



**Automating Production of Cross Media Content
for Multi-channel Distribution**

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AXMEDIS 2006 AXMEDIS Overview and General Tutorial

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- **Preface** 
- **What is AXMEDIS**
- **Short Market Analysis and Opportunities**
- **General State of the Art**
- **Needs and Limitations**
- **AXMEDIS Content Packaging**
- **AXMEDIS Content Protection and Tracking**
- **AXMEDIS Content Production and Processing**
- **AXMEDIS Application Scenarios**
- **Conclusions and references**

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This AXMEDIS tutorial and the others for the 2006

- **This tutorials is the first of a Series, the others are:**
 - ◆ **Content Production:** manual production of content, AXMEDIS model, MPEG-21 Model, object authoring, the packages, the metadata editor, the license editor, the protection editor, the players (PC, PDA, Mobile, STB/PVR), etc., Any kind of digital format content into the AXMEDIS format.
 - ◆ **Content Processing,** automated content production and processing tools, automating the backoffice, AXMEDIS GRID tools, estimation of descriptors, estimation of fingerprint, content protection, crawling of legacy databases and content management systems, content formatting, usage of Scripts, etc.
 - ◆ **Workflow tool usage with AXMEDIS tools,** integration of workflow systems with AXMEDIS, control of AXMEDIS tools, monitoring, etc.
 - ◆ **Content Distribution,** multichannel content distribution, example of for interned distribution with TISCALI, example of mobile distribution with ILABS, example of Kiosk distribution towards PDAs with ILABS, example of satellite distribution with EUTELSAT, content sharing, etc.

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Purpose of this Tutorial

- **This tutorial aims to provide you an overview of the AXMEDIS technologies, solutions and architecture.**
- **It gives you answers to the following questions**
 - ◆ What is AXMEDIS ?
 - ◆ Which is the State of the Art of the sector ?
 - ◆ Which are the innovations/advantages of AXMEDIS ?
 - ◆ What can I do with AXMEDIS ?
 - ◆ Why I should use AXMEDIS ?
 - ◆ Which are the major tools of AXMEDIS ?
 - ◆ How can I use AXMEDIS for my business ?
 - ◆ Which implications I have in using AXMEDIS ?
 - ◆ Who can help me in knowing more ?
 - ◆ Any other wish ?
 - ◆ ...
- **Please do not hesitate to make questions !!**





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Schema of the Tutorial and Purpose

- **Duration: 3.5-4 hours**
- **Which could be the Attendees of this Tutorial:**
 - ◆ **who** is interested to get a general overview of AXMEDIS aims, technologies, solutions and tools
 - ◆ **Business Managers** interested in assessing if AXMEDIS is suitable for their business or not, if it is an advantage or not, etc.
 - ◆ **Technical Managers** interested to have a first overview
 - impact of AXMEDIS technology in their solutions
 - technical innovation of AXMEDIS with respect to the state of the art
 - ◆ **Research Managers** interested to get on overview of the whole architecture and assessing the advantages for Using AXMEDIS framework for:
 - testing and developing new solutions, new algorithms, etc., reducing costs of infrastructure creation
 - Promoting and disseminating their new solutions on a large audience
 - Making business with AXMEDIS, exploiting the framework



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Preface

- **Currently, market of digital-content is growing very fast and it needs solutions for accessing new markets and defining/trial new business solutions**
- **Major needs:**
 - ◆ Convergence of the media, interoperability of content
 - ◆ Flexibility in the business and transaction models
 - ◆ DRM (Digital Rights Management) applications and introduction in several distribution channels, DRM interoperability
 - ◆ Harmonization of B2B and B2C areas for DRM
 - ◆ Massive processing in content production and distribution, and in license processing and event tracking
 - ◆ Open and unified architecture and solution for e-commerce of digital content
 - ◆ Etc.
- **These are a real challenge for many industries that are discovering the complexity of managing large digital content factories and distribution chains.**

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- AXMEDIS Application Scenarios
- Conclusions and references

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AXMEDIS



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, 8.4 Meuro of Funding**
- **About 200 people are working on AXMEDIS every day**
- **More than 35 partners (contractors and affiliated)**

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AXMEDIS



AXMEDIS Partners (up to Nov. 2006)























































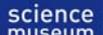












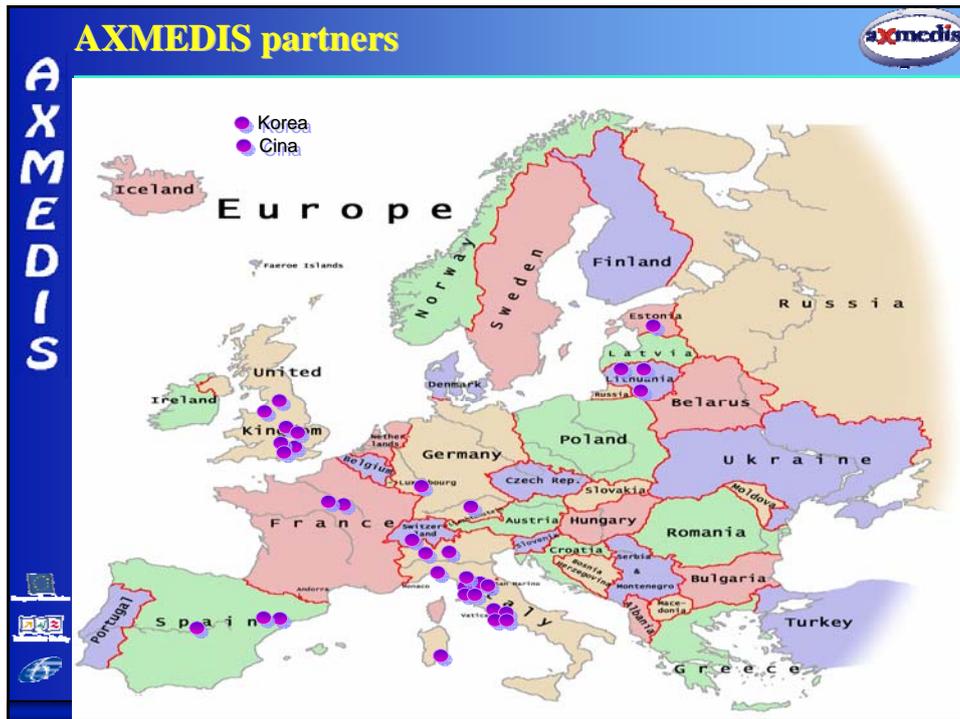






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AXMEDIS Contractors and Partners		
ACIT	ACit - ADVANCE CONCEPTS FOR INTERACTIVE TECHNOLOGY GMBH	Germany
AFI	ASSOCIAZIONE DEI FONOGRAFICI ITALIANI	Italy
ANSC	FONDAZIONE ACCADEMIA NAZIONALE DI SANTA CECILIA	Italy
BBC	British Broadcasting Corporation	UK
BL	Brook Lapping	UK
DIPITA	Department: Dipartimento di Italianistica, Università degli Studi di Firenze	Italy
DSI	Dipartimento di Sistemi e Informatica, Università degli Studi di Firenze, DISIT Lab.	Italy
ELION	Elion Enterprises Ltd.	Estonia
EPFL	ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE	Switzerland
ETRI	Electronics and Telecommunications Research Institute (Korea)	Korea
EUTELSAT	EUTELSAT S.A.	France
EXITECH	EXITECH srl	Italy
FIGIGD	FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V.	Germany
FOCUSEEK	Focuseek, crawling	Italy
HEXAGLOBE	Hexagloble	France
HP	HEWLETT PACKARD ITALIANA S.R.L.	Italy
ILABS	GIUNTI INTERACTIVE LABS S.R.L.	Italy
ITINNOV	IT Innovation Centre	UK
KTU	Kaunas University of Technology	Lithuania
MBI	MBI Srl.	Italy
PKU	Peking University, China	China
RIGEL	Rigel Engineering	Italy
SDAE	Sociedad Digital de Autores y Editores	Spain
SEJER	SEJER REPRESENTING BORDAS AND NATHAN	France
SIAE	Sociaetà Italiana Autori e Editori	Italy
SM	The Science Museum	UK
STRATEGICA	STRATEGICA srl	Italy
TEO	TEO LT, AB	Lithuania
TI	Telecom Italia	Italy
TID	Telefónica Investigación y Desarrollo (S.A.U.)	Spain
TISCALI	TISCALI Services	Italy
UNIVLEEDS	UNIVERSITY OF LEEDS	UK
UPC	Universitat Politècnica de Catalunya	Spain
UR	UNIVERSITY OF READING	UK
VRS	VRS Grupe, UAB	Lithuania
XIM	XIM LIMITED	UK

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AXMEDIS Objectives

- **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 distribution in terms of DRM and interoperability:**
 - ◆ 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 purposes

Content:

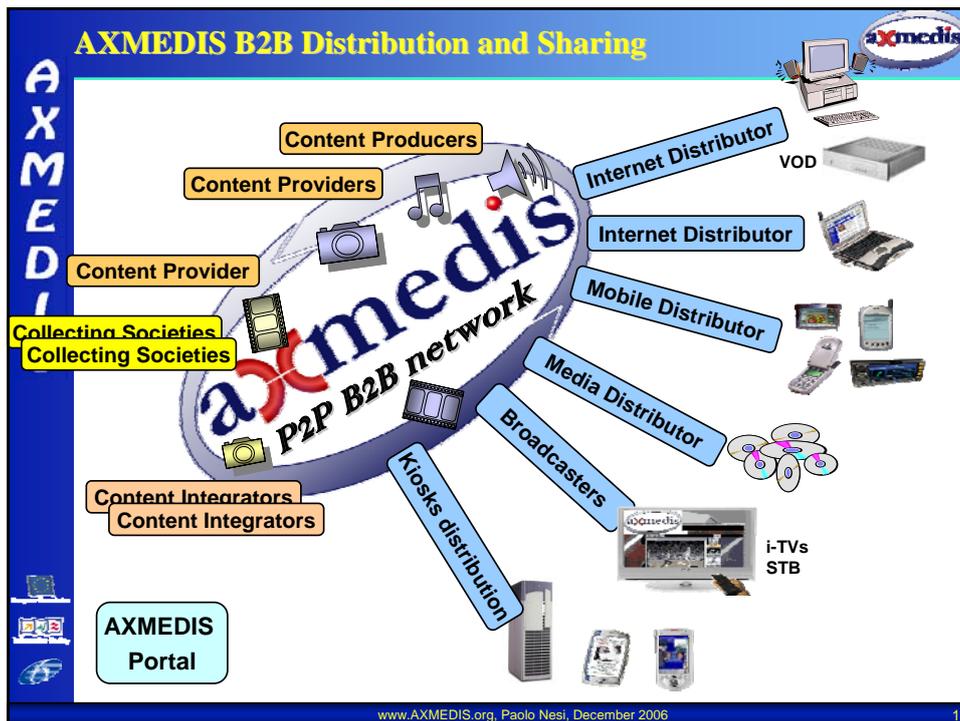
- Producers
- Providers
- Aggregators
- Packager
- Integrators
- Promoters
- Distributors
- ..

axmedis
Tools and Solutions
Models and technologies
Content authoring, processing, protection, distribution, controlling and usage

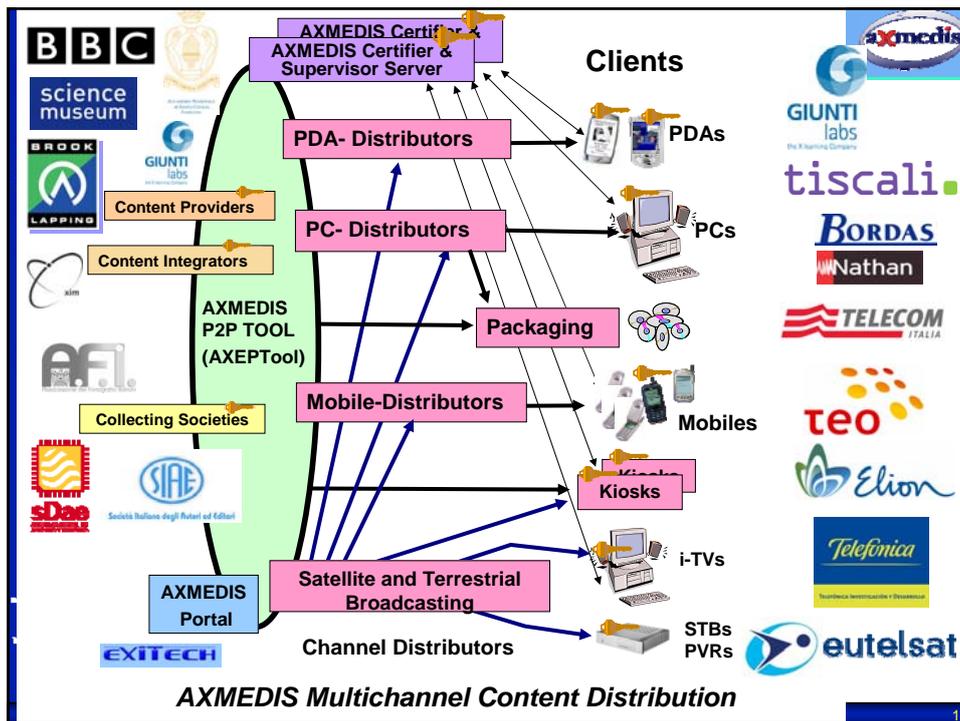
- Supporting both B2B and B2C distribution
- Reducing costs for Content Production, processing, etc
- Enabling Multichannel Distribution
- Enabling Interoperable Distribution of content
- Enabling e-commerce of secure digital content

Create a unified European platform for content packaging, protection and distribution in terms of DRM and interoperability (convergence)

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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.
 - **AXMEDIS Framework for all**
 - ◆ Set up and maintenance of an European Platform for improving the knowledge and tools on e-Commerce of digital goods.
 - ◆ Making the AXMEDIS Framework accessible for all
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Business Opportunities 1/3

AXMEDIS

- **For ALL Business Actors and for Content Provider/Producers**
 - ◆ Exploit new forms of content: the CROSS MEDIA
 - ◆ exploit a multi-channel distribution, convergence of media
 - ◆ greater level of security, control of content usage in all the channels B2B2C
 - ◆ creation new business models
 - ◆ lower costs of production, B2B distribution, promotion via P2P B2B
 - ◆ lower costs for content gathering, transcoding/monitoring platform, production of content on demand with AXCP
 - ◆ Protect and allow to make business with content types that cannot be protected up to now such as HTML, SMIL, and cross media in general
- **For Content Distributors/Mediators to**
 - ◆ defining several different business models on the same channel may be used, adapting the distribution channel to the users needs and would
 - ◆ distribute content with AXMEDIS tools on P2P to Consumers with the support of DRM
 - ◆ exploit P2P technology to access at content via the AXEPTool P2P B2B and AXMEDIA for C2C, B2C

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Business Opportunities 2/3

- **For Content Integrators and Multimedia Publishers to**
 - ◆ simple and direct access at content coming from many content providers, integrators, etc., in easy manner, simplified trading
 - ◆ integrate cross media content and automatically managing rights for complex multimedia products
 - ◆ define different business models adapting the distribution channel to the users needs and would

- **For Final Users to**
 - ◆ get access to cross media content, integrated HTML, SMIL, document, video, etc., no possible up to now
 - ◆ get access to the same content on several platforms and locations, interoperability of content and DRM
 - ◆ have the possibilities to select different business models on the same platform and channel
 - ◆ share content with AXMEDIS tools on P2P but based on DRM
 - ◆ have content at lower prices, etc.




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Business Opportunities 3/3

- **For Collecting Societies to**
 - ◆ provide support to their associated for posting content in the digital world and formalizing digital licenses
 - ◆ have the same content on several platforms and locations, interoperability of content and DRM, with multichannel support at low cost
 - ◆ have access at direct reports about the Content rights exploitation
 - ◆ automate the back office for content acquisition, adaptation, packaging and distribution
 - ◆ share the same platform as other collecting societies

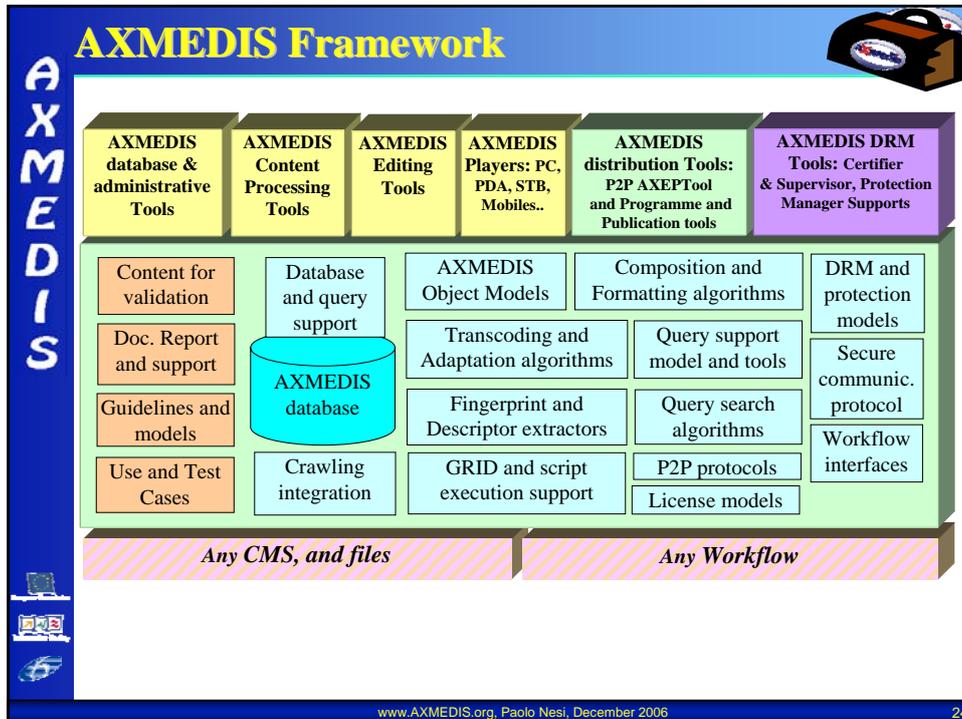
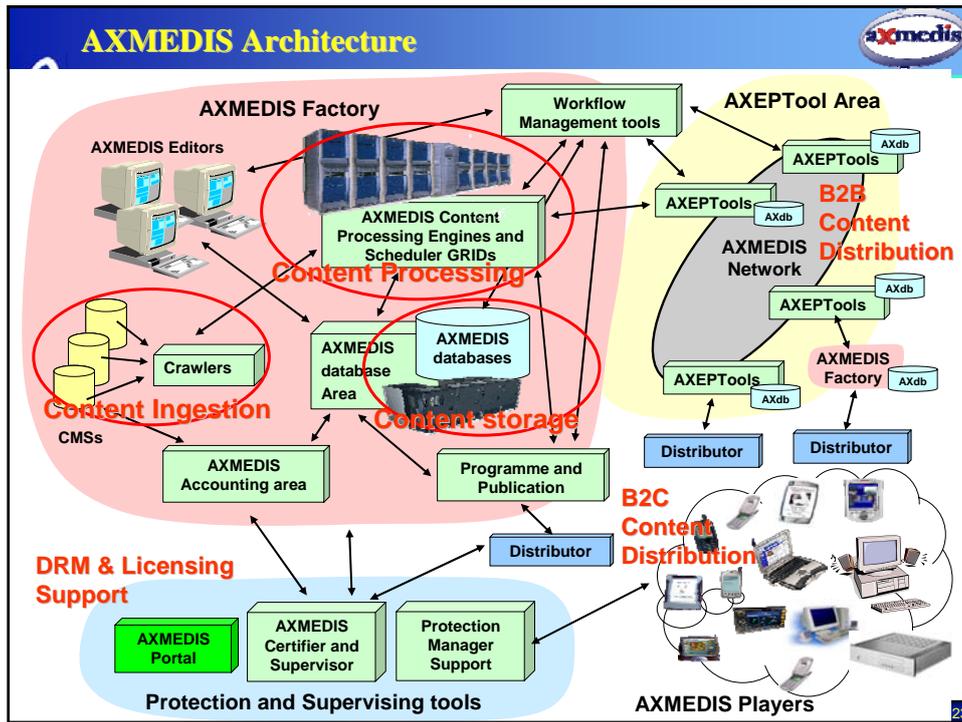
- **For IT companies to**
 - ◆ Save time and money in accessing at innovative technologies for content production and distribution, integrated environment
 - ◆ Usage a common development and distribution framework based on a standard and largely used by large actors
 - ◆ Make their tools usable and interesting for big players in the market and compatible with those of other vendors

- **For Research groups to**
 - ◆ Make accessible with low effort new algorithms and solution in an integrated and comprehensive environment such as AXFW and AXCP, used by a large number of large players and actors of the sector
 - ◆ Make visible their work and results to a large community




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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)

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AXMEDIS Technical Architecture

User Interaction and/or Automated Control via WSs

AXMEDIS (CP) Content Processing

- Script Editor and Debug
- AXCP GRID Scheduler

AXMEDIS Authoring Tools

- Metadata
- Resources
- X& Multimedia
- Styles
- DRM Licenses
- Plug-ins
- Protection information

AXMEDIS manual and autom. content sharing and Distribution Tools

- AXEPTool B2B P2P
- AXMEDIA B2C P2P
- Programme and Pub

AXMEDIS Administrative Tools

- AXMEDIS DRM Reporting Tools
- AXMEDIS MPEG-21 Multidev. Player & Plug-ins

AXMEDIS Model Supports and Plug-ins (including support for XML, XSLT, WSDL, OS, etc.)

