4.1) be a graphic user interface (GUI) capable of using the most common GUI capabilities such as drag and drop, right click, etc… to support human user to create rules;
6.4.2) provide possibility to insert scripting code instead of using graphic interface;
6.4.3) provide possibility to insert parameters of rule
6.4.4) provide possibility to define and estimate rule profiling
6.4.5) provide possibility to define rule temporal constrains

6.4.6) control manually inserted scripts before accepting it to detect syntax errors;
6.4.7) produce well formed rules in respect to the syntax of Rule Language;
6.4.8) work in respect of AXMEDIS Data Model Schema;
6.4.9) define new rules textually;
6.4.10) store rules for reuse;
6.4.11) allow query on the stored rules;
6.4.12) provide some procedure to impose structure to be applied on the new AXMEDIS object;
6.4.13) provide some procedure to choose a specific rule from the repository;
6.4.14) provide a way to debug/test rules;
6.4.15) communicate with the AXMEDIS Content Processing Engine
6.4.16) provide a way to activate rules;
6.4.17) be activated by the AXMEDIS Workflow Manager
6.4.18) display messages from the AXMEDIS Workflow Manager
6.4.19) support scripts to define new rules directly using the Rule Language;
6.4.20) be able to describe scheduling rules to let the Engine to perform specified tasks at specific time (e.g. repeat a formatting task periodically);
6.4.21) support Textual queries on content
6.4.22) provide help on line regarding the syntax of script language and functions provided by AXMEDIS Content Processing tools
6.4.23) support Visual queries on content
6.4.24) provide some facilities to write rules including and processing DRM features on the composite object or to give some directives on how to merge (if possible) components' DRM rules;

7 AXMEDIS Workflow

The Workflow Management System (WfMS) is to support the coordination of resources and activities during the development of any product, particularly in production and distribution of electronic multimedia products for AXMEDIS.

In order to identify the initial user requirements based on the user's expectation of the AXMEDIS Workflow Management System (WfMS), a questionnaire was submitted to the AXMEDIS Consortium content producers and distributors. This was followed up with an in-depth semi-structured interview with practitioners from within the Consortium membership. In the appendix to this document we have included the tabularised results of this requirements acquisition process which included at least one set of knowledge elicitation activities performed with practitioners from each of the three distinct business sectors within the domain namely music, advanced interactive-immersive e-media, and, e-book/educational multimedia. The questionnaire results as included in the Appendix also include costing data in respect of each of a set of typical activities such as:

- metadata integration
- composite object production
- protecting objects
- distributing objects to distributors
- acquiring objects from publishers
- finalizing the contract in the licences.
- production of the programme for publication.
- updating digital content
- updating metadata
- updating licences
- recovering history of the object production. tracking, administrative activities. rights clearance management. etc...

7.1 General requirements for AXMEDIS Workflow

The first requirements analysis exercise and its update have established and updated a range of AXMEDIS workflow integration functionality requirements which are itemised in this section and were broadly based on the elicitation of:

- The requirements of the existing workflows of the AXMEDIS content creators, integrators and distributors (presented as scenarios)
- The functional workflow requirements as demanded by the AXMEDIS Partners
- The integration requirements between the relevant AMXEDIS Content production and distribution client services components and a third party Workflow Management System (WfMS) as the first open-source WfMS integration Demonstrator. For this the AXMEDIS integration has to satisfy the Requirements of three types of Interfaces that are needed to operate seamlessly between the WfMS and the respective AXMEDIS components as follows:
- WfMS-AXMEDIS native tools and engines interface: This is a set of workflow integration requirements to serve The AXMEDIS native tools that perform specific actions on AXMEDIS Objects as needed for content authoring, formatting, rendering, composing, packaging, and bundling applications. This includes the integration of the WfMS and server-based AXMEDIS applications. These requirements can be itemised as follows together with labelling as to their current state of fulfilment:

The AXMEDIS Workflow Integration is required to provide integration with:

7.1.1) The AXMEDIS Editor

7.1.2) Content Processing Scheduler

7.1.3) The Program and Publication Engine. This has been implemented and tested successfully at one of the Partner's sites (DSI); currently integration testing at another Partner's site is in progress.

7.1.4) The Content Processor Engine. This is needed to harmonise the integration of workflow with the area of content processing and thus the integration of Workflow procedure and AXCP rules is needed. This will facilitate the capability to activate procedures in various ways to match the needs of any job, e.g. scheduling, over-riding etc; starting the activation by the reception of a message from the AXCP Scheduler.

7.1.5) The Protection Tool Engine. In the finalised AXMEDIS Framework Architecture for the first phase the Partners concluded that this requirement for direct integration of WfMS with the Protection Tool Engine was not necessary since the integration of WfMS with AXCP Engine will be sufficient for this purpose.

7.1.6) The Publication Tool Engine of AXEPTool. This is achieved through the integration of the WfMS with the AXCP Engine.

7.1.7) The Loading Tool Engine of AXEPTool. This is achieved through the integration of the WfMS with the AXCP Engine.

7.1.8) The AXEPTool P2P Active Selection Engine. This is achieved through the integration of the WfMS with the AXCP Engine.

7.1.9) The Plug in for the Accounting Manager and Reporting Tools. In the finalised AXMEDIS Framework Architecture for the first phase the Partners concluded that this requirement for direct integration of WfMS with the Plug in for Accounting Manager and Reporting Tools was not necessary.

7.1.10) Plug in for Administrative Information Integrator. In the finalised AXMEDIS Framework Architecture for the first phase the Partners concluded that this requirement for direct integration of WfMS with the Plug in for Administrative Information Integrator was not necessary.

7.1.11) Publication/Loading Rules/Selections Editor.

7.1.12) Programme and Publication Rule Editor

7.1.13) Protection Tool User Interface and Rule Editor

7.1.14) Collector ??? Engine (OPTIONAL). In the final version of the AXMEDIS Framework Architecture for the first phase the requirement for direct integration of the workflow with the Collector and Crawler engines was deemed unnecessary.

7.1.15) Core Accounting Manager and Reporting Tool (OPTIONAL). In the final version of the AXMEDIS Framework Architecture for the first phase the requirement for direct integration of the workflow with the Core Accounting Manager was deemed unnecessary.

7.1.16) Administrative Information Manager (OPTIONAL). In the final version of the AXMEDIS Framework Architecture for the first phase the requirement for direct integration of the workflow with the Administrative Information Manager was deemed unnecessary.

7.1.17) The AXMEDIS workflow must provide for a streamlined integration , open and flexible interface for third party WfMSs. In responding to this requirement the implemented WF integration architecture has adopted a flexible open approach to integration providing for each WfMS Interface with each of the AXMEDIS components uniform integration channels comprising the following components:

- Request and Response Gateways
- Request and Response Adapters
- Dedicated Plug-in

Thus the WfMS shall be able to tie together all the AXMEDIS Client tools (authoring/formatting/rendering/ composing/packaging/bundling applications) and the AXMEDIS Server Engines and thus create an integrated platform which will be made accessible through standard industry interfaces.

The AXMEDIS Workflow Integration must enable actors to interface any server-side component, regardless of language or platform or location and vice-versa. In responding to this requirement the implemented WF integration, using web services has exploited XML technology to enable the integration of applications that can be published, located, and invoked over the Web. In this way the WfMS invokes web service methods over HTTP, enabling one to interface any server-side component, regardless of language or platform or location. In order to use web services to interface the WfMS and the external engines, these applications are required to expose their APIs.

WfMS- User Query support interface: The Workflow integration must enable any actor to interface with the AXMEDIS Query Support; this type of interface is a particular case of the WfMS-AXMEDIS server engine interface which is to enable an authorised user to perform AXMEDIS queries related queries to and receive traceable responses from any AXMEDIS component relevant to performing actions on AXMEDIS Objects. This also includes the facility to perform advanced search on characteristics connected to AXMEDIS objects by invoking external search engines and thus retrieving the required information.

Additionally the AXMEDIS WfMS Integration must:

7.1.18) Interface with external CMS so that users are not impeded in their work; this implies that the Workflow Integration must facilitate the maintenance of AXMEDIS Object consistency integrated with authorised download and upload by actors. The AXMEDIS Workflow Integration architecture provides for both check-in and check-out operations of an AXMEDIS Object by an authorised actor. The former operation performs tasks related to maintaining object consistency by locking it in the repository and authorising its download exclusively for the actor. The latter operation releases this lock once the upload of the manipulated AXMEDIS Object has been successfully completed and concomitantly status/revision entries have been inserted in the WfMS.

7.1.19) Operate within the key Operating Systems (OS); for example the Windows, Linux, Mac Environments. The selected WfMS server application will run on Microsoft Windows XP Operating System while clients from various platforms, including Microsoft Windows XP, Linux and Mac/OS operating systems, will be supported.

7.1.20) Be mainly an open source tool based on open source distributed products through LGL, BSD or similar licences The web services needed to interface the WfMS which can be developed and customised using, for example, the open source AXIS product with a Java application server (Apache Tomcat, JBoss) or, in Microsoft environment, can be developed using IIS web server and .net framework.

7.1.21) Provide a Service Interface (API) to be used for developing the plug in for AXMEDIS Editors, Engines and Query Support.

7.1.22) Control and manage the process activities, for example by re-assigning, delegating, to the single activities;

7.1.23) Either a process editor user interface or a standard process definition language (XPDL, jPDL) will be used for defining and customizing the workflow processes for production, integration and distribution.

7.1.24) Provide workflow with multi-lingual and cross-lingual support (OPTIONAL)

7.1.25) Provide support for incremental job approval processes (sign–offs) over the course of bespoke multimedia content production

7.1.26) Be capable of automating the production process from content creation to delivering along the value chain. A key objective of AXMEDIS is to reduce the cost of content production, formatting and distribution by automating and streamlining workflow control for all phases of object lifecycle and interaction types to cover both for-stock and on-demand production and distribution

7.1.27) Provide a simple support to create AXMEDIS workflow procedures (a kind of AXMEDIS Workflow Builders' Kit (AXFW-BK)) and thus to harmonise and coordinate the AXMEDIS factory and its integration with legacy part of the factory (OPTIONAL)

7.1.28) Create a specific guideline document to support the rapid creation of workflow rules/procedure (workflow instances).

7.1.29) Support inter-factory and intra-factory activities; this is support for single-factory or multi-factory production of content and its P2P, B2C and B2B distribution

7.1.30) Suport both Openflow and MS BIZTalk and these at the same time for inter-factory activities.

7.1.31) Provide tools with high usability such that they are simply usable from by experts

7.1.32) Provide support for programming procedures

7.1.33) Provide support for monitoring and controlling the progress/status of workflow processes. This involves status monitoring over assigned process activities so as to be capable of managing more than one workflow process instance so as to provide workflow support for multi-agency co-design & co-production of multimedia content Through the above integration channels with AXMEDIS tools, engines and Query Support, based on the web services technology, the WfMS

user interface has the possibility of making queries on the status of AXMEDIS Objects as required to be processed during the course of content production and distribution.

7.1.34) Interact with the AXMEDIS Object Manager to access objects and track/update their status (i.e. allow workflow metadata visualisation, editing, automated updating and storage) (MANDATORY).)

7.1.35) All actions performed by the actor/user are logged by the WfMMFS in the AXMEDIS Object repository, together with as well as the new their revisions and status updates changes. All events will be logged so that tracking the actions performed on a specific object by a user as well as the objects status change and revision histories will be known. This provides for tracking of the local and global evolutionary states of each object in a way that is universally consistent, protected, inter-operable and efficient but above all has semantic integrity and continuity with seamless control of the object states and operations across all possible categories of lifecycles and project spaces end-to-end.

7.1.36) Not impose limitations on DRM

7.1.37) Provide support of collecting and organising procedures of workflow and to recovering them from the database, a suitable description of these procedures should be provided.

7.1.38) Provide time & status metadata updates that remain accessible to other Enterprise Project Management Applications, such as SAP for example (OPTIONAL)

7.2 Requirements for The Workflow programming Environment

The workflow programming environment must:

7.2.1) Allow the users to define in a simple manner the procedures for regulating the production process

7.2.2) Enable the users to interactively produce and set-up their workflow processes instances by invoking standard workflow functions in prototypical steps

7.2.3) Enable the users to produce workflow process instances by means of some graphical interface for programming.

7.3 Requirements for The Workflow activation and monitoring Environment

The workflow monitoring environment must:

7.3.1) Allow the users to be able to examine and easily understanding the status of the procedures within a given workflow. On the Client side, the WfMS User Interface will be the home interface for all users and actors involved in the product development and distribution processes. Through the WMFS User Interface the actors should be able to logs-in and see all the work items in which they are involved or committed and, by accessing one of these work items, be able to perform the actions required; e.g. launching the required tools etc.

7.3.2) Through the WfMS User Interface it should be possible to edit/create/delete AXMEDIS Objects or Components (in the user's work list, this creating/deleting sub-processes), by locking the AXMEDIS Object and downloading it to an exclusive Client work area, where it will be processed by the proper tools (authoring/formatting/rendering/composing/ packaging/bundling). Once the user/actor has terminated the activity by saving and closing the modified Object/component, he will copy it back to the exclusive access work area and issue a "terminate" activity task in the WfMS User Interface. This will bring back the Object/Component in the Object repository, having performed logging of the performed activity in the Object tracking data, re changed status and revision

8 AXMEDIS Object Acquisition from CMS

8.1 Crawler Collector Indexer

The Crawler Collector Indexer has to:

8.1.1) crawl into the CMSs and the databases of the content providers, integrators, and distributors to access content and indexing it. All the crawled content has to be stored in the Crawled Results Integrated Database to be used by the Collector Engine for automatic production/update of AXMEDIS objects inside the AXMEDIS Database.

8.1.2) use plug-in technology to access the CMS/database for extensibility.

8.1.3) collect and index different media sources.

8.1.4) collect all the information related to all pieces of content present in the CMS like metadata, technical details, DRM aspects, licensing aspects, possible products that use the content, multilingual information, etc.

8.1.5) notify to the Collector Engine when a new or updated AXMEDIS object is put in the Integrated Database.

8.1.6) store new objects in the Integrated Database by means of abstract XML documents (with no semantic meaning)

8.1.7) crawl the following databases:

- MySQL
- Oracle
- MS-SQL
- IBM-DB2
- PostgresSQL
- Tamino
- Extraway
- Learn eXact © Lobster © (via esposed webservice)

8.2 Plug-ins of Crawler Collector Indexer

Plug-ins of Crawler Collector Indexer has to:

8.2.1) access the specific CMSs database information. For each piece of content it produces an abstract XML document to be indexed (i.e. a set of feature/value pairs).

8.2.2) preserve links among content (i.e. if two pieces of content are related in the CMS the associated abstract documents have to be related as well).

8.2.3) Special consideration has to be given to the information needed for administrative activities (i.e. accounting).

8.3 Automatic gathering of Content, Collector Engine

Collector/Transcoder Engine will migrate the content from the Crawled Results Integrated Database (created by the Crawler Collector Indexer) to the AXMEDIS format and database. These tools will be capable of processing data automatically updating the content into the AXMEDIS database when these are updated into the CMSs.

The Collector Engine has to:

8.3.1) be notified when a new or updated object is introduced in the Crawler Results Integrated Database

8.3.2) decide on the basis of user defined rules if an abstract XML document from the Crawled Results Integrated Database has to be imported or not into the AXMEDIS Database.

8.3.3) build an AXMEDIS object from the abstract XML document produced by the Crawler plug-in. The building process should be controlled by the end-user who specify rules in order to produce the AXMEDIS object.

8.3.4) use plug-ins for estimation of fingerprints on content to complete the indexing.

8.3.5) provide support for queries in the Crawler Result Integrated Database received from the Query Support

8.3.6) The query results should not report objects already available in the AXMEDIS Database

8.4 Fingerprint Extractor as a collection of Collector Engine Plug-ins for extracting features

These plug-ins for the CMS involve research to extract meta data (content descriptors) directly from the content. Two different types of metadata can be distinguished:

- content descriptors, which provide information about content characteristics, and
- fingerprints, which identify or verify content.

The plug-ins produce content descriptors (including fingerprints) on objects newly added to the AXMEDIS database. Thus two classes of requirements can be identified:

- First, feature extraction and processing depend on the applications. Generally, different applications can be identified: Content Based Retrieval (CBR) using different types of content descriptors, Fingerprinting (FP) for identification of content, or FP for verification of content. e.g. these requirements include requirements from the algorithms about the input.
- Second, results of the feature extraction and processing also depend on the application: the resulting descriptors and their characteristics e.g. calculated content descriptors are not mandatory understandable for humans. More subtle content descriptor characteristics also influence their usage. For example, the size of the fingerprint (number of bits) affects the number of AXMEDIS digital resource that can be identified.

Within this document we address the specific requirements on fingerprinting algorithms within section 9.12. Here, the requirements on the content descriptors and related algorithms are described. Content descriptors support users in searching and identifying content.

Main requirements:

8.4.1) A unified interface, which allows the integration of different technologies, has to be defined.

8.4.2) Different types of content that have to be processed: images, videos, audio, and documents.

8.4.3) Specification of the applications of CBR and FP within AXMEDIS and the derived specifications of requirement on the feature extraction and processing as well as on the content descriptors.

8.4.4) Algorithm design has to consider the complexity of the content description calculation. This influences the performance of the content migration. (Scalability only relevant for retrieval. Thus it is not considered during the extraction). (DESIRED)

8.4.5) The descriptors have to be designed considering:

- Content Descriptor (e.g. size, or granularity of the input data for calculation of the content descriptors)
- Influence of processing operations (with a focus on typical processing operations like DIA rather than attacks) (DESIRED)

8.4.6) The encoding of a large number of fingerprints and their report for different point along the temporal evolution of the digital resource. For example, estimation of the rhythm every 30 seconds, estimation of some content descriptors for the Genre detection or coding every 2 minutes, estimation of the average number of character per word every page, etc. (DESIRED)

8.4.7) MPEG-7 encoded Metadata may be supported (OPTIONAL)

8.4.8) Content Descriptors has to include technical details such as:

Text: number of chars, number of words
Video: time duration, resolution, coding format, dominant colour (in the time)
Audio: rhythm, tonality, time duration, coding format, sample rate, number of channels
Multimedia: size, number of components
Animation: size, frame rate
Images: size, format, bit depth
General: size in terms of bytes

8.4.9) Requirements for feature extraction and music description of audio files

- Characterization of the rhythm, melody/harmony and timbre for retrieval by similarity.
- Automating labelling of audio segments in terms of music genre, type of sound source (male/female voice, musical instrument, noise), mood (energic, angry, soft, depressive…).

- Generation of short audio excerpts summarizing the main themes of a more complex music song or instrumental composition based on automatic structure analysis of the audio content. (based on rhythmic and/or harmonic patterns).
- Automatic detection of music genre and type of sound source (male/female voice or musical instrument, which instrument or musical ensemble, etc.).
- Recognition of one or two main "voices" in noisy environment (i.e. the other voices or instruments).
- Estimation of the main tonality, rhythm of music.

Requirements for feature extraction and description of textual file:

8.4.10) the feature extraction must be able to:

- identify the File type among the accepted ones (editable text, printable version, marked-up text, Adobe PDF, Microsoft Office Documents, Postscript, etc...)
- retrieve Text infos:
  - Standard encoding used in the text format, if any
  - Language(s) of the doc
  - Text length in periods
  - Text length in paragraph
  - Text length in lines (if applicable)
  - Text length in pages (if applicable)
- produce a Text summarization (OPTIONAL)
- extract Keywords
- determine the Text topic (OPTIONAL)
- determine the Text type (comics, poetry, tale, novel, script, diary, essay, article, subtitling, etc.) (OPTIONAL)
- determine the Text genre (OPTIONAL)

9 AXMEDIS Database

9.1 Managing a Database of AXMEDIS Objects

The database has to store AXMEDIS objects; AXMEDIS objects could be structured collections of components as well as single components to be integrated inside other AXMEDIS objects.

AXMEDIS Database has to:

9.1.1) be scalable in order to fit the needs of the small end user and of the big corporate end user;
9.1.2) be adaptable to free and commercial database and should be implemented in PostgresSQL (Free under BSD licence) or the commercial databases such as Oracle, DB2 and so on;
9.1.3) be a relational database instead of an object oriented or XML database (suggestion);
9.1.4) be independent from changes to the AXMEDIS Model structure schema .
9.1.5) manage AXMEDIS objects both in binary and xml formats.
9.1.6) store protected and unprotected AXMEDIS objects.
9.1.7) provide access to the structure of stored AXMEDIS objects, giving the ability to locate, extract and search: components, items & collections etc. inside the objects (when not encrypted).
9.1.8) support versioning of AXMEDIS objects.
9.1.9) store administrative information like the transactions performed on the clients as well as the accounting information like licences, contracts etc.
9.1.10) store the licences sold to the customers.
9.1.11) Information contained in the licence database will be accessible for browsing & query.
9.1.12) support queries on administrative information like: all transactions performed in a period, all transaction of a customer, etc. for reporting purposes.
9.1.13) support the following operations:
- add/update (new version) an AXMEDIS object given in binary or xml format;
- completely remove an AXMEDIS object giving the id;
- remove the last version of an AXMEDIS object giving the id.
- search for objects or components (see queries);
- extract a whole object or only a part of it (in binary or text format) for the last version or for a specific version.
- mark a version as unavailable storing the reason for which it is unavaible
- remove one of the version of an AXMEDIS object gived the id and the version

9.1.14) Guarantee consistency of AXMEDIS object ID.
9.1.15) support user management, to set what the user can do in the DB (possibly using capabilities of OS or optionally developing a provisioning system)
9.1.16) support groups of users
9.1.17) support user grants to:
- read objects produced by the user or other users of a specific group
- read any object
- add objects
- remove objects produced by the user or other users of a specific group
- remove any object
- manage users profiles…

9.1.18) users of the DB should be kept synchronized with the users of the AXMEDIS Workflow Manager
9.1.19) monitor access to the DB from users and keep a log of operations performed on the DB.
9.1.20) be used for IN/OUT AXEPTool DBs (OPTIONAL)
9.1.21) when a new version of an AXMEDIS Object is uploaded an event should be sent to AXEPTool
9.1.22) able to lock AXMEDIS objects. When an AXObj is read from the DB it could be possible to lock the object until it is uploaded (from the same user). When a locked file is read from another user a message has to say that it is read only and giving the name of the user locking the file.
9.1.23) allow Administration Tool to remove a lock.

AXMEDIS Licence and PAR DB has to

9.1.24) store the licences sold to the customers.

9.1.25) Information contained in the licence database will be accessible for browsing & query.
9.1.26) Store accounting information like licences, contracts etc.

WORKFLOW database has to
9.1.27) monitor access to the DB from users and keep a log of operations performed on the DB

Technical requirements:
9.1.28) Parts of AXMEDIS objects, like resources, may be stored on the file system.
9.1.29) The database has to provide efficient ways of searching inside the stored objects.
9.1.30) To avoid duplications as much as possible, inside the database AXMEDIS components/resources with the same id may be stored once (i.e. the same video used in many objects).
9.1.31) The AXMEDIS Database has to index all the metadata associated to AXMEDIS objects/components for fast retrieval
9.1.32) Support different indexing (full text, cross indexing,..) for mandatory and complementary metadata fields.
9.1.33) AXMEDIS Database could manage more efficiently metadata stored in the AXInfo part of the Object/Component (AXInfo structure will be fixed) and less efficiently non-standard metadata.
9.1.34) AXMEDIS Database metadata management should be configurable, in the sense that metadata for fast retrieval has to be configured.
9.1.35) AXMEDIS Database should run on MSWindows and Unix-like Platforms

AXMEDIS Database Administration Tools has to allow to:
9.1.36) search in the DB (using Query Support)
9.1.37) browse the DB by Author, Genre, Publisher, …
9.1.38) open last version or a specific version of an object using the AXMEDIS Editor
9.1.39) remove the last version of an object
9.1.40) remove completely an object
9.1.41) add/remove/modify users that can access to the DB
9.1.42) modify the grants of the user

9.2 Making queries inside Databases of AXMEDIS objects and inside the objects

9.2.1) AXMEDIS Tools shall reach objects into AXMEDIS Database by three different ways:
- By querying/searching using information filled in the form by the user;
- By browsing AXMEDIS Database categories, viz., showing AXMEDIS objects (stored into the database) grouped by significant metadata, such as browse all MS Word® ClipArts; MP3s and so on;
- By identifying, i.e., AXMEDIS Editor should obtain an AXMEDIS object from the database by some kind of unique identification (such as urn, path, unique database id, etc…);

9.2.2) AXMEDIS Tools (with user interface) shall show a technical query interface so that user shall be able to search content all over AXMEDIS network, AXMEDIS Database and within an object. Such interface should be as friendly as possible and it should show all possible technical and legal/DRM-related features which will be exploited within AXMEDIS . Moreover, the interface shall permit to save the query into the user profile. In such a way, users could reuse complex queries without time-loss to re-insert previously inserted query;

AXMEDIS Query Support has to
9.2.3) serve several AXMEDIS tools such as:
- AXMEDIS Editor/Authoring tools;
- AXMEDIS Internal editors/viewer;
- AXMEDIS Workflow Manager;
- AXMEDIS Rule/Selection Editors (such as P&P, publication tools, loading tools, …)
- AXMEDIS Engines (such as Composition, Formatting, Publication Engines, …);
- AXMEDIS Other tools and plug-ins for AXMEDIS interaction with Selection of objects.

9.2.4) be suitable for making technical query support, including aspects of DRM and aspects related to statistics on Action-Log. For example, you can select all Ramazzotti songs that have been played more than 1000 times in Europe;

9.2.5) provide support for the different activities that a user needs to work with; the most important activities are summarized in the following:

- provide support for making queries, mainly technical queries (activity mainly developed at the user interface level);
- store queries and their recovering for future reuse, that is an user interface with memory of the previous requests and a back end with caching capability;
- manage a personal repository of queries (realized at the user interface level);
- provide an user interface capable of adapting to the evolution of the AXMEDIS data format with a backend capable of translating "old queries" in the current format;
- user interface has to visualize results with some preview representation: this preview should be considered as a streaming activity from the point of view of right clearance
- user interface must be capable of presenting results sorted by different parameters such as: by license type and costs, by name, by match score or relevance when the information is present, by author, by location/provider, by size, by duration and in general it should be possible to order by the different fields present in the query;
- user interface shall have the capability of directly preview the multimedia contents for all the media for which a plug-in is provided or shall ask to the user to select the most appropriate viewer for the content under inspection;

9.2.6) be capable of making query both at level of simple AXMEDIS object and at the level of complex AXMEDIS objects. When complex objects are considered, query support must propagate the query to the components of a complex AXMEDIS object. In a more general sense query support must be capable of querying different sources of information and must be also open to other sources that the project must support if they appear:

- **AXMEDIS Database**: query support must be capable of querying the simple objects directly stored in the AXMEDIS database;
- Components of AXMEDIS objects: query support must be capable of recursively applies the query at the level of the objects embedded inside a complex or composite AXMEDIS object;
- **AXEPTool** distributed query in the P2P environment and database, interfacing the internal query with that of the P2P environment and reporting results: the user interface of the query object must be capable of distributing the query to the distributed P2P B2B database and to collect the results;
- **Collector Engine**, query from AXMEDIS environment passing in deep into the **Crawler Results Integrated Database**: the user interface of the query object must be capable of distributing the query to the Collector Engine and to collect the results; the results of the query will be not available outside the AXMEDIS Factory that hosts the Collector Engine;

9.2.7) be capable of receiving queries from Distribution channels, that are queries of the end users passing from the distribution channel and reaching the general AXMEDIS Database: the backend of the query support must be simply interrogated by other application according to a standard predefined protocol;

9.2.8) be capable of managing Selections;

9.2.9) support the following operators to build a query: and, or, not, like, contains...Query Support has to allow querying on predefined fields (title, author, PAR,...) as well as full text search inside metadata fields.

9.2.10) provide an user Interface to allow the user to customize the order of fields in the list of possible fields for query.

9.2.11) Provide support to the user to ask for a notification when new objects satisfy one of his/her query in order to identify if some new elements responding to the criteria appears in the repositories of AXMEDIS objects by means of Active Selections.

9.2.12) provide a User Interface to locate and display information on DRM results for eligibility of usage. This is required by other tools such as the AXMEDIS P&P Editor

9.2.13) provide an user Interface to check with AXCS so that black-listed results are not included

9.2.14) Notify results on the basis by a multi-channel distribution mechanism capable of managing email, SMS, and other media. The notification is performed with a predefined frequency on a predefined period of time (OPTIONAL);

9.2.15) Provide support for the following fields in the query and has to be as complex as the metadata model used to describe AXMEDIS Objects. Thus depending on metadata, the GUI can change the fields presented to the user. Technical queries have to include:

i. details related to the description of components.
ii. costs and DRM rules, for each action a price, play, excerpts, redistribution, resizing, distribution on a different area, validity of the DRM rule and copyright coverage, etc.
iii. available languages if there is speaker speech or text.
iv. range of age suggested.
v. business model suggested.
vi. time of delivering delivery and availability in terms of first delivering, if not ready.
vii. type of delivery: on-line, offline, etc….
viii. if on-line time of downloads or acquisition.
ix. cultural level.
x. subject, description of content with simple metadata.
xi. Textual description of subject and evolution.

9.3 Query support for clients

Actors (end users using an AXMEDIS compliant Client Viewer) can query one ore more AXMEDIS object. For this the Query Support is used, which is integrated in the Client Viewer.
The steps identified are:

1. Creating the query (different search characteristics)
2. Displaying the received results (including preview if possible)

The requirements for the query support for clients are:

9.3.1) The identification of relevant queries (with different) search parameters for the relevant content types to support flexible query interfaces with the users.

9.3.2) The identification of suitable user interface for presenting, navigating in, and selection of the query results with a focus on usability. (DESIRED)

9.3.3) Definition of the interface with the Query Support for Clients including the communication protocol and the standard definition language for the service interface.

9.3.4) The identification of suitable interface for creation of the queries with a focus on usability. (DESIRED)

9.3.5) The definition of a common interface with the Query Support to support different queries.

9.4 Selections

Selections are collections of symbolic queries and AXMEDIS Objects IDs. Selections are then a set comprised of symbolic queries not expanded or actualized such as S1= {Q1, Q2} or a selection of AXMEDIS Object IDs with some symbolic queries such as S2={Q3, AXOB1, AXOB444, AXOB3412}. Selection can be expanded or actualized so that S1 at time t1 can be S1@t1= {AXO1-1, AXO1-2, AXO1-3, AXO2-1, AXO2-2, AXO2-3, AXO2-4, AXO2-5, AXO2-6, AXO2-7, AXO2-8, AXO2-9}, while the same query at time t2 can be S1@t2= { AXO1-3, AXO2-1, AXO2-2, AXO2-3, AXO2-4, AXO2-5, AXO2-6, AXO2-8, AXO2-9, AXO3-1, AXO3-2}
Active Selections are selections that are stored in the user profile and marked as active. These selection can be expanded or actualized automatically by the system when an object is inserted in the system, removed from the system or modified in a way in which it is no more respondent to the selection.

9.4.1) AXMEDIS Query support will be capable of managing Selections by the UserSelection webservice that will use Query Support to manage the queries inside the selection

AXMEDIS AXEPTools for P2P distribution on B2B

9.5 AXEPTool for P2P on B2B

The AXEPTool is the application that allows business users to share a common environment in which AXMEDIS Objects can be published and loaded without the need of a centralized infrastructure which would be costly to maintain and a potential bottleneck in the whole production chain.

The AXEPTool for P2P on B2B must meet requirements divided into the following categories: **general requirements, discovery and connection to the AXMEDIS community, query to search AXMEDIS objects, loading remote AXMEDIS objects, publishing local AXMEDIS objects.**

9.5.1 General Requirements

9.5.1) AXMEDIS Objects should be published and loaded without the need of a centralized infrastructure which would be costly to maintain and a potential bottleneck in the whole production chain. Some functionalities of the network could be centralized wherever the centralisation allows better performance, security, and dramatic traffic reduction.

9.5.2) The messages exchanged between hosts in the P2P network should be transported in a way that the presence of firewalls and NATs do not compromise the network itself. Thus, HTTP tunnelling and other appropriated solutions will be designed and deployed whenever necessary.

9.5.3) The P2P network should be able to scale to a number of participants as large as 10^4 – 10^5

9.5.4) When a new object is published or an old object is updated into the AXEPTool Out database all the AXMEDIS peers that are interested have to be informed.

9.5.5) When an AXEPTools realize that a new version of an object or that a new object satisfy a P2P Active Selection it has to be downloaded and pushed into the Input Database.

9.5.6) The AXEPTool must allow other tools in the factory (i.e. the Main Query Support) to send queries to the P2P network.

9.5.7) The AXEPTool should run in the background installed in a server.

9.5.8) Only one instance of the AXEPTool should run in a factory.

9.5.9) A query produced by the user should be processed by participants in the P2P network. The AXEPTool will receive all query-hits relevant to a query. A query-hit is a datum containing all the information related to a remote AXMEDIS Object (a remote AXMEDIS Object is an AXMEDIS Object stored in another organization and shared in the P2P AXMEDIS Community). Among the others, the query-hit should provide :

i. size of the content
ii. version where applicable
iii. identification of the owner
iv. identification of the source (in cases of download from multiple sources it is likely to have only one owner but more sources from which one can load the content). The identification of a source is mainly a way to establish a connection to the remote AXMEDIS Object and can be in form of URI (protocol://sourceaddress/resource)
v. verification of certified metadata, presently assigned to the AXEPTool Monitor as a duty

9.5.10) A query produced by the user can either provide immediate results or no results at all. In any case, the user should be keep informed about one or more of the followings events:

i. When a content already downloaded is modified and a new version is released
ii. When a content relevant to a previous search is published by someone in the P2P network
iii. When a content that potentially may be of interest for the user is published

9.5.11) Related to previous "user requirement" a query can be saved into a "**Active Query Pool**". An Active Query is periodically resent by the AXEPTool with a given period.

9.5.2 Discovery and Connection to the AXMEDIS Community

9.5.12) When the user launches the AXEPTool , it starts a discovery protocol to find on the network one or more participants in the AXMEDIS P2P network. Once the discovery protocol provide results the AXEPTool tries to establish one or more connections. When the connections are established the AXEPTool is ready to exchange messages with the other participants in the community.

9.5.13) The discovery/connection mechanism should be completely automated and assisted by the user only in case of unrecoverable failure.
9.5.14) Identities of local and remote host must be verified by means of digital signatures. That implies the involvement of a external certification/supervisor authority. Hosts without a certified identity ARE NOT allowed to join the AXMEDIS community.

9.5.3 Security Requirements

9.5.15) Identities of local and remote host must be verified by means of digital signatures. That implies the involvement of a external certification/supervisor authority. Hosts without a certified identity ARE NOT allowed to join the AXMEDIS community.
9.5.16) Sharing an object in the P2P network is an operation that must be authorized.

9.5.4 Query User Interface Requirements

This section updates and overridden the old "Query to search AXMEDIS Objects"
The Query User Interface is referred from now on as QUI.

AXEPTool GUI has to:

9.5.17) use to produce technical and final user queries.
9.5.18) allow to create query compliant with the Query XML schema defined in AXMEDIS specifications.
9.5.19) allow to query on DB, CMS and P2P and in any combination of these sources.
9.5.20) be easily deployable in several machines/applications and must connect to the QS Web service
9.5.21) be able to save and load queries from a DB
9.5.22) allow to insert a query in an existing or empty selection
9.5.23) allow the creation of technical queries having to include:

- Complex metadata based on Dublin Core and other relevant metadata defined in AXMEDIS
- costs and DRM rules, for each action a price, play, excerpts, redistribution, resizing, distribution on a different area, validity of the DRM rule and copyright coverage, etc.
- available languages if there is speaker speech or text.
- range of age suggested.
- availability in terms of first delivering, if not ready.
- type of delivery: on-line, offline, etc
- if on-line time of downloads or acquisition.
- cultural level.
- subject, description of content with simple metadata.
- Textual description of subject and evolution.

9.5.24) Support the presentation of results to the user with the following details:

- size of the content
- version where applicable
- Id of the object (AXOID)
- identification of the remote peer (in case of P2P)
- any other relevant metadata that was requested with the query.
- Link or button to start the download of an object

9.5.5 DownLoading remote AXMEDIS Objects from the P2P Network

9.5.25) Once a query is processed by the AXMEDIS P2P network, the user receives a list of query-hits. The user should be able to select one or more objects from the list and start the download.
9.5.26) For any complete downloading session, the AXEPTool must implement a mechanism that identifies if new release of the same object becomes available. If a new release is available, the AXEPTool launches the download session for the new version.
9.5.27) The user should be able to start, suspend, cancel and resume the download of an object. Download are thus organized in sessions.
9.5.28) An object should be downloaded simultaneously from more than one source if multiple sources are sharing the object.

9.5.29) For any complete downloading session, an Active Query MAY be created and saved in order to be notified when a new release of the same object becomes available. If a new release is available, the download session for that object is resumed from the beginning and a new copy of the object is downloaded from the P2P sources.

9.5.30) Objects are loaded from the P2P network in the **AXEPTool In AXMEDIS Database** and they can be moved to the **AXMEDIS Database** manually by the user or automatically by the **Loading Tool Engine of AXEPTool.**

9.5.31) An object moved into the **AXMEDIS Database** becomes part of the business operations and digital rights of the object owner must be enforced.

9.5.32) The user should be able to configure the amount of bandwidth allocated to downloads.

9.5.6 Publishing Local AXMEDIS Objects

9.5.33) The user can select one or more objects and publish them in the P2P network. Selected objects are indexed to the **AXEPTool Out Database** and from that moment on they are available to other participants in the P2P network.

9.5.34) When the local AXEPTool receives a query from the AXMEDIS P2P network, it verifies whether or not objects stored in **AXEPTool Out AXMEDIS Database** match the query. In case of successful matching, the AXEPTool sends to the network a message containing one or more query hits. The implementation of such a functionality should rely on the **AXMEDIS Query Support Component of the AXEPTool Out AXMEDIS Database.**

9.5.35) The user can make a selection of objects stored in the AXMEDIS Database to be published in the P2P network. Selected objects are moved to the **AXEPTool Out Database** and from that moment on they are available to other participants in the P2P network.

9.5.36) When the local AXEPTool receives a query from the AXMEDIS P2P network, it verifies whether or not objects stored in **AXEPTool Out AXMEDIS Database** match the query. In case of successful matching, the AXEPTool sends to the network a message containing one or more query hits. The implementation of such a functionality should rely on the **AXMEDIS Query Support Component.**

9.5.37) The local AXEPTool can be asked from another participant in the P2P network to upload an AXMEDIS object or a block of an AXMEDIS object stored in the **AXEPTool Out AXMEDIS Database**.

9.5.38) The user should be able to configure the amount of bandwidth allocated to uploads.

9.5.7 Automatic Loading

We call ‘loading’ the operation of inserting and indexing an object in the local AXMEDIS database for future use in the production process. So the lifecycle of an object is summarized as follows:

- Created by a factory A
- Shared in the network
- Downloaded by one or more other factories
- Loaded by one or more factories
- Used according to rights

9.5.39) Loading must be an automated operation: objects matching a given set of queries must be loaded into the AXMEDIS DB.

9.5.40) Loading must be performed according to schedulable task. The structure of the job description should allow the user to define a selection to be actualized, the start time, the period T and the expire time. During the execution of the loading task, the objects matching the selection are loaded into the AXMEDIS database (unless they are already there). The selection must be actualized against the objects already downloaded from the network (AXDBIN).

9.5.41) The Loading Module takes care of objects becoming from different factories/peers that may not have the same set of metadata. For this reason it may be necessary a process of “mapping” from one set (the set of remote peer) to the local set of metadata before an object is loaded in the AXMEDIS database.

9.5.8 Automatic Publication

9.5.42) Object publication via P2P must be an automated operation: objects matching a given set of queries must be shared into the AXDB OUT.

9.5.43) Publication must be performed according to schedulable task. The structure of the job description should allow the user to define an active selection to be actualized, the start time, the period T and the expiration time. During the execution of the publication task, the objects matching the selection are loaded into the AXDB OUT database (unless they are already there). The selection must be actualized against the objects stored in the AXDB. Example of publication task is: : *publish **now** in the P2P network **all movies whose director is Foo**. Repeat the operation **weekly** and until the **31/12/2007***. The query is solved in the local AXMEDIS database.

9.5.44) If an object is versioned in the AXDB and the object belongs to an active selection then the last version of the object must be published.

9.5.45) Each time a object is published or a new version is published, other interested peers must be informed about the news.

9.5.46) Objects coming from the AXDB that are not protected must be protected before the publication.

9.5.47) It should be possible to unpublish one or more objects. Objects belonging to an expired publication task must be unpublished.

9.5.9 Automatic Downloading

We call 'downloading' the operation of receiving an object from a remote peer. A successful download must terminate when the received AXMEDIS object is stored in the local AXDBIN database.

9.5.48) Downloading must be an automated operation: objects matching a given set of queries or active selections must be downloaded in background without user intervention.

9.5.49) Downloading must be performed according to schedulable tasks/jobs. The structure of the job description should allow the user to define a selection to be actualized, the start time, the period T and the expire time. During the execution of the loading task, the objects matching the selection are downloaded unless they are already enqueued or already downloaded. The active selection must be actualized against the P2P network.

9.5.50) When an AXEPTools realizes that a new version of an object or that a new object satisfy a P2P Active Selection it has to start a new download session for the new version of the object.

9.6 AXEMEDIA Tool for P2P on B2C

The AXMEDIA Tool is the P2P application used in B2C via P2P. More requirements about Client/Server Distrubution via PC are available in "**AXMEDIS for Distribution via Internet**"

Features needed in the P2P tool for B2C are, mainly:

9.6.1) Must accept both AXMEDIS objects or any files: not only AXMEDIS objects can be "shared" and queried but files of any type or content;

9.6.2) Must provide evidence of the AXMEDIS files that are protected, certified by providers: the GUI must specially mark protected files thus also certified files;

9.6.3) Must monitor traffic of AXMEDIS object others files: AXEPTool must provide a real-time monitor for downloads and network traffic in order to give to the consumer the status of all operations under run. A GUI should present the monitored traffic as more as possible in an intuitively view.

9.6.4) Must provide a simple query support that allows simple search queries composition through a simplified GUI.

9.6.5) Must provide user registration.

10 Programme and Publication Engine Tools

The actor (in this case a Programme Producer/manager) can use the GUI of the P&P to interact with the Query Support, and to make selections from the results of the AXMEDIS Query Support to schedule some programmes (e.g. day, week, month, year) with the following rules:

- WHAT: the AXMEDIS object of interest
- WHERE: destination channel, where to publish e.g. iTV or kiosk or other, and "where" profile
- WHEN: date, time, slot, duration
- HOW: direct transfer, reference or require formatting engine

The representation of the above rules could be represented using XML.

The draft programme can be saved and reloaded from a P&P repository. Programme can be activated, once it is ready, by the actor using the GUI.

The active engine is continuous running module accessing the system clock to process a list of "activated" programmes, which consists of "rules" to make available AXMEDIS objects to the specified destination channels at the correct time, taking into account the transfer time.

In short, there are three modes of operation in this area:

- Create/change: the actor uses a GUI to create some programmes using the AXMEDIS Query Support to browse the AXMEDIS database, to select, to schedule, and to return with a list of relevant objects
- Activate: the actor activates a set of programmes from the above created and saved programmes
- Execute: The active engine looks at the given tasks and distribute the programme and relevant objects using the Distribution Server.

"On Demand" formatting process is to be performed by the Active P&P Engine before the actual AXMEDIS object is to be delivered to the distribution server. A check has to be carried out to verify if the object in question is "compatible" with the destination profile. If the profile of the AXMEDIS object is incompatible with the destination profile, the P&P Engine interfaces with the Formatting Engine to provide the appropriate processing on the object. For example, the AXMEDIS object in the database could be for HDTV and the actor has requested it to be used on a PDA. The Programme and Publication Engine provides the Formatting engine information on WHAT (reference to the AXMEDIS object) and the destination profile.

The Formatting engine is expected to

- Take a copy of the AXMEDIS object
- Process/convert the object so that it is compatible to the destination profile
- Create a new AXMEDIS object and return its ID to the P&P Engine

The AXMEDIS P&P Editor needs to provide

10.1.1.1) A GUI interface
10.1.1.2) to work in respect of the AXMEDIS Data Model Schema;
10.1.1.3) connection with Query Support to use the services provided in order to send query and to receive results
10.1.1.4) A definition of the P&P Programme (in XML to contain a list of selected AXMEDIS objects, etc)
10.1.1.5) A P&P Repository (such as a local director) to save and retrieve P&P programmes (including drafts).
10.1.1.6) The P&P programmes Repository may hold past P&P programmes that can be reused with or without modification for future usage
10.1.1.7) Interface with AXMEDIS Workflow Manager by using the appropriate workflow Plug In

P&P Editor GUI interface needs to allows

10.1.1.8) the Actor to select AXMEDIS objects using the AXMEDIS Query Support
10.1.1.9) the Actor to create, save, delete and manipulating programs with the following parameters:
    - WHAT: the AXMEDIS object of interest

- WHERE: destination channel, where to publish e.g. iTV or kiosk or other, and "where" profile
- WHEN: date, time slot, duration
- HOW: direct transfer, reference or require formatting engine

10.1.1.10) the Actor to "activate" one or more AXMEDIS P&P Programms

10.1.1.11) the Actor to perform a trail pre-activation of a program, to simulate, test and be prepared

- Quick trial of programme for the actor to test the P&P programme without processing in the P&P Engine
- Full trial of programme for the actor to test the P&P programme with processing in the P&P Engine but without distribution

10.1.1.12) the Actor can remove an active P&P programme if the active programme has not been delivered to the distribution server yet.

The AXMEDIS P&P Engine requires

10.1.1.13) Access to a correct system clock

10.1.1.14) interface with the AXMEDIS P&P Editor to receive active/trial AXMEDIS P&P Programmes

10.1.1.15) interface with AXDB to obtain the required AXMEDIS object, as specified in the P&P Programme

10.1.1.16) Connection to the Distribution Area to distribute the programme and all related objects in time for the programme consumption

10.1.1.17) Channel and distributor profile: Access to the profile of the Distribution Area (for the estimation of delivery time)

10.1.1.18) Update content daily or weekly according to the schedule and to update content incrementally to reduce the effort and workload (Not sure if this is relevant for this section but it should be more relevant for Publication of the AXEPTool) [OPTIONAL]

10.1.1.19) connection to the AXCP. AXCP is expected to

- Take a copy of the AXMEDIS object;
- Process/convert the object so that it is compatible to the destination profile
- Return the new ID reference of the formatted object

10.1.1.20) Interface with AXMEDIS Workflow Manager by using the appropriate workflow Plug In

10.1.1.21) connection to the P&P Engine Monitor;

10.1.1.22) to keep track of pending P&P Programmes which may be removed by the P&P Editor or the P&P Monitor;

10.1.1.23) to be able to recover from any unforeseen shut down, to restart with pending P&P Programmes; [

The AXMEDIS P&P Engine Monitor provides

10.1.1.24) Actor a GUI and graphical view to the P&P Engine. This allows the Actor to view all active and pending P&P programmes within the P&P Engine;

10.1.1.25) Manual removal of an active P&P Programme

10.2 P&P Engine tools for enabling content on demand

10.2.1.1) The AXMEDIS P&P Engine supports On-Demand requests from On-Demand Client tool which send P&P Programme in the AXMEDIS P&P Programme model;

10.2.1.2) The AXMEDIS P&P Engine process the On-Demand P&P Programme immediately;

11 AXMEDIS Protection Tools

11.1 AXMEDIS Object ID Generator and Object Registration (AXMEDIS Object Registrator)

AXMEDIS Object ID Generator and Object Registration has to:

11.1.1) produce AXMEDIS Object ID with the following features:
- every Object ID is associated to one and only one AXMEDIS Object (unique ID in the whole system)
- every AXMEDIS Object is referred by one and only one AXMEDIS Object ID
- an ID is associated to a specific Object during its whole life-cycle and this association remains active even if the Object is updated or removed

11.1.2) allow the generation of Object ID on the basis of a request performed by a Content Creator
11.1.3) be able to produce new IDs on-demand within an acceptable period of time
11.1.4) be able to register metadata related to an object
11.1.5) because the service has to be refined be able to manage (modify) metadata related to an object

11.2 User registration portal and service

User registration portal is a module providing functionalities for new user registrations. It is needed to support distributors who do not want to directly provide user registration, in order to acquire the minimum number of interfaces to AXCS and therefore minimizing the impact of AXMEDIS on their structure. In this way it is possible for a user to get registered in AXMEDIS without being forced to choose a referencing distributor.

