1. Publishable Executive Summary

AXMEDIS

Automating Production of Cross Media Content for Multi-channel Distribution

www.AXMEDIS.org

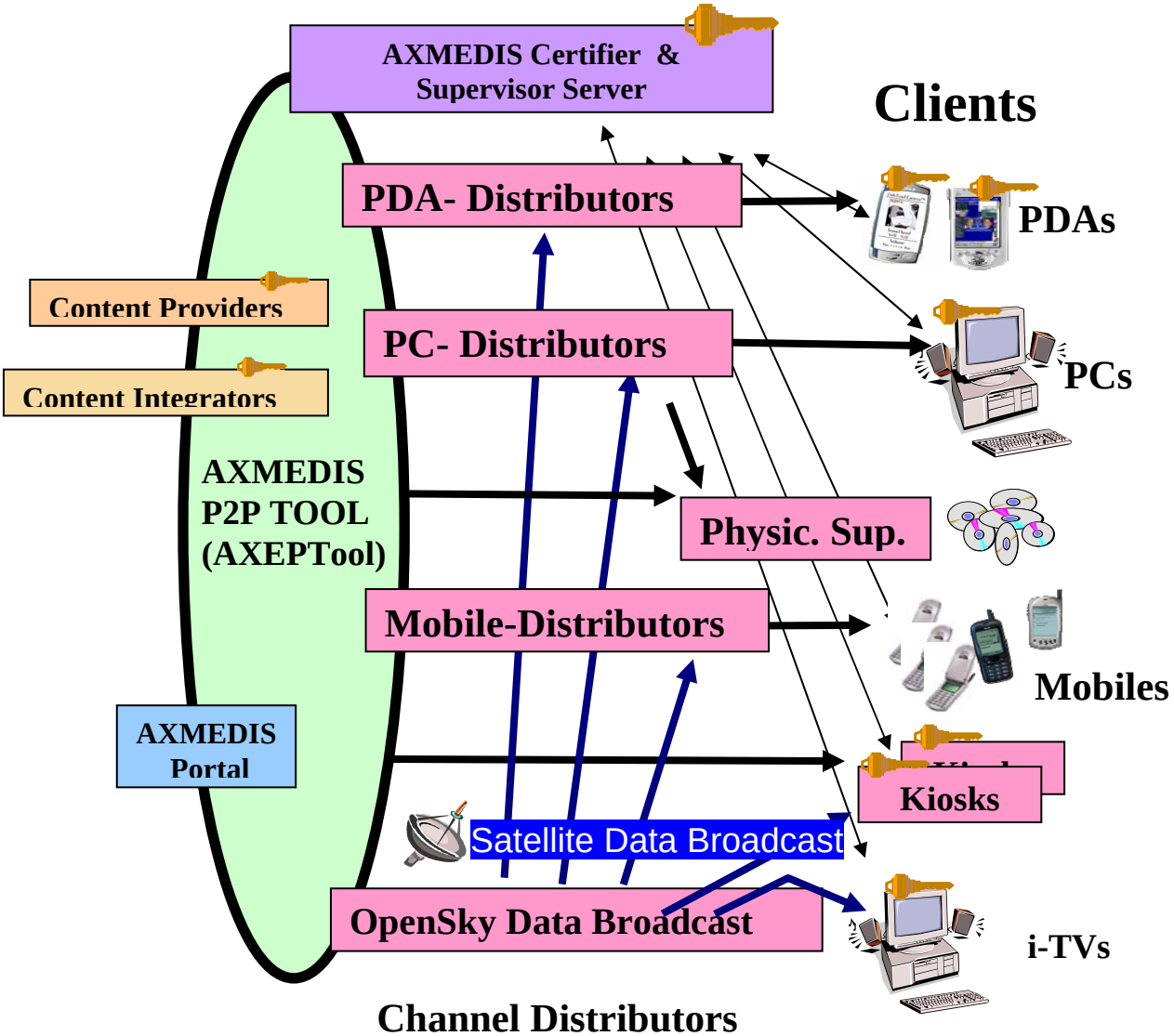
Current market trends and, more specifically, end-users needs demand the content industry to reduce prices without reducing products quality. This is where AXMEDIS project comes in to offer novel solutions and new possibilities to support setting up viable and sustainable e-content based business activities. Production costs can be substantially reduced while retaining (or even improving) product quality. Content providers, aggregators and distributors need innovative tools to increase efficiency. AXMEDIS automates, accelerates and restructures the production process making it faster and cheaper. AXMEDIS allows this by: (i) reducing content production costs, accelerating the process with automatic content composition / formatting and workflow support, (ii) reducing distribution and aggregation costs, increasing accessibility, thanks to a P2P platform at B2B level integrating content management systems and workflow, (iii) providing algorithms and tools for innovative and interoperable Digital Rights Management, exploiting MPEG-21, OMA-ODRL yet overcoming their limits; supporting several business and transactions models. AXMEDIS consortium has created a framework comprising innovative methods and tools to speed up and optimise content production, protection and distribution, and even enabling *production-on-demand*. AXMEDIS is deploying demonstrators, validated thanks to initiatives managed by leading distributors (partners) in cooperation with end-users and dealing with: (i) tools for content production, protection and B2B distribution; (ii) content production and distribution for i-TV-PC, PC, kiosks, mobiles, PDAs. The most relevant result will be achieved transforming demonstrators into sustainable business models for products and services during the last year of project time span. Additional demonstrators will be provided within the 3 associated projects launched as take up actions. The project also foresees support activities such as: training, management, assessment and evaluation, dissemination and demonstration at conferences and fairs (pleas see the established AXMEDIS conference series, published by IEEE Computer Society Press).

