

VCIP 2003



Introduction to MPEG-21



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8 July 2003



- What is MPEG-21 ?
- How is MPEG21 structured ?
- Why is MPEG-21 relevant to you ?

“It was on the 29th of January 1988 that an SC 2 / WG 8 resolution established the Moving Picture Coding Experts Groups”

Leonardo Chiariglione
Telecom Italia Lab

What is MPEG-21 ?



- An open framework for multimedia delivery and consumption
- Focal points:
 - Content creators
 - Content consumers

- MPEG is a working group of ISO
 - ISO/IEC JTC 1/SC 29/WG 11
 - Coding of moving pictures and audio
- Development of international standards for compression, decompression, processing and coded representation of moving pictures, audio, and their combination, in order to satisfy a wide variety of applications



Much of the material on these slides is from <http://mpeg.telecomitalia.com/>

Application examples

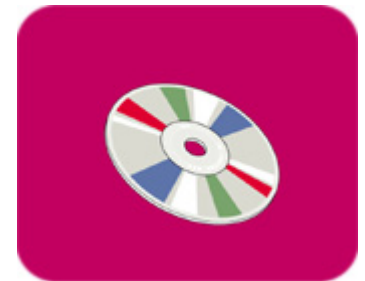


- Video CD, MP3, DVD
- Satellite TV, digital cable, HDTV
- Video on demand
- PC video streaming
 - Apple QuickTime
 - Microsoft Windows Media Player
 - RealNetworks Helix and RealPlayer
- Do-it-yourself



- MPEG-1 and MPEG-2 provide interoperable ways of representing audiovisual content, commonly used on digital media and on the air
- MPEG-4 defines how to *represent* content
- MPEG-7 specifies how to *describe* content
- MPEG-21 provides a truly interoperable multimedia framework

- Coding of moving pictures and associated audio for digital storage media
- Video and audio at 1.5M bit/s for CD-ROM
- Five parts:
 - Part 1 (systems): multiplexing & synchronization
 - Part 2 (video): ~VHS quality at 1.15M bit/s
 - Part 3 (audio): stereo at 384K, 256K, 192K bit/s
 - Part 4 (conformance testing): references for decoder
 - Part 5 (reference software): C implementation
- Applications: Video CD, MP3



- Generic coding of moving pictures and associated audio
- Digital Storage Media Command and Control (DSM-CC) for session set up and remote control of a server, used in set top boxes for satellite and cable TV
- Advanced Audio Coding (AAC) for multi-channel audio
- 4:2:2 profile for TV production studios
- Provisions for Intellectual Property Management and Protection (IPMP)
- Applications: digital TV set top boxes, DVD
- Transport Stream version
- Patent issues



- Coding of audiovisual objects
- MPEG-4 defines how to *represent* content
 - ancestry: VRML
 - interoperability of content structure
 - AFX — Animation Framework eXtension
 - XMT — textual XML format for SMIL, Web3D, etc.
 - adapt transparently to device capabilities
 - FSG — Fine Granularity Scalability
- Extensions of AAC and IPMP, Studio Profile
- MP4 and AVC file formats, multi-user environment
- Patent issues



- Multimedia content description interface
- MPEG-7 specifies how to *describe* content
 - describe content way beyond metadata
 - facilitate content management, in particular searching

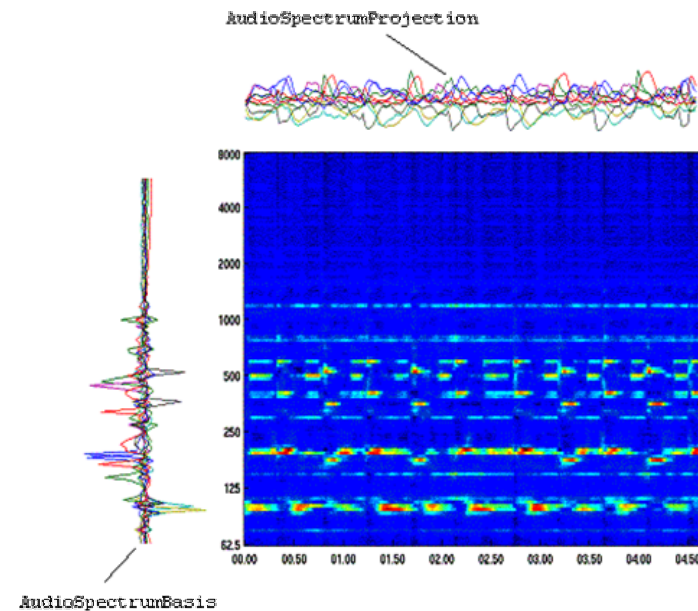
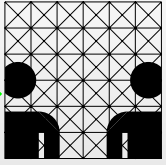


