Automating Production of Cross Media Content for Multi-channel Distribution

www.axmedis.org

IST-2-511299

Workshop on Cross Media Content production and sharing

Paolo Nesi
Coordinatore AXMEDIS

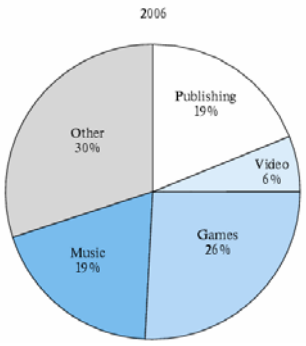
http://www.axmedis.org/cmcps2007/
11 April 2007
Accademia Nazionale di Santa Cecilia
Auditorium Parco della Musica, Rome - Italy

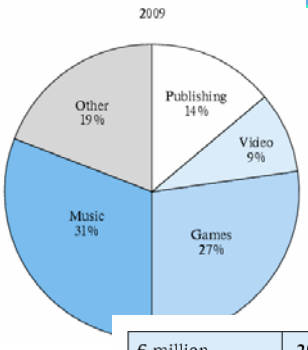
Agenda

AXMEDIS

- **Market and Trends**
- **AXMEDIS Overview**
  - AXMEDIS Framework
  - Cross Media Content
  - Major AXMEDIS tools
  - AXMEDIS Applications
  - Discussion
- **Lunch**
- **Content Production**
  - Manual Cross Media Content Production
  - Automated Content Production
  - Discussion
- **Closure**

Trend of Paid On Line Content

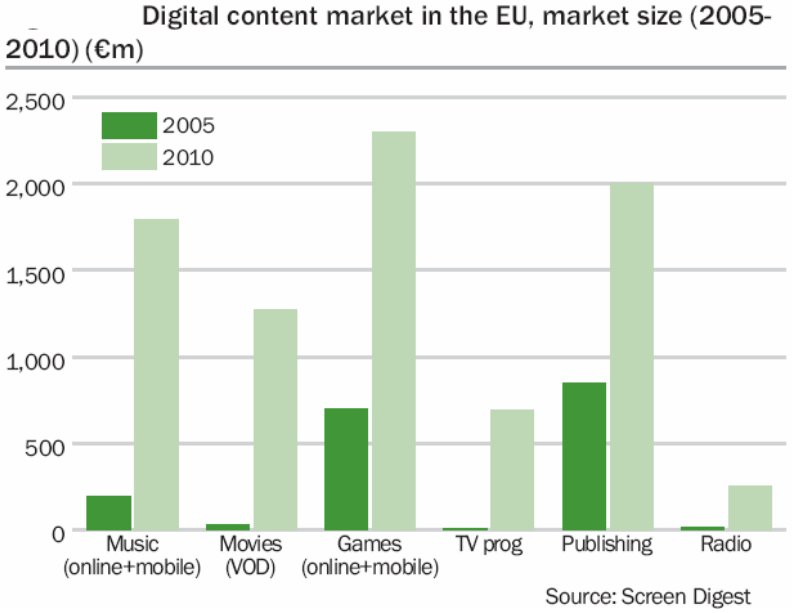




€ million	2006	2007	2008	2009
Publishing	268	326	370	403
Video	88	133	186	244
Games	368	485	610	762
Music	269	452	652	836
Other[7]	448	487	518	540
Total content revenues	1,441	1,883	2,336	2,785

Source: JupiterResearch – European Paid Content and Services Forecast

Also Screen Digest



IFIP Report 2006

The advance of the global digital music market

	2004	2005	Change
Broadband lines (M)	151	190	26%
Single tracks downloaded (M)	156	419	169%
Online music services	230	335	46%
Song catalogue (M)	1	2	100%
Subscription service users (M)	1.5	2.8	87%
Mobile phone subscriptions (M)	1350	1520	13%

Sources: PointTopic-IFPI, Nielsen SoundScan, OCC, IFPI Germany, SNEP, RIAJ, IFPI, subscription service providers, PWC

US digital music market – the key figures

	2004	2005	Change
Broadband lines (M)	34	43	26%
Single tracks downloaded (M)	143	353	147%
Album downloads (M)	6	16	193%
Mobile subscriptions (M)	163	174	7%

Sources: PointTopic-IFPI, Nielsen SoundScan, PWC

European digital market – the key figures

	2004	2005	Change
Broadband lines (M)	43	63	46%
Single tracks downloaded (M)	14	62	355%
Online music services	150	200	33%
3G mobile phone subscriptions (M)	5	18	255%

Sources: PointTopic-IFPI, OCC, IFPI Germany, SNEP, IFPI, Jupiter

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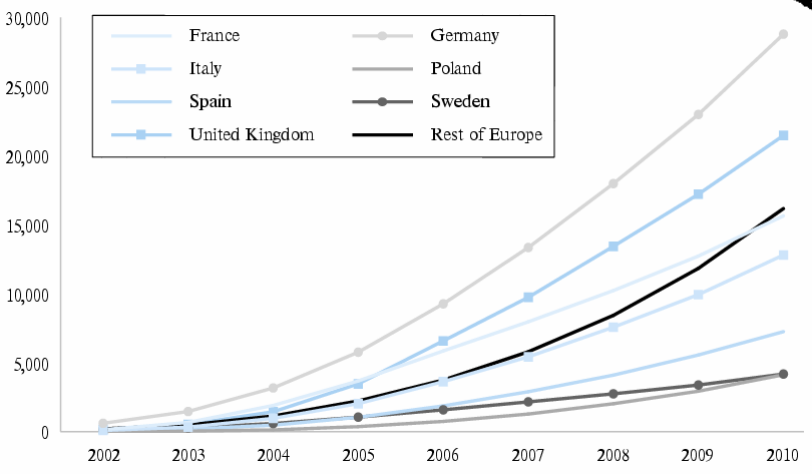
Grow AVG, Mill. Download files per year, EU 25, P2P



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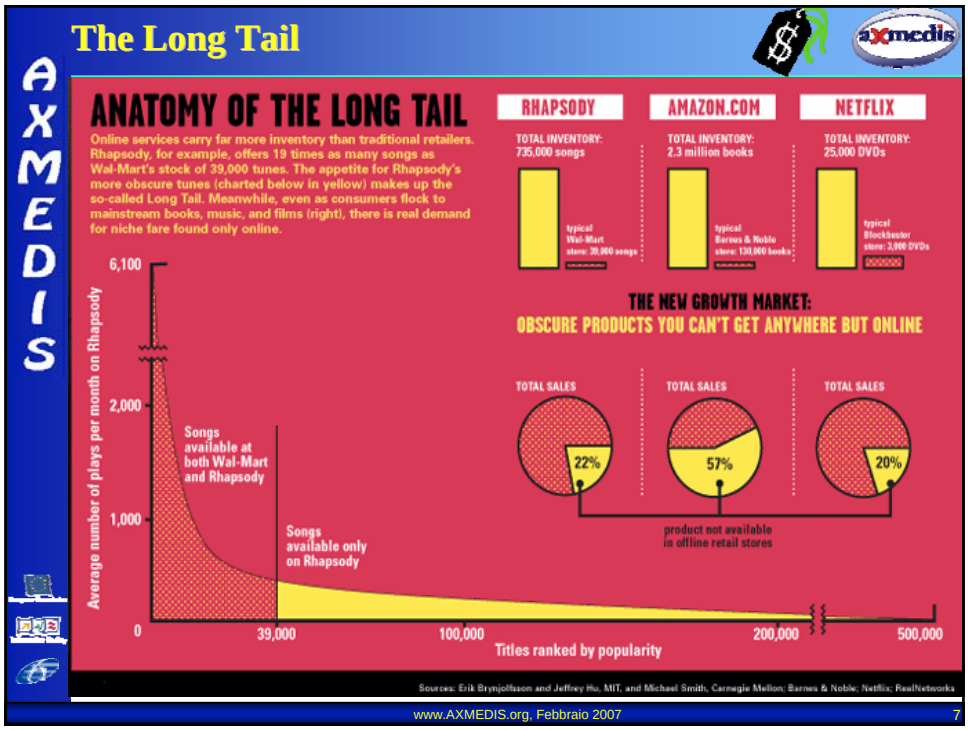
The Long Tail
ANATOMY OF THE LONG TAIL
Online services carry far more inventory than traditional retailers. Rhapsody, for example, offers 19 times as many songs as Wal-Mart's stock of 39,000 tunes. The appetite for Rhapsody's more obscure tunes (charted below in yellow) makes up the so-called Long Tail. Meanwhile, even as consumers flock to mainstream books, music, and films (right), there is real demand for niche fare found only online.
RHAPSODY
AMAZON.COM
NETFLIX
TOTAL INVENTORY: 735,000 songs
TOTAL INVENTORY: 2.3 million books
TOTAL INVENTORY: 25,000 DVDs
typical Wal-Mart store: 39,000 songs
typical Barnes & Noble store: 130,000 books
typical Blockbuster store: 3,000 DVDs
THE NEW GROWTH MARKET:
OBSCURE PRODUCTS YOU CAN'T GET ANYWHERE BUT ONLINE
TOTAL SALES
22%
57%
20%
product not available in offline retail stores
Average number of plays per month on Rhapsody
6,100
2,000
1,000
0
Songs available at both Wal-Mart and Rhapsody
Songs available only on Rhapsody
39,000
100,000
200,000
500,000
Titles ranked by popularity
Sources: Erik Brynjolfsson and Jeffrey Hu, MIT, and Michael Smith, Carnegie Mellon; Barnes & Noble; Netflix; RealNetworks
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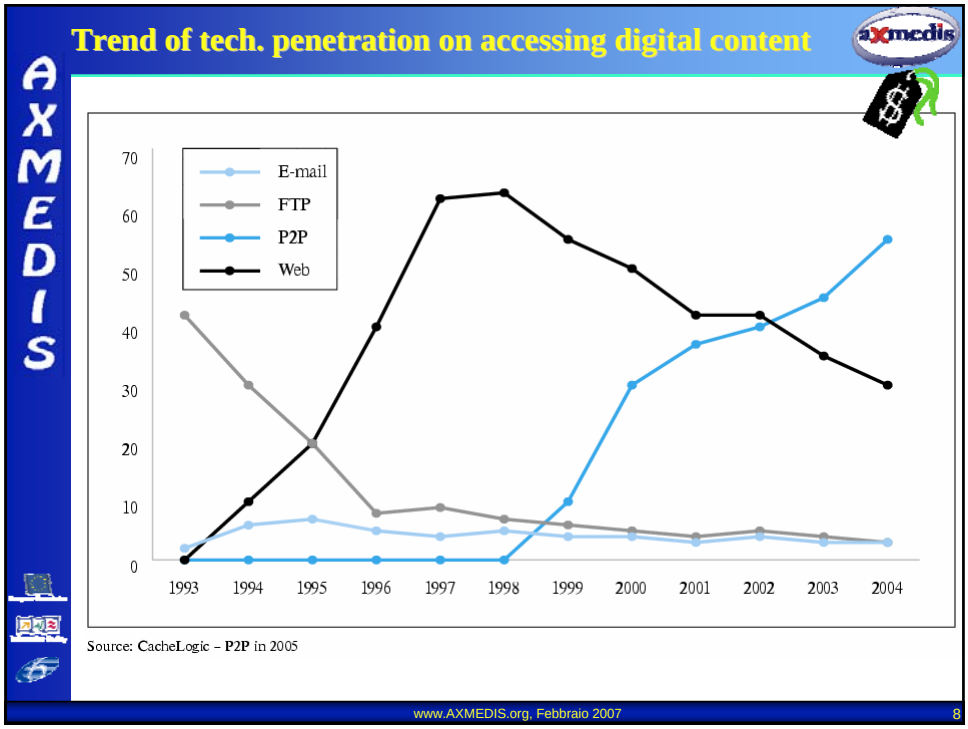
Trend of tech. penetration on accessing digital content
70
60
50
40
30
20
10
0
E-mail
FTP
P2P
Web
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
Source: CacheLogic – P2P in 2005
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Agenda