- Plug in Manager
- DRM Support
- Protection Support
- Content Adaptation
- Query Support
- Workflow Support
- Content Descriptors
- Content Crawling
- Content Packaging Support
- Content Processing
- Content Formatting
- Database Support
- Communic Support
- Metadata Support

External Systems:

- WS, https, FTP, Webdav, etc.
- CMSs
- AXMEDIS, MPEG-21 Databases
- AXMEDIS DRM Servers
- Traditional and P2P Distribution Channels and servers

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Use of AXMEDIS Framework

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

AXMEDIS Framework

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

Project Partners

9 subprojects Demonstrators

Direct Affiliation

AXMEDIS Based solutions

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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 convenient annual fee that can be covered in money or value by offering in change contributions to the AXMEDIS Framework itself for the community.
- For additional information please contact Paolo Nesi nesi@dsi.unifi.it

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AXMEDIS

AXMEDIS Major Innovations and Tutorials



- **This Tutorial give a general overview**
 - ◆ It should be followed before the others
- **For other information on AXMEDIS:**
 - ◆ **Content Model, packaging and protection**, please follow:
 - Tutorial on Content production (12th Afternoon, LT11)
 - Tutorial on Content processing (13th Morning, LT11)
 - ◆ **Automated Content Processing**, from CMSs to new content products, reducing time to distribution, cost reduction, please follow:
 - Tutorial on Content processing (13th Morning, LT11)
 - ◆ **Multichannel content distribution**, please follow:
 - Tutorial on Content distribution (14th Morning, LT11)
 - ◆ **Workflow integration**, please follow:
 - Tutorial on Workflow (14th Afternoon, LT11)

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Contact Information



- **Prof. Paolo Nesi, Ph.D.**

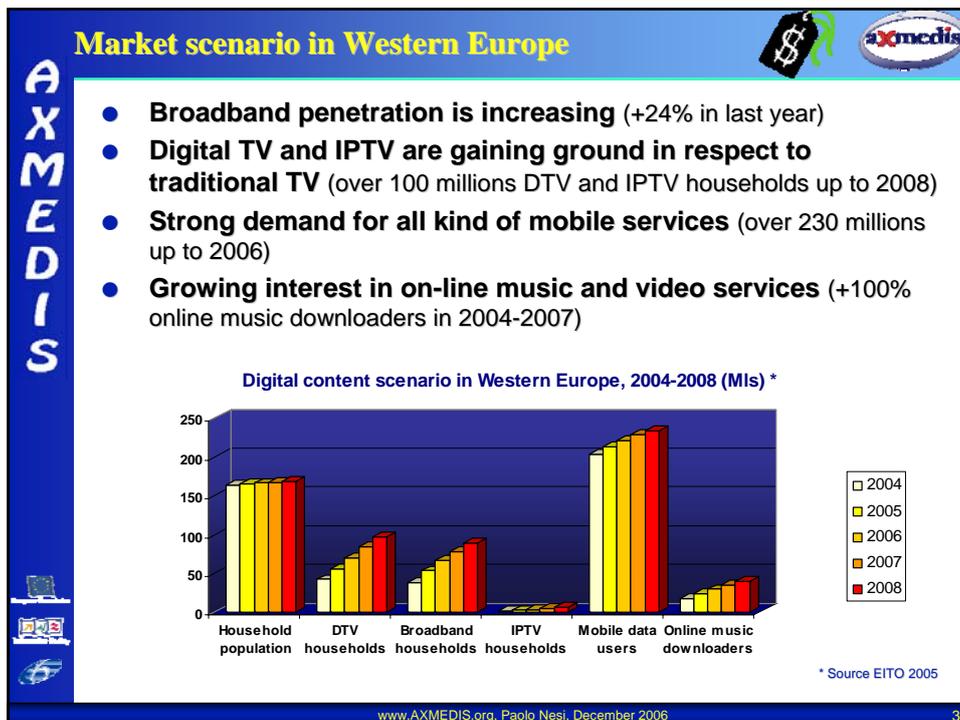
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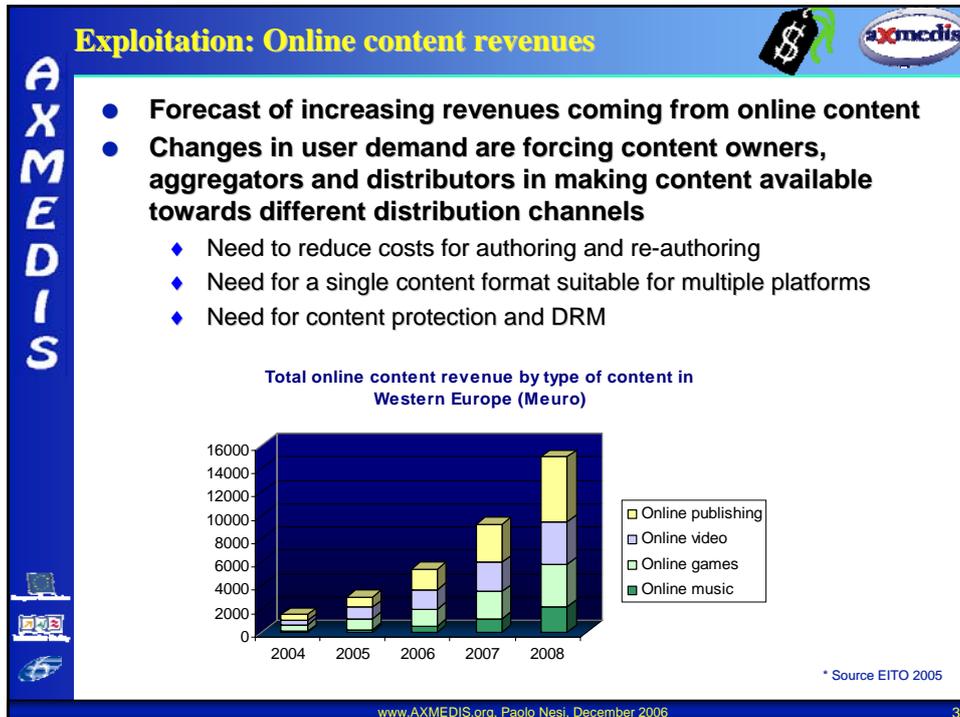
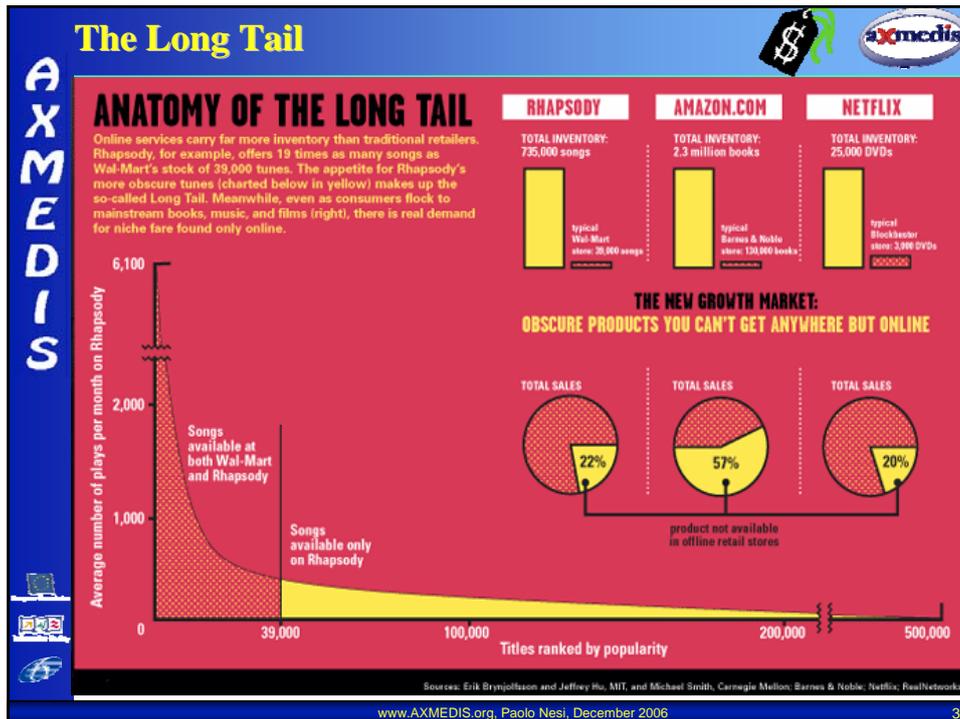
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Trends



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- **The tail is growing, it is getting fatter**
 - ◆ The ration 20%/80% is moving to a 40%/60%

- **The content in the long tail is continuously making more visible to buyers**
 - ◆ Smart metadata would help in suggesting content and thus on going on the tail:
 - “*who like AAAA also take BBBB!*”
 - “*if you like AAAA, you will love also BBBB!*”
 - ◆ Characterization and comparison with the rest of the head, the 20% of the famous pieces

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Needs and the cure



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- **The actors needs lower costs for**
 - ◆ production (packaging, protection, management, advertising, etc.), distribution and advertising
 - ◆ contract management, licensing, accounting, reporting, etc.

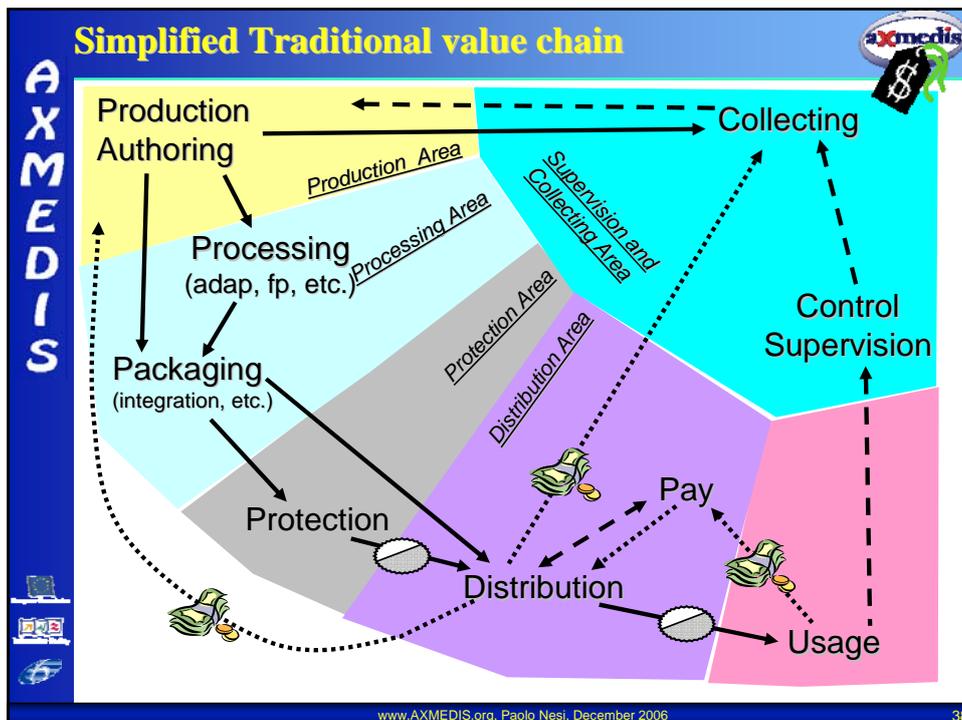
- **Automation is THE cure/solution to**
 - ◆ reduce the costs
 - ◆ make the long tail access possible and convenient for all

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- Short Market Analysis and Opportunities
- **General State of the Art**
- Needs and Limitations
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- AXMEDIS Content Protection and Tracking
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- AXMEDIS Application Scenarios
- Conclusions and references

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Traditional value chain Issues, state of the art

- **The protection is performed just before distribution**
 - ◆ By the distributor or
 - ◆ By a specialized third party company as a service
- **The B2B areas are (production, integration, etc.):**
 - ◆ Considered trusted
 - ◆ Based on paper contracts
 - ◆ Contracts are produced on the basis of a limited and not standard terminology, so that they are not easy interpreted and transported on other media, or channels, etc.
- **Producers and integrators have no control about what is done on the content in the last phase of distribution:**
 - ◆ authors and producers cannot verify, they may ask
 - ◆ integrators cannot verify, they may ask at the business partners
 - ◆ Etc.
- **The distributors:**
 - ◆ control the selling of content, mainly with conditional access systems
 - ◆ do not control/verify the exploitation of each single rights





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Terminology

The diagram illustrates the flow from an artist (with a palette and violin) to a central cloud labeled 'Work'. From this cloud, arrows point to various 'Manifestations': a stack of books, a banknote, musical notes, a sheet of music, and a landscape picture. Further arrows from these manifestations point to 'Resources', represented by a folder icon.

- The artist creates a Work
- The work may be used to produce several manifestations
- The manifestations may become digital files in several formats

Manifestations

Resources





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Some Actors of the value chain, “definitions”

- **Right/Content Owners, B2B, artists, etc.**
 - ◆ who has the rights on the initial work, non digital
- **Content Producers, B2B, Publishers**
 - ◆ Who is producing the manifestations of the work, define its rights, may produce the digital resources or not, etc.
- **Content Integrators, aggregators, B2B**
 - ◆ Who is Integrating/aggregating: resources + metadata ++ , added value, etc., may be adding other rights, etc.
- **Content Distributors, B2B, B2C**
 - ◆ Who is distributing digital content
- **Final Users, C2C (P2P)**
 - ◆ Who is using (or should use) the digital content on behalf of the rights obtained
- **Users, in general**
 - ◆ All the above actors that use in some way content on the basis of the rights obtained





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Rights Management and the digital world

- **DRM: Digital Rights Management**
 - ◆ general terms many times abused
- **Management of Digital Rights**
 - ◆ Limited to the management of rights of digital content ?
- **Digital Management of Rights**
 - ◆ More correct and reasonable
 - ◆ Management of both rights for original *works* and related *manifestations*, digital *resources*, etc.
 - ◆ in many solutions DRM is not intended in this way





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Digital Rights Management

- **DRM: Digital Rights Management is**
 - ◆ A set of technologies and solutions to cope with Digital Management of Rights

- **1st generation of DRM cover:**
 - ◆ security and encryption
 - ◆ prevent non authorized copying
 - ◆ mainly Conditional Access System, CAS

- **2nd generation of DRM cover:**
 - ◆ description, identification, trading, protection,
 - ◆ monitoring, and tracking of all forms of rights usages over contents, including management of rights holders relationships





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Aim of Digital Rights Management

- **To prevent the non-authorized rights exploitation by who has not acquired the rights**
- **To allow accessing at the digital content functionalities in a controlled manner**
 - ◆ To who has been **authenticated/certified**
 - ◆ To do what (are the rights) is defined in a **License**
 - ◆ **Verifying/Control/Supervise** if the above conditions and others are respected
 - ◆ By using technologies to **protect content** (e.g., encryption, fingerprint, watermark, etc.)
- **To *Verifying/Control* if the allowed rights are respected**

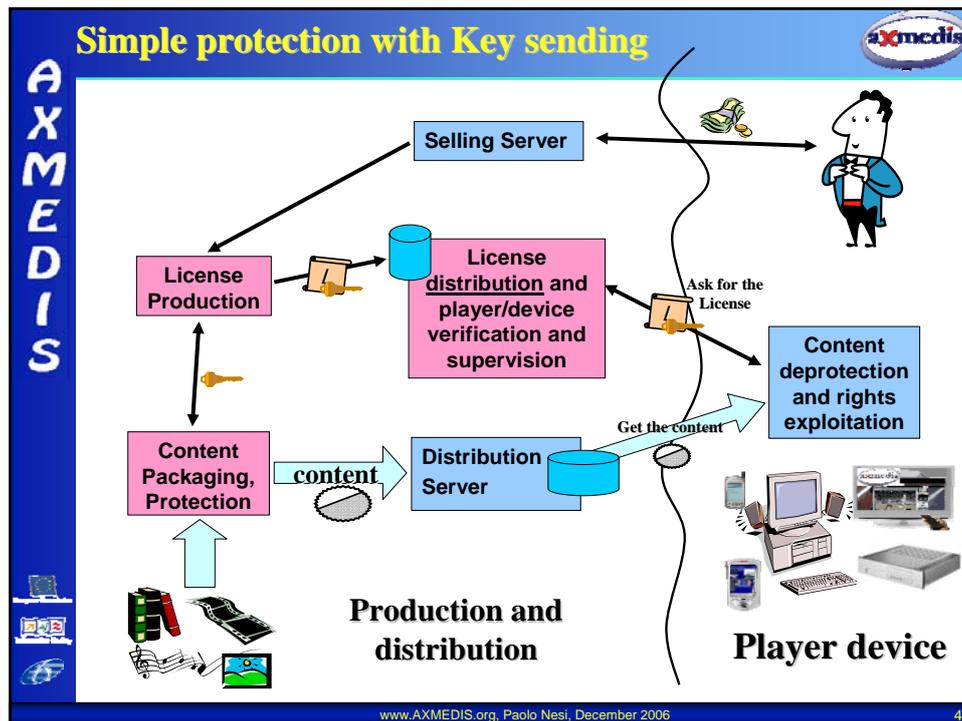
- **There are some Cons, since the user is constrained:**
 - ◆ Registration of users
 - ◆ Authentication of users and/or tools/terminal/devices
 - ◆ Control of users
- ***It has to be supported by a set of additional technical solutions***





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- ### How is DRM Secure?, behind the security
- **Encryption**
 - ◆ DRM may use strong encryption (# bits) never been cracked
 - **Digital signatures**
 - ◆ content header is digitally signed to prevent tampering
 - ◆ License is digitally signed, etc.
 - **Separate management of licenses from content**
 - ◆ Licenses can be processed in License Server and cached when needed.
 - ◆ content can be widely and securely distributed, P2P allowed
 - **Revocation of Licenses, Objects, Devices, etc.**
 - ◆ of license, of authorization, etc.
 - ◆ ways to prevent players from exploiting content when corrupted
 - **Authentication and certification of users and devices**
 - ◆ To prevent compromised player or non trusting users to receive or distribute other content,
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Technologies and standards

