Digital TV Metadata

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Metadata – a few Definitions…

Metadata "is data about data…[and]… is information about a thing, apart from the thing itself" [19].

Metadata is "normally understood to mean structured data about resources that can be used to help support a wide range of operations. These might include, for example, resource description and discovery, the management of information resources and their long-term preservation" [46]

Ned Batchelder and Michael Day

Metadata – a few Definitions…

A **Metadata Definition Language** is a domain independent description language to represent the structure, shape and type of arbitrary entities or their features of instantiated metadata documents. XML Schema is an example of this type of metadata definition language

Metadata – a few Definitions…

A **Metadata Definition** is any type of metadata, thus it is either a metadata definition language or a metadata definition instance. It describes any type or form of metadata

Types of Metadata

Rigid Metadata: Rigid metadata refers to application specific, non customizable standardization of metadata definitions. These are e.g. the metadata definitions currently standardized in broadcast multimedia containing TV-program descriptions (e.g. EPG)

Types of Metadata

Granular Metadata: Granular metadata refers to metadata with a higher degree of flexibility and customizability than rigid metadata. Often it represents an extension of rigid metadata. XML standards are one example

Metadata in Broadcasting

- Applying metadata in broadcasting provides an answer to handle diverse services and content in digital efficiently and in a consumer-friendly way

- Metadata as tool for coping with technological challenges in complex network environments

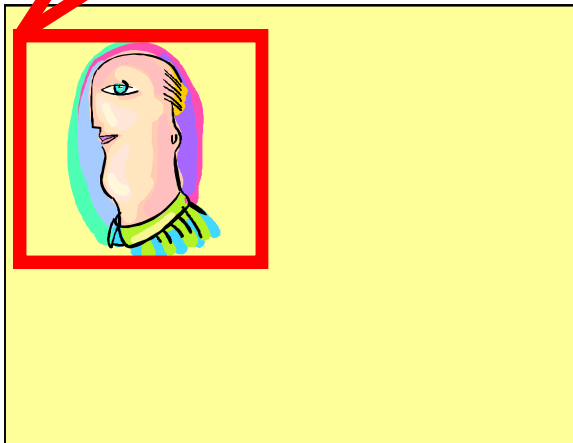- New possibilities of innovative services