The portal has to

11.2.1) store users personal data in order to be able to match an AXUID (user unique ID assigned by an AXCS) with a real identity
11.2.2) be a module separated from any AXCS, since it has to store personal user data such as name, birth date, nationality, city, address, telephone number, email address, interests, etc. Therefore, in respect of the privacy laws in force in almost all the European Countries, it cannot be tied to any AXCS
11.2.3) be able to communicate with one or more AXCSs in order to register new users in the AXMEDIS system
11.2.4) prevent automatically generated registration requests from being accepted; some kind of confirmation mechanism is needed in order to ensure that requests are performed by physical people and not automatic tools
11.2.5) prevent a single requester from issuing an unlimited number of registration requests, in order to ensure a single person has a single number of accounts (preferably only one)
11.2.6) send to a registered user the correspondent user certificate released by an AXCS

11.3 AXMEDIS Certifier and Supervisor

AXMEDIS Certifier and Supervisor is the AXMEDIS certification authority that provides services for Content Providers and Distributors and verify the correctness of the Clients (as “Clients” are intended also software agents, not only physics or legal people).
AXMEDIS Certifier and Supervisor database structure should be designed considering the distribution of services provided with the aim of scalable architecture capable of supporting a huge amount of transactions per second. These transactions can be of various kinds:
- requests of key
- requests of verification (tool, device, identity, etc)
- requests of certification of user-tool-device
- requests of log reports
- registrations

The architecture of AXMEDIS Certifier and Supervisor should be flexible enough to support centralised Certification and Supervision as well as distributed. In the centralised version only one AXMEDIS Certifier and Supervisor is set up for the whole network, in the other case each distributor and P2P network may have a distinct Certifier and Supervisor. They could be hierarchically organised or stand alone, limiting in this case the navigation of content.
The architecture of the AXMEDIS Certifier and Supervisor should be scalable and the internal services should be well separable to cope with large traffic for the certification and supervision and to allow the decentralisation of some of the services in an easy and reconfigurable manner.

11.3.1 General requirements on AXCS

11.3.1) All AXMEDIS users must be registered by AXCS (author, clearing house, collective management society, content provider, end-user, marketer, mediation service provider, metadata service provider, performer, producer, publisher, reseller, resolution service provider, retailer, etc);

11.3.2) Multiple registration in the AXMEDIS database of the same user should be avoided unless the user provide enough information to differentiate his role in AXMEDIS

Example: John Smith should be registered twice if it accesses AXMEDIS inside his company (as Content author or integrator) and at home as an end-user (consuming content on his own devices).

11.3.3) support the retrieving of a list which reports Certified Object Creators

11.3.4) support the retrieving of a list which reports all the object IDs with the associated Content Creators

11.3.5) All AXMEDIS tools must be registered: editor, composition engine, formatting engine, protection tool engine, etc. This activity is generally referred as "Off-line registration". This information has to be included in the AXCS database.

Example: A software producer builds a player for AXMEDIS Objects. If he wants his player to become an AXMEDIS player, he has to register it in the AXMEDIS system. Only after "Off-line registration" the player can be used in AXMEDIS system to play AXMEDIS Objects.

11.3.6) All AXMEDIS tool must be certified by AXCS. Certification activity is needed to avoid tool corruption. It involve the specified tool (the single installation of the tool) and it must be performed the first time that tool is used.

Example: A consumer wants to use an AXMEDIS player to play AXMEDIS Objects. He has to get it from the software producer and then, after its installation, the player has to be "Certified" in AXMEDIS .

The AXCS has to

11.3.7) "verify the certification of a tool". This verification occurs every time an action over an AXMEDIS Object is performed. Only certified tools can use AXMEDIS Objects.

11.3.8) "Authenticate" every AXMEDIS tool. In this phase the AXCS verifies the tool certification in order to avoid tool corruption. The "Authentication" can occur at a fixed time (for example every n minutes) or in any convenient way for the specific context (type of device, type of connection etc).

11.3.9) be accessible by users, devices, tools, only via PMS (except for the registration process which is accessible by distributors)

11.3.10) manage and supervise the registration process (according to the other subject involved)

11.3.11) support every communication over secure channels (confidentiality, authentication, integrity) apart from reporting activities of anonymous information (statistical analysis of actions);

11.3.12) manage protection keys associated to AXMEDIS objects (needed for unprotection of the content)

11.3.13) be the only protection keys holders. The protection keys are held only by AXCS that distribute them (via PMS servers) to all other subjects, which should have the rights to get them.

11.3.14) manage lists of OID with their protection information (key and others aspects)

11.3.15) record in an Action-Log all the actions (uses) performed on an AXMEDIS Object.

11.3.16) support collection of Action-Logs in both on-line and off-line operation of the AXMEDIS tools; Each time a tool connects and some off-line actions have been performed must be re-synchronised in order to check consistency of the tool and to register the off-line Action-Logs.

11.3.17) support the consultation to Action-Log performed by Distributor, Creator and Collecting Society

11.3.18) support the generation of Marketing reports with anonymous statistics.

Examples:

- Number of video viewed in a country;
- Number of hard-rock songs played in country;
- Mean length of video downloaded in a country or region;
- Mean size of video downloaded in a country or region;

11.3.19) support the generation of Administrative reports for accounting systems requested by Distributor, Creator and Collecting Society regarding only their respective objects (i.e. the objects under their management)

Example: A Distributor can access all the Action-Logs concerning his distributed AXMEDIS Object, but not the Action-Logs concerning other Objects. He can also collect on his own CMS/accounting system all the data related to the Action-Log that involve AXMEDIS objects in his catalogue

11.3.20) grant that only the authorized entities can access Action-Logs

11.3.21) produce different kinds of IDs such as AXCID, AXDID, AXUID, AXTID; in general it produces all the ID used to identify an object, a subject, a tool or anything else univocally in the whole system AXTID generation is available using the AXMEDIS Certification and Verification module of the AXCS but not in UUID format

11.3.22) be capable of blocking the access to the system for a single tool or a category of tools, if their security has been compromised

11.3.23) be capable of blocking the access to the system for a user in order to stop allowing him/her to use the AXMEDIS objects: this does not involve the tool or device used by the blocked user

Example: In a mediateque a user that uses a PC on the mediateque LAN try to perform a copyrights violation: that user must be blocked accessing the system but the PC can be used by all other mediateque users.

11.3.24) be designed to be manageable by a Distributor

Example: a Distributor can have (and use) his own AXCS to control his content over a specific distribution channel; a Collecting Society can access to AXCS services managed by a third party (a service provider).

11.3.25) Support Users mobility: it has to be possible to consume an object across multiple channels (each governed by a different AXCS) with no need the user register himself to each AXCS.

11.3.26) Support some kind of connection to other AXCS in order to be a part of a network. In this way, data stored in an AXCS can be retrieved by all other AXCSs.

11.3.27) support query and response about collected information to other ACXSs

11.4 Protection Support

Protection Tool Engine will be a service for:

11.4.1) avoid illegitimate usage of the produced content like cryptography for authentication and secure transmission.

11.4.2) authentication of clients to the AXMEDIS Certifier and Supervisor in order to allow content consumption reports and to be robust against terminals, which aim to violate DRM rules.

11.4.3) protecting content, single as well as set of objects (selections, collection, etc.),

11.4.4) Allow protection data to be encapsulated in the AXMEDIS object together with other information about DRM and licensing.

11.4.5) maintaining trace of established collections and actions to perform them again automatically when needed,

11.4.6) accepting protection commands from other tools,

11.4.7) working and managing the information contained in the Accounting Log and public log,

11.4.8) encryption/decryption, scrambling, etc., of content on the basis of MPEG IPMP,

11.4.9) converting AXMEDIS non protected objects in AXMEDIS protected objects,

11.4.10) requesting the protection information to the AXMEDIS Certifier and Supervisor notifying at the same time that a new object is published in its protected mode with related administrative information: content type, owner, identification, etc...,

11.4.11) Writing protection rules with some editor

11.4.12) Printing protection rules in a suitable manner

11.4.13) Definition of rules for protection selected set of objects

11.4.14) Integration of DRM rules models into the database of DRM-licenses. Once a new license or license model is created by the Protection Tool Editor it has to be saved into the AXMEDIS Database (see specific section for storing this information)
11.4.15) be capable of revoking a set of AXMEDIS Licenses
11.4.16) Exploitation of the **DRM Support**

11.5 Accounting Manager and Reporting Tools

Accounting managing and reporting tool should collect information from AXMEDIS Certifier and Supervisor and Administrative Information Integrator and log these data in Account/public log database.

11.5.1) DRM modelling, modelling licensing. Study Rights information models
11.5.2) Modelling database for licensing and transaction tracking
11.5.3) Communicating with the AXMEDIS Certifier and Supervisor to get specific information related to the transactions performed on the objects of a given content provider or aggregator.
11.5.4) Storing into the AXMEDIS database the transactions, matching who has done the action on what;
11.5.5) Listing clients of the provider, with the history of their transactions, etc.
11.5.6) Listing objects for which the user has authorization
11.5.7) Listing all distributors and higher level
11.5.8) Generate any kind of report among those for which data are present and accessible to the user who requested the report.
11.5.9) Report and statistic analysis data generation in order to empower content owner and distributors to improve, and possibly automate the process of building statistically based promotions and personalised offer at least as detailed hereafter:
- Generate a list of the most used/acquired contents
- Generate a list of the most used/acquired contents per user
- Generate a list of the most used/acquired contents per distributor
- Generate a list of the most used/acquired contents per category[1]
- Generate a list of the most used/acquired contents per user and category
- Generate a list of the most used/acquired contents per distributor and category
- Generate a list of the most used/acquired contents per distributor, user and category
- Generate a list of the least used/acquired contents
- Generate a list of the least used/acquired contents per user
- Generate a list of the least used/acquired contents per distributor
- Generate a list of the least used/acquired contents per category
- Generate a list of the least used/acquired contents per user and category
- Generate a list of the least used/acquired contents per distributor and category
- Generate a list of the leats used/acquired contents per distributor, user and category

11.5.10) Statistic analysis of the content usage, very useful for tuning the service and the structure of the ready to use proposed objects. Among these statistics it would be advisable to have the following ones: (should be addressed by external tools since statistical data are not stored in AXDB)
- Content sorted by usage rate
- Content used sorted by category
- Content used sorted by category and usage rate
- Top 10 used Content sorted by category
- Top 20 used Content sorted by category
- Bottom 10 used Content sorted by category
- Bottom 20 used Content sorted by category

11.5.11) Compute statistics about the access, utilisation, distribution etc. of the AXMEDIS objects based on the event reports previously generated. Among these statistics it would be advisable to have the following ones: (should be addressed by external tools simce statistical data are not stored in AXDB)
- Content sorted by access rate
- Content accessed sorted by category

[1] Where Category can be any classification info inside Dublin Core (Type, Description, Title, Abstract…)

- Content accessed sorted by category and access rate
- Top 10 accessed Content sorted by category
- Top 20 accessed Content sorted by category
- Bottom 10 accessed Content sorted by category
- Bottom 20 accessed Content sorted by category

11.6 Administrative Information Integrator

This is a set of tools for making available the administrative information received from the AXMEDIS certifier and supervisor and collected into the AXMEDIS database (managed by the Accounting Managing and Reporting tool) into the database of the Content Providers in their administrative form. For example, to bring administrative information into XAURA, HP CMS, XX CMS, etc. For this purpose, in WP 9.1 several Administrative Information Integrators will be realised. The idea is to find a common basis among them and to customise the application according to the needs and protocols to interact with the different CMSs.

The Administrative Information Integrator shall:

11.6.1) interface with different CMS technology;
11.6.2) store administrative information into the Content Provider database.
11.6.3) communicate with the AXDB to get administrative information related to a specific Content Provider.
11.6.4) guarantee privacy of sensitive data via protection mechanisms

11.7 Protection Processor

The protection processor has to:

11.7.1) be able to recover the information needed to properly manage a protected object
11.7.2) work in "user session": as soon as the user has logged himself and his identity has been validated the PMS can support protected manipulation of the object by such user (i.e. gather user licences, checking for some basic rights)
11.7.3) be capable of renew its own protection method in order to produce new secure object after a succeeded attack to a protection method
11.7.4) provide the functionality to include protection related information (IPMP) into AXMEDIS objects
11.7.5) be able to recognize IPMP information inserted into an AXMEDIS object
11.7.6) be capable of detect a succeeded attack in order to persecute the attacker (or to be excluded from the distribution) and to operate the renewal

11.8 Protection Manager Support/Server

The Protection Manager Support (PMS) shall

11.8.1) be invoked by the AXMEDIS Object Manager should allows only the granted actions performed by a specific user on a given resource (in a proper context)
11.8.2) operate on a specific AXMEDIS object and shall examine every requested action in order to control if the needed rights are acquired in some of the licenses
11.8.3) perform a query on its license server which is responsible to match results in the licenses set
11.8.4) be referred by different AXMEDIS Object Manager instance placed in editor, players, plug-ins and must be recoverable as a service
11.8.5) provide a method or process for acquiring the applicable license
11.8.6) be possible to associate licenses with the target/device of their governance
11.8.7) get the secret information (1 ore more decryption keys) from the AXMEDIS Certifier and Supervisor service, which are delivered on a safe channel
11.8.8) not be responsible to perform the granted action on the object model, while it shall communicate on a safe channel the secret information to access to the protected content, via proxy from the AXCS to the Protection Processor
11.8.9) get the status information of a specific AXMEDIS Object from a trusted entity in order to fulfill the conditions, which can be output of a right query. For example a user can perform an action a

limited number of times, the counter of the actually performed actions stored in a separated trusted entity also to consider same action performed on different devices

11.8.10) be divided in two communicating part in order to build the secure communication between who prepare queries for the rights and the part which answer to such queries

11.8.11) be interoperable and portable at least for the Client Part of the PMS, the so called PMS Client.

11.8.12) run as service especially when it is required by low capacity devices (i.e. PDA) and its client shall be able to execute such devices, this is for the PMS Client.

11.8.13) Add the protection information and/or license to governed parts of an AXMEDIS object shall not affect the ungoverned parts of this object.

11.8.14) present the location from which the applicable license may be retrieved

11.8.15) support Expression of the capabilities of a Peer

11.8.16) support Expression of different protection mechanism applying to the AXMEDIS Object: Fingerprinting, watermarking, digital seal, digital seal.

11.8.17) support operations in connected and unconnected environments.

11.8.2 DRM Support

DRM support involves research in the following fields:

- Analysis of existing standards for the representation of rights expressions, such as MPEG-21 REL and ODRL. The analysis will be used for representing rights and for license creation for new content and/or cross-media content. In the last case the rights of the cross-media content should be derived from the source content rights. Once the licenses are created, they can be validated and associated/extracted to/from content.

  On the other hand, users may be authorised according to licenses. To do so, we can use license interpretation or MPEG-21 authorisation model. For the authorisation model it is needed to create its different components, authorisation requested, authorisation story and authoriser. User authorisation also involves the integration with the Rights Data Dictionary (RDD).

  Other desired functionalities related to licenses are the content license migration between user domain devices and the integration of rights into a license database.
- DRM Interoperability, which involves the analysis of the problems arising in the content distribution via Internet including DRM control and support, interoperability between different systems, for instance windows media and MPEG 21, security protocols and quality of service, access devices, etc. A Rights Expression Translator will be developed. This tool would allow us to translate a subset of validated licenses (a profile) from a REL into another (for instance, from MPEG-21 REL to ODRL), providing interoperability.
- DRM for mobile, which involves the study of specificities of REL for mobile environments, that could lead to an implementation of a mobile profile for REL.
- Modelling DRM rules.

Development of the corresponding tools that provide the functionalities detailed below:

11.8.18) License Server:

1. License Creation
2. License Validation
3. License Storage and retrieval from the license database
4. Navigation of licensing information

11.8.19) Authorization Server:

1. License extraction from the content
2. License retrieval from the license database.

11.8.20) User authorization based on rights expressions and constraints (time, etc.) using RDD term genealogy. The authorization server will answer in two ways: true (i.e. user is authorized) or false. In the latter case, the authorization server will explain the reasons why the user is not authorized.

11.8.21) Rights expression translator: translates rights among different rights expression languages providing interoperability. This translation is done under certain conditions, as, in general, it is not possible to translate any rights expression expressed in one rights language to an equivalent rights expression expressed in other rights language.

11.8.22) Formal model of contracts and relationships with DRM model, including storage
11.8.23) DRM modelling, modelling licensing. Study Rights information models

11.9 Encryption/Decryption Support

The encryption/decryption support should allow the encryption and decryption of the AXMEDIS objects for permitting their use by the AXMEDIS tools (mainly AXMEDIS editor and AXMEDIS viewer).

When AXMEDIS editor creates an AXMEDIS object, the user that creates it may want the object to be encrypted. In this case, a symmetric key should be generated in order to encrypt/decrypt AXMEDIS object. Then, the information regarding encryption of the new AXMEDIS object has to be stored: Encryption algorithm used to encrypt the content and the symmetric key for encrypting/decrypting the object (protected with asymmetric ciphering techniques).

When an AXMEDIS user wants to make use of an encrypted AXMEDIS object, he must have permission to do it. This permission will be controlled by means of the DRM support described on section 9.9. In case the user has permission, the user receives the key for decrypting the object in a secure way (for instance, the key could be ciphered with the public key of the user) and inserted into the license giving permissions to use the object.

The encryption /decryption support could be summarised in the following requirements:

11.9.1) Encryption of AXMEDIS object with a symmetric key
11.9.2) Decryption of AXMEDIS object with a symmetric key
11.9.3) Storage of encryption/decryption information (cryptographic algorithm, keys, etc)
11.9.4) Encryption of symmetric key of AXMEDIS object using public key techniques
11.9.5) Decryption of symmetric key of AXMEDIS object using public key techniques
11.9.6) Providing all the above tools as AXMEDIS plug ins.

11.10 Fingerprint Extractor Plug-ins for extracting features

As described in section 8.4 two different types of descriptors can be distinguished (fingerprints and content descriptors). Content descriptors and related extraction algorithms are addressed in section 8.4. This section is focused on fingerprinting issues. Within the AXMEDIS framework fingerprinting technologies are important to ensure content usage according to the licensing condition. As data within AXMEDIS is distributed via a P2P-network, the fingerprinting technology observes upload/download on the P2P networks

Thus, it is very important to identify various processing operation, which are relevant according to the applications. These processing operations must not influence the calculated fingerprint or the related identification process.

Main requirements:

11.10.1) Definition of an unique interface, which allows the integration of different technologies.
11.10.2) Different types of content have to be processed, including images, videos, audio, and documents.
11.10.3) Specification of the applications of FP within AXMEDIS and the derived specifications of requirement on the feature extraction and processing as well as on the content descriptors. Additionally, relevant operations have to be identified and classified according to their potential influence on the FP.
11.10.4) Formalisation of their information in MPEG-7, (DESIRED)
11.10.5) Accessible as AXMEDIS Plug in into the AXCP and AXMEDIS editors
11.10.6) Supported by an HELP in XML for each single processing function
11.10.7) Algorithm design has to consider complexity. (Also here, scalability is not a requirement for the calculation of the fingerprint.) (DESIRED)
11.10.8) The fingerprints have to be designed considering (DESIRED):
- The maximum number of content that can be identified, which affects the fingerprint size.
- The minimum segment size necessary for calculation of the identifier (granularity).
- Error rates (RR, FP, FN) should to be chosen according to the application.

- Different processing operations (including unintentional and malicious attacks) and their influence on the identification and verification/authentication.

11.10.9) Requirements on the robustness of fingerprinting have to consider typical processing operations like (DESIRED)

- lossy compression,
- change of sample and resolution and other technical parameters within AXMEDIS (digital item adaptation),
- malicious attacks based, e.g.typical video or audio processing.

11.10.10) Forensic survival for legal purposes should be analysed.(OPTIONAL)

Requirements for text fingerprinting

11.10.11) Fingerprint must be independent from the file format

11.10.12) Fingerprint depends only on textual information (sequences of characters, words, punctuation) and it is independent from text formatting (bold, italics, tabs, font, size etc.)

11.10.13) Identification of original text, same fingerprint for identical documents.

11.10.14) Fingerprint allows to determine a degree of possible plagiarism between two texts in terms of similarity (OPTIONAL)

Requirements for spoken/vocal audio fingerprinting

11.10.15) Fingerprint must be independent from the file format

11.10.16) Identification of original digital resource by mean of fingerprinting

11.10.17) Identification of modified audio by means of:

- estimation of compatible fingerprint values on compressed/resampled digital resources.
- detection of audio files that include portions of the original

12 AXMEDIS Player

Although AXMEDIS focuses on content production, a reduced number of players (and MPEG-21 terminals) will be implemented in order to provide to the AXMEDIS Framework tools to be downloaded by end users to play back AXMEDIS Objects in cases when the target user is a consumer and especially when target platforms are such kind of devices that an Editor or other kind of sophisticated tools is not supported or envisaged due to either computational, or functional or display capabilities: such kind of tools may include PDAs, Mobiles, devices with embedded Multimedia DSP processors, etc. In the following requirements for PC and similar platforms are reported (first phase) and then requirements for a few mobile or lightweight devices which may be selected for the second phase (WP 4.1.4).

12.1 General requirements of AXMEDIS players

As a subset in functionality of an Editor, a Player must comply with some general requirements which are inherited from the Editor. These requirements are:

12.1.1) Supporting MPEG-21 standard plus additions for AXMEDIS
12.1.2) Loading AXMEDIS objects from file and from the database
12.1.3) Loading in XML mode
12.1.4) Loading in binary encoded/encrypted mode
12.1.5) Supporting license policies, business models, distribution channels etc. available from the AXMEDIS framework for a given platform
12.1.6) Respecting protection rules of AXMEDIS objects and components
12.1.7) Managing the registration of the user access, authentication, user id and password

Additional general requirements for any Player are:

12.1.8) (DESIRED) Managing user profiles. A profile will be a container of user preferences, AXMEDIS Player settings, appearances, etc…
12.1.9) (DESIRED) Providing trace of the most recent opened AXMEDIS Objects
12.1.10) (DESIRED) Providing access management in form of fast-forward playback and track jump

12.2 AXMEDIS Player on PC, Tablet PC

12.2.1 Tablet PC vs. PC

Tablet PC are mostly like PC with the following specific features:

- Tablet PC have about half computing power than PC (smaller processors)
- Tablet PC have limited screen size; consider a maximum of 1024x768; this has impact on GUI design;
- Tablet PC uses a Pen as pointing device instead of a mouse; this has impact on GUI design
- Tablet PC are “handwriting enabled”; this provides extra possibilities compared to a PC and does not imply constraints on the player design; the possible use of such feature would make the player more platform dependant which is not desirable;

Thus, the requirements on the player on PC and the requirements on the player on Tablet PC are mostly the same. Where it is not the case, it is clearly indicated.
In the following parts, we simply use the term “player” to speak about both Player on PC and Player on Tablet PC.

12.2.2 Platforms

The widely used OS on Tablet PC is Windows XP for Tablet PC, which is the same as XP *plus* some functionalities dedicated to the Pen device management, handwriting management etc.
Therefore we can consider that an AXMEDIS player running under Windows XP is good for running on most Tablet PCs.

Then requirements on platforms are:

12.2.1) The AXMEDIS Player must run at least on Windows XP Platforms
12.2.2) (DESIRED) The AXMEDIS Player should run on other Windows Platforms
12.2.3) The AXMEDIS Player must be written with portability to Linux and Mac OS in mind

12.2.4) (DESIRED) The AXMEDIS Player should be easy to install by the end user; care should be taken in avoiding the use of libraries or external software requiring (due to their licenses) a specific installation procedure. Dependencies to external libraries/software should be minimized

12.2.3 GUI of AXMEDIS Player

12.2.5) The AXMEDIS Player must follow usual GUI design guidelines in order to be user-friendly and easy to use

12.2.6) AXMEDIS Player must provide GUI for the most important AXMEDIS generic features, e.g. the AXMEDIS Player must provide appropriate dialogs to allow the user to log-in into the AXMEDIS system

12.2.7) (DESIRED) The AXMEDIS Player GUI should reflect Rights and Functions available on the displayed AXMEDIS Objects. For example, if copy/paste is not allowed on the AXMEDIS player, corresponding GUI controls should reflect that fact

12.2.8) (DESIRED) The Player's GUI should adapt to the TYPE of displayed content and functionalities available on such content. E.g. a video require a different set of button than an HTML document

12.2.9) (OPTIONAL) GUI should be designed to be usable at different screen definitions, including 1024x768

12.2.10) (OPTIONAL) GUI should avoid small controls (buttons etc.) in order to be more usable on a Tablet PC

12.2.11) (OPTIONAL) GUI should conform to the look and feel that has been adopted for other potential AXMEDIS software available to the End User;

12.2.12) The Player's GUI must support Internationalization. At least English language must be supported in its first versions.

12.2.4 Functionality of AXMEDIS Player

12.2.13) Player must allow using/activating of internal viewers/players to allow simple changing and visualization of the most used non-proprietary media formats

12.2.14) Player must be able to use protected content

12.2.15) Player must be able to display/playback a representative subset of content formats provided by the partners for the demonstrators, trough plugin/external modules/external libraries

12.2.16) The Player should have a playback function allowing blind access to stored "titles". Thus the user cannot access directly to the digital content (OPTIONAL)

12.2.17) Player must allow external viewers to be used for content playback/view. External viewers should use AXMEDIS plug-ins to guarantee the protection level and the content object access

12.2.18) The Player should have the possibility to start more playback instances of a viewer/player allowing local adaptation if necessary for resources overload (OPTIONAL)

Internal Viewers into the AXMEDIS player shall

12.2.19) be invoked by the AXMEDIS Player;

12.2.20) allow managing the digital resource by respecting the DRM and protection mechanism associated with the resource;

12.2.21) allow viewing the digital resource if it is a document or an image;

12.2.22) allow playing the digital resource if it is a video, an audio or an animation, or a multimedia resource, etc.;

12.2.23) allow manipulating the digital resource by means of very basic manipulation functions. For example zooming in or out the image resource, stop/play/pause, etc. Such operation shall not infringe the usage rules established by the DRM system;

12.2.24) (DESIRED) Player should be able to log a representative set of user action to the AXMEDIS Log service

12.2.25) The Player must understand and be able to render a representative set of presentation rules contained in a Composite AXMEDIS Object

12.2.26) The Player must provide a minimal, representative set of functions available from AXMEDIS Objects

Example: - an AXMEDIS Object may embed multiple AXMEDIS objects and provide information on the way to display some of these objects relative to the others: AXMEDIS player should be able to use these information and play content accordingly. Otherwise said: the AXOM

provides APIs, a representative set of this APIs should be exploited by the player, and reflected by its GUI;

12.2.27) (OPTIONAL) Annotation. The end user is able to add personal annotations to content by using the Player. The annotations can be text, graphics, recorded voice etc. that refer to content. The annotations do not modify the original content. The annotations are stored locally and separated from the content. The Player has the capacity to associate the annotations with the content so that the user knows to which content the annotations belong. The user can play the content and take the notes at the same time. When the content is a moving picture or a song the Player can add time stamps to the annotations. The Player can also handle the use of spatial stamps to accompany the user annotations. A spatial stamp could be used to associate an annotation to a certain position of a still picture

In addition, a Player for PC/Tablet PC may:

12.2.28) Permit to add annotations and comments by means of graphical actions such as drag-and-drop, contextual menus, etc (OPTIONAL)

12.2.29) Support plug-ins to show and manage specific media types that are to be reasonably expected for these elements, given the different nature that annotations and comments may have. (OPTIONAL)

12.2.30) Allow saving annotations to a file. (OPTIONAL)

12.2.5 Other requirements of AXMEDIS players

12.2.31) (OPTIONAL) Player should implement some APIs allowing it to be integrated into a host application (e.g. Netscape plug-in API, ActiveX API etc.)

12.2.32) Player must be able to display composite content like if they were a unique resource; e.g. an AXMEDIS Object composed by two object of type HTML and flash must be displayed as one object, in a single window

12.2.33) (DESIRED) Player should be able to perform correctly on low end computers or on Tablet PC

12.2.34) (OPTIONAL) **Resources playback management**: The Player should be able to smartly manage the resources playbacks, in the case where the user plays multiple resources at the same time. It should be able to, for example, stop the playback of hidden resources.

12.2.6 AXMEDIS Player as MPEG-21 Terminal

MPEG-21 Terminal Requirements are detailed in following sections. AXMEDIS encapsulate some parts of MPEG-21, making them available through AXMEDIS APIs.

12.2.35) (OPTIONAL) AXMEDIS Player should implement MPEG-21 engines corresponding to the subsets of DIA, DIM etc. available from AXMEDIS Objects

12.2.7 Mozilla plugin for AXMEDIS Player for PC and Tablet PC

When speaking about *Mozilla*, we are in fact speaking about the *Mozilla Framework* which is a set of tools, languages and APIs allowing the development of cross-platform GUI, document oriented applications. Without giving too much details of Mozilla's technologies, a quick summary is needed before introducing requirements implied by using these technologies to develop an AXMEDIS viewer.

The following components constitute the Framework:

- XUL, XBL are XML languages used to describe application GUIs
- CSS is used to manage the GUI look & feel and aspect
- Javascript is the language used as a glue, to provide the logic of the application, and to connect GUI to the application core
- XPCOM is a C++ Cross-Platform Component Model, much like Microsoft's COM. Mozilla's rendering engine and most of the APIs provided by the Framework are in fact XPCOM components. Adding capacities to the Mozilla Framework can be done by developing new XPCOM components, either in C++, or in Javascript.
- The old Netscape Plug-in API, still in use in all Web Browsers, is available to Mozilla to allow it to render content trough other rendering tools, and to basically interact with this rendering tool. A new Plug-in API is being designed by the Mozilla team, but its status is not yet stable. This new API is

aimed at increasing the possible interactions between the plugin and its host, thus increasing the integration between content rendered by the plugin and content natively rendered.

By default, the Framework provides APIs to manage internet connections, to manipulate XML through DOM, transform XML with XSLT, work with the File System, unzip files, manipulate RDF data models etc. It can natively render the following contents: HTML, XHTML, XUL, XML, most image formats (GIF, JPEG, PNG etc.), SVG is quite correctly supported, MathML, WAV sounds, plain text etc. Some well know rendering plug-ins are: Macromedia Flash; Adobe PDF Viewer; most Video & Audio Players etc.

This framework was a candidate to develop the player in a cross platform way. But wxWindow was choose instead.

Anyway, as Mozilla is the second favorite navigator used, it is required to be able to play AXMEDIS content from it and there a plugin must be developed.

12.2.36) The plugin must be able to call the different players
12.2.37) The plugin must be scriptable so that the calling HTML page could interact with it
12.2.38) The plugin should be deployable through the XPI mechanism.

Being able to develop a Mozilla based AXMEDIS viewer requires that:

12.2.39) AXOM APIs must be available through one or more Mozilla XPCOM component(s)
12.2.40) (DESIRED) A specific Mozilla distribution should be constructed for the AXMEDIS player, to avoid unexpected interaction between AXMEDIS Player and user's default Mozilla Browser.
12.2.41) (DESIRED) The choice of accepted content for the demonstrators should take the existence or inexistence of corresponding plug-in into account
12.2.42) A Mozilla version with an odd second digit must be used as the base version for the player development. Such versions do benefit of security corrections during their lifetime.

12.3 AXMEDIS Player on PDA

12.3.1) The AXMEDIS Player shall run on at least one of the most widespread PDA device with well supported OS and platform (like IPAQ or similar equipped with Windows PocketPC 2003, Windows PocketPC 2003 Mobile Edition …). . The target OS platform is Widows Pocket PC 2003.
12.3.2) (DESIRED) The AXMEDIS Player user interface should work almost exclusively through touch devices limiting to the minimum interaction via keys or other interfaces.
12.3.3) The AXMEDIS Player shall allow Digital Content playback for several audiovisual formats (e.g. AAC, MP3, MPEG-1/4, AVC, AVI, QuickTime, etc… or at least any format having a specific handling plug-in) at the most convenient profiles and levels, including scalable codecs and as far as possible computational graceful degradation for complex bitstreams
12.3.4) (DESIRED) Plug-ins may be used for media decoding such as video, audio, interaction. Such plug-ins could be integrated to AXMEDIS Object Manager directly. Indeed in these platforms use of Activex/COM or similar and implementation of object handlers in media decoders may not be possible.
12.3.5) AXMEDIS Player should be easy to download and to install in the PDA device (requirements in terms of needed minimal resources should be stated as well as expected power consumption)
12.3.6) AXMEDIS Player should communicate with a PMS client installed on PDA (requirements in terms of needed minimal resources should be stated as well as expected power consumption)

12.4 AXMEDIS Player on Mobiles

The AXMEDIS player for Mobiles will be used to enjoy AXMEDIS Objects directly on mobile phones. However have to be noted that this player is not used in the distribution to mobiles demonstrator (see section 15) which will deliver to the mobile phones the content stored into AXMEDIS Objects (e.g. a logo, a ring tone), possibly adapted for the device, and will not deliver the whole AXMEDIS Object.

The following are requirements for an AXMEDIS Player for mobiles:

12.4.1) AXMEDIS model and architecture has to support the possibility of realizing an AXMEDIS player for mobiles to allow the execution and play of protected AXMEDIS objects on mobiles.

12.4.2) The AXMEDIS Player shall run on at least one of the most widespread Mobile devices with well supported hardware and software platform. (e.g. Imate or similar smart phone equipped with Windows PocketPC 2003 Mobile Edition; Nokia or Sony Ericsson, Siemens… equipped with Symbian operating system). The target platform is Windows 5.0.

12.4.3) (DESIRED) The AXMEDIS Player user interface should work almost exclusively through a limited number of keys and/or interaction devices (pointing devices, joystick-like devices, etc.).

12.4.4) The AXMEDIS Player shall allow Digital Content playback for several audiovisual formats (e.g. AAC, MP3, MPEG-4, etc. or at least any format having a specific handling plug-in) at the most convenient profiles and levels, including scalable codecs and as far as possible computational graceful degradation for complex bitstreams

12.4.5) (DESIRED) Plug-ins may be used for media decoding such as video, audio, interaction. Such plug-ins could be integrated to AXMEDIS Object Manager directly. Indeed in these platforms use of Activex/COM or similar and implementation of object handlers in media decoders may not be possible.

13 AXMEDIS tools for Satellite Data Broadcast on B2B

13.1 Satellite Data Broadcast for B2B

The pushing mechanism can be used to renovate the catalogue of the Distributors periodically at low cost.
Referring to the B2B side of AXMEDIS , the satellite infrastructure will be used by AXEPTool to distribute contents to a large number of distributors using a single transmission.
When a new content is available the Content Producer makes it visible to the Distributors. In case one of the distributors requests the content a transmission is performed over satellite using multicast IP traffic technologies. This means that all Distributors (and any other user of the AXEPTool system) will receive the content at the same time and store it locally or not, according to a predefined set of filters.
Bidirectional satellite communications will be used for this task, using DVB-RCS (Digital Video Broadcasting – Return Channel via Satellite) technologies and a customized proxy solution that will permit to optimise the usage of resources (bandwidth, time for serving the requests and mainly costs).
The satellite distribution channel can be used for several activities of content distribution for both B2B business models:
The push of content

- updating the AXMEDIS content and components in the databases of the Distributors and of the Providers;
- updating the general indexing databases of the Distributors with updated information regarding the available AXMEDIS content and components of the Providers;
- updating the AXMEDIS content on Kiosks;

13.1.1) The streaming of AXMEDIS content on MPEG-4 on one or more channels for creating specific B2B channel with large institutions and consumers.

13.2 Server for B2B Satellite Data Broadcast

13.2.1) The B2B Satellite Data Broadcast shall treat both AXMEDIS Object and Regular Object..
Examples of Regular Objects are:

- Archives of database update
- File for indexing database
- Normal Archives
- ‘Service’ Files ;

13.2.2) An AXMEDIS B2B distributor or an automatic tool shall start the sending process of an AXMEDIS Object for a B2B distribution;

13.2.3) The B2B distribution shall provide a system of transport level encryption(DESIRED);

13.2.4) The B2B distribution shall provide a system of forced push of the content (the B2B user/AXMEDIS Distributor does not need to manually choose the content from a guide; it shall be received automatically in his local cache);
13.2.5) The AXEPTool P2P Client Application Interface shall accept special requests of a AXMEDIS Distributor asking for the content delivery by satellite (OPTIONAL); (DELETE)
13.2.6) The AXEPTool P2P Server shall upload in a specific server (internal to the OPENSKY Platform) the requested AXMEDIS Object (with related metadata) (OPTIONAL); (DELETE)
13.2.7) The B2B distribution storage server shall be authorized to access to the P2P network (OPTIONAL); (DELETE)
13.2.8) All AXMEDIS Objects shall have their associated part called AXMEDIS Info (metadata) ;
13.2.9) An AXMEDIS Objects shall be associated to an OPENSKY Package. All information contained in the AXMEDIS Info will be useful to retrieve complementary data for the creation of an OPENSKY Package. The last has the following main describing fields:
- Name
- Description
- Target Public (all, children, adult,…);

13.2.10) An AXMEDIS Object / OPENSKY Package shall be associated to an active Program to be transmitted in multicast to authorized users;
13.2.11) Error Correction or retransmission shall be used to ensure that the content is correctly received(DESIRED);
13.2.12) An AXMEDIS Object / OPENSKY Package, after finishing his transmission session, shall stay still available for future retransmissions via Push and/or Pull (example of Pull transmission is the reparation of lost packets during the Push transmission)(DESIRED).
13.2.13) The Satellite Data Broadcast Server shall provide a constant bit rate in its transmissions (DESIRED).
13.2.14) The Satellite Data Broadcast Server shall provide a mechanism of packet repairing (possibly by using a return channel: via unicast or multicast) particularly in case of transmissions one-shot.

13.3 Client for B2B Satellite Data Broadcast (PC+DVB Card)

13.3.1) The AXMEDIS B2B Client shall have a return channel to interact with the Server Side (repairing some lost packets, etc.) (DESIRED);
13.3.2) The AXMEDIS B2B Client shall have a specific hardware/software configuration expressly defined and validated by EUTELSAT .

Hardware:
- Processor
- RAM
- Mother Board
- DVB-S card
- Size of the Dish
- Platform (UNIX, Windows)

Software:
- Version and/or Distribution of the Operating System
- Service Packs and/or Additional Modules of the Operating System
- Version of drivers for all relevant adapters
- Version of the AXMEDIS B2B Client;

13.3.3) The AXMEDIS Object shall be accessed/manipulated at the end of the push transmission (a flag-file will be created to indicate the end of successful reception). The AXMEDIS B2B client can:
- move the AXMEDIS Object into a different location of the file-system;
- delivery the AXMEDIS Object to the application charged of apply some specified actions (updating database catalogue, moving the object into a web server, etc) associated with the AXMEDIS Object;

13.3.4) Each AXMEDIS Object shall be stocked in a distinct folder identified by the name of the OPENSKY package .

13.4 Client for B2B Satellite Data Broadcast (PC+DVB Card)

13.4.1) Satellite Reception: The STB shall be able to receive DVB digital signal according to ETSI EN 300 421.
13.4.2) Local Storage: The STB shall be equipped with an internal Hard Disk Drive (HDD).
13.4.3) Modem: The STB shall be equipped with a IP connection device able to receive sent IP data (at least V.92 PSTN modem and ADSL modem).
13.4.4) TV Output: The STB shall be able to produce PAL TV signal.
13.4.5) Video Scaling: The STB shall be able to display video in a resized 1/16 or ¼ window.
13.4.6) MP3 Audio: The STB shall be able to real time decode MPEG1 Layer 3 audio.
13.4.7) MPEG4 Video: The STB shall be able to real-time decode MPEG4 Video.
13.4.8) Push listener: The STB shall be able to store pushed packages on the local Hard Disk Drive
13.4.9) Push listener: The STB shall store pushed packages in a local subdirectory tree with path /listener/publisher name/package_name
13.4.10) Push listener: The STB, upon reception of error packages, shall ask the Push system for retransmission of the error data segments
13.4.11) Background: The STB shall be able to display on screen a JPG background plane
13.4.12) File system: The STB file system shall support time and date of the files creation, access, and modification
13.4.13) Storage space policy: The STB shall check available disk space at least once every day and delete pushed packages according to the validity policy INSERT REF! in order to make space of no less than the currently receiving package size
13.4.14) TV format configuration: The STB shall allow the configuration of the output TV aspect ratio parameter
13.4.15) Boot: The STB shall be able to play an MPEG4 video upon startup.
13.4.16) TV – out: The STB shall be fitted with SCART socket for TV output.
13.4.17) USB: The STB shall have at least 2 external USB interface.
13.4.18) IR – in: The STB shall have an Infra Red receiver
13.4.19) ON/OFF: The STB shall have an ON/OFF button on the front side.
13.4.20) Power plug: The STB power cord shall connect to mains by Europlug CEE 7/16.
13.4.21) Fan less: The STB shall be fan less.
13.4.22) Weight: The STB shall weigh no more than 3 Kg.
13.4.23) GUI: The STB shall allow user operation by means of a Graphical User Interface.
13.4.24) RC keys: The STB Remote Control shall have at least Arrow keys (Up, Down, Left, Right), Numeric keys (Digits 0 to 9), Volume control keys (Up and Down), “OK” key, “Back” key, “Help” key, “Mute” key, “On/Off” key, “Home” key, “PageUp” key, “PageDown” key.
13.4.25) Keyboard: The STB shall be able to receive input from a QWERTY keyboard.
13.4.26) ON/OFF RC: The STB shall toggle between full operation and stand-by modes when ON/OFF button is pressed on the Remote control.
13.4.27) ON/OFF STB: The STB shall toggle between full operation and stand-by modes when ON/OFF button is pressed on the STB.
13.4.28) Stand-by: The STB shall be able to receive DVB data while in Stand-by mode.

14 AXMEDIS for Distribution via Internet

The main goal of this section is to analyse the architecture of PC distributors devoted to handling multimedia premium content, into stable, documented and fully featured solutions open to integration with all the components of the AXMEDIS project so to enable a complete and easy to use environment for the publication and up-selling of content over the Internet.

In this section we will generally focus on any type of media (audio, video, images, text etc.), nevertheless the primary interest is related to the distribution of premium video content.

Nevertheless, especially in the entertainment arena in Europe, broadband content offerings are still in their infancy if compared to the North American market.

The European delay is not only due to the lack of technological solutions capable of addressing all the risks and issues arising in the value chain of content distribution over the Internet, but especially because the European market does not have the same linguistic scale of the North American market. Narrowing this gap and breaking the linguistic barriers is one of the core components of TISCALI's strategies.

TISCALI is an ISP present in many different European countries. As a matter of fact TISCALI is a unique Internet reality capable of offering pan-European services and applications such as email, messaging, Voip etc. As a general strategy, TISCALI has devotes strong efforts in the development of a global European infrastructure capable of delivering content to the numerous portals operative in all of its countries. This effort has consolidated in the development of a number of applications that pose the grounding blocks of such infrastructure.

At the centre is XAURA, an open, java based Content Management System, that enables to rapidly prototype content applications for the web. XAURA is rapidly being deployed to migrate all the current web properties of TISCALI into a unique global content infrastructure. XAURA can be adapted to fit most different content schemes. Among specific implementations, a considerable effort has been dedicated to the development of multimedia based services, especially when based on premium content. All these have been recently unified in a common framework, called the "MediaClub". The MediaClub is the main entry point for all audio-video content. It integrates the commercial DRM systems present in the company as well as TISCALI's billing gateway and deliver infrastructure enabling to provide pay per view, subscription based content packages and other models. Currently the system is working as an experimental service in Italy providing feature movies to TISCALI's ADSL subscribers.

14.1 Server for content distribution on PC

In addition to the delivery features requested by other partners, delivery to PC will have to be managed also via web server (eg. apache web server) http delivery in unicast and multicat. As per multicast, client-server operations will have to implement transmission control in order to prevent and, if required, provide real time retransmission of data.

14.2 Client for content distribution on PC

P2P services are a completely un-presided market that provides huge opportunities for Internet operators. What's most important, there is a growing need, among users, for P2P services that are capable of guaranteeing the quality of service and solving the most common and annoying issues with P2P illegal file sharing. As a matter of fact, there are up to **5 common issues** commonly experienced by users, each of which pose an opportunity and a challenge to content owners and broadband ISPs. Best explained with an example.

Suppose I were Searching for "The Matrix" on Kazaa. After retrieving tens of entries I chose a peer which appears to have high bandwidth (T3) and start downloading a 1GB file. Here is what I may experience (an most of the times I actually do):

Issue 1. Download Speed: I carefully selected a host with T3 connection but I receive data at a 36kb/s modem speed. After 36 hours and several attempts I finally manage to download the whole file. Now if everything went fine and the file is not corrupted, here what else may still happen (and normally it does):
Issue 2. Identity: Is it really what I was looking for? I double click on the file I just downloaded. It's name is "the_matrix.avi" but when I open it I discover it's a porn movie: I am storing a 1GB porno movie on my hard drive! It may even be worse. It may even be a porn DRMized file prompting me to purchase a license each time I try to open it.
Issue 3. Quality: who did the encoding? The movie's playback flickers and I can't distinguish a word from the sound track, not to mention Dolby Surround 5.1, Digital Dolby AC3 and all that makes a movie sound nice.
Issue 4. Security: is my PC going to blow up because of some virus? No, an AVI file can not carry a virus but does an average user know? And what if the file is in WMD format? In this case it may even have a virus.
Issue 5. Legality: Is anybody spying me?

The success of Internet media on demand lays in the emergence of distributors who will take care of Certification. P2P is the most amazing and effective mean to distribute content to the final users but somebody is needed out there to make users feel more comfortable. In other words, content owners will defeat piracy the moment they realize they can become competitive to what's available on the net. No one would pay 30 euros to download a movie from a p2p service. But what if it the movie cost 3 euros? Wouldn't be much better and save us a lot of worries.

What's important here is that broadband operators can play a major role in this game as they have trusted brands over the Internet (especially for their subscribers). Above all, they can guarantee quality of services, i.e. provide:

- Caching server sitting on their networks that are capable of providing all the data throughput available to their users. On a 256kb/s it takes about 4 times the duration of a movie to download the same full high quality DivX encoded movie. At 1mb/s you can start streaming it.
- DRM infrastructure that by enabling encryption, content license issuing and, notably, digital signing of content stands at the center of all content certification

Summarizing, the main actions that AXMEDIS must undertake in the development of the DRM for securing the content value are:

1. **Fit the 5 golden rules of media certification**:
    - Identity: provide a reliable certification method
    - Quality: state of the art encoding
    - Download speed: top class network infrastructure
    - Security: virus, worm and spam free
    - Legality: clear usage policies
2. **Pricing:** develop competitive pricing
   Downloading a movie should cost less than renting a DVD in the rental shop

This vision must be actively pursued and posed as basic requirement in the development of a PC based AXMEDIS client. Basic requirements to be provided in order to fulfil this business vision are:

14.2.1) The AXMEDIS User shall be able to access the distribution of AXMEDIS objects, using a Windows-based PC with an installed Microsoft Windows media Player;
14.2.2) Each AXMEDIS Object shall be delivered either via unicast or multicast IP transport;
14.2.3) Each AXMEDIS Object may be accessed either via client-server connection or via P2P exchange with other AXMEDIS USERS;
14.2.4) The AXMEDIS Client Application shall be a set of plug-in and possibly a viewer for AXMEDIS Objects: It will have to be an executable embedded via Microsoft Windows Media Player, and enable:

- interact with the Server Side in order to provide data transmission control including for the repairing of lost packets, sending profiling preferences, etc.

- manage transactions on AXMEDIS Objects (e.g. acquiring licenses from the AXMEDIS Certifier and Supervisor)
- provide delivery and playback statistics

14.2.5) The AXMEDIS Object shall be accessed/manipulated via the AXMEDIS Client. Users will be able to easily individuate, access and move the AXMEDIS Object into different locations of the file-system;

14.2.6) Each AXMEDIS Object shall be stocked in a distinct folder clearly identified by the user;

14.2.7) The AXMEDIS User shall be able to view all relevant properties of the content

14.3 Integration and customization TISCALI CMS to AXMEDIS Framework and content

The main goal is to transform XAURA and the MediaClub integrated with AXMEDIS tools, XAURA's main instance devoted to handling multimedia premium content, into stable, documented and fully featured solutions open to integration with all the components of the AXMEDIS project so to enable a complete and easy to use environment for the publication and up-selling of content over the Internet accessing to the content available on the AXMEDIS P2P network AXEPTool.

In order to meet the AXMEDIS requirement, TISCALI will put in place a new implementation of its XAURA CMS, which will be named XAURA 2.

The specific goals of the new CMS will be to:

14.3.1) Provide XAURA 2 with Content Management modules required to integrate advanced and business sensible applications of AXMEDIS such as content staging, reporting, usage tracking, personalization, scheduling, workflow management, advertising etc.

14.3.2) Extend XAURA 2 to support of all main standard and commercial content formats, repositories and applications that are supported by the AXMEDIS Project or by its partners systems

14.3.3) Extend XAURA 2 java classes to natively support all components of the AXMEDIS project, in particular the P2P services

14.3.4) Extend XAURA 2 features to provide the appropriate framework for the fulfilment of goals set in the development of the MediaClub

14.3.5) Extend XAURA 2 features for providing the appropriate tools needed for 10' Interface MediaClub experience

The activities planned are:

- Integrate XAURA java classes to natively support all components of the AXMEDIS project, in particular the P2P services with AXEPTool
- Final version of the XAURA enforced with AXMEDIS capabilities
- Optimization and fine tuning of the application. Integration of the solutions and their evaluation.
- implementation of additional features and integration in an experimental channel with a 10' Interface GUI. Development of tools for browsing catalogue through a remote control.