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  - Cross Media Content
  - Major AXMEDIS tools
  - AXMEDIS Applications
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  - Manual Cross Media Content Production
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What is AXMEDIS ?

- **AXMEDIS is a consortium/project of the European Commission proposed by companies and institutions to solve a set of problems in the area of e-commerce of digital content**
  - approved by the EC for reaching specific objectives, among them the creation of an Open Platform for the digital content production, protection and distribution.
  - partially funded by the EC and partially from the Companies and Institutions involved
- **AXMEDIS is open to ALL via the Affiliation**
  - It is possible to join AXMEDIS, allowing you to access at the knowledge and tools/source code produced for your business
- **Start: 1st September 2004**
- **Cost: about 14 Meuro**
- **About 200 people are working on AXMEDIS every day**
- **More than 35 partners (contractors and affiliated)**

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AXMEDIS Partners
AXMEDIS
Bordas
Nathan
eutelsat
tiscali
University of Reading
Fraunhofer Institut Graphische Datenverarbeitung
UNIVERSITAT POLITÈCNICA DE CATALUNYA
STRATEGICA
GIUNTI labs
EXITECH
mbi
LABLITA
ETRI
EPFL
TELECOM ITALIA
BBC
VRS GRUPÈ
teo
UNIVERSITY OF LEEDS
SIAE
Società Italiana degli Autori ed Editori
sDae
Elion
Hexaglobe
[rigel][engineering]
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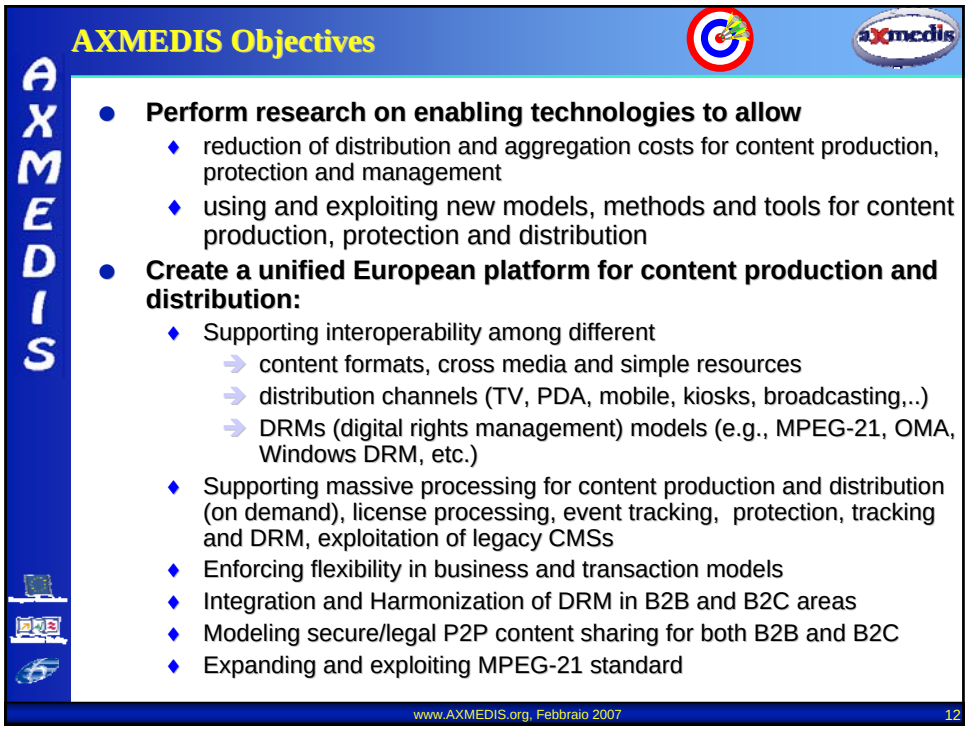
AXMEDIS Objectives
AXMEDIS
Perform research on enabling technologies to allow
reduction of distribution and aggregation costs for content production, protection and management
using and exploiting new models, methods and tools for content production, protection and distribution
Create a unified European platform for content production and distribution:
Supporting interoperability among different