Image credit: <http://mpeg.telecomitalialab.com/standards/mpeg-7/mpeg-7.htm>

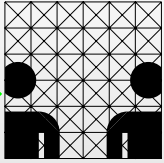


Content Descriptions vs. Metadata

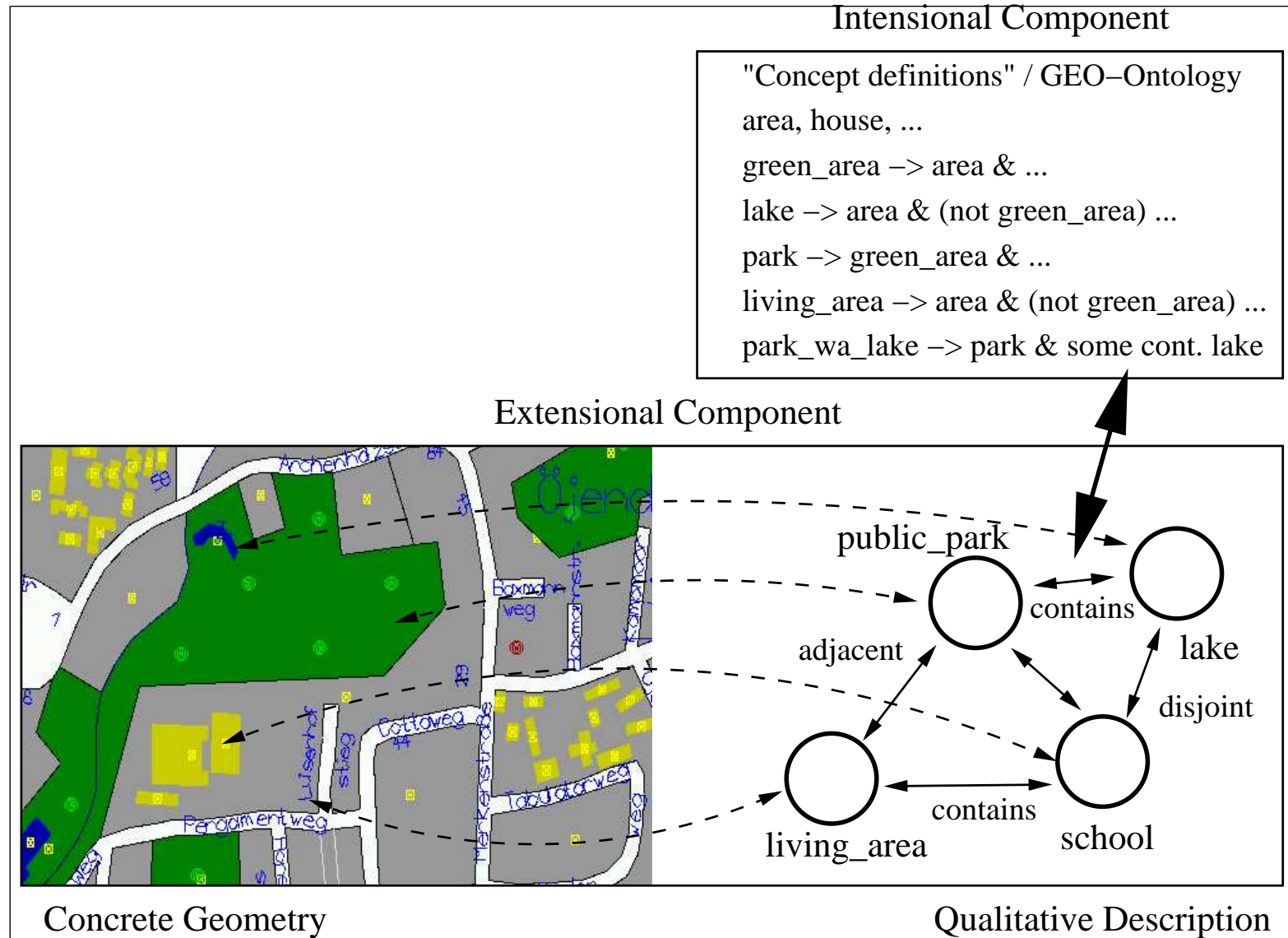


Concrete Geometry

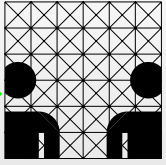
Starting point: a digital vector map



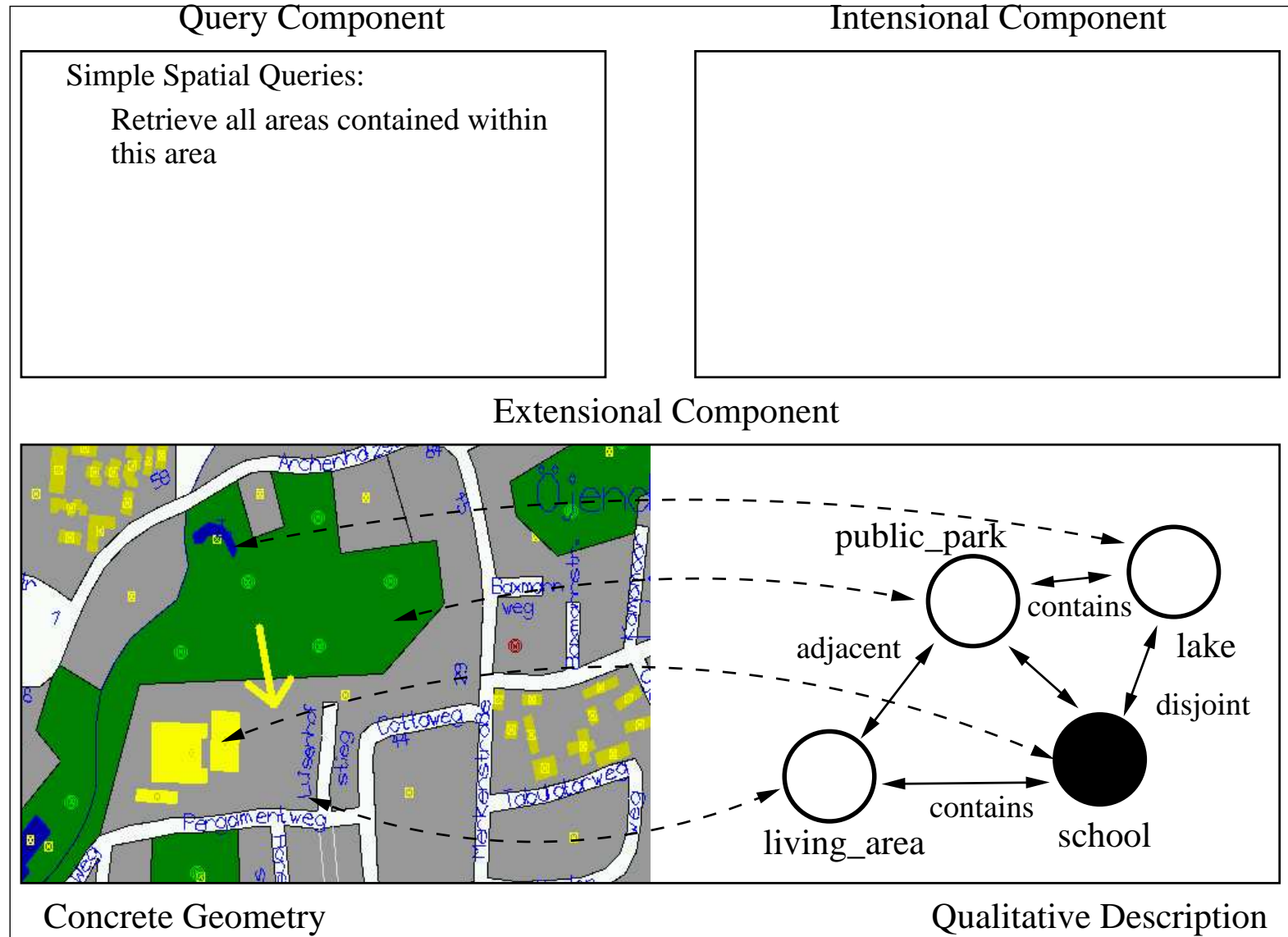
Content Descriptions vs. Metadata



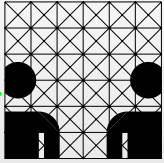
Some concepts are really “spatio-thematic”



