

VCIP 2003



Introduction to MPEG-21



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The parts of MPEG-21

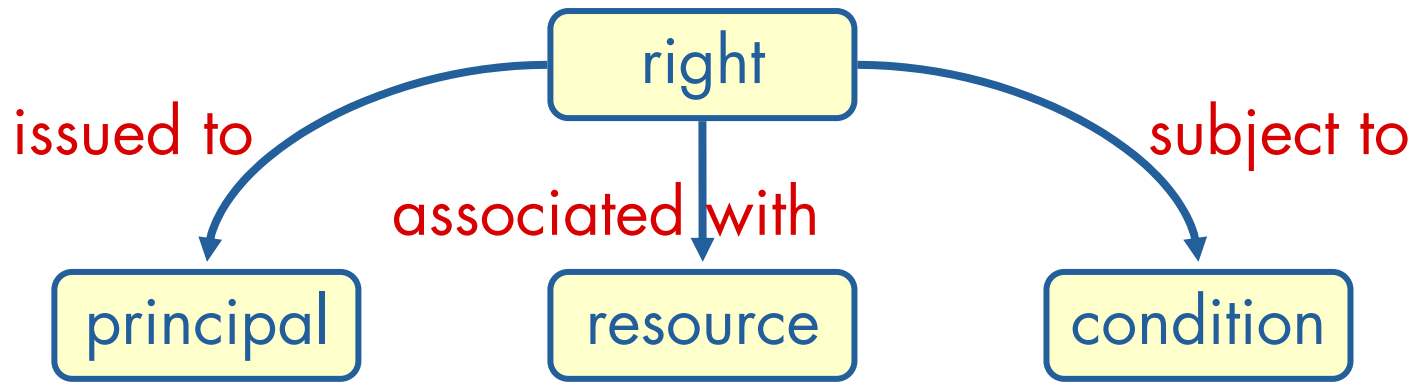


1. Vision, technologies and strategies
2. Digital Item Declaration
3. Digital Item Identification
4. Intellectual Property Management and Protection (IPMP)
5. Rights Expression Language
6. Rights Data Dictionary
7. Digital Item Adaptation
8. Reference Software
9. File Format

- Improvements over MPEG-4 IPMP:
 - Internetworking
 - IPMP tool retrieval & authentication
 - Integration of Rights Expressions (RDD & REL)
- Intellectual Property Management and Protection involves the enforcement of REL permissions
 - IPMP shall consult REL before any actions are taken in the User's system
- REL: What is protected? What right applies?
IPMP: How is it protected?

- Rights Expression Language
- A machine-readable language
- Can declare rights and permissions
- Uses terms defined in the Rights Data Dictionary

- The Rights Expression Language consists of licenses and grants that give specific permissions to Users to perform certain actions on certain resources, given that certain conditions are met
 - Grants can also allow Users to delegate authority to others
- User's system shall parse and validate the RE
- User's system shall check permissions before any further action is done
- DID parser is responsible for discovering and identifying where to gather licenses
- REL licenses are wrapped in Digital Items



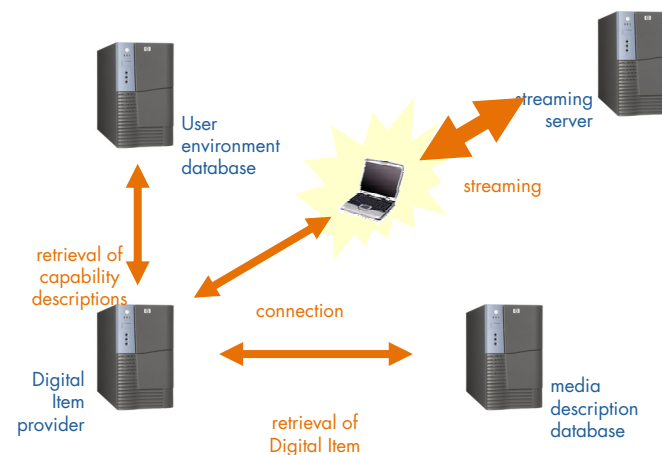
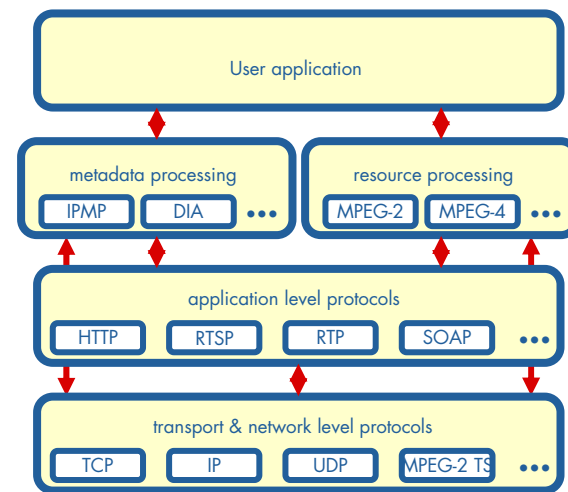
- REL grant consist of
 - principal to whom grant is issued
 - rights the grant specifies
 - resource to which right in grant applies
 - condition to be met before grant can be exercised