GUI features that will be implemented include:

- Multiple Website instance management (enables syndication of content to multiple distribution channels)
- 10' Interface content distribution model
- Deployment management
- Publishing engine management
- High performance module based static publishing
- Personalization module real time assembly

Backend features:

- Workflow
- Project Messaging

- Advanced media object management, including:
  - Read all available content
  - Create new content
  - Categorize content
  - Associate content items
  - Set and modify the permissions to manage content
  - Edit/delete existing content
  - Review and publish content
- WebServices based search engine
- Import/Export service
- Content Editor based on (XSD?) schema and client side logic implementation
- Application Reporting: DRM, transaction, content suppliers, users

As far as the MediaClub is concerned, the main goal is to transform the current implementation of the MediaClub into an end-to-end solution for creating, importing, publishing, up selling and delivering broadband content available on the AXMEDIS network and other foreign repositories. The system will be shipped directly with XAURA 2 and a customizable broadband player. System will be designed to support all main business models for content: free-to-air, subscription and pay per view content.

Operations as encoding and license creation (DRMization of content) may be performed by Tiscali employing it's own AXMEDIS production tool implementation. Nevertheless the system will be primarily used to distribute already encoded content and will be designed to easily integrate remote DRM repositories of content.

The MediaClub system will be designed in order to develop portal instances (we call them the "media portals") that may be capable of performing all operations associated with selling media. The MediaClub will natively come shipped with tools for content, metadata and user management.

The MediaClub system will ship with a number of JAVA GUI components and JAVA based interfaces that will enable to rapidly build all main functionalities of a media portal and integrate with remote systems as payment gateways, license servers and delivery infrastructure.

The MediaClub system will also include a tool for reporting all end user content purchases and use. The reporting tool will be designed to provide "views" to all content partners enabling these to monitor in real time their content performance.

Summarizing the MediaClub will be based on a four layer structure:
- User Certifier System. Manages user accounts, credits and matches user purchases to DRM business rules
- Catalogue Management System. Enables efficient management and publishing of catalogues of DRM encrypted content
- DRM layer. Enables to manage multiple DRM instances
- Payment Gateway Interface. Requires correct matching of DRM business rules with payment methods: Credit card payments, SMS payments, Drop Dialler, DSL/LAN dialler used for ADSL time online payments, Monthly billing on Access bills

GUI Features that will have to be implemented include:
- Media Catalogue management and publishing, including following publishing modules:
  - catalogue
  - registration
  - user page
  - preview
  - editorial

- extra
- play media
- top downloads
- customer care
- DRM and media test

- Delivery management. All content in the MediaClub will be encrypted by employing DRM technologies. The MediaClub will require users to purchase a **license** in order to be able to unlock any media content. Though primarily devoted to content download, users will have several ways of accessing content and viewing it:
  - **Streaming.** Similar to a broadcast experience, user acquires license and subsequently starts streaming content. Recommended only for higher bandwidth (450kb/s or above).
  - **Download.** After acquiring a license, the user can download the media (up to 10Mb/s encoding). Media can be viewd from the user's computer after the downloading process (can take 1-8 hours according to user access)
  - **Pre-Download**. User can first download content and then is prompted to purchase license.

- User management. All purchase models in the MediaClub require users to subscribe. Subscription will be integrated into the Tiscali user DB using Tiscali Single Sign-On system. Tiscali Single Sign-On will be used to build specific marketing offers to Tiscali users. The offer will be open also to non-Tiscali customers that will be managed in an external database (at least until every country has a short portal registration). Geographical limitations will also have to be applied if the contents are available only for certain territories.

- Business rules management. The MediaClub will be designed to support four different payment models that may allow users to:

  - Pay-per-View (PPV): User pays to view a single media in streaming or download mode before he can watch it. After having acquired a license for a media download, this license remains valid for only a limited time before it expires. This is set usually to 1 month. After having rented a media in streaming or download mode, the user will be able to see it as often as we likes within a certain period. This period is usually set to 72 hours (3 days) as it is common for home videos as well
  - Prepaid Credits: User can purchase in advance (prepaid) credits. Every time he rents or buys a media, a certain number of credits will be deducted from his account. Prepaying a higher number of credits results in a volume discount for the user. Experience with music prepaid credits show that the model is very adapted to Internet use.
  - Subscription: Based on a recurrent fee. User purchases either full access to a set of contents that can be viewed throughout the period he pays for. Or he gets a defined number of credits every month for that the subscription is valid.
  - Bundle. Content is accessible either for free or with a discount to specific Tiscali customers that purchase also an access product. This can also be achieved by charging a certain number of credits per month to the users account.
  - Sell-through. User acquires a permanent license and owns the media after the download, just as a purchased DVD (including the right to watch it without limitations and to burn it). Equivalent to a content offer of the shelf (CD, DVD, book etc.)

- Credits management. As a matter of fact, the MediaClub will use credits as the same underlying concept for all payment modes: PPV, prepaid credits, subscriptions and bundles. Credits are managed in a very similar way as currently done on Tiscali Music Club. All contents are associated to a set of credits which are translated into currency in the case of PPV, or are visualized as mere credits for prepaid users. example implementation could ser an equivalence of **100 credits = 1 euro.** Technically speaking the users always purchases a set of credits. This enables to provide ease of communication for all offers with

users able to easily asses the value of their purchase. Credits provide also and easy mean of negotiation with content owners.

The MediaClub will be designed in order to enable very fast and easy management and publishing of media content. The underlying architecture of Xaura 2 will provide all tools to manage relational data structures and basically any type of content, including media and multimedia objects. Backend features will include:

- Media Catalogne Import/Export
- Reporting: DRM, transaction, content supliers, users information, includine:
  - Transaction outcome
  - Content title
  - User
  - Purchase date
  - Content owner
  - Payment method
  - Distribution channel
- Media catalogue based search engine
- Content Management (in addition to what inherited from Xaura 2):
  - Edit media content data (title, abstract, main text, links, pictures, thumbnails etc.)
  - Specify right clearance properties of content (availability period, license properties etc.)
  - Specify publishing and distribution procedures (publishing meta-data)
  - Edit source format data (transmission standards, physical supports etc.)
  - Edit streaming and downloading format data (display size, frame rate etc.)
  - Edit credit packages and prizing
  - Review and edit customer data
  - Review and edit transaction data

14.3.6) A specific implementation of the Media Catalogue Import/Export will have to integrate the AXEPTool for accessing the AXMEDIS P2P network.
14.3.7) Such implementation shall be capable of executing queries on the AXMEDIS Database for the retrieval of new AXMEDIS Objects;
14.3.8) All AXMEDIS Object shall have their associated part called AXMEDIS Info (metadata);
14.3.9) AXMEDIS Objects shall be imported as MediaClub Media Catalogue objects.

The AXMEDIS Object will have to be designed in order to enable via the MediaClub back-office. In other words, the MediaClub will enable to create content packages that may be distributed in all models specified. This is possible thanks to the integration of business rule management procedures (which in turn integrate DRM functions available).

Importation of AXMEDIS Object will need to be optimized for the handling of large files (up to 5-10GB files) as required for High Definition (HD) feature movies.

14.3.1 Integration TISCALI content sources to AXMEDIS model and tools

Content provided by Tiscali will be natively hosted on the incoming MediaClub environment. Besides data hosted in XML format and other SQL based DB data, media files will be available in Microsoft Windows Media Video and as uncompressed AVI files.

AXMEDIS crawler to be provided so as to manage all Tiscali data and media types.

14.3.2 Analysing and Supporting certification, etc.

AXMEDIS Certification of clients has to:

14.3.10) generate an almost unique identification code for the device (PC, PDA, …) AXMEDIS tool are installed on. **Note**: the identification code has to be produced using ids of hardware components that hardly change (e.g. CPU, HD, network card, …)
14.3.11) generate a fingerprint of the installation of the tools on the device to be used to check tools integrity.
14.3.12) periodically communicate verification information to AXMEDIS Certifier and Supervisor to guarantee device and tools integrity

14.4 Adaptation of Clients and Servers to AXMEDIS : aspects of DRM

In addition to requirements expressed by other distributor partners:

DRM RULES:
14.4.1) activation of rights at a fixed date
14.4.2) counted number of plays (N variable)
14.4.3) burn option on removable device (CD, DVD etc)
14.4.4) counted number of devices
14.4.5) license server unavailability URL to be hard coded in DRM file

Other FEATURES:
14.4.6) support for high volume video files (5-5GB)
14.4.7) support high volume video streaming (up to 10Mb/s)

14.5 PC Client Optimisation

See AXMEDIA tool before

In addition to the optimisation as already requested by other distributor partners, optimization will have to be strongly focused on the delivery and playback of large volume video files such as HD feature movies.

14.6 PC Distribution Via Editis Platform

SEJER developed a platform to distribute content. This platform is currently used by the CNS, a consortium of French content providers targeted at schools. CNS acts as a Distributor over Internet portal, allowing schools/teachers to buy content, and student to access it. Accessing the CNS is possible using a standard web browser. Basically, the platform does not store the content. It simply provides links to the content of each content provider. Each content provider is then in charge of making its content available to the End User through Internet. For the AXMEDIS objects to be distributable trough the SEJER platform, and AXMEDIS infrastructure to be integrated in the SEJER platform chain, we consider that:

- the platform client integrates somehow an AXMEDIS player for playing the content, by means of an ActiveX in IE or a plugin in Mozilla for instance,
- the platform distribution portal is upgraded to be AXMEDIS compliant,
- the platform is able to use AXMEDIS authentication,
- all the content providers will NOT necessarily become AXMEDIS compliant

For AXMEDIS , it is required that:

Licenses Policies

The distributor must be able to enforce *at least* the following license policies:
14.6.1) Content is usable by one User from a starting date to an ending date
14.6.2) Content is usable from a starting date to an ending date within a given school or group of schools, and only in this one.

Commercial policy and relation with distributor:

The Distributor must be able to provide *at least* two kinds of offers:
14.6.3) Revenue share, where the distributor pays the Content Provider a percentage of the revenue for each sold resource
14.6.4) Bundle, where the distributor pays a negotiated amount of money to each distributor for unlimited use of their content within a given domain

Accounting

14.6.5) The distributor must be able to track usage of content through access and traffic data, collected at end-user level. in order to be able to pay back corresponding fees to the Content Provider

14.6.6) Content providers must have the ability to define packages of resources (in collaboration with different content providers). The price is fixed by Content Providers, along with the way fees are redistributed to the Content Providers belonging to the package.

14.6.7) (DESIRED) Content provider distributing their resources through a Package on a specific Distribution channel should be able to account the sales of this package in order to check the fees given back buy the distributor.

14.6.8) (DESIRED) Content Provider should be able to account the usage of its content and identify which distribution channel has been used to access it, in order to check the fees given back by the distributor

Registration and authentication

14.6.9) The distributor has to be able to use an already existing Database Of Registered Users. Schools may provide their own authentication mechanism and in these cases it is necessary to avoid adding a second one. This means that the AXMEDIS client has to provide a mechanism to allow the automatic opening of a session (login) by another application

14.6.10) The AXCS of this channel have to, in some ways, be able to interact with another authentication system's database (batch update, dynamic connection?)

14.6.11) These requirements must not reduce the security level of the whole system. If the satisfaction of these requirements requires rules, better provide the rules than reduce the security level.

Additional services to the Content Providers

The distributor should be able to provide the following services to the affiliated Content Providers:

14.6.12) **Protection**. The Content provider may not be AXMEDIS compliant. Therefore, the Distributor must have tools to transform raw content into AXMEDIS Protected Objects, according to the licence agreement discussed with the distributor, AUTOMATICALLY.

14.6.13) (DESIRED) **Aggregation**. Construction of packaged offer may require that the distributor has to construct an AXMEDIS Object representing in some ways such package. The AXMEDIS Framework should provide tools to AUTOMATICALLY construct such package.

14.6.14) (DESIRED) **Editorial services**. The Distributor portal provides ways for the Content Providers to speak about their content (announcement etc.). For AXMEDIS Compliant Content Providers, the AXMEDIS Framework should provide tools to set up AUTOMATIC construction. For instance, AXMEDIS tools should be available to automatically detect new version of the distributed product and to construct an "announcement" section on the portal with information from the Content Provider, such like Version information, List of changes etc.

Portal construction

The distribution portal is accessed through a standard web browser. Once the user logged in, the list of available resource for its profile and its rights is displayed. The content distributed but not accessible is hidden to the user. The same way, on the selling portal, it is desirable to adapt the pages according the user who is consulting them.

14.6.15) AXMEDIS must provide Tools and APIs to allow the Distributor to construct the consultation portal pages on the fly, according to which is requesting them. It consists mainly on getting the list of objects available to the user and extracting relevant information from the object to present the list.

14.6.16) (DESIRED) AXMEDIS should provide Tools and APIS to allow the Distributor to construct the selling portal pages on the fly, e.g. using the PARs and other metadata.

Other requirements

14.6.17) (DESIRED) The distributor should not have to set up a local CMS for the distributed content. It may store its affiliated Provider's content on its platform temporarily, for technical purposes, but not permanently.

14.6.18) (DESIRED) The portal may provide previews of some of the available resources. These previews should be dynamically gathered from the Content Provider, therefore through the AXMEDIS Framework, without the need to store the preview or the whole object locally.

Note: All those features are not requirement for the current version of the Editis plateform but might be in future versions.

15 AXMEDIS - Distribution for Mobiles

15.1 General Framework Requirements

Assuming the prior availability of the general pre-requisites to media distribution such as content authoring facilities for packaging content made up of AXMEDIS Objects (IMS Content Packages), then the experimental scenario for Distribution to Mobile would require that:

15.1.1) The AXMEDIS Distribution to Mobile Platform shall be developed and integrated with the AXMEDIS Content Processor.

15.1.2) The AXMEDIS Distribution to Mobile shall demonstrate the functionality of its AXMEDIS Dynamic Media Adaptation (AXDMA) within an Experimental Scenario Platform (ESP) which is itself to comprise an AXMEDIS Mobile Demonstrator and User Interface (UI) Portal with front-end components such as a User Interface and back-end server services such as an Administrator processing elicited user information re user profile and media requirements.

15.1.3) The AXMEDIS ESP for Mobile Distribution will have to be integrated with the AXMEDIS Dynamic Media Adaptation, the AXCP Engine and thus also with the AXMEDIS PMS.

15.1.4) The AXMEDIS Mobile Administrator & Portal (UI) together should support a number of facilities as would be typically expected within most online content preview and purchase scenarios.

15.2 The AXMEDIS Dynamic Media Adaptation (AXDMA) Integration Requirements

15.2.1) The AXMEDIS Dynamic Media Adaptation application must work integratively with the AXMEDIS Content Processor (AXCP JS Engine)

15.2.2) The AXDMA must facilitate flexible, personalised content delivery on-demand by providing the AXCP JS Engine with dynamically resolved and structured profile element values including optionally selectable personal, device and delivery context profiles and separate Transcoding and Profiling modules integrated through AXCP.

15.3 The AXMEDIS Experimental Scenario Platform General Requirements

A) Mobile Administrator & UI Portal General Requirements

An AXMEDIS Mobile Administrator back-end server, in general, is required to provide the necessary user services through the front-end interface for the provision of media on-demand (i.e. registration, user-device_ID and data management and associated media rights query and certification, personalised media Recommendation List browsing, query on-demand, media preview, selection, purchase and payment) as follows:

I) The Front-end (User Interface & Portal) is generally required to provide the appropriate user interaction spaces for:

15.3.1) Selection of current language by the user -from a list of supported ones

15.3.2) User log-in Identities Validation

15.3.3) User support for personal content selection criteria setting that can be used later by the Portal

15.3.4) Downloading applications

15.3.5) Searching for specific items of interest

15.3.6) Browsing through a catalogue of available and relevant content of interest

15.3.7) Highlighting choices from a Personalised (Recommended List) of available media best matched to the user's interests

15.3.8) Updating personal records

15.3.9) Checking through the inventory of acquired and remaining rights

15.3.10) Submitting on-demand content queries/orders

15.3.11) Displaying previews/trailers listing for specific items

15.3.12) Viewing one's personalised Recommendation List from the catalogue of available content

15.3.13) Enabling users to check a list of their acquired rights and updating their data.

15.3.14) User basket services and taking purchase and dispatch order for Content

II) The Back-end (Mobile Administrator) is generally required to provide for:

15.3.15) Registration of user's client domain
15.3.16) User and Client Device and ID management, certificating target device(s) based on User_ID, 16.3.2.3 IMEI(SV), SIM, Tel. No.
15.3.17) Users' account set-up and management including managing and updating user's data and user's role
15.3.18) Content Preparation in terms of ranked catalogues according to various user-specific, market-specific etc classification schemes
15.3.19) Definition of General Content Retrieval Criteria management, (definition, selection, update)
15.3.20) Supporting query-on-demand for a specific content (or type), personalised menus (prioritised profile specifically) for various types of information such as current media popularity charts, previous listings etc as required
15.3.21) Processing user's personalised Recommendation List as passed to it by the AXCP JS Engine
15.3.22) Play facility for previews/trailers to help Users decide about possible purchases
15.3.23) Users enabled to exercise, at any time, their acquired rights to consume content consistent within their remaining granted rights by ordering content dispatch and fruition at any of their registered device(s) at any time
15.3.24) Media selection, bundling, packaging (including special offers), purchases of, and payments for, licences and the play-display of rights just consumed
15.3.25) The AXMEDIS Distribution to Mobile will be able to use the AXMEDIS Digital Rights Management services including for composite content rights management

III) Dynamic Networked Services Management Requirements

15.3.26) The AXMEDIS Distribution to Mobile shall provide a mechanism for content delivery service continuity in case of temporary mobile network disconnection for users on-the-move (OPTIONAL)

15.4 The Experimental Mobile Distribution Platform – The Background

Today's telecommunication market is extremely interested in content-oriented services as sources for potential revenues. The AXMEDIS platform provides a comprehensive business perspective for both content providers and telecom service providers. A large variety of technologies and protocols are presently in use throughout the world, many of which are proprietary and do not adhere to any standard. Consequently, telecom operators encounter major challenges when attempting to deliver content-based value-added services. The AXMEDIS platform effectively addresses these challenges, by providing content owners with user-friendly tools in a familiar environment, and enables them to offer their content to a large number of users while ensuring content protection.
By increasing the number of accessible and standardised types of content, the AXMEDIS platform can assist operators and content providers in realizing the following goals:

- Increase end user satisfaction;
- Increase content offering to a broad range of customers supporting most diffused type of device (by streamlining content delivery to mobile handsets);
- Open new business opportunities to content providers and telecom operators.

ILABS has been operating in this market for several years since the advent of the mobile and ubiquitous delivery of educational content and training services; as the market leader in enhanced services for training and education (in the wider sense) and as an one of partners in the AXMEDIS consortium is ideally situated to provide a wide range of content over the AXMEDIS tool set.

15.5 General Description

Content distribution for mobile devices is performed using a "**content push**" method upon end user request (referred to as the "end user" or "subscriber" as the underlaying businnes model will be mainly centred on subscription mechanisms). In order to reach the desired content, the subscriber navigates through a set of menus (including the element referred to as "catalogue" that comprises more than simple menu choices). All formats supported by the AXMEDIS Framework are stored in the AXMEDIS Platform, and supplied upon

request. The most relevant and usable encodings will be identified and developed (or integrated and made accessible) within the AXMEDIS Platform. The platform will be capable of accepting any custom codecs and automatically supporting newly added formats whenever the necessary codec plug-in will be available. To ensure content protection the DRM should be used to define the type of protection and licensing methods.

15.6 Plug-and-Play Transcoding Support

AXDMA General Plug and Play Transcoding and Media Adaptation Requirements
The AXDMA Adaptation must provide for efficient multimedia transcoding, any format to any format (including audio e.g. ringtones, image, text) to suit the standard characteristics of users' device(s) for distribution on-demand to existing mobile devices and new generation of mobiles and PDAs.

The potential volume of downloads by mobile devices requires an efficient transcoding architecture, thus the transcoding must be kept as efficient as possible i.e. it must minimise the complexity in the adaptation process. The requirement for optimising quality, efficiency and complexity of the transcoding process for distribution to mobiles will be increasingly important for video distribution where it could be even more critical since the videos are typically large files and more complex to for transcoding.

In order to complete the subscriber's request and deliver the requested content to the mobile device the requested files should be available either in the distributor CMS or in its AXMEDIS database. Therefore, in the latter case it is necessary for the CMS to be able to generate the requested object automatically from one (or more) source-files exploiting its interconnection with local AXMEDIS database and all other framework tools necessary for the task completion.

The following scenario illustrates typical Transcoding requirements. One WAV file has been uploaded into the system. An end user may need a conversion of this file into a format suitable for use on own their device. Moreover to play this file as a sample it should be clipped (to 30 seconds, for example) and converted to the low-quality WMA similar format, while to sell this file it should be in high-quality WMA similar format. In order to be acquired and played by the end-user system it should be therefore fully converted into one of the device supported formats. Summing up, for sample playing it should be clipped (e.g. to 10 seconds, for example), or supplied in full length, depending on the subscriber requested operation (pre-view or purchase).

It is taken for granted that among available possible purchase modes there is the infinite repetition bound to a specific device. This latter has to be identified along with its user in an unequivocal manner (for example [[phone-no + SIM] + IMEI] where parenthesis represent the binding hierarchy) and modifiable under explicit request to service provider following a change in device (new system of the same or different model when possible) or change in SIM due to any valid reason (loss, subtraction, obsolescence…).

In this scenario, we see that even simple interfaces will require several different file formats at least. In order to service additional interfaces and devices, the number of required files quickly increases. The content manger or content administrator cannot generate these files manually, but the system can easily produce all of them using only the source files and the appropriate codecs for the needed conversion processes.

The AXMEDIS Experimental Scenario Platform (Lex-Mobile) Specific Demonstrator Requirements for Plug-and-Play Transcoding

The following is a list of requirements for supporting plug-and-play Transcoding:

15.6.1 Development platform and set of built-in components to be used:

a. Microsoft Windows 2000 Server.
b. The Transcoding server should be designed as Windows Service.
c. The Transcoding server should be equipped with the AXMEDIS plug-in to be capable of communicating with the AXMEDIS platform.
d. Additional components to be installed with the operating system to support different codecs (such as Windows Media, Microsoft Format SDK, etc. see later in this section for details).

15.6.2 Development language(s):
   a. Visual C/C++ compiler and linker (version 3.0 Embedded) for all public components.
   b. Other development languages such as ASP, ASP.NET, Java, JSP, etc. to be used for all private components, for example demonstration tools, or any of the internal developments.

15.6.3 Define the way of transcoding support:
   a. Support offline transcoding only (generate files in offline and store all of them on the content server, available for subscriber requests this either as a new AXMEDIS object or as they are, depending on the nature of the original object).
   b. Custom codecs should be easily integrated into the platform in order to add support for the new formats.

15.6.4 Define interoperable interface for plug-in codecs:
   a. Support all types of files (such as audio, video, ringtone, image, etc.).
   b. Support a dynamic set of properties (all of the listed file types have different set properties, so the interface should be as universal as possible in order to support all of them).

15.6.5 The following set of formats should be supported:
   a. For Windows PocketPC 2003 Mobile Edition PDA based SmartPhones

Text (Where U/A = UNICODE / ASCII)		**Image**		**Audio**		**Video**		**Animation**	
DOC (U/A)	x	*JPEG*	x	*WAV*	x	*AVI*	x	*Flash*	x
ODT (U/A)		*GIF*	x	*MP3*	x	*RealVideo*	x	*QuickTime*	x
TXT (U/A)	x	*PNG*	x	*AIF*	x	*QuickTime*	x	*Active Movie*	
RTF (U/A)		*TIF*	x	*PCM*	x	*MPEG 2/4*	4	*GIF*	x
XLS (U/A)	x	*TGA*		*RealAudio*	x	*Active Movie*		*QT-VR*	x
ODS (U/A)		*DIB*		*AMR*	x	*Indeo*		*SVG*	x
WAP (U/A)	x	*PCX*		*WMA*	x	*DVI*		*PPT*	x
HTML (U/A)	x	*AI*				*Cinepak*		*ODP*	(x)
XHTML (U/A)		*EPS*				*FLV*		*SMIL*	x
SGML (U/A)		*PSD*				*WMF*	x		
XML (U/A)	x	*SWF*							
PDF	x	*SVG*	x						
		BMP	x						

x = Needed, (x) = Optional

   b. For non Windows PocketPC 2003 Mobile Edition SmartPhone

Text (Where U/A = UNICODE / ASCII)		**Image**		**Audio**		**Video**		**Animation**	
DOC (U/A)		*JPEG*	x	*WAV*	x	*AVI*		*Flash Light*	x
ODT (U/A)		*GIF*	x	*MP3*	x	*RealVideo*	x	*QuickTime*	
TXT (U/A)	x	*PNG*	x	*AIF*	x	*QuickTime*		*Active Movie*	
RTF (U/A)		*TIF*		*PCM*		*MPEG 2/4*	MP4	*GIF*	x
XLS (U/A)		*TGA*		*RealAudio*	x	*Active Movie*		*QT-VR*	
ODS (U/A)		*DIB*		*AMR*	x	*Indeo*		*SVG*	
WAP (U/A)	x	*PCX*		*WMA*		*DVI*		*PPT*	x
HTML (U/A)	x	*AI*				*Cinepak*		*ODP*	
XHTML (U/A)		*EPS*				*FLV*		*SMIL*	(x)
SGML (U/A)		*PSD*				*WMF*			
XML (U/A)		*SWF*							
PDF		*SVG*							
		BMP							

x = Needed, (x) = Optional

15.6.6 The following set of screen resolutions should be supported:

Small		Regular		Wide		Special	
Resolution	**Ratio**	**Resolution**	**Ratio**	**Resolution**	**Ratio**	**Resolution**	**Ratio**
160x120	4/3	640x480	4/3	1280x768	5/3	160x160	1/1
320x240	4/3	1024x768	4/3	1280x1024	5/4	200x200	1/1
		1152x864	4/3			240x320	3/4
		1280x960	4/3			300x300	1/1
						320x320	1/1
						320x480	2/3
						600x600	1/1

x = Needed, (x) = Optional

15.6.7 The following set of formats conversion should be supported:

Conversions (resize)

4/3 -> 4/3	To								
From	160x120	320x240	640x480	1024x768	1152x864	1280x960	1600x1200	1920x1440	2048x1536
160x120	-	-	-	-	-	-	-	-	-
320x240	x	-	-	-	-	-	-	-	-
640x480	x	x	-	-	-	-	-	-	-
1024x768	x	x	x	-	-	-	-	-	-
1152x864	x	x	x	x	-	-	-	-	-
1280x960	x	x	x	x	(x)	-	-	-	-
1600x1200	x	x	x	x	(x)	(x)	-	-	-
1920x1440	x	x	x	x	(x)	(x)	(x)	-	-
2048x1536	x	x	x	x	(x)	(x)	(x)	(x)	-

x = Needed, (x) = Optional, - = Not needed

W -> w	To				
From	1280x768	1280x1024	1600x900	1920x1080	1600x1024
1280x768	-	-	-	-	-
1280x1024	x	-	-	-	-
1600x900	x	x	-	-	-
1920x1080	x	x	(x)	-	-
1600x1024	x	x	(x)	(x)	-

x = Needed, (x) = Optional, - = Not needed

Special	To							
From	160x160	200x200	240x320	300x300	320x320	320x480	600x600	1920x1200
160x160	-	-	-	-	-	-	-	-
200x200	x	-	-	-	-	-	-	-
240x320	x	(x)	-	-	-	-	-	-
300x300	x	(x)		-	-	-	-	-
320x320	x	(x)	x	(x)	-	-	-	-
320x480	x	(x)	x	(x)	x	-	-	-
600x600	x	(x)	x	(x)	x	x	-	-
1920x1200	(x)	(x)	(x)	(x)	(x)	(x)	(x)	-

x = Needed, (x) = Optional, - = Not needed

15.6.8 The following set of formats adaptation should be supported:

Ratio Adaptation (letterbox…)

	To				
From	4/3	5/3	5/4	16/9	25/16
2/3	-	-	-	-	-
3/4	-	-	-	-	-
1/1	-	-	-	-	-

4/3	-	(x)	(x)	x	x
5/3	X	-	(x)	x	x
5/4	X	(x)	-	(x)	(x)
8/5	X	(x)	(x)	(x)	(x)
16/9	X	(x)	(x)	-	(x)
25/16	**X**	(x)	(x)	(x)	-

x = Needed, (x) = Optional, - = Not needed

Resize and Adaptation (letterbox…)

All - > Common		To								
		4/3							5/3	5/4
From		160x120	320x240	640x480	1024x768	1152x864	1280x960	1600x1200	1280x768	1280x1024
1/1	160x160	-	-	-	-	-	-	-	-	-
	200x200	X	-	-	-	-	-	-	-	-
	300x300	X	x	-	-	-	-	-	-	-
	320x320	X	x	-	-	-	-	-	-	-
	600x600	X	x	x	-	-	-	-	-	-
16/9	1600x900	X	x	x	x	(x)	(x)	-	x	x
	1920x1080	X	x	x	x	(x)	(x)	(x)	x	x
2/3	320x480	-	-	-	-	-	-	-	-	-
25/16	1600x1024	X	x	x	x	(x)	(x)	-	-	-
¾	240x320	-	-	-	-	-	-	-	-	-
4/3	160x120	-	-	-	-	-	-	-	-	-
	320x240	X	-	-	-	-	-	-	-	-
	640x480	X	x	-	-	-	-	-	-	-
	1024x768	X	x	x	-	-	-	-	-	-
	1152x864	X	x	x	x	-	-	-	-	-
	1280x960	X	x	x	x	(x)	-	-	-	-
	1600x1200	X	x	x	x	(x)	(x)	-	x	x
	1920x1440	X	x	x	x	(x)	(x)	(x)	x	x
	2048x1536	X	x	x	x	(x)	(x)	(x)	x	x
5/3	1280x768	X	x	x	x	(x)	(x)	(x)	-	-
5/4	1280x1024	X	x	x	x	(x)	(x)	(x)	(x)	-
8/5	1920x1200	X	x	x	x	(x)	(x)	(x)	(x)	(x)

x = Needed, (x) = Optional, - = Not needed

All - > Wide		To					
		16/9		25/16	5/3	5/4	8/5
From		1600x900	1920x1080	1600x1024	1280x768	1280x1024	1920x1200
1/1	160x160	-	-	-	-	-	-
	200x200	-	-	-	-	-	-
	300x300	-	-	-	-	-	-
	320x320	-	-	-	-	-	-
	600x600	-	-	-	-	-	-
16/9	1600x900	-	-	-	x	X	-
	1920x1080	X	-	(x)	x	X	-
2/3	320x480	-	-	-	-	-	-
25/16	1600x1024	X	-	-	-	-	-
¾	240x320	-	-	-	-	-	-
4/3	160x120	-	-	-	-	-	-
	320x240	-	-	-	-	-	-
	640x480	-	-	-	-	-	-
	1024x768	-	-	-	-	-	-
	1152x864	-	-	-	-	-	-
	1280x960	-	-	-	-	-	-
	1600x1200	(x)	(x)	(x)	x	X	-
	1920x1440	(x)	(x)	(x)	x	X	x
	2048x1536	(x)	(x)	(x)	x	X	x
5/3	1280x768	-	-	-	-	-	-
5/4	1280x1024	-	-	-	(x)	-	-
8/5	1920x1200	(x)	(x)	(x)	(x)	(x)	-

x = Needed, (x) = Optional, - = Not needed

All -> Special		To									
		1/1					16/9		2/3	25/16	3/4
From		160x160	200x200	300x300	320x320	600x600	1600x900	1920x1080	320x480	1600x1024	240x320
1/1	160x160	-	-	-	-	-	-	-	-	-	-
	200x200	x	-	-	-	-	-	-	-	-	-
	300x300	x	x	-	-	-	-	-	-	-	-
	320x320	x	x	x	-	-	-	-	-	-	-
	600x600	x	x	x	x	-	-	-	x	-	-
16/9	1600x900	x	x	x	x	x	-	-	x	-	x
	1920x1080	x	x	x	x	x	X	-	x	(x)	x
2/3	320x480	x	x	x	x	-	-	-	-	-	-
25/16	1600x1024	x	x	x	x	x	X	-	x	-	x
¾	240x320	x	x	-	(x)	-	-	-	-	-	-
4/3	160x120	-	-	-	-	-	-	-	-	-	-
	320x240	x	x	x	x	-	-	-	-	-	x
	640x480	x	x	x	x	x	-	-	-	-	x
	1024x768	x	x	x	x	x	-	-	-	-	x
	1152x864	x	x	x	x	x	-	-	-	-	x
	1280x960	x	x	x	x	x	-	-	-	-	x
	1600x1200	x	x	x	x	x	(x)	(x)	x	(x)	x
	1920x1440	x	x	x	x	x	(x)	(x)	x	(x)	x
	2048x1536	x	x	x	x	x	(x)	(x)	x	(x)	x
5/3	1280x768	x	x	x	x	x	-	-	x	-	x
5/4	1280x1024	x	x	x	x	x	-	-	x	-	x
8/5	1920x1200	x	x	x	x	x	(x)	(x)	x	(x)	x

x = Needed, (x) = Optional, - = Not needed

c. .

15.7 DRM support for mobile devices and interoperability

This subject requires scope definition and determination of relevant requirements.
The following should be taken into account for the scope definition:

15.7.1) Define an appropriate set of rules for mobile content protection. Such rules should ensure that the original object protections both when stored locally (on user device) and accessed remotely (server side).

15.7.2) Define the user interface for DRM for mobiles .

- The user interface for the "end-user" should be very simple.
- The user interface for the "administrator" should allow easy definition of operations available for the end user.
- The verification of DRM respect should be easy and lightweight in terms of resources consumption.
- It should be possible to define, from among the available possible purchase modes, the "infinite repetition bound to a specific device" as a purchase option. This latter has to be identified along with its user in an unequivocal manner (for example [[phone-no + SIM] + IMEI] where the parenthesis represent the binding hierarchy) and modifiable under explicit request to service provider following a change in device (new system of the same or different model when possible) or change in SIM due to any valid reason (loss, subtraction, obsolescence…)

15.7.3) Have open architecture for supporting DRM in future standards, which can be implemented on mobile devices (this should not be AXMEDIS primary focus for mobile devices).

15.7.4) Define the licensing model(s) that are acceptable by all parties – content providers, content owners and mobile service providers (such as ILABS, or other companies in the same field) or by mobile operators.

15.7.5) This activity could be expanded into an AXMEDIS consortium to propose to the EU (or even worldwide) the creation of the non-business (non-profit) organization for license management, in which representatives from all interested parties can participate (content owners, providers, service providers and operators).

15.8 Device-Specific Media Adaptation Requirements

General Requirements for Device-Specific Adaptation

The AXDMA is required to structure and resolve any special Mobile Device Characteristics particular to the given user's device plus additional User Customisation Profiles incorporating optional selection from an available set of 2 key Category II profiling sub-sets or singletons as set out below:

a) User's Preferred Device Customisation
b) User's Device Play-Display Special Capabilities

This is also to accommodate the required operational constraints of different handsets in playing the same format because although market competition trends mean that there is a large degree of convergence amongst say the top 10 mobile phones in terms of their play and display capabilities, it is still the case that even for mobile devices accepting the same file format, they could require adaptation of the media to match their differing individual characteristics (e.g. bit-rate, sampling rate, etc) for the media.

One of the most widespread problems in the modern world of mobile devices is the issue of compatibility, support of various formats, and interoperability between different cellular phones. This problem is prevalent for almost all types of cellular devices irrespective of phone manufacturer; (one manufacturer may even produce two incompatible phones; and the problem just multiplies itself when considering multiple manufacturers).

Take, for example, the popular Nokia 3510i cellular phone, the first phone introduced that supports polyphonic ring tones. The announced polyphonic format used for this group of devices is SP-MIDI (Scalable Polyphony MIDI), which is based on the standard MIDI format but with reduced functionality. It was been co-developed by the Nokia Corporation and Beatnik Inc. The initial basic format is termed MIDI-4. Much content was developed for this standard and it has become relatively popular. It can be compared to the more advanced Nokia 7650 cellular phone, which also supports polyphonic ring tones with the improved MIDI-24 standard. The same file, when uploaded to both devices, is played using completely different methods (in some cases even the volume of the tracks is decoded and played differently).

The platform must have the resulting files in all formats, such that the Handset Management Engine can provide "application compatibility" and an opportunity to supply reasonable content quality to the end user

To further illustrate the disparity in handset specifications, consider the following additional details:

A polyphonic ring tone is downloaded to a mobile phone over MMS or WAP, unlike the traditional monophonic ring tone which is downloaded to the phone as an SMS message. Polyphonic tones cannot be sent to other mobile phones. In Europe and the UK subscribers are usually charged for polyphonic tone download via the mobile phone bill. In the United States, polyphonic ring tones are usually paid for with a credit card; some ringtones Web sites also accept payment by Pay Pal. The payment options depend on the service, the operator and the agreement with the subscriber.

B) The AXMEDIS Experimental Scenario Platform (Lex-Mobile) Specific Demonstrator Requirements for Device-Specific Media Adaptation (Handset Management Engine Requirements)

The following is list of requirements for implementing a Handsets Management Engine:

15.8.1) Define the development platform and set of built-in components to be used:
   a. Microsoft Windows 2000 Server.
   b. Learn eXact Mobile (Lex-Mobile) platform.
   c. The Handsets Management Engine should be implemented as an extension of Learn eXact Mobile (Lex-Mobile) platform.
   d. The Handsets Management Engine should be equipped with an AXMEDIS plug-in capable of communicating with the AXMEDIS platform.

15.8.2) Development language(s):
   a. Visual C/C++ compiler and linker (version 3.0 Embedded) for all public components.

b. Other development languages such as ASP, ASP.NET, Java, JSP, etc. to be used for all private components, for example demonstration tools, or any of the internal developments.

15.8.3) Define the data storage: The Handsets Management Engine will use the Learn eXact Mobile (Lex-Mobile) specific data storage to manage information relevant to supported handsets (for the selected telecom network); and map information regarding supported content formats. This will enable the CMS to request only the appropriate formats for the specific user.

15.8.4) **Define the User Interface:**

a. A simple UI is required to have self-configuration capabilities;
b. Whenever possible the UI should be web-based;
c. Whenever possible the interface will integrate plug-ins to manage AXMEDIS specific data or else will rely on AXMEDIS ActiveX to achive the same result.

15.9 Personalisation Engine Requirements

The AXDMA must enable dynamic access to, structuring, update, storage, and integration by the AXCP JS Engine of personal, device and delivery context profile element values. Personalisation Requirements can be seen in practice to demand a capability for profiling management, coupled with a requirement for dynamic collection and evaluation of personal, default and closure values of profile elements depending on the profile element values availability - Profiling Resolution.

Category I User-Specific Profiling Resolution Requirements

The AXDMA is required to structure and resolve Personal Profiles incorporating optional selection from an available set of 6 key Profile sub-sets or singletons as set out below:

a. Name
b. Device Identities:
c. Number of Devices in Use
d. Gender (Title):
e. Age /Date-of-Birth)
f. User's Preferences (Desired Media Types or Specifics)

Category II User-Specific Profiling Resolution Requirements

The AXDMA is required to structure and resolve the Standard Mobile Device Characteristics and User Customisation Profiles incorporating optional selection from an available set of 22 key Category II profiling sub-sets or singletons as set out below:

a. Screen Type
b. Colour Screen
c. Colours,
d. Screen size,
e. Screen resolution
f. Memory Size
g. ROM Size
h. CPU Speed
i. Operating System version,
j. MP3 Player
k. Voice Recording,
l. Interface
m. Infrared
n. Bluetooth
o. WLAN
p. Battery Type
q. Battery Time
r. Weight
s. Built-in Camera
t. Width
u. Height

v. Thickness

The following two device-specific user preferences also come within this category although they are distinguished as Media Adaptation profiles and already included under General Requirements for Device-Specific Adaptation in section 16.8 in this chapter of the document.

a. User's Preferred Device Customisation
b. User's Device Play-Display Special Capabilities

Category III User-specific Profiling Resolution Requirements
The AXDMA is required to structure and resolve the Delivery Context Profiles, incorporating selection from an available set of 7 key Category III profiling sub-sets or singletons as set out below:

a. Location
b. Language
c. UPRM (User's Presently Requested Media, if known specifically)
d. UCRH (User's Content Request History, including unsuccessful requests)
e. UDSC, User's Differentiated Service Classification
f. ZMCP, Zone/Market/Customer-category-Specific Promotional offers (bundles)
g. CMPC, Classified Media Popularity Chart

The AXMEDIS Experimental Scenario Platform (Lex-Mobile) Specific Demonstrator Requirements for Personalised Mobile Distribution

The particular ESP as selected for the next AXMEDIS Demonstrator namely Lex-Mobile will require the integration of a set of built-in components within a specific development platform as follows:

Lex-Mobile Built-in Component Requirements

Lex-Mobile is to incorporate the following built-in components:

a. Microsoft Windows 2000 Server
b. Learn eXact Mobile (Lex-Mobile) Platform
c. The Personalisation Engine should be implemented as an extension of Learn eXact Mobile (Lex-Mobile) Platform
d. The Personalisation Engine should be equipped with an AXMEDIS plug-in capable of communicating with the AXMEDIS Platform

Lex-Mobile ESP User Interface
Lex-Mobile is to incorporate a User-Interface with the following key requirements:

a. A simple UI with self-reconfiguration capabilities
b. Whenever possible the UI should be web-based;
c. Whenever possible the interface will integrate plug-ins to manage AXMEDIS specific data or else will rely on AXMEDIS ActiveX to achieve the same result.

Lex-Mobile Development languages

Lex-Mobile is to use the following Development Environment:

a. Visual C/C++ compiler and linker (version 3.0 Embedded) for all public components.
b. Other development languages such as ASP, ASP.NET, Java, JSP, etc. to be used for all private components, for example demonstration tools, or any of the internal developments.

Lex-Mobile Data Storage Requirements

Lex-Mobile will require the following data storage requirements:

a. The Personalisation Engine will use the Learn eXact Mobile (Lex-Mobile) specific data storage to manage information regarding user preferences, history and groups of interests (for the selected telecom network).

Most telephone users encounter wap/web based applications on a regular basis Many applications are not really satisfactory. This stems from one basic factor: users want to complete the operation as quickly as possible to reduce billing charges, and get off the line. When users find that they requests are not covered by an operator application, they simply hang up. Companies have woken up to this reality, and are investing in major efforts to improve web applications - to reduce airtime and to increase customer satisfaction. In parallel, the personalization should be as dynamic as possible from its inception to provide the most effective service possible. The personalization must address the issue of optimizing menus and methods of accessing the desired content.

Imagine a scenario in which a user wants to download a polyphonic ring tone to his/her device. He/she connects to the system, browses content, and potentially listens to the top-level menu. He/she selects a service: Dedications, Fun Greetings, Icons, Pictures, Ringtones, Polyphonic Ringtones, etc… and then a content catalog. Most systems present a hierarchy of content, starting, for example, with: popular music, folk music, classical music, ethnic music, etc. The user then selects a top-level category and may have to access a lower level or two, until he/she can finally select the actual content. Then he/she must specify the mobile device to which he is uploading or sending the content. If the operator's network supports more than one type of device (as is usually the case), then either the system must determine the type of device, or ask the user to select the device from a list. Without this vital piece of information or with incorrect information, all the effort of navigating through the menus is pointless..

The AXMEDIS platform can revolutionize this process by storing personalized information in the database, which can be automatically retrieved. The information could include history of the user, his preferences, and interest groups, and many other properties. This information could be used to modify the menu flow in order to ensure that the user's navigation is more effective. The platform can promote content to the users and/or suggest a narrow cross-section of content to speed up and enhance navigation - based on the users' history and other users from the same interest groups.

15.10 Integration of ILABS Content Sources to the AXMEDIS Model

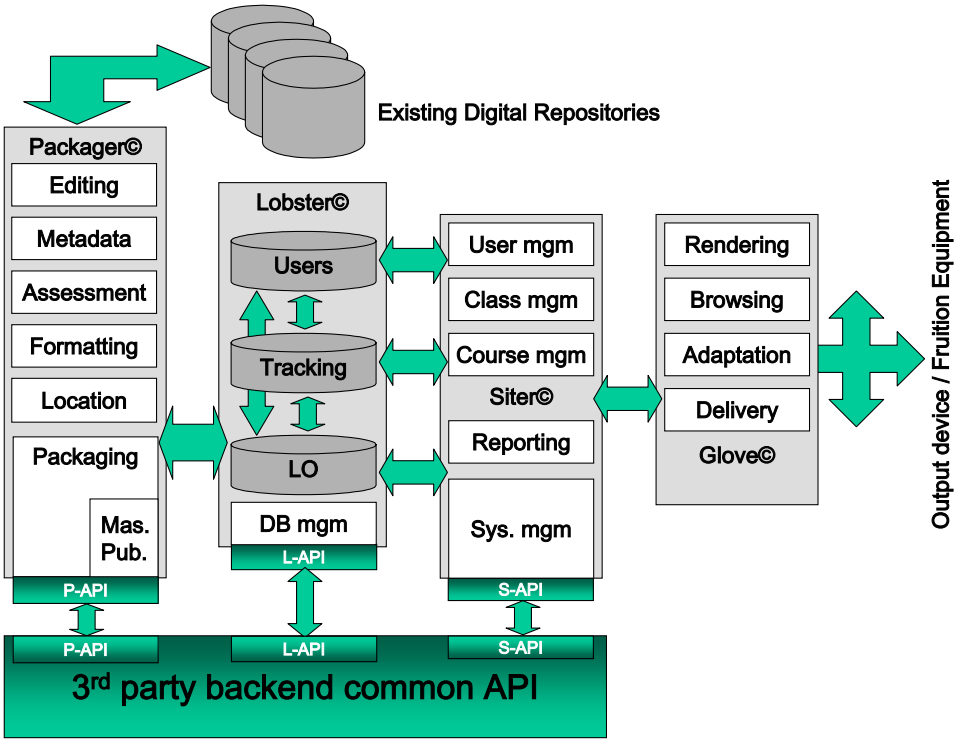
The present section focuses on the integration between AXMEDIS system and *learn eXact® Mobile* (LEX-Mobile). The AXMEDIS system has been described in other relevant documents (reported also in the reference section) it is now time to provide a description of LEX system. LEX is a proprietary environment developed in GIUNTI Interactive Labs during the past ten years and devoted to cover the whole value chain of e-learning publishing and fruition in full compliancy with international standards. The Mobile edition allows management of delivery to mobile devices. Basically it comprises the following elements:

- *Packager©* - the authoring and packaging facility of the *learn eXact®* platform;
- *Lobster©* - the data manager that handles all published content of the *learn eXact®* platform;
- *Siter©* - the e-learning management module of the *learn eXact®* platform;
- *Glove©* - the e-learning rendering and fruition module of the *learn eXact®* platform;
- D-Repository - any repository compliant to the *Digital Repository* standard (WebCT, BlackBoard…)
- Back-end - any existing backend compliant with the set of API exposed by *learn eXact®* platform.

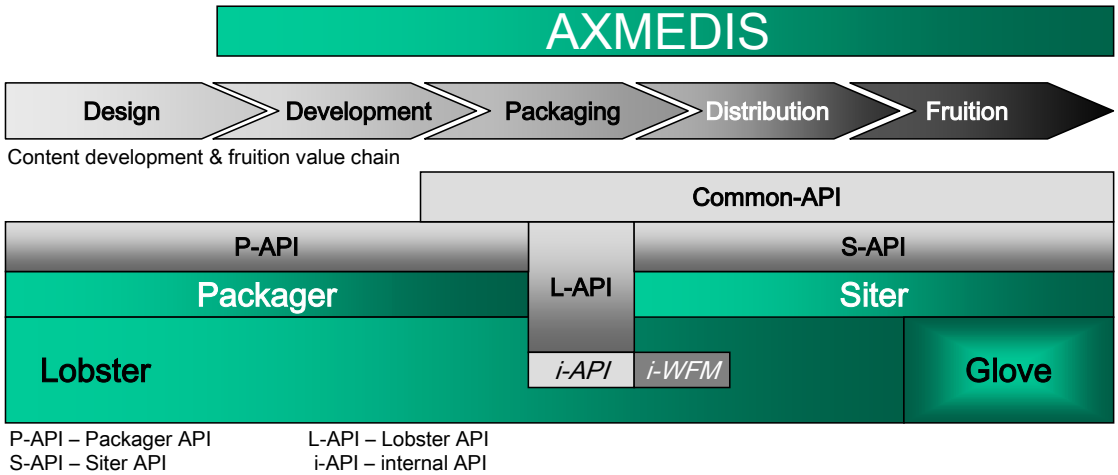
The most relevant aspect in the D-Repository connection is the possibility of using their content either as source or destination of the packaging process as all that is needed is the compatibility with IMS packaging standard. This feature was developed originally to grant users the possibility of continuing to exploit the already existing content sources or distribution facilities and infrastructure even in case of a shift in either production or delivery framework. The same principle is brought to the development of a set of APIs for interconnecting with external back-ends; this is actually the approach that will be followed to allow AXMEDIS empowered production and distribution value chains to be exploited. As stated in the TA it is expected that each distributor may keep on using own distribution media, but should also take advantage of the powerful support provided by AXMEDIS . Given the layered structure of GIUNTI Authoring and Learning Environment, this has been possible operating at API level in the area previously generically

marked as "backend" (for example SAP…). More specifically it has been necessary to define a set of new API to allow AXMEDIS co-operation with the new third party environment.