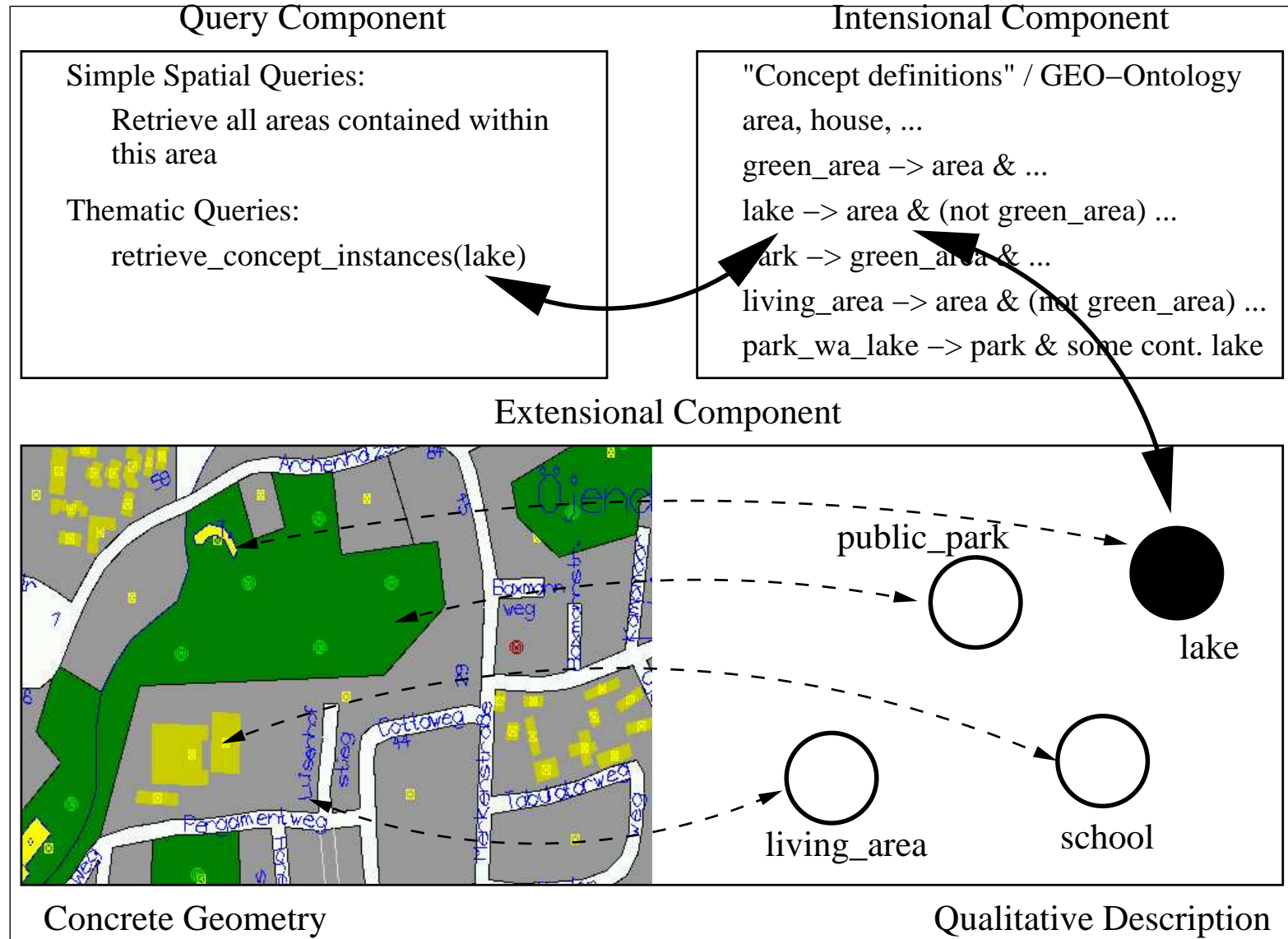
Content Descriptions vs. Metadata



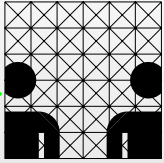
Purely spatial queries



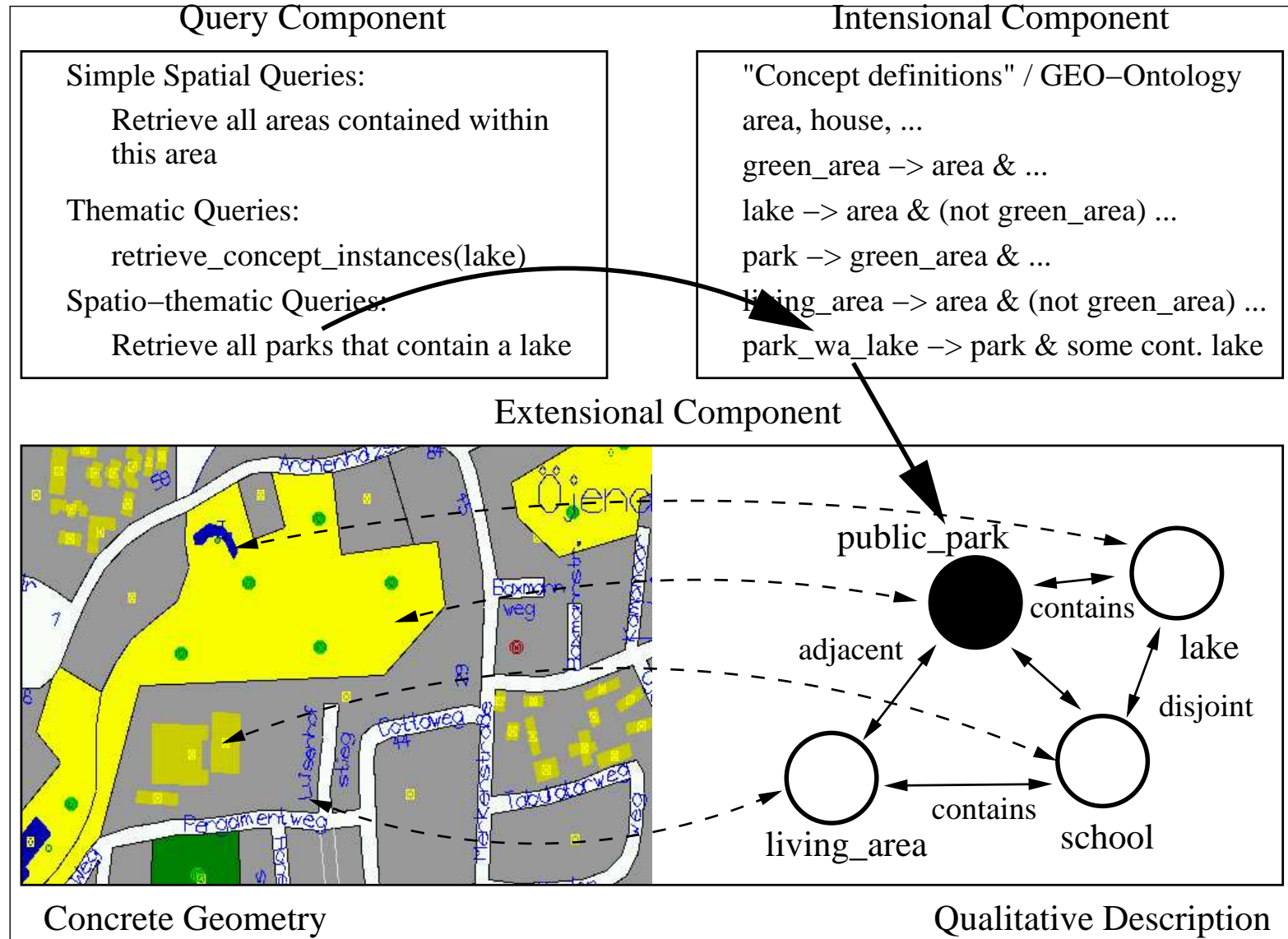
Content Descriptions vs. Metadata



Purely thematic queries



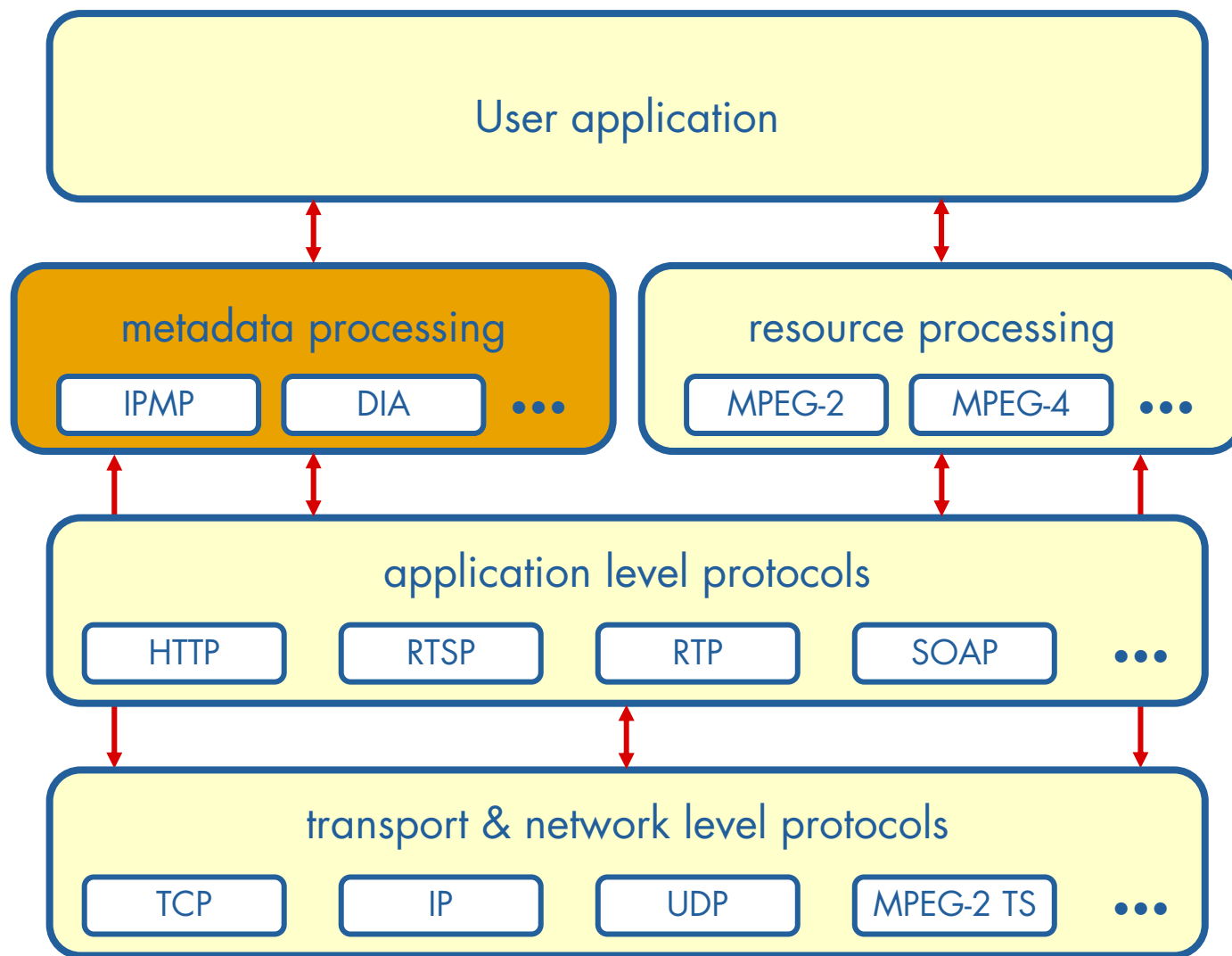
Content Descriptions vs. Metadata



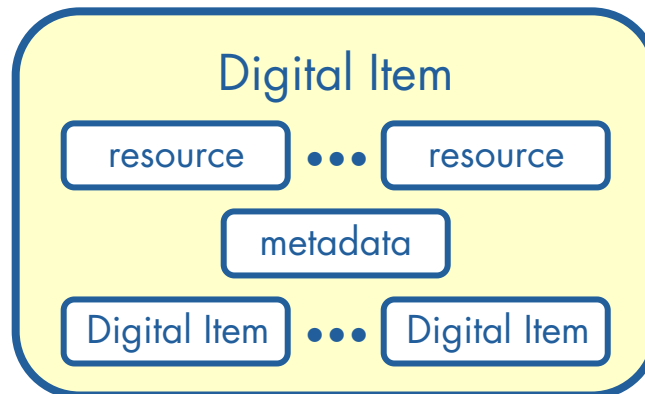
‘Spatio-thematic’ queries

Define the technology needed to support **Users** to exchange, access, consume, trade and otherwise