- **Technologies for content protection**
 - ◆ Microsoft Windows Media, DRM
 - ◆ Apple I-Tune
 - ◆ Media Commerce Suite of Real Network
 - ◆ EMMS of IBM
 - ◆ Liquid Audio
 - ◆ DMD secure
 - ◆ Sealed Media
 - ◆ Intertrust
 - ◆ Adobe
 - ◆ And also the Conditional Access Systems
- **Standards on DRM**
 - ◆ OMA, Open Mobile Association
 - ◆ MPEG-21, DI, DID, IPMP, REL, etc.
 - ◆ XrML, Content Guard, related to MPEG-21



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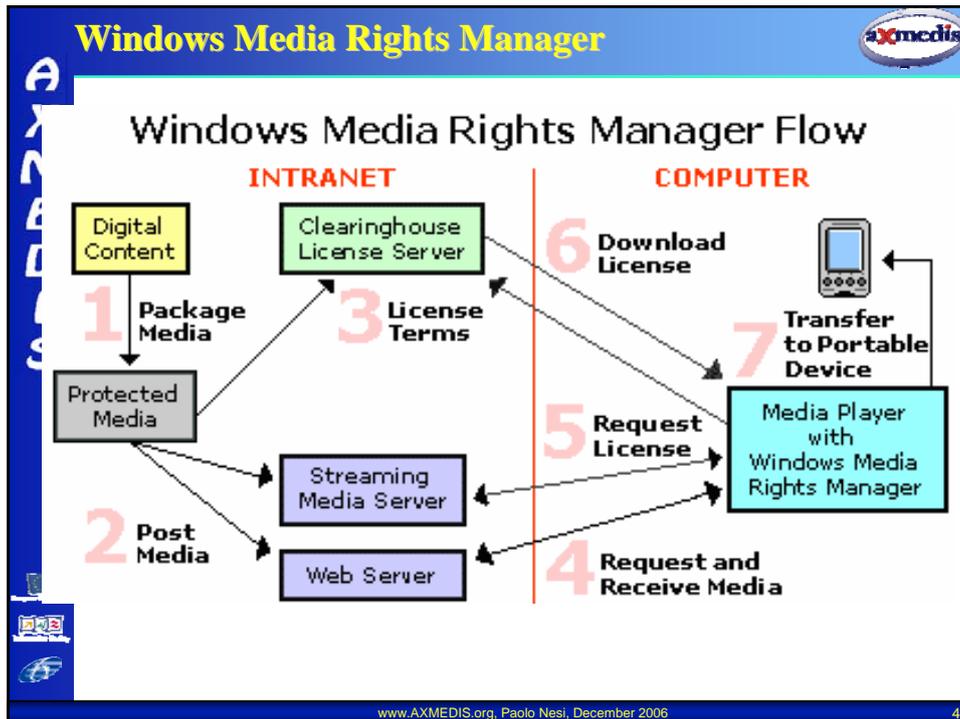
Major Related Organizations

- **Standardisation Bodies for elements**
 - ◆ MPEG-2, MPEG (Motion Picture Expert Group)
 - ◆ OMA (Open Mobile Alliance)
 - ◆ MI3P (ID and licensing aspects)
 - ◆ OASIS (Organization for advancement in Structured Information Standards)
 - ◆ TV-AnyTime (DVB....)
- **Associations/organization:**
 - ◆ OeB (Open eBook Forum)
 - ◆ CRF (Content Reference Forum)
 - ◆ WIPO (World Intellectual Property Organization)
 - ◆ RIAA (Recording Industry Association of America)
 - ◆ WS-I (Web Services Interoperability Organization)
 - ◆ ISMA (Internet Streaming Media Alliance)
 - ◆ CC (Creative Commons)
 - ◆ Etc.
- **Projects on Architecture and Value chain solutions**
 - ◆ AXMEDIS Project, research and development project, large consortium
 - ◆ Dream of SUN
 - ◆ DMP (Digital Media Project)
 - ◆ Etc.



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- ### Windows Media DRM?
- **Pay per view**
 - ◆ Play count
 - **Rental**
 - ◆ Expiration after first use
Useful for different time zones
 - ◆ Expiration on store
Useful for different time zones
 - ◆ Begin & expiration dates
 - **Subscription**
 - ◆ Begin & expiration dates
 - **Controlled distribution of media assets**
 - ◆ Can include any of the above
- ◆ Allow Backup Restore
 - ◆ Allow Burn To CD
 - ◆ Allow Play On PC
 - ◆ Allow Transfer To Non SDMI
 - ◆ Allow Transfer To SDMI
 - ◆ Begin Date
 - ◆ Burn To CD Count
 - ◆ Delete On Clock Roll back
 - ◆ Disable On Clock Rollback
 - ◆ Exclude Application
 - ◆ Expiration After First Use
 - ◆ Expiration Date
 - ◆ Expiration On Store
 - ◆ Minimum App Security
 - ◆ Minimum Client SDK Security
 - ◆ Play Count
 - ◆ PM App Security
 - ◆ PM Expiration Date
 - ◆ PM Rights
 - ◆ Transfer Count
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Microsoft Windows Media Rights Manager License

- **content owner sets rights to determine which actions are allowed from minimal control over playback to more restrictive licenses.**

- **license contains the**
 - ◆ key to unlock the Windows Media file.
 - ◆ rights, or rules, that govern the use of the digital media file.
 - ◆ (model based on Augmented License)

- **licenses can support different business rules, including:**
 - ◆ How many times can a file be played.
 - ◆ Which devices a file can be played or transferred on. For example, rights can specify if consumers can transfer the file to portable devices that are compliant with the Secure Digital Music Initiative (SDMI).
 - ◆ When the user can start playing the file and what is the expiration date.
 - ◆ If the file can be transferred to a CD recorder (burner).
 - ◆ If the user can back up and restore the license.
 - ◆ What security level is required on the client to play the Windows Media file.
 - ◆ And many others.





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Microsoft License delivering

- **Licenses can be delivered in different ways and at different times, depending on the business model**
 - ◆ Can be delivered before or after the content
 - ◆ Both possible if downloading
 - ◆ Only the first is reasonable in the case of streaming

- **Licenses can be delivered with or without the consumer being aware of the process using silent or non-silent license delivery.**





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i-Tunes of Apple, iTMS, I-Tunes Music Store

- AAC 128 Kbit, comparable with 160Kbit MP3
- 70 Millions of Files in the first year of work
- > 500.000 traces
- Very easy
- No subscription costs
- Pay per download (0.99\$ per file, 9.99\$ per collection)
- Tools: download, player, burning, play lists, etc.
- DRM proprietary, "FairPlay", cracked in April 2004
- Continue to work even if cracked





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I-Tune and DRM limits

- **Transfer of a trace to at most**
 - ◆ 7 CDs, burning
 - ◆ 3 authorized computers
- **Authorized transfer on a non limited number of i-POD**
 - ◆ Market and money on iPods
- **Content is bought forever**
- **Authorized transfer on any computer but they can be played only on those that are authorized**





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Concept of Super Distribution

- **What is intended as superdistribution ??**
 - ◆ A distribution in which the users collaborate to the distribution, such as in the P2P environments
 - ◆ A solution in which the content is separate from the license, such as in the models that will be discussed later:
 - Open Model
 - Augmented License
 - ◆ *A Solution in which some Certifier and Supervisors and/or the final user devices are capable of detecting violations thus activating some recovering activity*

- **Largely Supported and enhanced by AXMEDIS**




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Windows Media viz AXMEDIS



<ul style="list-style-type: none"> ● Limited number of BMs ● ProtMod limited to Key ● Content and license ● Signed Content Header ● Single channel ● Proprietary License <ul style="list-style-type: none"> ◆ Limited dictionary ◆ Limited number of rights ● Authentication of Player (device plus user) ● Revocation per Player ● Revocation per license ● Only digital resources that can be included into Widows Media ● Non B2B DRM 	<ul style="list-style-type: none"> ● Larger number of BMs ● Any Protection Model ● Content and license ● Signed Content AXINFO ● Multichannel ● MPEG-21 REL license <ul style="list-style-type: none"> ◆ Expandable dictionary ◆ Any type of rights ● Authentication of device, user, etc. ● Revocation per device, user, etc. ● Revocation per license ● Any digital format, of any type ● Allowed B2B DRM
--	---




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Limitations of Present DRM solutions

- **DRM is typically added only in the Integration or distribution phases**
 - ◆ **DRM is seen mainly for B2C**
 - Added by distributors
 - Owners demand to producers
 - Producers demand to integrators or distributors
 - Some Distributors demand to carriers
 - ◆ **DRM is tuned for a specific distribution channel and media**
 - Windows Media DRM for PC/internet, etc.
 - OMA DRM for Mobile
 - Etc.
 - ◆ **No convergence**
 - no interoperability of content
 - No possibility of assigning a License to a Domain
 - Partially solved producing content in several formats for several channels and terminals, very complex and expensive
 - ◆ **Large Limitations for the final users**
 - ◆ **Limitations for the business and markets**

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User's Trends

- **Users are gradually abandoning the traditional TV**
- **We can see that they**
 - ◆ Spend more time on PC/games console
 - ◆ Spend more money and time on i-TV
 - Cultural programme
 - Characters
 - Thematic information
 - ◆ Are more attracted by new content models and usages
 - ◆ Are more attracted by new devices,
 - ◆ Are interested in personal content publishing and sharing
 - YouTube, Video Google, etc.,
 - ◆ Are interested in Personal TV, personal realities,
 - ◆ Are more interested in individuality and personal needs,
 - ◆ etc.

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The Media Usage at home

Source EITO2005

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The market is moving

- **From few content of high value to many of lower value, the log tail is become fatter and more relevant**
 - ◆ From few actors to many
 - ◆ From professional production to personal production
 - ◆ From high costs of production to more sustainable lower costs
 - ◆ From high prices to more sustainable lower prices
 - ◆ From ring-tones to audio tracks and from them to videos, TV
 - ◆ From single channel to multichannel, the convergence
 - ◆ From proprietary to standard, interoperable solutions
 - ◆ From illegal to legal to P2P, flat rate
 - ◆ From DRM for B2C to DRM for B2B2C, etc.
 - ◆ From entertainment to edutainment, infotainment
 - ◆ From paying to accept various forms of advertising
 - ◆
- The digital content is not only entertainment but also: e-learning, e-culture, e-banking, e-government, e-health, e-personal content, etc.

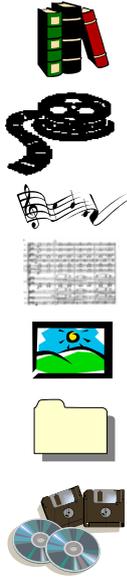
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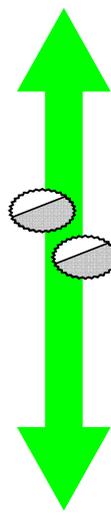


Convergence, the Interoperable Content



- Internet Distributor
- Internet Distributor
- Mobile Distributor
- Broadcasters, DVB-H
- Media Distributor
- Broadcasters, DVB-T
- Broadcasters, DVB-S
- Kiosks distribution





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Present Needs for Accessing New Markets

- **Reduction of costs to access at the Fatter "Tail"**
- **Needs of Interoperable Content that may Migrate from**
 - ◆ one terminal/device to another
 - ◆ one user to another
 - ◆ one channel to another
 - ◆ Licenses assigned to users, devices or domains
 - ◆ etc.
- **Transcoding/Adaptation problems**
 - ◆ Content is packaged
 - ◆ Content is protected, adaptation of protected content is needed
 - ◆ Content contains several types of information: digital resources, metadata, glue, etc.
 - ◆ On the servers and/or on the client terminals
- **DRM Architecture has to support Migration and Adaptation**
 - ◆ see in the following

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Business Rules, a way to formalize allowed rights

- **Exploitation Models (contracts from the consumers to the provider are aligned to the exploitation model):**
 - ◆ Subscription to a collection or service
 - ◆ All you can eat
 - ◆ Pay per renting
 - ◆ Pay per use, pay per play, pay per print, etc.
 - ◆ Pay per stream, per download, etc...
 - ◆ Pay per minute all you can eat
 - ◆ Pay per burning the CD
 - ◆ Pay per copy the object
 - ◆ Pay per moving the object
 - ◆ Pay per passing the object to a different device
 - ◆ Pay per building a collection
 - ◆ Preview without paying
 - ◆ Try and buy
- **Etc.**

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B2B Rights Management

- **Advantages of B2B DRM**
 - ◆ Automation of contract-based deals
 - ◆ Assessing the Usage in the B2B
 - ◆ Reducing costs of B2B promotion
 - ◆ Allowing integration and composition of protected content
 - ◆ Allowing content production on demand, no contracts signatures, immediate DRM processing
 - ◆ Try and buy, try and use for business
 - ◆ Free try for Business users
 - ◆ Increasing the control, decreasing the risk

- **P2P distribution**
 - ◆ sharing of content
 - ◆ lower costs to access content
 - ◆ Lower costs to promote/distribute content
 - ◆ Increment of accessible content



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Summary of Major Needs

- **Convergence of content distribution and usage**
 - ◆ Multichannel solution
 - ◆ create/buy one to use on many devices
 - ◆ Interoperable Content and Devices
 - ◆ Interoperable DRM, Licenses

- **Content management in the home**
 - ◆ the domain management
 - ◆ Interoperability of content in the home, interoperability of the devices, the Home Media Server
 - ◆ Multimedia Middleware among devices
 - ◆ Integration with domotic applications and tools





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Summary of Major Challenges

- **Reduction of production, protection and distribution costs**
- **Content production/protection on demand**
- **Automating the B2B area, DRM and distribution**
 - ◆ Production, protection and distribution phases
 - ◆ Expanding DRM to B2B
 - ◆ Reducing costs of B2B distribution
- **Real Time content Processing**
 - ◆ Reducing production and distribution costs
 - ◆ Flexible Content Distribution
 - ◆ Content production, protection, distribution on demand
 - ◆ Adaptation and transcoding
 - ◆ Accelerating B2B processing
- **Increasing security: rights usage and control on**
 - ◆ Harmonization of B2B and B2C
 - ◆ Increasing security and interoperability
 - ◆ Increasing control of rights exploitation
 - ◆ Allowing the set up of a large number of business models
- **Any other question/issue ??**





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 - ◆ Content Model and hierarchy
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AXMEDIS Content Elements

- **Content Packaging for protection and distribution**
 - ◆ Streaming (so called real-time) and/or downloading
 - ◆ Sharing on P2P, etc..
 - ◆ portable on physical supports, etc. (scalable)
 - ◆ binary and/or XML, etc.
- **Real Cross Media**
 - ◆ Multimedia hierarchies of digital resources such as models based on:
 - ➔ HTML, SMIL, SCORM/LOM, WEDELMUSIC, MPEG-4, etc.
 - ➔ With internal and external links and relationships: *for example one HTML page may be build by using several images and audio files.*
 - ◆ **Integration of docs, audio, video, images, via spatial rendering and synchronization, providing interactivity**
- **The Content Package in the hands of the final user to be used may need of the following information**
 - ◆ Metadata.....
 - ◆ Digital Resources.....
 - ◆ Protection Information.....
 - ◆ License.....

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AXMEDIS Metadata

- **Metadata:**
 - ◆ Identification of information,
 - ➔ unique ID (AXOID), UUID,
 - ➔ distributor ID, UUID,
 - ➔ other codes such as: ISRC, ISBN, etc.
 - ➔ Producer ID and Information, etc.
 - ➔ Author Information, etc.
 - ◆ Classification information also for indexing:
 - ➔ Dublin core, etc.
 - ◆ Descriptors: for indexing, MPEG-7, technical and conceptual, etc.
 - ◆ References to Owner, to Distributor, etc.
 - ◆ Fingerprint
 - ◆ Historical and versioning aspects
 - ◆ Etc.
- **Some of them are grouped in AXMEDIS format in the so called AXMEDIS Information, AXINFO**
- **One Metadata set for each resource or group, ITEM**



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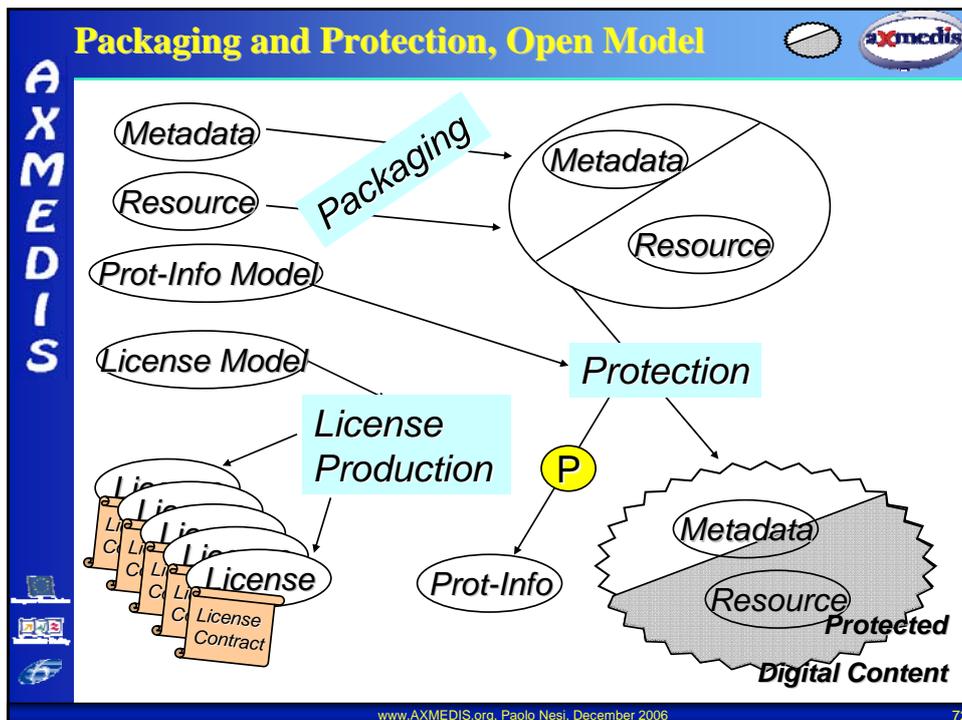
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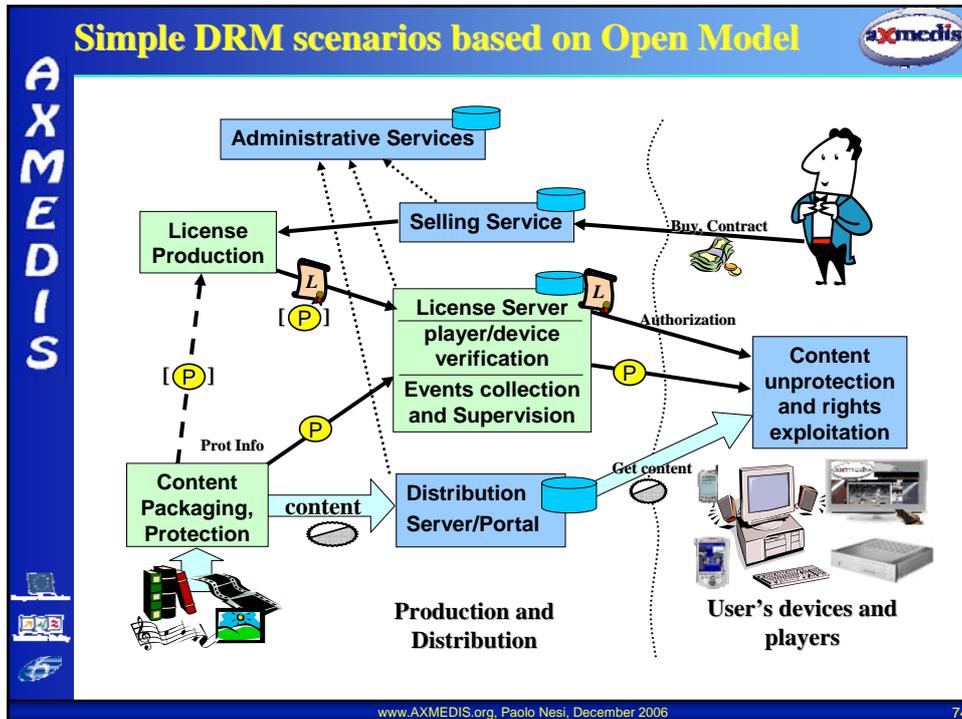
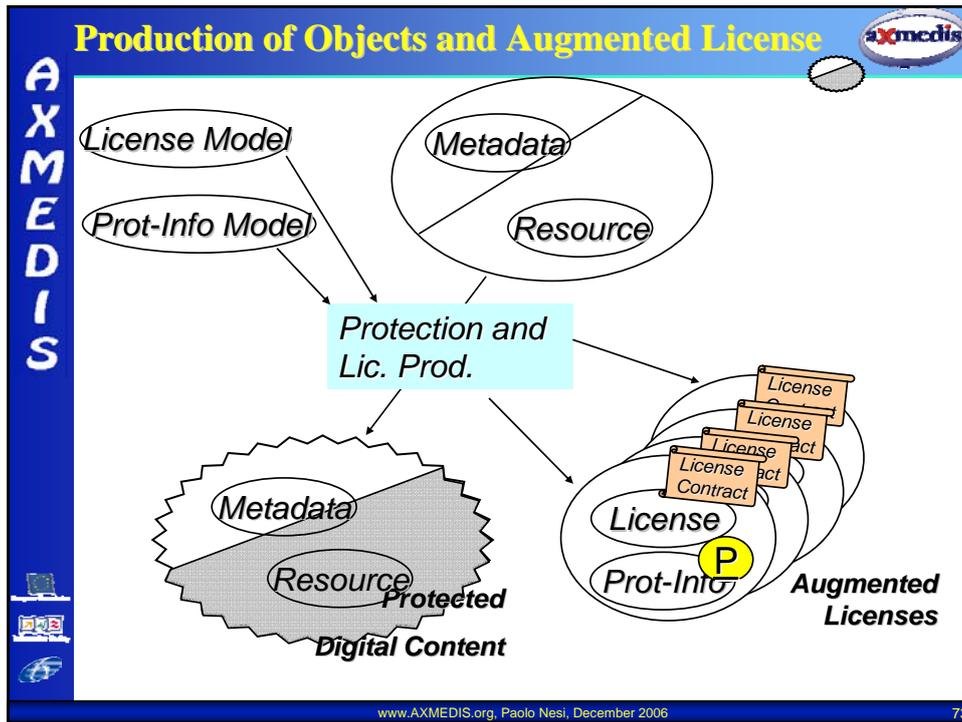
AXMEDIS Content Elements

