Automating Production of Cross Media Content for Multi-channel Distribution

www.axmedis.org

IST-2-511299

AXMEDIS Tutorial Content Production

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David Fuschi (ILABS), Laurence Pearce (XIM), Paolo Nesi (DSI), Atta Badi (IRC), Arnaud Valette (SEJER), Claudio Alberti (EPFL), Martin Schmucker (FGGIGD), Massimo Moneglia (DIPITA), Jaime Delgado (FUPF), Isabella Longo (AFI)

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Purpose of this Tutorial

- **Course Objectives**
  - → Show what can be created using AXMEDIS production tools & framework,
  - → Present the AXMEDIS production chain,
  - → Interleave generic introductions with practical demonstrations.

- **Expected Audience**
  - → People working in content factories.
- **Learning outcomes**
  - → What is AXMEDIS
  - → Which are the main components and tools available for content production in AXMEDIS
  - → How to use the main tools of the AXMEDIS suite
  - → The benefits of adopting AXMEDIS in respect to traditional production methods

Preface

- ***Currently, the digital-content market is growing very fast and it needs solutions of production, protection and distribution of massive content collections for accessing new markets and defining/trial new business solutions.***
- ***Major limitations:***
  - *Convergence of the media, interoperability of content*
  - *DRM applications and introduction in several distribution channel*
  - *Massive processing of content processing and distribution*
  - *Etc.*
- ***These are a real challenge for many industries that are discovering the complexity of managing large digital content factories and distribution chains.***
- **Content producers, providers, aggregators and distributors constantly need to adopt innovative means.**

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AXMEDIS Content model & production overview

Pierfrancesco Bellini (DSI), Davide Rogai (DSI),
Arnaud Valette (SEJER), Nicola Baldini (Focuseek)

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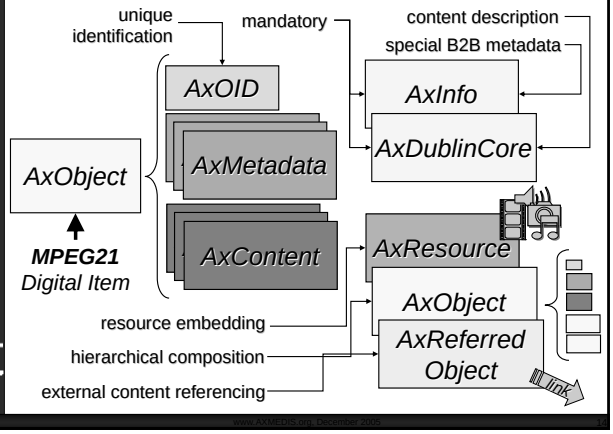
AXMEDIS Model

- **An AXMEDIS Object is a container of:**
  - Metadata (Dublin Core, AXMEDIS specific metadata, any XML metadata)
  - Any Digital Resources (audio, video, images, documents)
  - An (optional) SMIL file for the presentation of digital resources
  - Other AXMEDIS Objects (embedded or referenced)
- **An AXMEDIS Object is a MPEG21 Digital Item with a specific structure**
- **Kinds of AXMEDIS Objects**
  - A *Basic AXMEDIS Object* is an AXMEDIS object with resources and the related metadata
  - A *Composite AXMEDIS Object* contains/references other Basic/Composite AXMEDIS Objects
- **Only AXMEDIS Objects have metadata**
- **Only AXMEDIS Objects can be protected but metadata are always accessible**

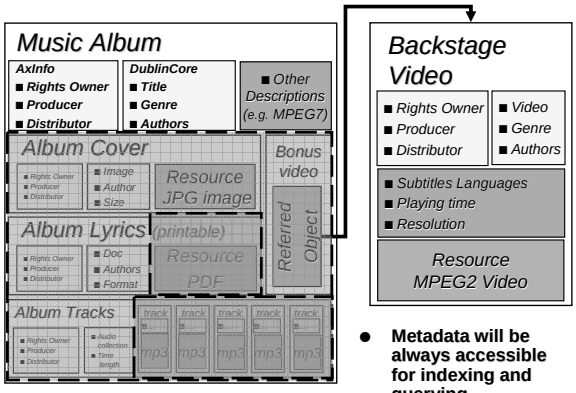
Metadata – Dublin Core

- **Dublin Core Metadata are a standard set of metadata usable for multimedia cataloguing**
- **15 basic elements**
  - title,
  - creator,
  - contributor,
  - description,
  - coverage,
  - format,
  - date,
  - identifier,
  - language,
  - publisher,
  - rights,
  - source,
  - subject,
  - type,
  - relation
- **Other elements and derived elements**
  - abstract, audience, available, conformsTo, dateAccepted, …

AXMEDIS Object: structure



AXMEDIS Object: an example

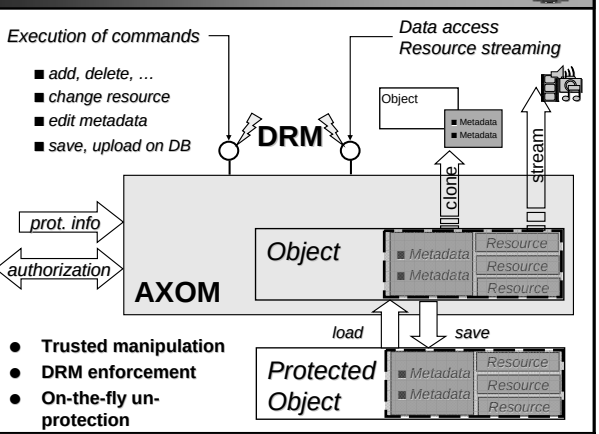


- **Metadata will be always accessible for indexing and querying**

Metadata - AxInfo

- **The AxInfo contains B2B and AXMEDIS specific metadata**
  - ObjectCreators (ID, Name, Company, Nationality, etc.)
  - Owner (ID, Company etc.)
  - Distributor (ID, Name, Company, etc.)
  - Object version & revision
  - ObjectStatus, ObjectType
  - IsPromoOf (AXOIDs)
  - History of object production
  - Workflow information
  - Fingerprints algorithms used
  - Internal Potential Available Rights (the rights owned)
  - Potential Available Rights (the rights on sell)
  - Metadata certification and status

AXMEDIS Object Manager



- **Trusted manipulation**
- **DRM enforcement**
- **On-the-fly un-protection**

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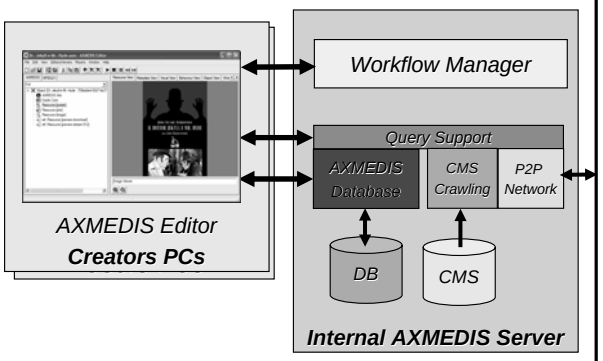
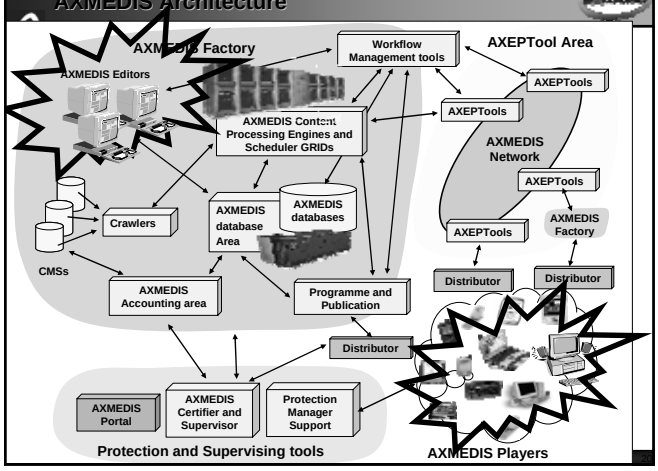
AXMEDIS Editor inside the AXMEDIS Factory