Example for Metadata

```
<face>

  <xposition>10</xposition>
  <yposition>20</yposition>

</face>
```
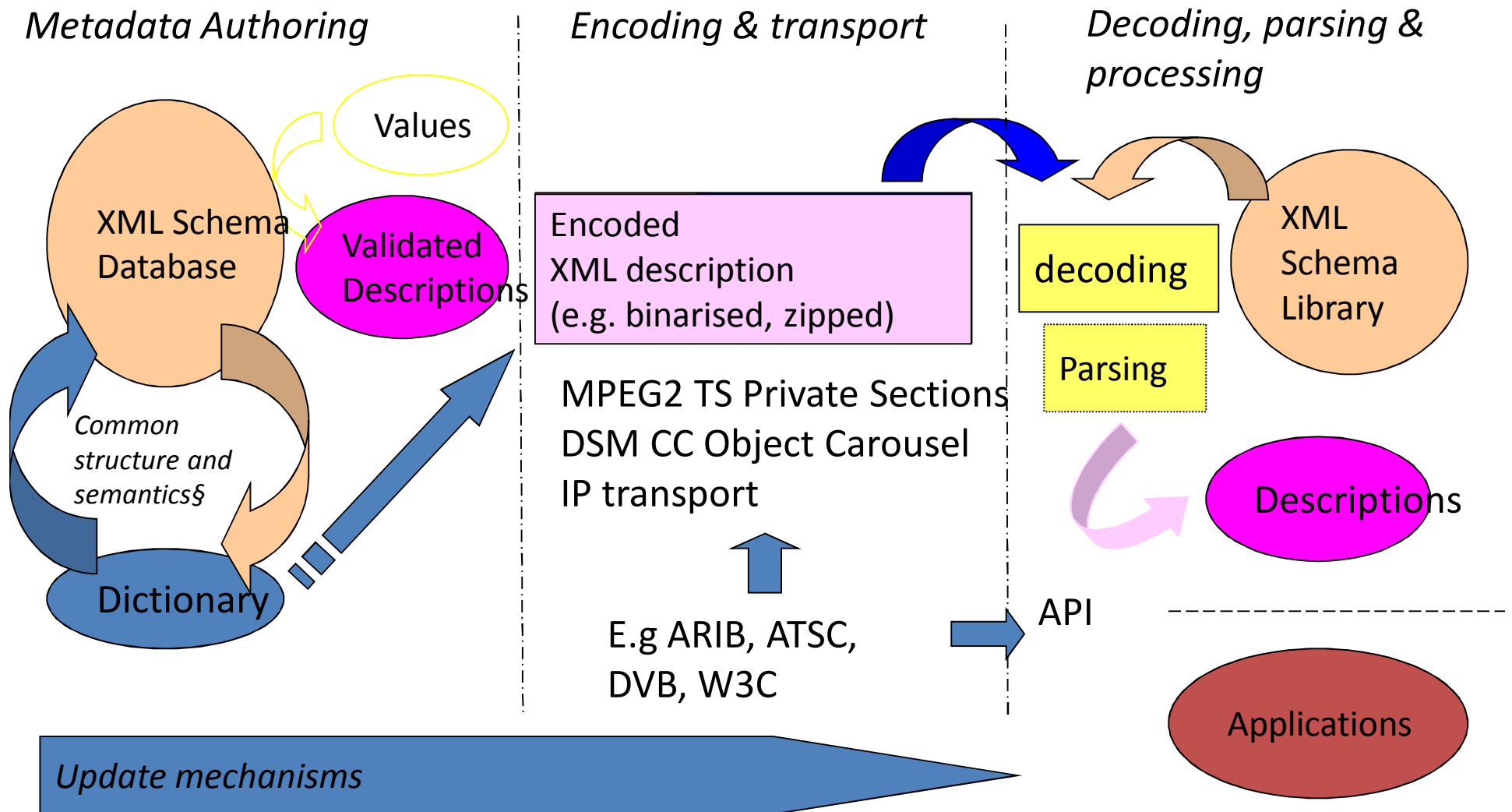
Metadata

Content e.g. Image

Metadata in Broadcasting

- Metadata provides an insight into syntactically and semantically complex data

- Metadata distils the essence of content into a set of simple descriptors

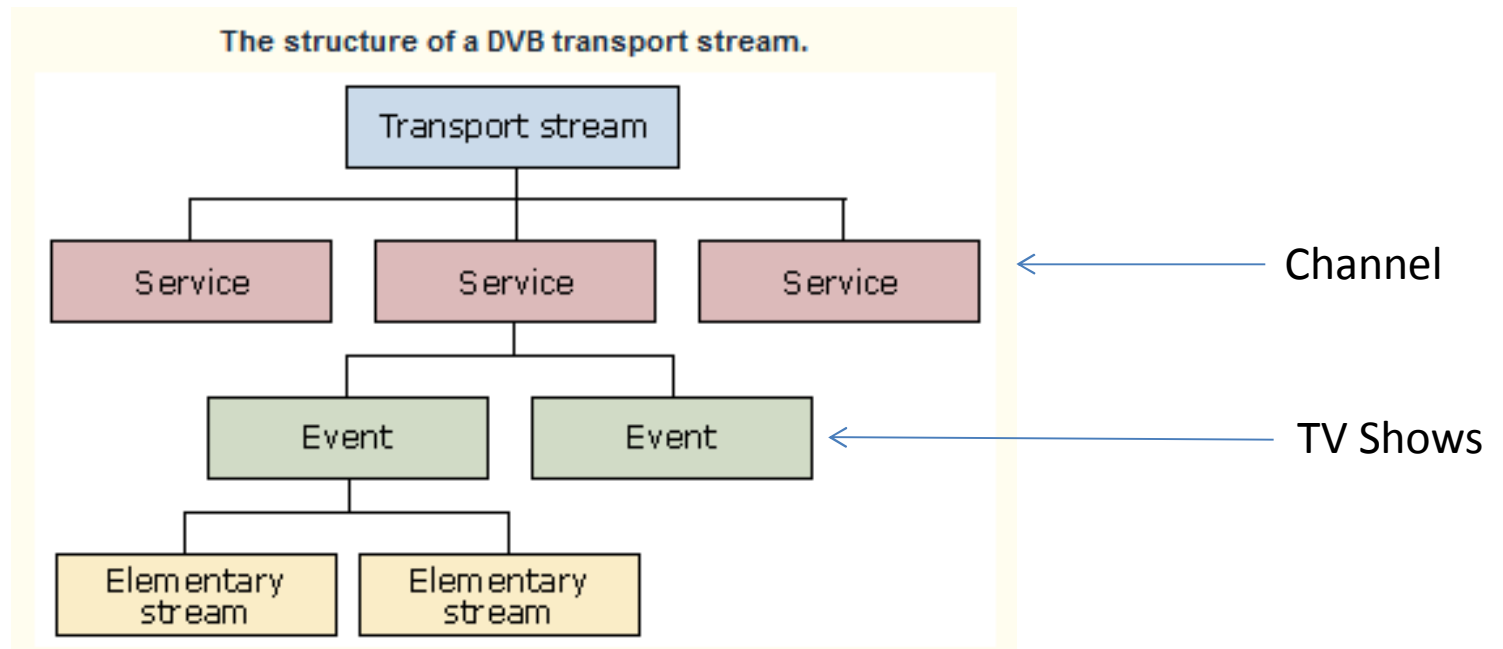- Metadata helps to structure and manage information in diverse settings