- Set of clear, consistent, structured, integrated and uniquely identified Terms to support REL
- Specification of dictionary structure and methodology to create dictionary
- Dictionary is prescriptive, inclusive, and has audit provisions
- Legal definitions are mapped from other Authorities
- Supports mapping & transformation of metadata from terminology of one namespace (or Authority) into that of another namespace in automated or partially-automated way
- Dictionary is based on a logical model, the Context Model, which is the basis of the dictionary ontology

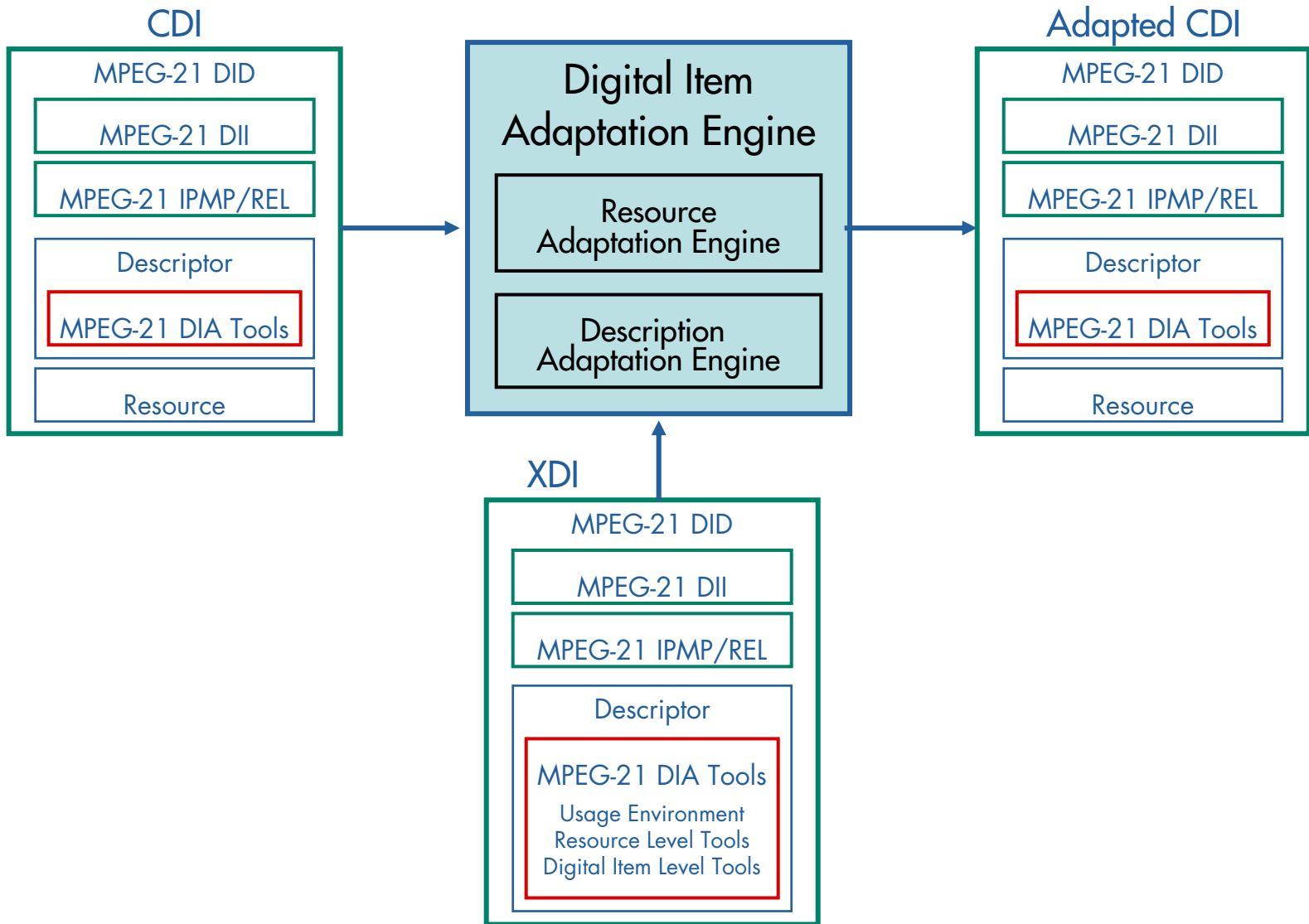
MPEG-21 Part 7 — Digital Item Adaptation