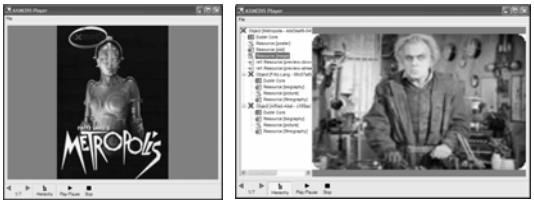


AXMEDIS Architecture



AXMEDIS ActiveX

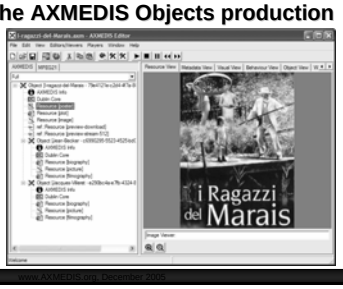
- **The AXMEDIS ActiveX allows**
  - the fruition of AXMEDIS Objects within other Windows applications and web pages
- **It allows to:**
  - Show the resources inside the object
  - Control the execution of resources (play/pause/stop)
  - Hide/show the AXMEDIS Hierarchy



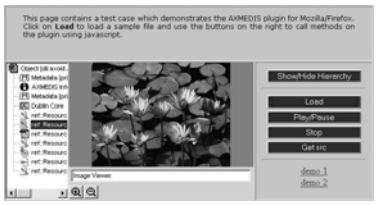
- **It has been used to produce a prototype of the PC Player**

AXMEDIS 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
  - Metadata
  - DRM
  - Protection
  - Presentation
  - Workflow
  - Annotation
  - …

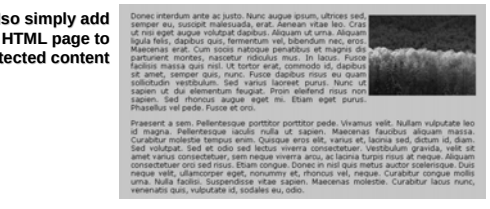


AXMEDIS Player Mozilla's plugin

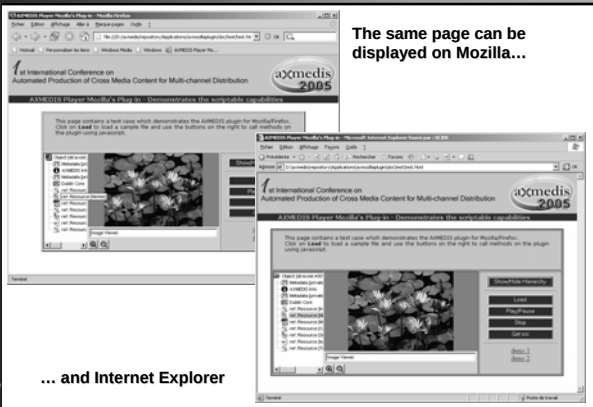


You may use Javascript to dynamically control the properties of the player and to call its methods

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



AXMEDIS Player Mozilla's plugin & ActiveX



The same page can be displayed on Mozilla…

… and Internet Explorer

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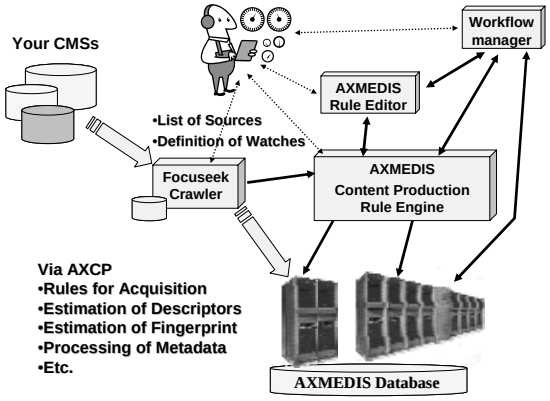
Demos:

- **Demonstration**
  - ♦ AXMEDIS Editors
  - ♦ Metadata editor
  - ♦ DRM editor
  - ♦ Plug in for processing content
  - ♦ Access to the database
  - ♦ Creation of composed objects
  - ♦ AXMEDIS Players as Active X and plugins

Fast and Continuous Crawling of Content



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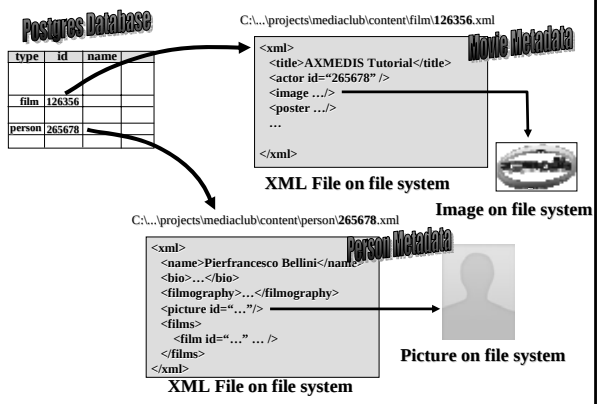
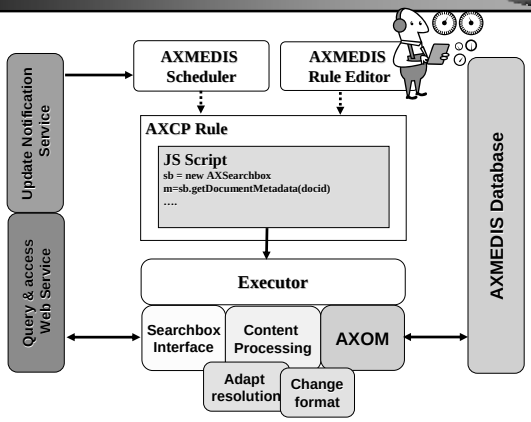
Crawling the TISCALI Xaura2 CMS

- **Xaura2 is a Java XML/XSL based CMS platform for Internet content distribution**
- **All content metadata are stored in the file system as XML files, only a few of them, mainly for search, indexing and status purposes, are stored in the Database.**
- **The MediaClub is an instance of Xaura2 containing a movie archive:**
  - ♦ 89 movies
  - ♦ 189 people (directors and actors)

TISCALI MediaClub



AXMEDIS Content processing



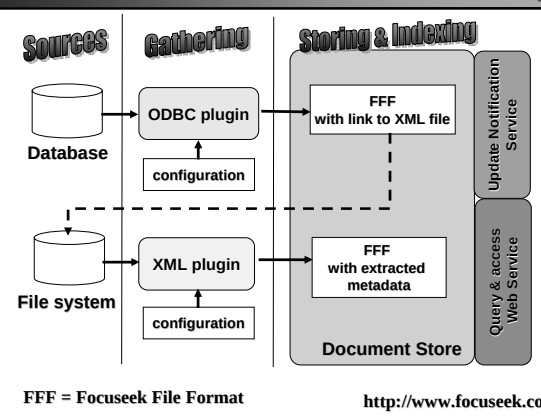
TISCALI MediaClub Metadata

- **Movie Metadata (stored in XML files)**
- **Title**
- **Genre (e.g "drammatico", "commedia", "horror", "documentari")**
- **Director (person id)**
- **Actors (person ids)**
- **Abstract**
- **Plot**
- **Credits**
- **Distributor**
- **Year**
- **Image (a jpeg image of the movie)**
- **Poster (a jpeg image of the movie poster)**
- **URLs for preview (download/stream at different bitrates)**
- **URLs for use (download/stream at different bitrates)**
- **…**

Person Metadata (stored in xml files)
- **Name**
- **Biography**
- **Filmography**
- **Picture (a photo)**
- **Films (movie ids)**

Produced Objects

Using Focuseek searchbox



FFF = Focuseek File Format

http://www.focuseek.com

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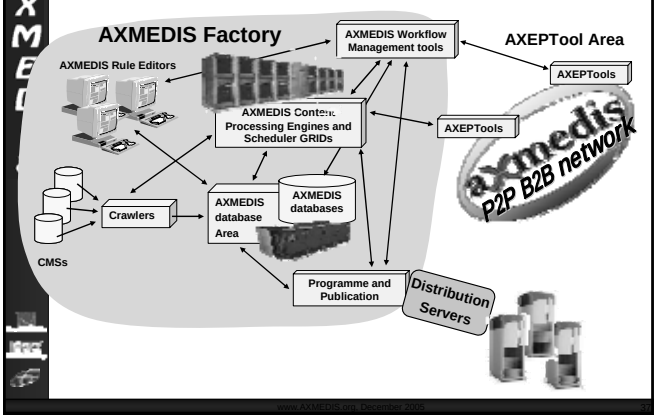
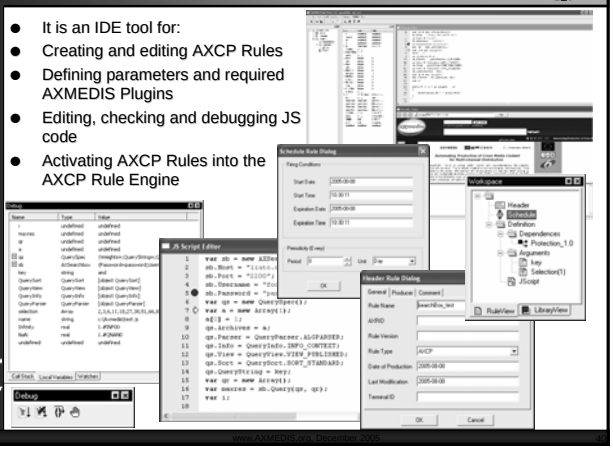