content formats, cross media and simple resources
distribution channels (TV, PDA, mobile, kiosks, broadcasting,..)
DRMs (digital rights management) models (e.g., MPEG-21, OMA, Windows DRM, etc.)
Supporting massive processing for content production and distribution (on demand), license processing, event tracking, protection, tracking and DRM, exploitation of legacy CMSs
Enforcing flexibility in business and transaction models
Integration and Harmonization of DRM in B2B and B2C areas
Modeling secure/legal P2P content sharing for both B2B and B2C
Expanding and exploiting MPEG-21 standard
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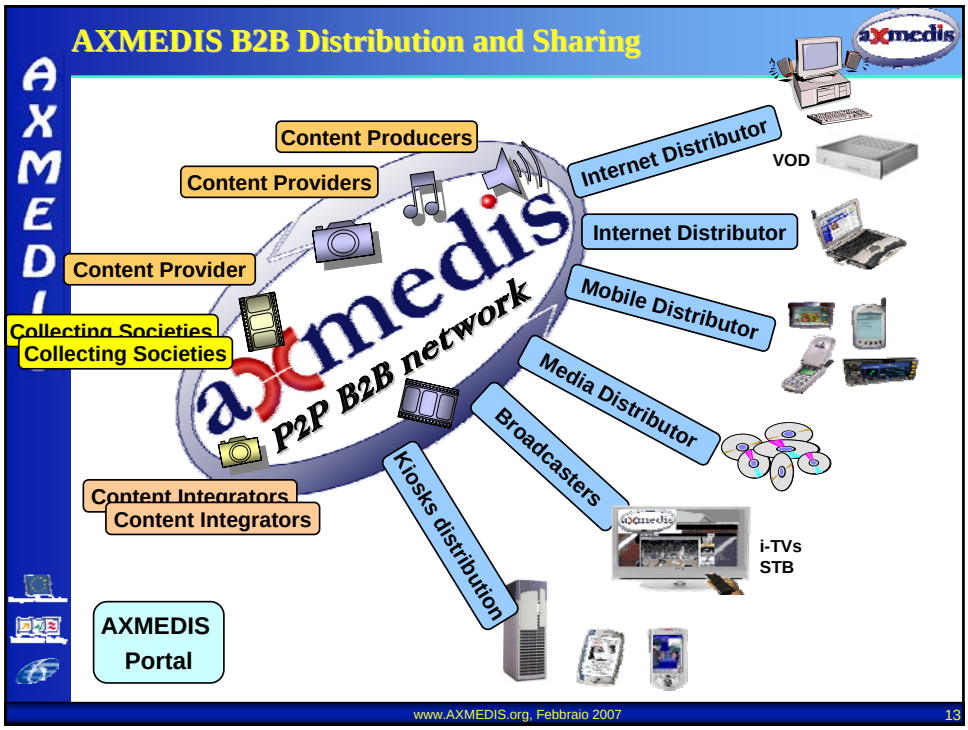
AXMEDIS B2B Distribution and Sharing
Content Producers
Content Providers
Content Provider
Collecting Societies
Collecting Societies
Content Integrators
Content Integrators
AXMEDIS Portal
axmedis
P2P B2B network
Internet Distributor
VOD
Internet Distributor
Mobile Distributor
Media Distributor
Broadcasters
Kiosks distribution
i-TVs
STB
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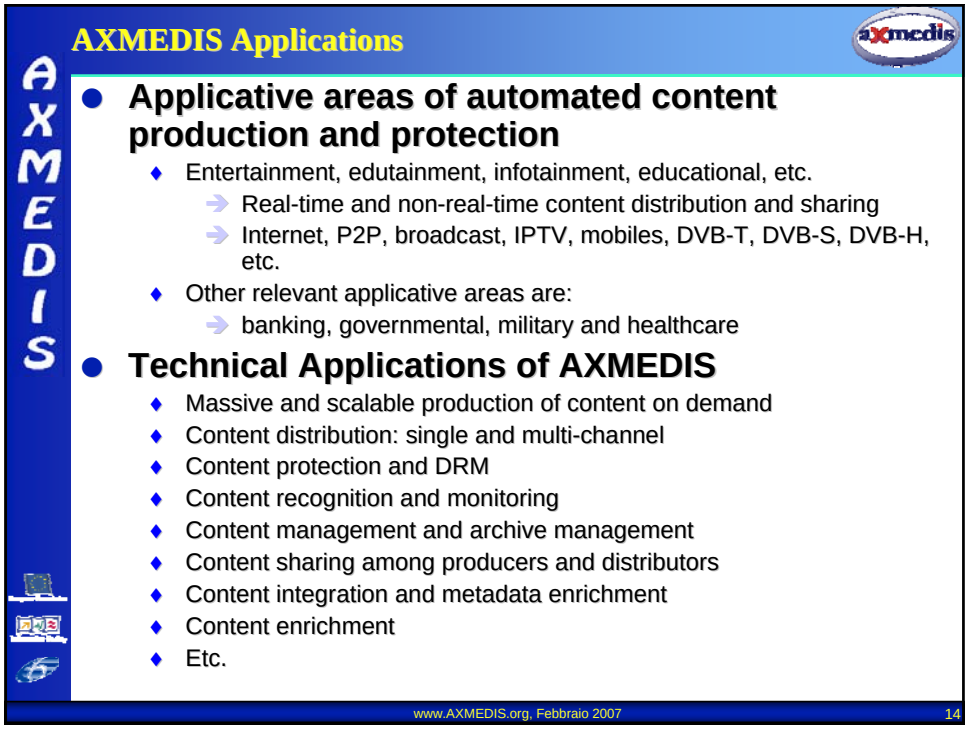
AXMEDIS Applications
Applicative areas of automated content production and protection
Entertainment, edutainment, infotainment, educational, etc.
Real-time and non-real-time content distribution and sharing
Internet, P2P, broadcast, IPTV, mobiles, DVB-T, DVB-S, DVB-H, etc.
Other relevant applicative areas are:
banking, governmental, military and healthcare
Technical Applications of AXMEDIS
Massive and scalable production of content on demand
Content distribution: single and multi-channel
Content protection and DRM
Content recognition and monitoring
Content management and archive management
Content sharing among producers and distributors
Content integration and metadata enrichment
Content enrichment
Etc.
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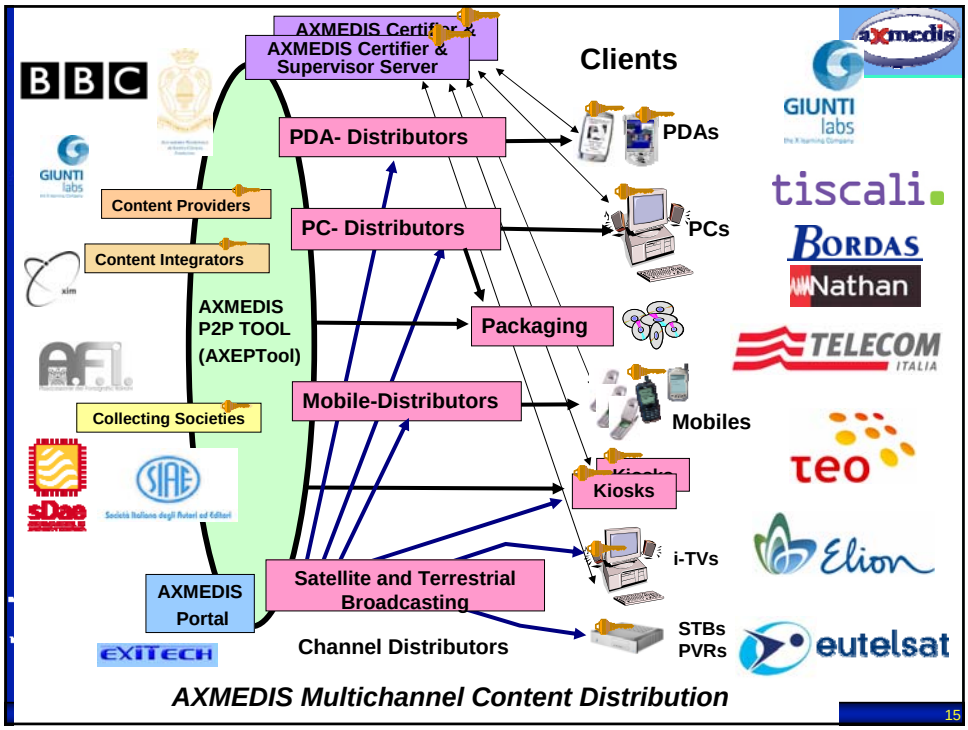
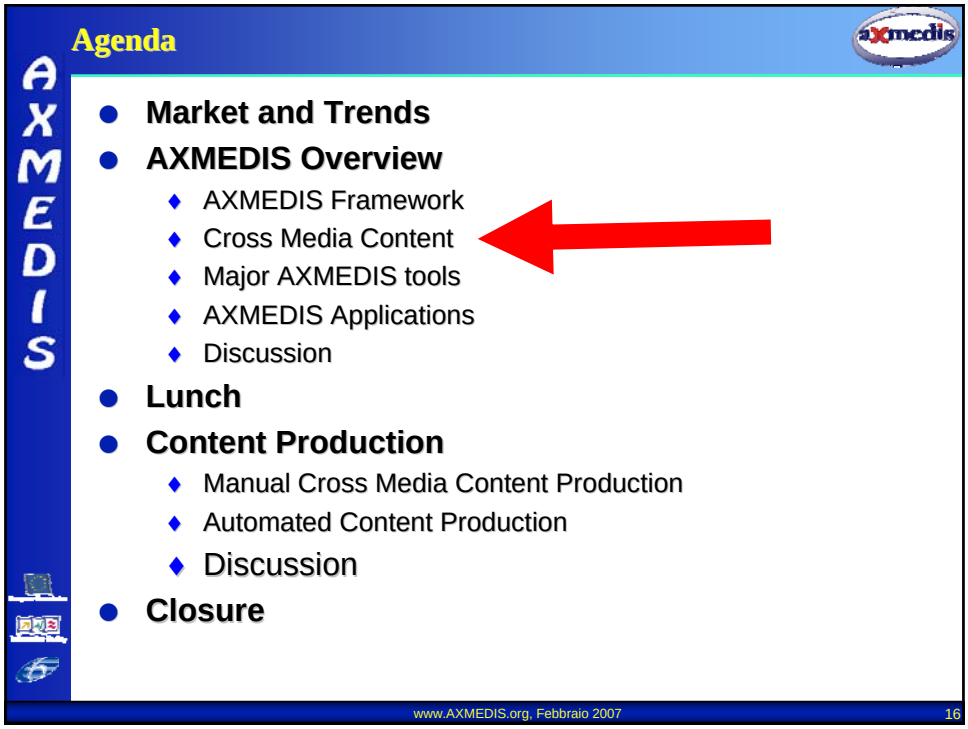