- Goal: achieve transparent interoperable access to distributed multimedia content
- Enable ad hoc formation of User communities in which contents is shared with agreed or contracted
 - Quality
 - Reliability
 - Flexibility
 - Diversity
- Guaranteed user experience

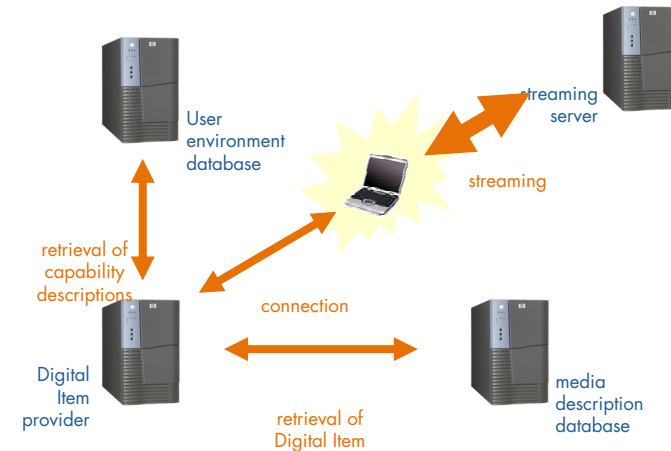


Relation between DIA and other MPEG-21 parts



Scope of standardization

- User Characteristics
- Terminal Capabilities
- Network Characteristics
- Natural Environment Characteristics
- Resource Adaptability
- Session Mobility



Usage Environment Description Tools

- User Characteristics
- Terminal Capabilities
- Network Characteristics
- Natural Environment Characteristics

Digital Item Resource Adaptation Tools

- Bitstream Syntax Description
- Terminal and Network Quality of Service
- Metadata Adaptability

Digital Item Declaration Adaptation Tools

- Session Mobility
- DID Configuration Preferences
- DIA Description Messages

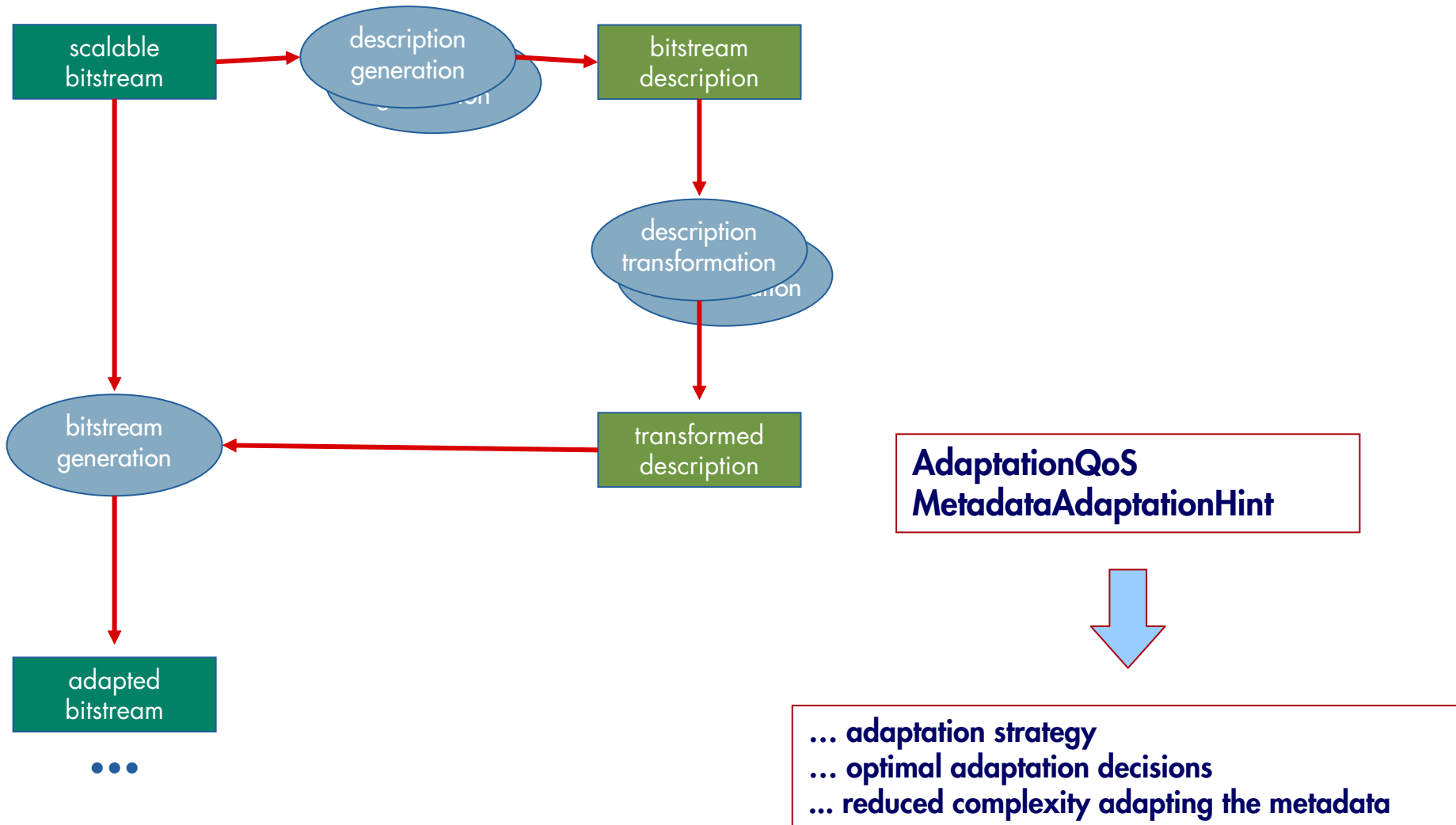
- BSDL (Bitstream Syntax Description Language)
- gBS Schema (generic Bitstream Syntax Schema)