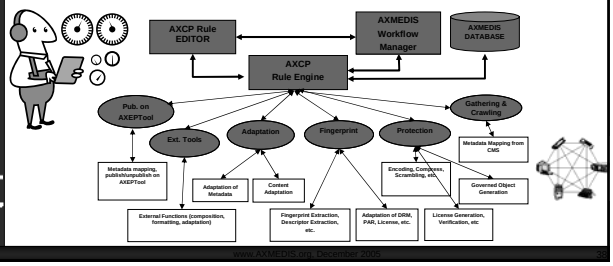
AXMEDIS Content Processing Area: *AXCP Rule Editor*

- It is an IDE tool for:
- Creating and editing AXCP Rules
- Defining parameters and required AXMEDIS Plugins
- Editing, checking and debugging JS code
- Activating AXCP Rules into the AXCP Rule Engine



AXMEDIS Content Processing Area

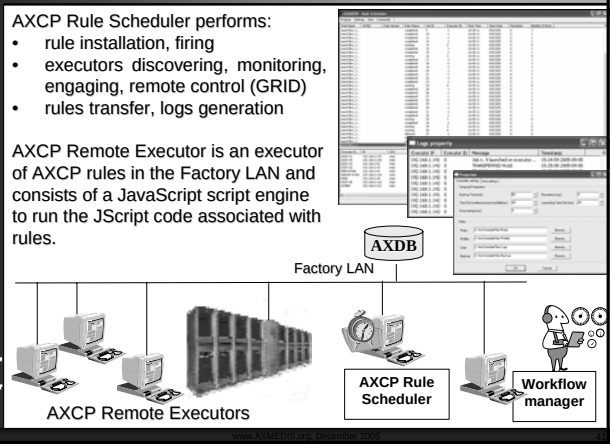
- It is a distributed tool based on a **GRID infrastructure** for automatic production and processing content on the basis of rules (*AXCP Rules*) which are written as scripts (*AXCP Rule Editor*) and executed in parallel and rationally using the computational resources accessible in the content factory (*AXCP Rule Engine*). AXCP area receives commands coming from the Workflow of the factory.



AXMEDIS Content Processing Area: AXCP Rule Engine (GRID)

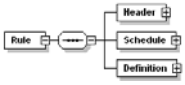
AXCP Rule Scheduler performs:
- rule installation, firing
- executors discovering, monitoring, engaging, remote control (GRID)
- rules transfer, logs generation

AXCP Remote Executor is an executor of AXCP rules in the Factory LAN and consists of a JavaScript script engine to run the JScript code associated with rules.



AXMEDIS Content Processing Area: *AXCP Rule*

- AXCP Rules include metadata for heading information (*Header*) and firing (*Schedule*)
- AXCP Rules contain algorithms for composition, formatting, adaptation, transcoding, extraction of fingerprint and descriptors, protection, license manipulation, potential available rights manipulation, resource manipulation, load and save from databases and file system, content migration etc. (*Definition*)



- Algorithms are written by using JavaScript programming language
- JS was extended
  - with data types derived from AXMEDIS Framework, MPEG21, and general resource definition such as: images, documents, video, licenses, etc.
  - to use different functionalities for content processing by means the AXMEDIS Plugin technology (adaptation, fingerprint, etc…)

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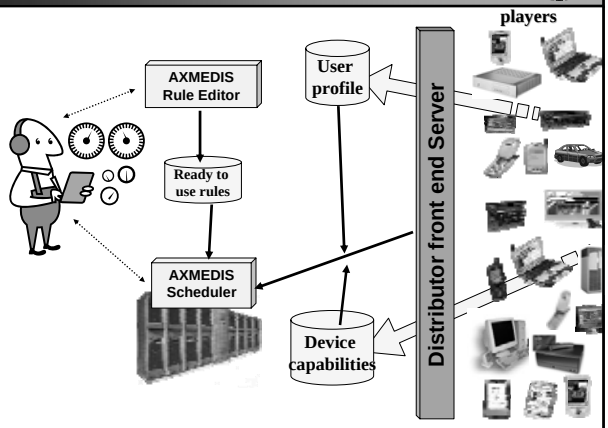
AXCP as Transcoding/Adapt. Platform



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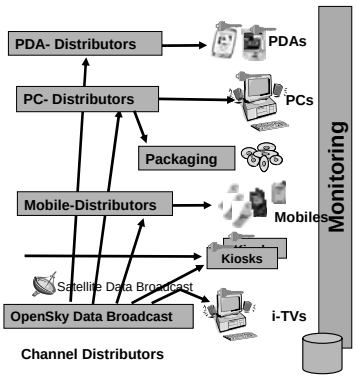
Adaptation of audio content

- **Functionalities:**
  - Support a variety of file formats and codecs (mp3, wav, aiff, wma…)
  - Supports down-sampling and channel-mixing
  - Allows selecting precisely a piece of a file
  - Support for MPEG-21Digital Item Adaptation descriptors:
    - → adapt to a particular user's presentation or rendering preferences
    - → adapt to a particular user's auditory deficiency
    - → adapt to output capabilities of the terminal

Usage of Fingerprint



- **Then Content Owners, may monitor**
  - distribution channels
  - published content collection
  - Etc.
- **To detect the passage of their content by**
  - estimating in real time the fingerprint the
  - searching into the database

Adaptation of multimedia content

- **Functionalities**
  - Allows creating generic multimedia files (3GP, MP4 ISMA compliant)
  - Adaptation of aggregated simple media files (MPEG-4 audio and video, MPEG-1/2 audio and video, JPEG images, AVI files, SRT subtitles…)
  - Media tracks may be added, removed and delayed
  - Extraction of single track from multimedia files
  - File splitting by size or time
  - Concatenation of multimedia files
  - Conversion between different multimedia scene formats (MP4, BT, XMT, SWF, X3D, SMIL…)

Excursus - Biometrics

Fingerprinting - Motivation

- **General Purpose**
  - Content Identification
  - Content Verification
- **Purpose within AXMEDIS**
  - Primary: ensuring a "clean" AXMEDIS environment
  - Secondary: content identification, e.g. for monitoring of the distribution channels
- **In AXMEDIS**
  - Developments for audio content, images, video content
  - Plug-In interface for the integration of existing algorithms

Extraction of descriptors from audiovisual data

- **MPEG-7 "Multimedia Content Description Interface"**
  - Description of audiovisual content in multimedia environments
  - Provides standardized core technologies
- **Applications**
  - Indexing
  - Retrieval
  - Recommendation
  - Intelligent browsing
  - Classification
  - Automatic summarization

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  - → GRID, etc....
  - → Adaptation
  - → Fingerprint
  - → Descriptors
  - → Workflow
- **Content Protection Tools**
  - → Legal Aspects
  - → Protection Processor
  - → DRM Tools
- **Comments, Acknowledgements & Contact Information**

Extraction of descriptors from audio content

- **Functionalities**
  - Each file characterized by a numerical model describing its content according to different dimensions of music perception:
    - → Currently: timbre
  - Models can be used to compute similarity between files
  - Application:
    - → Music classification
    - → Music recommendation
    - → Playlist generation
    - → Clustering of music collections
- **Future functionalities**
  - Rhythm and melody/harmony models to describe audio content more faithfully
  - Segmentation based on semantic regions to allow for easy browsing of audio files and automatic thumbnailing

Extraction of descriptors from audiovisual data

- **Low Level Descriptors**
  - Describe audiovisual data on a low semantic level
  - Example:
    - → Spectrum shape of an audio signal
    - → Dominant colour of a picture
- **High Level Descriptors**
  - Descriptors with a higher semantic hierarchy
  - Example:
    - → Music genre of a song
    - → Keywords of a text

