MPEG - 4 / Structured Audio:
an overview

MPEG - 4 / Structured Audio : an overview

➢ <u>Intro: MPEG</u>

➢ <u>MPEG-4 Overview</u>

➢ <u>MPEG-4 SA</u>

Intro

- MPEG = **M**oving **P**icture **E**xpert **G**roup

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- Work Group of a Subcommittee of ISO/IEC

Intro

- MPEG = **M**oving **P**icture **E**xpert **G**roup

- Work Group of a Subcommittee of ISO/IEC:

  - ISO/IEC/JTC1/SC29/ WG11

MPEG's Mission :

"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."

[Moeritz2005]

MPEG-4 Overview

- *General Goals*

- *Definition of an MPEG-4 Scene*

- *MPEG-4 Audio*

MPEG-4 Overview

- *General Goals:*

- **Scalable Content**

MPEG-4 Overview

- *General Goals:*

- **Interactivity**

MPEG-4 Overview

- *General Goals:*

- **Highest quality for encoder/decoder**

MPEG-4 Overview

- *General Goals:*

- **Copyright protection**

From Pereira2002

MPEG-4 Overview

- *Definition of an "MPEG-4 Scene":*

- **Content** is represented by **Objects**
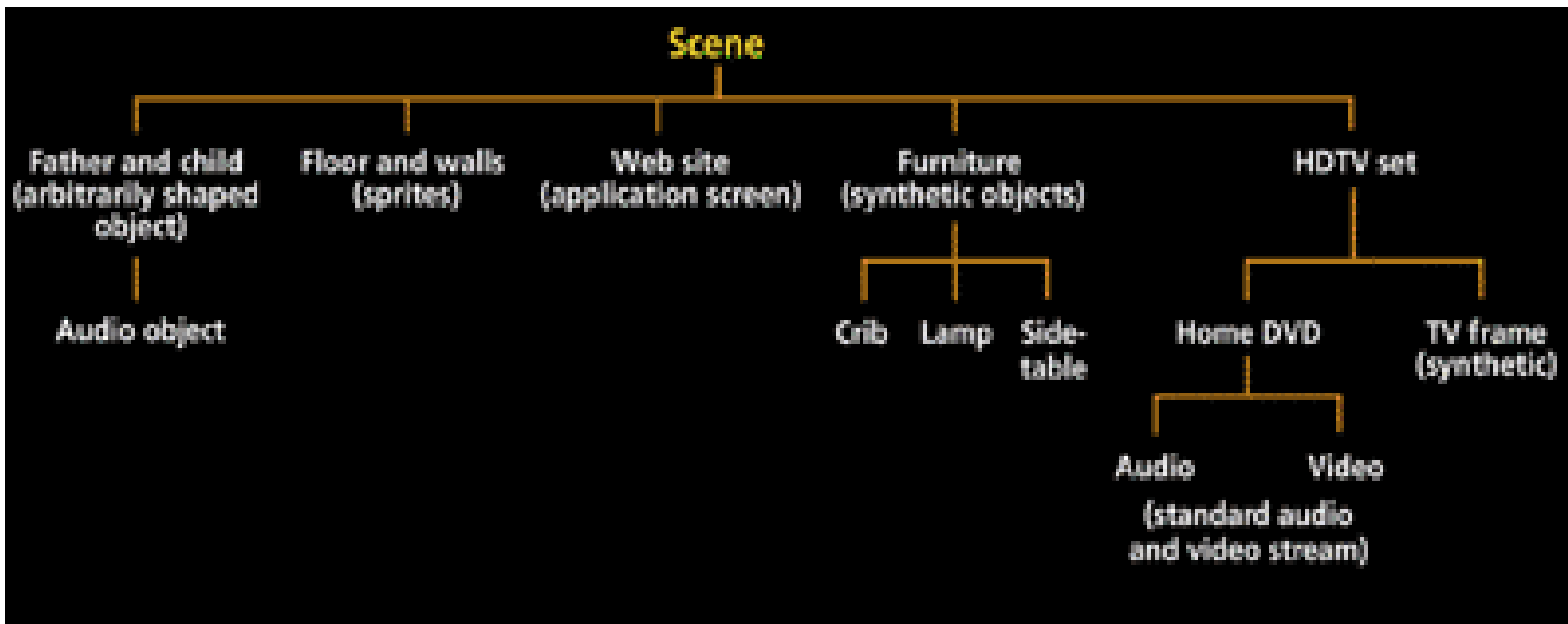
MPEG-4 Overview

- *Definition of an "MPEG-4 Scene":*

- **Content** is represented by **Objects**

- **Scene** = combination of **Objects**

MPEG-4 Overview

- *Definition of an "MPEG-4 Scene":*

- Scenes defined in

  - **Binary Format for Scenes (BIFS)** files

http://www.chiariglione.org/mpeg/tutorials/papers/koenen/mpegf1.htm

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MPEG-4 Overview

- *MPEG-4 Audio:*

- MPEG-4 Audio[...] represents the first explicit connection between the well-developed but independent bodies of work in the computer-music, synthetic speech, and audio-coding communities. [Scheirer1998]

MPEG-4 Overview

- *MPEG-4 Audio:*

- **General Audio Signals** :

  - Coding audio by transform coding techniques

  - From 6kbits/s to broadcast quality

MPEG-4 Overview

- *MPEG-4 Audio:*

- **Speech Signals :**

  - Coding

  - Manipulations at playback (pitch, speed)