- AdaptationQoS

- MetadataAdaptationHint

- A BSD describes the syntax (high level structure) of a binary media resource
- BSDL: XML schema based language to design specific bitstream syntax schemas for particular media formats
- gBS schema: generic schema enabling the construction of resource format independent bitstream syntax descriptions

Adaptation architecture



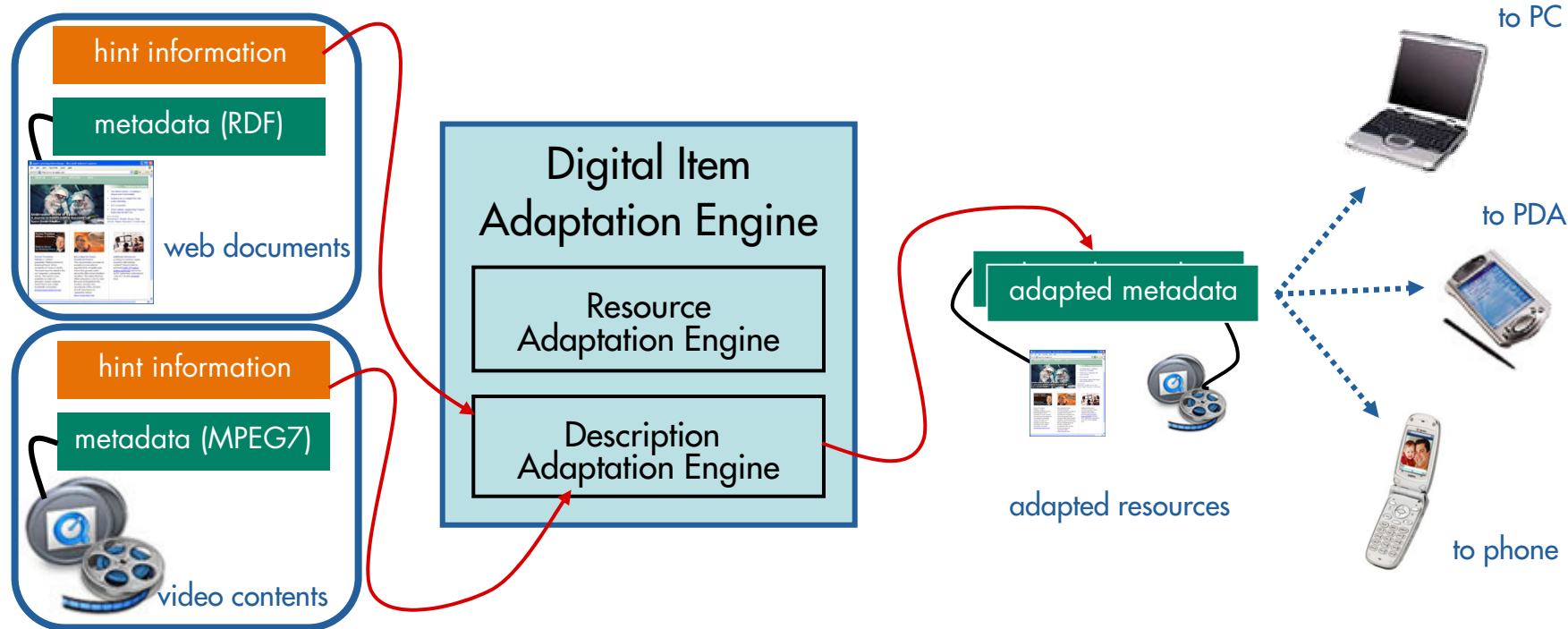
Terminal and Network Quality of Service



- *AdaptationQoS* specifies the relationship between constraints and feasible adaptation operations
- Constraints: *BandwidthInkbps*, *ComputationTimeInMillisecs*
- Utilities (qualities): *PSNRIndB*
- Adaptation Methods:
 - *frameDroppingAndOrCoefficientDropping*, requantization, *fineGranularScalability*, *waveletReduction*, *spatialSizeReduction*