Metadata in Broadcasting

- Metadata can be used as descriptive and structural framework for content and services

- Metadata is integrating into the broadcast value-chain taking regards in the service development

- There are many metadata standards in broadcasting defining own system architectures, definition languages, work-flow, content representations and metadata representations

- Examples: TV-Anytime, SMPTE, DVB-SI or MPEG-7

End-to-end delivery and management

Metadata Authoring

Encoding & transport

Decoding, parsing & processing

Values

XML Schema Database

Validated Descriptions

Common structure and semantics§

Dictionary

Encoded
XML description
(e.g. binarised, zipped)

MPEG2 TS Private Sections
DSM CC Object Carousel
IP transport

E.g ARIB, ATSC,
DVB, W3C

decoding

Parsing

XML Schema Library

Descriptions

API

Applications

Update mechanisms

Example: The DVB TS

The structure of a DVB transport stream.

Transport stream

Service — Channel

Service

Service

Event — TV Shows

Event

Elementary stream

Elementary stream

Bouquet: set of services, possibly from different TSs

Example: DVB-SI

- **Program Association Table:** lists all services found in a Transport Stream
- **Program Map Table:** Identifies the Elementary Streams within a service.
- **Conditional Access Table:** parameters that control the scrambling of a service

MPEG Program Specific Information (PSI)