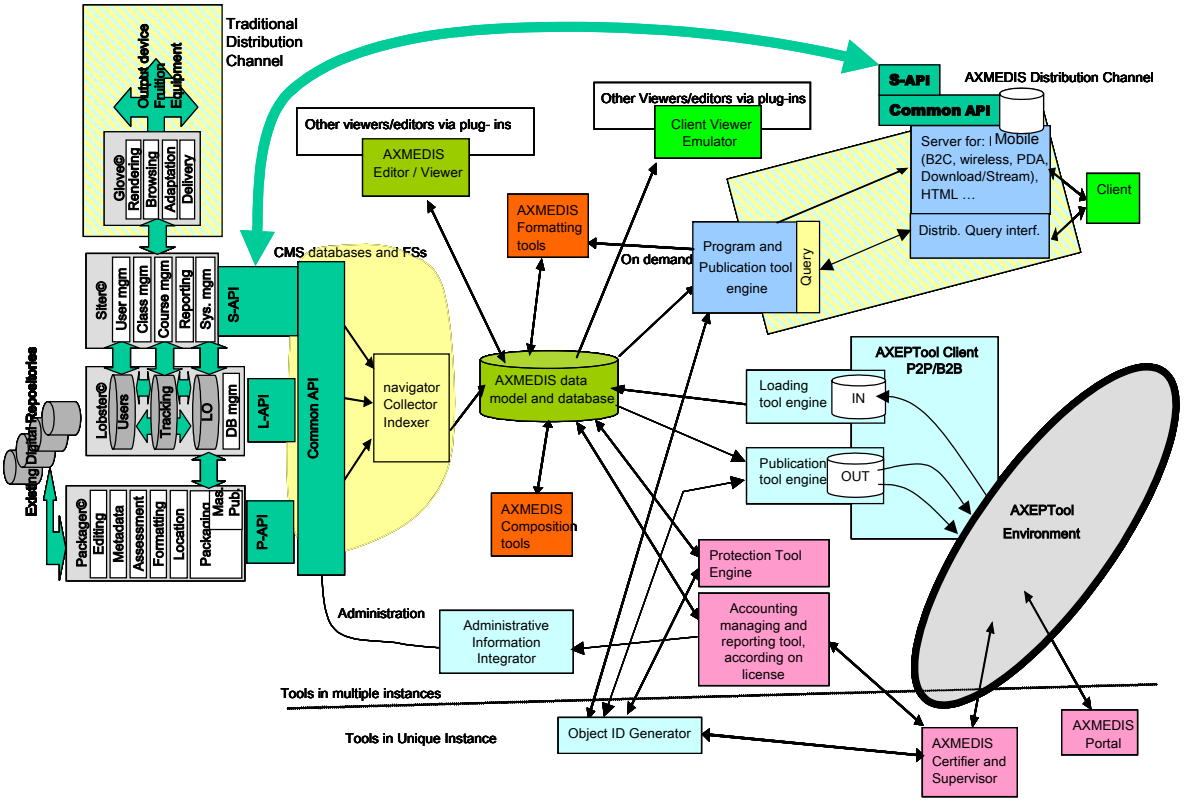
The following schema illustrates the architecture.



From the previous picture it is evident that the two environments always have a "mediated" interaction, and this is achieved through proper APIs sets. Having said this, it is necessary to examine in more detail the level of functionalities covered by the various set of API in respect to the process value-chain. In the following diagram is summarised the possible level of interaction between AXMEDIS as a backend and our environment is presented. The set of common API allow interaction mainly at packaging, distribution and fruition level (at least as far as content delivery is concerned) even though the rendering tool (Glove) is designed only for e-learning purposes and therefore is not compatible with the overall aim if the project. On the other hand during at the design and development phase the possibility of interaction is limited (especially at the design) to data import/export.



From the above schema is evident that the Lobster embeds a workflow management system used to handle cooperative editing of content. The packager can toggle, via internal API, the status of a package (LO for Learning Object or course) between the status of "locked" and "unlocked" while the Siter can manage, via internal API, all states of the package. The internal API is implemented via web-service and it is not exposed to the backend. Having stated this, it is now necessary to see how the overall architecture will look like at the end of the integration phase.



Interaction will basically occur at the level of the CMS and file system thanks to the 3rd party backend common API as highlighted in the picture above. It is worth mentioning that the schema is an adaptation of the one describing AXMEDIS architecture and reported both in the TA and in the framework specifications. The only relevant change is the one depicting the interaction between AXMEDIS (seen here as a backend) and the GIUNTI Authoring and Learning Environment.

16 AXMEDIS for Distribution towards i-TV

16.1 Introduction

EUTELSAT is the most relevant carrier of satellite data broadcast for i-TV. EUTELSAT implements the Satellite Data Broadcast in the OPENSKY service.

Satellite Data Broadcast is a content distribution mechanism that permits the distribution of the AXMEDIS content in a very efficient manner.

This technology allows large quantities of data to be pushed via satellite directly on the user's PC without congesting local networks. The same technology also allows the content providers to bring live multimedia streaming content directly to the user's PC either for free to air content (mainly for marketing purposes) or paying on-demand channels.

The use of this type of data delivery is completely transparent with regard to the AXMEDIS process and only acts as a cost effective and efficient transport mechanism.

The satellite distribution channel can be used for several activities of content distribution for B2C business models:

The push of content

- delivering AXMEDIS content on demand directly to the consumers connected to the satellite i-TV according to their interactive requests;
- delivering AXMEDIS content to the consumers connected to the satellite i-TV-PC according to their selection performed from the programmed content of the day and week;

16.2 General Description

WP4.8 is related to the content distribution, based on satellite data broadcast, towards I-TV[2] client applications. The satellite data broadcast provides a very fast distribution channel[3] that can be very suitable to deliver highly demanded content to a very large audience of users. Moreover, the continuous falling of the prices of hard disks[4] provides the possibility to proactively store a huge amount of content on the client platform, opening up totally new distribution and fruition scenarios based on push content delivery.

In order to effectively exploit the considerable potentials of the satellite distribution, the AXMEDIS framework provides the possibility to adopt this technology both in a B2B and in a B2C scenario. The requirements for the B2C scenario, covering client-side and server-side applications, are provided in the present section.

The satellite distribution enables different delivery paradigms, either in streaming or in download. The following table gives a summary about the main delivery paradigms that do not require streaming or client-side caching.

delivery paradigm	description	back channel	protocol	choice of content	waiting time	notes
Pure push	A predefined carousel of content is built on the server and distributed in broadcast. Users can choose from a list of incoming content the items that shall be downloaded from the carousel at the time they will be actually delivered.	not required	multicast	restricted to the most popular content items	variable (generally several hours)	No feedback from users to optimise the carousel.

[2] Although the term "i-TV" usually identifies a paradigm for distributing applications through the digital TV broadcast, so that they can be downloaded and executed on specifically designed platforms (interactive set-top boxes), in the context of AXMEDIS the term "i-TV" is used to identify a distribution of multimedia content to PCs using a "push" delivery model.

[3] one transponder DVB-S may carry up to 38 Mb/s

[4] today storing 1GB costs less than 1 EUR, in the next 2 years this cost will drop to less than 0,1 EUR

Optimised push	Same as above, but optimised to meet the general preferences of the users. Users profiles are periodically provided by users and are built either automatically or according to explicit votes.	yes (required to send back profiles)	multicast	restricted to the most popular content items	variable (generally several hours)	Improvement of the pure push delivery.
Multicast pull	Users can request any kind of content; however the server will postpone the delivery so that it is possible to satisfy many requests of the same content item with a single delivery, using multicast protocol.	yes (required to send back the wish list and/or votes)	multicast	the whole catalogue	variable (generally several hours)	Provides some kind of near-on-demand service.
Pure pull	Same paradigm as the http download. Data are delivered to clients using either by satellite or by terrestrial connection.	required	Unicast	the whole catalogue	very low	

Possible non-streaming delivery paradigms using satellite distribution

More delivery paradigms are possible when a cache is available on the client platform. More precisely, the client-side cache (and, in general, any client-side content filtering engine) has the effect of disjoining the access paradigm from the distribution paradigm. For instance, a content that is distributed in push can be selectively stored in the cache and consumed later on using an access paradigm that is virtually on-demand.
Moreover, a client-side composition agent could build a totally new content just aggregating some components retrieved from the cache, enabling the possibility to build personalised TV/radio programs or slideshows.
However, the AXMEDIS framework will support only a subset of the many possible delivery and access paradigms that may come out from the above considerations. For instance, no streaming support will be available in the AXMEDIS demonstrators[5].
The following table summarises the application models that will be analysed in order to choose the features supported by AXMEDIS demonstrators.

application	delivery paradigm	description	main research topics	notes
STANDARD T4.8.1	PURE PUSH	At any moment, the AXMEDIS user can access the lists of the AXMEDIS objects available in the carousels and choose to receive any of them (no request and no connection are necessary)	▪ push optimisation ▪ push-pull balancing	

[5] the lack of streaming support in the demonstrators is not due to the inability to support streaming in AXMEDIS

(no cache required)	MULTICAST PULL	The AXMEDIS user votes an AXMEDIS object from the catalogue of latest releases. A high priority carousel is periodically updated to include the most voted objects (e.g. every week the top ten most voted items are put in the carousel). If the voted item is actually in the carousel, it will be automatically downloaded to the user's Hard Disk as soon as it is broadcasted. The AXMEDIS user may also request an AXMEDIS object from a "full catalogue" in order to receive it in multicast, without urgency, through a "low priority" carousel. Requests will be served with a FIFO strategy. The same service can also be used to get lost packages	▪ user profiling ▪ server queue management	
	PURE PULL (Internet)	If the AXMEDIS user requesting an AXMEDIS object from the "full catalogue" does not want to wait, the object can be delivered through Internet.		
CACHED-BASED DISTRIBUTION ON I-TV T4.8.2 (cache required)	OPTIMISED PUSH	Provides a near-on-demand media access from a cache that is periodically updated from a push carousel. The carousel is optimised according to a general user profile. The objects received from the carousel are filtered on the client platform according to the specific user profile. The user can access the cached objects using an on-demand-like paradigm, to play them or to save them to the hard disk.	▪ push optimisation ▪ filtering strategies ▪ caching strategies ▪ user profiling	This service is particularly suitable for not very expert users and for busy people. An additional HD dedicated to the CACHE is suggested
CACHED-BASED PERSONALISED CONTENT DISTRIBUTION T4.8.3 (cache required)	OPTIMISED PUSH	It is based on a client side content aggregation using the object which are already available in the cache (it is an enhancement of the previous application). Provides the possibility to create personalised content directly on the client platform, using as ingredients the AXMEDIS objects that are in the cache.	▪ push optimisation ▪ filtering strategies ▪ caching strategies ▪ user profiling ▪ aggregation strategies	No manipulation of AXMEDIS objects will be done in the client platform. The aggregation will be performed on the fly at the time the object is presented.

Application models supported by AXMEDIS demonstrators

As far as the standard application is concerned, the "catalogue of the latest releases" is a list of the new AXMEDIS objects from the AXEPTool which periodically is available to be voted by the AXMEDIS users. The most voted objects are broadcasted by a "high priority carousel" which occupies most of the available bandwidth. The rest of the bandwidth is dedicated to the broadcasting of a "low priority carousel" containing AXMEDIS objects that had been requested to be delivery not urgently.
The catalogues also include the schedule and, possibly, a free sample of the available AXMEDIS objects.

From a technical point of view, the three application models described in the previous table may be easily integrated in a unique framework. However, commercial opportunities may suggest implementing in the final platform only some of them. Moreover, the AXMEDIS user can choose to activate any configurations, also for a short period of time. For example, a user who usually prefers voting or explicitly requesting AXMEDIS objects, for some time and for some reasons may choose to have some content automatically delivered in the cache, according to his/her profile. This option would be probably preferred by not skilful or by busy people. The same reason may make some users choose the automatic content composition which is the functionality that requires the minor effort at all.

The push optimisation is related to the management of the bandwidth to be used by the "high priority" carousel and the bandwidth which remains for the "low priority" carousel. In order to consider many different situations of the service, dynamic adaptations of the bandwidth will be also analysed.
When an AXMEDIS user subscribes to the service he/she has also to provide some information about his/her preferences. This explicit user profile shall be dynamically and implicitly updated after the actual behaviour

of the user with any of the functionalities summarised in the table. The AXMEDIS broadcast server periodically updates the database of all the AXMEDIS user profiles.

16.3 Server for content distribution on i-TV

16.3.1) A web server shall be available where AXMEDIS users can express their preferences inside a list of proposed AXMEDIS Objects;

16.3.2) Another AXMEDIS partner (i.e. TISCALI), having highly clicked website, could provide its own top-list, then another Push Carousel, including this AXMEDIS top content, could be defined(OPTIONAL);

16.3.3) AXMEDIS Objects in the top list, resulting from the users voting session, shall be sent in push to several users ;

16.3.4) AXMEDIS Info of an Object (Metadata) shall contain some pre-distribution information about Potential Market, Users etc. and not only statistical information ;

16.3.5) An AXMEDIS actor shall play the role of the OPENSKY Publisher ;

16.3.6) An internal server has to be installed in the OPENSKY Platform to join the AXEPTool (P2P network). The AXEPTool has to be compatible with Linux ;

16.3.7) An entity shall produce a query on the AXMEDIS Database for the retrieval of new AXMEDIS Objects ;

16.3.8) An AXMEDIS Object shall be associated to an OPENSKY Package. All information contained in the AXMEDIS Info will be useful to retrieve complementary data for the creation of an OPENSKY Package. The last has the following main describing fields :

- Name
- Description
- Target Public (all, children, adult…)

16.3.9) An AXMEDIS Object / OPENSKY Package shall be associated to an active Program to be transmitted (depending on the result of the voting session for this Package) in multicast to authorized users ;

16.3.10) An AXMEDIS Object / OPENSKY Package, after finishing his transmission session, shall stay still available for future retransmissions via Push and/or Pull (example of Pull transmission is the reparation of lost packets during the Push transmission) (DESIRED).

16.3.11) The lost packets during the transmission of AXMEDIS objects that have been explicitly requested by a user shall be notified to the server; the server shall decide the most effective recovery technique, either based on the retransmission of packets in unicast (via Internet) or redelivering the packets in the subsequent data carousel (OPTIONAL)

16.3.12) The push/pull balancing shall be analysed in order to reduce the average response time. The size of the bandwidth dedicated to the main carousel (broadcasting the top ten AXMEDIS objects of the week) and the remaining bandwidth to be used for the “low priority” carousel (objects explicitly required) shall consider many aspects (the loading situation of the server, the number of AXMEDIS users, the number of requests in the server queue, etc.). Another important factor is related to the percentage of lost packets; for example, if an OPENSKY package has lost 50% of total packets amount and the same situation is present in 80% of the authorized receiving stations then the OPENSKY package will be re-transmitted in Push for all authorized users. If an OPENSKY package has lost 5% of packets amount and the same situation is present in 10% of the authorized receiving stations then each station will ask for re-transmission of packets lost in Pull, individually (DESIRED)

16.4 Client for content distribution on i-TV

16.4.1) The AXMEDIS User shall be able to access the push distribution of AXMEDIS objects, using a Windows-based PC ;

16.4.2) The AXMEDIS Client Application shall have a return channel (e.g. via Internet) in order to:

- Interact with the Server Side for repairing lost packets (DESIRED),
- Sending profiling preferences, etc (DESIRED).
- Manage transactions on AXMEDIS Objects (e.g. acquiring licenses from the AXMEDIS Certifier and Supervisor)
- Provide a feedback to the Push Distributor useful to manage the data carousel (OPTIONAL);

16.4.3) The AXMEDIS Client Application shall have a DVB-S card connected to a satellite dish correctly pointed to the satellite providing OPENSKY Services ;

16.4.4) The AXMEDIS Client Application shall have a DVB-S card correctly installed and configured to:

- Listen on the transponders of OPENSKY
- Filter the right PIDS (Program Identifiers) where AXMEDIS Object are in transmission ;

16.4.5) The AXMEDIS Client Application shall provide an API level to guarantee a full interaction with the OPENSKY application. This integration will allow the OPENSKY users community to access AXMEDIS Objects (DESIRED);

16.4.6) The AXMEDIS Client Application shall be a set of plug-in and possibly a viewer for AXMEDIS Objects: both of this additional elements will be added into a OPENSKY Setup AXMEDIS compatible (DESIRED);

16.4.7) The AXMEDIS Object shall be accessed/manipulated at the end of the push transmission . The AXMEDIS Client Application can move the AXMEDIS Object into a different location of the file-system (DESIRED);

16.4.8) Each AXMEDIS Object shall be stocked in a distinct folder identified by the name of the OPENSKY Package ;

16.4.9) The AXMEDIS User shall be able to view the list of the AXMEDIS objects that are going to be distributed in broadcast in the incoming carousels .

16.4.10) The user shall be able to explicitly request (ask for downloading) some AXMEDIS Objects. These Objects will be available on the user's file system at the time they will be actually delivered by the data carousel. The List shall contain some information (estimated) about the incoming transmission:

- Start Time
- Duration
- Guaranteed bit rate (Speed)
- Size
- Target (User that can play the Content)
- Name
- Short Description
- Publisher Details;

16.4.11) The AXMEDIS User, who has voted for scheduling the AXMEDIS Object, shall receive it automatically without any other manual action (OPTIONAL);

16.4.12) The AXMEDIS User shall be able to open all correctly received AXMEDIS Objects .

16.5 Client for content distribution on i-TV (STB)

16.5.1) Satellite Reception: The STB shall be able to receive DVB digital signal according to ETSI EN 300 421.

16.5.2) Remote control: The STB shall be operated through an infra-red Remote Control (RC) and infra-red keyboard.

16.5.3) Local Storage: The STB shall be equipped with an internal Hard Disk Drive (HDD).

16.5.4) Modem: The STB shall be equipped with a IP connection device able to receive sent IP data (at least V.92 PSTN modem and ADSL modem)

16.5.5) TV output: The STB shall be able to produce PAL TV signal.

16.5.6) Video Scaling: The STB shall be able to display video in a resized 1/16 or ¼ window.

16.5.7) MP3 Audio: The STB shall be able to real time decode MPEG1 Layer 3 audio.

16.5.8) MPEG4 Video: The STB shall be able to real-time decode MPEG4 Video.

16.5.9) Push listener: The STB shall be able to store pushed packages on the local Hard Disk Drive

16.5.10) Push listener: The STB shall store pushed packages in a local subdirectory tree with path /listener/publisher_name/package_name

16.5.11) Push listener : The STB, upon reception of error packages, shall ask the Push system for retransmission of the error data segments

16.5.12) Background: The STB shall be able to display on screen a JPG background plane

16.5.13) File system: The STB file system shall support time and date of the files creation, access, and modification

16.5.14) Storage space policy: The STB shall check available disk space at least once every day and delete pushed packages according to the validity policy INSERT REF! in order to make space of no less than the currently receiving package size
16.5.15) TV format configuration: The STB shall allow the configuration of the output TV aspect ratio parameter
16.5.16) Boot: The STB shall be able to play an MPEG4 video upon startup.
16.5.17) Main Menu: The STB shall enter the main menu at the first RC key hit after startup.
16.5.18) GUI: The STB GUI shall be displayed with a transparent background to show underlying running video.
16.5.19) Menu structure: The menu shall have a tree structure.
16.5.20) Menu navigation: All the STB GUI screens shall accept "Back" input to navigate back to the last screen of the Menu navigation.
16.5.21) Contextual Help: All the STB GUI screens shall open a contextual "Help" when the "Help" button is pressed.
16.5.22) Messaging: The STB GUI screen shall provide an alert to inform the user of the presence of a Message in the Message area
16.5.23) Main Menu (unlogged): Before login the main menu shall contain "Help", "General Catalogue", "UOP", "Login", "New User", "Message Area" and "Setup" entries.
16.5.24) Main Menu (logged): After login the main menu shall contain "Help", "My Contents" and "Logout" entries.
16.5.25) Help: The "Help" entry from the Main Menu shall open an Help window with general description of the application.
16.5.26) General Catalogue: The "General Catalogue" shall consist of a list with columns for (left to right): an Icon, a Text, a Button.
16.5.27) My Contents: The "My Contents" shall consist of a list with columns for (left to right): an Icon, a Text, a Button.
16.5.28) UOP: The "UOP" screen shall present the Current UOP and "Top up" entry.
16.5.29) Login: The "Login" screen shall display input boxes for "Username" and "Password".
16.5.30) STB-30: Logged in: Upon correct insertion of "Username" and "Password" in the "Login" screen, the STB shall enter "My Contents" screen.
16.5.31) New User (Privacy policy): The "New User" screen shall show a text window with the "Privacy policy" (as from INSERT REF!) and the buttons "Accept" "Decline" buttons.
16.5.32) New User (Registration form): The "New User" screen after the "Privacy policy" is accepted shall show the "Registration form" (as from INSERT REF!).
16.5.33) Message Area: The "Message Area" shall present the list of text messages delivered to the logged user.
16.5.34) Setup: The "Setup" menu shall contain "TV Format", "Antenna" and "Dial-up" entries.
16.5.35) Logout: The "Logout" selection shall bring the navigation back to the unlogged Main Menu.
16.5.36) TV - out: The STB shall be fitted with SCART socket for TV output.
16.5.37) USB: The STB shall have at least 2 external USB interface.
16.5.38) IR - in: The STB shall have an Infra Red receiver
16.5.39) ON/OFF: The STB shall have an ON/OFF button on the front side.
16.5.40) Power plug: The STB power cord shall connect to mains by Europlug CEE 7/16.
16.5.41) Fan less: The STB shall be fan less.
16.5.42) Weight: The STB shall weigh no more than 3 Kg.
16.5.43) GUI: The STB shall allow user operation by means of a Graphical User Interface.
16.5.44) RC keys: The STB Remote Control shall have at least Arrow keys (Up, Down, Left, Right), Numeric keys (Digits 0 to 9), Volume control keys (Up and Down), "OK" key, "Back" key, "Help" key, "Mute" key, "On/Off" key, "Home" key, "PageUp" key, "PageDown" key.
16.5.45) Keyboard: The STB shall be able to receive input from a QWERTY keyboard.
16.5.46) ON/OFF RC: The STB shall toggle between full operation and stand-by modes when ON/OFF button is pressed on the Remote control.
16.5.47) ON/OFF STB: The STB shall toggle between full operation and stand-by modes when ON/OFF button is pressed on the STB.
16.5.48) Stand-by: The STB shall be able to receive DVB data while in Stand-by mode.

16.6 Integration and customization EUTELSAT framework to AXMEDIS content

16.6.1) The AXMEDIS Certifier Supervisor shall give complete visibility to the AXMEDIS Distributor concerning transactions made by their users .

16.7 Integration EUTELSAT content sources to AXMEDIS model and tools

16.7.1) All AXMEDIS Object shall have their associated part called AXMEDIS Info (metadata) ;
16.7.2) An AXMEDIS Object shall contain a part of clear content:
16.7.3) User can evaluate his interest to the pushed content

16.8 Adaptation of Clients and Servers to AXMEDIS: aspects of DRM

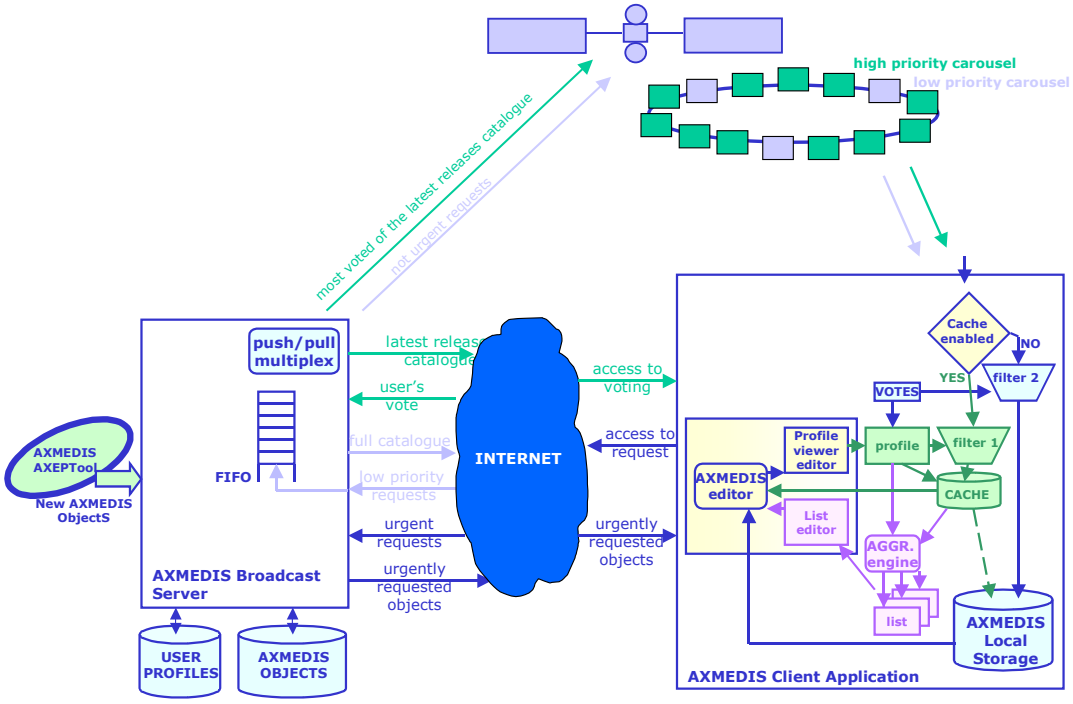
DRM RULES:

16.8.1) distinction by country
16.8.2) expiration of rights after X days/hours from licence delivery
16.8.3) expiration of rights after X days/hours from first play
16.8.4) expiration of rights at a fixed date
16.8.5) counted number of plays (N=1 only once)
16.8.6) unlimited play
16.8.7) free preview for X minutes
16.8.8) low-quality play (it means that the same content is played at different qualities depending on the license...)

DRM FEATURES:

16.8.9) support for audio and video files
16.8.10) support for audio and video streaming
16.8.11) licensing information separate from encoded file (i.e., no re-encoding necessary for new business rules/licenses)
16.8.12) implemented on different platforms
16.8.13) low footprint (memory/CPU)
16.8.14) short and text-encoded authorization requests/messages during the licensing phase (and only few steps) (maybe licensing could be transported over SMS) (DESIRED)
16.8.15) offline licensing (pre-delivery)
16.8.16) non-interactive licensing (simply a message from the server to the client, not an interactive protocol)

16.9 Delivery Management and cache strategies



General Scenario

SERVER APPLICATION REQUIREMENTS:

User profiling

16.9.1) The server application shall fulfil the requirements provided in 17.3.

16.9.2) AXMEDIS objects distributed in the broadcast carousel shall carry additional metadata, that are required for performing client-side filtering.

16.9.3) The server application shall be able to build a predefined carousel, by choosing AXMEDIS objects from an existing pool and according to a given set of rules.

16.9.4) The server application shall be able to provide an optimisation of the carousel as described in 17.3.

16.9.5) The server application shall be able to provide a further optimisation of the carousel on the basis of a collective user profile that resides on the server (DESIRED).

16.9.6) At the beginning of the service, the collective user profile shall be initialised at default status in order to drive the delivery management process ;

16.9.7) The collective user profile shall be built and periodically updated depending on the user profiles that are provided by the clients ;

16.9.8) The server application shall keep a record of individual user profiles and usage history (DESIRED)

16.9.9) The AXMEDIS user profiles in the AXMEDIS Broadcast Server shall be periodically updated according to the history of AXMEDIS user choices and to the user profiles provided by the AXMEDIS Client Applications (DESIRED);

CLIENT APPLICATION REQUIREMENTS:

16.9.10) The client application shall download to a dedicated storage area all AXMEDIS objects received from the carousel. *Notes: (1) this requirement shall be intended as a workaround for separating the parts that are related to the delivery of AXMEDIS objects (covered by the Opensky application described in 17.3) from the parts related to the processing and presentation of AXMEDIS objects (covered by CRS4); (2) the same workaround is assumed for B2B distribution to kiosks.*

16.9.11) An error-free delivery of AXMEDIS objects to the storage area shall be guaranteed. *the server shall be notified about damaged or lost packets, so that it will put in place the most suitable recovery techniques).*

16.9.12) The dedicated storage area shall be structured in a suitable way (e.g. using a tree) in order to organize the different AXMEDIS object types.

16.9.13) Since a single client platform application may be used, at different moments, by different users, an authentication session shall be provided. Also, individual set-up options shall be available to each user. (DESIRED)

16.9.14) The application shall provide a GUI-based set up environment for general initializations such as paths, storage area size, etc..

16.9.15) All AXMEDIS objects that are available in the storage area shall be processed by a filter in the same order they have been downloaded (i.e. the storage area shall behave as a FIFO). *Note: this requirement is justified by the assumption that the storage area is in fact a workaround for developing the demonstrator. In a product-targeted implementation the filtering is actually performed operating directly in a FIFO in memory, not on disk.*

16.9.16) The filter will either accept or discard AXMEDIS objects according to a given filtering algorithm. Discarded objects shall be removed from the storage area. Accepted objects shall be moved to a distinct area, named cache.

16.9.17) No data transfer on disk shall be done when moving objects from the storage area to the cache (i.e. the storage area and the cache should be two distinct views of the same files on disk).

16.9.18) The filtering algorithm shall reduce the amount of AXMEDIS objects that are presented to the user, throwing away those objects that have a lower probability to be consumed.

16.9.19) The filtering algorithm is required to access only the visible part of the AXMEDIS objects .

16.9.20) The behavior of filtering algorithm shall be based on any of the following groups of parameters: content features (i.e. metadata, or features extracted from metadata), usage environment (e.g. date, time, …), usage history (i.e. user choices or some variable derived from these), user profile (either explicit or implicit, e.g. derived from user demographic information).

16.9.21) The set up environment shall provide the possibility to define a basic user profile (DESIRED); the elements involved in this profile are dependent on the filtering algorithm.

16.9.22) The application shall provide a cache management policy that shall decide whether to remove AXMEDIS objects from the cache.

16.9.23) The cache management policy shall be affected by any of the following factors: content type, initial set-up, history of user accesses, user identity and filtering algorithm (DESIRED).

16.9.24) The user shall be able to view the list of AXMEDIS objects in the cache through a GUI.

16.9.25) The list of AXMEDIS objects in the cache shall be organized according to user-defined actions (e.g. changing the order, showing/filtering the list, searching objects, highlighting attributes, etc.) (DESIRED)

16.9.26) The user shall be able to directly manipulate the cache with actions like: deleting objects, cleaning up the cache, etc. (DESIRED).

16.9.27) The AXMEDIS User, depending on the license, shall be able to open and play any AXMEDIS object that is available in the cache *Note: an Internet connection is assumed to be available in order to grant access permission to the AXMEDIS object which was chosen from the cache, according to the DRM rules ; however, such a connection could be probably not necessary to grant the contents access according to the customer permissions. The licences could be previously obtained at the moment of the service subscription.*

16.9.28) The application shall implicitly keep a record of the actions performed on cached AXMEDIS objects, in order to update the usage history.

16.9.29) It shall be possible for the user to provide an explicit rating on cached AXMEDIS objects, so that it can be used for updating the user profile and/or the usage history. (DESIRED). *Note: the use of this data shall depend on the adopted filtering algorithm.*

16.9.30) To prevent the cache management policy to remove AXMEDIS objects from the cache, the user shall be able to lock an object in the cache (DESIRED).

16.9.31) The client application shall periodically send the local user profile and usage history to the AXMEDIS server (DESIRED).

16.9.32) The privacy of the users shall be protected, i.e. the user shall be aware of the profiling information that is sent back to the server and may decide, in the set up environment, to avoid the disclosure of personal information. This may affect the behaviour of filtering algorithms (DESIRED).

16.10 iTV Client Optimisation and onsite Content Integration

The aim of this activity is to study, explore and define new delivery and consumer models based on client-side content composition. More specifically, the research study aims to define and verify algorithms and methods able to produce personalized audiovisual programs and media on demand services by aggregating content, from different sources, directly on the AXMEDIS Client Application. This task requires the Automatic Cache feature because it works with the AXMEDIS objects which are already in the cache.
This application model may be particularly suitable to people that are used to push delivery paradigms like television.
The term "AXMEDIS channel" is used hereafter with the following meaning: "an aggregation of AXMEDIS objects, either temporal or spatial, performed on the client platform directly at presentation time". AXMEDIS channels are accessed in sequence, like normal TV or Radio programs.
This configuration necessarily implies a different business model from the previous applications. In fact, in this case the end user shall pay a subscription (weekly, monthly or yearly) for the AXMEDIS channels and not for each AXMEDIS object included in them.

CLIENT APPLICATION REQUIREMENTS:

16.10.1) The client application shall download to a dedicated storage area all AXMEDIS objects received from the carousel. *Notes: (1) this requirement shall be intended as a workaround for separating the parts that are related to the delivery of AXMEDIS objects (covered by the Opensky application described in 17.3) from the parts related to the processing and presentation of AXMEDIS objects (covered by CRS4); (2) the same workaround is assumed for B2B distribution to kiosks.*

16.10.2) An error-free delivery of AXMEDIS objects to the storage area shall be guaranteed. *Note: this is assured by fulfilling 17.3 (i.e. the server shall be notified about damaged or lost packets, so that it will put in place the most suitable recovery technique).*

16.10.3) The dedicated storage area shall be structured in a suitable way (e.g. using a tree) in order to organize the different AXMEDIS object types.

16.10.4) Since a single client platform application may be used, at different moments, by different users, an authentication session shall be provided. Also, individual set-up options shall be available to each user. (DESIRED)

16.10.5) The application shall provide a GUI-based set up environment for general initializations such as paths, storage area size, etc..

16.10.6) All AXMEDIS objects that are available in the storage area shall be processed by a filter in the same order they have been downloaded (i.e. the storage area shall behave as a FIFO). *Note: this requirement is justified by the assumption that the storage area is in fact a workaround for developing the demonstrator. In a product-targeted implementation the filtering is actually performed operating directly in a FIFO (in memory, not on disk).*

16.10.7) The filter will either accept or discard AXMEDIS objects according to a given filtering algorithm. Discarded objects shall be removed from the storage area. Accepted objects shall be moved to a distinct area, named cache.

16.10.8) No data transfer on disk shall be done when moving objects from the storage area to the cache (i.e. the storage area and the cache should be two distinct views of the same files on disk) ;

16.10.9) The filtering algorithm shall reduce the amount of AXMEDIS objects that are presented to the user, throwing away those objects that have a lower probability to be consumed.

16.10.10) The filtering algorithm is required to access only to the visible part of the AXMEDIS objects .

16.10.11) The behavior of filtering algorithm shall be based on any of the following groups of parameters: content features (i.e. metadata, or features extracted from metadata), usage environment (e.g. date, time, …), usage history (i.e. user choices or some variable derived from these), user profile (either explicit or implicit, e.g. derived from user demographic information).

16.10.12) The set up environment shall provide the possibility to define a basic user profile (DESIRED); the elements involved in this profile are dependent on the filtering algorithm.

16.10.13) The application shall provide a cache management policy that shall decide whether to remove AXMEDIS objects from the cache. This could imply possible channels updating/redefinition actions.
16.10.14) The cache management policy shall be affected by any of the following factors: content type, initial set-up, history of user accesses, user identity and filtering algorithm (DESIRED).
16.10.15) The user shall be able to view the list of AXMEDIS objects in the cache and the available channels through a GUI.
16.10.16) The list of AXMEDIS objects in the cache and the available channels shall be organized according to user-defined actions (e.g. changing the order, showing/filtering the list, searching objects, highlighting attributes, etc.) (DESIRED).
16.10.17) The user shall be able to directly manipulate the cache with actions like: deleting objects, cleaning up the cache, etc. (DESIRED).
16.10.18) The AXMEDIS User, depending on the license, shall be able to make use of the AXMEDIS channels.
16.10.19) The client application shall provide an aggregation engine that shall automatically build a set of predefined AXMEDIS channels using the AXMEDIS objects that are available in the cache ; *Note: the client application shall be able to adapt and interpret scripts (e.g.SMIL-compliant) carried by AXMEDIS objects, delegating the rendering of audio-visual content to specific modules already available.*
16.10.20) The aggregation engine shall continuously monitor the actual cache content in order to build, according to the DRM rules and user permissions, the best possible AXMEDIS channel (DESIRED).
16.10.21) Three kind of AXMEDIS channels shall be available:
- Radio channel (play lists), composed by a temporal sequence of audio objects;
- TV channel, composed by a temporal sequence of audiovisual objects;
- TV-portal channel, composed by the spatial aggregation of a TV with some real-time textual/graphics content (DESIRED).

16.10.22) A certain number of default AXMEDIS channels shall be available (e.g., 3 radio channels, 3 TV channels, and 1 TV-portal channel) according to a default user profile .
16.10.23) The set up environment shall allow the AXMEDIS user to personalize the AXMEDIS channels (DESIRED).
16.10.24) The AXMEDIS channels shall provide some of the typical VCR functionalities (e.i, playback, rewind, fast-forward, pause) (DESIRED).
16.10.25) The rewind functionality shall be granted only for a limited period of time (e.g. 1 hour) (DESIRED); after this time the AXMEDIS object could not be in the cache any more.
16.10.26) The AXMEDIS user shall be able to record some events in the hard disk (podcast-like functionality), according to the DRM rules (DESIRED).
16.10.27) The AXMEDIS User shall be able to view a list of the available AXMEDIS channels .

17 AXMEDIS for Distribution to PDA via Kiosks

In this section are presented the basic requirements for the described scenario. Some of these requirements are in strict dependency with requirements described before when describing other platform components (more specifically editing, formatting, composing and securing).

17.1 Server for content distribution on PDA

17.1.1) High power computation ability to manage
   i. Content description
   ii. Content adaptation
17.1.2) Storage of catalogue with object preview has to be available
17.1.3) Storage for object selected in the chart has to be available
17.1.4) A maximum size for downloadable object has to be defined in relation to each target device to ensure download feasibility
17.1.5) A maximum number for locally stored AXMEDIS Object per category has to be defined to ensure reasonable update time
17.1.6) The max number of locally available stored AXMEDIS Object has to be adaptive and dependent on object average dimension
17.1.7) The server has to be capable to handle in parallel system update and customer service
17.1.8) The server needs a secure connection for economic transaction
17.1.9) Catalogue upgrade/ change should be synchronised with kiosk operation to avoid problems during purchase transactions
17.1.10) The server has to be remotely controlled (optional)
17.1.11) The server has to receive AXMEDIS software components (including updates) and AXMEDIS rules via the AXMEDIS framework.
17.1.12) Storage consumption has to be remotely manageable and statistics should be kept for maintenance
17.1.13) System services and functionalities have to be remotely controlled at least in terms of availability
17.1.14) Content delivery should always happen in secure mode
17.1.15) Fruition on delivery platform should be conditioned by availability of proper decoding tools (to be distributed with content if absent on target platform)
17.1.16) Catalogue and content customisation (in terms of delivery format, quality, chunking, protection…) has to be managed on the server side or eventually at the source while preparing specialised content
17.1.17) The server is equipped with a Web Server (for example IIS 5.0) and a framework for the software execution (for example .NET framework)
17.1.18) The server should equipped with an AXMEDIS License generator tool to create license for user devices
17.1.19) The client device cannot access internet except for aspects related to interaction with PMS and AXCS via the server or to specified URL in tunnelling mode.
17.1.20) The server has a Multilanguage application
17.1.21) The server needs a local repository to store information related to Kiosk application
17.1.22) The server has a Windows 2000 or XP operating system
17.1.23) The server has to install the satellite AXMEDIS tool to receive in push the catalogue on a scheduled basis

17.2 Integration & customisation of ILABS platform for content management with AXMEDIS content

In order to ensure the more profitable integration of AXMEDIS content into ILABS CMS is necessary to take into account that ILABS CMS is natively based on XML and LO-LOM objects. This implies that there should be defined a proper mapping procedure and processing guidelines for the usage of ILABS Massive publisher to proper populate ILABS CMS with AXMEDIS content. To achieve the reverse process it could be possible to adopt the reverse process. In the rest of this section are pointed out the most relevant point to tackle to ensure feasibility of the proposed approach

17.2.1) AXMEDIS content should be described and structured in XML according to IEEE-LO/LOM, IMS, IMS CP, AICC and SCORM standards.

17.2.2) When an object to be imported embeds objects, low level constraints have to be apparent at the outer level (AMEDIS Object Metadata) so to avoid acquisition / import of objects that may turn out to be unusable during the aggregation or processing step to be carried out inside the company that has acquired the object. Examples of this low level constraints are:

- A photography course embedding images ruled by exclusive resale agreement in specific market,
- A history of art course embedding a nude may be restricted in certain countries,
- A history of rock embedding info on the Kiss cannot be sold in Germany with their original logo.

17.2.3) Samples data structures and management methods should be provided for all kind of basic and combined assets as specified in the following section related to content sources.

17.2.4) the following operations will be applied for management of the local system:

i. Insert
ii. Extract
iii. Preview
iv. Save
v. Protect
vi. De-protect
vii. Group
viii. Ungroup
ix. Search
x. Export
xi. Import

Definitely they will be possible if the DRM allows it but at the same time is necessary that they are performed onto the object by company tools therefore proper plug-ins are necessary in order to maintain and respect present interoperability with platforms like WebCt, Blackboard… and keep compliancy with IEEE-LO/LOM, IMS, AICC and SCORM standards.

17.3 Integration of ILABS content sources and formats with AXMEDIS models & tools

17.3.1) AXMEDIS content related models, structures, classes, methods and hierarchies should be exposed

17.3.2) Proper API provided with samples for primary content category should be provided

17.3.3) The following kind of objects (both raw and combined) should be available:

ii. Raw assets
  - Text
  - Images
  - Audio
  - Video (actual shot)
  - Animation (synthetic)

iii. Combined assets (basic)
  - Text + Images (image & caption eventually in multi language)
  - Text + Audio (audio & subtitles eventually in multi language)
  - Text + Images + Audio (image & caption + narrator voice and subtitles)
  - Audio + Text (audio & subtitles in multi language)
  - Animation + Text (animation + subtitles in multi language)
  - Video + Text (video + subtitles in multi language)
  - Generic LO (HTML based)
  - Generic LO (Flash based)

iv. Combined objects (advanced)
  - Multimedia presentation embedding sets of raw assets
  - Multimedia presentations composed of basic combined objects
  - Generic course (HTML based and composed of generic LO)
  - Generic course (Flash based and composed of generic LO)

Note: this is the list of object that our system can handle. Each of them has metadata associated and their usage is usually regulated via specific acquisition contracts. In the LOM standard © and IPR related issues are dealt with only via basic info as owner and contributor. There is no room for DRM that has to be external and, therefore should be merged at time of conversion into AXMEDIS format. If such operation is done at single asset level then when aggregating back structured content constraints should be exposed. Take also into account that IMS, AICC and SCORM standard are implemented differently into different platforms therefore to grant content reusability into several platforms like WebCt and Blackboard the LO/course has to be strictly respecting the standard and DRM metadata will be lost if embedded as not part of the standard itself.