- **Digital Resources:** Resource
 - ◆ Any digital information: images, docs, txt, video, game, application, xml files, audio, animation, etc.
 - ◆ Hierarchy of digital resources, nesting levels
 - ◆ Internal and external links: e.g., HTML navigation, SMIL references, MPEG-4 paths..
- **Protection Information:** Prot-Info Model → P
 - ◆ What has to be done to access (unprotect) a given information/resource
 - ◆ Protection Tools used, their parameters, etc.
- **License:** License Model → License Contract
 - ◆ Which rights are provided, who is the recipient, what are the conditions, etc.

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The Cross Media Content Model

- **AXMEDIS Cross media content model**
 - ◆ Model supporting B2B-B2C content production and transactions, for protected and non protected objects
 - ◆ Overcoming limitations in content modeling and DRM of Windows Media, I-Tune, Adobe, Google, etc.:
 - ➔ Any kind of digital resource, more than different 300 file types
 - ➔ Cross media: images, documents, video, audio, HTML, SMIL, MPEG-4, etc.;
 - ➔ Content components: composition and reuse;
 - ➔ DRM Chain of licenses: B2B and B2C integration;
 - ➔ Integration of semantics and behavior into the content.
 - ➔ Absolute flexibility in metadata usage and addition, descriptors, etc.
 - ◆ Based and extending MPEG-21 ISO standard
 - ◆ Supporting legal P2P for both B2B and B2C applications
- **DRM, Digital Rights Management**
 - ◆ Modeling licenses for the B2B-B2C areas
 - ◆ Algorithms and tools for processing licenses, chains and relationships

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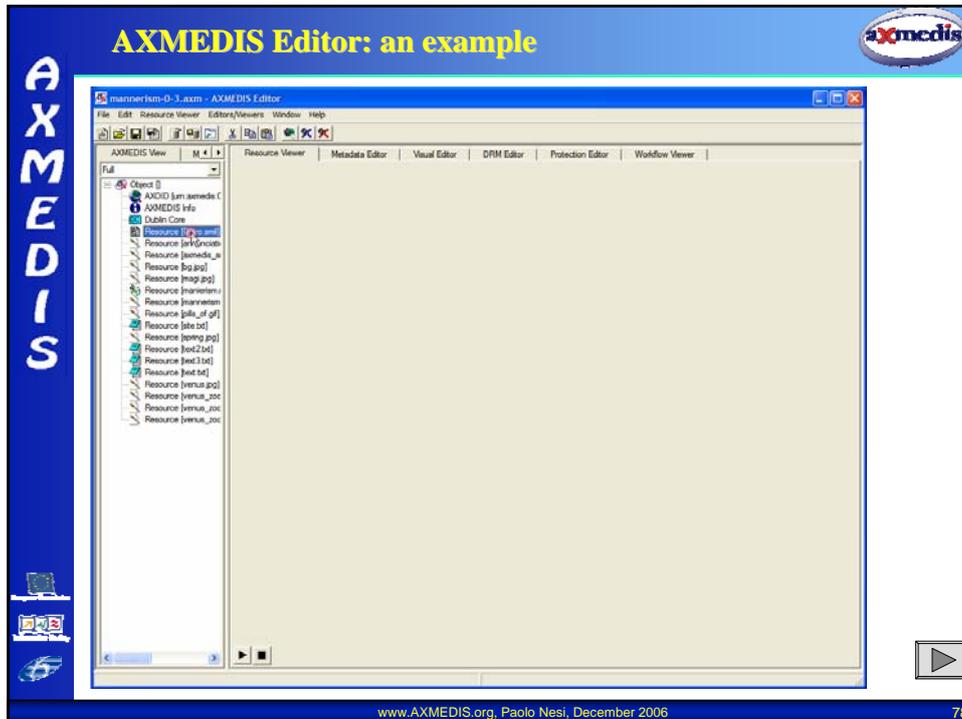
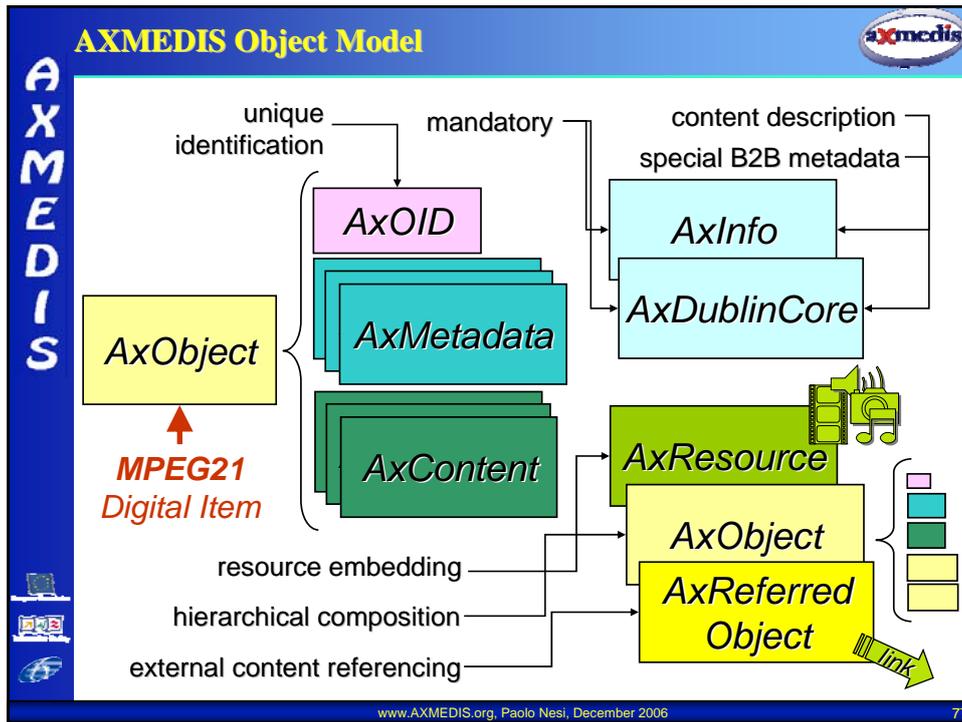
AXMEDIS hierarchical objects

Nesting levels of Objects

References to external Objects

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AXMEDIS Considerations

- **AXMEDIS mainly adopt the Open Model, any other model can used for your distribution channel according to your needs and business**
- **AXMEDIS supports your:**
 - ◆ Content Production:
 - New forms of protected content, CROSS MEDIA
 - ◆ Automated content production with GRID processing for
 - production, protection and distribution, for transcoding and on-demand, for licensing, directly your CMSs
 - Accessing/managing data flow with any databases
 - ◆ Content Distribution
 - Multichannel, cross media content
 - reducing your costs for setting up, production and distribution
 - B2B/B2C distribution with P2P and DRM
 - ◆ Content protection and DRM
 - Many many new business models
 - Interoperable MPEG-21 ↔ OMA licenses
 - ◆ Integration with Workflow
 - ◆ Content supervision and control with AXMEDIS DRM tools
 - ◆
- **Any other question/issue ?**





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 - ◆ Protection Technologies
 - ◆ License Models and Processing
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AXMEDIS Digital Rights Management

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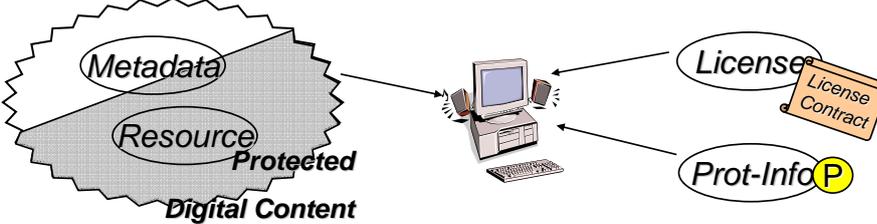
- **To allow accessing at the digital content functionalities in a controlled manner**
 - ◆ To who has been registered the first time and continuously: **authenticated and certified**
 - ◆ To do what is defined in a **license** (to allow exploiting the rights)
 - ◆ By using technologies to **protect content** (e.g., encryption, fingerprint, watermark, etc.)
 - ◆ **Verifying/Control/Supervise** if the above conditions and others are respected

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Managing License and Protection Information

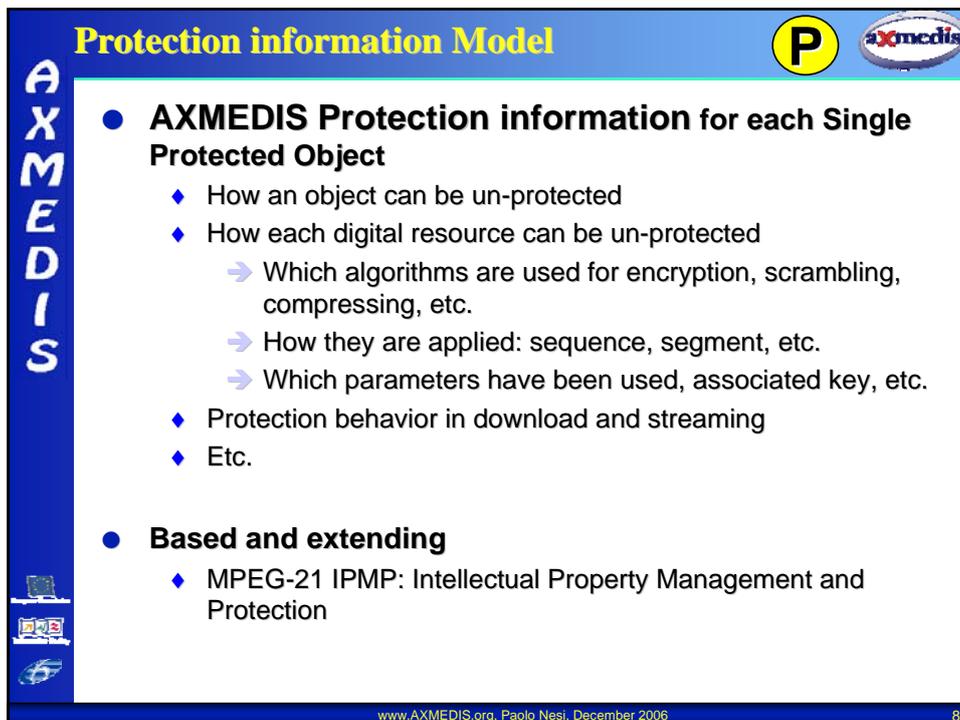
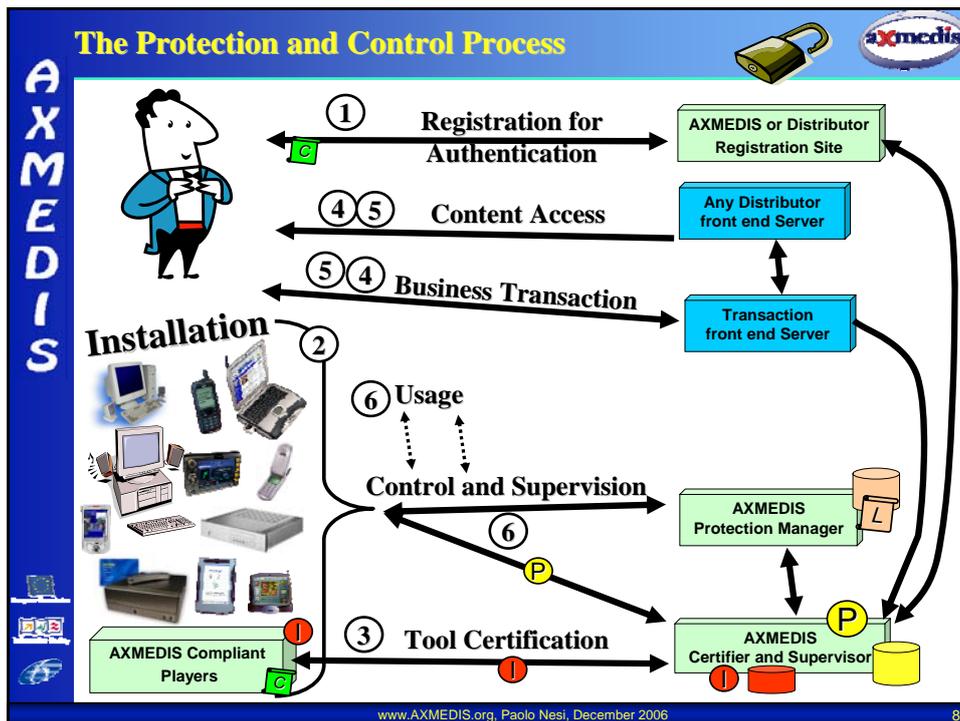
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- **Once obtained the content a license is needed to exploit the right you have acquired,**
 - ◆ or at least you need a server that verify that you are authorized to exploit some right and provide you the Authorization
- **Once you are Authorized to exploit the rights you may get a reference to**
 - ◆ the Protection Information to Unprotect the specific object segment and/or digital resources
- **License and Protection Information are typically located in external and remotely located Servers**
 - ◆ but may be cached on the terminal device if allowed by the license issuer
- **During all these phases the AXMEDIS Certifier and Supervisor verify integrity and certificate**

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License Definition and Processing




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- **License:**
 - ◆ digital version of the contract
 - ◆ contains the list of acquired rights
 - ◆ may be signed by clicking
 - ◆ supported by a way to demonstrate its authenticity
 - ◆ can be stored in the digital object or not
 - If not, may in the terminal or remotely located
 - ◆ may refer to other licenses, creating a chain of licenses for the evaluation of each given grant associated to a right
 - ◆ formalized in some language
 - Refer to some dictionary for terms that define the semantics of the expressions of the language
 - ◆ may be revoked
 - ◆ Etc.





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AXMEDIS License formal language




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- **AXMEDIS License**
 - ◆ Derived from MPEG-21REL
 - ◆ Support for RDD: Rights Data Dictionary
- **MPEG-21 RELRights Expression Language**
 - ◆ Derived from XrML
- **XrML 2.0: eXtensible rights Markup Language**
 - ◆ At the basis of the MPEG-21 REL
 - ◆ ContentGuard, Nov. 2001, Microsoft
 - ◆ At the basis of the Windows Media
 - ◆ Derived from DPRL
- **OMA ODRL: Open Digital Rights Management**
 - ◆ Expression language for mobiles
 - ◆ Simpler than MPEG REL
 - ◆ Under certain restriction is compatible with AXMEDIS license
 - ◆ ..