manipulate **Digital Items** in an efficient, transparent and interoperable way

MPEG-21 scope



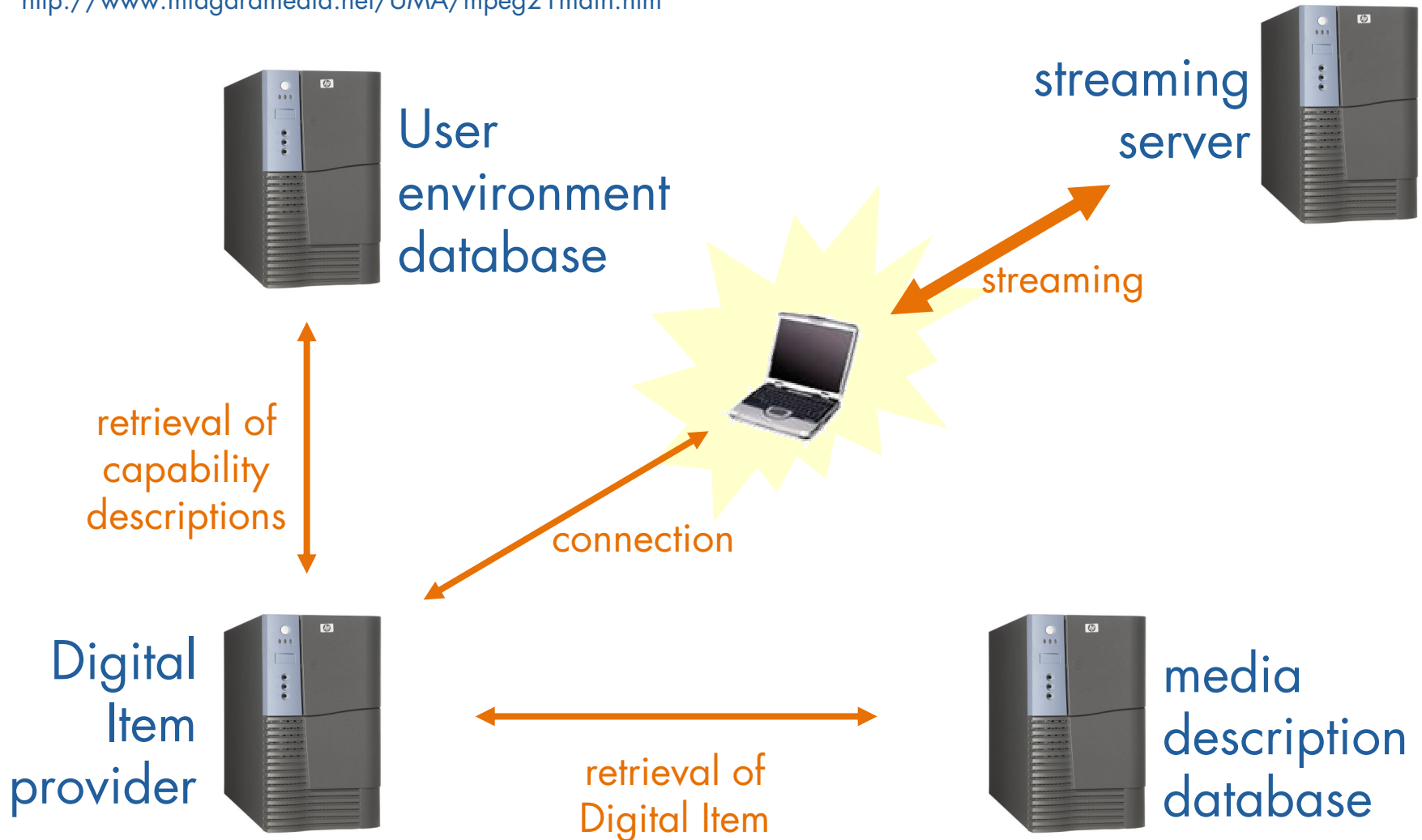
- Structured digital objects, including a standard representation and identification, and metadata
- Fundamental unit of distribution and transaction within the MPEG-21 framework
- No further technical meaning



- A **User** is any entity that interacts in the MPEG-21 environment or makes use of a Digital Item
 - Users include individuals, consumers, communities, organisations, corporations, consortia, governments and other standards bodies and initiatives around the world.
- Users are identified specifically by their relationship to another User for a certain interaction
- MPEG-21 makes no distinction between a “content provider” and a “consumer” — both are Users
 - A single entity may use content in many ways
 - however, a User may assume specific or even unique rights and responsibilities according to their interaction with other Users within MPEG-21