- UtilityFunction:
 - describes possible adaptation operators and associated qualities using a set of constraint points as indexes
 - Linear interpolation is assumed between constraint points
- LookUpTable:
 - additional multi-dimensional sets of data to support more elaborate adaptation scenarios
- StackFunction
 - tool for describing the data in numerical function format

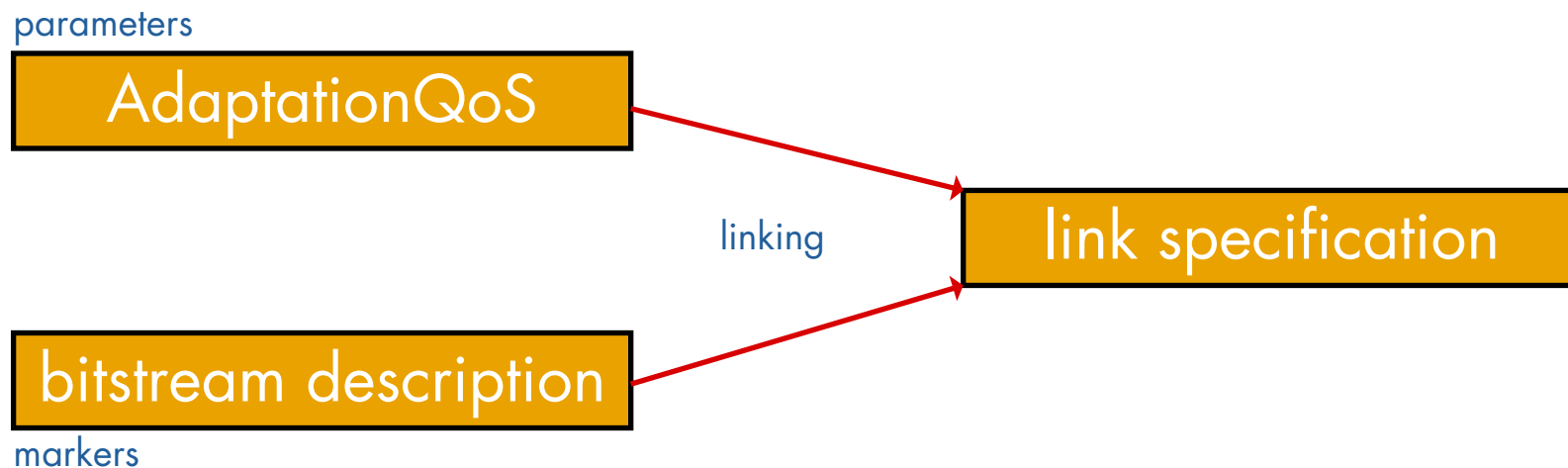
Metadata Adaptability

- *MetadataAdaptationHint* describes adaptation hint information pertaining to metadata within a digital item
- Hint: a set of syntactical elements with prior knowledge about the metadata that is useful for reducing the complexity of the metadata adaptation process