AXMEDIS Multichannel Content Distribution



AXMEDIS Cross Media Content Model

- **Model supporting B2B-B2C content production and transactions,**
  - for protected and non protected objects
- **Based on MPEG21 Digital Items**
- **Overcoming limitations in content modeling and DRM of Windows Media, I-Tune, Adobe, Google, etc.:**
  - Any kind of metadata and Any kind IDs
  - Cross media: any kind of digital resource
    - images, documents, video, audio, games, HTML, SMIL, MPEG-4, etc.;
  - Content components: composition and reuse;
  - DRM interoperability: MPEG-21 and OMA
  - DRM Chain of licenses: B2B and B2C integration;
  - Integration of semantics and behavior into the content.
- **Supporting legal/secure P2P for B2B and B2C/C2C**

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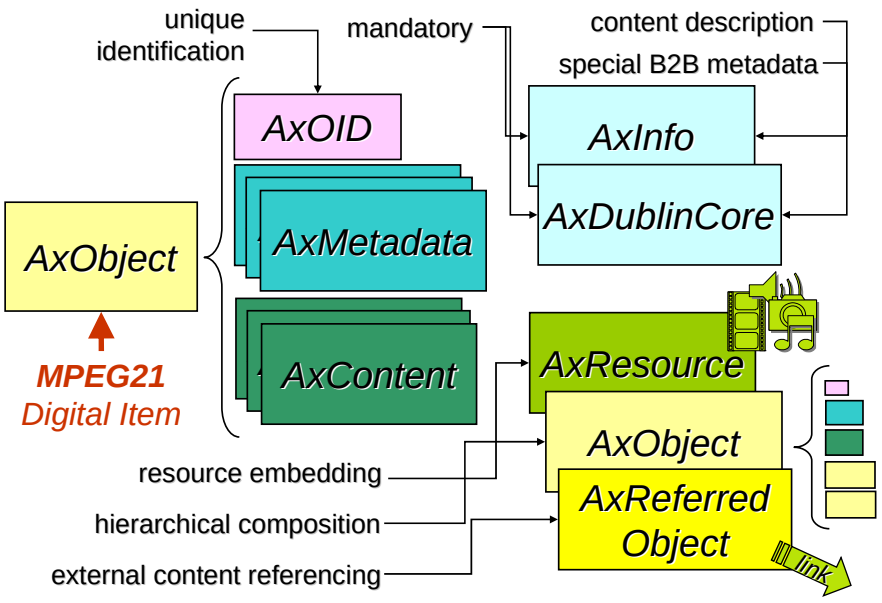
AXMEDIS Object Model



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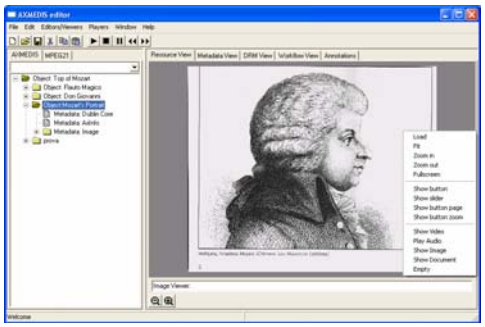
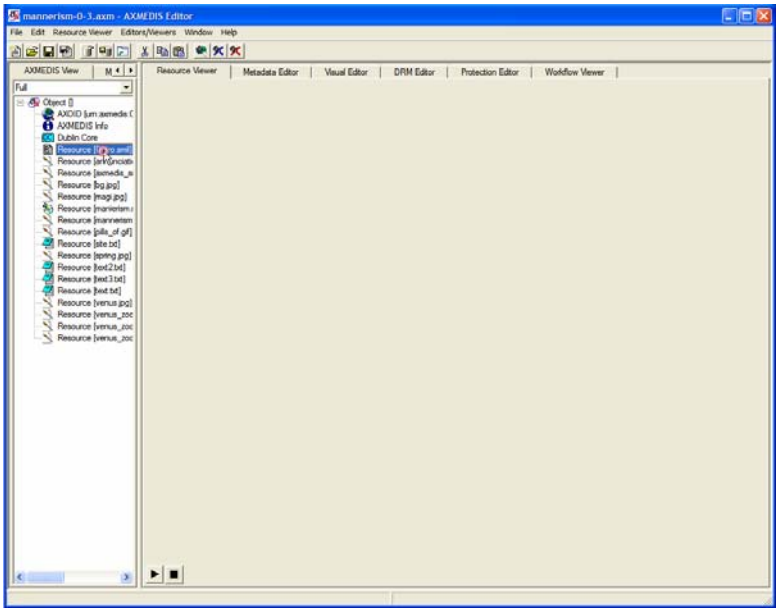
AXMEDIS Authoring Editor

- **The AXMEDIS Editor is an application allowing**
  - manual production of AXMEDIS objects
  - inspection of automatically produced objects
  - finishing AXMEDIS objects pre-produced automatically
- **It integrates many Editors & Viewers to handle all the aspects of the AXMEDIS Objects production**
  - Resource
  - OBJ Composition
  - Metadata
  - DRM/Licenses
  - Protection
  - Presentation
  - Behavior
  - Etc.…



AXMEDIS Editor



Overview

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- **AXMEDIS Overview**
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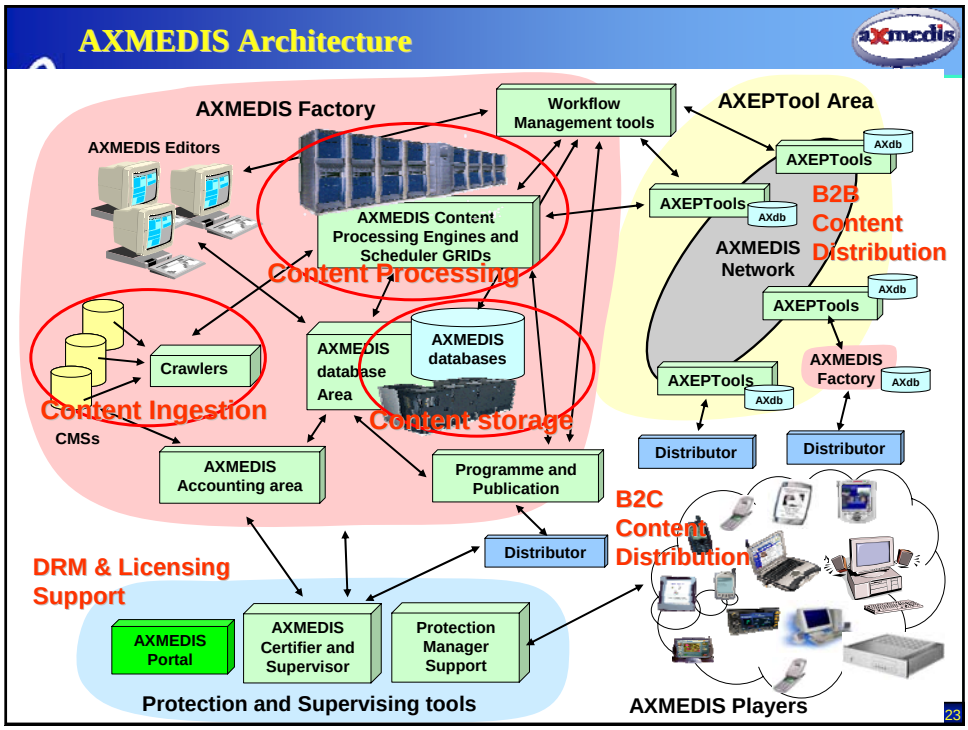
Major AXMEDIS Tools

- **Players for cross media content:**
  - PC, PDA, STB, mobiles, etc.
- **Content Production tools**
  - Authoring tools for cross media content: AXMEDIS Editor
    - for content, protection and licenses
  - Automated production tools for content, protection packages and licenses: AXCP, Workflow
  - CMS: search and retrieval, automated connection with your own and/or third parties CMSs
- **Content Distribution**
  - P2P tools for B2B and C2C in a controlled and safe/legal manner: AXEPTool, AXMEDIA
  - User and tool Registration portals
  - Certification authority, AXCA
  - License Server and Certifier and Verificator, PMS/AXCS
  - Scheduling: Program and publication, Workflow, etc.
  - Distirbution Portal