1.1 Objectives

Given this overall aim the main project objectives are:

- Allowing automating cross-media production and distribution, by supporting interoperability on content, composition, protection (DRM, Digital Rights Management), etc., making possible the deployment of solutions for content production on demand;
- Creation of a common model for interchanging cross media content and components among Content Providers and Content Distributors, supporting copyright law, interoperability for Content Formats and DRM models. Safeguarding owners' rights during content production process considering the whole value chain;

- Establishing modalities and tools for managing, distributing and sharing cross media content and components among producers, publishers, distributors to reach final users via a multi-channel architecture (including but not limited to i-TV, PC, PDA, mobile phones, Kiosk, etc.);
- Deployment of a set of demonstrators: (i) integration of Content Management Systems with AXMEDIS solutions including P2P framework, (ii) accelerating content production, composition / formatting, and P2P sharing at B2B level, (iii) content production and distribution on-demand for i-TV, (iv) content production and distribution for PC, (v) content production and distribution on-demand for Mobile phones, (vi) content production and distribution to kiosks and local PDAs, (vii) deployment of three "take-up" actions for demonstrating the exploitability of AXMEDIS solution;
- Research and develop tools and technologies to make large content collections more accessible to (i) the business market of content integration/aggregation and for (ii) the mass market over several distribution channels. Some of these collections are either in the archives of the project partners such as ANSC, ILABS, SEJER, or distributed by them;



The AXMEDIS consortium (consisting of leading European digital content producers, integrators, aggregators, and distributors; and also information technology companies and research groups) is creating the AXMEDIS framework to provide innovative methods and tools to speed up and optimise content production and distribution, up to the *production-on-demand* capability, for leisure, entertainment and digital content valorisation and exploitation in general. AXMEDIS format can include any other digital formats and it can exploit and expand: SMIL, HTML, PDF, PS, FLASH, DOC, images, video, MPEG-4, MPEG-7, MPEG-21, as well as *de facto* standards.

AXMEDIS is project organising and deploying a set of demonstrators operating as real components in activities such as production, protection and distribution organised by the leading distributor partners. This is to achieve and realise a real-life distribution chain validated by the activities of end-users. The demonstrators focus on tools for: (i) content production and B2B distribution / sharing; (ii) content production and distribution to end-users via different channels including interactive TV (i-TV), personal computer (PC), kiosk, mobile, PDA and others, (iii) digital rights management and control.
AXMEDIS will offer assistance and technical support to companies interested in using the developed platform and adopting AXMEDIS solutions, accessing to the so-called AXMEDIS Framework. This support action will be provided through activities such as training, management, assessment and evaluation, dissemination and demonstration at conference and fairs.
Furthermore, AXMEDIS consortium is going to grant about 1 million Euro to companies and research institutes that proposed take up project and have been selected by experts to develop real solutions by exploiting AXMEDIS technologies (this is referred to as *take up actions*).