MPEG-21 CE testbed

<http://www.midgardmedia.net/UMA/mpeg21main.htm>



The parts of MPEG-21

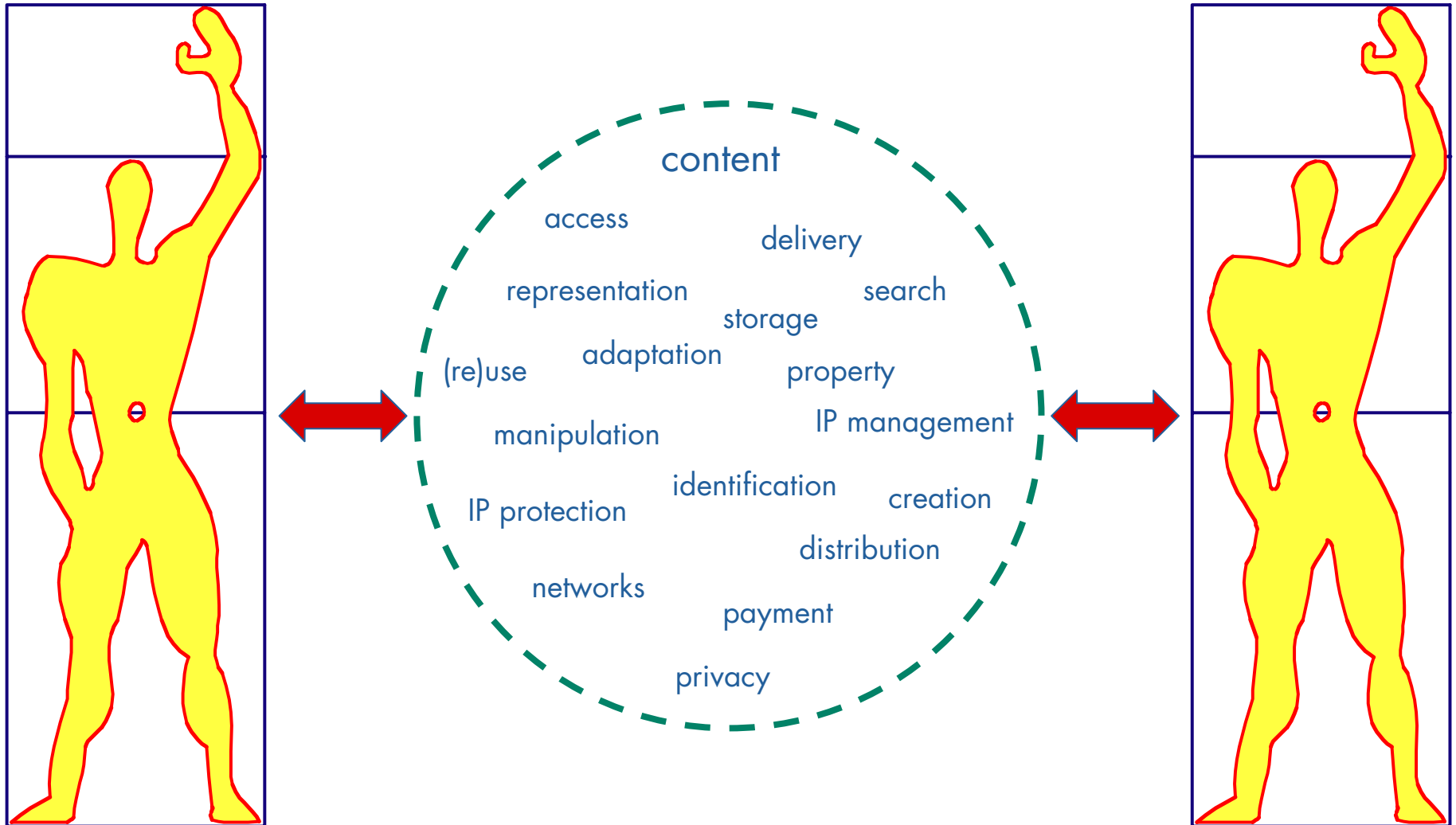


1. Vision, technologies and strategies
2. Digital Item Declaration
3. Digital Item Identification
4. Intellectual Property Management and Protection (IPMP)
5. Rights Expression Language
6. Rights Data Dictionary
7. Digital Item Adaptation
8. Reference Software
9. File Format

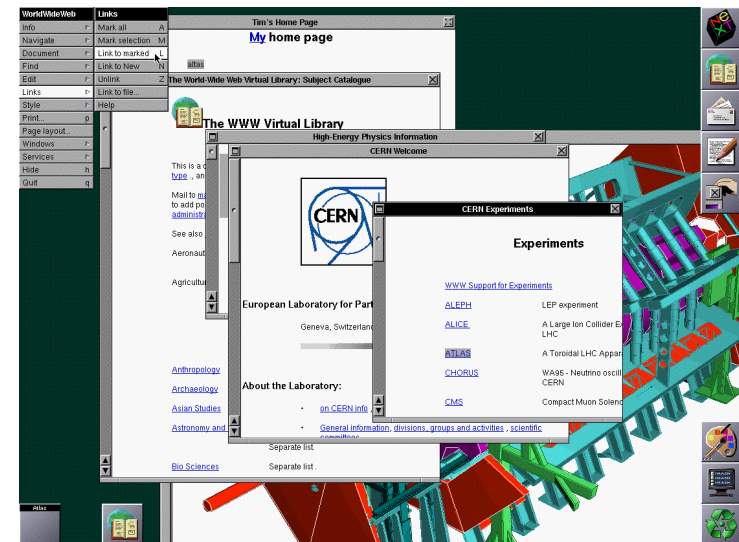
- Define a multimedia framework to enable transparent and augmented use of multimedia resources across a wide range of networks and devices
 1. Provide a vision
 2. Facilitate integration and harmonization of technologies
 3. Provide a strategy for achieving a framework through collaboration



Users and content



- World Wide Web's phases
 - 1990 (info.cern.ch) — scientific exchange
 - 1995 (tidal wave) — free content
 - 2000 (dot bomb) — ubiquitous fast network
- Users are starting to recognize the value of their digital asset resources
- Markets must be efficient