AXMEDIS Architecture
AXMEDIS Factory
AXMEDIS Editors
Workflow Management tools
AXMEDIS Content Processing Engines and Scheduler GRIDs
Content Processing
AXEPTool Area
AXEPTools
AXDb
B2B Content Distribution
AXMEDIS Network
AXMEDIS Factory
Crawlers
CMSs
Content Ingestion
AXMEDIS database Area
AXMEDIS databases
Content storage
AXMEDIS Accounting area
Programme and Publication
Distributor
B2C Content Distribution
DRM & Licensing Support
AXMEDIS Portal
AXMEDIS Certifier and Supervisor
Protection Manager Support
Protection and Supervising tools
AXMEDIS Players
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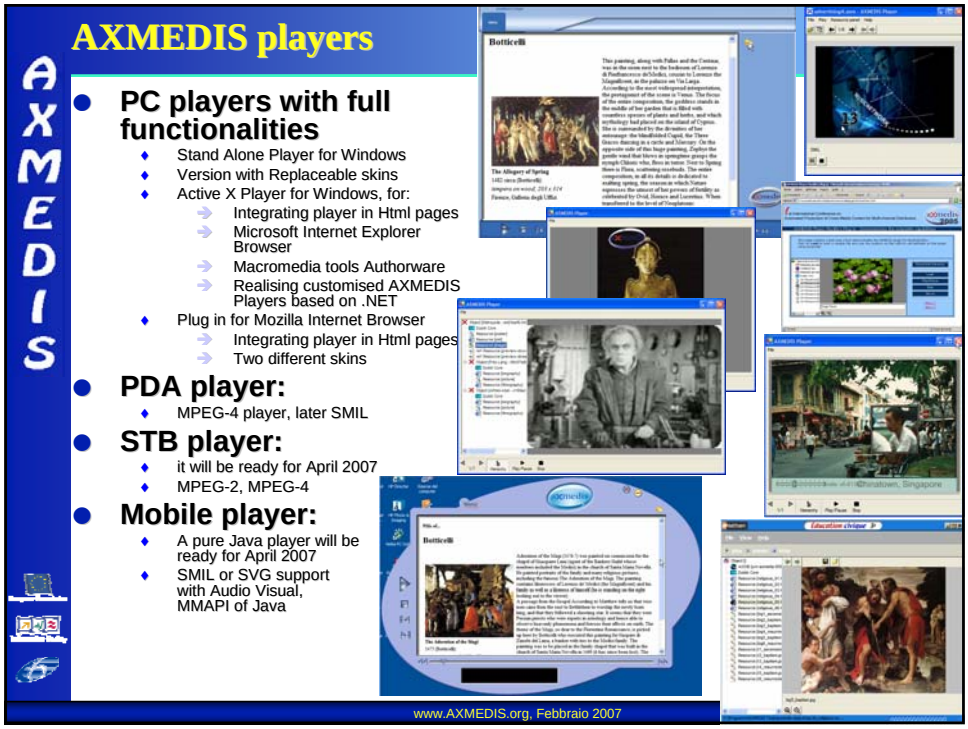
AXMEDIS players
PC players with full functionalities
Stand Alone Player for Windows
Version with Replaceable skins
Active X Player for Windows, for:
Integrating player in Html pages
Microsoft Internet Explorer Browser
Macromedia tools Authorware
Realising customised AXMEDIS Players based on .NET
Plug in for Mozilla Internet Browser
Integrating player in Html pages
Two different skins
PDA player:
MPEG-4 player, later SMIL
STB player:
it will be ready for April 2007
MPEG-2, MPEG-4
Mobile player:
A pure Java player will be ready for April 2007
SMIL or SVG support with Audio Visual, MMAPI of Java
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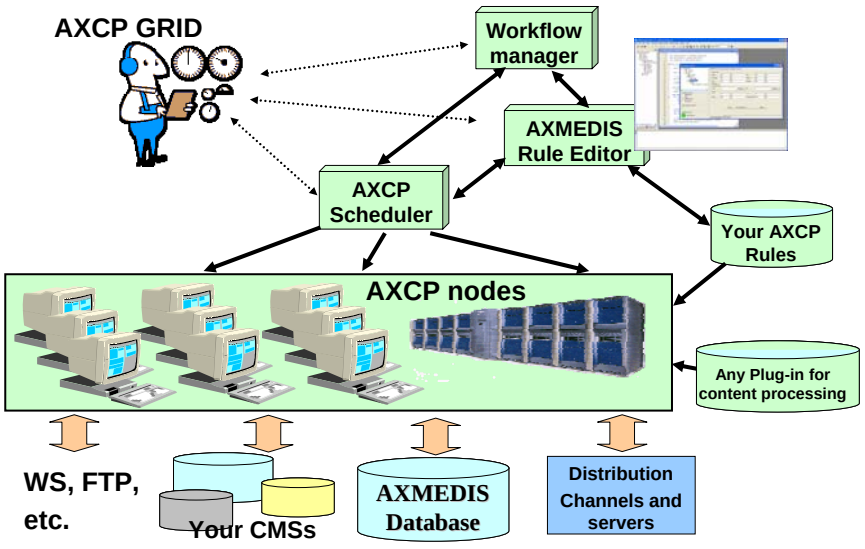
AXMEDIS Content Processing Capabilities

- Automated Content Ingestion and Gathering
- Automated Content Query and Retrieval
- Automated Content Load and Storage: databases and files

- Automated Content and Metadata Processing
- Automated Data processing
- Automated Content Composition
- Automated Content Formatting
- Automated Content Protection
- Automated Content Licensing

- Automated Content Publication/Download on P2P Network
- Automated Content Distribution
- Automated Profile management and processing
- Automated Production of Content on Demand

AXMEDIS Content Processing GRID



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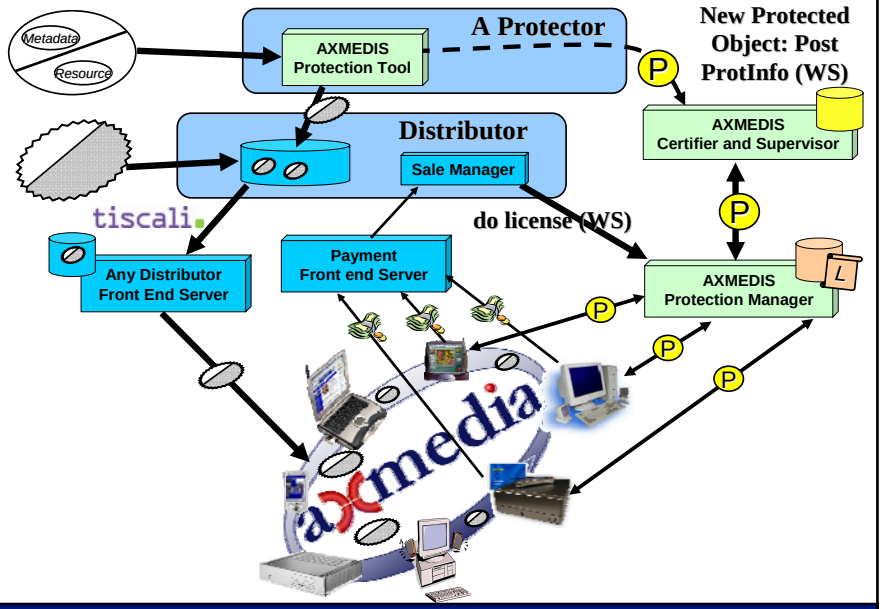
AXMEDIS Applications/Demonstrators

- **Multichannel Architecture for distribution**
- **Distribution towards:**
  - PCs via Internet+P2P: TISCALI Media Club, DSI
  - PCs via Satellite data broadcast: EUTELSAT, MBI
  - PDA via Kiosks: ILABS + ANSC Kiosks, TISCALI, DSI
  - STBs:
    - DVB-T, VOD: TEO and ELION (telecom Lithuania and Estonia)
    - STB/PVRs via Satellite data broadcast: EUTELSAT, MBI
  - Mobiles:
    - MPEG-21 distribution to mobiles: ILABS, TISCALI, DSI
    - OMA based distribution to mobiles: Telecom Italia, DSI
  - DVB-T + home domains/media center: BBC, SDAE, ETRI, UPC
- **P2P distribution with AXMEDIS**
  - B2B content distribution
  - C2C content distribution and sharing
  - Sharing content among archives and mediateques
- **Content Enrichment:**
  - VARIAZIONI (other 10 partners): GERMINUS, RIGEL, ALBENIZ, UPC, etc. (www.variazioni.org)

TISCALI Distribution with AXMEDIS Technology

- **B2C distribution**
- **AXMEDIS objects with**
  - Video and Audio Files, and also MPEG-4
- **Licenses and Protection Information not in the object**
- **The AXMEDIS Objects may be**
  - shared among consumers with AXMEDIA Tool a P2P tool
  - Visualized and played on AXMEDIS players free downloaded
- **The users have to perform the registration of**
  - themselves on an AXMEDIS portal
  - any AXMEDIS player tool they would use
  - Mainly on PCs and Media Centers. PVRs
- **License allows**
  - Content sharing on AXMEDIA
  - Content play
  - Content Adaptation…
  - Content Migration on other P2P channels…
  - Content Migration on any other AXMEDIS terminal

TISCALI Distribution with AXMEDIS Technology



ILABS Distribution with AXMEDIS technology

- **B2B and B2C distribution**
- **AXMEDIS objects with**
  - Educational and cultural content,…
  - Video, images, document, audio, animations, etc.
- **Licenses and Protection Information not in the object**
- **The AXMEDIS Objects may be**
  - Visualized and played on AXMEDIS players free downloaded
- **The users have to perform the registration of**
  - themselves on an AXMEDIS portal
  - any AXMEDIS player tool they would use
  - Mainly on PDA and mobiles
- **License allows**
  - Content play
  - Content Adaptation…
  - Content Migration on any other AXMEDIS terminal, in some cases