MPEG-4 Overview

- *MPEG-4 Audio:*

- **Synthesized Speech Scalable :**

  - Text to Speech with prosody (pitch contour, phoneme duration)

MPEG-4 Overview

- *MPEG-4 Audio:*

- **Synthesized Audio :**

  - Structured Audio Tool Set => our interest today

MPEG-4 / SA

- *Concepts/Chronology*

- *Components of the SA toolset*

- *Decoding Scenario/Profiles*

- *Applications*

MPEG-4 / SA

- *Concepts/Chronology:*

- "A structured representation of multimedia information is one which makes model-based assumptions about the origins and nature of its content"[Scheirer1999]

MPEG-4 / SA

- *Concepts/Chronology:*

  - **"timbral redundancy" [Scheirer1999]**

MPEG-4 / SA

- *Concepts/Chronology:*

- 1996 : NetSound project by Eric Scheirer

- 1997 : MPEG call for proposals on SA answered by

  MIT Media Lab => Netsound project encapsulated in

  MPEG-4 evolution

MPEG-4 / SA

- *Components of the MPEG-4 SA toolset:*

- **SAOL (SA Orchestra Language)**

- **SASL (SA Score Language)**

- **SASBF (SA Sample Bank Format)**

- **Scheduler**

MPEG-4 / SA

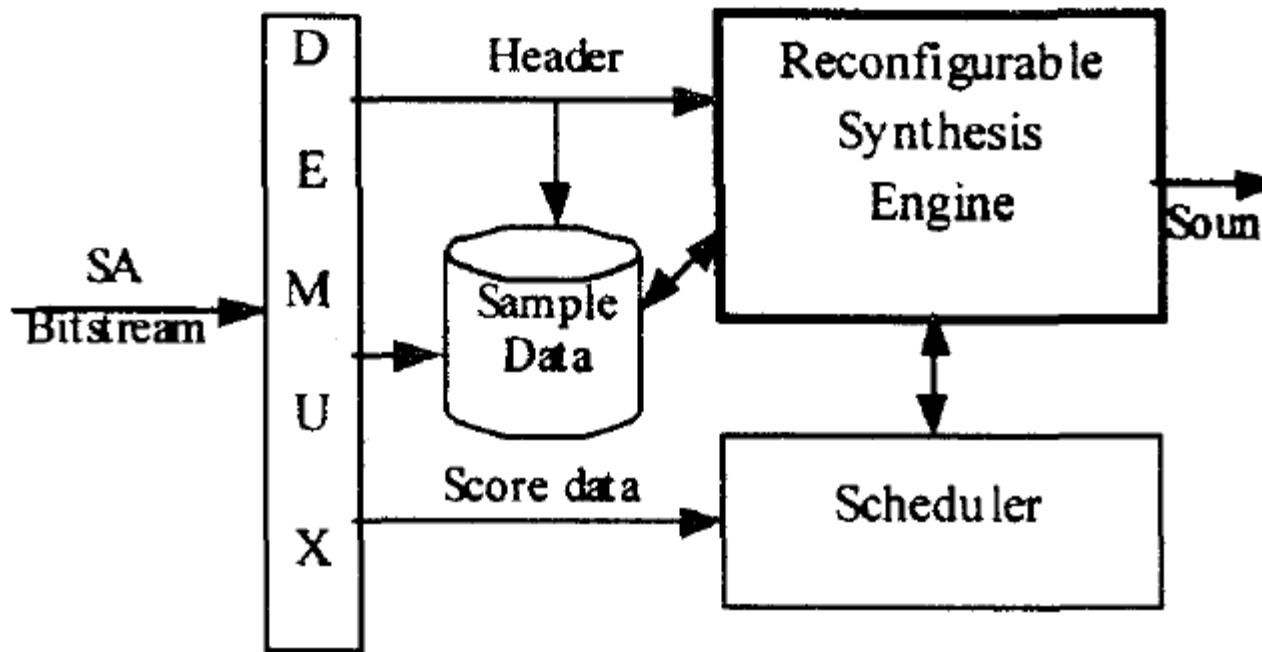- *Decoding Scenario/Profiles :*

Fig. 1 from [Scheirer1998]

MPEG-4 / SA

- *Decoding Scenario/Profiles :*

  - **Profile 1:**

    - **Only MIDI data in the bitstream**

    - **No specification of the sound output**

MPEG-4 / SA

- *Decoding Scenario/Profiles :*

  - **Profile 2:**

    - **Bitstream may not contain SAOL, SASL**

    - **MIDI and SASBFfor sound generation**

    - **Normalized sound quality**

MPEG-4 / SA

- *Decoding Scenario/Profiles :*

  - **Profile 3:**

    - **Bitstream may not contain SASBF, sample data**

    - **All synthesis purely algorithmic**

    - **Normalized sound quality**

MPEG-4 / SA

- *Decoding Scenario/Profiles :*

  - **Profile 4:**

    - **Full package, with all the functionalities**

    - **Normalized sound quality**

MPEG-4 / SA

- *Applications:*

- Low bit-rate transmission of music (dance music)

- Internet Karaoke

- Virtual Reality Environment

- Other to be determined by users !

Conclusion

- One example of evolving MPEG-4 many

  facets

- Where to find software to create SA file

- http://www.cs.berkeley.edu/~lazzaro/sa/book/simple/index.html

Bibliography

- file:///mnt/data/CourseWork/mumt611/a02/AnnotatedBibliography.html