1.2 AXMEDIS Consortium

AXMEDIS Partner/Contractor	ACRONYM	COUNTRY
Distributed Systems and Internet Technology Lab, Department of Systems and Informatics, University of Florence, DISIT Lab. (co-ordinator)	**DSI-DISIT**	Italy
Dipartimento di Italianistica, University of Florence	**DIPITA**	Italy
Associazione dei Fonografici Italiani	**AFI**	Italy
Fondazione Accademia Nazionale di Santa Cecilia	**ANSC**	Italy
Ecole Polytechnique Federale de Lausanne	**EPFL**	Switzerland
Eutelsat S.A.	**EUTELSAT**	France
Fraunhofer Gesellschaft zur Foerderung der Angewandten Forschung E.V.	**FHGIGD**	Germany
Giunti Interactive Labs S.r.L.	**ILABS**	Italy
Hewlett Packard Italiana S.r.L.	**HP**	Italy
Tiscali S.p.A., TISCALI Services	**TISCALI**	Italy
Fundacio Universitat Pompeu Fabra	**FUPF**	Spain
Xim Limited	**XIM**	UK
Societa Consortile a Responsabilità Limitata Centro di Ricerca, Sviluppo e Studi Superiori in Sardegna	**CRS4**	Italy
ACit - Advance Concepts for Interactive Technology GmbH	**ACIT**	Germany
Bordas and Nathan of Sejer	**SEJER**	France
University of Leeds	**UNIVLEEDS**	UK
University of Reading	**IRC**	UK
Consorzio Pisa Ricerche	**CPR**	Italy
Strategica	**STRATEGICA**	Italy
Exitech S.r.L.	**EXITECH**	Italy

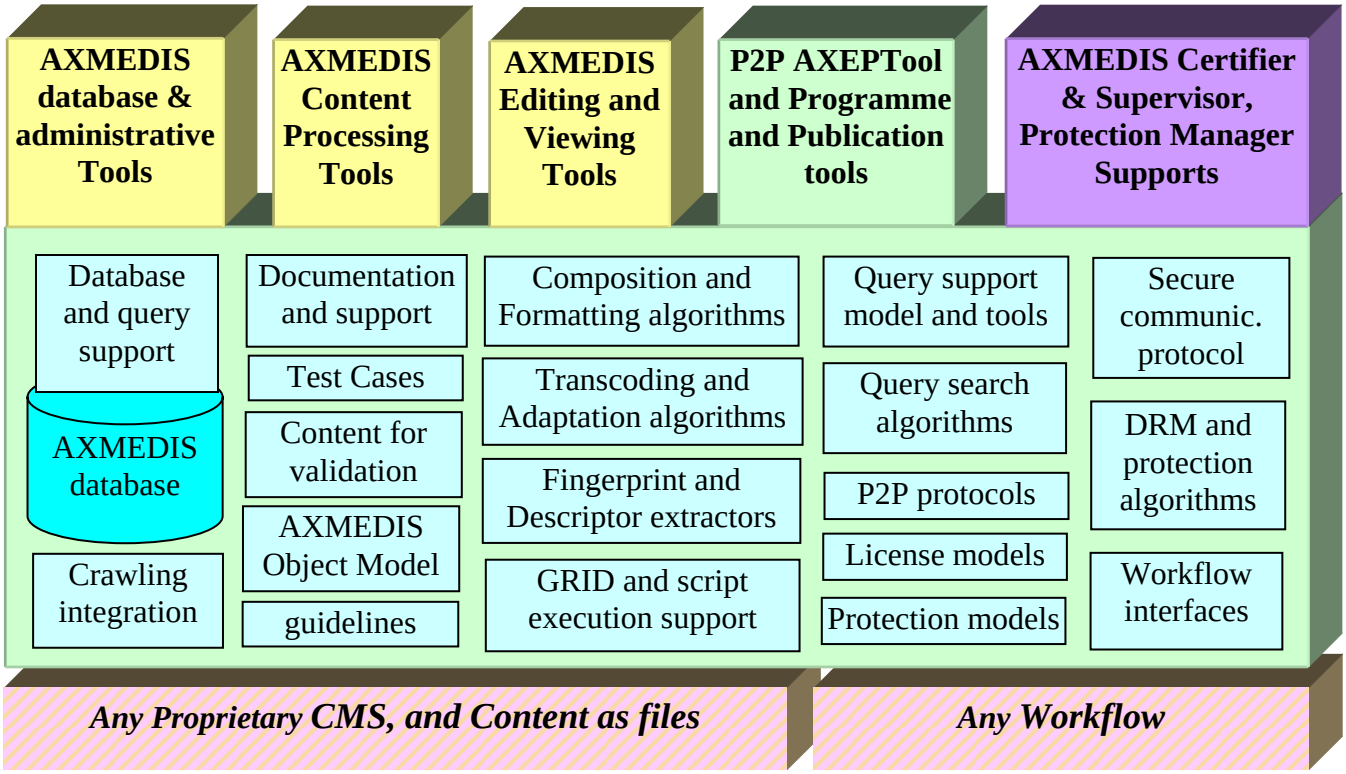
1.3 Work Performed in the period M13-M24