17.3.4) The following set of formats should be supported:

a. For PC based Point of Presence (POP)

Text (Where U/A = UNICODE / ASCII)		**Image**		**Audio**		**Video**		**Animation**	
DOC (U/A)	x	*JPEG*	x	*WAV*	x	*AVI*	x	*Flash*	x
ODT (U/A)	x	*GIF*	x	*MP3*	x	*RealVideo*	x	*QuickTime*	x
TXT (U/A)	x	*PNG*	x	*AIF*	x	*QuickTime*	x	*Active Movie*	
RTF (U/A)	x	*TIF*	x	*PCM*	x	*MPEG 2/4*	x	*GIF*	x
XLS (U/A)	x	*TGA*	x	*RealAudio*	x	*Active Movie*	x	*QT-VR*	x
ODS (U/A)	x	*DIB*	x	*AMR*	x	*Indeo*	x	*SVG*	x
WAP (U/A)	NA	*PCX*	x	*WMA*	x	*DVI*	x	*PPT*	x
HTML (U/A)	x	*AI*	x			*Cinepak*	x	*ODP*	(x)
XHTML (U/A)	x	*EPS*	x			*FLV*	x	*SMIL*	x
SGML (U/A)	x	*PSD*	x			*WMF*	x		
XML (U/A)	x	*SWF*	x						
PDF	x	*SVG*	x						
		BMP	x						

x = Needed, (x) = Optional

b. For PDA based Point of Presence (POP)

Text (Where U/A = UNICODE / ASCII)		**Image**		**Audio**		**Video**		**Animation**	
DOC (U/A)	x	*JPEG*	x	*WAV*	x	*AVI*	x	*Flash*	x
ODT (U/A)		*GIF*	x	*MP3*	x	*RealVideo*	x	*QuickTime*	x
TXT (U/A)	x	*PNG*	x	*AIF*	x	*QuickTime*	x	*Active Movie*	
RTF (U/A)		*TIF*	x	*PCM*	x	*MPEG 2/4*	4	*GIF*	x
XLS (U/A)	x	*TGA*		*RealAudio*	x	*Active Movie*		*QT-VR*	x
ODS (U/A)		*DIB*		*AMR*	x	*Indeo*		*SVG*	x
WAP (U/A)	x	*PCX*		*WMA*	x	*DVI*		*PPT*	x
HTML (U/A)	x	*AI*				*Cinepak*		*ODP*	(x)
XHTML (U/A)		*EPS*				*FLV*		*SMIL*	x
SGML (U/A)		*PSD*				*WMF*	x		
XML (U/A)	x	*SWF*							
PDF	x	*SVG*	x						
		BMP	x						

x = Needed, (x) = Optional

c. For SmartPhone based Point of Presence (POP)

Text (Where U/A = UNICODE / ASCII)		**Image**		**Audio**		**Video**		**Animation**	
DOC (U/A)		*JPEG*	x	*WAV*	x	*AVI*		*Flash Light*	x

ODT (U/A)		*GIF*	x	*MP3*	x	*RealVideo*	x	*QuickTime*	
TXT (U/A)	x	*PNG*	x	*AIF*	x	*QuickTime*		*Active Movie*	
RTF (U/A)		*TIF*		*PCM*		*MPEG 2/4*	MP4	*GIF*	x
XLS (U/A)		*TGA*		*RealAudio*	x	*Active Movie*		*QT-VR*	
ODS (U/A)		*DIB*		*AMR*	x	*Indeo*		*SVG*	
WAP (U/A)	x	*PCX*		*WMA*		*DVI*		*PPT*	x
HTML (U/A)	x	*AI*				*Cinepak*		*ODP*	
XHTML (U/A)		*EPS*				*FLV*		*SMIL*	(x)
SGML (U/A)		*PSD*				*WMF*			
XML (U/A)		*SWF*							
PDF		*SVG*							
		BMP							

x = Needed, (x) = Optional

17.3.5) The following set of screen resolutions should be supported:

a) For PC based Point of Presence (POP)

Small		**Regular**		**Wide**		**Special**	
Resolution	**Ratio**	**Resolution**	**Ratio**	**Resolution**	**Ratio**	**Resolution**	**Ratio**
160x120	4/3	640x480	4/3	1280x768	5/3	160x160	1/1
320x240	4/3	1024x768	4/3	1280x1024	5/4	200x200	1/1
		1152x864	4/3	1600x900	16/9	240x320	3/4
		1280x960	4/3	1920x1080	16/9	300x300	1/1
		1600x1200	4/3	1600x1024	25/16	320x320	1/1
		1920x1440	4/3			320x480	2/3
		2048x1536	4/3			600x600	1/1
						1920x1200	8/5

x = Needed, (x) = Optional

b) For PDA/SmartPhone based Point of Presence (POP)

Small		**Regular**		**Wide**		**Special**	
Resolution	**Ratio**	**Resolution**	**Ratio**	**Resolution**	**Ratio**	**Resolution**	**Ratio**
160x120	4/3	640x480	4/3	1280x768	5/3	160x160	1/1
320x240	4/3	1024x768	4/3	1280x1024	5/4	200x200	1/1
		1152x864	4/3			240x320	3/4
		1280x960	4/3			300x300	1/1
						320x320	1/1
						320x480	2/3
						600x600	1/1

x = Needed, (x) = Optional

17.3.6) The following set of formats conversion should be supported:

Conversions (resize)

4/3 -> 4/3	**To**								
From	160x120	320x240	640x480	1024x768	1152x864	1280x960	1600x1200	1920x1440	2048x1536
160x120	-	-	-	-	-	-	-	-	-
320x240	x	-	-	-	-	-	-	-	-
640x480	x	x	-	-	-	-	-	-	-
1024x768	x	x	x	-	-	-	-	-	-
1152x864	x	x	x	x	-	-	-	-	-
1280x960	x	x	x	x	(x)	-	-	-	-
1600x1200	x	x	x	x	(x)	(x)	-	-	-

1920x1440	x	x	x	x	(x)	(x)	(x)	-	-
2048x1536	x	x	x	x	(x)	(x)	(x)	(x)	-

x = Needed, (x) = Optional, - = Not needed

w -> w	**To**				
From	1280x768	1280x1024	1600x900	1920x1080	1600x1024
1280x768	-	-	-	-	-
1280x1024	x	-	-	-	-
1600x900	x	x	-	-	-
1920x1080	x	x	(x)	-	-
1600x1024	x	x	(x)	(x)	-

x = Needed, (x) = Optional, - = Not needed

Special	**To**							
From	160x160	200x200	240x320	300x300	320x320	320x480	600x600	1920x1200
160x160	-	-	-	-	-	-	-	-
200x200	x	-	-	-	-	-	-	-
240x320	x	(x)	-	-	-	-	-	-
300x300	x	(x)		-	-	-	-	-
320x320	x	(x)	x	(x)	-	-	-	-
320x480	x	(x)	x	(x)	x	-	-	-
600x600	x	(x)	x	(x)	x	x	-	-
1920x1200	(x)	(x)	(x)	(x)	(x)	(x)	(x)	-

x = Needed, (x) = Optional, - = Not needed

17.3.7) The following set of formats adaptation should be supported:

Ratio Adaptation (letterbox…)

	To				
From	4/3	5/3	5/4	16/9	25/16
2/3	-	-	-	-	-
3/4	-	-	-	-	-
1/1	-	-	-	-	-
4/3	-	(x)	(x)	x	x
5/3	x	-	(x)	x	x
5/4	x	(x)	-	(x)	(x)
8/5	x	(x)	(x)	(x)	(x)
16/9	x	(x)	(x)	-	(x)
25/16	**x**	(x)	(x)	(x)	-

x = Needed, (x) = Optional, - = Not needed

Resize and Adaptation (letterbox…)

All - > Common		**To**								
		4/3							5/3	5/4
From		160x120	320x240	640x480	1024x768	1152x864	1280x960	1600x1200	1280x768	1280x1024
1/1	160x160	-	-	-	-	-	-	-	-	-
	200x200	x	-	-	-	-	-	-	-	-
	300x300	x	x	-	-	-	-	-	-	-
	320x320	x	x	-	-	-	-	-	-	-
	600x600	x	x	x	-	-	-	-	-	-
16/9	1600x900	x	x	x	x	(x)	(x)	-	x	x
	1920x1080	x	x	x	x	(x)	(x)	(x)	x	x
2/3	320x480	-	-	-	-	-	-	-	-	-
25/16	1600x1024	x	x	x	x	(x)	(x)	-	-	-
3/4	240x320	-	-	-	-	-	-	-	-	-
4/3	160x120	-	-	-	-	-	-	-	-	-
	320x240	x	-	-	-	-	-	-	-	-
	640x480	x	x	-	-	-	-	-	-	-
	1024x768	x	x	x	-	-	-	-	-	-
	1152x864	x	x	x	x	-	-	-	-	-
	1280x960	x	x	x	x	(x)	-	-	-	-
	1600x1200	x	x	x	x	(x)	(x)	-	x	x
	1920x1440	x	x	x	x	(x)	(x)	(x)	x	x
	2048x1536	x	x	x	x	(x)	(x)	(x)	x	x

5/3	1280x768	x	x	x	x	(x)	(x)	(x)	-	-
5/4	1280x1024	x	x	x	x	(x)	(x)	(x)	(x)	-
8/5	1920x1200	x	x	x	x	(x)	(x)	(x)	(x)	(x)

x = Needed, (x) = Optional, - = Not needed

All - > Wide		To					
		16/9		25/16	5/3	5/4	8/5
From		1600x900	1920x1080	1600x1024	1280x768	1280x1024	1920x1200
1/1	160x160	-	-	-	-	-	-
	200x200	-	-	-	-	-	-
	300x300	-	-	-	-	-	-
	320x320	-	-	-	-	-	-
	600x600	-	-	-	-	-	-
16/9	1600x900	-	-	-	x	x	-
	1920x1080	x	-	(x)	x	x	-
2/3	320x480	-	-	-	-	-	-
25/16	1600x1024	x	-	-	-	-	-
3/4	240x320	-	-	-	-	-	-
4/3	160x120	-	-	-	-	-	-
	320x240	-	-	-	-	-	-
	640x480	-	-	-	-	-	-
	1024x768	-	-	-	-	-	-
	1152x864	-	-	-	-	-	-
	1280x960	-	-	-	-	-	-
	1600x1200	(x)	(x)	(x)	x	x	-
	1920x1440	(x)	(x)	(x)	x	x	x
	2048x1536	(x)	(x)	(x)	x	x	x
5/3	1280x768	-	-	-	-	-	-
5/4	1280x1024	-	-	-	(x)	-	-
8/5	1920x1200	(x)	(x)	(x)	(x)	(x)	-

x = Needed, (x) = Optional, - = Not needed

All -> Special		To									
		1/1					16/9		2/3	25/16	3/4
From		160x160	200x200	300x300	320x320	600x600	1600x900	1920x1080	320x480	1600x1024	240x320
1/1	160x160	-	-	-	-	-	-	-	-	-	-
	200x200	x	-	-	-	-	-	-	-	-	-
	300x300	x	x	-	-	-	-	-	-	-	-
	320x320	x	x	x	-	-	-	-	-	-	-
	600x600	x	x	x	x	-	-	-	x	-	-
16/9	1600x900	x	x	x	x	x	-	-	x	-	x
	1920x1080	x	x	x	x	x	x	-	x	(x)	x
2/3	320x480	x	x	x	x	-	-	-	-	-	-
25/16	1600x1024	x	x	x	x	x	x	-	x	-	x
3/4	240x320	x	x	-	(x)	-	-	-	-	-	-
4/3	160x120	-	-	-	-	-	-	-	-	-	-
	320x240	x	x	x	x	-	-	-	-	-	x
	640x480	x	x	x	x	x	-	-	-	-	x
	1024x768	x	x	x	x	x	-	-	-	-	x
	1152x864	x	x	x	x	x	-	-	-	-	x
	1280x960	x	x	x	x	x	-	-	-	-	x
	1600x1200	x	x	x	x	x	(x)	(x)	x	(x)	x
	1920x1440	x	x	x	x	x	(x)	(x)	x	(x)	x
	2048x1536	x	x	x	x	x	(x)	(x)	x	(x)	x
5/3	1280x768	x	x	x	x	x	-	-	x	-	x
5/4	1280x1024	x	x	x	x	x	-	-	x	-	x
8/5	1920x1200	x	x	x	x	x	(x)	(x)	x	(x)	x

x = Needed, (x) = Optional, - = Not needed

17.3.8) The following set of tools should be supported:

Audio	Video	Image	Text	Animation	3D	HTML

					modeling	**layout**
Sound Forge	AVID	Photoshop	Word	Flash MX	Maya	Learn eXact Packager
Audacity	Final Cut Pro	Adobe Illustrator	Open Office		3D Studio Max	Dreamweaver MX
	After Effects	Adobe InDesign				

17.4 Adaptation of ILABS pay per use clients & servers to AXMEDIS aspects of DRM

17.4.1) For each item should be possible to describe the following data

i. © Declaration / Disclaimer
ii. © Owner
iii. IPR owner
iv. Other special rights
v. Price policy
vi. Usage policy
vii. Special needs

17.4.2) For price policy should be possible to define:

i. Market of usage
ii. Country of usage
iii. Type of usage
iv. Base price
v. Discount policy

17.4.3) For Usage policy should be possible to define:

i. Sale to end user
ii. Sale to retailer
iii. Sale to publisher
iv. Country of usage
v. Type of usage

17.4.4) At least the set of objects specified in the section related to content sources should be manageable individually.

17.4.5) AXMEDIS content related DRM structures, classes, methods and hierarchies should be exposed. This means that when an object to be imported embeds objects low level constraints have to apparent at the outer level so to avoid acquisition / import of objects that may turn out to be unusable during the aggregation or processing step to be carried out inside the company that has acquired the object. Take into account that a course can be composed of tens of LOs, a.LO can be in turn composed of tens of components. They can have multiple organisations and each component (down to raw asset) may have metadata. Moreover if the LO is SCORM it can be traceable that means that there are a set of API embedded into the object that interact with the fruition system to report and collect data on the operations performed by the user in terms of fruition. In terms of DRM this may imply the possibility to change LO delivery format from SCORM to IMS or AICC (here delivery is a specific term of the mentioned standards related to LCMS and means how the user will be managing the fruition on the content and not the standard meaning of AXMEDIS .

17.4.6) Proper API towards the DRM engine should be provided with samples for both raw and combined object

17.5 Optimization of content distribution (push and pull balance)

User profile should reflect a simple set of definition and usage rules that will simplify the overall process and minimise the impact of privacy related issues. User identification should be dome via indirect media to avoid issues related to privacy and sensible data management.

17.5.1) Personal data should be limited and stored in a safe manner

17.5.2) Connection to a third trusted party to manage customer identification
17.5.3) Connection to a clearing house to handle economic transactions
17.5.4) Presence / absence of fruition tools on delivery platform should be verified
17.5.5) User profile info should be used to promote to customer newly available content
17.5.6) Promotion message should be soft
17.5.7) User should be able to stop at any time push information services
17.5.8) No content can be delivered but just pre-view
17.5.9) Content should be delivered with no pull information inside
17.5.10) Content should be delivered in secure mode
17.5.11) Content visualisation tools should be delivered to customer if not already available
17.5.12) Device identification should be unique and un-ambiguous

18 AXMEDIS WWW Portal Requirements

18.1 General description

As stated in the Annex I, the AXMEDIS portal is the general service front end to users, playing a fundamental role in the technical infrastructure and in the implementation of synergies among distribution channels for classical music digital content.
The web portal will be the main front end for the customers (those that can be interested to join the AXMEDIS framework). It will be designed and organized to attract potential users through an appealing and efficient user interface. The usability characteristics of the web portal will be well studied so that the visual aspect of the web pages can be easy to use and efficient. During the development of web pages, the different market segments and user profiles will be taken under consideration so that the appearance of the web portal is interesting for frequent web users and easy and attractive for people who are less familiar with this media. This is very important since the project, which is mainly based on editorial production and distribution, must take care about the brand and the image on the market. So logo, icons, colours, shapes and sound have to be appealing and unique in such a way that they can be a strong element in the marketing and dissemination phase.

The **main roles of the AXMEDIS portal** are the following:

- Providing technical information to contractors, affiliated partners, user group members etc.: software components, test cases, discussion lists, documents, guidelines, etc.;
- Providing information and access point to who is interested to join the AXMEDIS initiative
- Providing administrative information for the contractors;
- Providing support for research institutions interested to join AXMEDIS and to contribute to its development;.
- Disseminating the information of AXMEDIS and providing some demonstrator;
- Providing support to companies and institutions that will be involved in the take up actions;

The Annex I note that: "the AXMEDIS Portal is NOT a super database of the contents. The content is stored into the databases of the Content Providers and distributors".

The AXMEDIS web site will be implemented using PHP modules and MySql database on an Apache server. The web site will be compatible with any other web server and should be moved on a Microsoft IIS web server as well. The style sheet technology was used to guarantee an uniform model and style of the site layout. The entire code will be projected, implemented, and tested by Exitech. The main reason for doing so is that we like to have a very high level of site personalization. Anyway if one or more commercial or third party tool will be found guaranteeing all the web site requirements in a better manner it may substitute our code.

The web site or at least some selected parts should be validated respecting of the W3C standards (HTML 4.0, CSS and accessibility) by using W3C validation tools or equivalents.

The AXMEDIS web site will be divided in four main areas:

- (i) public area,
- (ii) user group area, (private)
- (iii) affiliated area, (private)
- (iv) contractors. (private)

Each area has to provide specific content and services as described in the following. The private sections should have the same modalities we are already familiar with or similar to the MUSICNETWORK portal, while being more structured and functional.
The web page access will be free for the public area and controlled for the other. Members will have access to the hole web site including the contractors area. The affiliated area member cannot access the contractors area and the UG area members cannot access the other private areas.

The web site will manage several type of access:

- Anonymous
- User Group member
- Affiliated
- Contractor
- Public area administrator
- User group area administrator
- Affiliated area administrator
- Contractors area administrator
- Contractors activity administrator
- Webmaster

The following services were identified for the web site:

- Information on AXMEDIS (multilingual – 6 languages)
- Information on UG activity
- Information on Affiliated activity
- Information on Contractors activity
- Mailing list for discussion of problems
- Upload and download of documents
- Contractors and affiliated web pages
- Event and fairs announcements and registration
- Test cases database
- Trial applications and tests results
- Identification of major sources of information
- WEB site search engine (html, .pdf, .ps, .doc file format and database content)
- WAI accessibility for some selected parts of the web site
- W3C standard compliance for some selected parts of the web site
- Newsletter service and newsletter archive browsing
- News service, top ten news, top ten downloaded documents, etc.
- Web site statistics, documents, logs, etc.
- Collaborative area
- CVS availability
- Opening and closing operation for activities,

18.2 Private side for the CONTRACTORS, (private access):

The contractor area will be accessible only to the contractors. In order to become a contractors area member the user has to contact the webmaster and after the project coordinator confirms the access will be activated. The main characteristics of the contractors area are:

- A structure divided in ACTIVITIES with news and documents for each activity. New activities can be added dynamically by one contractors area administrator.

Each of them has to provide

- documents upload for that task, automatically will be accessible for all the CONTRACTORS in the global list. For each upload a message is automatically added and displayed into the activity news and posted on the mailing list indicated by the responsible, see below.
- download of document of the ACTIVITY
- specific blobs posted
- a responsible that has to administrate the documents cataloguing, has to maintain the main HTML page of the activity and to state which mailing list(s) has to receive an email for each news or document posted.
- A main html activity page with
  - last posted public documents
  - most requested public documents

- Possible activities could be: CA, WP1, Dissemination, events, etc.

- On the Left Menu and at the general level for all Contractor
  - Messages to be posted on the internal NEWS/BLOGS
  - Access to the AXMEDIS CVS
    - For cooperative work on sources of the AXMEDIS framework
  - Access to the Contractors web pages, only internally accessible, but granting the possibility to perform autonomous changes by each individual contractor
    - One home page for each contractor for names, emails, fax, of people involved, roles, link to their web pages and activities, any links to relevant document into the AXMEDIS database, see below, etc.
  - Access to add new events in the list
  - Change of profile, non (?) change of mailing list subscription
  - Access to send a email to the mailing list: CONTRACTOR, AFFILIATED, PARTICIPANTS, USER GROUPS
  - List of the available documents by alphabetic or date ordering with the evidence in which ACTIVITY has been posted
  - Search in the database of documents and html pages
  - Access to the list of ACTIVITIES Archive
  - Access to the list of Running ACTIVITIES

- For the contractors area administrators more services will be available:
  - Creation of a new ACTIVITY and related framework
  - Close an Activity (pass it from running Activities to the Activities Archive)
  - Control for polishing lists and the above services
  - Monitoring access and producing statistics
  - Change the access to document granting the access of a document to CONTRACTORS, AFFILIATED, USER GROUP or PUBLIC. In those cases the related list of document is updated.
  - See the list of registered people at the several levels
  - Allow to a Contractors area member to administrate an activity (create a Contractors activity administrator

- The Contractors activity administrator will access the tool for the activity administration. It will be possible to:
  - Manage the activity documents (organise, delete or move documents)
  - Maintain the activity html pages
  - View the activity statistics (web page access, activity mailing lists)
  - Close an Activity (pass it from running Activities to the Activities Archive)

- The Contractors area will have several mailing lists or reflectors
  - AXMEDIS , generic, for all the contractors
  - AX-TEC: for research and technical aspects,
  - AX-ADM: for administrative aspects
  - Other mailing lists can be activated if needed (dissemination, management, assessment)
  - Any kind of communication among partners for the AXMEDIS framework have to go through these mailing lists.
  - The mailing list subscription will be managed by the contractors area administrator. Any request for adding or removing people from the mailing lists has to be sent to her/him.
  - Only the contractors subscribed to a mailing list can send a mail to the other subscriber. If a message arrives from an unknown email address it will be ignored.

- Area for cooperative work on documents, (like BSCW or NUXEO)
  - It has to be integrated with the ACTIVITIES support above

18.3 AFFILIATED Area (private)

The access to the affiliated area will be grant to the affiliated area members and to the contractors area member.

For the affiliated area the following services will be provided:

- the information will be a selection of what stated above,
  - Messages to be posted on the internal Affiliated NEWS
  - Access to part of AXMEDIS CVS
  - Access to the Affiliated web pages, only internally accessible, but granting the possibility to perform autonomous changes by each individual affiliated
    - One home page for each affiliated for names, emails, fax, of people involved, roles, link to their web pages and activities, any links to relevant document into the AXMEDIS database, see below, etc.
  - Change of profile, non change of mailing list subscription
  - Affiliated mailing list
  - Documents upload/download
  - Search in the database of documents and html pages (not into the contractors area)
  - Area for cooperative work on documents

- For the affiliated area administrators more services will be available:
  - Control for polishing lists and the above services
  - Monitoring access and producing statistics
  - Change the access to document granting the access of a document to CONTRACTORS, AFFILIATED, USER GROUP or PUBLIC. In those cases the related list of document is updated.
  - See the list of registered people at the several levels

18.4 Private side for the USERGROUP:

- the information will be a selection of what stated above

The need to have:

  - a specific mailing lists
  - Upload and download of documents into the affiliated area
  - The access to the contractors and affiliated documents will be as decided during upload by the Contractors or Affiliated
  - Area for cooperative work on documents
  - a list of questionnaires to give some answers
  - search on all documents, but access to only those marked as USERGROUP or PUBLIC

- As usual for the UG area administrators more services have to be available:
  - Control for polishing lists and the above services
  - Monitoring access and producing statistics
  - Change the access to document granting the access of a document to CONTRACTORS, AFFILIATED, USER GROUP or PUBLIC. In those cases the related list of document is updated.
  - See the list of registered people at the several levels

18.5 Public side accessible to PUBLIC:

- Menu on the left
  - Description
    - general information of the project
  - AXMEDIS Framework
    - Architecture, Purposes, etc
  - Dissemination
    - download of the press release, a sort of draft flyer
  - Demonstrations

        - Some download possible, etc.. connection to demos
    - Downloads
        - Of document and tools
    - Events and conferences
    - Contacts
        - contacts and main people list
    - Partners
        - list of the Contractors with their logos
        - please start to provide the logo collection
    - Affiliated partners (those that have signed during the registration to be visible)
    - Registration rules
        - How to become affiliated, real access to the AXMEDIS information
        - How to become participants, simple registration on the newsletter
    - Links
    - Statistics
    - Private area info

- Services visible on the first page
    - Immediate description in several languages
    - news
    - last posted public documents
    - most requested public documents
    - registration to the mailing list
    - mailing lists for all the affiliated
    - request of information, send an email to me
    - Search in PUBLIC documents and web pages

18.6 Main service characteristics

18.6.1 Documents Download

For downloading a documents the user has to use the download item into the services menu. Both the four areas documents and the activities documents index will be displayed. It is possible to browse into the structure and view/download any document.

18.6.2 Documents Upload

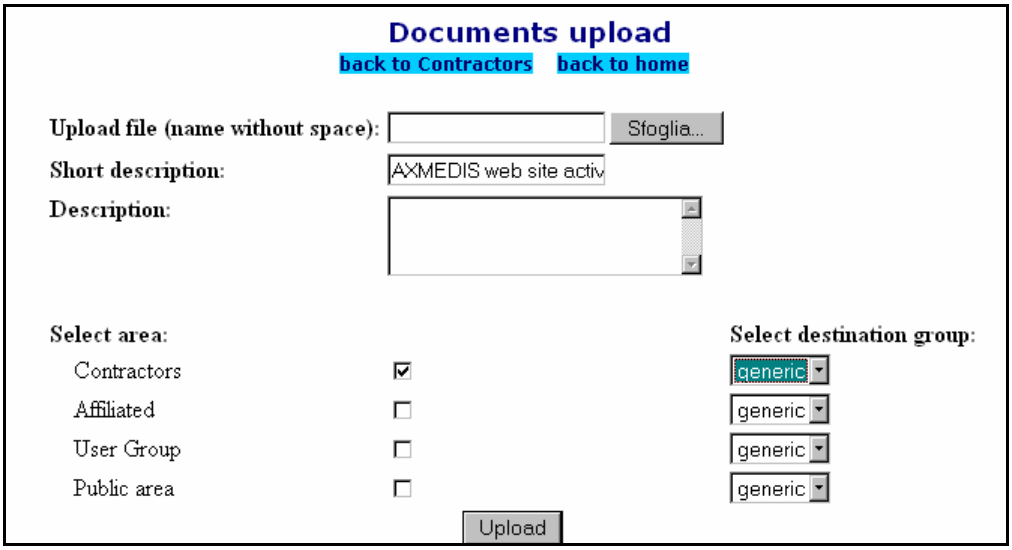
Any user who has an account on the AXMEDIS web site may upload a document in his own area or into the other areas like shown into the next table:

User is Member of:	Upload available into the
Contractors	Contractors area, activities, Affiliated area, User group area, Public area
Affiliated	Affiliated area, User group area, Public area
UG	User group area, Public area

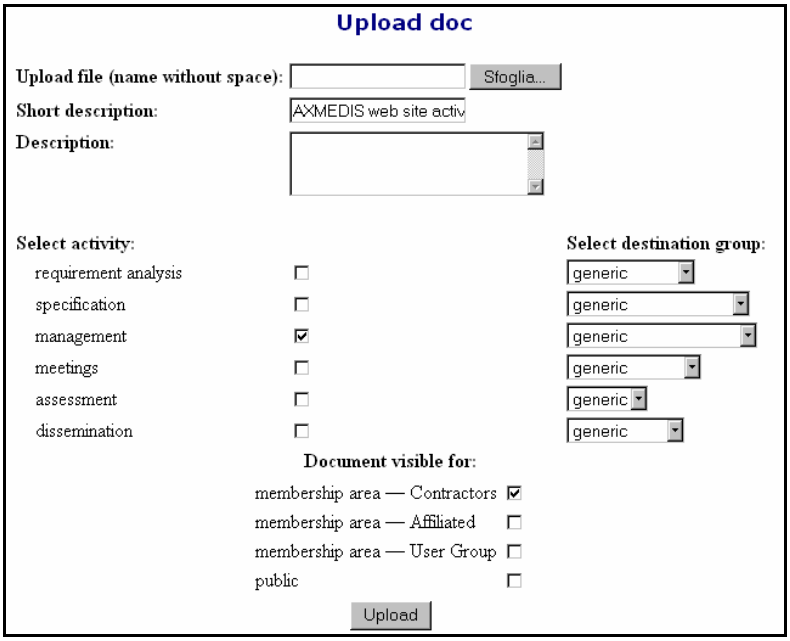
The anonymous user cannot upload documents.

For accessing to the uploading service the user has to access the web site, perform the login and choose the upload doc into the Services menu.

Into the next window browse for the file to be uploaded (name without space), insert the document short description (to be shown into the top ten or other short lists), then the complete description. Choose the areas where the document has to be viewed and the relative destination group. The same document may be uploaded into all the four areas (no copies will be created but only the several accesses will be created).



The activities documents can be uploaded by accessing any activity into the Contractors Area. Use the upload document link for having the next window:



The same steps have to be followed paying attention to select the activities and the correct destination group.

18.6.3 Web search engine

A service offered by the AXMEDIS web site is the search engine. The engine will be chosen in order to fulfil requirements like the capability to perform database search and to allow some protection on the result (in case the user is not registered), possibility of personalization, etc.
Search engine requirements:

- Perform search into the html file
- Perform search into the txt file
- No search into the php code
- Allows to eliminate some directory from the search path
- Allows search into a part of the database (messages)

18.6.4 Mailing lists

Several mailing lists have to be set up at different levels. Any web site area will have one or more mailing lists. The members of contractors area, according to the CA, will be automatically added to one or more mailing lists. The members of the other areas will accept an agreement when the subscription will be done.
The mailing lists have to respect the following requirements:

- Only subscribers can send emails to the mailing list
- Some antivirus scan will be perform on the messages
- Some controls will be performed to eliminate vacancy message propagation
- The email addresses for members of contractor area mailing lists will be loaded from the database so the user can change at any time his/her address by accessing the edit profile service

18.6.5 User Profile

The user profile allows the web site registered users to update the personal information.
The only field that cannot be changed by the user is the account. It can be changed only by the webmaster.
The profile will collect several information like:

- First name
- Second name
- Country
- Email
- Website
- Title
- Affiliation
- Type of affiliation
- Type of role
- Area of role
- Contact information (phone, fax, ecc.)

18.6.6 Contractors and Affiliated web pages

The members of the contractors area and the members of the affiliated area will have the possibility to fill a web page on the AXMEDIS web site.
The web pages are generated one for each affiliation (company). Any company has to define a person who will administer the web page.
Information like company contacts, overview on the activity, description of products can be inserted into these pages.
The pages could be activated on request.

18.6.7 CVS

A CVS have to be set up in order to allow the work on the same source code. The CVS system will be choose after the evaluation of:

- Reliability capabilities
- Transfer security
- Binary file management
- Rule definition capability
- Access rights managements capability
- Costs (several freeware are available)

18.6.8 Cooperative work environment

The AXMEDIS users need to use a collaborative environment in order to perform the cooperative documents editing. In order to do it the tool have to fulfil a set of requirements like:

- Reliability capabilities
- Transfer security

- Office file management (doc, xls, ppt)
- Access rights managements capability
- Workflow capability
- Costs
-

19 Appendix

19.1 Content Management Systems used by the partners

AXMEDIS – CMSs -V1-2							
N.	**Participant short name**	**Country**	**CMS**	**DBMS**	**Content stored in**	**Notes**	**CMS Platform**
1	**DSI**	Italy	X				Windows XP
1 bis	**DIPITA**	Italy	X				Windows 2000 Professional, GNU/Linux Mandrake 10 + GNU/Linux Slackware 10.
2	**AFI**	Italy	in-house developed CMS written in PHP	MySQL		Development in progress	Windows XP
3	**ANSC**	Italy	XML CMS based on Extraway engine	Extraway (XML DBMS)		Development in progress	Windows 2000 prof. XP for new Pc's 2 Macs with Mac OS 9.2 (planning MAC OS X)
4	**YYY**	Israel	YYY Content Management System	Oracle 8.1.7	File System only		Windows 2000 Server
5	**EPFL**	Switzerland	X				Windows XP
6	**EUTELSAT**	France	Eutelsat Multicast Toolkit (EMT)	Postgresql v. 7.4.5	File System		Linux RedHat 7.3 and upper
7	**FHGIGD**	Germany	X				Windows 2000, Solaris and Linux (SuSE 9).
8	**ILABS**	Italy	LEX - learn eXact(c)	Tamino	File System	Plan to change to a relational DBMS	Win32 based platforms
9	**HP**	Italy	HP proprietary CMS, which is part of the HP DMP	MSSQL or ORACLE	FILE SYSTEM		
10	**XX**	UK	own CMS called RMS (Royalty Management System).	SQL2000	File System		Windows 2000 / Windows XP
11	**TISCALI**	Italy	XAURA	MySQL or ORACLE	DBMS (some images) File System for multimedia (mainly	now migrating to new version XAURA 2	primarily Linux (also SUN Solaris & Windows Server 2000)

					Network Appliance Net Filer technology)		
12	**FUPF**	Spain	X				
13	**XIM**	UK	in-house developed CMS written in PHP	MySQL	File system	considering migrating to ZOPE	Red Hat Linux (7+)
14	**CRS4**	Italy	X				
15	**ACIT**	Germany	X				Windows 2000
16	**SEJER**	France	proprietary CMS for XML repository, another one for media content	Oracle 9i for XML repository, SQL2000 for media (images, video, flash, director)	XML in DBMS media in FILE SYSTEM		Windows 2000 and Windows Server 2003
17	**UNIVLEEDS**	UK	No CMS		File System	In future Zope	Windows XP. * 2x 3TB NAS Win. Server2003 * linux boxes with Fedora Core 2 kernel 2.6.x * a Mac OSX
18	**IRC**	UK	X				Windows XP
19	**CPR**	Italy	docPile (doc. management) PhProjekt (groupware + cms) TUTOS (the same as PhProjekt).	MySQL, Postgres			Linux (Debian e Slackware) W2003 server with SQLserver
20	**EXITECH**	Italy	WEDELMUSIC	MySQL, 4thDimension	File System	To be completed	Windows XP

19.2 Composition & Formatting Tools used by the partners

AXMEDIS – Information from Contractors -V1-1

Participant short name	multimedia content formatting tools	multimedia content automatic production tools	multimedia content protection / DMR	multimedia content format	specific hardware	platform operating system	notes
DSI	X	X	X	X	X		
DIPITA	X	X	X	X	X		
AFI	Audio file	**Produce** PEAK DECK PRO-TOOLS ITUNESo **Video post production** FINAL CUT	Any audio track produced should include the ISRC code which allow to identify main info on that track (country of production, original producer, year of the issue, identification number)	**Audio** MP3 MP4 AIFF WAV **Video** MPEG **Image** JPG	MAC for production and post production MAC and WINDOWS for the net	MAC OS X 10.3.5	
ANSC	Audio file Image file	None automatic Wave Lab for audio		**Audio** MP3 AIFF WAV **Video** MPEG WMV **Image** TIFF JPG	MAC (MAC OS 9.2) PC (Windows 2000 and XP)	Windows 2000 pro Windows XP Mac OS 9.2 (in future MAC OS X)	
YYYY	YYYY Content Management System	YYYY Content Management System and 3rd-party studios supplies content in the required formats	no preference	**Audio** WAV a/u-law PCM Microsoft WMA **Video** no preference		Windows 2000 Server	
EPFL	X	X	X	X	X	Windows XP Linux (RedHat 9, SuSE 9)	
EUTELSAT	Eutelsat Multicast Toolkit (EMT) with internal modules: Secure Data Broadcast (SDT), Corporate TV (CTV), Private Live Broadcast (PLB).	Windows Media Encoder Niagara (preferred)	Windows Media Technology DRM We want to find, in the AXMEDIS context, something of more OPEN and STANDARD and NOT	Windows Media Technology WMV WMA Real QuickTime.		Linux RedHat 7.3 and upper Linux Fedora Core 2 Windows Media Encoder/Server,	

			OWNERSHIP of a single company			Windows Media DRM Encoder/Licenser	
FHGIGD	X	X	X	X	X	Windows 2000 Solaris and Linux (SuSE 9)	compatibility using Java
ILABS	**Image** Photoshop, Adobe Illustrator, Adobe InDesign **HTML layout** Learn eXact Packager **Web animation** Flash MX **3D modeling** Maya 3D Studio Max	Adobe Premiere Learn eXact Packager	None DMR Verisign Certificates will be adopted for usage with SDK Learn eXact & Tamino internal tools	**Audio** WAV MP3 **Video** AVI MPEG Flash **Image** JPEG GIF PNG TIF	P3/P4 adequately equipped MM-PC	Windows 2000 Windows XP	
HP	HP DMP (Distributed Media Platform) hasn't embedded tools for editing and formatting contents	HP DMP hasn't an embedded multimedia content production tool		Any content type is manipulated by HP DMP			
XX	**Audio** WindowsMedia Encoder (v8, 9) **Image** Photoshop Fireworks	Our own content production applications	WindowsMedia DRM	**Audio** WMA **Image** JPG	Dell servers with Quad Xeon processors	Windows 2000 Windows XP	**Tools in-house** XX Ripper XX Transcoder XX Packager / Packaging on Demand (PoD)
TISCALI	**HTML layout** general purpose text editors Macromedia Dreamweaver MX Homesite Microsoft Front Page Flash MX **Encoding** Windows Media Encoder Helix Producer	mainly internally developed tools devoted to video capture (based on Adobe Premiere) and multi-encoding (based on Windows Media SDK and Helix Producer)	Microsoft Windows Media Rights Manager	**Audio** Windows Media Audio **Video** AVI Windows Media Video Real Media Video **Image** Jpeg Gif Tiff psd	Dell Optiplex workstations and Dell Power Edge servers. HP EVO notebooks In addition, for video encoding we also have a wide range of input and switch devices including DV, BetaSP, DVD, Digi-Beta, S-VHS, VHS players from main manufacturers (Sony, Panasonic, Philips and others).	Windows 2000 Windows XP	
FUPF	X	X	X	X	X		
XIM	**Image** Photoshop Illustrator **HTML layout** Dreamweaver MX **Web animation** Flash MX **Video editing** Final Cut Pro	**Production** iMovie iPhoto iDVD **batch video format conversion** Apple Compressor / Discreet Cleaner	none	**Audio** Authoring AIFF/SD2 Publishing MP3 AAC Real Audio MP3 embedded in Flash SWF	Apple Macs (dual G5s, powerbook G4s), all OS X 10.3. Windows XP/98 machines for web content testing **Audio** MOTU audio interfaces **Video** firewire DV in-house	Mac OS X 10.3	

	Video compositing and effects After Effects **3D modelling and rendering** Maya **Audio** Digital Performer 4 (with various plugins) PEAK			**Video** Authoring QuickTime Publishing MPEG4 WindowsMedia RealMedia Flash FLV **Image** Authoring TIFF/PSD/AI Publishing JPG GIF SWF	**Format conversions** BetaSP DigiBeta		
CRS4	X	X	X	X	X		
ACIT	Adobe Photoshop Adobe Acrobat Corel Draw Dreamweaver MX	None	none	**Audio** MP3 WAV **Video** Realmedia MPEG **Image** JPEG GIF		Windows 2000 Windows XP	
SEJER	**Compression** Sorenson Squeeze **Uncompressed** AVI / WAV High res. Mpeg / mp3	Cygwin GNU tools (zip, sed, perl, GNU Make,) MS Tools	Proprietary file/stream format based on bluefish (protection) and zip(compression) libraries We have developed our own encoder and our own mozilla client decoder (Protocol Handler)	**Audio** SWF MP3 **Video** SWF MPEG **Image** basic JPEG **Document** XHTML (MathML, SVG, CSS, javascript) **Mozilla framework** XUL RDF	Simple PC's	Windows 2000 Windows XP Linux platform to use Cygwin Mac OS X (external partners)	
UNIVLEEDS	X	X	X	X	X	Windows XP 2x 3TB NAS running Windows server 2003 linux boxes with Fedora Core 2 kernel 2.6.x a Mac OSX but just to interface to a PowerPhaseFX+ digital camera back	
IRC	**Image** Photoshop	Windows Movie Maker	none	**Video** QuickTime in MPEG4	Dell Optiplex Machines	Windows 2000	

	HTML layout Dreamweaver MX **Web animation** Flash MX; **3D modelling** Maya			WindowsMedia Flash FLV **Images** Photoshop in GIF, JPEG, etc	GX280 and other Dell Workstations running Windows XP/98, Sony VIAs as mobile workstations & HP Palm top for location-sensitive mobile content services request & delivery testing etc..	Windows XP	
CPR	X	X	X	X	X		
EXITECH	Wedelmusic MS Tools Adobe Tools	Wedelmusic MS Tools	Wedelmusic	Wedelmusic **Audio** WAV MP3 **Video** AVI MPEG Fl **Image** JPEG GIF PNG TIF	Windows XP / 2000 or Linux on PC		

19.3 Workflow Scenarios for Production Processes of Digital Multimedia Objects and Costs

The AXMEDIS Workflow Management System (WFMS) is to identify and coordinate the deployment of actors, tools, AXMEDIS Objects and resources in order to enhance the efficiency of multimedia Production and Distribution processes. These activities can be then directed to a worker (user) to complete the assigned activities or if the activities require no human intervention, then they are done automatically by invoking the required tools through the WFMS.

In the following , the typical sequences of workflow processes for the production and distribution of multimedia objects in the three distinct sectors namely music, interactive e-media and e-books are described.

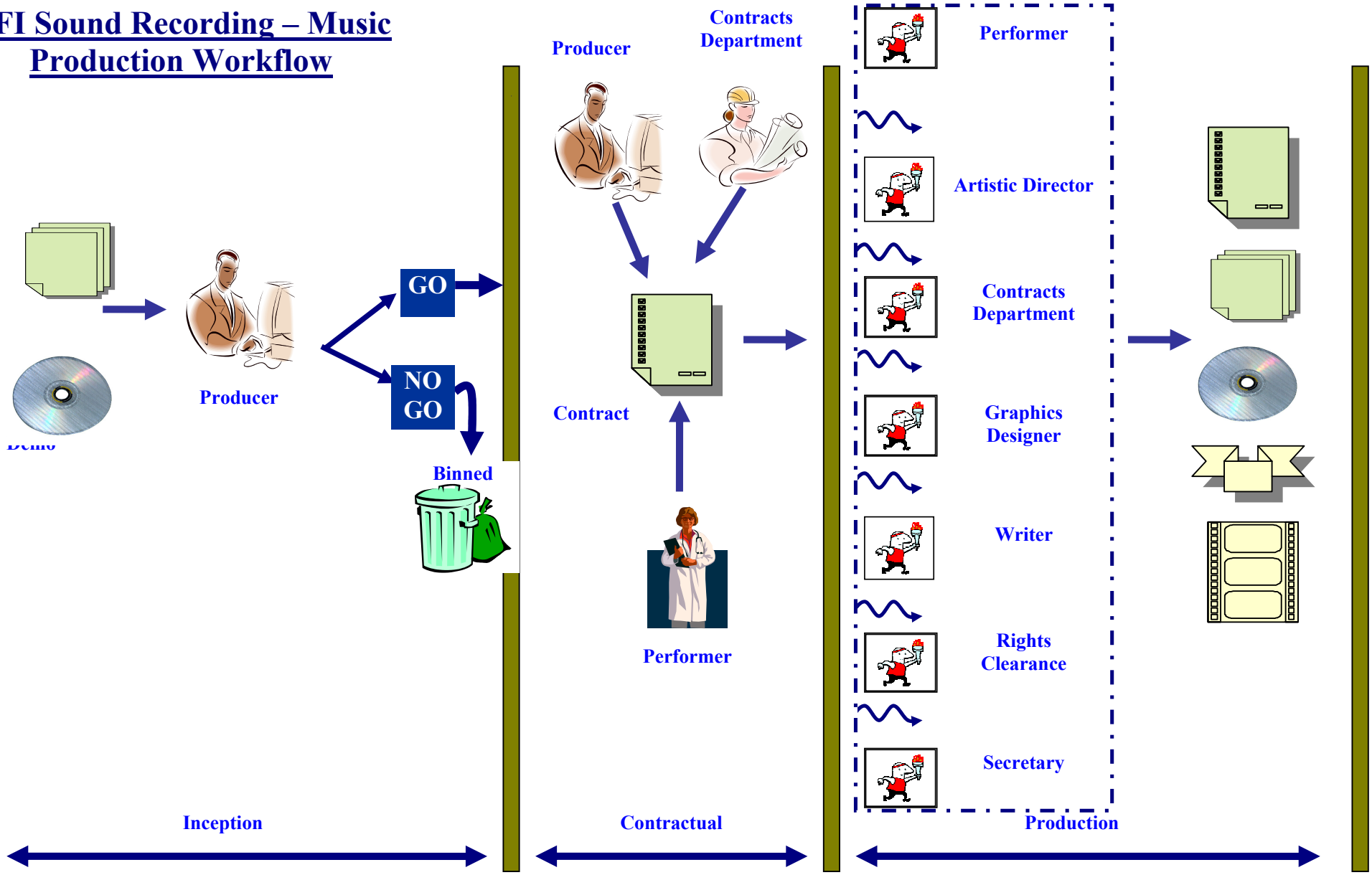
19.3.1 Music & Audio Production and Distribution Workflows

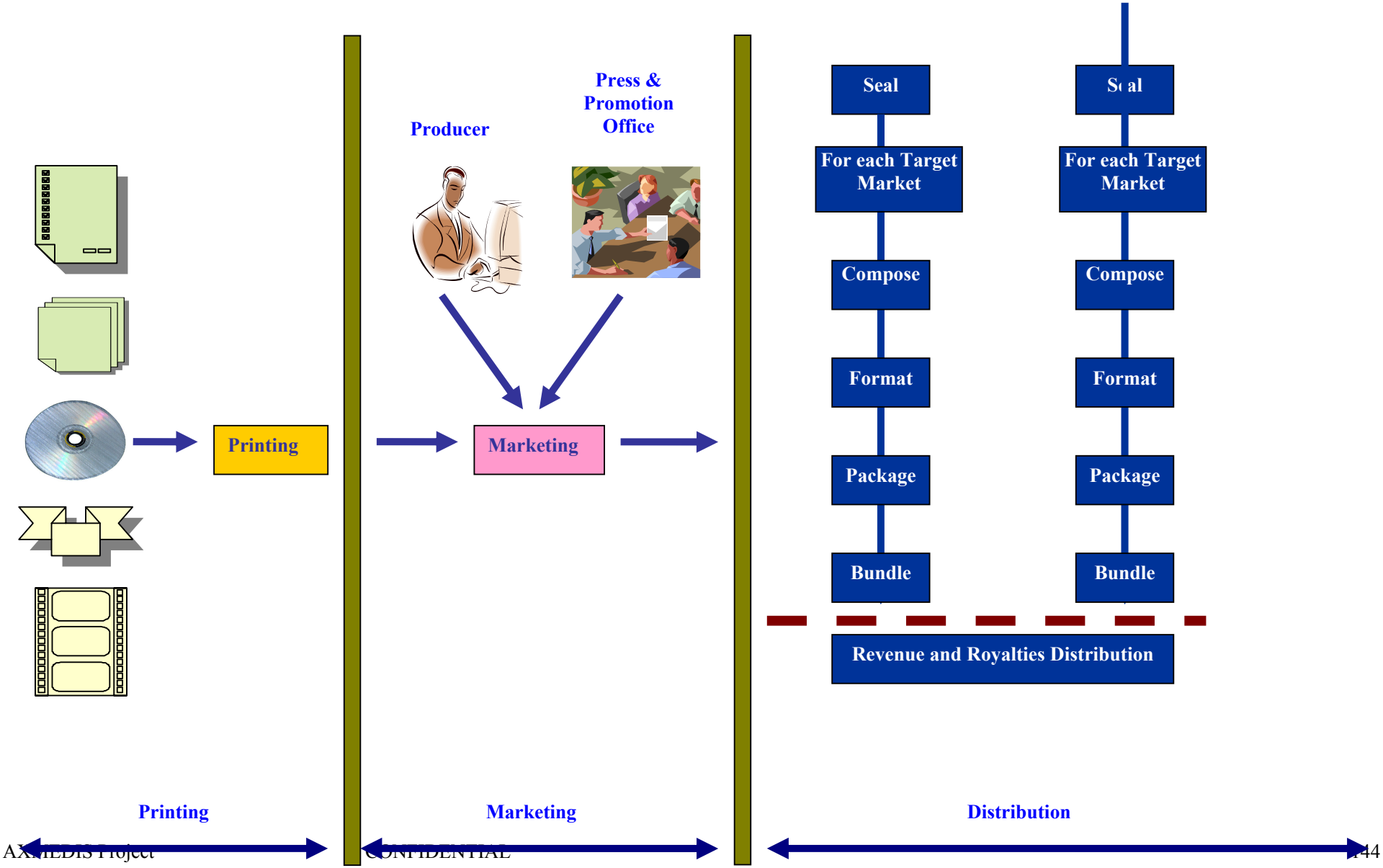
19.3.1.1 The Workflow for Music & Audio Production

SOUND RECORDING- MUSIC PRODUCTION

1) A producer receives a demo (simple and generally home made) of the proposed song from the publisher or the author.
2) The producer decides to record it (or not).
3) Producer/performer agreements general situation: contract already exists (exclusivity)
4) Start of the production process involving:
   a. Artistic director : in charge to overview the production step by step (in house)
   b. Contracts department (in house) : contracts with recording studio, musicians, sound engineer, musical assistant, etc
   c. Graphic designer for the booklet/label: freelance (contract) or in house
   d. Writer for the booklet notes: freelance (contract)
   e. Rights' clearance (in house) : deals with Authors and Publishers Collecting societies to get mechanical licence (fees depend on terms of copyright duration on the songs, on number of recording, on number of recording "free of charge" for promotional use etc); clearance of the rights on any image used in the booklet;
   f. Secretary (in house): ISRC code, label copy, cue sheets (metadata), bar code etc
5) The material is given for the print: original master, label copy (number of catalogue, titles, subtitles, publishers, musicians etc) ISRC code, bar code, mechanical licence, graphics releases
6) Distributor: general situation contract already exist.
7) Before distribution the producer starts with marketing and promotion including press communication. Press and promotional offices (in house) Promotion might include the distribution of content extracts.
8) (Commercial) distribution generally intended as selling of recording. Distribution can be done via multiple channels not limited to retailers, websites, music shops, direct sells etc. The distributed content can be delivered in various formats and on various media types.

AFI Sound Recording – Music Production Workflow




Producer
Press & Promotion Office
Printing
Marketing
Seal
For each Target Market
Compose
Format
Package
Bundle
Seal
For each Target Market
Compose
Format
Package
Bundle
Revenue and Royalties Distribution
Printing
Marketing
Distribution

8.2.1.1.1 Actors involved in the sound recordings process since the beginning

1. ***Publisher***
   Activity: an organization/company that makes music works public and share the author rights. The copyrights must be assigned to the music publisher by the authors/composer in written contract, in return for a percentage of royalties produced by the song.
   Actors that connect with Publishers in the content value chain:
   - **Authors/composers**
   - **Authors and Publishers Collecting Societies:** Co-register works with Authors or Publishers, provide work information, publisher and author information, use terms and conditions and publisher agreements.
   - **Publishers:** Co-publishing and/or sub-publishing agreements (a foreign agent retained by the original music publisher of a song to exploit the song in the foreign agent's geographic territory)
2. ***Phonographic Producer***
   Activity: an organization/company that undertakes the technical and economical responsibility necessary for the making of sounds recordings.
   Actors that connect with Producers in the content value chain:
   - **Producers:** Co-production contract and production licenses terms and conditions (i.e. sub licensing agreement with a foreign producers authorizing him to duplicate and sell copies of existing masters, in exchange for paying to original producer a royalty for each record sold.
   - **Performers:** Obtain licence terms and conditions for performing rights
   - **Authors and Publishers Collecting Societies:** Obtain license terms and conditions for first fixation, work ID, product ID - so called Compulsory Mechanical licence
   - **Phonographic Producers rights Collecting Society:** collect and distribute the neighbouring rights (public exploitation of sound recording)
   - **Distributors/Aggregators:** commercial contract agreements
   - **Clearing Houses:** Multiple work use clearing/ distribution terms and conditions production .
3. ***Performer***
   Activity: realize the works of the authors within productions process.

   Actors that connect with Performers in the content value chain:
   - **Producers:** Performance, first fixation and reproduction licence terms and conditions
   - **Performers Rights Collecting Society:** collect and distribute the neighbouring rights (public exploitation of sound recording)
4. ***Collective Management Society***
   Activity: an organization that provides collective representation to their constituents such as authors/creators, phonographic producers or performers.
   Authors and Publishers Collecting Society
   The Authors and Publishers collecting societies collect and distribute royalties from the multitude of users of copyright material in their home territory and, through reciprocal arrangements with societies in other countries, extend their reach to the international sphere. They are involved in standardizing:
   - Certified metadata for work identification
   - Licences for the different concepts under which the works are exploited (mechanical reproduction, public performance, public communication).
   - Maintaining work use data
   - Distribute rights revenue to authors and publishers

   Producers Rights collecting Societies/ Performers Rights Collecting Societies

A society/organization that collects and distributes fees received on behalf of its members from users of sound recordings and music videos mainly the broadcasting industry.