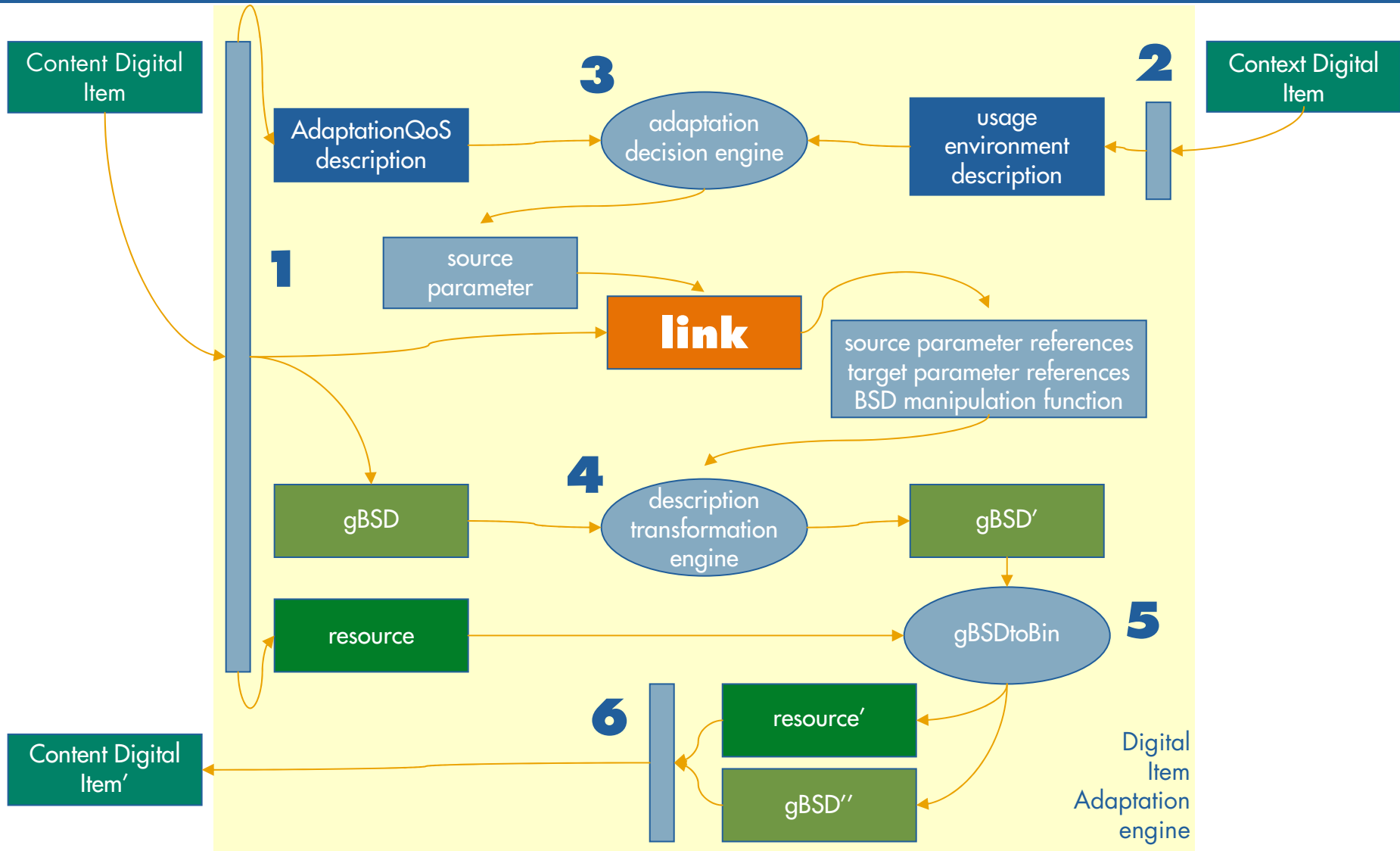


In some cases it is convenient to specify intrinsic operations based on a universal model for scalable bit-streams

A specified operation can be seen as a **link** that is composed of a mapping condition between identified parameters and an operation, which is conducted if this mapping is fulfilled



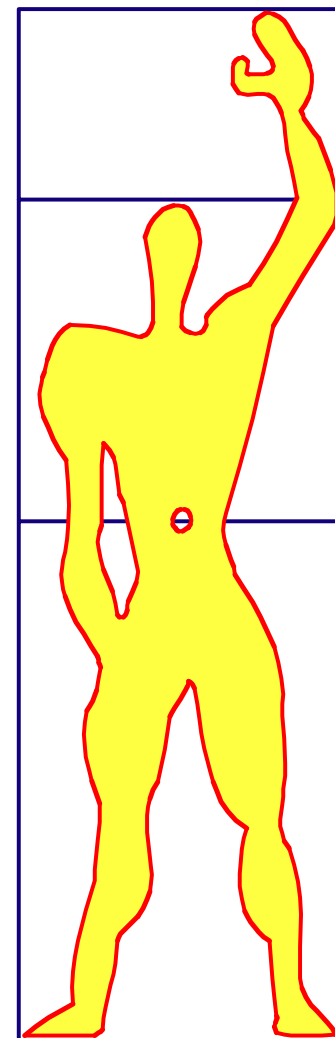
(g)BSD, AdaptationQoS, and Link



- Success of a standard depends on the availability of reference software
- Plan to use the software developed in Core Experiments (CE) as a basis
- Platform independence
- Future repository (requires membership)
 - <http://mpeg.nist.gov/cvsweb/MPEG-21/>
- Temporary repository
 - <http://www.titr.uow.edu.au/cgi-bin/mpeg-ref-sw.pl>
- Current main issue: parsing DID