After the first 24 months of activity is already possible to see some actual results. In fact, from a scientific and technical viewpoint, the consortium has:

- Defined a cross media content model for managing any kind of content model and protecting it with the support of MPEG-21 DRM,
- Collected and formalized detailed requirements, use cases, test cases and scenarios (including their updated versions)
- Development of a set of basic enabling technologies in WP4 and WP5 as a results of the research activity such as: cross media model, protection models and tools, workflow integration, GRID language for cross media content processing, database modelling for MPEG-21 and AXMEDIS, license formalisation and DRM interoperability, formatting algorithms based on SMIL descriptors and genetic algorithms, integrated P2P architecture, adaptation and Transcoding algorithms and processing tools, multichannel distribution,

architecture and tool for AXMEDIS/MPEG-21 editing and playing, algorithms and support for protecting complex cross media content, etc.

- Produced the specification of AXMEDIS framework addressing the identified needs and requirements. These documents have been published and include:
  - Specification of AXMEDIS cross media model
  - Specification of AXMEDIS editors and tools, workflow, metadata, etc.
  - Specification of AXMEDIS content processing area with GRID, Scheduler, etc., content processing algorithms, adaptation, fingerprint, etc.
  - Specification of AXEPTools for P2P on B2B distribution
  - Specification of AXMEDIS database and query support
  - Specification of AXMEDIS protection models and tools
  - Specification of AXMEDIS players and tools
  - Specification of Programme and Publication Tools
  - Specification of Demonstrators of the AXMEDIS framework and platform
- Completed the specification of content for validation,
- Completed the specification of training activities,
- Identification and usage of metrics and reference parameters to measure work done and results achieved in relation to what planned,
- Improved and management of the User Group,
- Produced suitable dissemination material (flyer, press cutting, project presentation, tutorial, video, posters, web pages, etc.) and published it on the web,
- Organized AXMEDIS 2005 conference held in November-December 2005, Florence, Italy,
- Preparation of the AXMEDIS 2006 conference to held in Leeds, December 2006.
- First implementation of AXMEDIS Framework,
- Distribution of a first version of the major AXMEDIS tools, with related AXMEDIS content for demonstration (in AXMEDIS format)
- Production and demonstration of some video for the major AXMEDIS tools
- Set up and improvement of an AXMEDIS Wiki portal and support
- Preparation, publication and management of the call for take up, selection of the most valuable proposals, preparation of a new Description of Work including what proposed in selected take up proposals
- Production of content and tools for test and validation,
- Specification and realisation of the first version of demonstrators for multichannel distribution via internet, via kiosks, towards mobiles and via satellite data broadcast.
- Production of a set of documents for promoting the AXMEDIS framework: the so called AXMEDIS for all, the user manual of major AXMEDIS tools, the user manual of the AXMEDIS content processing GRID java script language, etc.
- Dissemination of results via several conference attendance/organisation, articles submission, development and distribution of supportive dissemination material (CD, DVDs, posters, flyers, etc.)
- Improvement and refinement of project results Exploitation plan



1.4 Results achieved

The main results achieved in this second year are:

- the definition of a general architecture for multichannel distribution with interoperable terminals and content (including DRM support).
- structuring and implementation of AXMEDIS Framework, AXMEDIS framework guidelines, CVS for AXMEDIS framework (several versions collected)
- tools for content composition and formatting, definition of rules syntax for content composition and formatting, initial results in terms of composition and formatting algorithms development and application, SMIL profile, SMIL templates, genetic algorithms for style parameters optimizations.
- Definition of AXMEDIS cross media data model, transformations from protected to non protected objects and vice-versa,
- An improved version of AXMEDIS authoring tool including: metadata editor and viewer, video player, audio player, SMIL player, DOC viewer, OSMO MPEG4 player, HTML player, active X server, etc.,
- AXMEDIS content processing tools, based on Java Script for processing content and GRID technology, control of CPU usage, control of GRID operation via web service,
- AXMEDIS protection processor for AXMEDIS tools, supporting IPMP of MPEG-21 and much more,
- AXMEDIS database, and query support,
- content crawler integrated with AXMEDIS Content processing engine,
- algorithms for fingerprint and adaptation estimation,
- Definition of P2P architecture at the basis of the AXEPTool and for P2P on B2C,
- Improvement of MPEG-21 IPMP, accepted contribution to ISO,
- First realization of the accounting managing and reporting tool, and statistical reporting
- Analysis of contractual and legal aspects, from contract to license and related mutual processing
- First version of the content distribution analysis for internet and DRM,
- Integration analysis of AXMEDIS DRM with standards and commercial solutions,