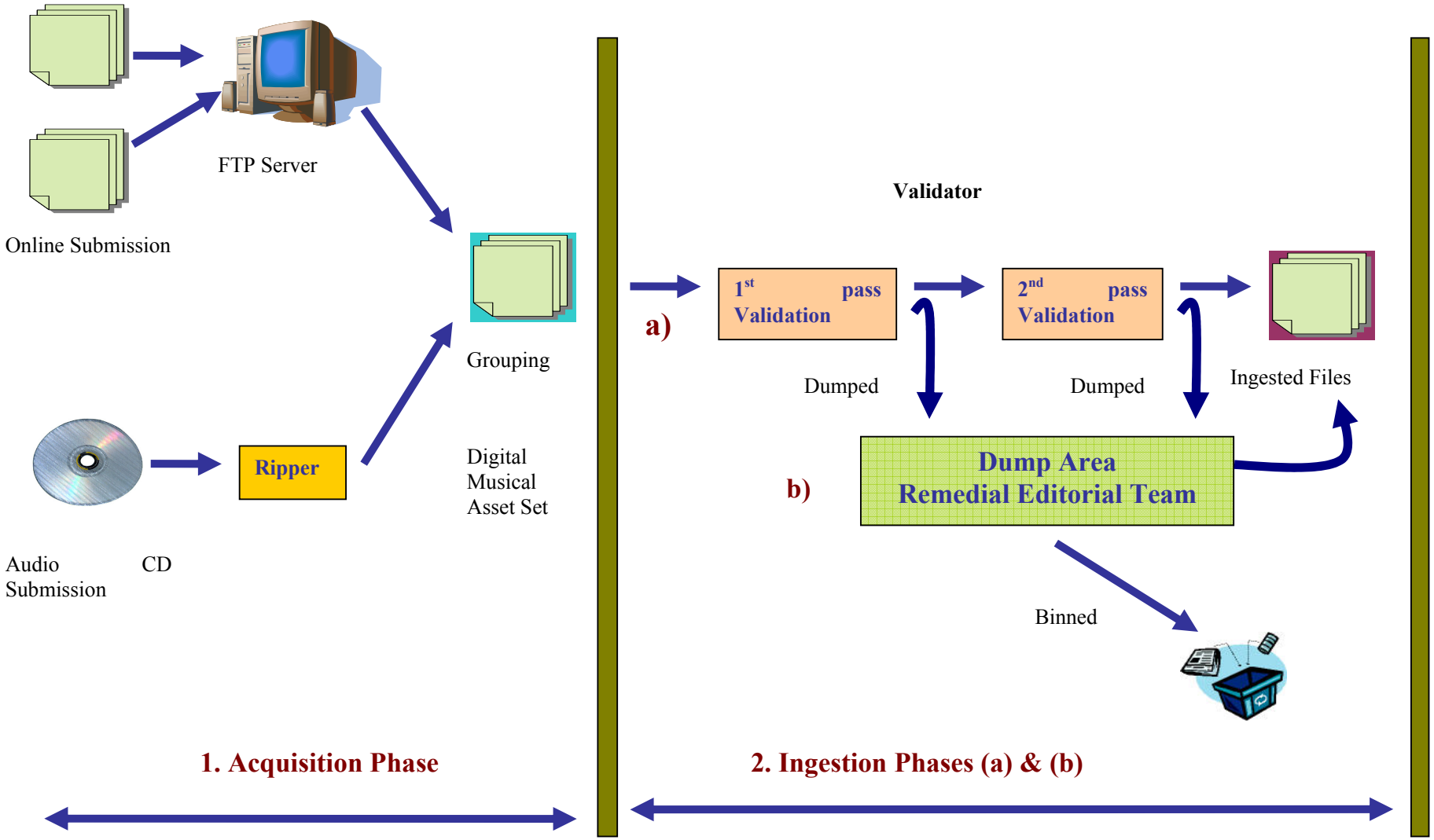
- Certified metadata for work identification
- Licenses for public use of sound recording
- Maintaining work use data
- Distribute rights revenue to producers/performers

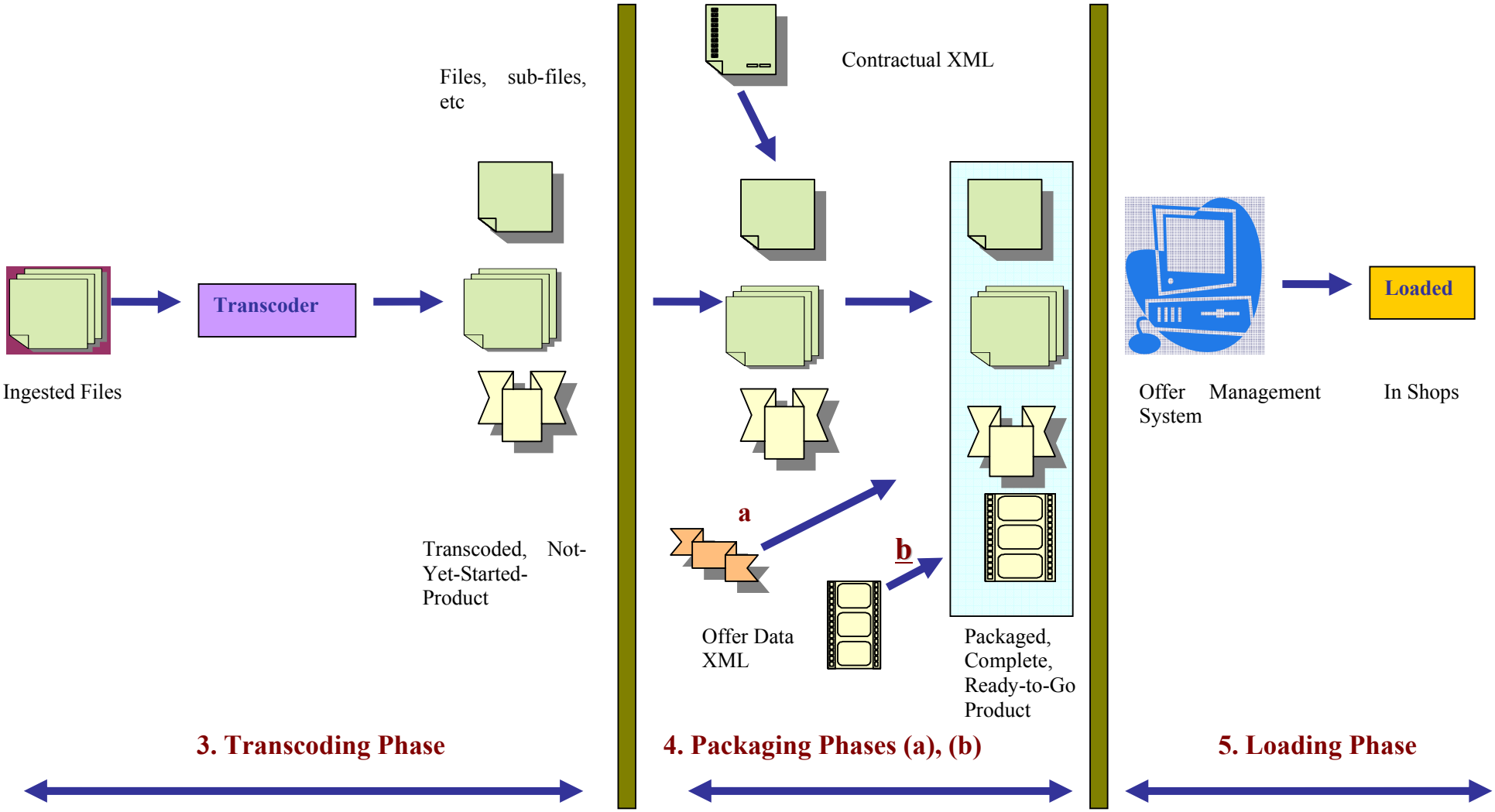
19.3.1.2 The Workflow for Music & Audio Distribution

XX is one of the AXMEDIS partner involved in the distribution of digital multimedia contents. This section will now describe the workflow activities involved in distribution of musical contents.

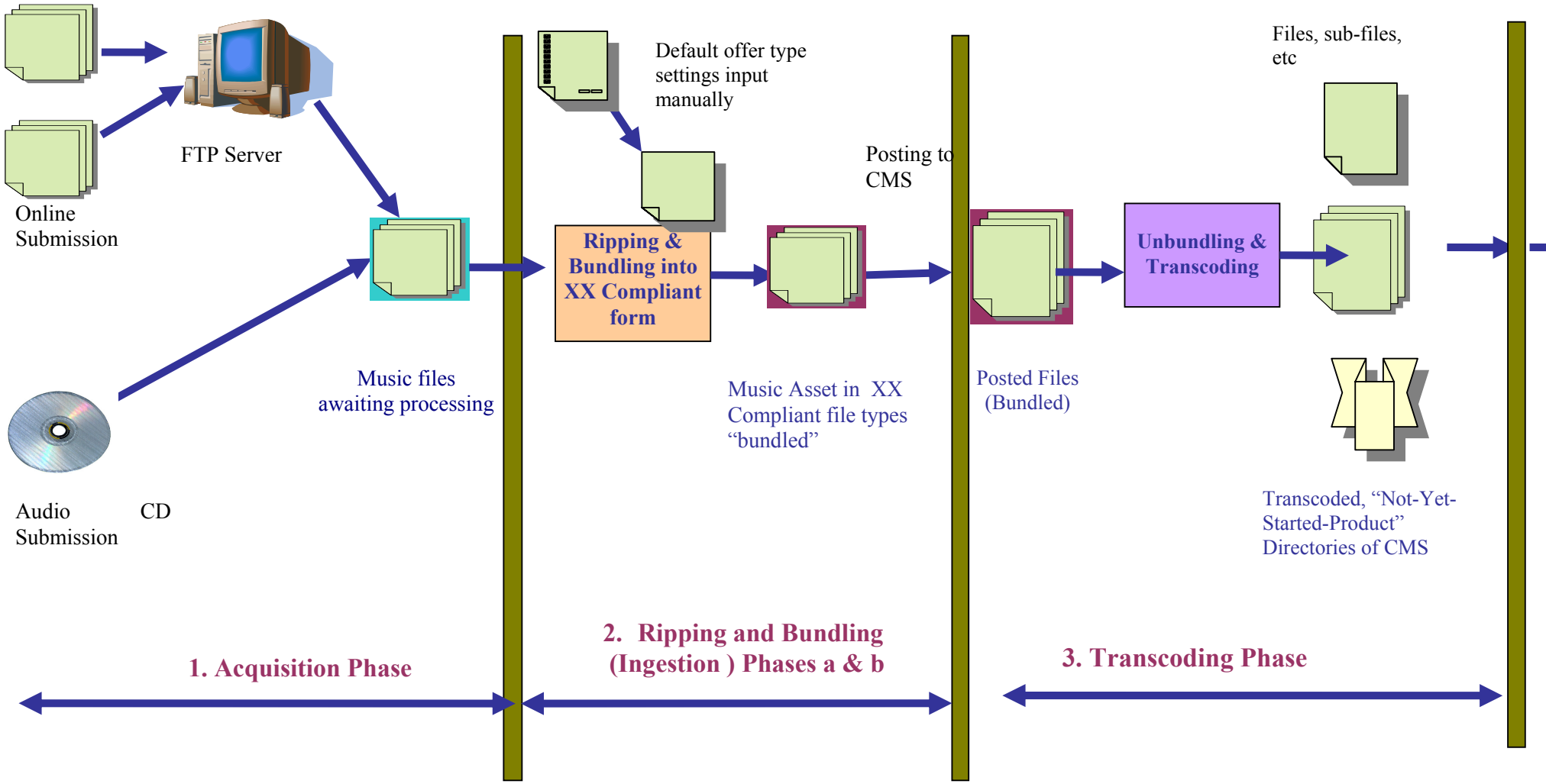
In this section, the current and the proposed (forthcoming) workflow processes at XX are illustrated by two sets of diagrams below which show the broadly similar nature of both workflows both of which essentially comprise a similar processing scenario spread over 6 phases, as follows:

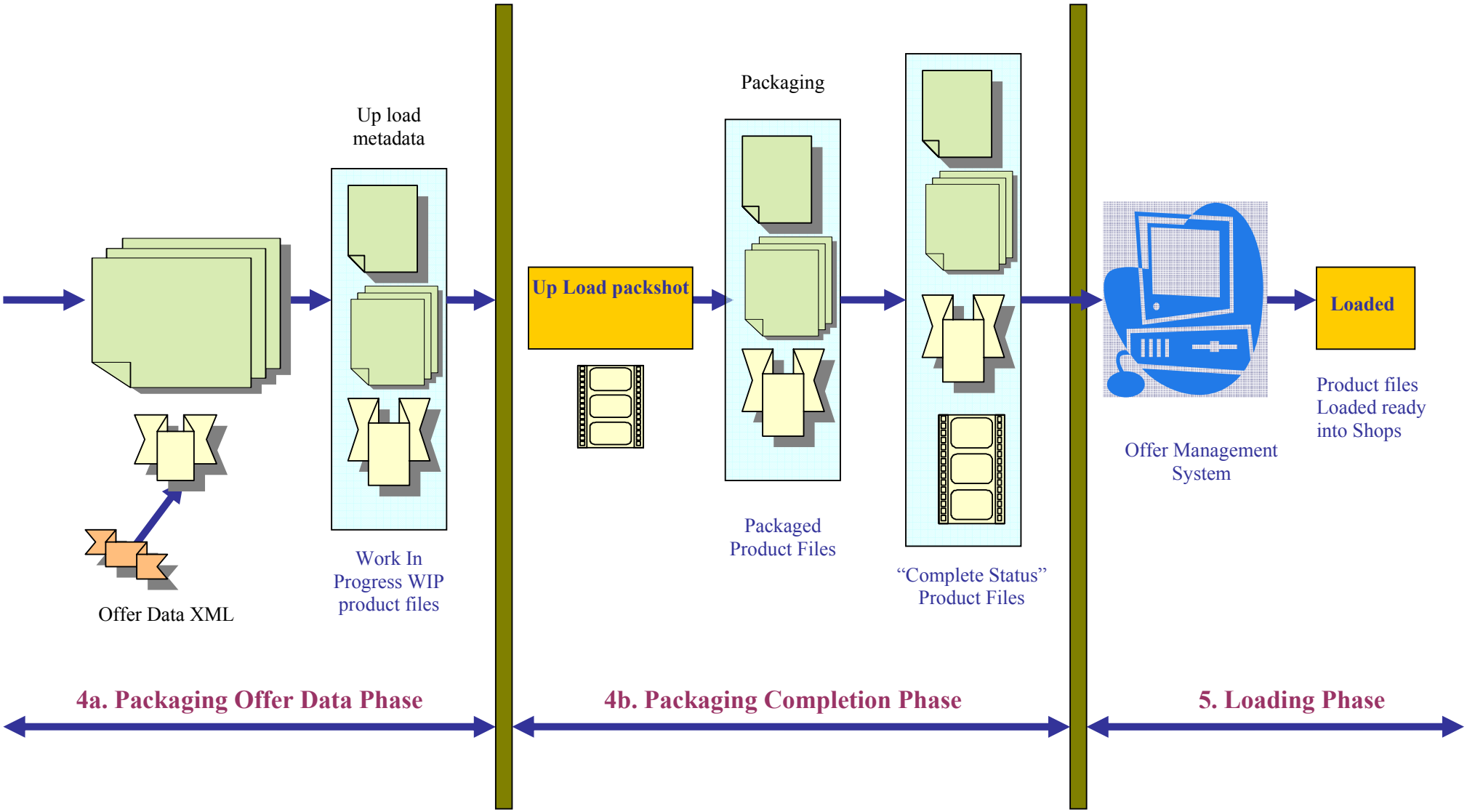
Proposed XX Workflow for Music Distribution




Files, sub-files, etc
Contractual XML
Transcoder
Ingested Files
Transcoded, Not-Yet-Started-Product
a
b
Offer Data XML
Packaged, Complete, Ready-to-Go Product
Offer Management System
Loaded
In Shops
3. Transcoding Phase
4. Packaging Phases (a), (b)
5. Loading Phase

Current XX Workflow for Music Distribution




Up load
metadata
Packaging
Up Load packshot
Loaded
Product files
Loaded ready
into Shops
Offer Management
System
Work In
Progress WIP
product files
Packaged
Product Files
"Complete Status"
Product Files
Offer Data XML
4a. Packaging Offer Data Phase
4b. Packaging Completion Phase
5. Loading Phase

Transcription of knowledge

Based on the knowledge elicitation meetings held with the XX team on 25/10/2004, the XX Workflow for the digital distribution of online music is documented below.

8.2.1.2.1 Typical Scenario for music distribution (XX)

Any task comprises of three stages namely the preparatory task enablement, followed by the task core processes, and concluded with the task closure stage. In a sense the XX Media Distribution to be described below can be viewed equally as production closure or distribution enablement processes followed by core distribution activities. It is important to note that with XX the closure processes of distribution namely the download-on-demand of appropriate offers to be made available at a particular online shop or region normally occurs at download run-time and therefore the final real-time bundling and delivery phase of the XX Distribution is a feature of the dynamic web transaction environment and is not included here as coming within the provenance of the Distribution Workflow Control although it takes place under interactive control of the customer and the XX Offer Loader during music download-on-demand

The overall XX Distribution scenario is divided into six phases, starting from the acquisition of the digital media to its final delivery.

1) Acquisition Phase

Stock acquisition at XX occurs mainly through FTP music download from the respective producer's server or sometimes the stock arrives by post on an Audio CD. Due to the high volume of music stock that various music producers (referred to as labels) supply for distribution on demand through online shops linked to XX, currently XX have to prioritise the processing of new releases. They treat new releases as "urgent" files to be fast-tracked through the required internal XX processes and loaded into online shops within around 10 days.

XX maintain a rigorous Quality Audit (QA) process on all stocks submitted to them by music publishers. A considerable number of the music files/CDs that arrive at XX to be distributed online, have missing metadata fields etc (e.g. genre type) that have to be completed within the internal XX make-ready process before such stock can be loaded into the shops. The music files that arrive at XX for processing generally have files formatted as (128-WMA) along with an XML document containing the metadata. The XX arrivals-server stores such files in a folder specific to each music producer i.e. according to each label. Upon the arrival of each new file, a script is invoked to check the file for its release date and if this falls into the category of new releases, the relevant file name is tagged "urgent" thus giving it a high priority for processing by being moved to the urgent area of the database.

Alternatively, those music files that are received by XX in the form of Audio CD need to be checked and classified for processing as "urgent" or "non-urgent". Such Audio CDs are "ripped" into individual track files using in-house ripping software that converts the files into 128-WMA file format, re-named using the XX-compliant files naming convention, before they are stored into the appropriate area of the database. The ripper program takes three passes i.e. runs three times using the data on the CD to generate 3 versions of the ripped files. These 3-versions are checked against each other and if they are not identical, they are discarded and the source CD is put in a special queue for further consideration and quality checks before being either rejected or accepted after further processing. Otherwise, if all the three ripped versions are the same, the CD is accepted with one copy of the file being stored to go through the make-ready pipelined process before being loaded into the shops.

An XML document containing the metadata for the CD is also generated and stored along with the music files. The files received from FTP servers can also be in different file formats and hence they too are converted into 128-WMA file format (if necessary) and re-named using the XX-compliant file naming convention before being stored in the database. It is also possible that the original XML document that accompanied each music file upon arrival at XX, is found to be incomplete and may have several data fields missing. In such cases the XML document is created manually with the missing information filled. At this stage, the acquisition phase for these files is considered to be complete and they are ready for further processing. All such files are given XX-

compliant names as alphanumeric file names that are also the codes for identification of various parameters, e.g. supplier code, bit-rate, etc. This process is also known as "Bundling" and the files are referred to as "Bundled".

Due to the lack of full adherence to formatting and metadata standards on the part of the music producer companies who are the XX suppliers, all the above processes can not be fully automated under workflow control but currently need continuous human intervention; hence the considerable workload involved during the XX make-ready process.

2a. Ingestion Phase (a)

Once the files are in the XX acquisitions database, an "Ingestion Program" is started. This program polls the database continuously for new acquisitions waiting for further processing. If it finds a new "urgent" file to be processed as higher priority stock, it picks it up and processes it through the ingestion. Otherwise the next available "non-urgent" file will be picked up to be processed by this ingestion program.

If there is any file in the "urgent" area of the database, the ingestion program invokes a validating program for its first pass validation. This program checks the WMA file along with the XML metadata file and makes a high level surface check to ensure that the metadata values are all present and correct. Typically this is a syntactical check for validating the structural integrity of the metadata i.e. to see if all of the required values are present. If any missing values are detected in the metadata at this stage, then such values will have to be supplied by references to the contractual rules in force with the respective supplier and will thus be extracted and inserted accordingly.; e.g. missing genre, UPC[1], ISRC[2], etc. If any files are found to be faulty in a way that can not be readily rectified by the above data extraction and insertion process then the whole bundle will be "dumped" into a specially designated "Dump Area" of the database to be processed further through a remedial procedure (described below in phase 2b).

After the above first pass validation, the validator makes a second Quality Audit pass to check other parameters within the XML document and the music content itself, e.g. the encoding used, the bit-rate used, compression, sound quality, etc. If this QA check were to report faulty or problematic items, then the whole bundle will again be dumped into the Dump Area of the database to be processed further through a remedial procedure (discussed later). If the files are found non-faulty they are moved to a different area, the CMS[3] Area of the database, using predetermined rules. These valid files are now called "Ingested" and ready to be stored in the XX relational database area which uses the XML data to store the various files related to each other in appropriate tables.

2 (b): Ingestion Phase (b) via Remedial Editorial

Whenever any file is "dumped" in the Dump Area of the Acquisitions Database, by the validator, a Remedial Editorial team reviews the dumped file to find out the reasons for the dump action, e.g. missing UPC, ISRC number, formatting problems, content problems etc. They take appropriate action based on these reasons for the earlier dump action so that the files concerned can pass both the above validation stages e.g. the missing values are inserted, the media files may have to be re-generated in appropriate format, etc. If the remedial action required can not be performed by the Dump Area staff (e.g. ISRC values cannot be obtained), then the files are binned i.e. will not be processed further by XX and the suppliers are informed accordingly unless such data can be obtained and inserted accordingly.

The product code (UPC) and the International Standard Recording Code (ISRC) should be included in the metadata to allow traceable royalty payments to be effected for each sale. It should be noted that new regulations will require that if an ISRC number is not available for a product then that product cannot be included in the download charts.

3. Transcoding Phase

This is the process of taking the root product and creating various derivative media from it. The transcoder keeps running in the background all the time to see whether there are any newly ingested musical assets that have not been transcoded. When it finds one it takes the available files and uses a set of transcoding rules derived from contract XML to generate the required sub-files from the root product as permitted according to the contract with a particular label (according to their stipulated preferences and default sets for distribution in

various territories). The transcoder stores the related files together in the location allocated to that product set plus adds DRM onto the product.

Essentially in this phase, the "Ingested" bundles (i.e. file sets each belonging to a particular music product e.g. a CD) are transcoded to generate different types of files based on the distribution requirements. This is done by unbundling the files and using them as needed to produce derived versions e.g. to generate 30 sec clips. Additional file versions as may be required for different formats etc for various distribution channels etc. These files are called sub-files or the child files of the original parent file. The full set of files that then become available for each product as the output of the transcoding process i.e. all the related files and sub-files as a full set as required for each music product is re-bundled and stored along with their location information in the CMS database. These files are now known as "Transcoded" files and that partition of the database where they are kept is known as the "Products" Area.

At the end of this stage, the resulting files are referred to by their status as "Not-Started" products. This is to signify the fact that they have been transcoded ready as a product but they are still not ready to be loaded into the server areas dedicated to various online shops as further packaging phases are still needed in order to pack the Pack shots (Artists Photo, etc) and the offer-terms metadata (i.e. metadata specifying terms of availability re various download package offers as agreed with the suppliers to be targeted for different market regions (online shops for different countries etc) plus other applicable Offer Data as recommended by the proprietary XX Recommendation System as will be described in the subsequent phases.

4 (a). Packaging Phase (a)

These "Transcoded" Product files are then packaged in two phases; firstly to add the offer data to the metadata and secondly to add the pack shots. In the first of the following two packaging phases, the Contract XML data are accessed from the XX Proprietary Offer Management System (i.e. terms of product download availability as agreed with the label; i.e. with the supplier). Such Offer Data are added to the product metadata along with other applicable Offer Data from the XX Recommendation System. The resulting bundle is referred to as a WIP Product i.e. a Work-In-Progress product that has the status "packaged" and is moved to the Work-In-Progress area of the CMS database.

4(b). Packaging Phase (b)

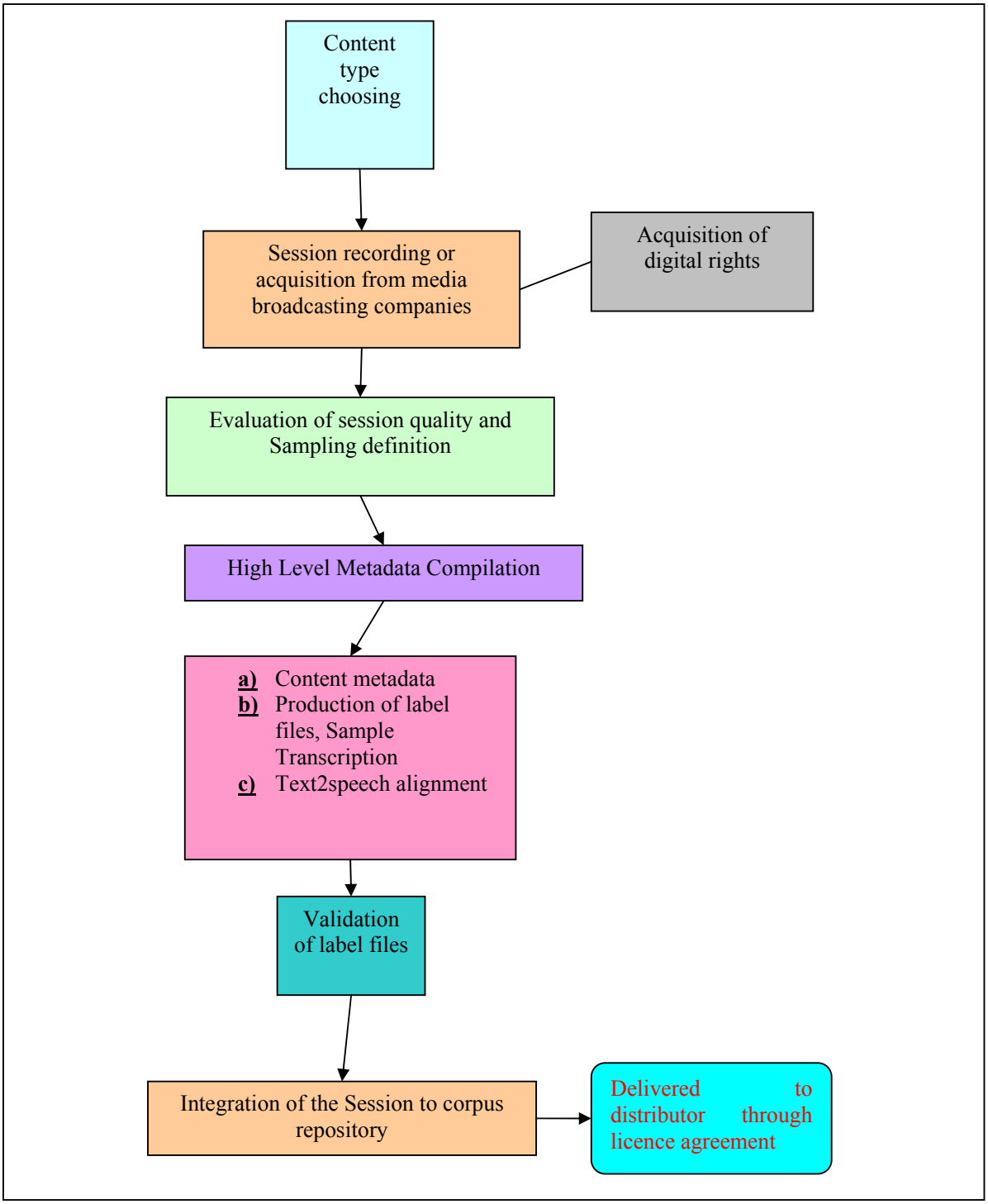
In this final packaging completion phase, the "Pack shots" are added to the Packaged WIP so as to completely package together all the files, i.e. the media file itself with DRM, and, all the sub-files including clips, pack shots, metadata (including Offer Data) which are then packaged with the status "complete" and becomes ready-to-go for loading into the regional online shops as in the next phase described below.

Phase 5: Loading

The "complete" packaged product resulting from the packaging completion phase is then input to the XX Offer Management System which loads such "complete" files into the database of XX shops based on the pre-agreed time and terms of release for each region. These files will then be called "Loaded" files and will be available for the end users according to the offer terms as agreed with the respective labels. If the files are loaded early then only the 30 sec clips will be available for download, until their release time, for the region concerned - as stipulated in the contract by the respective label. The full product will be available from the date of release onwards.

At some points the online download availability of certain media may cease if the contractual terms stipulated that the media were to be made available online only for a limited period of time. So such products are simply unloaded and thus become unavailable

19.3.1.3 Spontaneous speech repositories production workflow



19.3.1.4 Audio/Music/e-Content Distribution Workflow

Diagram 1 Audio/Music/e-Content Distribution

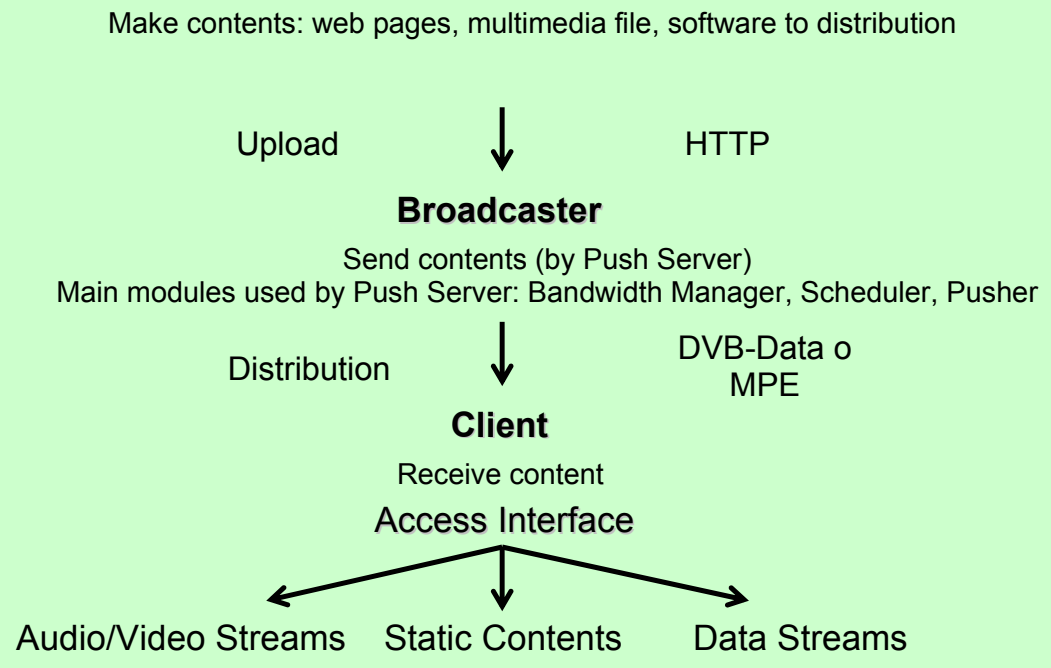
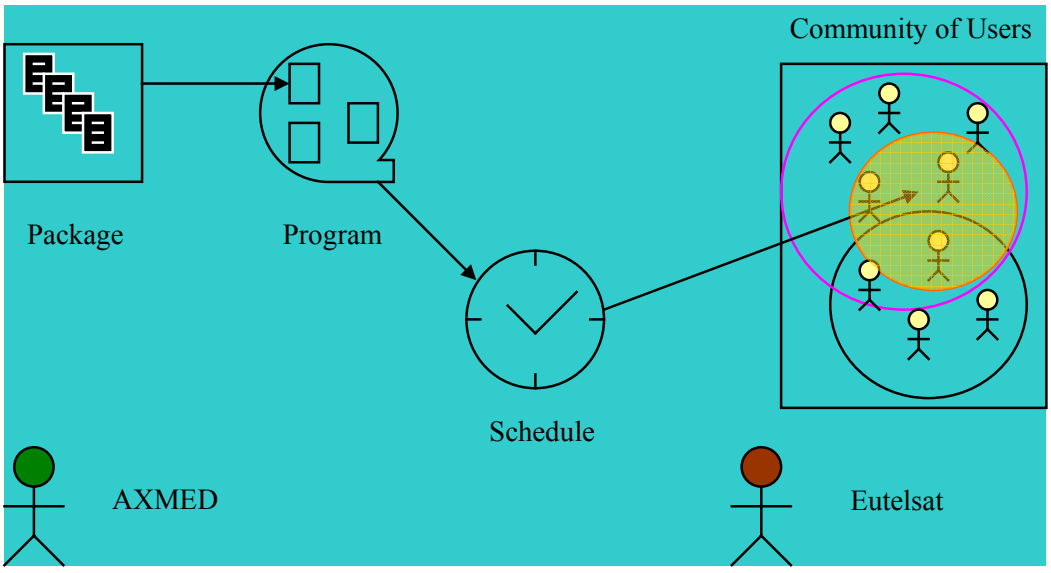
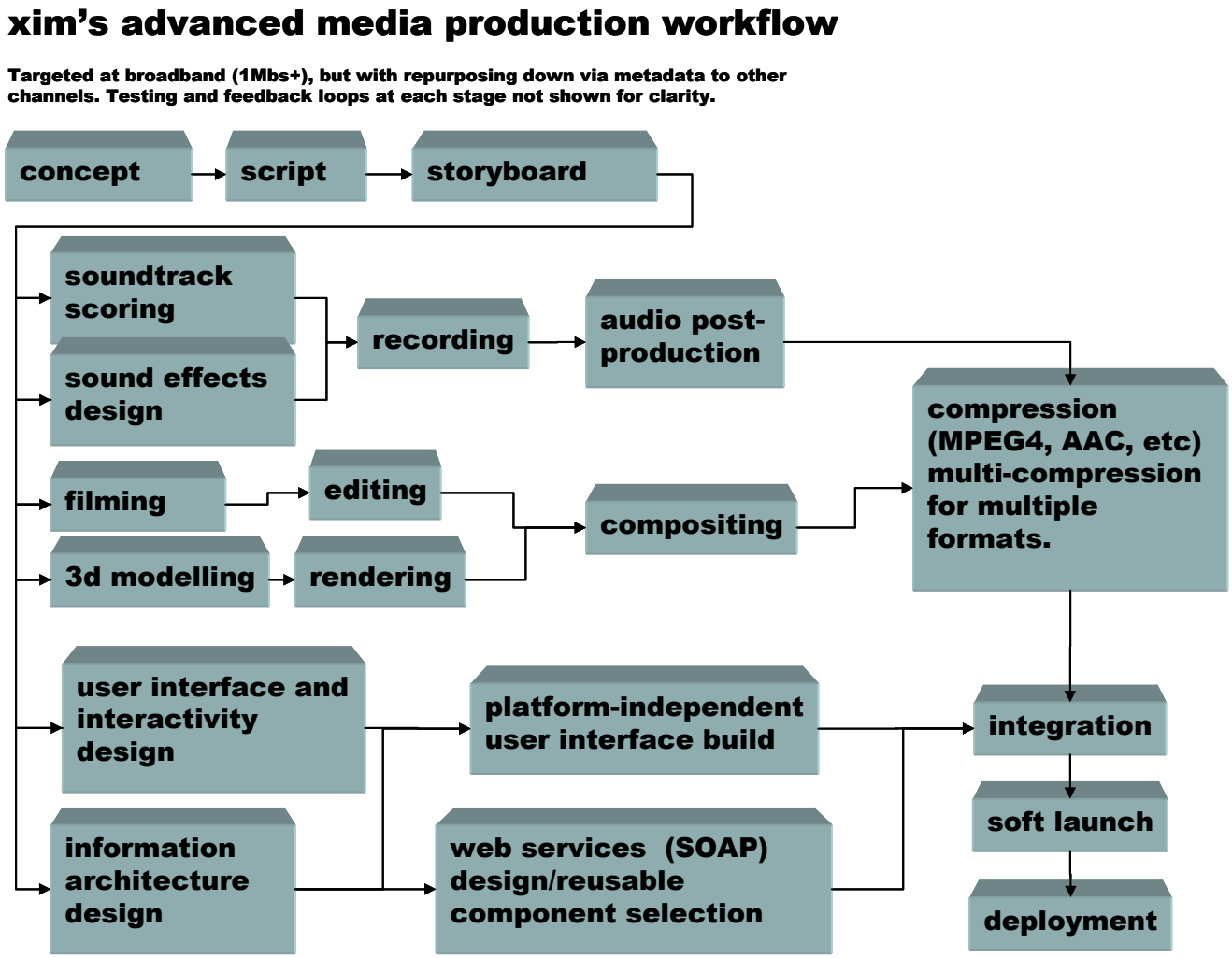


Diagram 2



19.3.2 Advanced Interactive and Immersive e-Media Production and Distribution Workflow [XIM]



Advanced media workflow

- **Conceptualisation** - A producer starts with a concept for a production, which is scripted and storyboarded as a non-linear storyline, meaning that multiple, contingent versions of the same storyline are developed. A sound track is scored and recorded.
- **Sound** - Sound effects are designed and recorded into a library for the project, but not edited yet. Clearance for usage is sought from 3rd party sound sources.
- **Filming** - Location and or sets are prepared, filming takes place, including all possible routes through the content in line with the storyboard.
- **Rendering** - 3D models are developed and rendered out ready for compositing (integrating).
- **Post production** - All audio-video content is then composited and edited into suitable slices for interactive playout.
- **Clearance** - Once a working mock-up or prototype is developed, this is distributed to the relevant sources for usage clearance for any 3rd party media.
- **Transcoding** - All AV content is compressed with suitable codecs for the target platforms.
- **Information architecture** - Information architecture is designed by the software engineers.
- **Copy writing** - Text-based content sourced or written (again, a clearance loop may be necessary).

- **Localisation** - Localisation is applied to written and spoken content for the target languages.

- **UI development** - The User interface is designed (using UML use cases) and tested for usability and accessibility requirements.
- **Coding** - Software engineers design and build the web services and program logic. This may include web-based database, interfaces with a custom CMS, SOAP or .NET web services, and the actual embedded scripting which will be client-based, which is at present is usually coded in Flash and deployed as an SWF.
- **Multimedia integration** - All elements are integrated using authoring tools suitable for the target platforms.
- **Testing** - Final testing is carried out (each previous step includes iterative testing in addition).
- **Soft launch** - The service is 'soft launched' meaning essentially beta testing.
- **Go live / launch** - Final deployment takes place once feedback from testing has been elicited and incorporated.
- **Review process** - Once fully operational, the service or game is reviewed, monitored and refined as necessary.

19.3.3 Multimedia Edutainment/ e-book Production and Distribution Workflow

This section will now describe the workflow for various AXMEDIS partners involved in production and distribution of Multimedia Education/Entertainment/e-books.

19.3.3.1 Typical Scenario for Digital Object Production and Distribution

I. **Sketch Phase**: Concept initiator creates sketch of New Product Development (NPD) and gives this to the Director. Director can make a decision of No-Go or Go. If the decision is No-Go the sketch is binned and the NPD concept is discarded otherwise the NPD concept will progress to Phase 2.

II. **Sketch Digitisation Phase**: Technical Team in consultation with the legal copyright experts develop a digitised mock-up of the sketch.

III. **Digitised Mock-up Appraisal Phase**: The digital mock-up is given to the Director for appraisal. The Director can make a decision of No-Go or Go. If the decision is No-Go the sketch is binned and the NPD concept is discarded otherwise the NPD concept will progress to Phase 4.

IV. **Initial Project Appraisal Phase**: An Editorial Board is convened to consider the Go-stamped digital mock-up and decides whether a project can be feasible and launched at this time. If the decision is No-Go the project launch will not take place or may be postponed. If the decision is Go, a new project is started and the new product development concept progresses to Phase 5. Team leaders are assigned and the production is initiated using a content production technical team and a Rights Clearance Seeking legal team.

V. **Production-to-Draft Phase**: The technical team comprising text, graphics and audio editors work to produce the digital drafts and in parallel the clearance seeking team work to secure the required copyright clearance agreements from external copyright owners. The Draft when ready, is presented to an Evaluation Board by the production team.

VI. **Continuing Evaluation Phase**: The Evaluation Board comprising the production team, distribution team, marketing and legal experts will evaluate the Draft and if the Draft is not-ready, it will be either discarded or sent back to Phase 5 for re-Drafting. Whenever a Draft is evaluated as "ready", then the Draft of the new product will be (re)-Sealed and the new product will progress to the final phase 7.

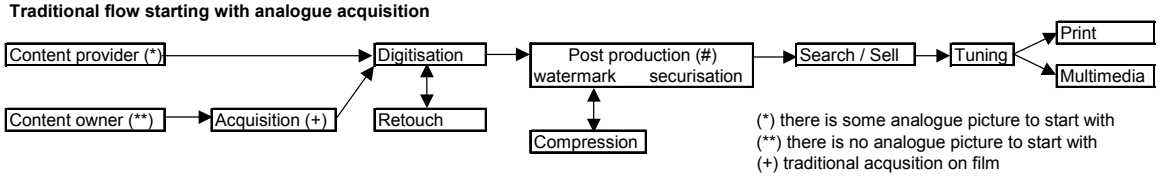
VII. **Distribution Phase**: In this phase, target distribution channels are selected and for each channel the (re)-Sealed Draft product goes through a linear sequence of composition, formatting, packaging, bundling, and distribution to users (B2B or B2C).

LOOP

Depending on any reworking that may prove necessary during phase 7, due to rights/marketing issues (e.g. specific geo-politic or cultural sensitivities requiring substitution or re-working of certain part of a re-Sealed product for distribution to specific markets through particular channels, or, due to unexpected rights clearance difficulties having

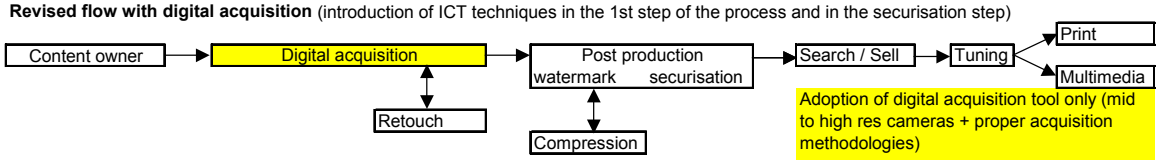
arisen) the new re-sealed product may need to be referred to phase 5, for re-Drafting. Introduction of ICT in content production process for publishing (some comparisons)

Traditional flow starting with analogue acquisition



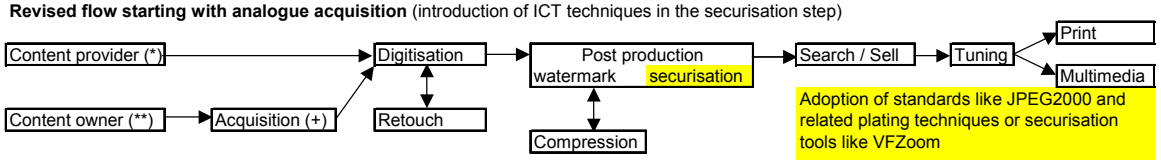
(*) there is some analogue picture to start with
(**) there is no analogue picture to start with
(+) traditional acqusition on film
(#) the securisation process is only partially adopted

Revised flow with digital acquisition (introduction of ICT techniques in the 1st step of the process and in the securisation step)



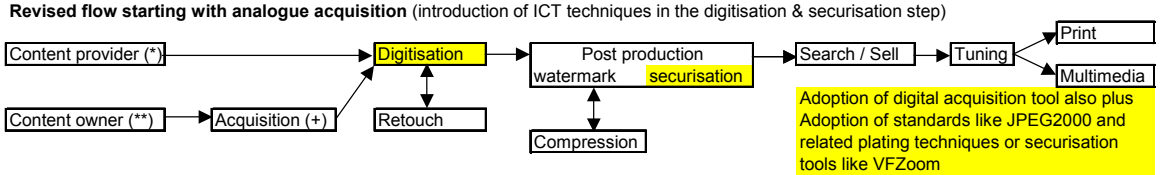
Adoption of digital acquisition tool only (mid to high res cameras + proper acquisition methodologies)

Revised flow starting with analogue acquisition (introduction of ICT techniques in the securisation step)



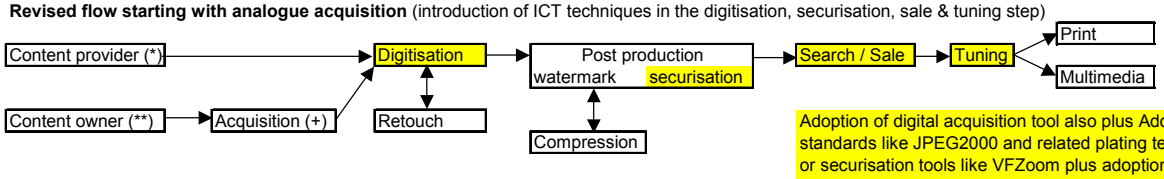
Adoption of standards like JPEG2000 and related plating techniques or securisation tools like VFZoom

Revised flow starting with analogue acquisition (introduction of ICT techniques in the digitisation & securisation step)



Adoption of digital acquisition tool also plus Adoption of standards like JPEG2000 and related plating techniques or securisation tools like VFZoom

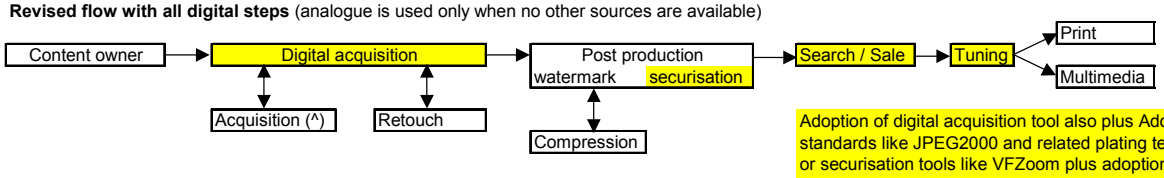
Revised flow starting with analogue acquisition (introduction of ICT techniques in the digitisation, securisation, sale & tuning step)



(*) there is some analogue picture to start with
(**) there is no analogue picture to start with
(+) traditional acqusition on film
(#) the securisation process is only partially adopted

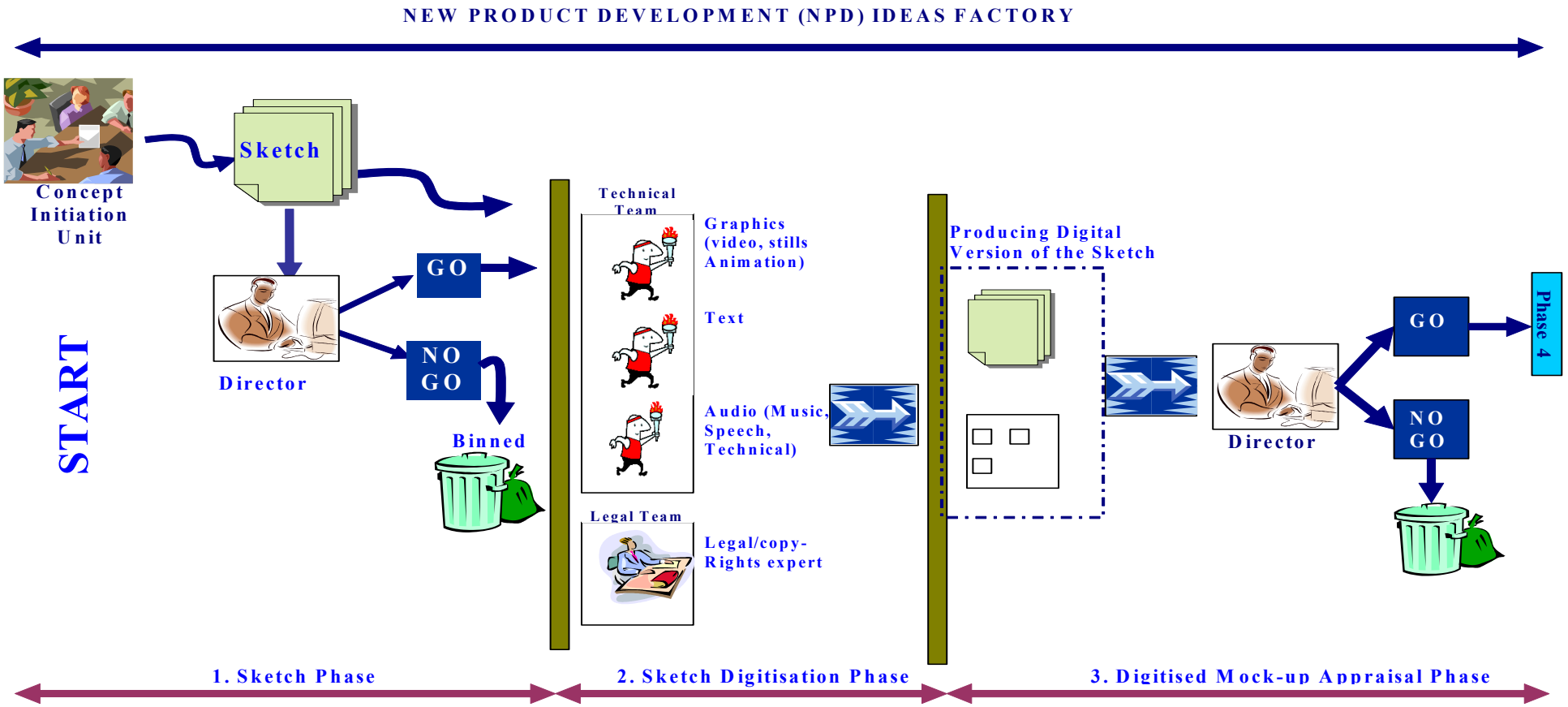
Adoption of digital acquisition tool also plus Adoption of standards like JPEG2000 and related plating techniques or securisation tools like VFZoom plus adoption of e-commerce tools and work flow solution to help manage the clearence process during invoicing and delivery. Introduction of colour calibration in the Digitisation and tuning step (note that different standard apply to colour space in the two phase nominally RGB and CMYK / Esacromy)

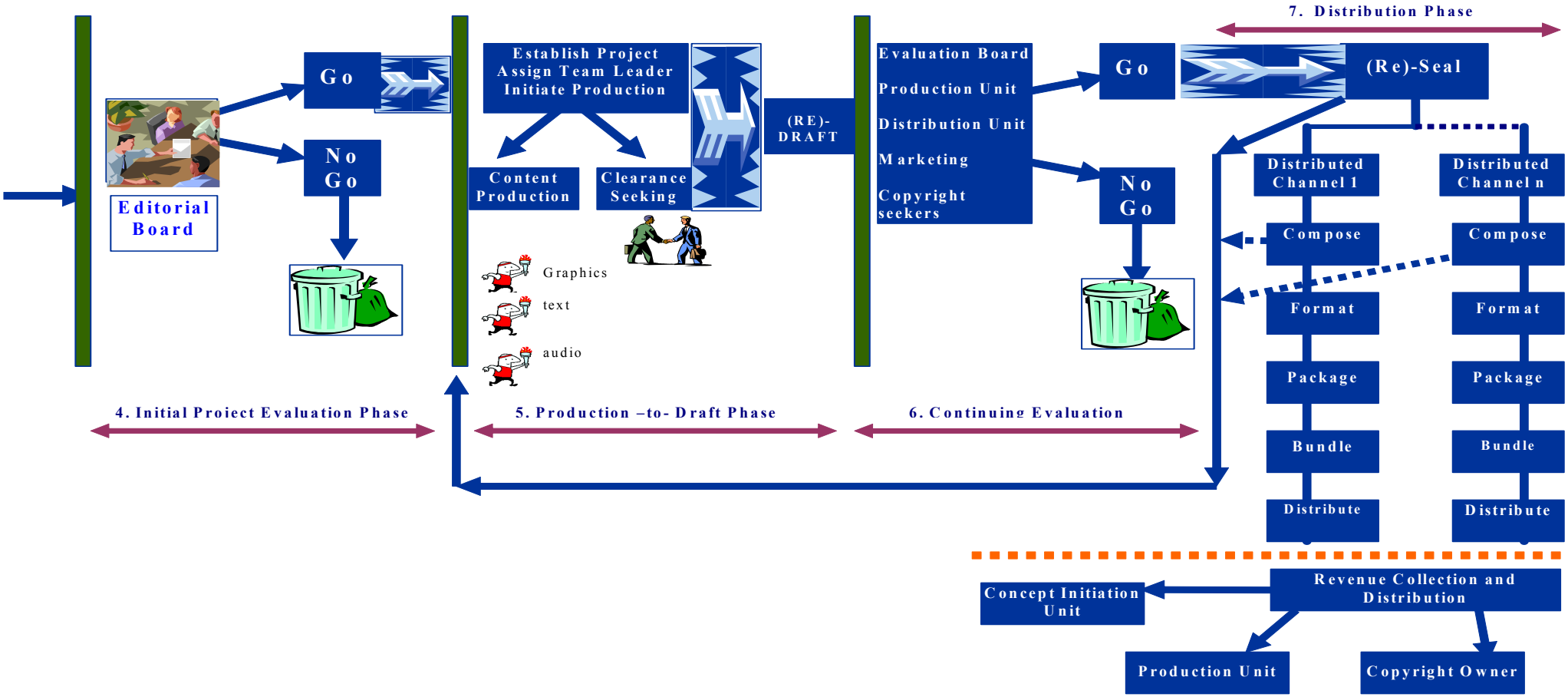
Revised flow with all digital steps (analogue is used only when no other sources are available)



(*) there is some analogue picture to start with
(**) there is no analogue picture to start with
(#) the securisation process is only partially adopted
(^) aquisition from analogue sources as the only one available

Adoption of digital acquisition tool also plus Adoption of standards like JPEG2000 and related plating techniques or securisation tools like VFZoom plus adoption of e-commerce tools and work flow solution to help manage the clearence process during invoicing and delivery. Introduction of colour calibration in the Digitisation and tuning step (note that different standard apply to colour space in the two phase nominally RGB and CMYK / Hexachrome)


NEW PRODUCT DEVELOPMENT (NPD) IDEAS FACTORY
Concept Initiation Unit
Sketch
START
Director
GO
NO GO
Binned
Technical Team
Graphics (video, stills Animation)
Text
Audio (Music, Speech, Technical)
Legal Team
Legal/copy-Rights expert
Producing Digital Version of the Sketch
Director
GO
NO GO
Phase 4
1. Sketch Phase
2. Sketch Digitisation Phase
3. Digitised Mock-up Appraisal Phase


7. Distribution Phase
Go
No Go
Editorial Board
Establish Project
Assign Team Leader
Initiate Production
Content Production
Clearance Seeking
Graphics
text
audio
(RE)-DRAFT
Evaluation Board
Production Unit
Distribution Unit
Marketing
Copyright seekers
Go
No Go
(Re)-Seal
Distributed Channel 1
Distributed Channel n
Compose
Compose
Format
Format
Package
Package
Bundle
Bundle
Distribute
Distribute
4. Initial Project Evaluation Phase
5. Production –to- Draft Phase
6. Continuing Evaluation
Concept Initiation Unit
Revenue Collection and Distribution
Production Unit
Copyright Owner

8.2.3.1.1 Production Process (ILABS)

The production chain follows well-codified and standardised process that can be described as follows:

Activity	Task		Involved roles
Idea (1)			*Management* *Authors* *Chief Editor* *Press Office*
Market survey (2)			
Title design (3)			
Go / No Go decision [6] *(4)*			*Management*
Research of (5)	*Sources (6)* *References (7)* *Contacts (8)* *…*	*IPR/© clearance*	*Management* *Authors* *Editorial board* *Editorial staff* *Press Office* *Legal Department*
Draft acceptance [7] *(if positive the next step starts if not the previous is reiterated)*			*Management* *Authors* *Editorial board* *Legal Department*
Editing of (11)	*Texts (12)* *Notes (13)* *Indexes (14)* *…* *Multimedia (15)* *Captions (16)*		*Authors* *Chief Editor* *Editorial board* *Editorial staff* *Press Office* *Legal Department*
Product final acceptance *(if positive the next step starts if not the previous is reiterated)*			*Authors* *Chief Editor* *Legal Department*
Finalisation of (17)	*Texts (18)* *Notes (19)* *Indexes (20)* *…* *Multimedia (21)* *Captions (22)*		*Chief Editor* *Editorial board* *Editorial staff* *Production department* *Press Office* *Legal Department*
Formal authorisation to start production *(if positive the next step starts if not the previous is reiterated. In this case IPR/© clearance should have been completed if not process may be suspended / stopped / cancelled)*			*Management* *Chief Editor* *Editorial board* *Legal Department*
Production	*Depends on the kind of publication (CD, WEB, TV, book, magazine …)* ***See the pre press section too***		*Production department* *Press Office*

Most of the relevant differences between the various kinds of production lay in the characteristics of the used multimedia item (an image suited for print out requires at least 600dpi while the same image for the web could be tuned on a 72dpi basis).