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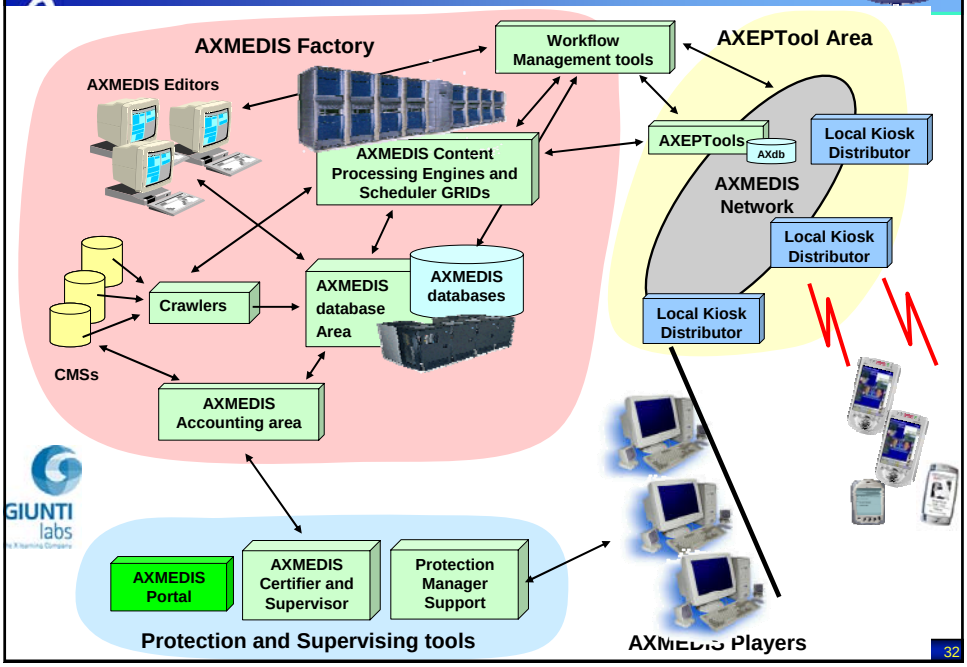
AXMEDIS Architecture



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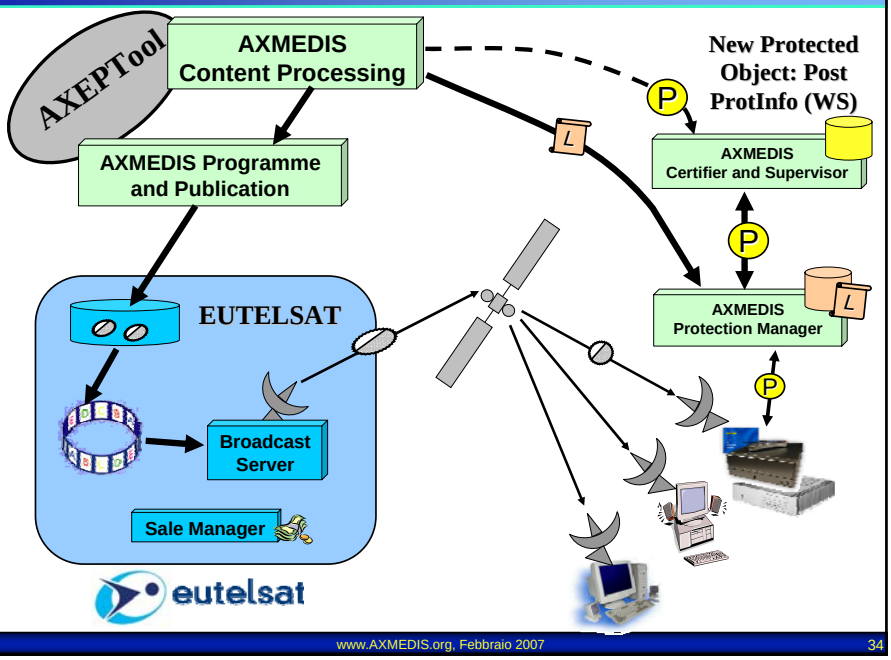
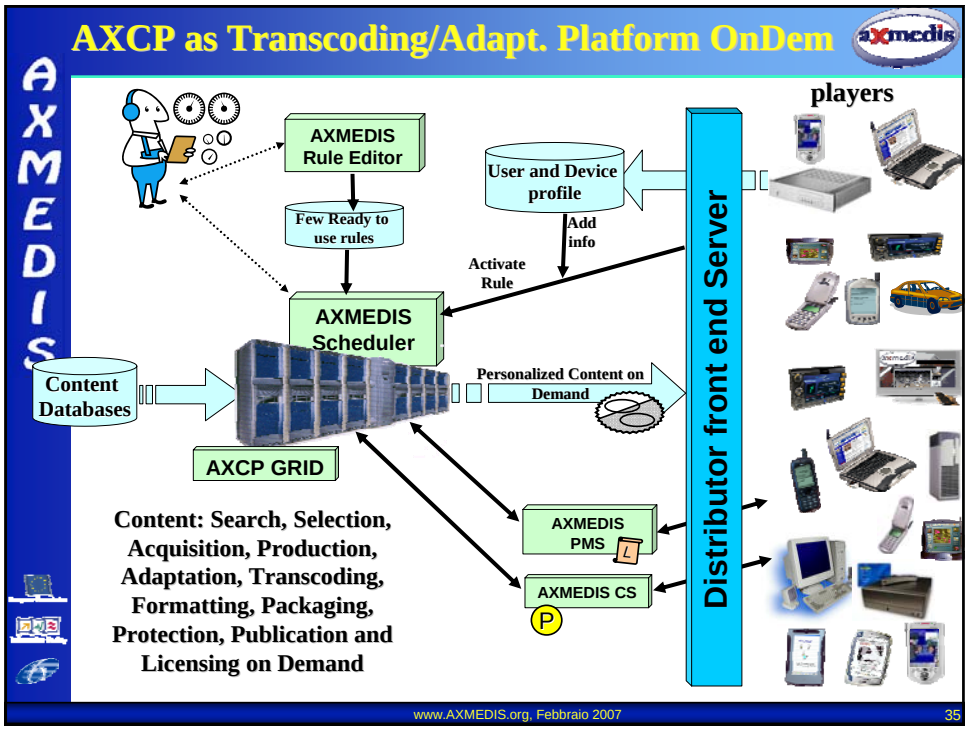
EUTELSAT Distribution with AXMEDIS technology

- **B2B and B2C distribution**
- **AXMEDIS objects with**
  - Any kind of content,…
  - Video, images, document, audio, animations, etc.
- **Licenses and Protection Information not in the object**
- **The AXMEDIS Objects may be**
  - Visualized and played on AXMEDIS players free downloaded
- **The users have to perform the registration of**
  - themselves on an AXMEDIS portal
  - any AXMEDIS player tool they would use
  - Mainly on PC for TV and/or i-TV
- **License allows**
  - Content play
  - Content Adaptation…
  - Content Migration on any other AXMEDIS terminal, in some cases