Functionalities of Metadata Extractor from text

- **Lexical processing**
  - PoS tagging of plain text files (English only)
  - Extraction of a definable number of single word keywords (TF.IDF)
  - Integration with collocation keywords
- **Semantic processing**
  - Word Sense Disambiguation of the extracted keywords
  - WordNet synset association to each keyword
  - Identification of main semantic domain

Extraction of descriptors from audio content

- **Functionalities**
  - Each file characterized by a numerical model describing its content according to different dimensions of music perception:
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Content Processing

- **Demonstrations:**
  - AXMEDIS Content processing Rule editor
  - Rule scheduler and GRID in action
  - Content Gathering from legacy CMSs
  - Automatic Production of AXMEDIS content Objects
  - Processing content for adaptation, fingerprint, descriptors, etc.
  - Workflow integration

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Automating Production of Cross Media Content for Multi-channel Distribution

www.axmedis.org

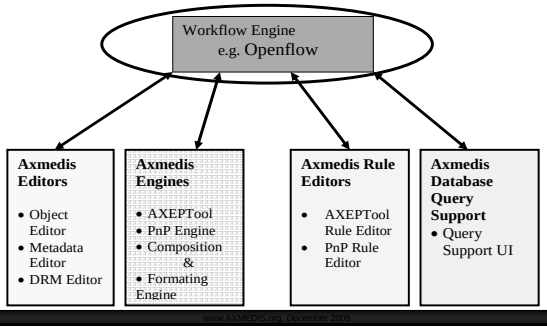
IST-2-511299

AXMEDIS Content Protection

Isabella Longo (AFI), Jaime Delgado (FUPF), Andrea Vallotti (DSI)

Axmedis Workflow Integration

For AXMEDIS, the workflow will form a backbone for the automation of various production and distribution activities by inter-acting with various AXMEDIS tools.



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Rights clearance process – state of the art

Multimedia producer

I want to create a multimedia work

Documentary of Florence

It will contain copyrighted works or portions of works

Still images | Music | Videos

Resulting work will be distributed, publicly performed, etc

Documentary of Florence → DVD | PC | TV

Rights clearance process – state of the art

Multimedia producer

1 I have to identify the rights holders

Videos

Potential Rights holders

- Producer
- Production company
- Music rights holders
- Actors
- Screenwriters
- Directors
- Distributors (of various markets)

Rights clearance process – state of the art

Multimedia producer

1 I have to identify the rights holders

Still images

Potential Rights holders

- Photographer
- Artist (if painting is not in public domain)
- Publisher (e.g., book, catalogue)
- Company owning photos (Images, studio, record company etc)
- Company with rights to license
- Entity that owns building (if you need photos of buildings)
- Individual represented in image

Problems to be solved

Multimedia producer

1 Issue of rights holders identification

Multiplicity of rights

The multimedia producer has a lot of rights to clear.

Multiplicity of right owners

The multimedia producer has a lot of right owners to search for. He needs to identify and obtain all third parties licenses necessary to authorize him to incorporate the various works in the product .

Overlapping rights

Many individual items incorporated in multimedia products are subject to overlapping rights.

Legal insecurity

He may not know whether multimedia rights are available. Current right holders, may not have acquired all the rights necessary to license multimedia products. Only in few countries some of these rights are licensed by collecting societies

Rights clearance process –state of the art

Multimedia producer

1 I have to identify the rights holders

Music

To use music in a visual work the customer needs a synchronisation license which is generally negotiated on an individual basis with the music publisher and the master owner who respectively will share the received fee with the authors/composers and with the artists.

Sound recording of famous Florence songs

Musical works of famous Florence songs

Sound recording of Mozart

Potential Rights holders

- Music Producer – master owner
- Music Publisher
- Recording label
- Companies with rights to license (i.e.sub-publisher)
- Distributors (licensed in various markets)

Rights clearance process – state of the art

Multimedia producer

2 I have to negotiate clearances for the intended usage with each right holder of each work

RIGHT HOLDERS

Still images | Music | Videos

I have to send them all information needed (description of the new work, usage, territories, terms etc)

Right holders may change some conditions (only certain territories)

… may not grant permission for certain usage (can't edit the work)

or worst, they may deny permission on my preferred choices… or propose too high costs ….

Problems to be solved

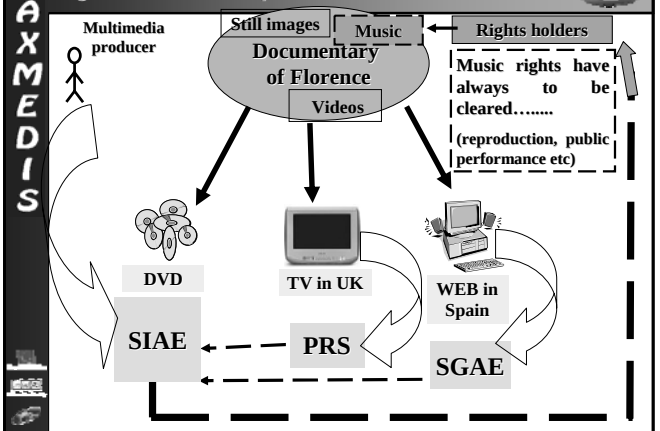
Multimedia producer

2 Rights negotiation process is arduous and frustrating…

The multimedia producer has spent a lot of time
The multimedia producer has spent a lot of money
The multimedia producer has not get permission for all chosen works
The multimedia producer can't afford all proposed costs
The multimedia producer has to reshape the original project or, worst, renounce to do it …

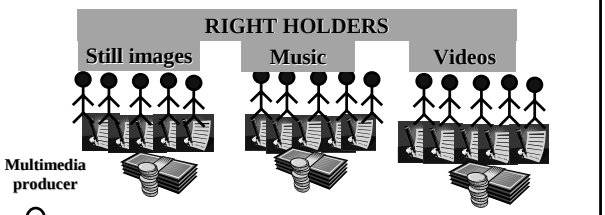
Documentary of ????

Rights collection process – state of the art



Rights clearance process – state of the art

3 In the best case dozen of separate written contracts have to be issued..



Right holders are inclined to apply lump sum schemes (once for all payment) also because is impossible for them to control if licenses' conditions are respected..

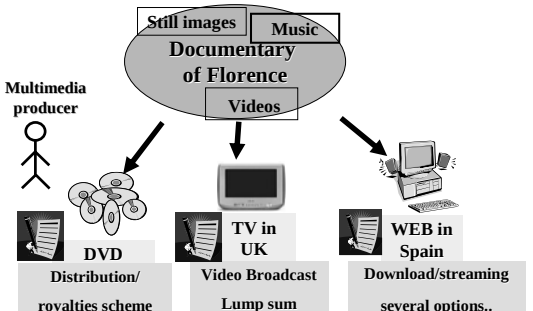
Problems to be solved

Rights holders cannot control if their contracts are respected
Rights holders cannot control the use of their rights
Multimedia producers cannot control if their contracts are respected
Users may not control consumers behaviors..
Users reports sent to collecting societies are often not homogenous
Collecting societies data are often not exhaustive
Collection and distribution of rights revenues may be frustrated

Risk of piracy
Loss of creativity
Loss of business
Loss of revenues

Rights clearance process – state of the art

… and then negotiate contracts with users



Multimedia producer will try to get advances and flat fee payment also because he cannot control if contracts' conditions are respected..

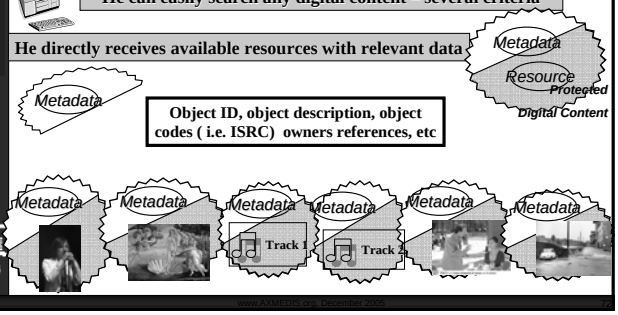
AXMEDIS SOLUTIONS

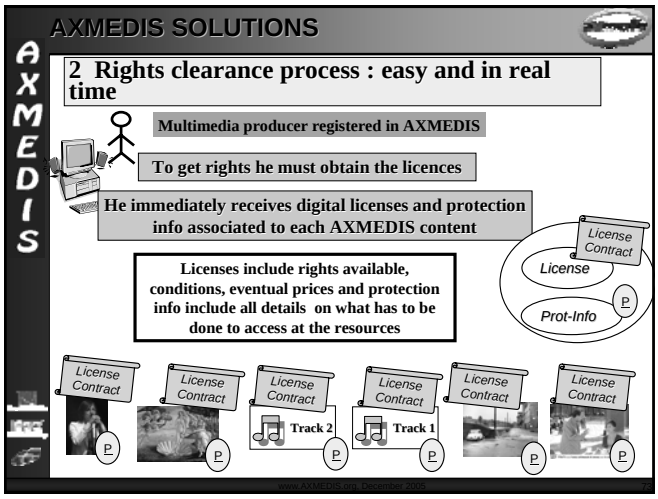
1 Rights holders identification: easy and in real time