The IPR and © management is usually managed in a parallel stream, main interactions occur whenever some asset cannot be cleared and therefore has to be replaced. Such event may therefore occur at any step and the impact may be marginal or relevant depending on a set of possible combinations of factors:

- The relevance for the publishing project of the object that could not be cleared;
- The reason for lack of clearance;
- The stage of the publishing process:
- The availability of a replacement / equivalent object…

In line of principle a similar approach applies (with major or minor changes) to the editorial process of whatsoever product. We will primarily focus on traditional, desktop and multimedia publishing as they present the highest number of contact points and overlaps. Digital TV, serials, movies and in general products requiring video production are somehow different as the design and planning phase is much longer and has several by-products (storyboards, drawings, scripts, books… even buildings) that in certain case will have their own existence and production cycle. Therefore we will just give a very brief sketch of this process without entering in details.

Activity	Involved roles

[6] Such a decision is based on market data and production cost analysis to ensure the expected return on investment (ROI)

[7] At this step starts a parallel process for managing © and IPR clearance performed in an asynchronous parallel fashion.

<table>
<tr><td colspan="2">Idea</td><td colspan="2">Storyboard drafting</td><td>Author
Writer
Script editor
Art director
Director
Producer
Production accountant</td></tr>
<tr><td colspan="4">Cost estimation</td><td>Producer
Production accountant</td></tr>
<tr><td colspan="4">Go/No Go decision</td><td>Producer</td></tr>
<tr><td>Title design</td><td>Storyboard finalising
Scripting drafting
Casting preparation</td><td rowspan="2">Cost estimation refinement</td><td rowspan="5">IPR/© Contracts management</td><td>Author
Script editor
Producer
Director
Casting director
Art director</td></tr>
<tr><td>Design & preparation</td><td>Casting
Scripting
Lighting drafting
Shooting plan drafting
Effects drafting
Costumes drafting
Sound track drafting
Contracts finalising</td><td rowspan="3">Costume designer
Makeup designer
Composer
Audio Engineer
Graphic designer
Special effect designer
Fight arranger
Lighting cameramen
Production assistant
Location manager
Art director
Director
Casting director
Producer
Production lawyer
Production accountant</td></tr>
<tr><td>Development & shooting</td><td>Storyboard adapting
Lighting management
Shooting plan adapting
Effects management</td><td rowspan="3">Cost control</td></tr>
<tr><td>Post Production</td><td>Mounting
Sound addition
Effects addition
Packaging</td></tr>
<tr><td colspan="2">Marketing</td><td>Marketing manager</td></tr>
<tr><td colspan="2">Distribution & rights selling</td><td>Revenue management</td><td>Marketing manager
Production accountant</td></tr>
</table>

Following what has just been stated we will detail the publishing process and for each role, the overall set of activities macro requirements and related tools. For each set of macro requirements and related tools we have also tried to point out basic requirements in terms of functionalities taking for granted that all other minor or non-crucial requirements should be implicitly solved by adopted tools. In the schema communication tools like e-mail, ftp … are taken as granted. As the print medium is still a very important market and cost production is relevant (paper consumption for start-up and close down of print process, ink consumption, quality assurance with optical on-line check of print process, printing equipment maintenance…) we will also provide a sketch of the pre-press service where in the recent years ICT has been increasingly adopted helping reducing production costs and times while retaining or even increasing result quality.

Details will be initially provided for the editorial process (expanding what was previously just sketched in terms of actions and needs) then actors will be described in more detail. Only after this all the pre print activity will be tackled.

8.2.3.1.2 Process, involved roles and related macro requirements

An overview on the macro requirements is provided I on the macro requirements and /or need tools related to each activity, task and sub-task according to involved roles in the following schema.

Activity	Task	Involved roles	Description	Macro Requirements / Needed tools
Idea (1)		*All*	*Product basic concept sketch*	*There are no special requirement*
Market survey (2)		*Management*	*This is the basic activity carried out in order to define new products. As each publishing activity should be based on sell forecast. This phase ensures that all analysis efforts have been carried out to give a sound basis to the evaluation process of a new publishing idea. Usually there is also a major effort to locate new ideas into a publishing plan.*	*Market studies, forecasts & Press survey are used to keep under control market evolution and are a starting point on which the management intuition relies for soundness* *Scorecards indicators & Company management tools are used to keep under control all major company indicators (balance, sell, cash flow ...)*
		Press Office	*Provide information and starts preparing product early announcement*	*There are no real requirements for this actor category in this phase.*

Activity	Task	Involved roles	Description	Macro Requirements / Needed tools
		Authors	*Usually there is no direct involvement in the survey at least in an operational manner. The author is generally meant to provide ideas based on the market survey results.*	*There are no real requirements for this actor category in this phase.*
		Chief Editor	*The role of the chief editor in this phase is to mediate results of the survey, managements expectations and authors ideas with present and scheduled publishing activities in order to state if there is room for a new product, when and where.*	*Publishing planning system in order to ensure that if a new title has to be started there is enough man / machine power and time to adjust the new development*
Title design (3)		*Management*	*The main contribution in this phase is related to the strategy. Care is taken to harmonise each new operation with the existing publishing plan, or else in defining new plans.*	*Scorecards indicators & Company management tools are used to keep under control all major company indicators (balance, sell, cash flow ...)*
		Press Office	*Prepares the product early announcement*	*There are no real requirements for this actor category in this phase.*
		Authors	*There is a direct involvement in this phase. Each author will contribute with his own original piece of content (text, image, video, music, design ...) at least in terms of samples and sketches in order to better clarify its idea and proposal.*	*Text editors to manage pieces of text describing ideas and content* *Image processing tools to show sample of pictures* *Audio managing tools could be required when examining digital or analogical samples non played live.*
		Chief Editor	*Defines the guidelines of the project in a storyboard according to company adopted standards and procedures. Guides the single or group of authors to integrate into the editorial working group and gives general rules for checking the production process. He also states the relevant milestones and deadlines in the overall process. Provides the accounting department will all required data to set up the related items in the company planning and accounting system.*	*Text editors to manage pieces of text describing ideas and content* *Image processing tools to show sample of pictures*[3] *Audio managing tools could be required when examining digital or analogical samples non played live.* *Publishing planning system in order to ensure that if a new title has to be started there is enough man / machine power and time to adjust the new development*
Go / No Go decision (4)		*Management*	*Based on the result of the market survey, the analysis of the proposed ideas and the production availability and costs a go / no go decision is taken. Many publishing project are stopped at this stage regardless of the content or idea quality but due to excessive cost or lack of real market.*	*Scorecards indicators are used to keep under control all major company indicators (balance, sell, cash flow ...)* *Publishing planning system in order to ensure that if a new title has to be started there is enough man / machine power and time to adjust the new development*
Research of (5)	*Sources (6)* *References (7)* *Multimedia (9)* *Similar titles (10)*	*Authors* *Editorial board* *Editorial staff*	*Available information sources are sought and book-marked. Highlighted sources are classified and stored into a DB or files for future reference. Each source is ranked in terms of relevance, quality and richness.* *Copyright issues related to the source are noted..*	*Information services (Reuters, ANSA ...), BBS, Archives, Books & libraries, Internet are used as common information sources were to seek data.* *Databases are used both for seeking and storing found data. Therefore it is necessary to have a database management system and related tools*
		Press Office	*Provide information and sources*	*There are no real requirements*
	Contacts (8)	*Management* *Editorial board*	*Possible partners for publishing are sought both on a local and an international basis according to the marketing strategy that was established in the design phase*	*Personal knowledge and relation are mainly used in this phase and therefore the only real requirement is a good "relational capability" for all the involved team.*
Editing of (11)	*Texts (12)* *Notes (13)* *Indexes (14)* *Captions (16)*	*Author* *Chief Editor* *Editorial board*	*Acts as a supervisor checking for quality assurance and publishing plan (schedule, cost ...) respect. Has the full responsibility of the phase development.*	*Publishing planning system in order to track man / machine power used* *Reporting tools for production cost update toward the accounting department*
		Authors *Editorial staff*	*Writes, produces, acquires and stores contents and assets to be used in the production phase. During this process various tools and procedures are used.*	*Text editors to manage text. Both in creation phase as well as in the revision one.* *Databases for seeking and storing data (reference and processed data)*
		Press Office	*Prepares the announcement*	*There are no real requirements*
	Multimedia (15) *[Images* *Audio* *Video]*	*Chief Editor* *Editorial board*	*Acts as a supervisor checking for quality assurance and publishing plan (schedule, cost ...) respect. Has the full responsibility of the phase development.*	*Image processing tools, Video managing tools, Audio managing tools: to check acquired content ... and operate a proper selection based on quality criteria.* *Databases for seeking and storing data*

Activity	Task	Involved roles	Description	Macro Requirements / Needed tools
		Authors	*Creates, processes and archives items to be used in the production process.*	*Image processing tools, Video managing tools, Audio managing tools: to acquire content and turn it into basic assets to be used in the production process Databases for seeking and storing data*
		Editorial staff	*Acquires, classifies and stores items to be used in the production process.*	*Image processing tools, Video managing tools, Audio managing tools: to check acquired content, classify and store it. Databases for seeking and storing data*
Finalisation of (17)	*Texts Captions Notes Indexes*	*Authors Chief Editor Editorial board*	*Acts as a supervisor checking for quality assurance and publishing plan (schedule, cost …) respect. Has the full responsibility of the phase development.*	*Publishing planning system in order to track man / machine power used Reporting tools for production cost update toward the accounting department Publishing tools: to check produced content in terms of layout and aspect. Databases for seeking and storing data*
		Editorial staff	*Processes and stores contents and assets taking care of layout and aspects related issues (text correctness, proper linking between captions and images …)*	*Publishing tools to manage textual content. Both in term of layout as well as in aspect. Databases for seeking and storing data*
		Production department	*Prepares the proper layout of each text portion according to the expected product Finalises and optimises content in order to fit the designed layout Produces the eventual product cross index*	*Publishing tools to manage content. Both in term of layout as well as in aspect. Programming tools to manage product development (multimedia, web and TV only) Databases for seeking and storing data*
		Press Office	*Finalises the announcement and starts promoting the product*	*There are no real requirements*
	Images Audio Video	*Authors Chief Editor Editorial board*	*Acts as a supervisor checking for quality assurance and publishing plan (schedule, cost …) respect. Has the full responsibility of the phase development.*	*Image processing tools, Video managing tools, Audio managing tools: to check acquired content … and operate a proper selection based on quality criteria. Databases for seeking and storing data*
		Editorial staff	*Processes and stores contents and assets taking care of layout and aspects related issues (resolution, layout, colours …)*	*Image processing tools, Video managing tools, Audio managing tools: to check acquired content, classify and store it. Databases for seeking and storing data*
		Production department	*Prepares the proper layout of each multimedia portion according to the expected product Finalises and optimises content in order to fit the designed layout Produces the eventual product cross reference*	*Image processing tools, Video managing tools, Audio managing tools: to manage content. Both in term of format as well as in aspect. Programming tools to manage product development (multimedia, web and TV only) Databases for seeking and storing data*

At this point the process ends that can be described in general terms with no specific reference to the actual production cycle. In terms of productions there are peculiarities that are strictly dependent on the specific product that is being produced. For our project aims, production details of a specific product are not as crucial as the process described so far. This is mainly due to the fact that at this point the producer will use the object in its own production environment respecting rules and constraints deriving form DRM.

It is taken as granted at this stage that an operation like storing content on a specific location of the file system in an unprotected mode will be possible only if the DRM rules and data provided with the managed object allow this to happen. Therefore we believe it is more crucial at this stage to point out the process steps and what is used to achieve it in general rather than to specify in details steps that may greatly vary from actor to actor. Nevertheless basic indication of related macro requirements or needed tools are provided

Activity	Task	Involved roles	Description	Macro Requirements / Needed tools
Production	*Books & Magazines*	*Production department*	*Prepare the final layout (which depends on several factors including co-editions …) according to optimisation methods for paper saving (back and front printing, page cutting …). Uses the proper printing procedures and equipment according to copies expected number. Checks the correctness of the attained result*	*Publishing & printing tools to manage content. In term of layout, aspect … Image processing tools: to manage content. Both in term of format as well as in aspect. Databases for seeking and storing data*

Activity	Task	Involved roles	Description	Macro Requirements / Needed tools
	CD/ROM DVD		*Finalises the title and implements the run-time environment (including multi-language aspects…)* *Mounts all product components in the final version,* *Checks the correctness of the attained result* *Prepares the gold disk for mass production* *Prepare the final packaging*	*Publishing tools to manage content. Both in term of layout as well as in aspect.* *Image processing tools,* *Video managing tools,* *Audio managing tools: to manage content. Both in term of format as well as in aspect.* *Programming tools to manage product development* *Databases for seeking and storing data*
	Web		*Finalises the site (including multi-language aspects…)* *Mounts all site components in the final version,* *Checks the correctness of the attained result* *Puts on line the final version or provides the ASP[8] with the due files and file system structure*	*Image processing tools,* *Video managing tools,* *Audio managing tools: to manage content. Both in term of format as well as in aspect.* *Programming tools to manage product development* *Databases for seeking and storing data*
	TV, iTV, PDA mobile and other new media		*Finalises the title and implements the run-time environment (including multi-language aspects…)* *Finalises the production (according to delivery platform)* *Checks the correctness of the attained result* *Deliver the final version*	*Publishing tools to manage content. Both in term of layout as well as in aspect.* *Image processing tools,* *Video managing tools,* *Audio managing tools: to manage content. Both in term of format as well as in aspect.* *Programming tools to manage product development* *Databases for seeking and storing data*

Management

Description	Macro Requirements / Needed tools
After having an idea the first step is generally a market survey. This is the basic activity carried out in order to define new products. As each publishing activity should be based on sell forecast. This phase ensures that all analysis efforts have been carried out to give a sound basis to the evaluation process of a new publishing idea. Usually there is also a major effort to locate new ideas into a publishing plan. *Once some preliminary result from the market survey is available (in case of positive ones) a design phase is started. The main contribution in this phase is related to the strategy. Care is taken to harmonise each new operation with the existing publishing plan, or else in defining new plans.* *Based on the result of the market survey, the analysis of the proposed ideas and the production availability and costs a go / no go decision is taken. Many publishing project are stopped at this stage regardless of the content or idea quality but due to excessive cost or lack of real market.* *Possible partners for publishing are seek both on a local and an international basis according to the marketing strategy that was established in the design phase*	*Market studies, forecasts & Press survey are used to keep under control market evolution and are a starting point on which the management intuition relies for soundness* *Scorecards indicators & Company management tools are used to keep under control all major company indicators (balance, sell, cash flow …)* *Publishing planning system in order to ensure that if a new title has to be started there is enough man / machine power and time to adjust the new development* *As far as partner search is concerned personal knowledge and relation are mainly used in this phase and therefore the only real requirement is a good "relational capability" for all the involved team.*

Authors

Description	Macro Requirements / Needed tools
Usually, even if there is a direct involvement in the "idea" generation, there is no direct involvement in the survey at lest in an operational manner. The author is generally meant to provide ideas based on the market survey results. *Each author will contribute to the design phase with his own original piece of content (text, image, video, music, design …) at least in terms of samples and sketches in order to better clarify its idea and proposal.* *Available information sources are seek and book-marked. Highlighted sources are classified and stored into a DB or files for future reference. Each source is ranked in terms of relevance, quality and richness.* *Copyright issues related to the source are noted.* *They write, produce, acquire and store contents and assets to be used in the production phase. During this process various tools and procedures are used.* *They create, process and archive items to be used in the production process.* *They do also act as a supervisors, checking for quality assurance and publishing plan (schedule, cost …) respect.*	*Text editors to manage pieces of text describing ideas and content in the design phase, in creation phase as well as in the revision one.* *Image processing tools,* *Video managing tools,* *Audio managing tools: to examine content in the design phase, to acquire content and turn them into basic assets to be used in the production process, to check acquired content … and operate a proper selection based on quality criteria in the finalisation phase.* *Information services (Reuters, ANSA …), BBS, Archives, Books & libraries, Internet are used as common information sources were to seek data.* *Databases for seeking and storing data (both reference and processed data) Therefore it is necessary to have a database management system and related tools* *Publishing planning system in order to track man / machine power used in the editing phase* *Publishing tools: to check produced content in terms of layout and aspect.* *Reporting tools for production cost update toward the accounting department*

Press Office

[8] Here ASP stands for Access Service Provider

Description	Macro Requirements / Needed tools
It acts throughout the whole process mainly with a promotional role. It performs all actions related to product advertising and promotion tuning the delivered news to the product development stage. Early announcement: *this is done in order to start attracting potential customer and public audience attention toward the newly concept idea* Announcement: *once the product is almost finished starts the announcement activity once again focused to attract attention and prepare the ground for the subsequent promotion and marketing actions.* Promotion*: this is the last phase of the process and is usually aimed to support the sell activity of the product. Aside from standard advertisement activities there may be special events, press conferences ...*	*Text editors to manage pieces of text describing ideas and content in the design phase, in creation phase as well as in the revision one.* *Image processing tools,* *Video managing tools,* *Audio managing tools: to examine content in the design phase, to acquire content and turn them into basic assets to be used in the production process, to check acquired content ... and operate a proper selection based on quality criteria in the finalisation phase.* *Here personal knowledge and relation are essential and therefore the only real requirement is a good "relational capability" for all the involved team.*

Chief Editor

Description	Macro Requirements / Needed tools
The role of the chief editor in this phase is to mediate results of the survey, managements expectations and authors ideas with present and scheduled publishing activities in order to state if there is room for a new product, when and where. *Defines the guidelines of the project in a storyboard according to company adopted standards and procedures. Guides the single or group of authors to integrate into the editorial working group and gives general rules for checking the production process. He also states the relevant milestones and deadlines in the overall process. Provides the accounting department will all required data to set up the related items in the company planning and accounting system.* *Acts as a supervisor checking for quality assurance and publishing plan (schedule, cost ...) respect. Has the full responsibility of the phase development.*	*Text editors to manage pieces of text describing ideas and content* *Image processing tools,* *Video managing tools,* *Audio managing tools: to examine available and searched raw material, to check acquired content ... and operate a proper selection based on quality criteria.* *Publishing planning system in order to ensure that if a new title has to be started there is enough man / machine power and time to adjust the new development and also to track man / machine power used* *Reporting tools for production cost update toward the accounting department* *Publishing tools: to check produced content in terms of layout and aspect.* *Databases for seeking and storing data*

Editorial board

Description	Macro Requirements / Needed tools
Available information sources are seek and book-marked. Highlighted sources are classified and stored into a DB or files for future reference. Each source is ranked in terms of relevance, quality and richness. *Copyright issues related to the source are noted.* *Possible partners for publishing are seek both on a local and an international basis according to the marketing strategy that was established in the design phase* *Acts as a supervisor checking for quality assurance and publishing plan (schedule, cost ...) respect. Has the full responsibility of the phase development.*	*Information services (Reuters, ANSA ...), BBS, Archives, Books & libraries, Internet are used as common information sources were to seek data.* *Personal knowledge and relation are mainly used in this phase and therefore the only real requirement is a good "relational capability" for all the involved team.* *Publishing planning system in order to track man / machine power used* *Reporting tools for production cost update toward the accounting department* *Publishing tools: to check produced content in terms of layout and aspect.* *Image processing tools,* *Video managing tools,* *Audio managing tools: to check acquired content ... and operate a proper selection based on quality criteria.* *Databases for seeking and storing data*

Editorial staff

Description	Macro Requirements / Needed tools
Available information sources are seek and book-marked. Highlighted sources are classified and stored into a DB or files for future reference. Each source is ranked in terms of relevance, quality and richness. *Copyright issues related to the source are noted.* *They acquire, classify and store items to be used in the production process (sources raw materials).* *They write, produce, acquire and store contents and assets to be used in the production phase. During this process various tools and procedures are used.* *They process and store contents and assets taking care of layout and aspects related issues (text correctness, proper linking between captions and images ... resolution, layout, colors ...)*	*Information services (Reuters, ANSA ...), BBS, Archives, Books & libraries, Internet are used as common information sources were to seek data.* *Text editors to manage text. Both in creation phase as well as in the revision one.* *Databases for seeking and storing data (reference and processed data)* *Publishing tools to manage textual content. Both in term of layout as well as in aspect.* *Databases for seeking and storing data* *Image processing tools,* *Video managing tools,* *Audio managing tools: to check acquired content, classify and store it.*

Company Management tools

Directly used but not affected by the production flow as they are valid in a general way and context. They represent the management framework and therefore support the whole process.

Macro Requirements / Needed tools Description
Scorecards indicators & Company management tools *used to keep under control all major company indicators (balance, sell, cash flow ...)*
Reporting tools *for production cost update toward the accounting department*
Production planning system *both in order to ensure that if a new title has to be started there is enough man / machine power and time to adjust the new development and to track man / machine power used in the editing phase*

Generic tools

Directly used and somehow affected by the production flow, mainly in terms of accessibility and indexing. They do provide sources of information and therefore they do represent part of the content that will be directly affected by the production process.

Macro Requirements / Needed tools Description	Requirements / Needed tools
Information services (Reuters, ANSA ...), BBS, Archives, Books & libraries, Internet *used as common information sources were to seek data. Data collected here will be then used throughout the production process.*	*Granted access* *Digitising facilities* *Archiving facilities* *Indexing facilities* *Seek engines tools* *Categorization tools* *Crawling engines tools*
Market studies, forecasts & Press survey *used to keep under control market evolution and are a starting point on which the management intuition relies for soundness*	*Granted access* *Digitising facilities* *Archiving facilities* *Indexing facilities*

Specific tools

Directly used and affected by the production flow. Most requirements should already be covered by available commercial products. Certainly integration issues may rise when taking into account the variety of used tools. Such a problem can be solved by adopting a criterion of compatibility for formats used in the various suite of tools. In the following schema are therefore reported only the basic and essential requirements while all details have been skipped.

Macro Requirements / Needed tools Description	Requirements / Needed tools
Publishing tools & Text editors *to manage pieces of text describing ideas and content in the design phase, in creation phase as well as in the revision one.* *to check and manage textual content. Both in term of layout as well as in aspect.*	*Easiness of use* *Wide content format acceptance (Word ©, WordPerfect ©, Lotus Notes ©, AmiPro ©, StarOffice ©, Aldus Pagemaker ©, FreeHand ©, Illustrator ©, Quark Express ©, Director ©, Flash ©, Maya ©, AferEffects ©, ...)* *Easy to integrate and recall from working environment* *Multi platform* *Powerful export / Import filters* *Support connection with major DB (through ODBC, OLE ...)*
Image processing tools, *Video managing tools,* *Audio managing tools:* *to examine content in the design phase,* *to acquire content and turn them into basic assets to be used in the production process,* *to check acquired content, classify and store it ... and operate a proper selection based on quality criteria in the finalisation phase.*	*Easiness of use* *Wide content format acceptance* *Easy to integrate and recall from working environment* *Multi platform* *Powerful export / Import filters* *Editing tools (cut, paste, join, fade, ...)* *Image filtering & palette management* *Support also professional features (gamma correction, filtering ...)*
Databases *for seeking and storing data (both reference and processed data) Therefore it is necessary to have a database management system and related tools*	*Easiness of use* *Wide range of storable objects (video, pictures, audio, text ...)* *Relational capabilities* *Fast access* *Wide capacity* *Easy retrieve* *Powerful indexing* *Multi key management* *Multi language management*

The pre-print service

Due to the fact that the Pre Print Activity could be considered either as an internal part of the production process of a Publishing house or as a service provided to a generic customer by a specialised entity, this part of the publishing workflow has been detailed here. Of course also the pre print service has its own well codified and standardised process that can be described as follows:

Activity	Task	Involved roles
Contract (1)	*Initial contact* *Offer (Pricing & Schedule)* *Contract*	*Customer* *PPS – Marketing* *PPS – Production manager*
Material provision (2a) (2b)	*Material provision (raw, formatted, to format …)*	*Customer*
Print proof provision (3)	*(Eventual formatting)* *page proof preparation* *Validation iteration* *Delivery to: Customer or to next step*	*Customer* *PPS – Production manager* *PPS – Technician* *PPS – Graphic expert*
High quality image insertion (4) (5)	*High quality picture insertion* *Colour page proof* *Validation iteration* *Delivery to: Customer or to next step*	*PPS – Graphic Expert* *PPS- Production manager* *Customer*
Blue print (6) (7)	*Blue print* *Validation iteration* *Delivery to: Customer or to next step*	*PPS – Graphic Expert* *PPS- Production manager* *Customer*
Film production (8) (9) (10)	*Film* *Validation iteration* *Delivery to: Customer or actual print out*	*PPS – Graphic Expert* *PPS- Production manager*

If comparing this schema with the one presented at the very beginning it is quite apparent that here we've placed in evidence and stressed the case of a service (initial point (1)) rather than the case of actual production. In such an instance the entry point should be regarded as block (1a) dashed as well as its connection to the rest of the flow.

In case of a service then the customer will contact the Pre Print Service (PPS) in order to check PPS availability, related costs and schedule and also to establish the data exchange policy (in terms of formats…). Then the customer will provide the PPS either with a closed document (generally a PDF or EPS file) or with an open one along with high resolution pictures and a print out foul proof. Only rarely it happens that the customer requires the PPS to do also the assembly and the paging.

As far as the production process is concerned, and once there is an established layout and grid, usually it is required to replace low quality pictures with the high quality one provided. Once this step has been accomplished a colour press proof is ready. From the colour press proof it is possible to derive a blueprint and from this one a film. Once the film has been produced the pre-print process is ended and is possible to go for actual printing. The customer will have several intervention cycles especially as far as approval is concerned. It is also possible that a customer may require only a subset of the overall process steps as the PPS could be used as an outsourcing facilities covering the process and therefore also the kind of delivered work will depend on customer needs and adopted policies

19.3.3.2 Process, involved roles and related macro requirements

In the following schema is provided an overview on the macro requirements and /or need tools related to each activity, task and sub-task according to involved roles. It is also necessary to take into account that needs and requirements affecting the customer imply compatibility and interoperability issues which can be considered as additional requirement for the system.

Activity	Task	Involved roles	Description	Macro Requirements / Needed tools
Contract (1)		*Customer*	Presents to the PPS his needs in terms of work, results, budget and schedule (kind of paper, print paper format, additional services …)	*Text editors to manage pieces of text describing ideas and content* *Image processing tools to show samples* *Mailing & FTP tools to manage data exchange with the PPS*
		Marketing	Provides the customer information, keeps track of customer requests and acts as an interface with the Production manager & department	*Text editors to manage pieces of text describing ideas and content* *Image processing tools to show samples* *Mailing & FTP tools to manage data exchange with the Customer*
		Prod. manager	Supports the Marketing department by data provision on schedule, costs and needs (formats for the raw material, resolution, work procedure …)	*Publishing planning system in order to estimate and plan man / machine power used* *Reporting tools for production cost estimates*

Activity	Task	Involved roles	Description	Macro Requirements / Needed tools
Material provision (2)	*Open document provision (2a)*	*Customer*	Provides the PPS production with an open document along with high resolution pictures (accepted supports are CD, DVD, ZIP, JAZ or mail).	*Digital storage management tools to store the raw data (CD/DVD burner, data compressors …)* *Mailing & FTP tools to manage data exchange with the PPS*
	Closed document provision (2b)	*Customer*	Provides the PPS production with a closed document (generally a PDF or EPS file) along with high resolution pictures (accepted supports are CD, DVD, ZIP, JAZ or mail).	*Digital storage management tools to store the raw data (CD/DVD burner, data compressors …)* *Mailing & FTP tools to manage data exchange with the PPS*
Print proof provision (3)	*Layout preparation*	*Prod. manager*	With graphic experts examines the proof of concept / content provided by the customer along with raw data and plans activities, work load and all subsequent steps.	*Text editors* *Image processing tools: to manage customer content and check pictures* *Publishing planning system to manage man / machine power* *Mailing & FTP tools to manage data exchange with the Customer*
		Graphic expert	Prepares the page grid and layout, takes care of fonts, pictures (low or mid resolution), text and all other page characteristics according to customer requests	*Publishing & printing tools to manage customer content.* *Image processing tools to handle images to be used (low, mid & high resolution)* *Mailing & FTP tools to manage data exchange with the Customer*
		Customer	It may happen, even if rarely, that the customer requires the PPS to act as a full service covering all steps from assembly, design and layout to paging of the overall work. In case this happens the customer will provide the PPS with a proof of concept and detailed descriptions on expected results.	*Publishing & printing tools* *Image processing tools: to manage content. Both in term of layout, aspect format…* *Databases for seeking and storing data* *Mailing & FTP tools to manage data exchange with the PPS*

Activity	Task	Involved roles	Description	Macro Requirements / Needed tools
Print proof provision (3) Cont.	*Print proof*	*Graphic expert*	Prepares the actual print proof and hands it over to the Customer for a iterative validation process aimed to get to a foul proof accepted by the customer	*Publishing & printing tools* *Image processing tools: to manage content. Both in term of layout, aspect format…* *Databases for seeking and storing data* *Mailing & FTP tools to manage data exchange with the Customer*
		Prod. manager	Supervises the whole process	*Publishing planning system in order to track man / machine power used* *Reporting tools for production cost update toward the accounting department* *Mailing & FTP tools to manage data exchange with the Customer*
		Customer	Validates the results reached so far in the process and gives approval for passing to the next step	*Publishing & printing tools* *Image processing tools: to manage content. Both in term of layout, aspect format…* *Databases for seeking and storing data* *Mailing & FTP tools to manage data exchange with the PPS*
High quality image insertion	*Image substitution (4)*	*Prod. manager*	Supervises the whole process	*Publishing & printing tools* *Image processing tools* *Publishing & printing tools: to check results*
		Graphic expert	Starting from the result of the previous step (when needed) or from the material received from the customer takes care to replace low quality pictures with the high quality one provided.	*Publishing & printing tools* *Image processing tools: to manage and package content* *Databases for seeking and storing achieved work* *Mailing & FTP tools to manage data exchange with the Customer*
	Validation (5)	*Graphic expert*	Sends to the customer the set of files produced at the previous step (4). The shipping is usually done providing an electronic support (CD, DVD …) holding the resulting work (Quark-X Press … format) along with closed files (PDF, EPS …). At this point an iterative validation process is initiated between the PPS and the customer to get to a colour press proof accepted by the customer.	*Digital storage management tools to store the result of the packaging (CD/DVD burner, data compressors …)* *Databases for seeking and storing data* *Mailing & FTP tools to manage data exchange with the Customer*
		Customer	Validates the results reached so far in the process and gives approval for passing to the next step	*Digital storage management tools to access received packaged data (data de-compressors …)* *Mailing & FTP tools to manage data exchange with the PPS*

Activity	Task	Involved roles	Description	Macro Requirements / Needed tools

Activity	Task	Involved roles	Description	Macro Requirements / Needed tools
Blue print	*Preparation (6)*	*Graphic expert*	Produces a blueprint starting from the colour press proof to be sent to the customer for approval. Once again here starts an iterative process that ends with the formal approval by the customer.	*Publishing & printing tools* *Image processing tools: to manage and package content and to calibrate colours* *Databases for seeking and storing achieved work* *Mailing & FTP tools to manage data exchange with the Customer*
	Validation (7)	*Graphic expert*	Sends to the customer the set of files produced at previous steps (4 & 6). The shipping is usually done providing an electronic support (CD, DVD …) holding the resulting work (Quark-X Press … format) along with closed files (PDF, EPS …).	*Digital storage management tools to store the result of the packaging (CD/DVD burner, data compressors …)* *Databases for seeking and storing data* *Mailing & FTP tools to manage data exchange with the Customer*
		Customer	Validates the results reached so far in the process and gives approval for passing to the next step	*Digital storage management tools to access received packaged data (data de-compressors …)* *Mailing & FTP tools to manage data exchange with the PPS*
Film production (8) (9) (10)		*Graphic expert*	Starting from all that has been produced in steps (4) and (6) a final film is produced. What attained here could be either sent to print (10) or to the customer (9).	*Printing tools: to manage calibrated content* *Databases for seeking and storing achieved work* *Mailing & FTP tools to manage data exchange with the Customer*

Customer

Description	Macro Requirements / Needed tools
Presents to the PPS his needs in terms of work, results, budget and schedule (kind of paper, print paper format, additional services …) *Provides the PPS production either with an open document along with high resolution pictures (accepted supports are CD, DVD, ZIP, JAZ or mail).* *Provides the PPS production either with a closed document (generally a PDF or EPS file) along with high resolution pictures (accepted supports are CD, DVD, ZIP, JAZ or mail).* *Only rarely it happens that the customer requires the PPS to do also the assembly and the paging of the overall work. In case this happens the customer will provide the PPS also with a proof of concept and detailed descriptions on expected results.* *Takes part to the validation process.*	*Text editors to manage pieces of text describing customer ideas, content, requirements and expectations* *Image processing tools: to examine available raw material, to check acquired content..* *Publishing tools: to check produced content in terms of layout and aspect.* *Databases for seeking and storing data* *Mailing system to keep in touch with marketing / production people and manage daily work*

Production Management

Description	Macro Requirements / Needed tools
Acts mainly as a supervisor and a decision maker. *Supports the Marketing department by data provision on schedule, costs and needs (formats for the raw material, resolution, work procedure …)* *With the graphic expert examines the proof of concept given by the customer and plans activities* *Supervises the whole process*	*Publishing planning system in order to ensure that if a new work has to be started there is enough man / machine power and time to adjust the new development* *Text editors to manage pieces of text describing ideas and content* *Reporting tools for production cost update toward the accounting department* *Publishing tools: to check produced content in terms of layout and aspect.* *Mailing system to keep in touch with marketing / production people, customers and manage daily work*

Marketing

Description	Macro Requirements / Needed tools
Contacts potential customers and presents range of provided services, related quality, cost and benefits. *Provides the customer specific information on a certain work.* *Keeps track of customer requests, feedbacks, remarks …* *Acts as an interface with the Production manager & department*	*Market studies, forecasts & Press survey are used to keep under control market evolution* *Mailing system to keep in touch with customers ? production management and manage daily work* *Reporting tools for checking sell rate, customer satisfaction …* *Databases for managing contacts, orders, complaints …*

Graphic Experts

Description	Macro Requirements / Needed tools

Prepares the page grid and layout, takes care of fonts, pictures (low or mid resolution), text and all other page characteristics according to customer requests *Prepares the actual print proof and hands it over to the Customer for a iterative validation process aimed to get to a foul proof accepted by the customer* *Starting from the result of the previous step (when needed) or from the material received from the customer takes care to replace low quality pictures with the high quality one provided.* *Sends to the customer the set of files produced at the previous step (4). The shipping is usually done providing an electronic support (CD, DVD …) holding the resulting work (Quark-X Press … format) along with closed files (PDF, EPS …). At this point an iterative validation process is initiated between the PPS and the customer to get to a colour press proof accepted by the customer.* *Produces a blueprint starting from the colour press proof to be sent to the customer for approval. Once again here starts an iterative process that ends with the formal approval by the customer.* *Sends to the customer the set of files produced at previous steps (4 & 6). The shipping is usually done providing an electronic support (CD, DVD …) holding the resulting work (Quark-X Press … format) along with closed files (PDF, EPS …).* *Starting from all that has been produced in steps (4) and (6) a final film is produced. What attained here could be either sent to print (10) or to the customer (9).*	*Publishing planning system in order to track man / machine power used* *Text editors to manage pieces of text describing customer ideas, content, requirements and expectations* *Image processing tools: to examine available raw material, to check acquired content..* *Publishing tools: to check produced content in terms of layout and aspect.* *Databases for seeking and storing data* *Mailing system to keep in touch with marketing / production people, customers and manage daily work*

Company Management tools

Directly used but not affected by the production flow as they are valid in a general way and context. They represent the management framework and therefore support the whole process.

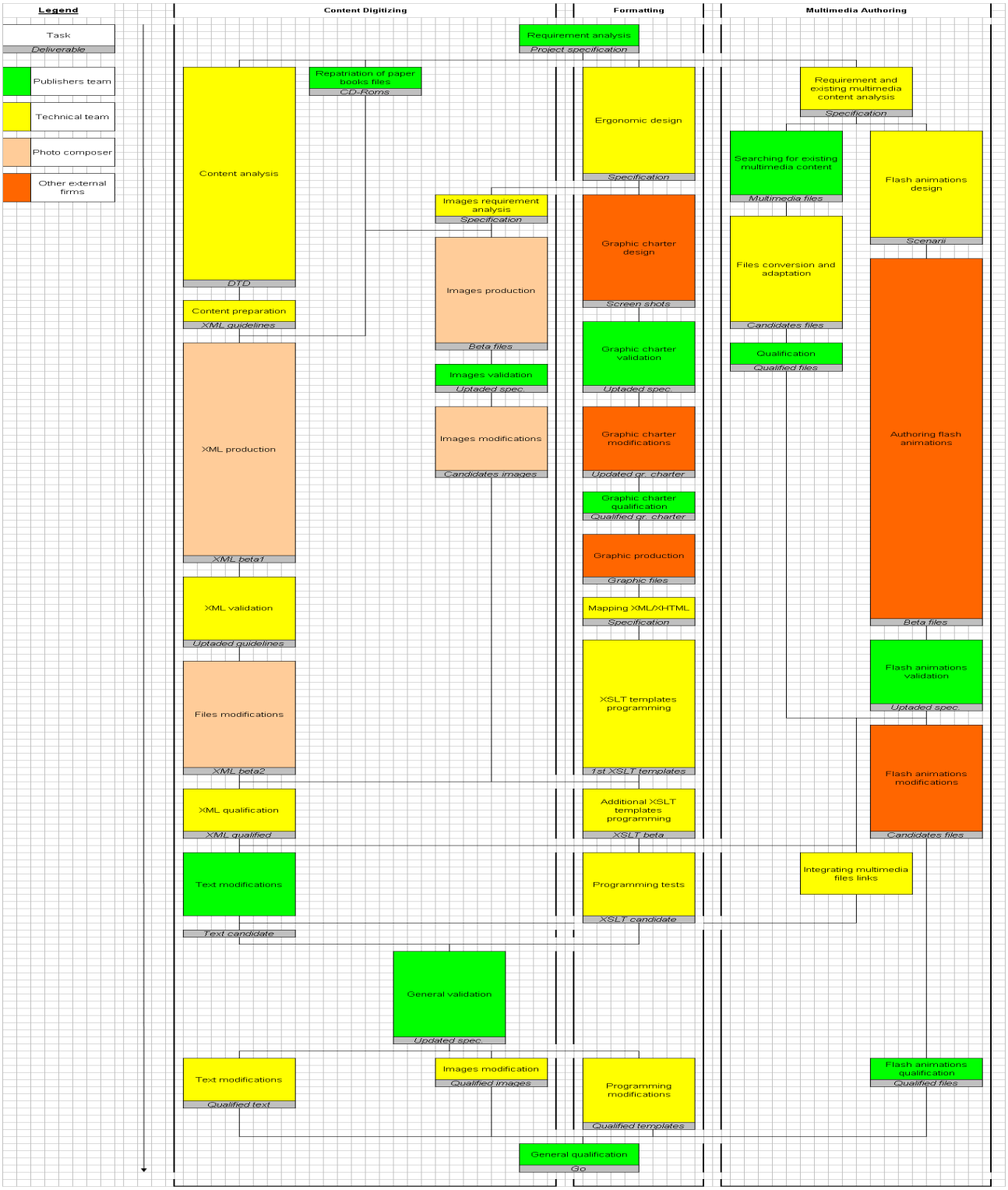
Macro Requirements / Needed tools Description
Reporting tools *for production cost update toward the accounting department*
Production planning system *both in order to ensure that if a new title has to be started there is enough man / machine power and time to adjust the new development and to track man / machine power used in the editing phase*

Specific tools

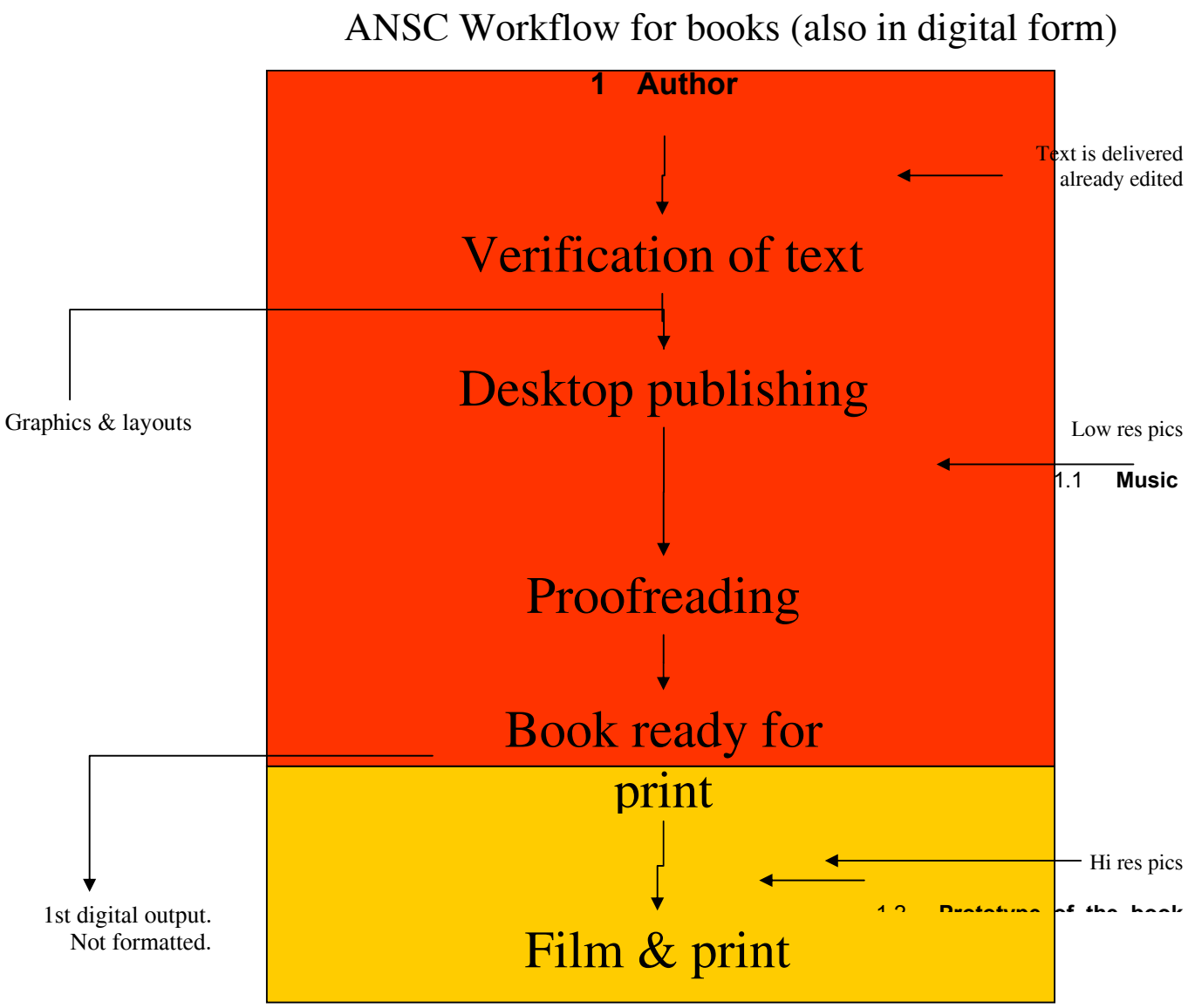
Directly used and affected by the production flow. Most requirements should already be covered by available commercial products. Certainly integration issues may rise when taking into account the variety of used tools. Such a problem can be solved by adopting a criterion of compatibility for formats used in the various suite of tools. In the following schema are therefore reported only the basic and essential requirements while all details have been skipped.