The need for harmonization



s/w platform owners

h/w platform owners

creators

distributors

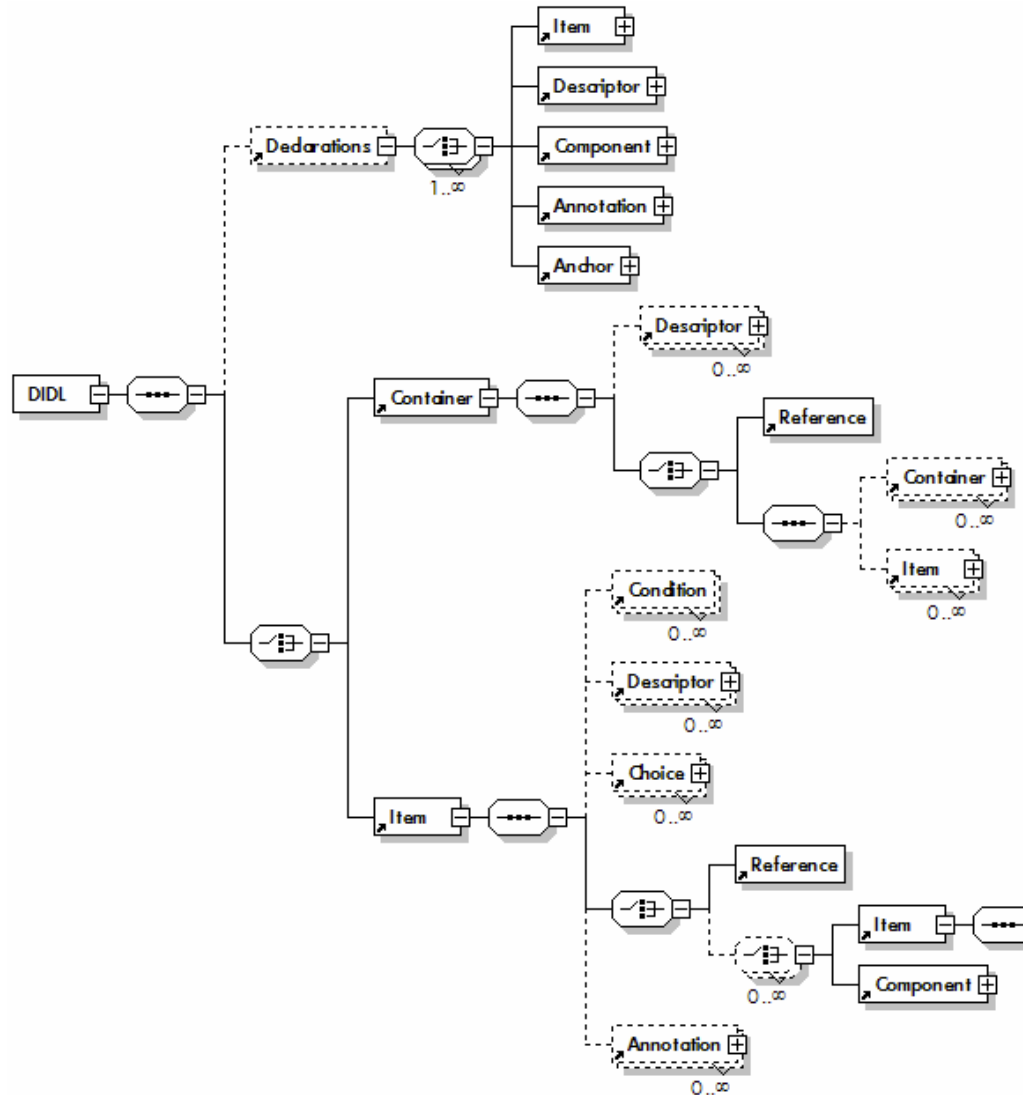
service providers

gadget platform owners

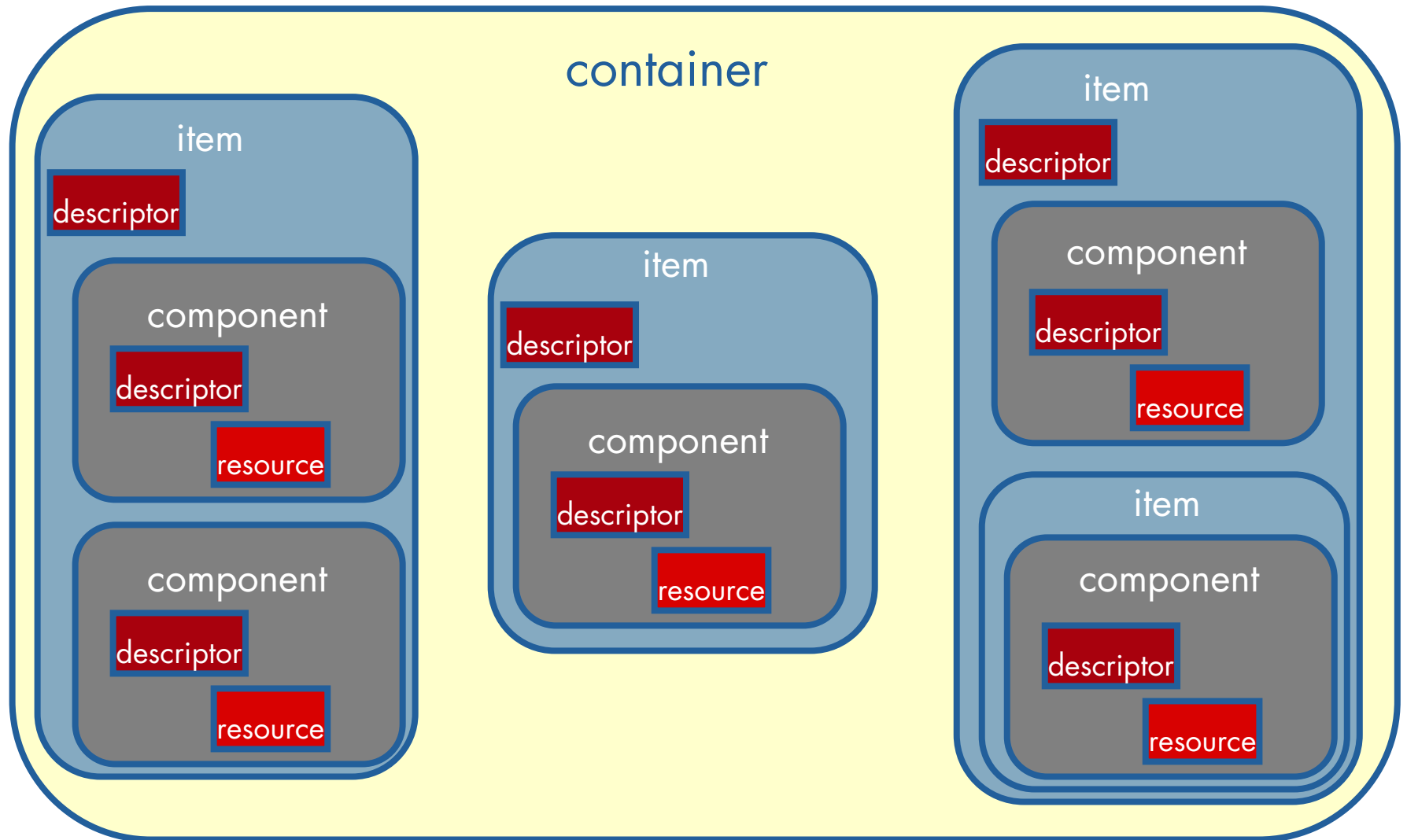
fiduciaries

- Index a Digital Item
- Purpose: describe a set of abstract terms and concepts to form a useful model for defining Digital Items
- Three normative sections:
 - Model
 - set of abstract terms and concepts
 - Representation
 - normative description of syntax & semantics of DID elements
 - Schema
 - normative XML schema comprising the entire grammar of DID

Digital Item Declaration in detail