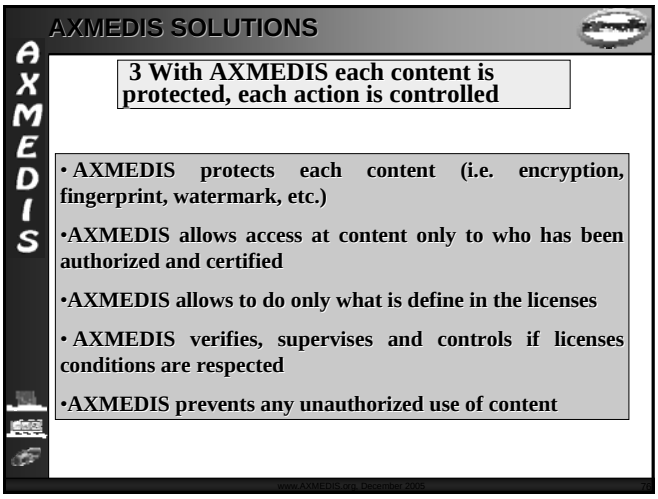
Multimedia producer registered in AXMEDIS

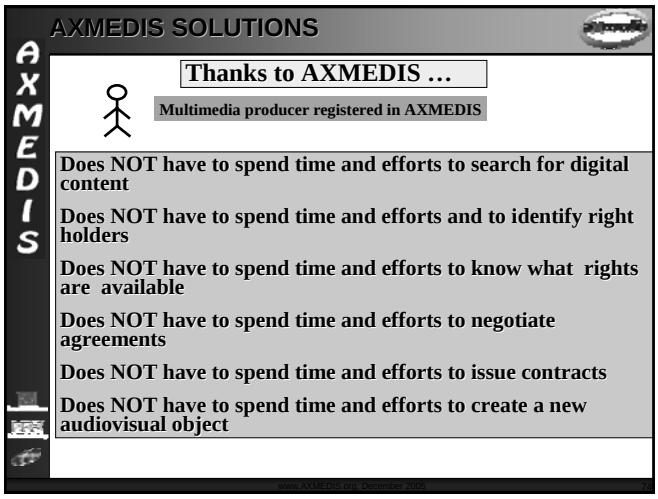
He can easily search any digital content – several criteria

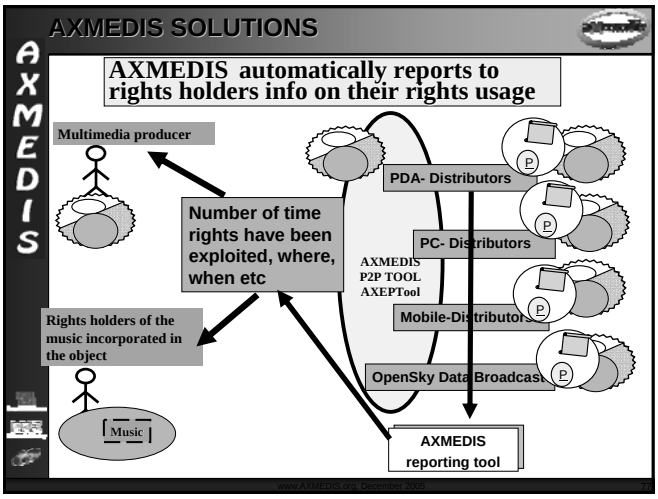
He directly receives available resources with relevant data

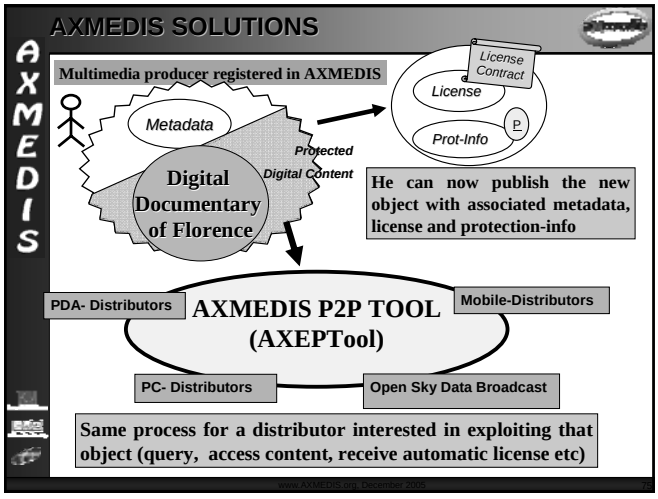


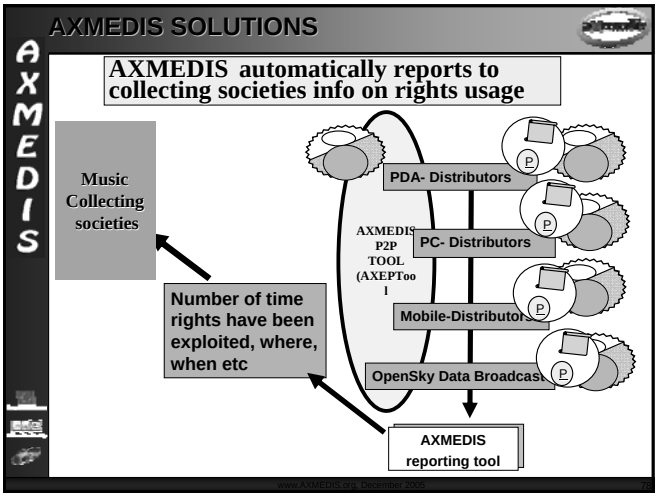

AXMEDIS SOLUTIONS
AXMEDIS
2 Rights clearance process : easy and in real time
Multimedia producer registered in AXMEDIS
To get rights he must obtain the licences
He immediately receives digital licenses and protection info associated to each AXMEDIS content
Licenses include rights available, conditions, eventual prices and protection info include all details on what has to be done to access at the resources
License Contract
License
Prot-Info
Track 2
Track 1


AXMEDIS SOLUTIONS
AXMEDIS
3 With AXMEDIS each content is protected, each action is controlled
• AXMEDIS protects each content (i.e. encryption, fingerprint, watermark, etc.)
•AXMEDIS allows access at content only to who has been authorized and certified
•AXMEDIS allows to do only what is define in the licenses
• AXMEDIS verifies, supervises and controls if licenses conditions are respected
•AXMEDIS prevents any unauthorized use of content


AXMEDIS SOLUTIONS
AXMEDIS
Thanks to AXMEDIS …
Multimedia producer registered in AXMEDIS
Does NOT have to spend time and efforts to search for digital content
Does NOT have to spend time and efforts and to identify right holders
Does NOT have to spend time and efforts to know what rights are available
Does NOT have to spend time and efforts to negotiate agreements
Does NOT have to spend time and efforts to issue contracts
Does NOT have to spend time and efforts to create a new audiovisual object


AXMEDIS SOLUTIONS
AXMEDIS
AXMEDIS automatically reports to rights holders info on their rights usage
Multimedia producer
Number of time rights have been exploited, where, when etc
Rights holders of the music incorporated in the object
Music
PDA- Distributors
PC- Distributors
AXMEDIS P2P TOOL AXEPTool
Mobile-Distributors
OpenSky Data Broadcast
AXMEDIS reporting tool


AXMEDIS SOLUTIONS
AXMEDIS
Multimedia producer registered in AXMEDIS
Metadata
Digital Documentary of Florence
Protected Digital Content
License Contract
License
Prot-Info
He can now publish the new object with associated metadata, license and protection-info
PDA- Distributors
AXMEDIS P2P TOOL (AXEPTool)
Mobile-Distributors
PC- Distributors
Open Sky Data Broadcast
Same process for a distributor interested in exploiting that object (query, access content, receive automatic license etc)


AXMEDIS SOLUTIONS
AXMEDIS
AXMEDIS automatically reports to collecting societies info on rights usage
Music Collecting societies
Number of time rights have been exploited, where, when etc
PDA- Distributors
AXMEDIS P2P TOOL (AXEPTool)
PC- Distributors
Mobile-Distributors
OpenSky Data Broadcast
AXMEDIS reporting tool

AXMEDIS

4 With AXMEDIS each right usage is automatically reported to actors involved in the value chain

• With AXMEDIS each right holder CAN control the use of their rights (original right holders, new right holders, distributors, users etc)

• With AXMEDIS consumers behavior CAN be controlled

• With AXMEDIS collecting societies CAN get all data needed to monitor users and to collect and distribute revenues in an efficient and transparent manner.