EUTELSAT Distribution with AXMEDIS Technology




AXCP as Transcoding/Adapt. Platform OnDem
AXMEDIS
players
AXMEDIS Rule Editor
Few Ready to use rules
User and Device profile
Add info
Activate Rule
AXMEDIS Scheduler
Content Databases
Personalized Content on Demand
AXCP GRID
Distributor front end Server
Content: Search, Selection, Acquisition, Production, Adaptation, Transcoding, Formatting, Packaging, Protection, Publication and Licensing on Demand
AXMEDIS PMS
AXMEDIS CS
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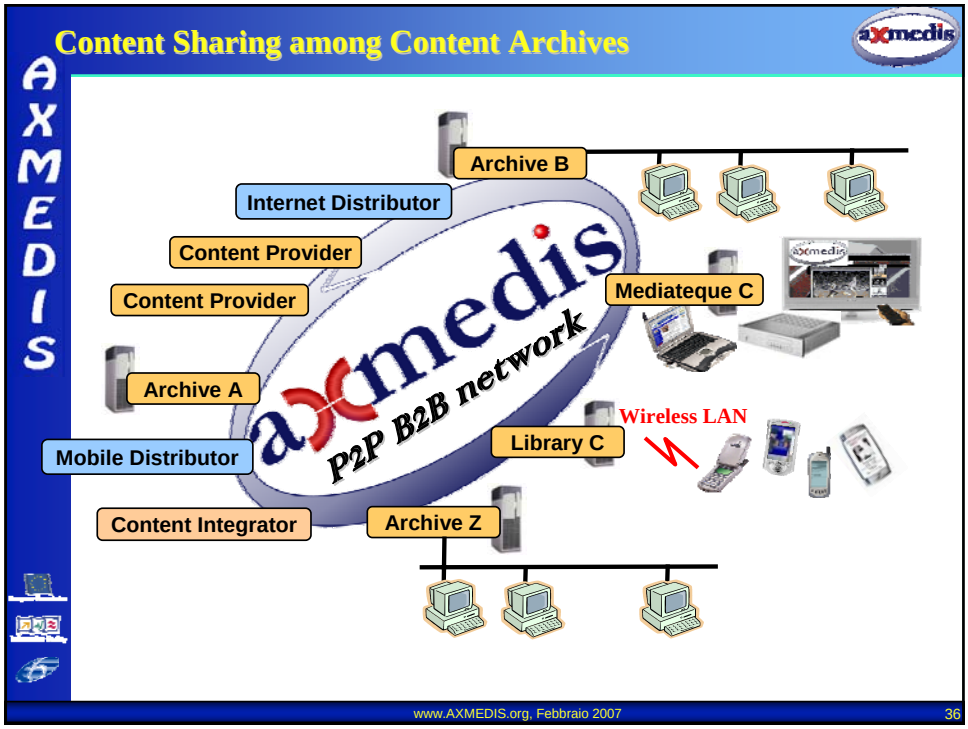
Content Sharing among Content Archives
AXMEDIS
Archive B
Internet Distributor
Content Provider
Content Provider
Mediateque C
Archive A
axmedis
P2P B2B network
Wireless LAN
Library C
Mobile Distributor
Content Integrator
Archive Z
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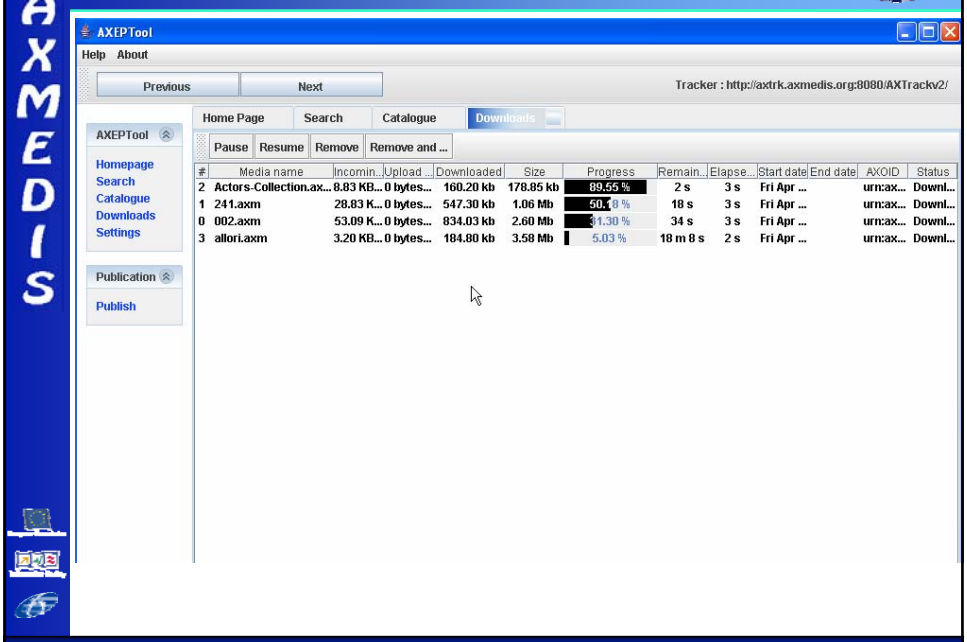
P2P Distribution and content Sharing with AXMEDIS

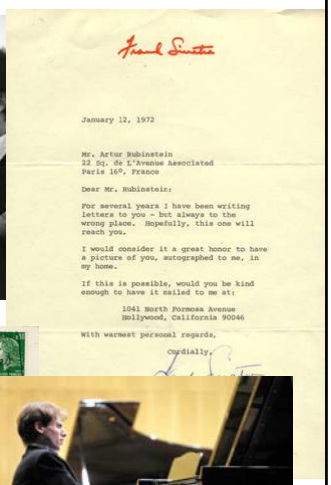


AXMEDIS P2P Tools

- **AXMEDIS P2P tools for content sharing respecting IPR**
  - Content Distribution and P2P file sharing based on BitTorrent
  - DRM support, supervision and control
  - Certified metadata, etc.
- **AXEPTool**
  - Only for B2B
  - Technical queries and information:
    - Features, descriptors, duration, formats, license information, distribution model, etc.
  - Automated loading and publication via the AXCP tools
  - Control and certification of metadata
- **AXMEDIA tool:**
  - Only for C2C and B2C
  - Simple queries on simple user focussed metadata
  - Simple management of files on the file system
  - Control and certification of metadata

For Content Enrichment with VARIAZIONI

- **700 hours of audiovisual**
  - Master classes of famous magisters (Harmos)
  - Concerts
  - Conferences
  - Special Events…
- **1000 hours of audio**
  - Concerts
  - Lessons
  - Rehearsals of concerts
  - Popular Songs…
- **2000 historic documents**
  - Programs of concerts
  - Letters
  - Scores
  - Images
  - Articles
  - Pedagogical Material



January 12, 1972

Mr. Artur Rubinstein
22 Sq. de L'Avenue Associated
Paris 16º, France

Dear Mr. Rubinstein:

For several years I have been writing letters to you - but always to the wrong place. Hopefully, this one will reach you.

I would consider it a great honor to have a picture of you, autographed to me, in my home.

If this is possible, would you be kind enough to have it mailed to me at:

1041 North Formosa Avenue
Hollywood, California 90046

With warmest personal regards,

Cordially,

www.AXMEDIS.org, Febbraio 200 39

Partners in VARIAZIONI

- **Coordinator and content provider**
  - Fundacion Albeniz (FIA)- *Spain*
- **Technical providers**
  - Germinus XXI, Grupo Gesfor (Germinus)- *Spain*
  - Dipartimento di Sistemi e Informatica, Università degli Studi di Firenze (DSI) -*Italy*
  - Rigel Engineering SRL (Rigel)- *Italy*
  - Music Technology Group, Universitat Pompeu Fabra (UPF)- *Spain*
  - Exitech SRL - *Italy*
- **Content providers**
  - Lithuanian Academy of Music and Theatre (LMTA)- *Lithuania*
  - Koninklijk Conservatorium Brussel, Erasmushogeschool Brussel (EHB)- *Belgium*
  - Escola Superior de Música e Artes do Espectáculo do Porto (ESMAE)- *Portugal*
  - Sibelius Academy (SIBA)- *Finland*
- **Dissemination**
  - Association Européenne des Conservatoires, Académies de Musique et Musikhochschulen (AEC) - *Netherlands*

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DRM Interoperable …….. Yes, but how ?

DRM, Digital Rights Management

- Digital management of rights

DRM Proprietary

- based on proprietary formats for content and licenses, IPMP information, control messages, and reporting, etc.

DRM Interoperable (e.g., MPEG-21, DMP o OMA)

- based on a UNIQUE format Standard for content and licenses, IPMP information, control messages, and reporting, etc.
  - Extension are not accepted if not decided by the standard body

DRM Interoperable "a la AXMEDIS"

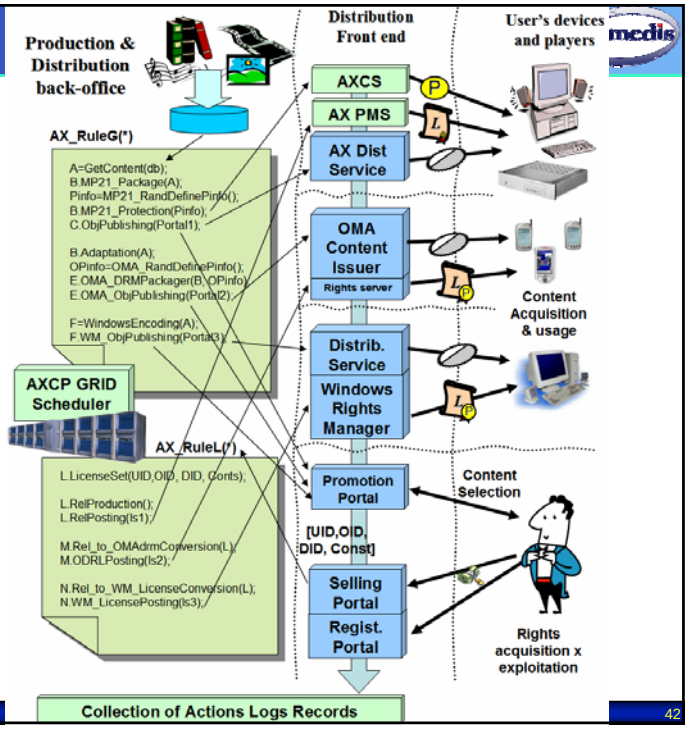
- based on SEVERAL *formats standard (MPEG-21 e OMA)* e/o *proprietary* for content and licenses, IPMP information, control messages, and reporting, etc.
  - It can be extended to accept other formats when they are needed for example to have also Windows Media, i-Tune, or more, etc.
  - Support of the B2B