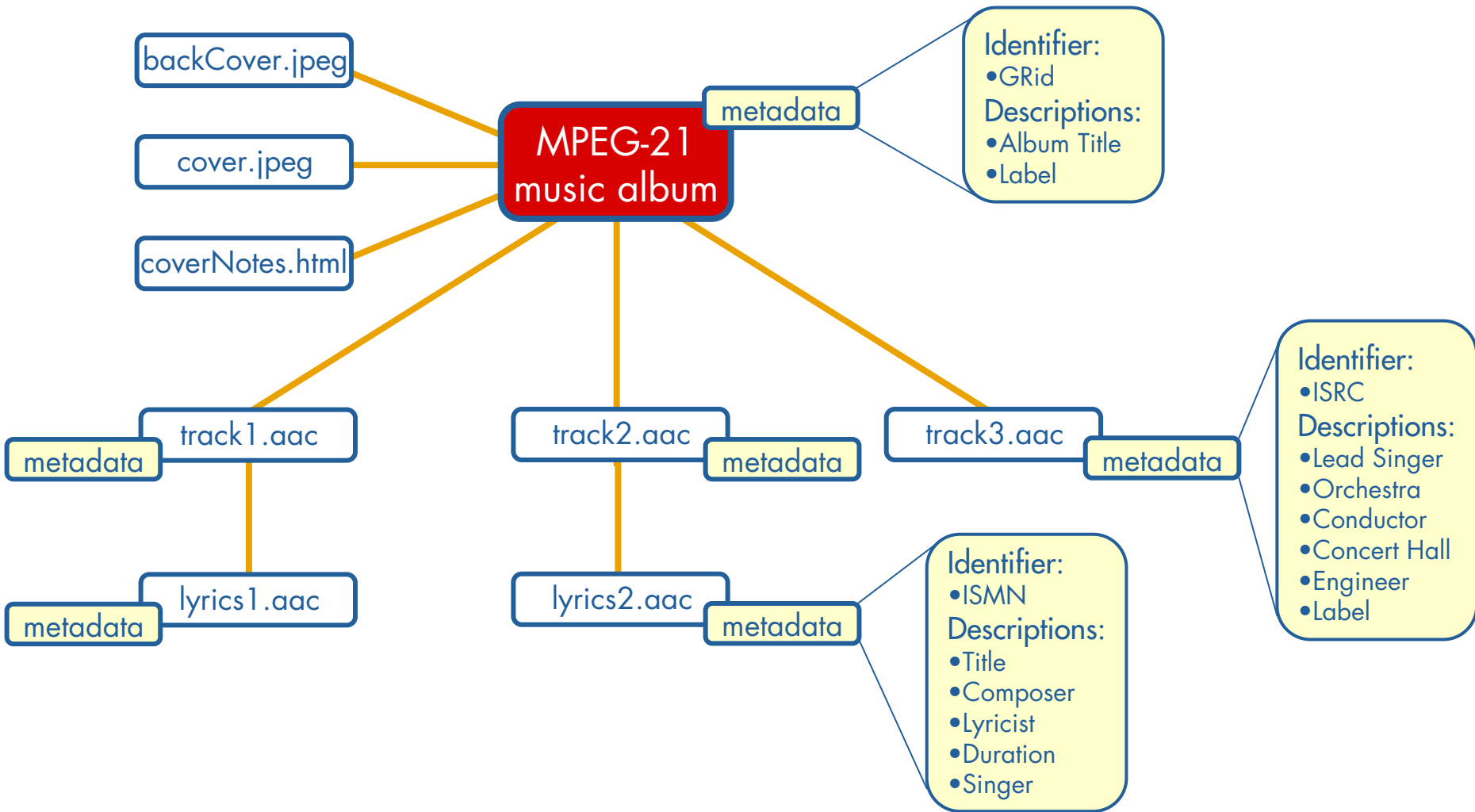
Digital Item Declaration example



The scope of the Digital Item Identification (DII) specification includes:

- How to uniquely identify Digital Items and parts thereof (including resources)
- How to uniquely identify IP related to the Digital Items (and parts thereof), for example abstractions
- How to uniquely identify Description Schemes
- How to use identifiers to link Digital Items with related information such as descriptive metadata
- How to identify different types of Digital Items

DII example: MPEG-21 music album





i n v e n t

http://www.inventoland.net/imaging/mp21/vcip2003_T6.pdf