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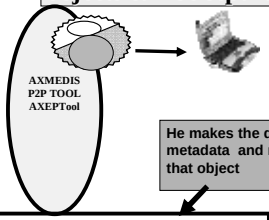
AXMEDIS SOLUTIONS

In addition AXMEDIS incorporated objects can be separately exploited



A registered user watches the documentary. He wants to get rights for using a song heard in the documentary but he does not know the song title

He makes the query to get metadata and rights available on that object

Option 1

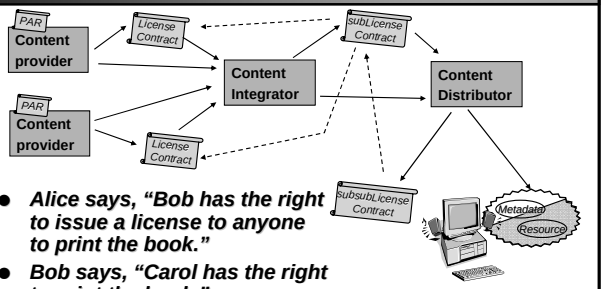
That song CAN be extracted for reuse following the associated license and he can directly get the license

Option 2

That song CAN'T be extracted but He got data to directly make the query of that song

5 AXMEDIS increments the access to content and offers several new business opportunities

Managing License Chain



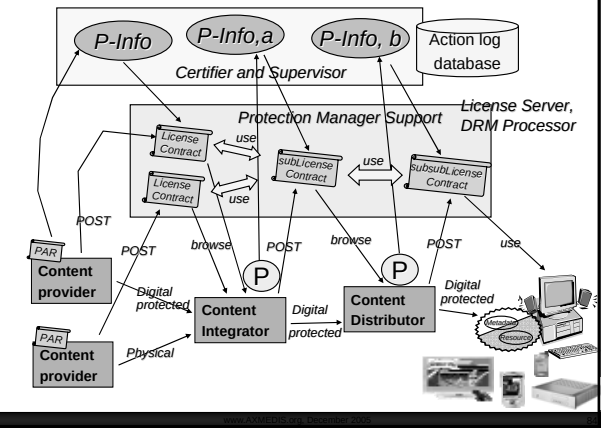
- ***Alice says, "Bob has the right to issue a license to anyone to print the book."***
- ***Bob says, "Carol has the right to print the book."***
- **To solve the SubSubLicense all the connected Licenses are needed**
- **They have to be accessible on Processing Engine**
- **This may involve massive processing**

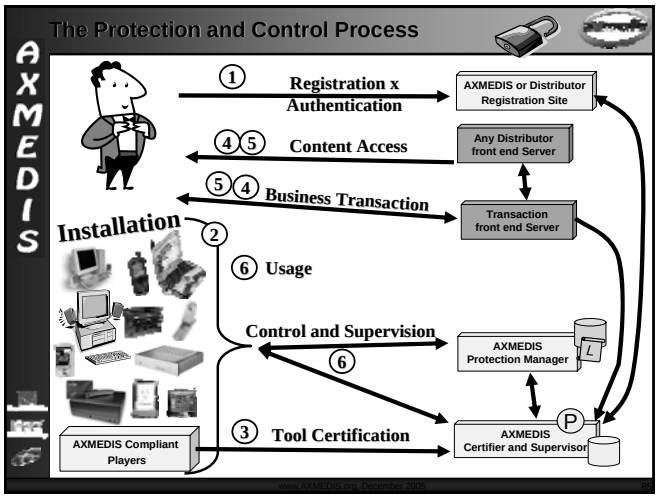
AXMEDIS SOLUTIONS

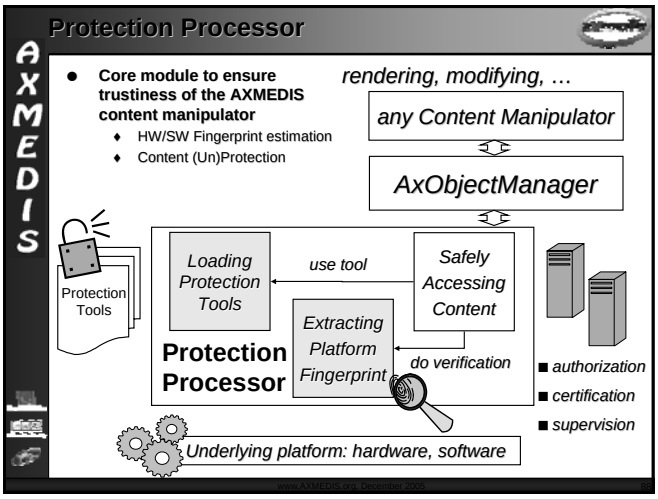
With AXMEDIS rights holders identification is easy and in real time
With AXMEDIS rights clearance process is easy and in real time
With AXMEDIS each content is protected, each action is controlled
With AXMEDIS each right usage is automatically reported to actors involved in the value chain and to collecting societies
AXMEDIS increments the access to content and offers several new business opportunities

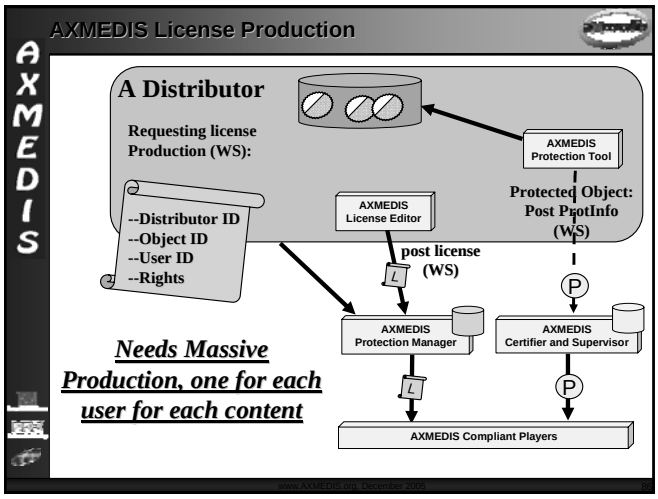
No risk of piracy
More creativity
More business
More revenues