- Digital Items act as a structure for organizing resources and its descriptions
- Need a mechanism for defining a set of operations by which a terminal can process a DI or DID
- Currently considering to specify a set of operations that can be used to process DIs: Digital Item Method
- A DIM defines an intended method for configuring, manipulating and/or validating a DI

- Interoperability of Digital Items means that terminals must handle the DIs in a consistent manner
- Digital Item Methods provide a way to specify a selection of preferred procedures by which the DI should be handled at the DI level
 - a menu of user interaction possibilities
- Digital Item Processing encompasses all aspects of processing a DI from an application perspective
- Applications build DIP environments around a fundamental DIME

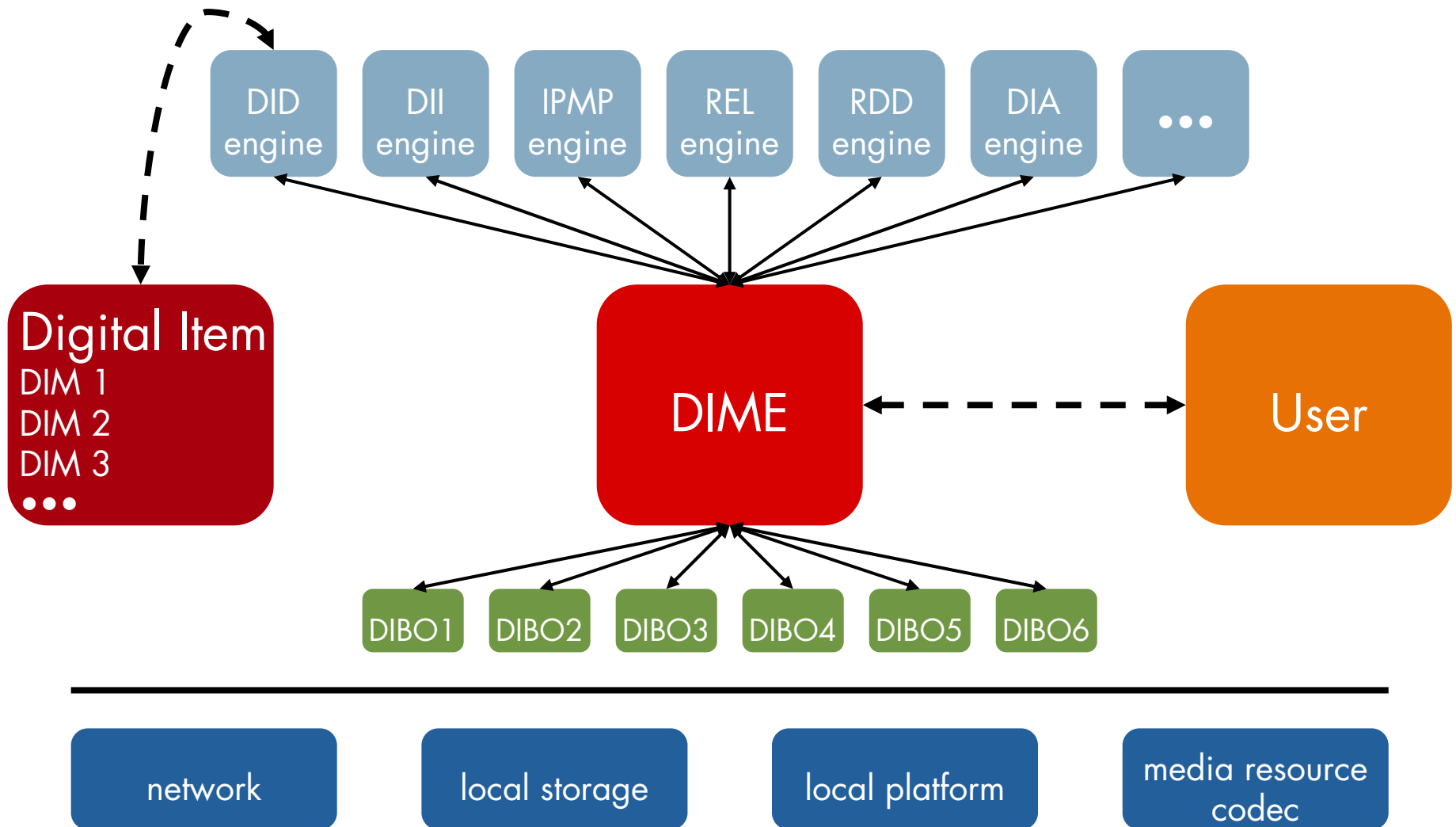


Digital Item processing terminology