- Verification of DRM and distribution for mobiles, OMA usage from AXMEDIS content processing.
- Analysis of content integration for satellite data broadcast, analysis of strategies and technical details for content distribution via satellite for I-TV,
- DRM and business models for satellite data broadcast, first results of user needs analysis,
- AXMEDIS Certifier and Supervisor, registration portal, certification authority, integration of all such components
- First collection of content for test and validation, integrated version of content, formatting guidelines and styles,
- First prototype of the CMS interface for Administrative integration,
- First prototype of the demonstrators for distribution content
- Workflow support for interfacing AXMEDIS tools with workflow tools

Intentions for use and impact: The AXMEDIS results will be mainly exploitable for

- allowing the distribution of content on multichannel architecture
- reducing costs of content production and distribution
- exploiting AXMEDIS Framework and Tools
    - Content Processing (AXMEDIS Content Processing GRID)
        - Reducing production costs and time
        - Accelerating: composition, formatting, protection, feature extraction, distributions, publishing, etc.
    - Set up and management of single/multichannel Content Distribution with DRM, interoperable DRM (MPEG-21 and ODRL OMA)
    - Using and/or customising AXMEDIS Players (PC, PDA, etc.) for creating players/terminals
    - Using and/or customising AXMEDIS P2P tools for B2B
    - AXMEDIS Programme and Publication tools,
    - AXMEDIS Certifier and Supervisor
    - AXMEDIS Protection Manager Server, license server and processor.
- Exploiting AXMEDIS Infrastructure
    - Accessing to advanced State of the Art and standards solutions
    - Accessing to knowledge and tools for content production, protection and distribution
- tutorials on content: general aspects and state of the art, content production and protection, on distribution tools, on general AXMEDIS aspects, etc.,

The project as also foreseen the possibility of "affiliating" new partners in project life due course (actually this has already turned into reality and is no more just a possibility). The rational for this is that there are many **reasons to get affiliated to AXMEDIS,** which can be summarized as follow:

- Obtaining access to an *open platform* that can be customized for your production., protection and distribution needs;
- *Reduction of costs* for content gathering, processing, production, protection and distribution;
- Adopting a standard model (MPEG-21) for content and licenses modeling and thus for inserting DRM in your business;
- Establishing contacts with other business partners interested in exploiting similar technology;
- Acquiring a larger control about content usage;
- Creating customized players;
- Exploiting and trial of new business models;
- Exploiting capabilities of secure legal P2P distribution;
- Setting up and create a customized distribution channel interoperable with others;

- Setting up some new service (empowering your present solution) on the basis of AXMEDIS technology;
- Setting up of one-stop service for content protection and DRM set up;
- Allowing reporting to your business customers which rights are exploited on their content;
- Allowing the management of rights reporting for multimedia products;
- Allowing using a solution that can be safer and more flexible with respect to state of the art;
- Saving money in accessing at innovative technologies for content production and distribution, integrated environment;
- Accessing to strongly innovative technology to trial it;
- Contributing to the AXMEDIS Framework is allowing you to continuing accessing to the framework reducing the costs for its accessibility.

For such reasons **Research institutions and technology providers** are interested in getting affiliated with AXMEDIS, in more detail, once affiliated it will be possible for them to:

- make visible and promote the produced algorithms and tools that can be used for content processing and modelling and that can be in some how integrated into the AXFW. These tools may be provided as demonstrators with limited capabilities;
- exploit the AXMEDIS Framework to make business with it for the reasons reported in the above list;
- add new content models and new DRM models and make them interoperable with MPEG-21 and others already in place on AXMEDIS;
- test new algorithms and tools with respect to the state of the art solutions, in a very easy and cheep manner;
- access at low cost a framework by means of which several different configurations and solutions may be built to cover the needs of the value chain actors and tested with low effort;
- access at tools based on MPEG-21 standard;
- collaborate with very relevant and well known research institution and companies of the areas;
- etc.

A detailed description **of AXMEDIS Framework present status** can be obtained from its coordinator. Demonstrations of AXMEDIS tools and of the whole AXMEDIS Framework are provided at AXMEDIS conferences and in other occasions listed on AXMEDIS Portal. The AXMEDIS Framework can be accessed by Affiliated Partners. The Affiliation to AXMEDIS may be performed by subscribing an Affiliation Agreement with an AXMEDIS Contractor.

1.5 AXMEDIS Contact:

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