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MPEG-21 REL data model

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graph TD
    right[right] -- issued to --> principal[principal]
    right -- associated with --> resource[resource]
    right -- subject to --> condition[condition]
            
```



- **REL grant consists of**
 - ◆ principal to whom grant is issued
 - ◆ rights the grant specifies
 - ◆ resource to which right in grant applies
 - ◆ condition to be met before grant can be exercised

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An example of statement

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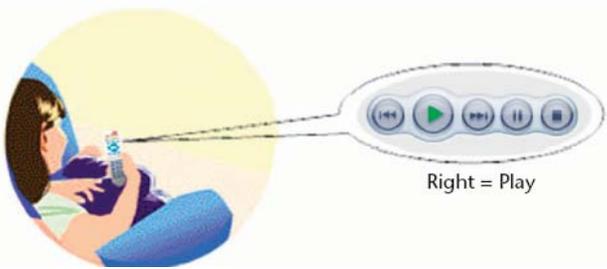


Condition = November 2003



Resource = Ocean Wilds





Right = Play

- Rosy can Play 3 times the Ocean Wilds in November 2003.

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Possible values for terms




- Principal
 - ◆ AllPrincipals and KeyHolder
- Rights
 - ◆ Issue, Obtain, PossesProperty and Revoke
- Resources
 - ◆ DigitalResource, Revocable and ServiceReference
- Conditions

<ul style="list-style-type: none"> ◆ AllConditions, ExerciseMechanism, ExistsRight, Fullfiler, PrerequisiteRight, RevocationFreshness, ValidityInterval ◆ CallForCondition ◆ ExerciseLimit ◆ FeeFlat ◆ FeeMetered ◆ FeePerInterval ◆ FeePerUse ◆ FeePerUsePrePay ◆ SeekApproval 	<ul style="list-style-type: none"> ◆ Territory ◆ TrackQuery ◆ TrackReport ◆ TransferControl ◆ ValidityIntervalFloating ◆ ValidityIntervalStartsNow ◆ ValidityTimeMetered ◆ ValidityTimePeriodic
--	---

- Examples of Rights
 - ◆ Adapt
 - ◆ Delete
 - ◆ Diminish
 - ◆ Embed
 - ◆ Enhance
 - ◆ Enlarge
 - ◆ Execute
 - ◆ Install
 - ◆ Modify
 - ◆ Move/Migrate
 - ◆ Play
 - ◆ Print
 - ◆ Reduce
 - ◆ Uninstall
 - ◆ Burn
 - ◆

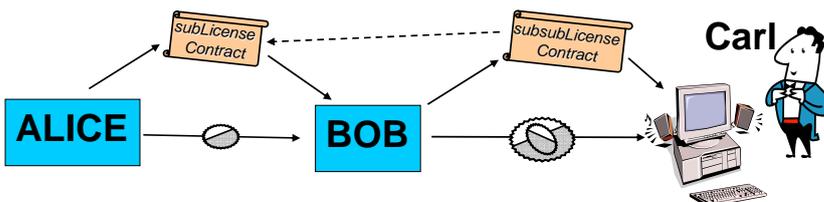
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Managing License Chain

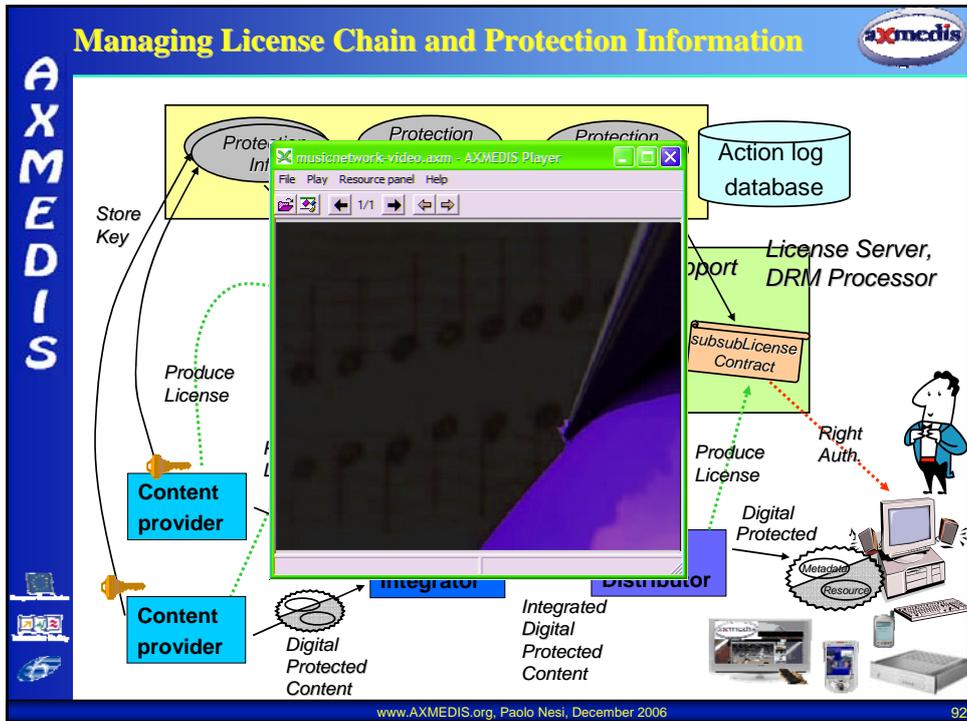
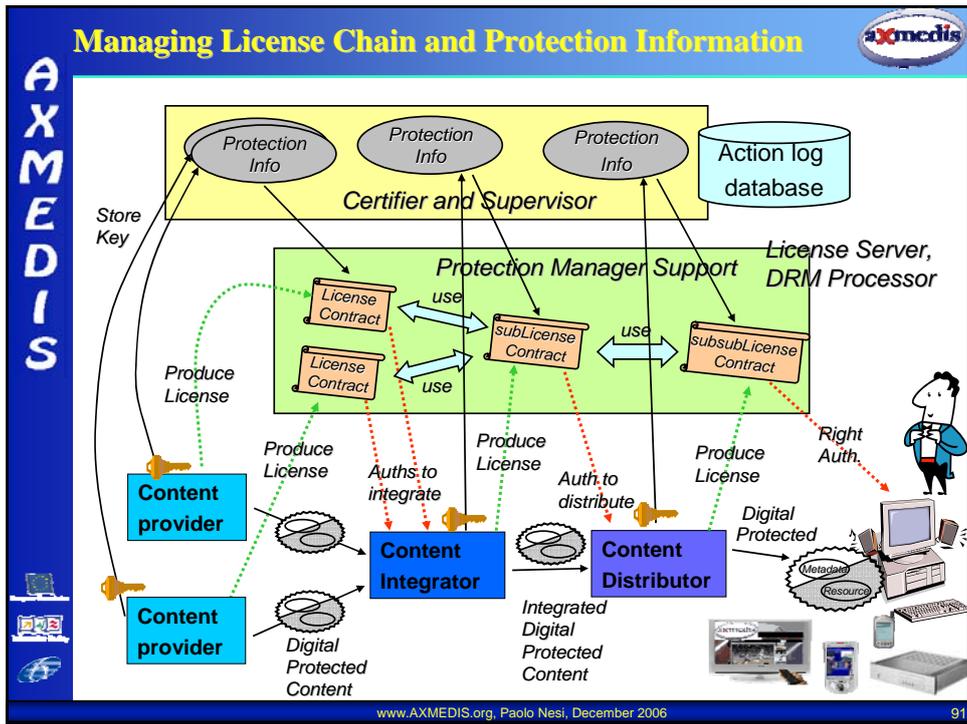


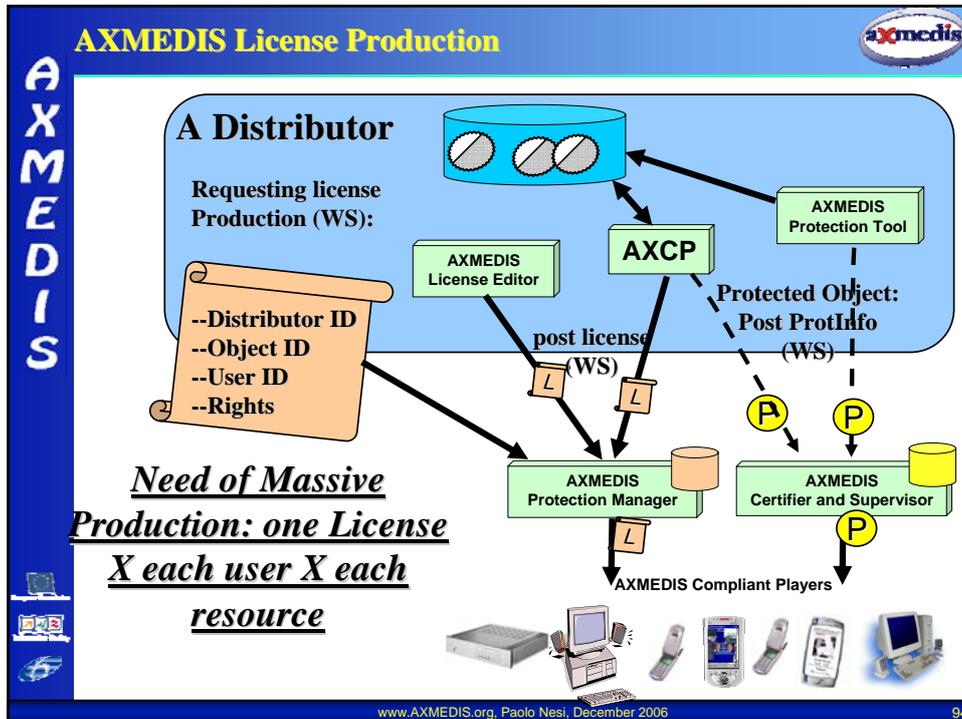
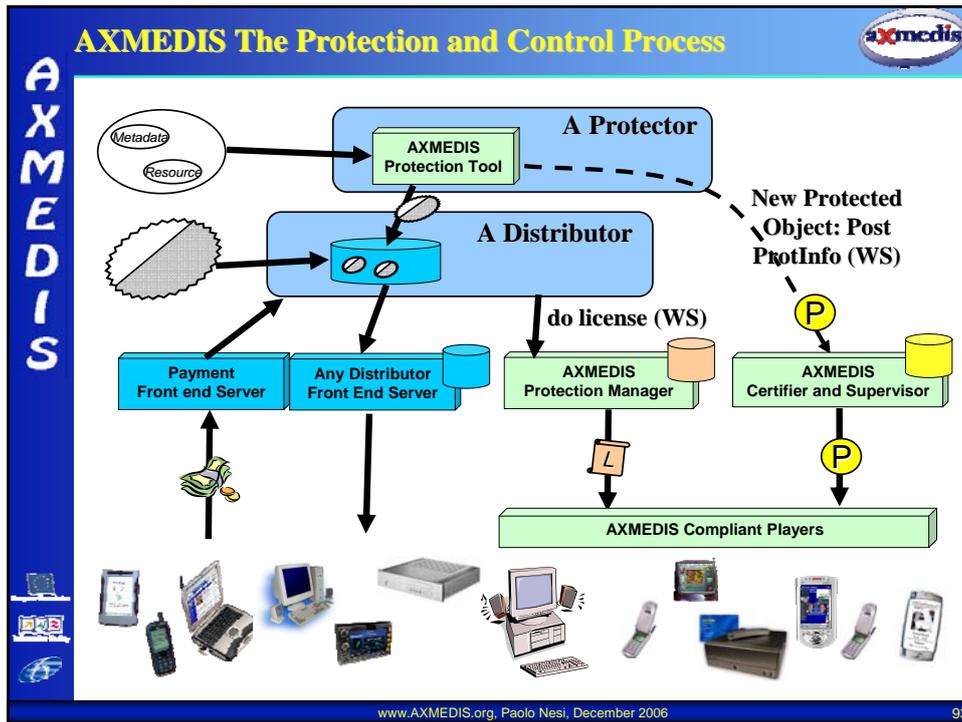


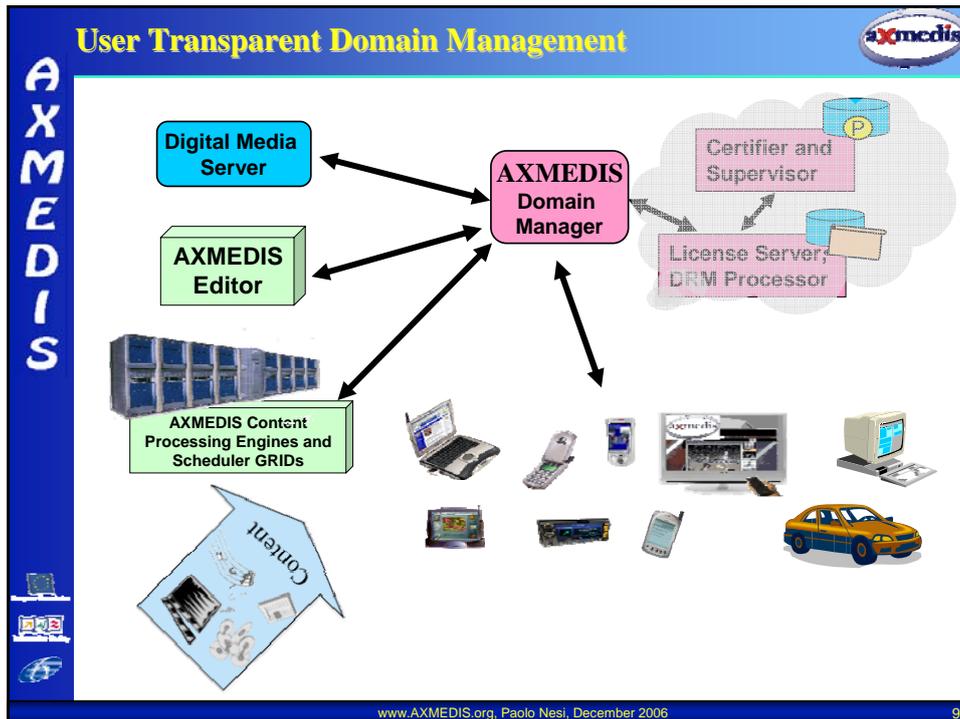
- **Alice states** "Bob has the right to issue a license to anyone to print the book in Italy"
- **Bob states** "Carl has the right to print the book in Italy"
- To solve the SubSubLicense for Carl all the connected Licenses are needed
- Licenses have to be accessible on Processing Engine

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AXMEDIS Consideration

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- **AXMEDIS License:**
 - ◆ Formalized in MPEG-21 REL
 - ◆ Can be used for formalising both B2B and B2C
 - ◆ Can be interoperable with OMA licenses
 - ◆ Can address single users, devices or domains
 - ◆ Can be produced
 - ➔ **Manually** with AXMEDIS DRM Editor
 - ➔ **Remotely** by using a WEB service
 - ➔ **Massively and remotely** by using AXMEDIS content processing tools
 - ◆ Processed in the chain of licenses
 - ➔ by the AXMEDIS Protection Manager Support as License Server/DRM Processor
 - ◆ Can be included into AXMEDIS objects or can be provided independently
 - ◆ Can be cached or not on the client terminal
 - ◆ Can formalize a large set of business models
 - ◆ Etc.
- **Any other question/issue ??**

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AXMEDIS Control and Supervision

- Performed by the: AXCS and AXMEDIS PMS
- Continuously verify and certify the trusting level of the Tool/Device/Terminal and of the User
- Collect Action Logs (event logs) related to rights exploitation and thus to License usage
- Allow the implementation of black lists for Users, Tools, Devices/Terminals, Licenses

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Continuous Control and Supervision

- Continuously verify and certify the trusting level of the Tool/Device/Terminal and of the User
 - ◆ Verification of certificates
 - ◆ Verification of terminal consistency and trusting level
 - ◆ Detecting infringement and violations
 - ◆ Recovering of critical situations
 - ◆ Taking decision on the movement of User, Tools, etc. into the black list to revoked authorizations

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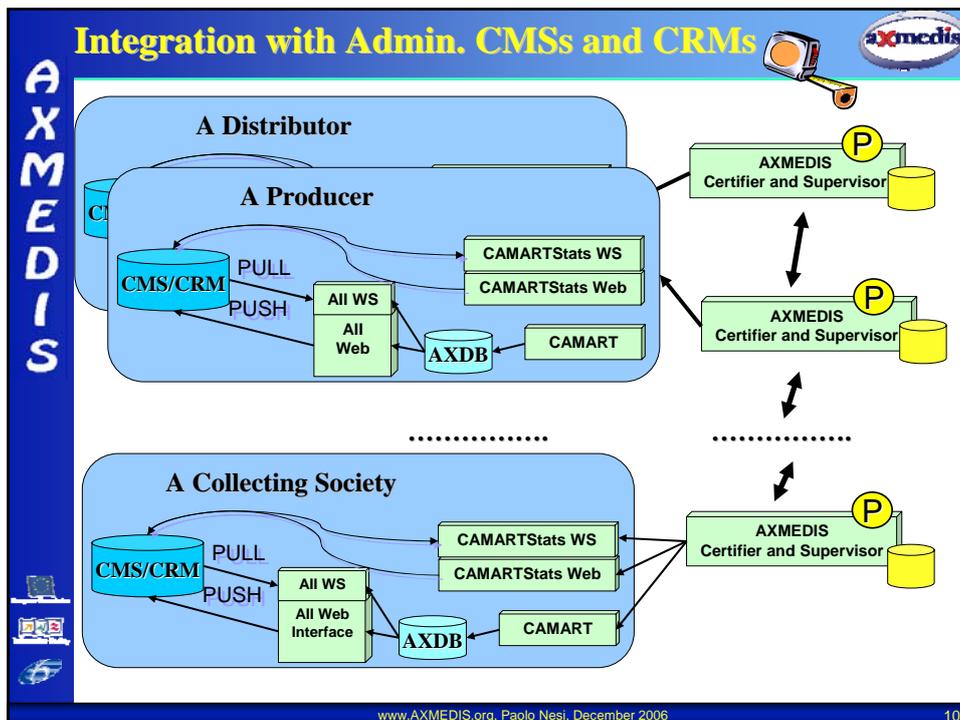
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List of Events/Actions on rights Exploitation

- **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...
- **Extending MPEG-21 Event Reporting**
 - Specifies how to express ER-Request and Event Report and how they are represented as digital item

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Reporting, accounting manager and tool, examples




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- **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 or 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 Distributor-ID for each of them, in a certain Geographic Region or State

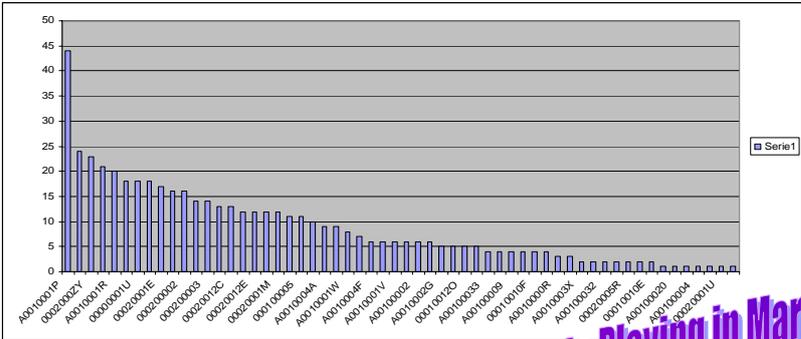
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Event reporting




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- **Single traces, events, etc.**
- **Statistical data for reporting and analysis**



Distribution of exploited objects Playing in March

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Black Lists Management






- **AXMEDIS Certifier and Supervisor and PMS may manage black lists of:**
 - ◆ Users, AXUID
 - ◆ Licenses, AXLID
 - ◆ Objects, AXOID
 - ◆ Devices, AXTID
 - ◆ Distributors, AXDID
 - ◆ Etc.
- **The distinction from Users and Devices is strongly needed to preserve the distinction from the several channels**
- **This allows to define precise and fine policies for managing critical conditions that may occur.**

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AXMEDIS Considerations






- **AXMEDIS DRM integrated solution:**