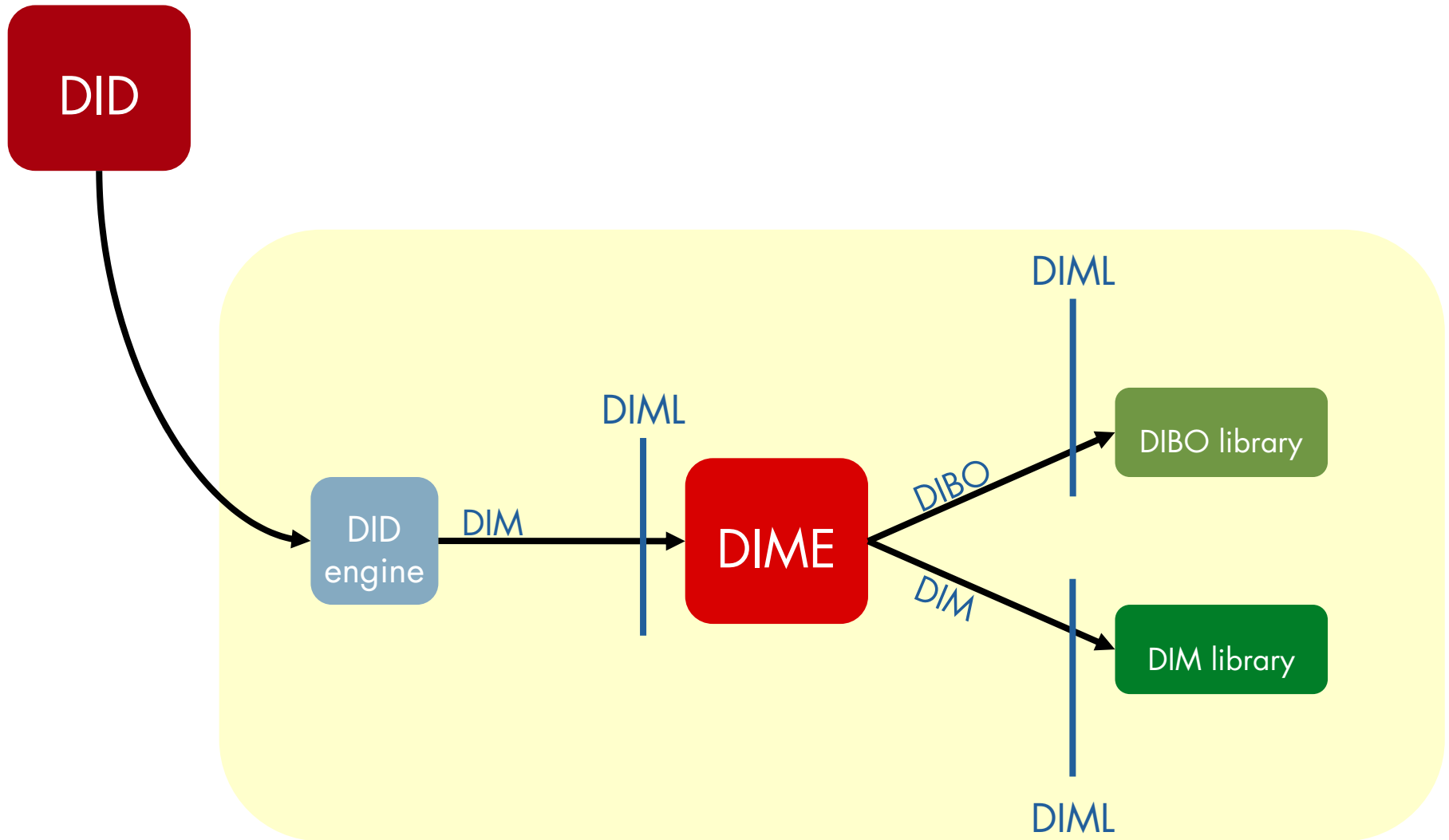


- CDI — Content Digital Item
 - a DID containing the actual content
- DIBO — Digital Item Base Operation
- DIM — Digital Item Method
 - method that can be applied to a DID
 - DIME — DIM Engine
 - part of the terminal responsible for executing the DIM
 - DIML — DIM Language
- DIP — Digital Item Processing
- MI — Method Item
- PI — Processing Item
- XDI — Context Digital Item

Digital Item Processing



DIP flow control



- An MPEG-21 file format shall be capable of storing MPEG-21 Digital Items
 - all components of the DI within a single file
- The MPEG-21 file format will inherit several concepts from MP4, in order to make 'multi-purpose' files possible

- Persistent association of information with DIs
- Accessibility
- Personal data
- Content representation
- Event reporting
- ...



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