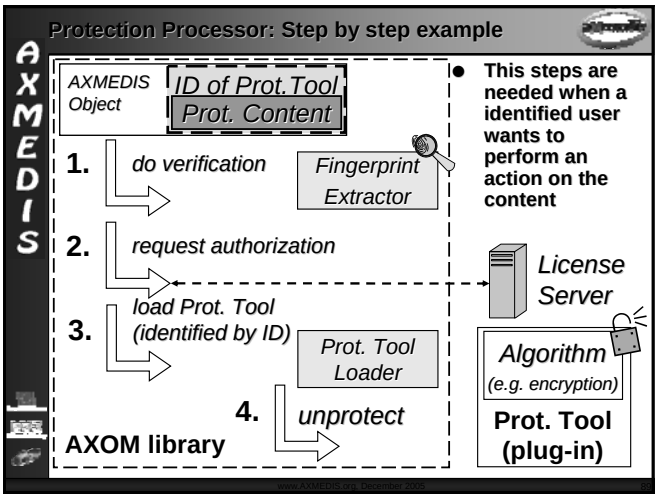
Managing License Chain in AXMEDIS

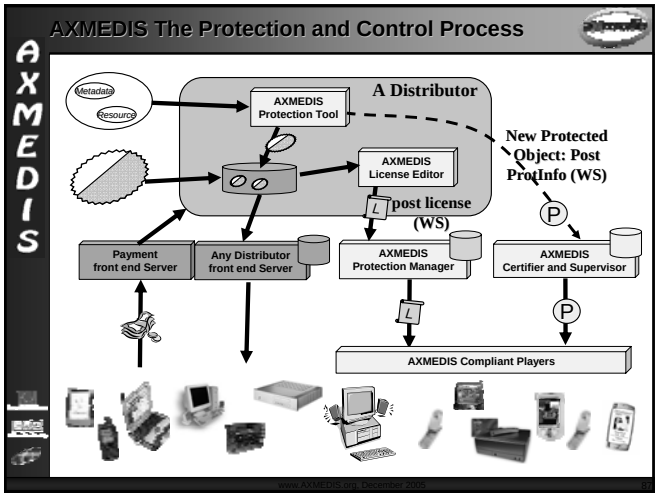


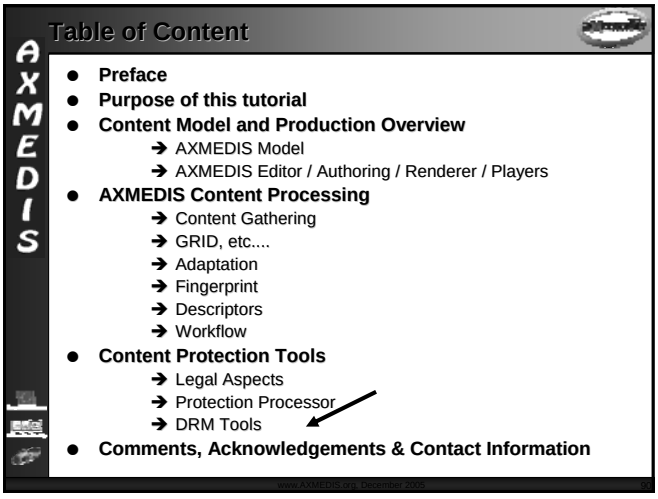

The Protection and Control Process
AXMEDIS
1 Registration x Authentication
AXMEDIS or Distributor Registration Site
4 5 Content Access
Any Distributor front end Server
5 4 Business Transaction
Transaction front end Server
Installation
2
6 Usage
Control and Supervision
6
AXMEDIS Protection Manager
3 Tool Certification
AXMEDIS Certifier and Supervisor
AXMEDIS Compliant Players


Protection Processor
AXMEDIS
Core module to ensure trustiness of the AXMEDIS content manipulator
HW/SW Fingerprint estimation
Content (Un)Protection
rendering, modifying, …
any Content Manipulator
AxObjectManager
Protection Tools
Loading Protection Tools
use tool
Safely Accessing Content
Extracting Platform Fingerprint
do verification
Protection Processor
authorization
certification
supervision
Underlying platform: hardware, software


AXMEDIS License Production
AXMEDIS
A Distributor
Requesting license Production (WS):
AXMEDIS Protection Tool
Protected Object: Post ProtInfo (WS)
AXMEDIS License Editor
--Distributor ID
--Object ID
--User ID
--Rights
post license (WS)
AXMEDIS Protection Manager
AXMEDIS Certifier and Supervisor
AXMEDIS Compliant Players
Needs Massive Production, one for each user for each content


Protection Processor: Step by step example
AXMEDIS
AXMEDIS Object
ID of Prot.Tool
Prot. Content
1. do verification
Fingerprint Extractor
2. request authorization
License Server
3. load Prot. Tool (identified by ID)
Prot. Tool Loader
4. unprotect
AXOM library
Algorithm (e.g. encryption)
Prot. Tool (plug-in)
This steps are needed when a identified user wants to perform an action on the content


AXMEDIS The Protection and Control Process
AXMEDIS
Metadata
Resource
A Distributor
AXMEDIS Protection Tool
New Protected Object: Post ProtInfo (WS)
AXMEDIS License Editor
post license (WS)
Payment front end Server
Any Distributor front end Server
AXMEDIS Protection Manager
AXMEDIS Certifier and Supervisor
AXMEDIS Compliant Players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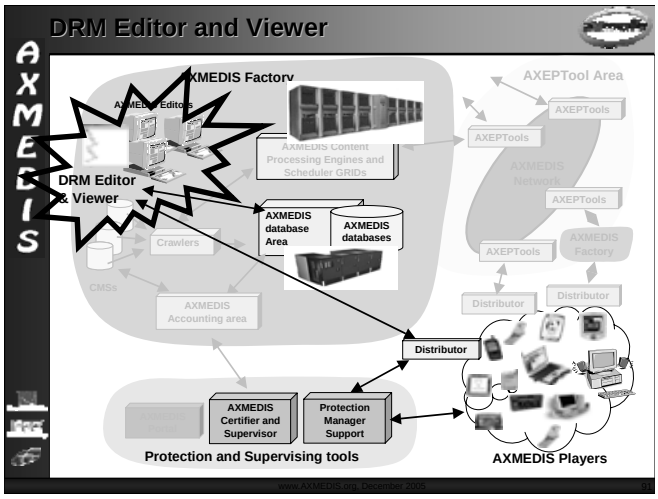
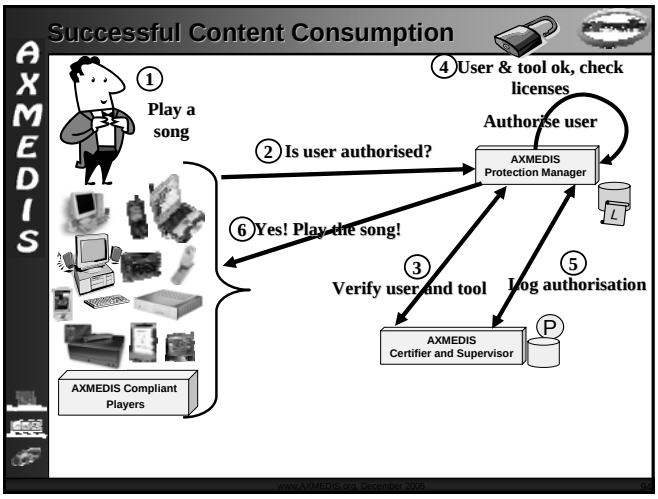
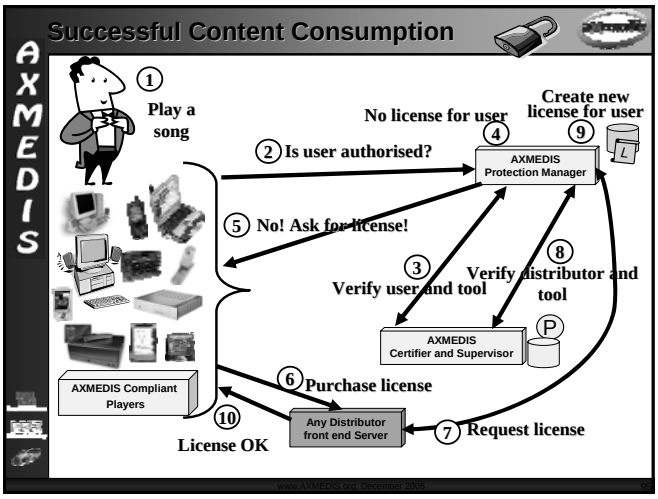
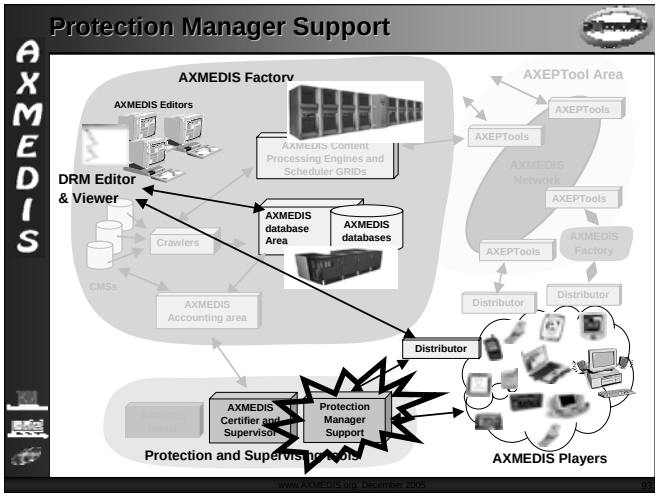
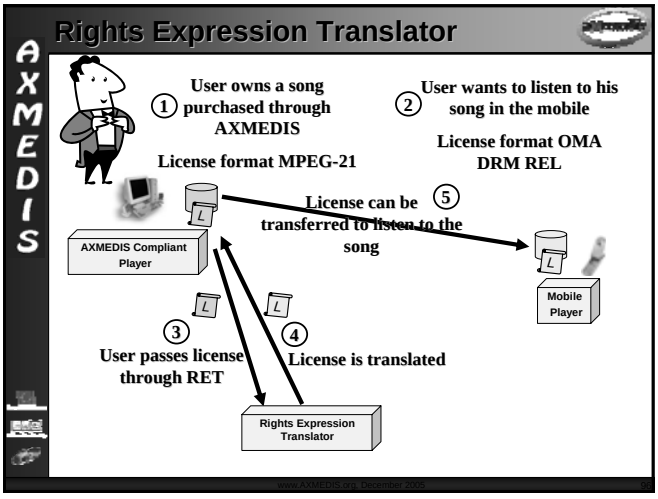