 - ◆ Allows usage of DRM on new object types such as Cross Media content: SMIL, HTML, etc.
 - ◆ Allows the control on multichannel distribution
 - ◆ Support multiple business models in the same and on different channels
 - ◆ Support with a unified DRM both B2B and B2C areas
 - ◆ Continuously Controls user terminals
 - ◆ Collects Actions Logs of any kind of event
 - Allows to bring back easily the Action Log on your Administration
 - Provides the evidence of the exploited rights
 - Provides statistical data on the rights exploitation
 - ◆ Manages black lists of several Entities
 - Allows the definition of policies for putting user, device, license, objects, etc. into the black lists
 - ◆ Etc.
- **Any other question/issue ??**



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 - ◆ AXMEDIS players
 - ◆ Automated AXMEDIS Content Processing and Production
 - ◆ Multichannel Back-Office Management
 - ◆ Production of Content on Demand
 - ◆ Workflow integration
 - ◆ AXMEDIS Database Management
- AXMEDIS Application Scenarios
- Conclusions and references



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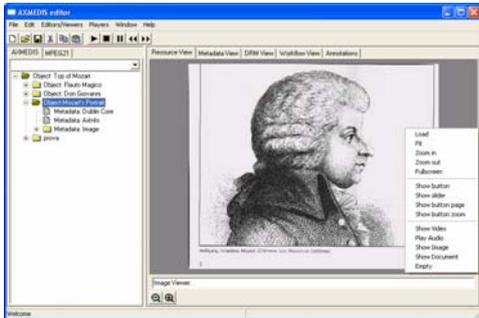
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AXMEDIS Authoring Editor

- **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....



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AXMEDIS Editor: HTML based example

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AXMEDIS Client Tools

- **AXMEDIS/MPEG-21 Model plus a set of players**
 - ◆ Audio and video players: almost any format
 - ◆ Document viewers: PDF, HTML, etc.
 - ◆ Image viewers: any format
 - ◆ Cross media: MPEG-4, SMIL player, HTML, etc...
 - ◆ Etc.

- **AXMEDIS Metadata support**
 - ◆ AXInfo, Dublin Core, etc.
 - ◆ Any descriptors, etc.

- **Possible integration AXMEDIS AXOM core module in any player**
 - ◆ The access to the AXMEDIS Framework allows you to create in short time your customized AXMEDIS compatible player in many platforms based on AXOM:
 - ➔ Windows
 - ➔ Linux
 - ➔ PDA, Windows Mobile 5
 - ➔ Etc.

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AXMEDIS players

- **PC players with full functionalities**
 - ◆ Stand Alone Player for Windows
 - ➔ Replaceable skins
 - ◆ Active X Player for Windows, for:
 - ➔ Integrating the player into Html pages
 - ➔ Microsoft Internet Explorer Browser
 - ➔ Macromedia tools Authorware
 - ➔ Realising customised AXMEDIS Players based on .NET
 - ◆ Plug in for Mozilla Internet Browser
 - ➔ Integrating the player into Html pages
 - ➔ Two different skins
- **PDA player:**
 - ◆ Mainly MPEG-4 player, later SMIL
- **STB player:**
 - ◆ two of them 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 Player: example of Dynamic Advertising

Resources:

- some images
- a video/film
- advertising video 1
- advertising video 2

Features:

- insertion of images and advertising without editing the video
- the advertising can be included and changed dynamically





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AXMEDIS Player with Skin: HTML example

The Skin can be customized by replacing some images and XML data.

▶

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AXMEDIS Player with Skin: oval skin example

Different Skin with respect to the previous, based on the same code

▶

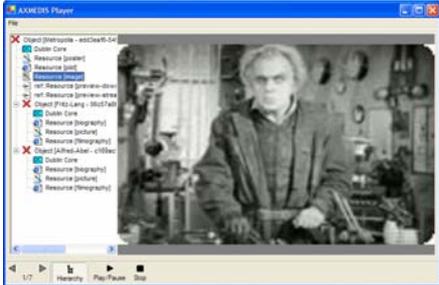
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AXMEDIS ActiveX

- **The AXMEDIS ActiveX allows**
 - ◆ the fruition of AXMEDIS Objects within other Windows applications and web pages, IE
- **It allows to:**
 - ◆ Show the resources inside the object
 - ◆ Control the execution of resources (play/pause/stop)
 - ◆ Hide/show the AXMEDIS Hierarchy

- **It has been used to produce many different PC Players**

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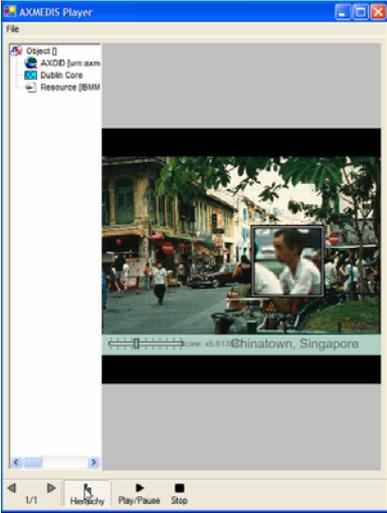
AXMEDIS Player .NET ActiveX: some examples

Based on AXOM

.NET usage of the AXMEDIS Active X

Example with MPEG-4 Content

..



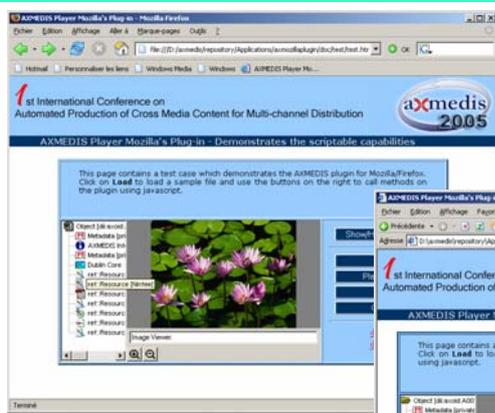
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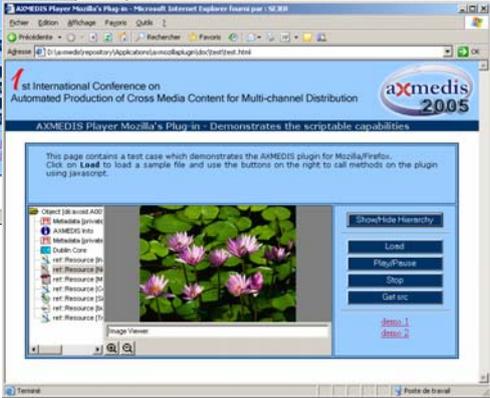
AXMEDIS Player Mozilla's plugin & ActiveX

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The same page can be displayed on Mozilla...



... and Internet Explorer

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AXMEDIS Player Mozilla's plugin

AXMEDIS





You may also simply add it into an HTML page to display protected content

You may use Javascript to dynamically control the properties of the player and to call its methods

Donec interdum ante ac justo. Nunc augue ipsum, ultrices sed, semper eu, suscipit malesuada, erat. Aenean vitae leo. Cras ut nisi eget augue volutpat dapibus. Aliquam ut urna. Aliquam ligula felis, dapibus quis, fermentum vel, bibendum nec, eros. Maecenas erat. Cum socios natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. In lacus. Fusce facilisis massa quis nisi. Ut tortor erat, commodo id, dapibus sit amet, semper quis, nunc. Fusce dapibus risus eu quam sollicitudin vestibulum. Sed varius laoreet purus. Nunc ut sapien ut dui elementum feugiat. Proin eleifend risus non sapien. Sed rhoncus augue eget mi. Etiam eget purus. Phasellus vel pede. Fusce et oro.

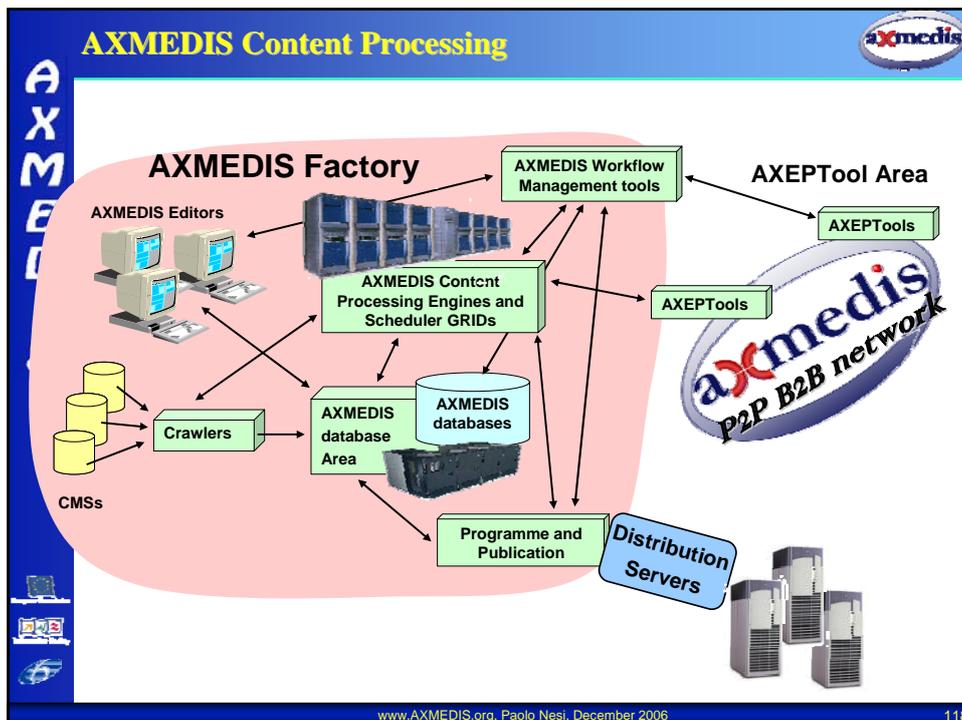
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AXMEDIS Player Mozilla's plugin: Educational player

Also in this case, it is possible to use different graphic designs based on the same code

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AXMEDIS Content Processing Applications

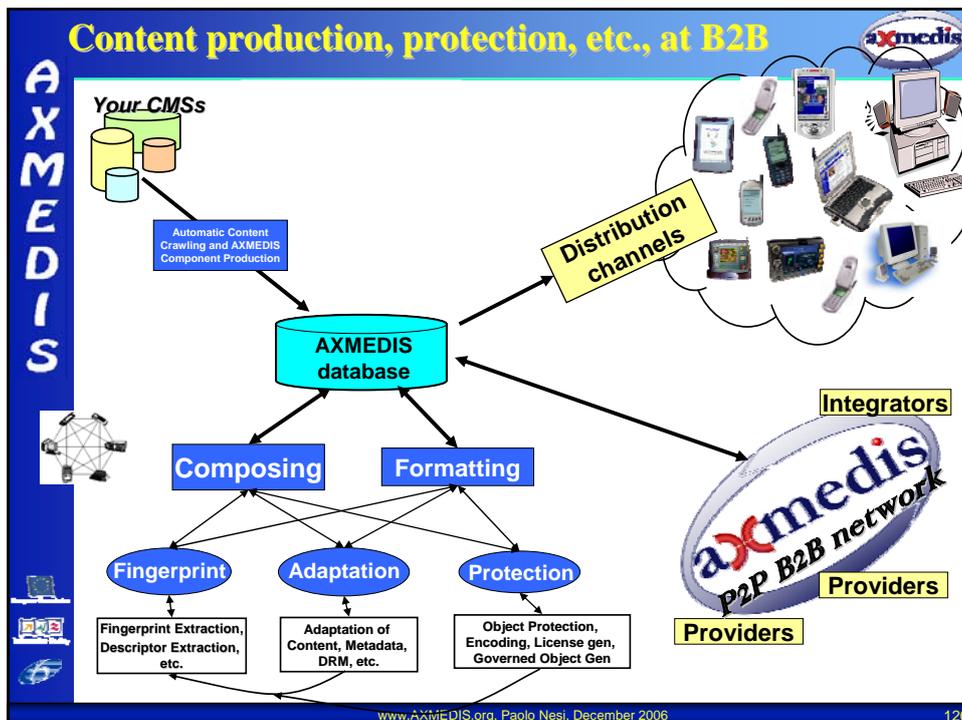
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- **Automating back office content production/protection and distribution**