- **Network Information Package**: provides tuning information for a group of Transport Streams
- **Bouquet Association Table**: A set of services that may belong to different TSs
- **Service Description Table**: name, description, language, country availability, running status, …
- **Event Information Table**: service status and timing that allows for classification of service: "running", "not running", "paused", "starts in a few seconds", …
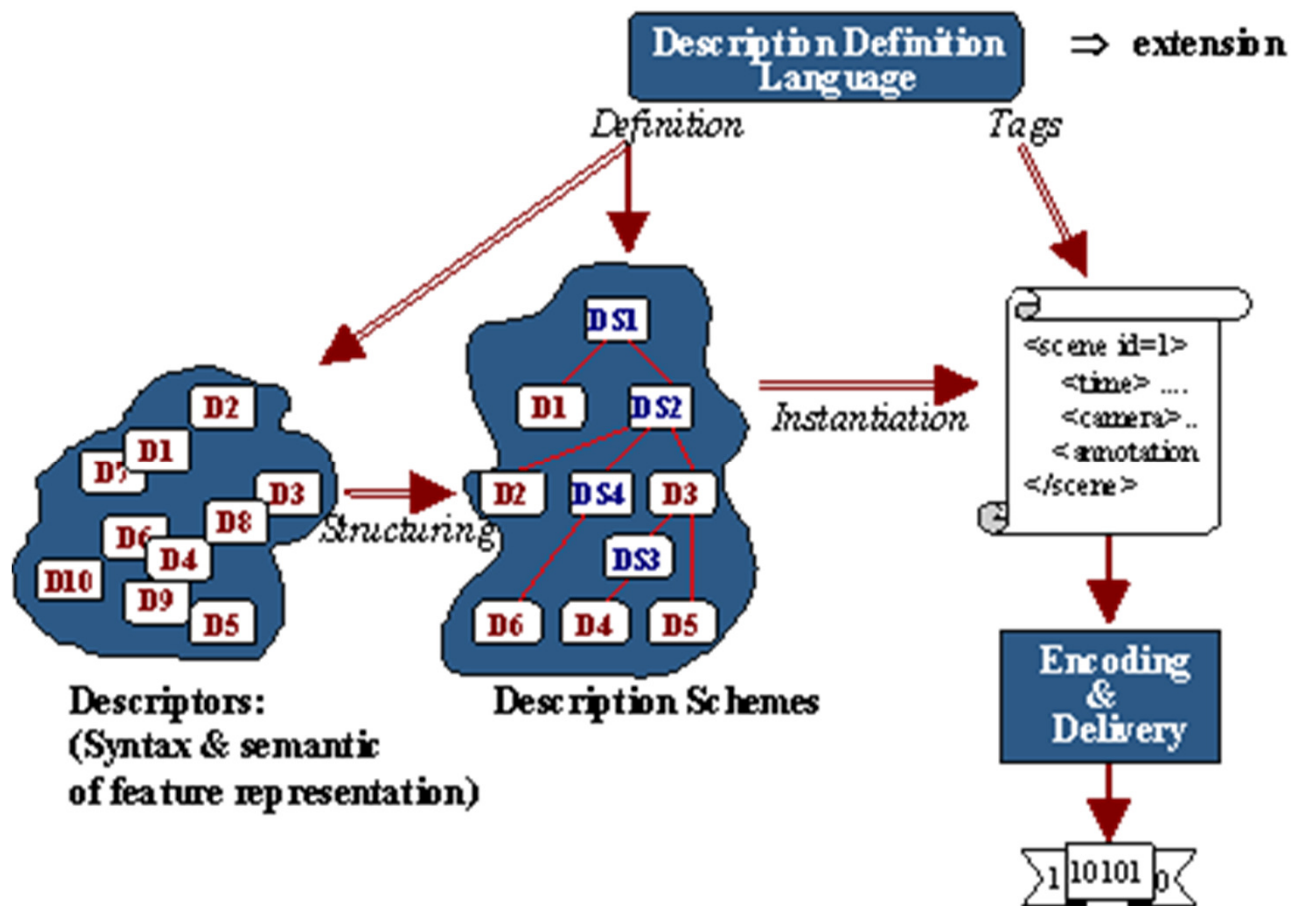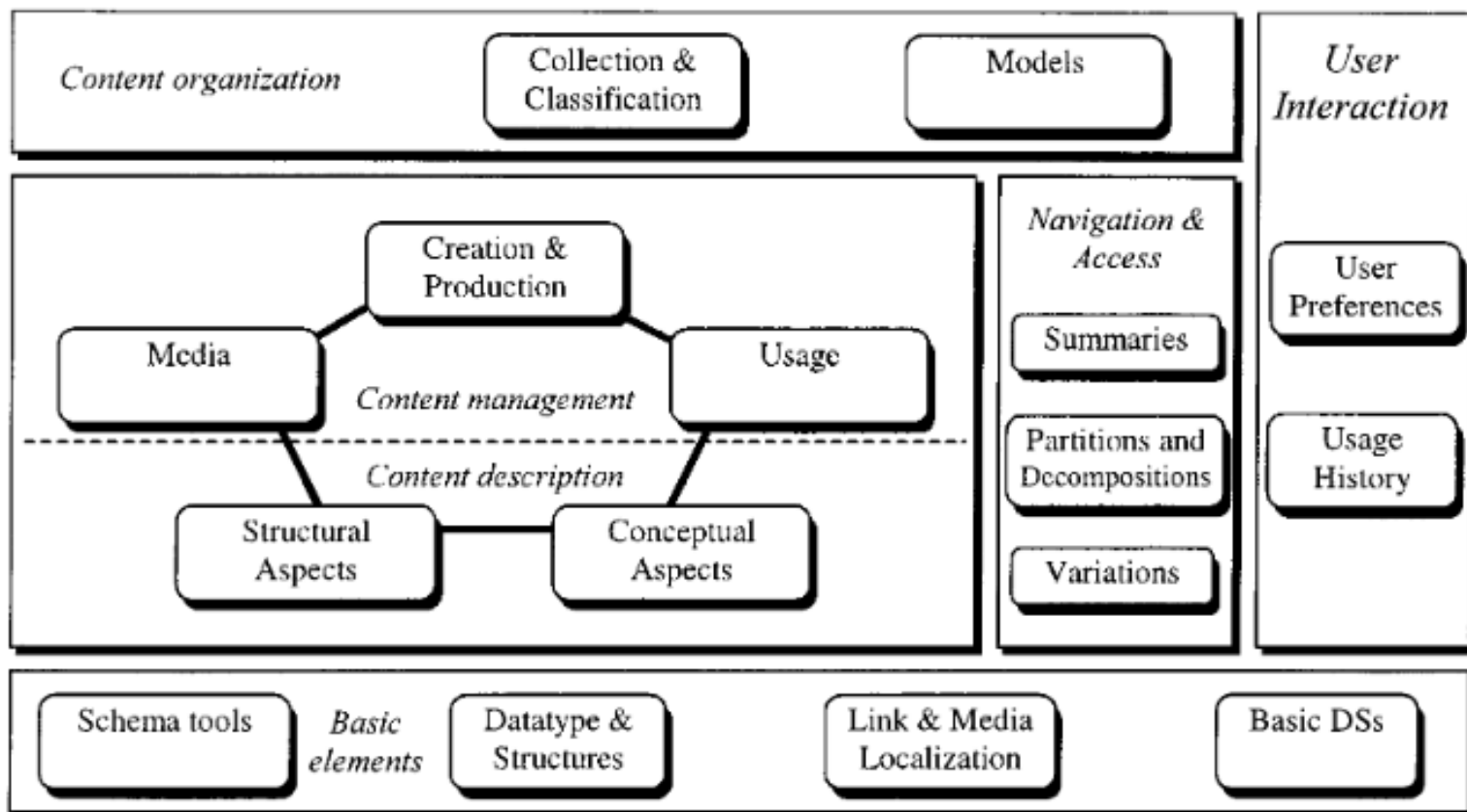
Service Information (SI)