DRM Editor and Viewer
AXMEDIS
AXMEDIS Factory
AXMEDIS Editors
DRM Editor & Viewer
AXMEDIS Content Processing Engines and Scheduler GRIDs
AXMEDIS database Area
AXMEDIS databases
Crawlers
CMSs
AXMEDIS Accounting area
AXEPTool Area
AXEPTools
AXMEDIS Network
AXMEDIS Factory
Distributor
Protection Manager Support
Protection and Supervising tools
AXMEDIS Players


Successful Content Consumption
AXMEDIS
1 Play a song
2 Is user authorised?
3 Verify user and tool
4 User & tool ok, check licenses
Authorise user
5 Log authorisation
6 Yes! Play the song!
AXMEDIS Protection Manager
AXMEDIS Certifier and Supervisor
AXMEDIS Compliant Players

DRM Editor and Vi
AXMEDIS


Successful Content Consumption
AXMEDIS
1 Play a song
2 Is user authorised?
3 Verify user and tool
4 No license for user
5 No! Ask for license!
6 Purchase license
7 Request license
8 Verify distributor and tool
9 Create new license for user
10 License OK
AXMEDIS Protection Manager
AXMEDIS Certifier and Supervisor
AXMEDIS Compliant Players
Any Distributor front end Server


Protection Manager Support
AXMEDIS
AXMEDIS Factory
AXMEDIS Editors
DRM Editor & Viewer
AXMEDIS Content Processing Engines and Scheduler GRIDs
AXMEDIS database Area
AXMEDIS databases
Crawlers
CMSs
AXMEDIS Accounting area
AXEPTool Area
AXEPTools
AXMEDIS Network
AXMEDIS Factory
Distributor
Protection Manager Support
Protection and Supervising tools
AXMEDIS Players


Rights Expression Translator
AXMEDIS
1 User owns a song purchased through AXMEDIS
License format MPEG-21
2 User wants to listen to his song in the mobile
License format OMA DRM REL
3 User passes license through RET
4 License is translated
5 License can be transferred to listen to the song
AXMEDIS Compliant Player
Mobile Player
Rights Expression Translator

Protection area

- **Demonstration**
  - Overview on state of the art on rights management and AXMEDIS benefits
  - Protection mechanisms
  - DRM Editor and viewer
  - License production and storage
  - Rights Expression Translator

Publicly Accessible AXMEDIS Framework Documents

- **DE3.1.3 -- Framework and tools Specification, 10 parts**
  - A) AXMEDIS General aspect and Model
  - B) AXMEDIS Viewers and Players
  - C) AXMEDIS content processing area, GRID
  - D) AXMEDIS Fingerprint and Descriptors
  - E) AXMEDIS Database and Content gathering
  - F) AXMEDIS AXEPTools P2P
  - G) AXMEDIS Workflow
  - H) AXMEDIS Protection and accounting
  - I) AXMEDIS Draft Distribution and Portal
  - J) AXMEDIS Definitions and Terminology
- **DE5.1.1 -- AXMEDIS Framework Infrastructure**
- **DE5.2.1 -- AXMEDIS Framework Validation and Integration**

Table of Content

- **Preface**
- **Purpose of this tutorial**
- **Content Model and Production Overview**
  - → AXMEDIS Model
  - → AXMEDIS Editor / Authoring / Renderer / Players
- **AXMEDIS Content Processing**
  - → Content Gathering
  - → GRID, etc....
  - → Adaptation
  - → Fingerprint
  - → Descriptors
  - → Workflow
- **Content Protection Tools**
  - → Legal Aspects
  - → Protection Processor
  - → DRM Tools
- **Comments, Acknowledgements & Contact Information**

Publicly Accessible AXMEDIS Framework Documents

- ***Early Reports on Basic Technologies***
- ***DE4.1.1 - Content Modelling and managing***
- ***DE4.2.1 - Content indexing, monitoring and querying***
- ***DE4.3.1 - Content Composition and formatting***
- ***DE4.4.1 - Content sharing and production on P2P***
- ***DE4.5.1 - Content Protection and Supervision***
- ***DE4.6.1 - Content Distribution via Internet***
- ***DE4.7.1 - Content Distribution toward mobiles***
- ***DE4.8.1 - Content Distribution via satellite data broadcast, the push optimisation and the on demand problem***
- ***DE4.9.1 - The Usability issues for the AXMEDIS production tools***

Publicly Accessible General AXMEDIS Documents

- **DE2.1.1 (two parts, A and B) User Requirements and use cases**
  - A) User Requirements
  - B) Use Cases
- **DE2.2.1 -- Test Cases and Content Description**

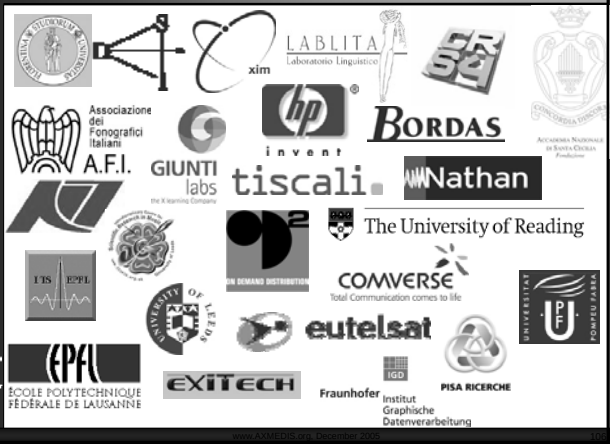
- **Reports on Content**
- **DE3.1.3 -- AXMEDIS Content Aspects Specification**
- **DE8.1.1 -- Content for Test Cases and Validation**
- **DE8.2.1 -- Content Selection Guidelines**
- **DE8.3.1 -- Multilingual guidelines and technical solutions**
- **DE8.4.1 -- AXMEDIS Editorial Format Guidelines and Basic Examples**

References

- **AXMEDIS: www.axmedis.org**
- **CRF: Content Reference Forum: http://www.crforum.org/**
- **DMP: Digital Media Project, www.chiariglione.org**
- **EITO 2005: European Information Technology Observation 2005: http://www.eito.com/index-eito.html**
- **ODRL: http://odrl.net/**
- **OMA: www.openmobilealliance.org**
- **MI3P, Music Industry Integrated Identifier Project, http://www.mi3p-standard.org/**
- **MPEG, MPEG-21: www.chiariglione.org**
- **MUSICNETWORK: www.interactivemusicnetwork.org**
- **WEDELMUSIC: www.wedelmusic.org**
- **Microsoft Windows Media: http://www.microsoft.com/windows/windowsmedia/default.aspx**

Comments, Acknowledgements & Contact Information

Thanks to all AXMEDIS partners



Other AXMEDIS courses

- **Hope you have enjoyed this Tutorial**
  - For additional information please refer to AXMEDIS contact person or access to the AXMEDIS web portal and/or CD for further documentations and reports from which this Tutorial has been produced.
  - Updated reports are being produced annually.
  - By affiliating with AXMEDIS and participating the AXMEDIS events and activities, you will be kept up to date with the latest progress and development.
- **Additional AXMEDIS courses include:**
  - AXMEDIS Detailed Overview, 6 hours, full day course
  - AXMEDIS Content Production area, demonstration and training
  - AXMEDIS Content Distribution area, demonstration and training
  - *They are available online at the AXMEDIS web portal*

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.***

DISIT-DSI
Department of Systems and Informatics
Distributed Systems and Internet Technology Lab
University of Florence
Via S. Marta 3, 50139 Firenze, Italy
Email: nesi@dsi.unifi.it
Web: http://www.AXMEDIS.org

Affiliation to the AXMEDIS

- **You can be affiliated with AXMEDIS. The affiliation provides access to a large amount of information, knowledge, and source code, related to the AXMEDIS Framework.**
- **If you are interested in the affiliation, please contact P. Nesi by email (nesi@dsi.unifi.it). The benefits of the affiliation include the possibility of using the AXMEDIS specification and technology for your business.**
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  - attend AXMEDIS public meetings, for further information see www.axmedis.org or contact P. Nesi at nesi@dsi.unifi.it