 - ◆ Open and secure architecture for content production, processing, protection and enrichment, based on a scalable GRID model
 - ◆ Maximum flexibility with
 - ➔ AXMEDIS content processing GRID Language
 - ➔ Uses plugins for content adaptation/transcoding for multi-channel production, fingerprinting, processing profiles, etc.
 - ➔ Algorithms for automated formatting of content: SMIL, style, Genetic Algorithms
- **Automating massive processing applications**
 - ◆ For solving the on-demand problem:
 - ➔ Production
 - ➔ Adaptation, transcoding, processing,
 - ➔ Advertisement insertion
 - ➔ Managing profiling (user device, network, etc.), etc.
 - ◆ Multi-channel distribution:
 - ➔ multiple interoperable DRMs, license chain processing/reasoning
 - ◆ Content recognition for monitoring
 - ➔ broadcast and networks,
 - ➔ P2P, Web sites, etc.

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AXMEDIS Content Processing Capabilities

- **Automated Content Ingestion and Gathering**
- **Automated Content Query and Retrieval**
- **Automated Content Storage**
- **Automated Content Processing**
- **Automated Content Composition**
- **Automated Content Formatting**
- **Automated Content Protection**
- **Automated Content Licensing**
- **Automated Profile management and procesing**
- **Automated Data processing**
- **Automated Content Publication/Download (P2P)**
- **Automated Content Distribution**
- **Automated production of Content on Demand**

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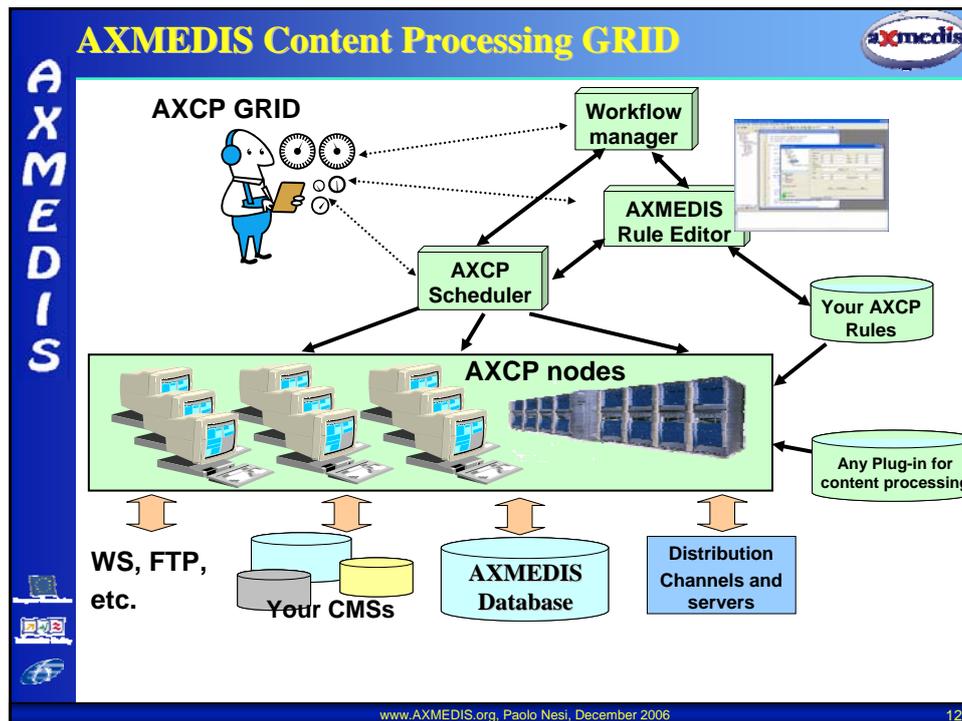


AXCP: Content Managing Capabilities

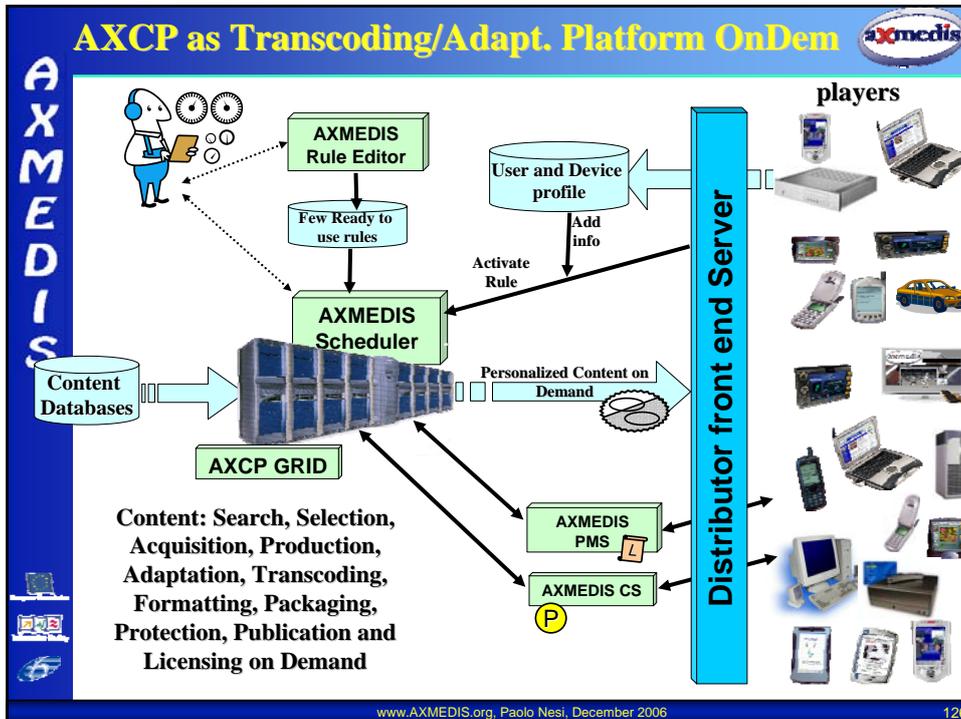
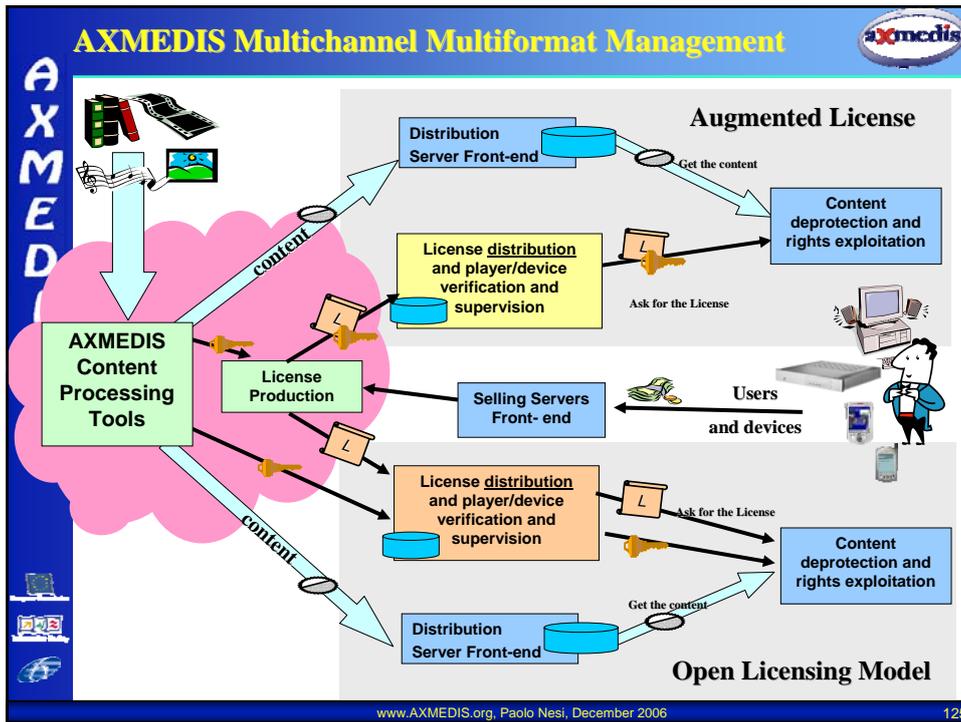
- **Access to several different resources:**
 - ◆ File Systems: Win, Linux, MAC, etc.
 - ◆ ODBC, JDBC, etc.
 - ◆ Native DB: DB2, Oracle, MS-SQL, MySQL, etc.
 - ◆ Protocols: IMAP, POP, Z39.50, etc.
 - ◆ XML databases
- **you can automate:**
 - ◆ Load and Save of AXMEDIS objects
 - ➔ From/by the AXEPTool, P2P B2B tools
 - ➔ From/by the AXMEDIS database
 - ➔ From/by other legacy CMS via Crawler and other means
 - ➔ From/by the file system and Local Area Network
 - ◆ Publication of results on distribution channels

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- ### AXMEDIS Content Processing capabilities
- ◆ **In AXCP Scripts you can manipulate, produce, adapt, extract, manage and process:**
 - ◆ Any type of resource in any format
 - AXMEDIS/MPEG-21 Objects, IMS, SCORM, OMA objects, and features
 - ◆ Digital resources in any format
 - ◆ Production of new objects: composition, etc.
 - ◆ Formatting, automatically producing/selecting: SMIL, XSLT, etc.
 - ◆ Digital resource adaptation, transcoding,
 - ◆ Extraction of descriptors and fingerprints
 - ◆ Synchronization of media, etc.
 - ◆ Metadata processing, adaptation, and mapping
 - ◆ production and posting of licenses/PAR in OMA and MPEG-21
 - ◆ Verification of Licenses against them and PAR
 - ◆ Protection Information, OMA and MPEG-21 IPMP
 - ◆ Profiling for devices and network capabilities,
 - ◆ Reasoning on device capabilities and user preferences
 - ◆ User Profile and preferences
 - ◆ Etc.
 - ◆ **Open to any other module with plug-in technology:**
 - ◆ Burning
 - ◆ Etc.
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AXMEDIS Considerations

- **AXMEDIS Content Processing allows you to automate any kind of content processing:**
 - ◆ Massive or small scale processing
 - ◆ Locally performed or Workflow controlled
 - ◆ On any kind of Digital Resource not only AXMEDIS objects

- **AXCP Applications for massive processing as**
 - ◆ Production/packaging platform for producers and integrators
 - Digital files, metadata, etc.
 - ◆ Protection of objects, and protection information processing
 - ◆ Transcoding/adaptation platform for distributors
 - ◆ License Production, or as License Sever/processor
 - ◆ etc.

- **Any other question/issue ??**







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AXMEDIS Workflow

- **Based on**
 - ◆ OpenFlow, Biz Talk in a second step
 - ◆ Web service as integration

- **Control and monitoring of**
 - ◆ AXMEDIS Authoring/Editing tools
 - ◆ AXMEDIS GRID control via AXCP Scheduler
 - ◆ AXMEDIS Database
 - ◆ AXMEDIS Programme and Publication
 - ◆ Etc.

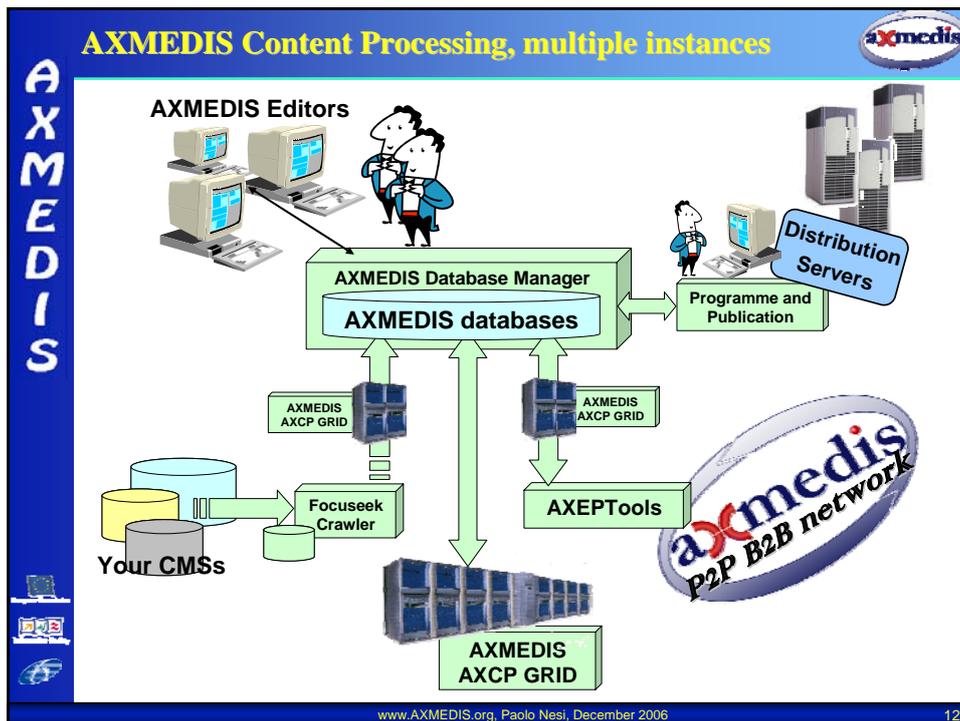
- **Full control and monitoring of all the Content Factory activities**





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- ### AXMEDIS Database Information
- **Management and Query on Several Information**
 - ◆ **AXMEDIS, MPEG-21 Objects**
 - Protected and non protected AXMEDIS, MPEG-21 objects
 - ◆ **Licensing information**
 - License models
 - Specific instances of Licenses related to objects
 - Specific Instances of Licenses related to signed contracts
 - PAR: Potential Available Rights
 - ◆ **Protection information**
 - Protection information models
 - Specific instances of Protection Information of the Objects
 - ◆ **Action Logs coming from the AXCS**
 - ◆ **User information**
 - ◆ Etc.
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AXMEDIS Considerations



- **AXMEDIS integrates:**
 - ◆ A Crawling solution to fast gathering of Content and other information located in your CMSs
 - ◆ A Database Manager capable of Collecting and managing AXMEDIS content
 - ◆ Query Support to make technical business queries on: local AXDB, AXEPTool, and on yours CMSs
 - ◆ Queries on the AXEPTools are applied to all the P2P AXMEDIS network virtual database

- **AXMEDIS Automated Content processing Integrates:**
 - ◆ Access to the AXMEDIS database
 - ◆ Publication of Content on the P2P AXEPTool
 - ◆ Publication of Content towards the Distributors Servers
 - ◆ Loading and processing content coming from the legacy and/or current CMSs via the integrated Crawler Focuseek