Other SI tables

- **Time and Date Table**: UTC codes as Modified Julian Time
- **Time Offset Table**: time offsets for local time
- **Running Status Table**: updates the status of events
- **Stuffing Table**: Used to replace or invalidate tables
- **Discontinuity Information Table**: informs the TV receiver that the stream is "corrupted" and some SI information may be missing
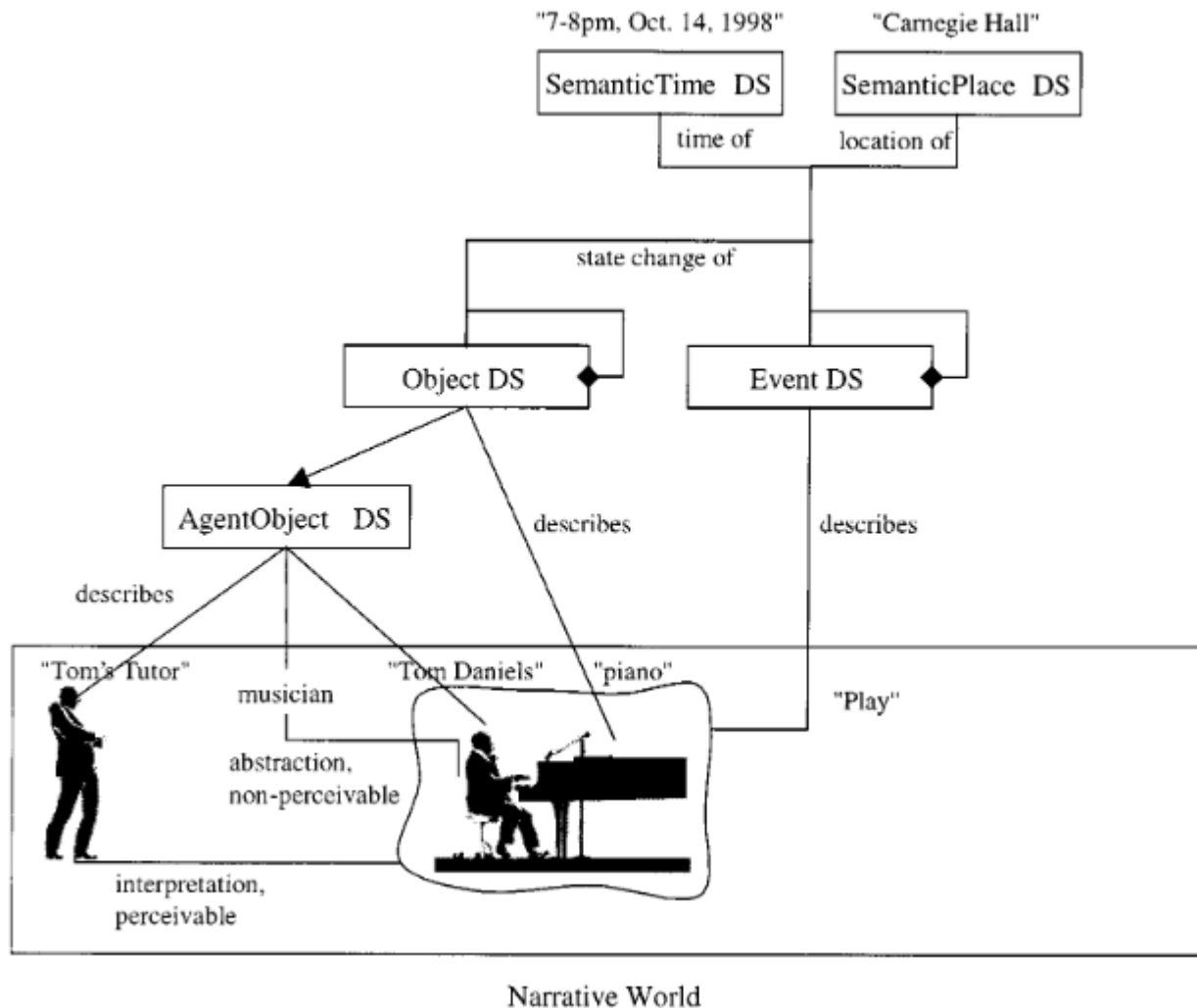
MPEG-7

- MPEG-7, formally named "Multimedia Content Description Interface", is a standard for <u>describing the multimedia content</u> data that supports some degree of interpretation of the information's meaning, which can be passed onto, or accessed by, a device or a computer code. MPEG-7 is not aimed at any one application in particular; rather, the elements that MPEG-7 standardizes support as broad a range of applications as possible.

MPEG-7 Description elements

Content organization

Collection & Classification

Models

User Interaction

Creation & Production

Media

Usage

Content management

- - - - - - - - -

Content description

Structural Aspects

Conceptual Aspects

Navigation & Access

Summaries

Partitions and Decompositions

Variations

User Preferences

Usage History

Schema tools

Basic elements

Datatype & Structures

Link & Media Localization

Basic DSs

Conceptual aspect description example

"7-8pm, Oct. 14, 1998"   "Carnegie Hall"

| SemanticTime DS | SemanticPlace DS |

time of   location of

state change of

| Object DS | ◆ | | Event DS | ◆ |

| AgentObject DS |

describes   describes

describes

"Tom's Tutor"   "Tom Daniels"   "piano"   "Play"

musician

abstraction,
non-perceivable

interpretation,
perceivable

Narrative World

Other examples