Macro Requirements / Needed tools Description	Requirements / Needed tools
Publishing tools & Text editors *to manage content in all phases (eventually design, creation as well as in the revision in case of full servicing).* *to check and manage textual content. Both in term of layout as well as in aspect.*	*Easiness of use* *Wide content format acceptance (Word ©, WordPerfect ©, Lotus Notes ©, AmiPro ©, StarOffice ©, Aldus Pagemaker ©, FreeHand ©, Illustrator ©, Quark Express ©, Director ©, Flash ©, Maya ©, AferEffects ©, …)* *Easy to integrate and recall from working environment* *Multi platform* *Powerful export / Import filters* *Support connection with major DB (through ODBC, OLE …)*
Image processing tools: *to examine content,* *to manipulate content: crop, resize, resample, filter, alter (via special effects) retouch and / or calibrate,* *to prepare content, on the basis of quality criteria, for the finalisation phase.*	*Easiness of use* *Wide content format acceptance* *Easy to integrate and recall from working environment* *Multi platform* *Powerful export / Import filters* *Editing tools (cut, paste, join, fade, crop, resize, resample, filter, alter (via special effects) retouch and / or calibrate, … gamma correction, palette management)*
Databases *for seeking and storing data. Therefore it is necessary to have a database management system and related tools*	*Easiness of use* *Relational capabilities* *Fast access* *Wide capacity* *Easy retrieve* *Powerful indexing* *Multi key management*

19.3.3.3 e-Books Production Process Workflow



19.3.3.4 Books/e-Books Production Process Workflow



19.4 Answers to the Workflow Questionnaire

Q No.	Workflow Questions		XX	SEJER	UNIVLEEDS	CONVERSE	EUTELSAT	XIM
1.	Which of the following stage(s) does your multimedia business include?	a) Producer (accessing/ creating/ authoring, editoring, rendering etc)		Yes We produce our own content	Yes	Yes	In our B2B scenario we are Carrier (responsible for the content delivery)	Yes
		b) Integrator (accessing, editing, aggregating, formatting, etc.	Yes	Yes We aggregate content from other producers	-	Yes	In our B2C scenario we have some agreement with Producer to distribute their content to our users and sharing revenues. In this case we are Integrator and Distributor	Yes
		a) Distributor (editing, formatting, packaging, bundling and distribution)	Yes	Yes We distribute books & e-content (from us and other publishers too)	-	Yes – but we deliver the final product only.		
		b) Retailer (selling mainly B2C)	Yes	Yes	-	Yes	In our B2C scenario, we don't sell directly to final users, but we sell to our partners and they keep the contact with the final user	
2.	Do you have an established "mature[1]" process for any or all of the above?	a) Yes b) No	Yes	No	No	Yes – for distributing items for mobiles	Yes we started each scenario three years ago	No
3.	What tools do you normally require to integrate with the Workflow Management for each of the above categories as relevant? In each category If Yes, then could you please make it available for the purpose of this WFMS Requirement Specification exercise	a) For Production? Yes/No	No	Yes	No			Yes
				All Validator build tool (proprietary & make file)				Authoring tools (Photoshop, Maya, Flash)
		b) For Integration? Yes/No	Yes	Yes	No			Yes
				Validator build tool (proprietary & make font)			A simple packaging procedure to pass form AXMEDIS world to the OPENSKY one. Ex: a tool that calls it for getting the AXObj and assign it into an OPENSKY package. Our tools are either the web interface where publishers package their content or they can do that by using some API to use the technology in a "silent" mode.	Flash, Dreamweaver
		c) For Distribution?	Yes		No	Yes		No

						We need to get finally rendered reformatted, resized and converted object for delivery	Who should decide the transmission details? In our architecture there is a Publisher. After packaging an AXObj in our Push Technology who will associate it to a Program? Who will schedule the Program? Who will decide the target for the Program? See next slide with a general scenario Also in this case our workflow management takes into account two possible scenarios: transmission details are defined either using web-based interface for Publishers or sending formatted (XML) commands to our server passing through the API level.	
		d) For Retail?	No		No			No
		If Yes, then could you please make it available for the purpose of this WFMS Requirement Specification exercise.					Our Partners (User Providers) assign/buy contracts for their users either from an appropriate web-based User Administration Interface or by sending some formatted (SML) requests to our API level. Partners buy in advance, some credits from us. Credits will allow to Partners of buying contract for their users. Final users will pay to our partners the price for the contract.	
4.	**Are you happy that the AXMEDIS Use Cases being proposed prototypically cover all the aspects of your core workflow logic in respect of each of your relevant process streams**		Yes	Yes, it should help us to set up a Workflow as we are not currently using tools to manage it.	Yes	No, for my opinion it may be constantly defined for different types of distribution channels.	Yes but it will be difficult to find a common interface for all distribution channels	Yes
5.	**If No, what aspects of which one of your process streams (a,b,c,d as above) are not fully accommodated, please specify?**		Will cover minor points in interview	-	-			-
6.	**What client platforms do you use which would require Workflow management client software?**		Proprietary Content Management/ Ingestion programs	MS Windows, Mac OS	Windows PC (OS= XP pro & Win Server 2003 Limited use - LINUX & OSX)	Actually our client is our application server application which distribute the final content item for mobile device. Windows 2000 Server is used for application server	Java Platform for developing our client application it runs on either Window or LINUX. The client application is charged of receiving the AXObj, of stocking it and of delivering it to the appropriate viewer/player For developing we have both windows and Linux workstations	Mac OS x Windows XP
7.	**Are there any relevant requirements aspects for the AXMEDIS WFMS as covered in the WFMS**		No		We are not using WFMS at the moment so we are	Still an open issue, should be resolved later if any	WF engine could operate in Linux	No

	Requirements Discussion Document that in your opinion have been left out				not in a position to comment			
8.	**The Workflow interface for AXMEDIS has to interoperate with one or two Open Source Workflow Engines selected from the list of the leading WF engines availableas shareware and nominated by members of the Consortium, Please state your preference as follows:**	• **WF engines preferred by you for Windows PC (XP, 2000, 98) Environment** • **WF engines preferred by you for the Mac Environment** • **WF engines preferred by you for the Linux Environment**	XX has little or no knowledge in this area.		Mostly PC XP, 2000, 98 A few MAC machines mainly to control digital camera back system A few Linux machines mainly web servers, ftp, ssh	We have no special preferences just windows platform should be supported	Windows and Linux, Web-based proposal (http://con-cern.org)	
9.	**Are any stages of your workflow currently announced**	**If yes please describe:**	Only by proprietary systems to be covered in interview	No	-			No
10.	**Do you need to share workflow management with partner organisations in your value chain?** **i) How does this work now?** **ii) Who is involved?** **iii) Would all of these organisations adopt AXMEDIS :** **Following the meeting, please provide a flowchart and brief description of your workflow**		No	We should share ideally WF with many partners i) We don't use any WFMS, Some. ii) authors, publishing houses, designers, software houses, schools, photo-composers, Mail/file exchange iii) Not sure all of them can adapt it (authors, schools,…) Definitely No	-	iii) Definitely no, we are the final distributor before delivering finalised content item for the mobile device	i) Publisher uploads the content ii) Publisher and Broadcaster (Eutelsat) iii) Yes if AXM editor produces a stable result in DRM Technology Broadcaster (Eutelsat) send content, owner of technology, responsible to transport level. Final user access the content	i) Approval processes at each stage ii) Client iii) No

Q No.	Workflow Questions		ANSC	DIPITA	AFI	ILABS	TISCALI	EXITECH
1.	**Which of the following stage(s) does your multimedia business include?**	**a) Producer (accessing/creating/ authoring, editoring, rendering etc)**	Yes	Yes	Offline Workflow	We produce our own content and also editing, management, distribution and fruition tools, platform and solutions. We also produce CD/DVD or books but only on specific customer order and commitment		
		b) Integrator (accessing, editing, aggregating, formatting, etc.		Yes	Offline Workflow	We acquire, adapt and aggregate content from other publishers when there is no in-house experience on the specific domain	YES, namely Pre-encoding, encoding, encrypting, (meta)data entry and content upload (in certain cases remote content import). We call them the "Content Acquisition Platform"	
		b) Distributor (editing, formatting, packaging, bundling and distribution)			Offline Workflow	We distribute mainly editing, management, distribution and fruition tools, platform and solutions but also e-content, CD/DVD and/or books (these latter only when agreed with committers)	YES	
		c) Retailer (selling mainly B2C)				We sell mainly editing, management, distribution and fruition tools, platform and solutions but also e-content, CD/DVD and/or books (these latter only when agreed with committers)	YES	
2.	**Do you have an established "mature[1]" process for any or all of the above?**	**a) Yes** **b) No**	Yes	Yes	Yes	We are ISO9000 certified and the process has been documented, procedures are in place, simple tools are used.	PARTIALLY	
3.	**What tools do you**	**a) For Production? Yes/No**		No	Yes	Yes	N/A	

	normally require. to integrate with the Workflow Management for each of the above categories as relevant? **In each category If Yes, then could you please make it available for the purpose of this WFMS Requirement Specification exercise**				Audio tools as Peak Bias(MAC), Deck Bias (MAC), Protools(MAC) and multimedia developer as Macromedia Director. But also many more.	Visual SourceSafe – for CM management and control of developed code Learn eXact Suite – for content production (LO, LOM…) Bugzilla – for problem tracking MS-Word – for document production / MS-Excel – for process tracking and recording / forecasting MS-Project for planning		
		b) For Integration? Yes/No		Yes	Yes	Yes		
		If Yes, then could you please make it available for the purpose of this WFMS Requirement Specification exercise.		WinPitchPro (http://www.winpitch.com) – Speech analysis, Text2Speech Editing, Synchronization and Tagging software. IMDI Tools (http://www.mpi.nl/IMDI/) – Speech Metadata Management tools	As above in a)	Visual SourceSafe – for CM management and control of developed code Learn eXact Suite – for content production (LO, LOM…) Bugzilla – for problem tracking	Pre-encoding, encoding, encrypting, (meta)data entry and content upload are processed via internally developed tools + Xaura (WF is implicit in the tools – very simple few step process) For remote content import we do use software importation tools with implicit built in workflow	
		c) For Distribution?		No	Yes	No		

		If Yes, then could you please make it available for the purpose of this WFMS Requirement Specification exercise.			multimedia developer as Macromedia Director		For content upload we use common commercial FTP managing software For (audio video) content delivery deployment we use internally developed software routines for automatically transferring content from central content repository to edge cache servers	
		d) For Retail?		No		No		
		If Yes, then could you please make it available for the purpose of this WFMS Requirement Specification exercise.					Xaura enables to specify e-store business rules, pricing etc. License back-office tool for reporting and customer care operations (re-funding, re-issuing of licenses)	
4.	**Are you happy that the AXMEDIS Use Cases being proposed prototypically cover all the aspects of your core workflow logic in respect of each of your relevant process streams**			Yes	Yes	Yes	No	
5.	**If No, what aspects of which one of your process streams (a,b,c,d as above) are not fully accommodated, please specify?**						Content Acquisition Platform (audio video) content delivery deployment Synchronization between license creation and Xaura metadata management Notification between license issuing and License back-office metadata	
6.	**What client platforms do you use which would require Workflow management client software?**			Microsoft Windows 2000 & XP	Mac, Windows XP	Microsoft Windows	To be assessed during AXMEDIS specification process. Presumably the tools would be Xaura, License back-office and the Content Acquisition	

						Platform.	
7.	**Are there any relevant requirements aspects for the AXMEDIS WFMS as covered in the WFMS Requirements Discussion Document that in your opinion have been left out**		No	No	Yes System Management		
8.	**The Workflow interface for AXMEDIS has to interoperate with one or two Open Source Workflow Engines selected from the list of the leading WF engines availableas shareware and nominated by members of the Consortium, Please state your preference as follows:**	• **WF engines preferred by you for Windows PC (XP, 2000, 98) Environment** • **WF engines preferred by you for the Mac Environment** • **WF engines preferred by you for the Linux Environment**				No Preference		
9.	**Are any stages of your workflow currently announced**	**If yes please describe:**	No	No	No	No	Multi-encoding, DRM license creation Remote content import Content Publishing (audio video) Content delivery deployment Xaura metadata synchronization License back-office metadata notification	
10.	**Do you need to share workflow management with partner organisations in your value chain?** **i) How does this work now?** **ii) Who is involved?** **iii) Would all of these organisations adopt AXMEDIS :** **Following the meeting, please provide a flowchart and brief description of your workflow**			No	i) Recording, Mastering, Sending master to CD printer and packaging, send back for distribution. ii) Artists, Sound Engineers, Producers, Designers (CD lay-out), CD printers. iii) Mainly the CD printer should be	We do not need as we cover the whole value chain, but it would be beneficial i) we don't use any WFMS ii) authors, publishing house, servicing companies, distributors and retailers iii) not sure all of them can (authors) adopt it	YES i) Synchronization between partner license creation and Xaura metadata management Notification between partner license issuing and License back-office metadata ii) Content syndicator	

				adopt AXMEDIS avoiding the terrestrial sending of Master Audio and master Graphics.		iii) Yes, several, including XX	

19.5 Answers to the Content Process / Distribution Cost Questionnaire

A.F.I Responses to supplementary Questions re Costing

0) Which of the following multimedia business sectors is your company involved in:
a) Music Production and/or Distribution
b) Educational/e-book Production and Distribution
c) Advanced Entertainment e-media Production and Distribution (e.g. films, videos, games, immersive-3D environments, interactive experience portals etc)
Music Production

1) On the whole, i.e. considering the entire scenario end-to-end what is the proportion of your production/distribution workflow that is automated and what proportion is manual?
Most of the producing process, with regard to music recording , are manual if by manual we intend the direct involvement of professionals. Partially automated are the contractual and licensing forms (based on standard forms) .

12) Please could you give your best evaluation of the time, tools used and cost typically incurred in your processes for the following typical activities (it may be helpful to refer to the attached map of activity hierarchies in order to remember to include all the steps involved for each typical activity below for each of the streams.
As far as the recording process lay its basis on many variants changing time by time, the costs and time spent for each recording process are not always the same. In the table below we illustrate the following case:

- *CD album (containing almost 12/14 songs)*
- *Artist/ singer (quite famous)*
- *Breakeven :30.000 copies*
- *Cost of each copy to the public € 20,00*
- *Some cost are expressed in percentage calculated on the amount of copies sold*
- *Costs of in house people such as artistic director, contract and rights clearance office, accountant, graphic aggregator and press agent are in connection with specific time spent.*

- *this refer to the case in which the producer is also publisher.*

8.2.1.1.5 AFI Audio/Music Production Workflow & Costing

	Time taken HOURS	Tools used	Gross cost
ISSUING THE BUDGET LEGAL OFFICE	4 18/20	EXCEL WORD	€ 88.00 € 2,000.00
CONTRACT WITH ARTIST	2	WORD	€ 44.00
CONTRACT WITH RECORDING STUDIO	1	WORD	€ 22.00
CONTRACT WITH MUSICIANS OR BAND 5 people	1	WORD	€ 22.00
CONTRACT WITH ORCHESTRA	1	WORD	€ 22.00
CONTRACT WITH ARRANGER	2	WORD	€ 44.00
CONTRACT FOR COVER DESIGN	1	WORD	€ 22.00
CONTRACT WITH CD BOOKLET WRITER	1	WORD	€ 22.00
CONTRACT FOR COPIES OF MUSIC SCORES	0.3	WORD	€ 11.00
CONTRACT WITH DISTRIBUTOR CONTRACT WITH PROMOTER	3 2	WORD WORD	€ 66.00 € 44.00
CONTRACT WITH CD FACTORY CONTRACT FOR VIDEO PRODUCTION	1 project base	WORD	€ 22.00 € 44.00
*PUBLISHING CONTRACT	1	WORD	€ 44.00

*CUE SHEET FORM for Authors and Publishers Collecting Society	0.15	WORD	€ 5.50
MECHANICAL RIGHTS FORM for Coll. Soc.	0.3	WORD	€ 11.00
ISRC LISTING for all tracks	0.3	EXCEL	€ 11.00
ACCOUNTANCY DEP.	10	EXCEL	€ 220.00
CONTRACTS MANAGEMENT	3	WORD	€ 66.00
UPLOADING METADATA ON DATABASE	3		€ 45.00
UPLOADING LICENSING DATA ON DATABASE	3		€ 45.00
UPLOADING MP3 ON DATABASE	3		€ 45.00
GRAPHIC AGGREGATOR	24		€ 480.00
CD COVER AND BOOKLET LAYOUT	1	FOTO LAB.	€ 400.00
ARTISTIC DIRECTOR	80		€ 3,200.00
PRESS AGENT	project base		€ 5,000.00
MECHANICAL RIGHTS	30.000 copies		€ 18,000.00
CD PRINT/RELEASE	30.000 copies		€ 24,000.00
ARTIST ROYALTIES	5/10 %		€ 48,000.00
SPECIAL SAMPLES FOR B2B USERS	16 ORE	CD BURNING	€ 352.00
FLEXIBLE COSTS			
PROMOTION/ADVERTISING	project base	tv/radio/magazines etc	€ 220.00
MUSICIANS/BAND	project base		€ 15,000.00
ORCHESTRA	project base		€ 5,000.00
ARRANGER	project base		€ 15,000.00
MUSIC SCORES	project base		€ 2,000.00
RECORDING STUDIO	200	equiment	€ 20,000.00
GRAPHIC DESIGN	project base		€ 1,000.00
BOOKLET WRITER	project base	WORD	€ 500.00
DISTRIBUTION	15%		€ 90,000.00
PROMOTER	project base		€ 15,000.00
PROMOTION/ADVERTISING	project base	tv/radio/magazines/promo stage	€ 150,000.00
VIDEO CLIP	project base	VIDEO COMP.	€ 15,000.00

XIM's response to Costing Questionnaire

10) Which of the following multimedia business sectors is your company involved in:

a) Music Production and/or Distribution
b) Educational/e-book Production and Distribution
c) Advanced Entertainment e-media Production and Distribution (e.g. films, videos, games, immersive-3D environments, interactive experience portals etc)

C

11) On the whole, i.e. considering the entire scenario end-to-end what is the proportion of your production/distribution workflow that is automated and what proportion is manual?

XIM's production work is currently highly bespoke and hence 95% manual. Approximately 5% of effort is achieved via scripting of tools, for example, batch image preparation in photoshop, batch video compression into streamed formats, batch 3D rendering etc.

12) Please could you give your best evaluation of the time, tools used and cost typically incurred in your processes for the following typical activities (it may be helpful to refer to the attached map of activity hierarchies in order to remember to include all the steps involved for each typical activity below for each of the streams.
XIM's costs are highly variable depending on the scope and complexity of the project. However, I have estimated a basic range of current costs in the table below, which we can compare against once we are using AXMEIS tools to support our workflow.

As well as direct costs, it is also important to consider the production lead-time, which is often delayed by inefficient clearance and approval processes. There is great potential to reduce this by means of the AXMEDIS tools and framework.

Typical activity	Time taken (hours)	Tools used	Cost Incurred (e.g. man-minutes + other resources)
metadata integration	0	not applicable	0
composite object production	100-400 hours	Maya, Flash, Photoshop, After Effects	Labour, computer and software depreciation (€2.5k per production)
protecting objects	0	None at present but wish to in the future	IPR counsel (€?)
distributing objects to distributors	4-16 hours	standard tools for email, FTP, WebDAV, DVD-ROM burning	communications, consumables, couriers etc. (€10-€150)
acquiring objects from the publisher	5-20 hours depending on source	(small effort but can be large elapsed time (up to 2 weeks), impacting delivery lead time)	usage rights of third party components €250-€2000 depending on nature of the objects
finalizing the contract in the licenses .	4-16 hours	email, MsOffice	legal counsel may be required (€1-€3k)
production of the programme for publication	200 hours	Maya, Flash, Dreamweaver, Photoshop, Final Cut Pro, After Effects	Labour, computer and software depreciation (€2.5k per production)
updating digital content eg a) updating metadata b) updating licenses c) recovering history of the object production . tracking	50-200 hours	Maya, Flash, Dreamweaver, Photoshop, Final Cut Pro, After Effects	Labour, computer and software depreciation (€2.5k per production)
administrative activities . clearance of rights . etc...	5-20 hours for clearance, depending on source. Also included here is the approval process with key stakeholders.	email, MsOffice.	(small effort but can be large elapsed time (up to 2 weeks), impacting delivery lead time)

Any other activities, please enter here: programming, integration and testing	200-300 hours	Flash, Java, Dreamweaver, MEL, etc	Labour, computer and software depreciation (€2.5k per production)

Tiscali's response to Costing Questionnaire

Which of the following multimedia business sectors is your company involved in:

a) Music Production and/or Distribution

Distribution only

b) Educational/e-book Production and Distribution

N/A

c) Advanced Entertainment e-media Production and Distribution (e.g. films, videos, games, immersive-3D environments, interactive experience portals etc)

Pre-encoding, encoding, DRM-encrypting, (meta)data entry, file upload and Distribution only

11) On the whole, i.e. considering the entire scenario end-to-end what is the proportion of your production/distribution workflow that is automated and what proportion is manual?

Pre-encoding, encoding, DRM-encrypting, (meta)data entry, file upload:
50% manual / 50% automated if content is not imported
20% manual / 80% automated if content is imported
Distribution :
30% manual 70% automated

12) Please could you give your best evaluation of the time, tools used and cost typically incurred in your processes for the following typical activities (it may be helpful to refer to the attached map of activity hierarchies in order to remember to include all the steps involved for each typical activity below for each of the streams?

All considerations below are related to video files (Movies)

Typical activity	**Time taken**	**Tools used**	**Cost Incurred (e.g. man-minutes + other resources)**
Metadata integration		Xaura	60 minutes per movie / man 15 min /system resources time
this operation includes both manual and automatic work for new content uploaded into Xaura system			
composite object production	16 hours per 1 item	Xaura	Special sites: 960 min / man per item 15 min /system resources time
This operations is strictly confined to the development of multimedia web GUIs for special sites (entirely managed via Xaura)			
protecting objects	Movies: 4 hours	WM DRM	Movies: 30 min / Man per video 210 min /system resources time
objects protection is available via Microsoft Windows Media DRM			
distributing objects to distributors	Movies: 1 hour	FTP	Movies: 10 min / Man per video 50 min /system resources time
Distributor is to be meant any media server repository (Tiscali or third party)			
acquiring objects from the publisher	Off-line transfer: about 2 weeks per 10 movies (depends on publisher responsiveness) on-line transfer: aprox. 60 minutes per movie	Delivery courier	120 minutes for object requirements definition / man if data is not imported and provided with XML data sheet (in this case 20 min)
These durations are strongly variable depending on responsiveness			
finalizing the contract in the licenses	2 months – 1 year	Face to face negotiation	7 days per content deal (each deal aprox 100 movies)
This is the most time consuming and lasting operation. Strogly depeding on content owner			
production of the programme for publication	2 hour per movie	xaura	60 min / movie / man
For Tiscali this operation means content publishing and integrity testing			
updating digital content e.g.			
a) updating metadata	20 min per movie	xaura	20 min per movie/ man
This may happen in the case of translations, error handling or just data modification			
b) updating licenses	30 min	WM DRM	30 min / Man per video
c) recovering history of the object production . tracking	N/A	N/A	N/A
administrative activities . clearance of rights . etc...	4 hours of work per Content Provider	Excel	240 min / man per Content Provider
This work is done manually by merging Xaura reports			
Any other activities, please enter here			

a) Uploading the data to the online system	about 1 hour / per movie	FTP	Movies: 10 min / Man per video 50 min /system resources time
Via Xaura and simple FTP manager applications			
b) Testing the content on the live platform	1.5 hour per movie	YYYY CMS	90 min per video /man
Controlling playback integrity and metadata coherence			

XX's response to Costing Questionnaire

0) Which of the following multimedia business sectors is your company involved in:

a) Music Production and/or Distribution

b) Educational/e-book Production and Distribution

c) Advanced Entertainment e-media Production and Distribution (e.g. films, videos, games, immersive-3D environments, interactive experience portals etc)

11) On the whole, i.e. considering the entire scenario end-to-end what is the proportion of your production/distribution workflow that is automated and what proportion is manual?

30% automated, 70% manual (for current ingestion system)

12) Please could you give your best evaluation of the time, tools used and cost typically incurred in your processes for the following typical activities (it may be helpful to refer to the attached map of activity hierarchies in order to remember to include all the steps involved for each of the streams.

Typical activity	**Time taken**	**Tools used**	**Cost Incurred (e.g. man-minutes + other resources)**
metadata integration	1 hour per batch of 50 products	Xl proforma spreadsheet, ftp client, xml	1 man hour
composite object production	30 minutes per batch of 50 products	xml	10 man minutes
protecting objects	5 minutes per batch of 50	Content management database	5 man minutes
distributing objects to distributors	24 hrs	Dataloader, oms	3 man hours
acquiring objects from the publisher downloading files	3 hours per batch of 50 albums	ftp client	15 man minutes
finalizing the contract in the licenses .	3 weeks	email	3 man days
production of the programme for publication n/a	n/a	n/a	n/a
updating digital content e.g.			
a) updating metadata	1 hour per week	Content management	1 man hour
d) updating licenses	1 hour per week	Content Management	1 man hour
e) recovering history of the object production . tracking n/a	n/a	n/a	n/a

administrative activities . clearance of rights . etc...	1 hour per week	email	1 man hour
Any other activities, please enter here			

ANSC's response to Costing Questionnaire

Raw costs of 2004 digitisation / cataloguing process

Images:

Digitisation of music manuscripts (catalogue record already present)

Standard:
Master copy (offline): tiff, 600 dpi, RGB
Intranet copy: jpg, 300 dpi, RGB
Internet copy: jpg, 72 dpi, RGB
Cataloguing: SBN (Servizio Bibliotecario Nazionale)
Metadata: MAG Schema 1.5

Costs:
¤ 0,70 each page (master + intranet copy)
Production of technical metadata: YES

Digitisation of photographs + catalogue record production

Standard:
Master copy (offline): tiff, 600 dpi, Grayscale or RGB
Intranet copy: jpg, 300 dpi, Grayscale or RGB
Internet copy: jpg, 72 dpi, Grayscale or RGB
Cataloguing: ICCD Scheda F (modified for ANSC purposes)
Metadata: MAG Schema 1.5

Costs:
¤ 8-10 each photograph (master + intranet copy)
Great accuracy of cataloguing process
¤ 2,5 digitisation only
¤ 5,5 cataloguing process of each digital photograph
Great accuracy of cataloguing process
Production of technical metadata: YES

Audio:

Standard:
Master copy (offline): Wave file, 16 or 24 bit, 48 Khz
Intranet copy: MP3 file 128 Kbit
Internet copy: MP3 file 128 Kbit (30 secs sample or whole)
Cataloguing: SBN (Servizio Bibliotecario Nazionale / Discoteca di Stato)
Metadata: MAG Schema 2.0

Costs:
¤ each hour
Great accuracy of cataloguing process
Production of technical metadata: YES

Video:

Standard:
Master copy: Wave file, 16 or 24 bit, 48 Khz

Intranet copy: MP3 file 128 Kbit
Internet copy: MP3 file 128 Kbit (30 secs sample or whole)
Cataloguing: SBN (Servizio Bibliotecario Nazionale / Discoteca di Stato)
Metadata:

Bibliographic record:
Standard:
Cataloguing: SBN (Servizio Bibliotecario Nazionale)
The record is stored into ANSC CMS through a Unimarc>XML conversion.
Metadata: ICCU MAG 1.5

Costing Questionnaire (Expert H)

1) Which of the following multimedia business sectors is your company involved in?
a) Music/Audio Production and/or Distribution(yes)
b) Educational/e-book Content Production and Distribution(yes)
c) Advanced Entertainment e-media Production and Distribution (e.g. films, videos, games, immersive-3D environments, interactive experience portals etc) (yes)

2) For each of the above sectors in which your company has an involvement, or for at least one of the above which you feel mainly characterises your business model, please specify which of the following stage(s) is included in your multimedia business
a) Producer (accessing, creating, authoring, editing, rendering etc) (B2B)
b) Integrator (accessing, aggregating, editing, formatting, etc) (B2B)
c) Distributor (editing, formatting, packaging, bundling and distribution,etc) (B2B)
d) Retailer (selling, mainly B2C) (yes)
e) Other?

3) Do you have an established, "mature" process for any or all of the above? (yes)
(by a mature process essentially we mean a business process that is specified formally, established and communicated to all staff and is routinely followed as a standardised process flow e.g. a flow chart /decision tree etc.)

4) Which tools do you normally use for integrated operations management of any of the above multimedia development and/or distribution processes as may be relevant to your business; as follows:
a) for the overall Workflow Management?
b) for the Production Phase? (yes)
c) for the Integration/Ingestion Phase ? (yes)

5) Which client platforms do you use which would require Workflow Management client software? PC, MACOS, UNIX

7) Any other requirements for the AXMEDIS Workflow Management that you feel should be included?
C2C

10) Are any stages of your workflow currently automated? (yes)
If yes, please describe which activities are currently controlled by a Workflow Management System:

11) Do you need to share workflow management with partner organisations in your value chain?
i) How does this work now? MANUAL
ii) Who is involved? ALL PARTNERS nm2
iii) Would you think these organisations would find the adoption of the AXMEDIS framework helpful for their operations? MAYBE

12) Meta data are part of the trust third party responsibility. Metadata are interested tracing all history and project history, where for project we intent the evolution of the content production.

-- On the whole, i.e. considering the entire scenario end-to-end what is the proportion of your production/distribution workflow that is currently automated? FOR SOME WOOLS 100%

Costing Questionnaire (Expert C)

1) Which of the following multimedia business sectors is your company involved in?

c) Advanced Entertainment e-media Production and Distribution (e.g. films, videos, games, immersive-3D environments, interactive experience portals etc) (yes)

2) For each of the above sectors in which your company has an involvement, or for at least one of the above which you feel mainly characterises your business model, please specify which of the following stage(s) is included in your multimedia business

a) Producer (accessing, creating, authoring, editing, rendering etc) (yes)
b) Integrator (accessing, aggregating, editing, formatting, etc) (yes)
c) Distributor (editing, formatting, packaging, bundling and distribution,etc) (yes)

3) Do you have an established, "mature" process for any or all of the above? (yes)
(by a mature process essentially we mean a business process that is specified formally, established and communicated to all staff and is routinely followed as a standardised process flow e.g. a flow chart /decision tree etc.)

4) Which tools do you normally use for integrated operations management of any of the above multimedia development and/or distribution processes as may be relevant to your business; as follows:

b) for the Production Phase? (no)
c) for the Integration/Ingestion Phase ? ? (no)

5) Which client platforms do you use which would require Workflow Management client software?(none)

7) Any other requirements for the AXMEDIS Workflow Management that you feel should be included?
(No) Technical data of images and audio to track from acquisition through production to distribution vital to include compression details

10) Are any stages of your workflow currently automated? Yes/No
If yes, please describe which activities are currently controlled by a Workflow Management System:
Non linear off line to online conform

11) Do you need to share workflow management with partner organisations in your value chain?

i) How does this work now? PERSONAL CONTACT, DOCUMENTS
ii) Who is involved? Producer, director, designer, editor, commission editor
iii) Would you think these organisations would find the adoption of the AXMEDIS framework helpful for their operations? ONLY IF IT FITTED WITH EXISTING WORKFLOW

- Metadata:
- History, technical details (camera setting), compression details, re formatting details (from 16:9 to 4:3, etc.) copyright details, artistic details, author details, last recording, main contract elements SHOULD BE ACQUIRED at point of needs (during plannins, shooting, post production, etc.)

12) On the whole, i.e. considering the entire scenario end-to-end what is the proportion of your production/distribution workflow that is currently automated? 5% automated

13) For the following typical activities, please could you give your best evaluation of *their relative cost* in terms of resources used (staff time, tools etc) and thus the costs typically incurred in your processes (it may be helpful to refer to the attached map of activity hierarchies). For each of the common activities listed in the table below and/or those activities within your own multimedia value chain which you may wish to append to this table, it may be easier to consider the relative cost incurred as the percentage of the cost for the task under consideration relative to the overall cost incurred for the entire value chain end-to-end.

Typical activity	Time taken	Tools used	Cost Incurred

			(e.g. man-minutes + other resources)
metadata integration	0	0	0
composite object production	30%		> 30%
protecting objects	0	0	0
distributing objects to distributors	1%	Physical delivery	1%
acquiring objects from the publisher	5%	Physical	5%
finalising the contract in the licenses .	105	Personal contact, email	20K Pound per year
production of the programme for publication	40%		40% of the total cost
updating digital content e.g.	5%		
a) updating metadata	0	0	0
f) updating licenses	5%	Word	5%
g) recovering history of the object production, tracking	5%		5%
administrative activities, clearance of rights, etc...	15%	Pc	15%
Any other activities, please enter in rows below			

19.6 Answers to the Questionnaire to the User Group of Experts (November 2004)

In answers letters are used to identify experts.

19.6.1 General

1. See you any problems or limitations in the usage of P2P model for sharing and distributing content at B2B level ?
   a) NO provided that the content is protected
   c) IRP Limitations, existing business network may wish to limit access
   d) no
   e) I show problems regarding the quality and format needed for different content, example high quality of images and mobile phones
   f) not clear to me yet
   g) NO
   h) synchronisation of images across a distributed file store, simultaneous access of content by collocated users via hit contention problems

2. Are you interested in becoming connected to AXMEDIS AXPTool for publishing/ distributing/ integrating content ?
   a) yes, depending on outcomes and results
   b) SIAE is a collective management society, so it is not dealing with objects but with information and works on payments by commercial users
   c) yes
   d) yes
   e) yes

f) yes
g) yes
h) yes as EC NM2 project, and potentially as that for commercial hosting media

3. Which is your methods for content distribution at B2B ?
   a) OFF line traditional market
   b) broadcast (terrestrial, cable, satellite) videostream (CHS, DVD, CD) Internet
   d) physical shipping tapes CDs
   e) broadband
   f) depending on the platform
   h) ATM, ETHERNET, FTP
   Area you moving content with hardware media (CD, DVD…) ?
   b) NO
   d) yes, CD, DVD
   e) I have digital tape just for archive
   f) also
   g) DVD, DV tape, CD, FLASH USB
   …….
   Which hardware media (CD, DVD, tapes, etc..) ?
   a) VHS mainly
   c) DVD, CD, VHS
   d) CD, DVD, BETACAM SP, DIGTAL BETACAM,
   f) all
   g) DVD, DV tape, CD, FLASH USB

4. How many Gigabytes are you moving per year or per months ?
   c) don't know
   d) images (50 Giga to 1 Tera per year), video 150 Hrs per year
   f) …..
   g) 1 Giga
   h) several peta bytes (commercial)
   How large is your catalogue in terms of number of digital objects ?
   c) programming more than 20
   d) images 25000we have users of over 50000 video tapes
   e) we have 200 hrs of pedagogical audiovisual musical content
   f) millions
   g) 200-300 objects
   h) millions (commercial)
   How large is your catalogue in terms of number of Gigabyte ?
   a) few
   d) entire catalogue is about 3 Tbyte
   h) several peta (commercial)

5. How many times per week/month/year do you refresh your catalogue? For which parts: entirely, partially?
   a) as association we don't know each Tv producer or their wisher. Mainly for major fairs
   d) one per month, add images, edit metadata, delete images
   e) 1 per month, partially
   f) daily
   g) monthly partially
   h) daily
   ……

6. Which type of content is dominant in your catalogue (for example, video, audio, documents, images, multimedia formats) ?
   a) VIDEO
   c) video and virtual reality
   d) picture of users and video
   e) audiovisual of great musical events
   f) video
   g) audio and documents
   h) video
   In which digital format ?
   c) 625 regular, or HDTV (1080)
   d) video digital betacam, images tiff/jpg
   e) DV cam
   f) high res MPEG
   g) mpeg3 AND PDF
   h) mpeg 1 and 2

7. Is your content protected during the B2B distribution and sharing ?
   a) no only the contract
   c) no only by legal rights
   d) no or very little protections
   e) yes
   h) yes

8. How much you spend in Adapting digital content during the year in terms of euros or man months ?
   d) about 20 MM per year
   e) just put video on broadband
   f) 10-15 MM per year
   h) several man year (commercial)

19.6.2 Content Management Systems

9. Which CMS are you using?
   b) SIAE has developed its own management tools some of them in cooperation with other collective societies
   c) none
   d) fotoware family of SW
   g) WEDELMUSIC
   ……

10. Which kind of DBMS is behind the CMS (i.e. MySQL, DB2, Oracle, ...)?
    b) SIAE copyright management system concerns data of content/works and not content itself.
    c) none
    d) FW is based on tagging and SQL
    e) ORACLE
    f) all

11. Content (images, video, ...) is stored in the DBMS or in the File System?
    c) none
    d) In the FS and it is indexed
    e) in DBMS
    f) all

12. Which is your favourite platform for CMS (i.e. Windows, Unix/Linux, Macintosh, etc.)?
    c) WINdows

d) windows
e) WINDOWS ……
f) windows

13. Which is your favourite operating system for CMS (i.e. Windows 2000, MAC OSX 10.3, etc.)?
    c) win 2000
    d) win 2000 professional
    e) Windows
    f) windows
    g) WINDOWS
    h) unix

14. On the basis of your experience do you have some comments/needs on content management systems?
    c) I would welcome a template in which we could enter a part of the information regarding rights to see created the license
    d) capability to connect together a CMS, capability to automatically translate metadata to other standards, capability to integrate content protection automatically or semi automatically

19.6.3 Composition & Formatting Tools

15. Which multimedia content formatting tools are you using?
    c) MAYA, AVID, 3DSMAX
    d) fotoware per images
    f) chellomistral
    g) WEDELMUSIC
    h) proprietary, + quick time pro, Virtual DUB, graphics Converter

16. Which multimedia content automatic production tools are you using (i.e. Windows Movie Maker, Digital Image, etc.)?
    c) none
    d) one of the above, transcribe/transcode with clearner
    f) chellomistral
    h) proprietary, + avid, premiere, final cut pro

17. Do you use some automatic procedure based on script language for automatic content production (i.e. Javascript)?
    c) none ……
    f) yes propeirary
    g) NO
    h) UNIX shell scripts, java scripts

18. Which multimedia content format are you using or prefer for:
    - video (i.e. mpeg, avi):
      c) Mpeg
      d) DVI, MPEG
      e) MPEG
      f) mpeg
      g) AVI MPEG
      h) MPEG, QT
    - audio (i.e. mp3, wav, wma):
      c) vaw
      d) MP3
      f) vaw

G) MP3
h) WAV, AIFF …….

- image (ie. jpg, gif, tif, bmp, png…):
  c) jpg
  d) TIF, JPG
  f) BMP
  g) tiff
  H) JPEG, TARGA, TIFF.
- document (i.e. word, txt, html, …):
  c) WORD
  d) DOC, PDF
  f) word
  g) TXT word PDF
  h) RTF, PDF
- animation (i.e. flash, …):
  D) QT
  f) some animation.
  h) flash
- other:
  c) various virtual reality formats
  d) interactive QT and java based players

19. Which specific hardware are you using for multimedia content production (i.e. video/audio digitalization devices …)?
    c) Snell and Wilcox Converters + formatter ALCHIMIST
    d) video DISCre + film flome, infernbo, Pinnacl, for images photoshop

20. Which is your target devices for your content production (i.e. PC, TV, mobile, PDA, …) ?
    c) TV mostly, and also PC and mobile
    d) VIDEO TV and picture web and magazine
    e) PC and cable tv
    f) TV and PC
    g) PC
    h) all the above plus STB and other media terminal

21. Do you use any specific tool for content adaptation (i.e. for video/audio adaptation,…)?
    c) only for reframing (Snell and WILCOX)
    d) yes, DISCRE + CLEANER software
    g) WEDELMUSIC
    h) Virtual DUB and Quick Time Pro

22. Which multimedia content protection / DMR tools are you using?
    c) none
    d) none
    f) multiple depending on the platform
    g) WEDELMUSIC

23. Which is your favourite platform for content composition & formatting tools (i.e. Windows, Unix/Linux, Macintosh, etc.)?
    c) Windows, but also some MAC
    d) IRIX and LINUX, also windows in part
    e) windows
    f) windows
    g) windows

h) MAC

24. Which is your favourite operating system for content composition & formatting tools (i.e. Windows 2000, MAC OSX 10.3, etc.)?
    c) Windows,
    d) IRIX, LINUX RED HAT, WIN 2000
    e) windows
    f) windows
    g) windows
    h) mac os 9

25. Which is the schema or standard you use for digital contents cataloguing (i.e. Dublin Core, Unimark, ICCU schema, etc…)
    b) the standard we use are agreed by CISAC and approved by ISO. They refer to CIS (Common Information tool for CISAC Society), information on standards and identifiers can be recovered from www.cisac.org
    d) IPTC, Dublin Core or Photo, IPTC for VIDEO (very little)
    e) our own system based on UNIMARC
    f) ICCU, UNIMARC
    h) all the above plus MPEG7 derivations

26. On the basis of your experience do you have some comments/needs on automatic content composition/formatting?
    c) complex area in TV production, since so many factor are involved format (landscape 4:3 16:9 Versus Portrait) use of graphic overlay, transmissions etc..
    d) I believe this is a very difficult issues and will need a lot of target users profiling and target device profiling
    e) take a lot of time to take in account the different needs of each
    h0 a growing market

27. Do you have an Integration team in your company?
    D) yes
    f)yes
    g) YES
    h) yes

19.6.4 Distribution via Satellite data Broadcast

28. See you any problems or limitations in the usage of Protected Satellite Data Broadcast for distributing content at B2B level (e.g., satellite dish installation, dvb-adapter, etc.)?
    a) Content rights owner protection main issue
    c) attenuation, no return patch except for the phone
    d) no experience
    f) NO
    g) NO
29. Do you need guaranteed bandwidth channels for your data transfer (e.g. live streaming) (inside the questions set number 4)?
    c) YES
    e) I need a very high quality in the dissemination effect
    f) YES IN SOME CASEs
    h) we have several QOS related problems

30. Do you have a broadband internet connection in your production location?

c) YES
d) YES, adsl
e) yes
f) yes
h) YES

19.6.5 Business Models

31. do you need additional DRM rules for B2B with respect those that you have hear ?

a) AXMEDIS tools have to include all the existing rules actually regulating the market and future exploitation
c) no
D) yes as discussed
e) I need a very easy way to refresh the content

32. do you need additional DRM rules for B2C with respect those that you have hear ?

a) Some and the issues of analogue mole protection against illegal use
b)
c) No
d) As discussed .
e)

19.6.6 Content protection and DRM

33. Do you see any problem or limitation in the usage of the DRM model proposed for creation and consumption of multimedia content?
a) I need more explanation
c) no
e) a problem is to predefine the way to disseminate the content
f) not clear yet
G) NO
h) negotiation of licenses seems to be manual, layered web for B2b is needed, simple boiler plate license for B2C is needed, preval of user plus data protection issues, fingerprint should be related with content hash or similar. …

34. Are you interested in using the protection model proposed in your own organisation?
a) it depends on how it works, sure we need to protect content
d) yes
e) I need to more detailed information about the system
f) ??
g) YES
h) may be

35. Which are for you the five most important requirements presented?
c) ability to preserve information across various media ad under compression plus attenuation
h) ALL
Would you add or delete any requirement?
h) NO
Do you think that the proposed requirements address the current problems on content protection aspects?
c) yes
d) to a great extend, yes
e) all the person participate In a musical lass

h) partially see the email on license negotiation

36. How many multimedia objects need protection in your organisation?
    c) 20k
    d) each one ……
    f) x00.000
    h) Millions
    Which kind of protection? (Avoid unauthorised users access, avoid superdistribution, etc.)
    d) avoid editing, alteration, redistribution
    f) MULTIPLE
    g) WEDELMUSIC
    h) multiple

37. Which formats are you currently using for content distribution/protection?
    c) 625, 625 digital 601
    d) we do not digitally protect content
    g) WEDELMUSIC
    h) Multiple

38. Is your content currently protected during distribution and sharing? How?
    c) NO
    d) NO
    g) yes with WEDELMUSIC
    h) proprietary DRM

39. How much do you spend in content protection during the year in terms of euros or man months? For which amount of content?
    c) 0-40000 euro
    d) NO

19.6.7 Distribution via Internet

1. Ideally in the full end-to-end value chain between content supplier and Internet end user distributor who do you see as better suited for the collection of end users transaction revenue?
   c) internet end user distribution
   f) content aggregated for distribution
   h) ISP

2. How should be end user transaction revenue split from central point of revenue collection across the full value chain
   c) aired percentage to content supplier, then distributes accordings to percentage
   f) like clearing house ….
   h) flexibility, multiple profile

3. Are all players in the value chain expected to participate to the end-user revenue split or are there specific players who should be remunerated by other means?
   c) most players will export-dem,and payments in return for their contributions. This is necessary in UK tv
   f) the clearing house will probably receive a fixed amount for the transaction and the commercial company as well
   h) depends on the value add plus lost of the play /supply

4. Do you see any specific reason for keeping real time recording of end user content transactions in the end-to-end value chain between content supplier and final B2C distributor?

c) usage number should be reliable + known. With transparency there will be non confidence from content creators (for instance, movie businss model with distributor as warner)
f) yes, if they need to change the frequency of the offering of price
h) logging for financial / regulation / CDM purposes

5. What system of payment do you see as mostly suited for fulfilling B2B transactions across the value chain?
C) initially secure payments, once business partners know plus transaction each other other normal invoicing can be used
f) invoicing based on info of clearing house or accounting reports
h) micropayment modes ?

6. Could you list the key market drivers for the development of a viable business in the distribution of digital content over the Internet?
c) dynamic content relation to or derived from will known entertainment branos, reliability of service plus billing good quality device with quality screens
f) sex, sports, information
h) trust, security, Dreadth of content plus suitability of viewing device

7. Which are the key typologies of content which should be part of a broad digital content offer over the Internet? What volumes of content per typology would be required? What update rates?
c) music sames, sambling, stories derived from key entertainment branos, news plus sports, serial adult
f) video, audio, graphics
h) do you mean topology ?, if so cross media

8. Which are the primary content formats which you use or see as set to vest a major role in the near future? Could you also list their key advantages and limitations?
c) cartoon (band dosing) type stories, games, 3D content, automatically generated video sequence, radiovision. CARTOON: simpleway telling stories of all kids, from from satire….. GAMES: full immersive, show play, RADIOVISION: simple successions, piching by audio….
f) Video, poor data, interactive games, info to pda…
h) PDF, Mpeg4, MPEG21, MPEG7, cross media, layered media (eg. Tv overlays with other channels), 3Dmedia, flash…

20 Bibliography and references

- Book Zone Pro - http://www.bookzonepro.com/glossary.html based on the Go Ahead Self-Publish! Glossary, compiled and edited by Eileen Birin - © 2004 Wheatmark, Inc
- Brandon Hall – Glossary 2004 - http://www.brandonhall.com/public/glossary/
- Consultants Advisory http://www.consultants-advisory.com
- Content reference Forum: http://www.crforum.org/index.html
- Coral project: http://www.coral-interop.org/index.html
- DMP – Digital Media Project: www.chiariglione.org
- Harold Underdown – The Complete Idiot's Guide to Publishing Children's Books - Appendix A: Glossary of publishing terms and jargon 2004 - http://www.underdown.org/cigglossary.htm
- Henry Budgett, J K Johnstone – Glossary of terms associated with the typesetting and printing industries – Based on a series of articles in a newsletter called "Desktop Publisher" published between 1986 and 1989 - The material contained in this glossary is originally the copyright of The Desktop Publishing Company Ltd and must be acknowledged as such if the material is re-used in any other form. However, permission for re-use is freely granted http://members.aol.com/richardw51/typeglossary.htm
- Mantex - DeskTop Publishing, a glossary of terms 2000 - www.mantex.co.uk/samples/dtp.htm
- MPEG – www.chiariglione.org
- MUSICNETWORK: www.interactivemusicnetwork.org, review of protection model and technologies: http://www.interactivemusicnetwork.org/wg_protection/upload/musicnetwork-de4-5-1-protection-of-coded-music-v1-4.pdf
- MUSICNETWORK: www.interactivemusicnetwork.org, review of distribution models: http://www.interactivemusicnetwork.org/documenti/view_document.php?file_id=1135&PHPSESSID=9896900f37703f59751348ecbed57ce3 ,
- Pfeiffer Consulting http://www.pfeifferreport.com/
- publishers association – the glossary of book trade terminology from glossary of publishing terminology1997 - www.osi.hu/cpd/resources/paglossary.htm
- R. Koenen, J. Lacy, M. MacKay, and S. Mitchell *The Long March to Interoperable Digital Rights Management* January, 2004, http://www.intertrust.com/main/research/papers.html
- Schlumberger http://www.slb.com
- The Rainwater Press Publishing Primer - A glossary of terms for the electronic publishing, graphic arts, and printing industries 2000 - http://www.rainwater.com/glossary.html
- W&GS (Workflow & Groupware Strategies) http://www.wngs.com/
- WEDELMUSIC Project: www.wedelmusic.org
- WFMC (Workflow Management Coalition) http://www.wfmc.org/
- WIPO directive: http://www.wipo.int/