 - ◆ Saving results of the Content Processing back to you CMSs

- **Any other question/issue ??**

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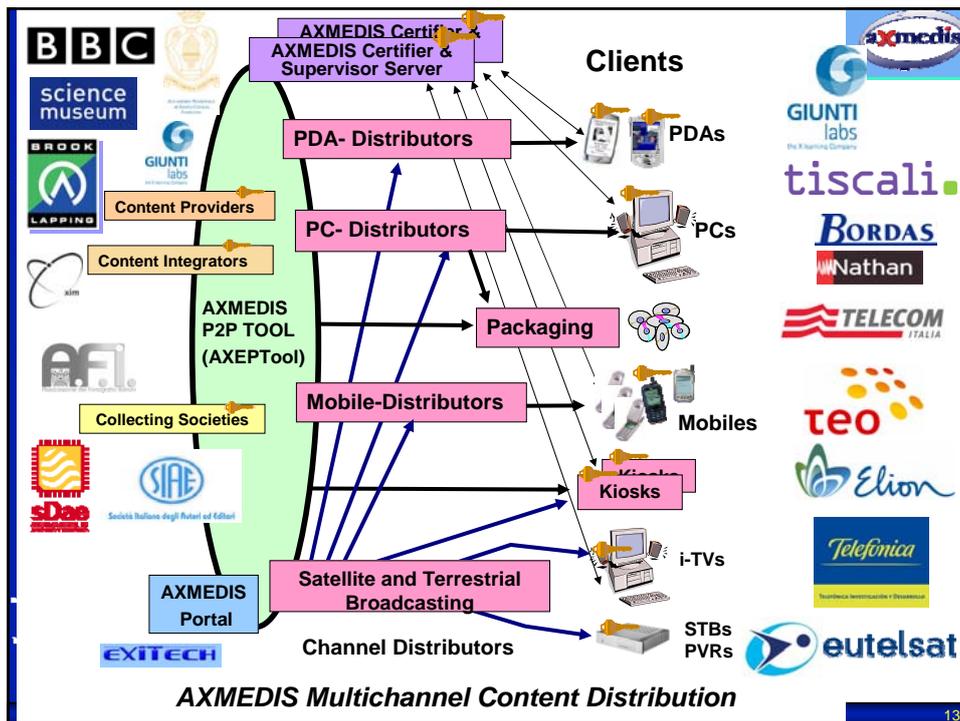


Table of Content

- Preface
- What is AXMEDIS
- Short Market Analysis and Opportunities
- General State of the Art
- Needs and Limitations
- AXMEDIS Content Packaging
- AXMEDIS Content Protection and Tracking
- AXMEDIS Content Production and Processing
- **AXMEDIS Application Scenarios** 
 - ◆ Application Scenarios
 - ◆ Content Sharing and/or Distribution
 - ◆ AXMEDIS Demonstrators
- Conclusions and references

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AXMEDIS Application Scenarios

AXMEDIS

- **P2P distribution with AXMEDIS**
- **AXMEDIS Programme and Publication**
- **Distribution to (see www.axmedis.org):**
 - ◆ PCs via Internet, the TISCALI Media Club Demonstrator
 - ◆ PDA via Kiosks, the ILABS Kiosk Demonstrator
 - ◆ PCs and STB/PVRs via Satellite data broadcast, the EUTELSAT, UNIVLEEDS Demonstrator
 - ◆ Mobiles, the ILABS Demonstrator for mobiles
 - ◆ STBs (DVB-T, etc.): AX:ELTEO, TEO and ELION Demonstrator
 - ◆ Mobiles and PDA: AX-DELTA, the Telefonica Demonstrator
 - ◆ home domains: AX-4HOME, BBC Demonstrator
 - ◆ mobiles with OMA: AX-4HOME, Telecom Italia Demonstrator
- **Sharing content among archives and mediateques**
- **Content Enrichment:**
 - ◆ VARIAZIONI Projects: GERMINUS, RIGEL, ALBENIZ, UPC, etc. (www.variazioni.org)
- **General AXMEDIS Multichannel Architecture**

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Notes on Demonstrators

- **In most of the demonstrators there is:**
 - ◆ 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 All for collecting reporting data
 - ◆ Usage of the AXMEDIS Editors and Players
 - ◆ 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:**
 - ◆ Workflow support
 - ◆ 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

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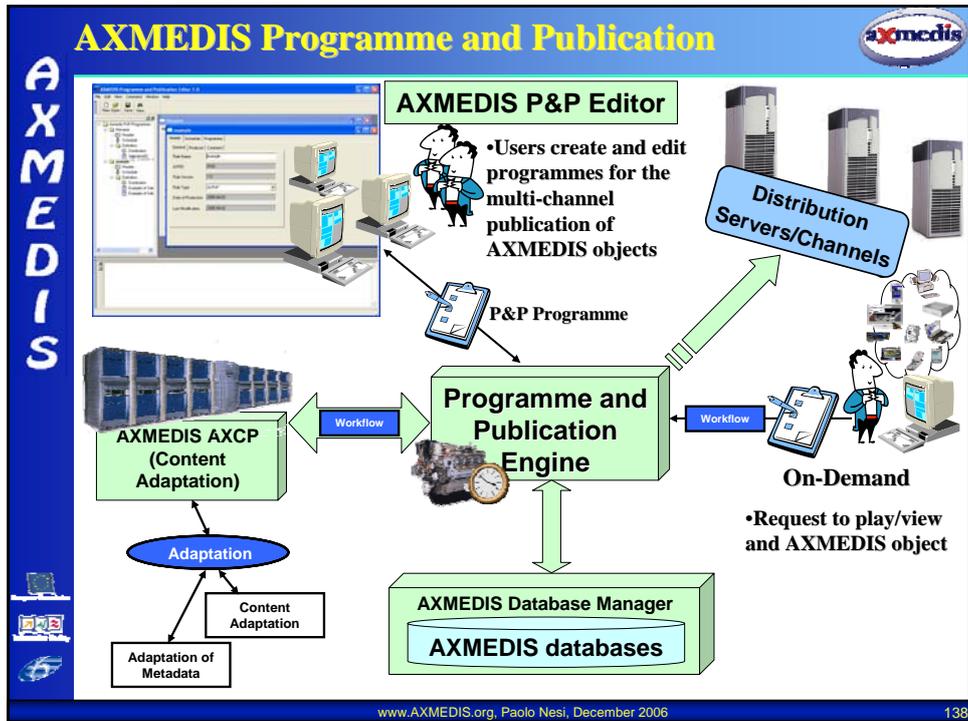
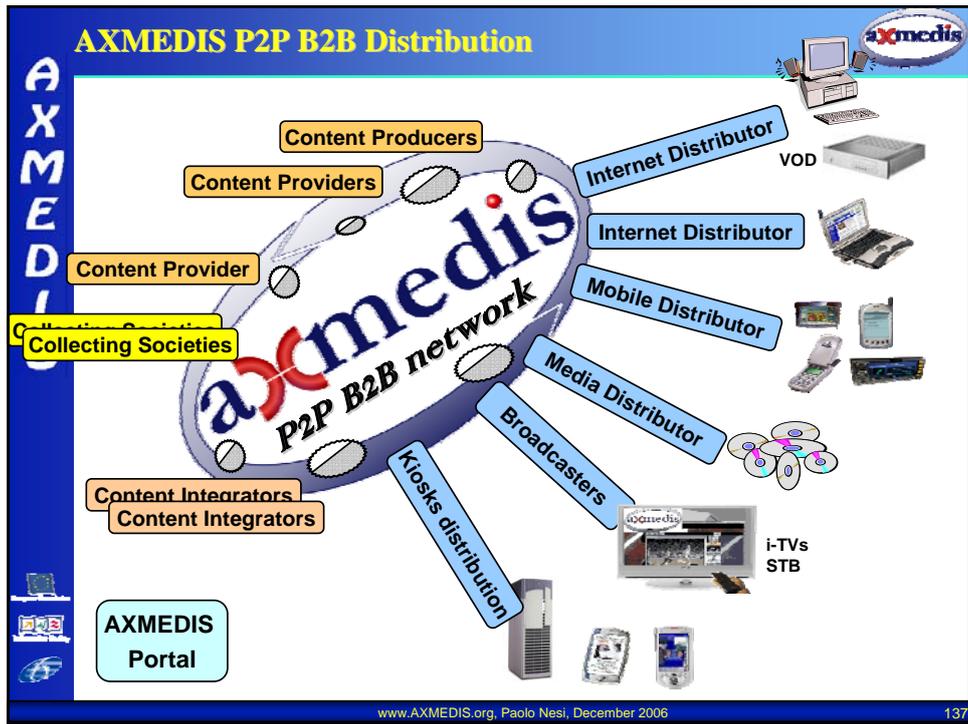


AXMEDIS P2P Tools

- **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

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TISCALI Distribution with AXMEDIS Technology

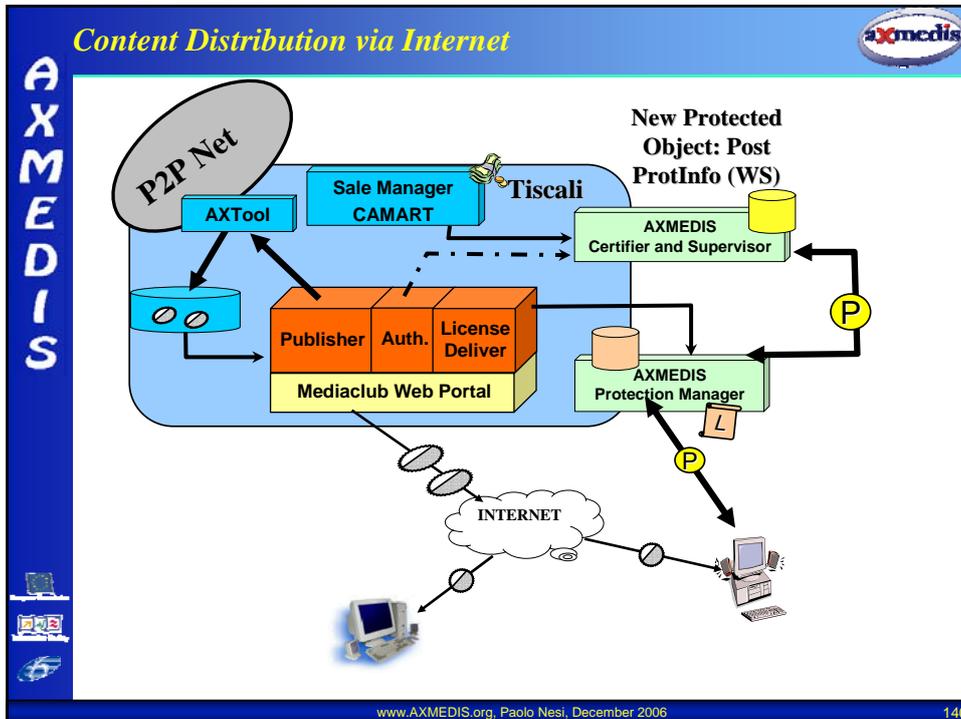


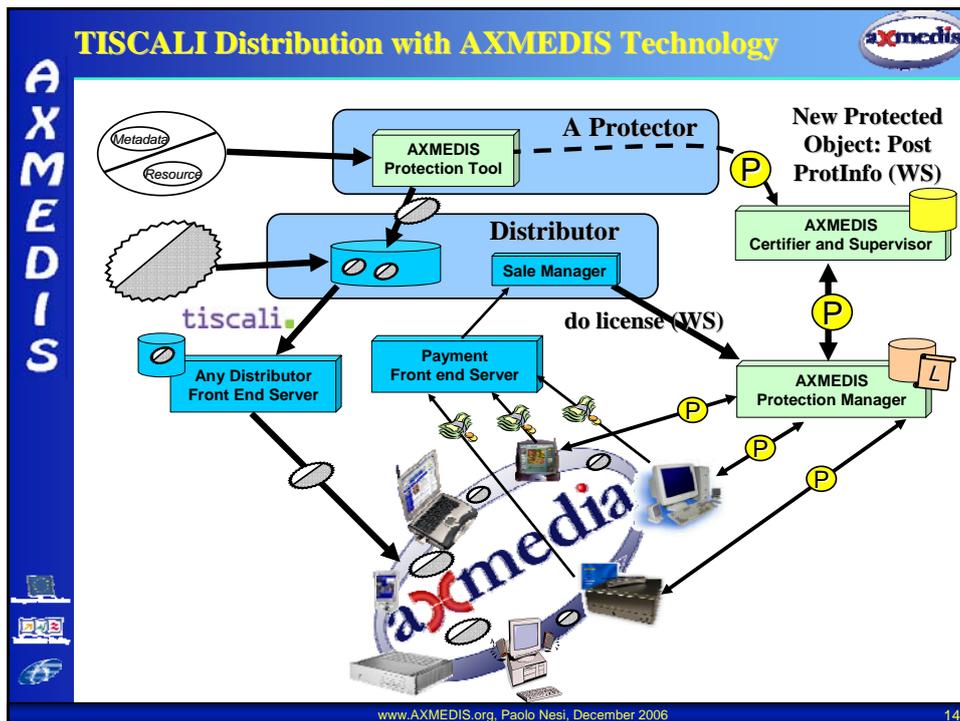
- **B2C distribution**
- **AXMEDIS objects with**
 - ◆ Video and Audio Files, and also MPEG-4
- **Licenses and Protection Information not in the object**
- **The AXMEDIS Objects may be**
 - ◆ shared among consumers with AXMEDIA Tool a P2P tool
 - ◆ Visualized and played on AXMEDIS players free downloaded
- **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



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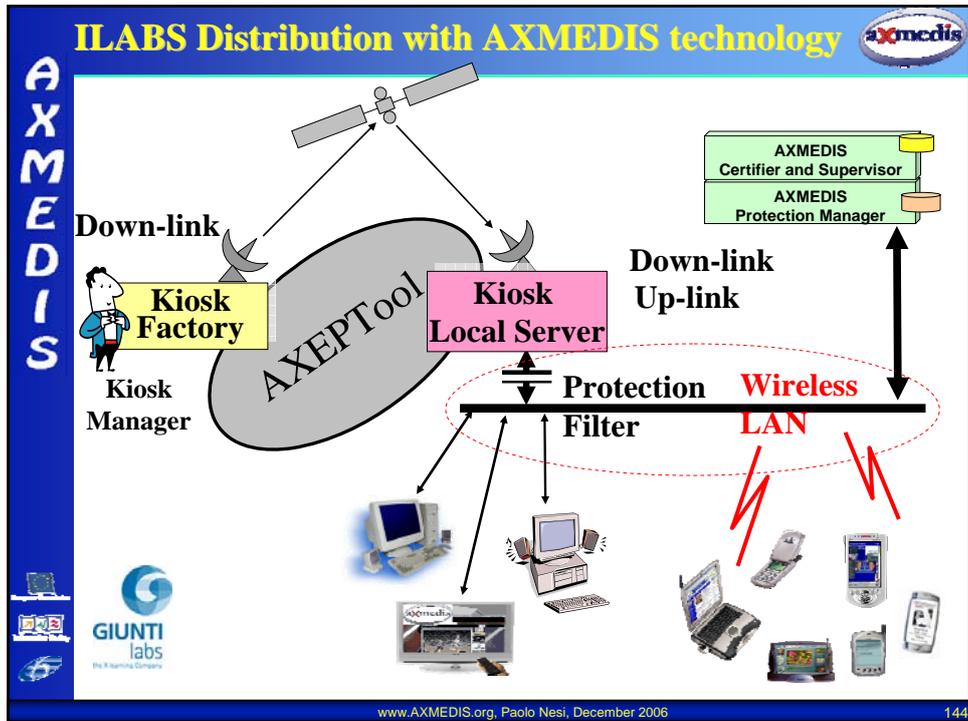
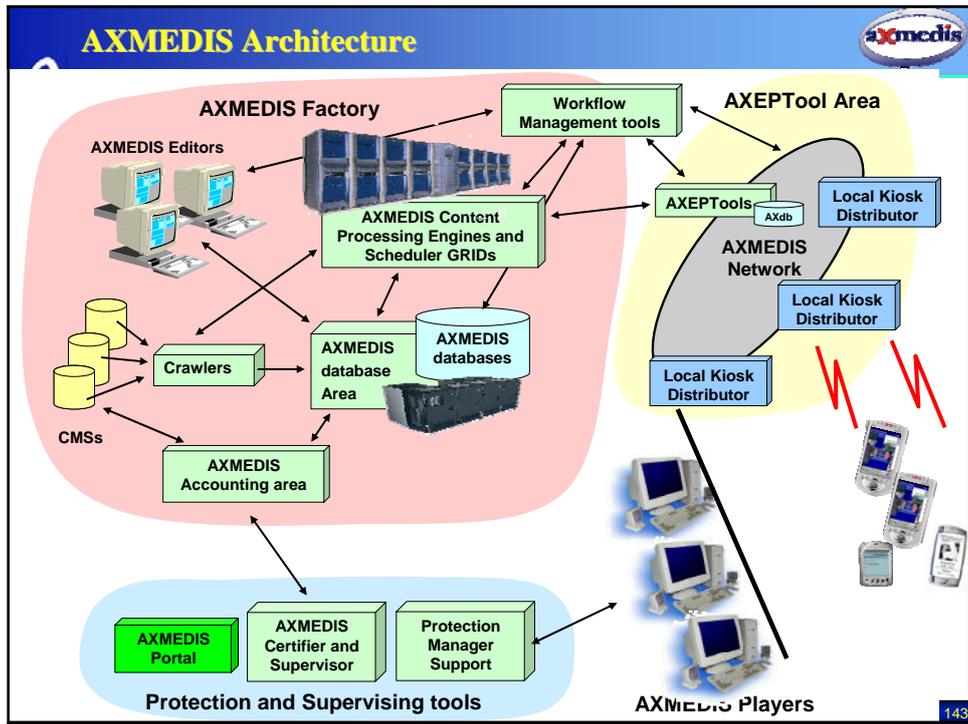
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ILABS Distribution with AXMEDIS technology

- **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



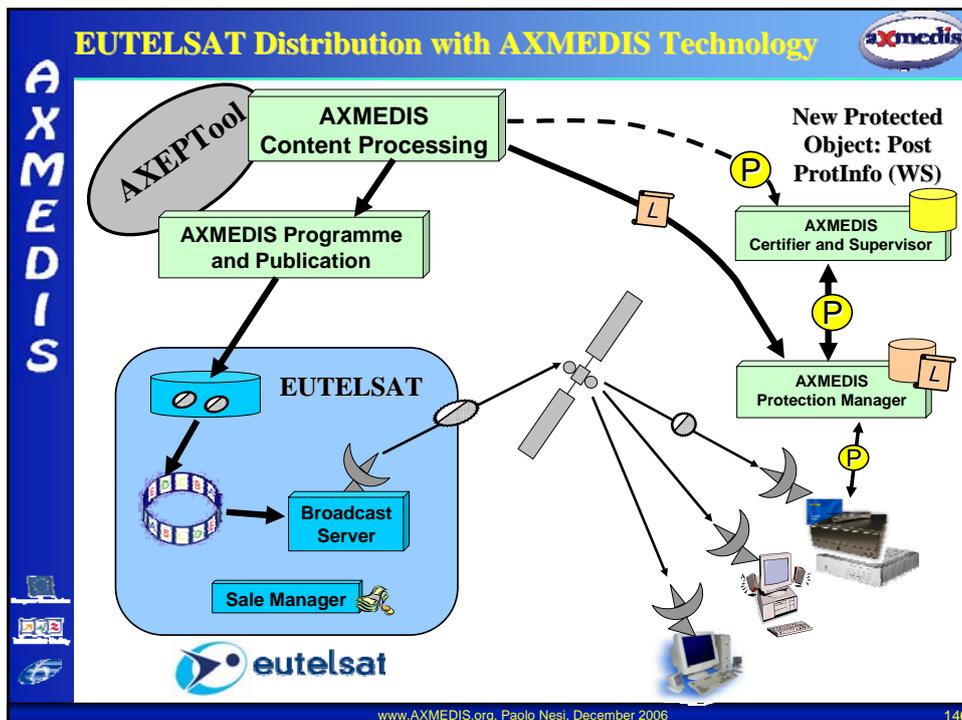
EUTELSAT Distribution with AXMEDIS technology

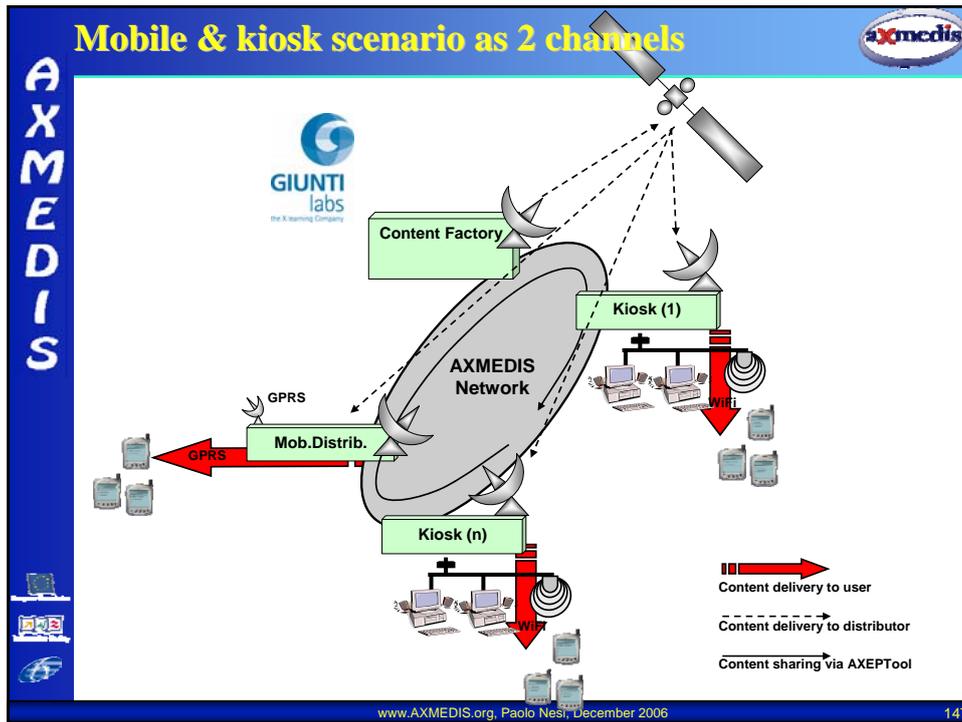
- **B2B and B2C distribution**
- **AXMEDIS objects with**
 - ◆ Any kind of content,...
 - ◆ Video, images, document, audio, animations, etc.
- **Licenses and Protection Information not in the object**
- **The AXMEDIS Objects may be**
 - ◆ Visualized and played on AXMEDIS players free downloaded
- **The 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



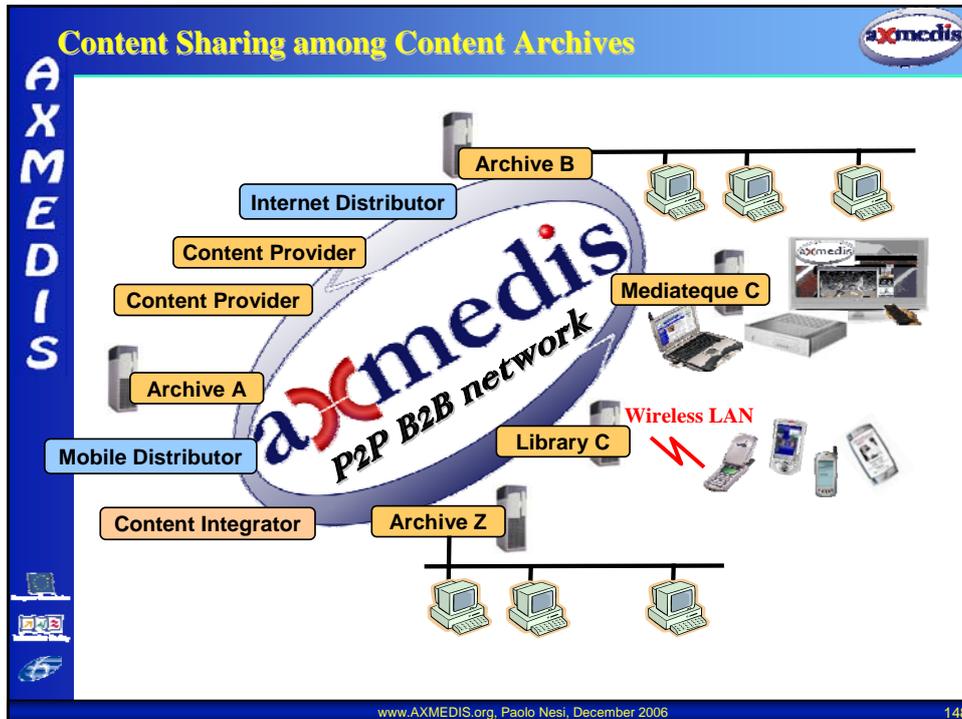


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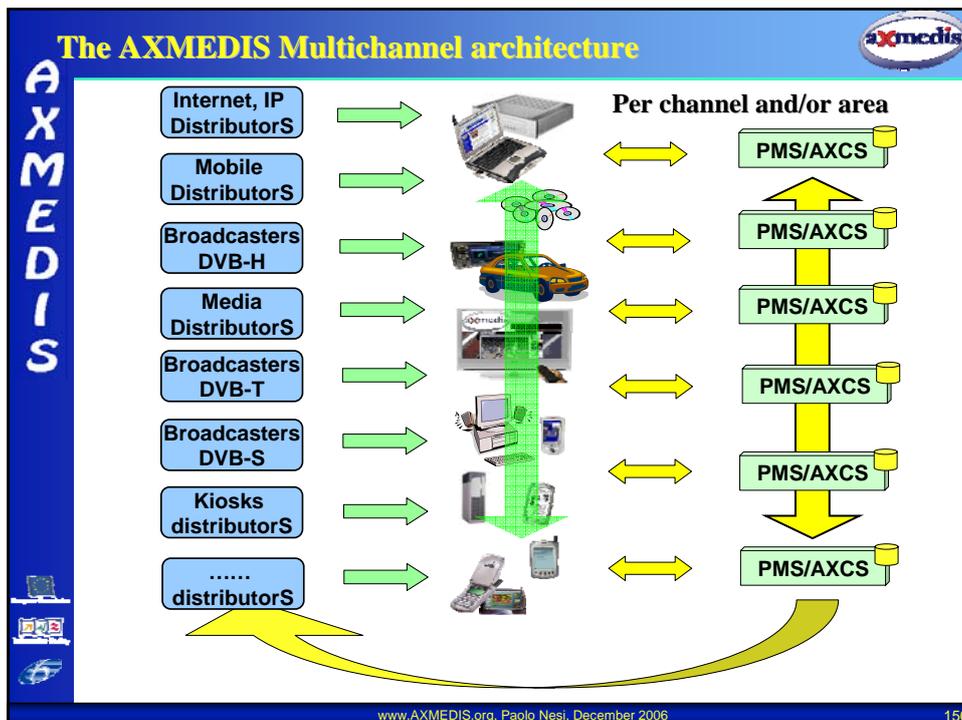


What AXMEDIS can do for Small Publishers

- **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

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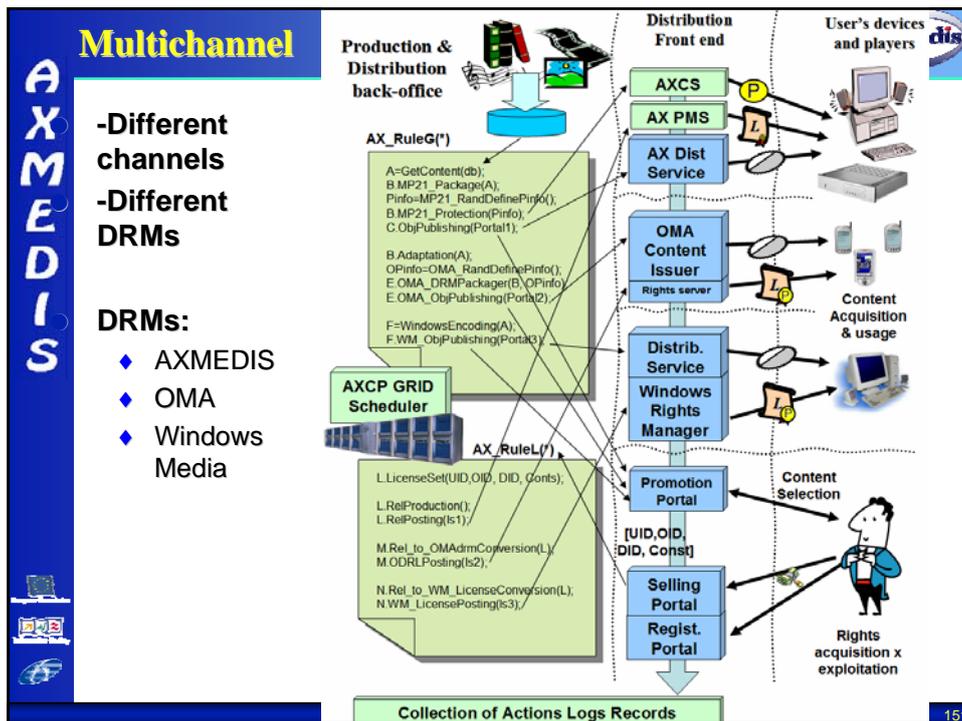
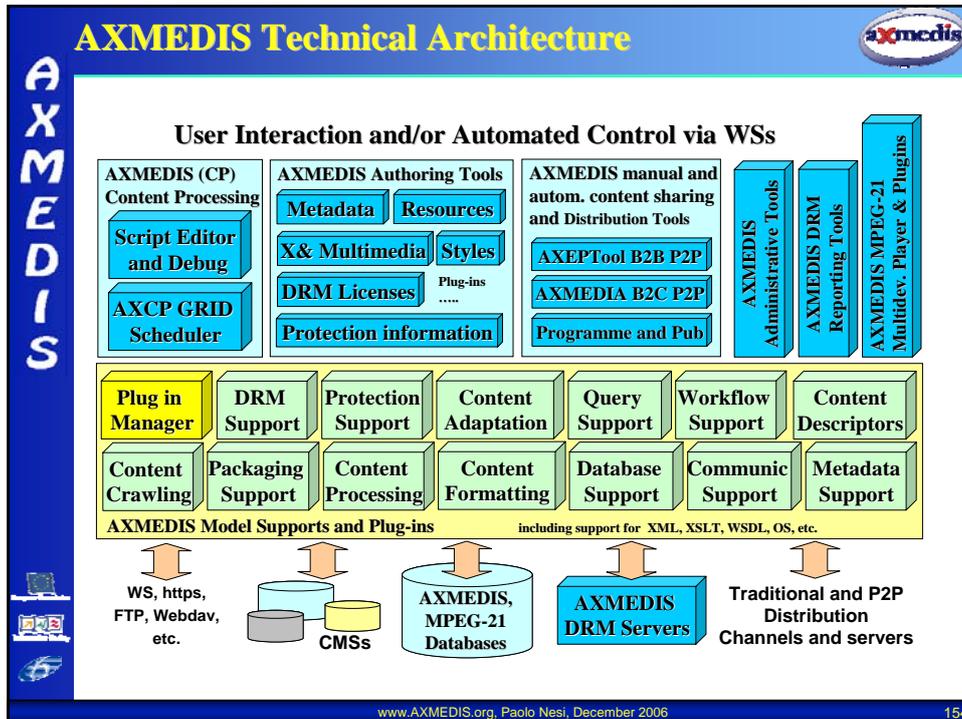
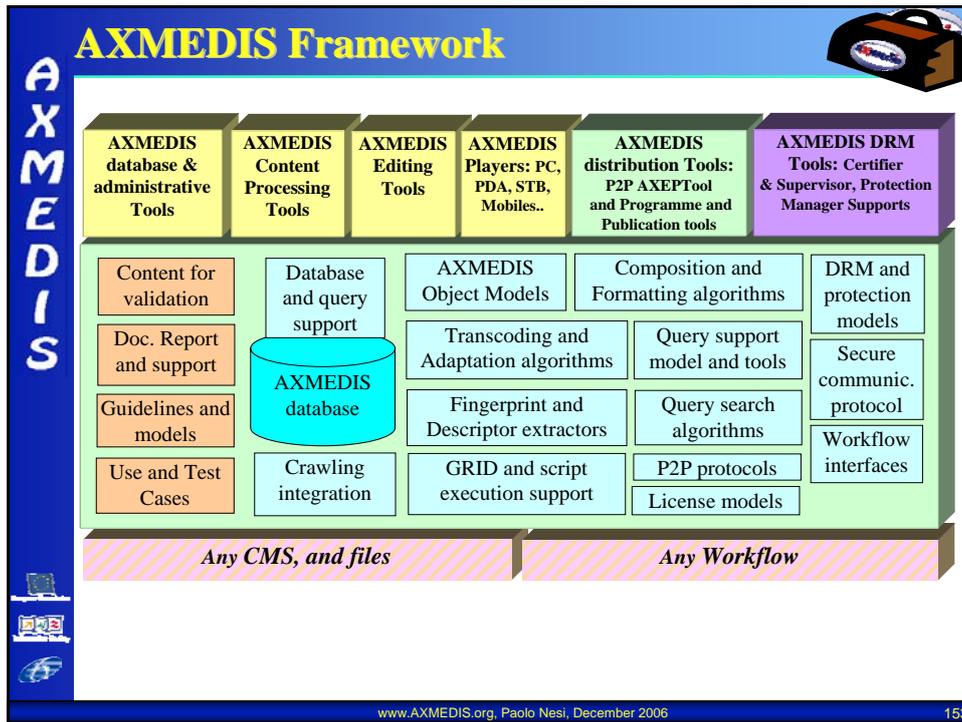


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- AXMEDIS Content Production and Packaging
- Examples of AXMEDIS Applications
- **Conclusions and references**

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Use of AXMEDIS Framework

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

AXMEDIS Framework

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

Project Partners

9 subprojects Demonstrators

Direct Affiliation

AXMEDIS Based solutions

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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 convenient annual fee that can be covered in money or value by offering in change contributions to the AXMEDIS Framework itself for the community.
- For additional information please contact Paolo Nesi nesi@dsi.unifi.it

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AXMEDIS Major Innovations and Tutorials

- **This Tutorial give a general overview**
 - ◆ It should be followed before the others
- **for other information on AXMEDIS :**
 - ◆ **Content Model, packaging and protection**, please follow:
 - Tutorial on Content production (12th Afternoon, LT11)
 - Tutorial on Content processing (13th Morning, LT11)
 - ◆ **Automated Content Processing**, from CMSs to new content products, reducing time to distribution, cost reduction, please follow:
 - Tutorial on Content processing (13th Morning, LT11)
 - ◆ **Multichannel content distribution**, please follow:
 - Tutorial on Content distribution (14th Morning, LT11)
 - ◆ **Workflow integration**, please follow:
 - Tutorial on Workflow (13th Afternoon, LT11)

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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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Email: nesi@dsi.unifi.it
Web: <http://www.AXMEDIS.org>*



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