Multichannel

Distributors managing different channels

Different DRMs

- AXMEDIS
- OMA
- Windows Media



List of Events/Actions on rights Exploitation

- **Collecting Events and Actions**
  - Further reporting
  - Further verification of consistency
  - provide the evidence about the exploitation of rights to: content owners, producers, collecting societies, distributors, etc.
  - provide the billing information to the final user
  - provide the statistical information
- **Counting the usage, exploitation of rights**
  - how many times a music piece has been played, how many print out have been produced, etc.
  - Dynamic definition of price for example…
- **MPEG-21 Event Reporting**
  - Specifies how to express ER-Request and Event Report and how they are represented as digital item

Reporting, accounting manager and tool, examples

- **Reporting to Distributor**
  - Each exploited right with references to the User-ID for each distributed object (objects that contains its Dist-ID)
- **Reporting to the Integrator/creator**
  - Who create new object from other objects of from scratch
  - The number of exploited rights for each object that contains the Creator-ID and the Dist-ID for each of them
- **Reporting for the Collecting societies, CS**
  - Who is monitoring the exploited rights for third parties, for other creators
  - The number of exploited rights for each Creator-ID associated with the CS, for each object that contains the Creator-ID and the Dist-ID for each of them, in a certain Geographic Region or State

Overview

- **Market and Trends**
- **AXMEDIS Overview**
  - AXMEDIS Framework
  - Cross Media Content
  - Major AXMEDIS tools
  - AXMEDIS Applications
  - Conclusions and Discussion
- **Lunch**
- **Content Production**
  - Manual Cross Media Content Production
  - Automated Content Production
  - Discussion
- **Closure**

In the above described Applications

- **We have seen:**
  - Usage of the AXMEDIS Editors and Players
  - Massive usage of the AXCP GRID for managing back office issues, defining specific scripts for:
    - Automated content production and adaptation (MPEG-21, OMA, etc.)
    - Automated creation of licenses (MPEG-21, OMA, etc.)
    - Automated regeneration of new versions of the objects
    - Automated object acquisition and posting on DataBases
  - Support of the AXMEDIS PMS and AXCS for the DRM aspects
  - Support of the CAMART and AII for collecting reporting data
  - Front ends for selling and distributing of the Distributors involved so that to maintain their plate and relationships with their customers
- **In some demonstrators there is the usage of:**
  - The P2P tools, for B2B and B2C2C
  - Some specific tools for content posting on the databases
  - Some specific player tools for final users
  - Some specific tools for Home and Factory Domain Management
  - Workflow support

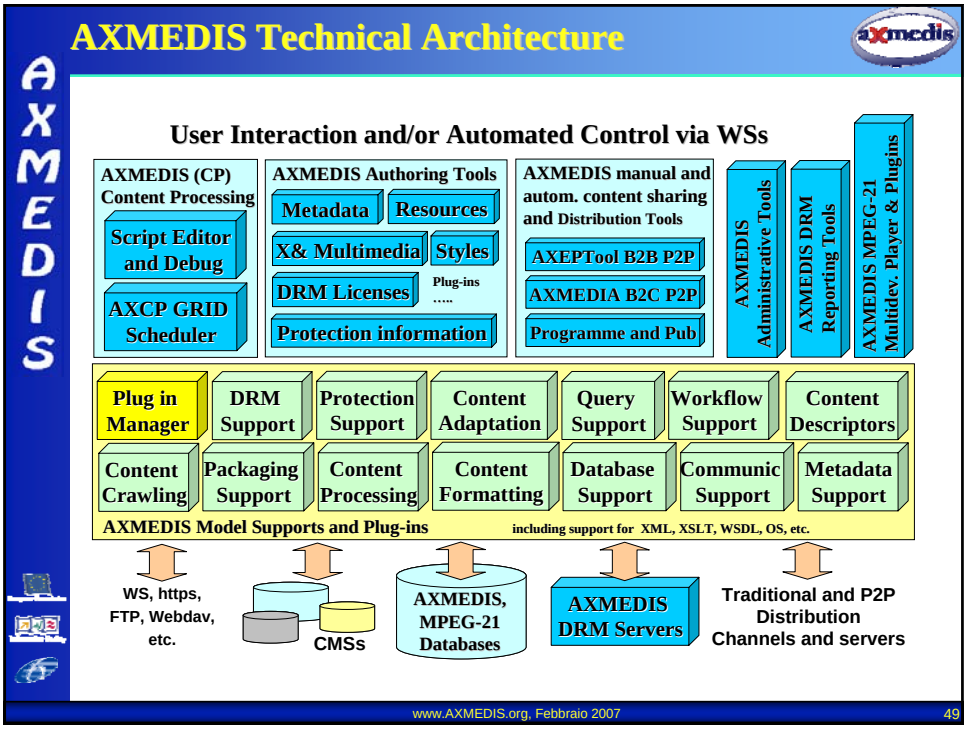
AUTOMATING the BACKOFFICE

- **Lower costs of and enabling**
  - content gathering, transcoding/monitoring platform, production of content on demand with AXCP
  - integrate cross media content and automatically managing rights for complex multimedia products
  - production, B2B distribution, promotion via P2P B2B
- **New forms of content and unexploited content:**
  - Making business with cross media content, integrating HTML, SMIL, document, video, etc., no possible up to now
  - Exploiting the content "long tail"
- **Interoperability, convergence of media**
  - interoperability of content and DRM, Multi-channel distribution
  - access to the same content on several platforms, devices and locations
  - greater level of security, control of content usage in all channels B2B2C
- **DRM, creation new business models**
  - different business models on the same channel may be used
  - adapting the distribution channel to the users needs and would
  - Access to detailed reporting on the exploited rights
- **Distribute content with**
  - Any B2C: Internet, STB, broadcasting, Mobile, kiosks, pda, etc.
  - P2P to Consumers with the support of DRM

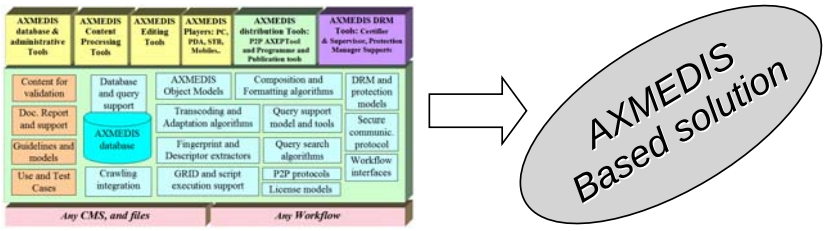
What AXMEDIS can do for Small Publishers

- **New possibilities and low costs for:**
  - Access to new technology that supports new forms of content (cross media content) and DRM standard and interoperable
  - Exploitation of content never used for business before
  - Manual and/or automated Creation of AXMEDIS Objects, protection of them for multichannel distribution
    - Direct access to legacy CMSs
  - Automated Posting of produced objects in a P2P network, making them visible to other actors of the value chain, with defined DRM rules
  - Access to other objects and components via the P2P network for creating more valuable objects and for second localized distribution
  - For creating your own distribution system
  - Direct Reporting of the object consumption, without losing the control of the owned objects and rights

AXMEDIS Technical Architecture



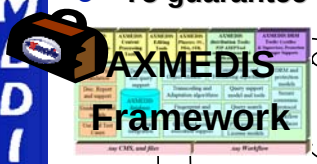
As the AXMEDIS Framework can be exploited



- **Usage of AXMEDIS Framework and Tools by**
  - Set up and management of single/multichannel Content Distribution with DRM
  - Customizing AXMEDIS Players (PC, PDA, etc.) for creating YOUR own Players
  - Customising AXMEDIS P2P tools for B2B
  - Exploiting Content Processing tools for (AXMEDIS AXCP GRID)
    - reducing production costs and time
    - automating: composition, formatting, protection, feature extraction, distributions, publishing, etc.
- **Exploiting AXMEDIS Infrastructure**
  - Accessing to advanced State of the Art and standards solutions
  - Sharing Content in a B2B Environment (AXEPTool)

Use of AXMEDIS Framework

- Exploitation of AXMEDIS research and innovation
- To guarantee the return of investment



Project Partners

- *Research institutions*
- *IT Companies*
- *Content Distributors*
- *Content Providers,*
- *Integrator*
- *Etc.*

9 subprojects Demonstrators

Direct Affiliation

AXMEDIS Based solutions

Affiliation to the AXMEDIS

- ***Interoperability on content and DRM, a common framework for all is an added value to your business!***
- **You can become affiliated with AXMEDIS.** The affiliation provides access to
  - **a large amount of information and knowledge**
  - **full source code of the AXMEDIS Framework**
- The benefits of the affiliation include the possibility of using the AXMEDIS technology and tools (customize them from source code), for your business without limitations
- The affiliation can be formalized via the affiliation agreement, you can find information on the flyers and on the DVD and on the portal.
- The affiliation has a small annual fee that can be covered in money or by value offering in change contributions to the AXMEDIS Framework for the community.

Contact Information

- ***If you like to know more about the AXMEDIS framework and other AXMEDIS technologies and functionalities please do not hesitate to contact the project coordinator***
- ***Prof. Paolo Nesi, Ph.D.***

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