

Describing Multimedia

- or the need to fight the MMCE-Crisis ?

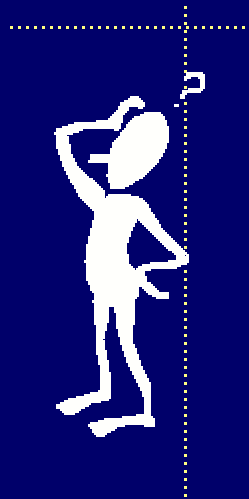
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„Old“ Media — „New Media“

Where are we?



How does the future
look like?

„Old“ Media — well received

- Broadcasting Radio and TV
 - Press
 - other printed media
 - ...
-
- Technical media as foundation
 - well-organised and optimised production and distribution
 - correspondents, editorial staff, ..., typesetters, ...
 - large archives
 - agents and distribution & logistic centres

„New Media“ ?

- The many *CDs* and *DVDs*
- *WWW* - Hypertext over *Internet*
- Radio over *Internet*
- TV over *Internet*
- *Video-on-Demand*
- Multimedia over *Internet*
- courses as *Web-pages*
- *Online-services*
- ...

At this point
only technological
innovation ...

... with high potential
to become
real new media

... or are we just fascinated by
the digital world and interactivity ?

The Pretended „New Media“

- Production & distribution of material insufficiently developed
- Do we miss essentials wrt ...
 - MM-correspondents, MM-editorial staff, MM-..., MM-designer, ... ?
 - large MM-archives ?
 - MM-agents and MM-distribution & logistic centers ?

Why do we face these deficiencies?

- ...
- inadequate approach for handling multimedia content
- inadequate support by tools
- ...

The Problem

„Multimedia-Content-Engineering-Crisis“

- production process for multimedia content inadequate
 - very expensive
 - extremely time consuming
 - need specialised expertise
- multimedia products today usually „one-way-productions“
 - pre-orchestrated & canned presentations
 - not adaptable to different needs of user groups
 - almost not reusable in different contexts



Gallery of Cardiac Surgery - Cardio-OP

Internet-based and database-driven multimedia information system for physicians, medical lecturers, students, and patients in the domain of cardiac surgery

Partners

- ▣ technical partners

- ▣ Databases and Information Systems, University of Ulm / Vienna
- ▣ FAW, Ulm
- ▣ ENTEC GmbH

- ▣ medical partners

- ▣ Depts. of Cardiac Surgery, University of Heidelberg
- ▣ Cardiology, University of Ulm
- ▣ Rehabilitation Hospital, Isny

- ▣ publishers

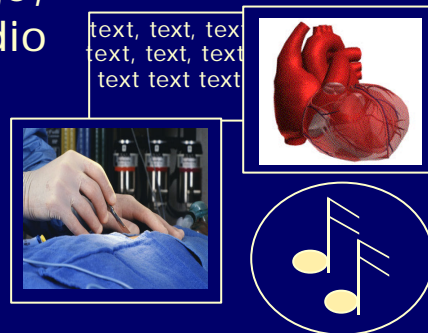
- ▣ Huethig, Heidelberg

[Klas, Greiner, Friedl - ICMCS 1999]

„Exhibits“ in the Gallery of Cardiac Surgery

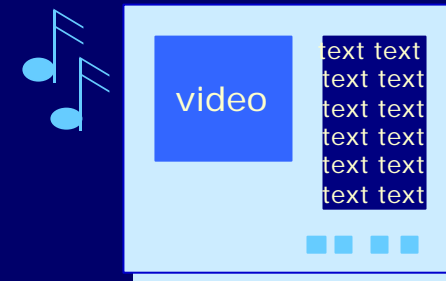
media data

text, image,
video, audio



multimedia documents

multimedia book on operative
techniques, training material



composition

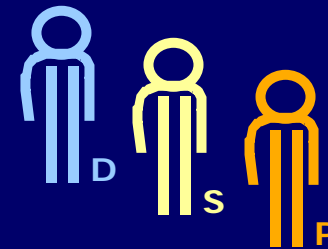
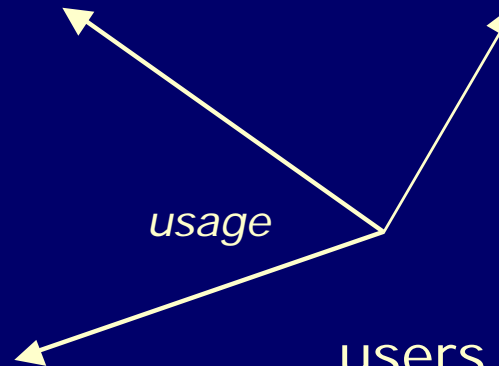


annotation

metadata

format, duration, size, ...
content, context

usage



users

different knowledge, interest
different technical infrastructure

Goal

- support cost-effective production and (re)-usage of multimedia content for different context for different user groups.

Approach

- modelling of media-fragments in MM-repository for fine-grained access and re-usage in various multimedia presentations
- appropriate tools for authoring and presentation environments integrated with repository

Impact

- changes the way of handling and describing multimedia content

Central Requirements & Challenges

- interaction
 - mandatory requirement anyway
- flexible reuse of multimedia material
 - reuse of material in different granularity and different context
- adaptation
 - to a user's interest, knowledge, technical infrastructure
- presentation-neutrality
 - allow for separation of layout and structure
- description of multimedia content
 - capture semantics
 - process metadata

Granularity of Reuse

The screenshot shows a software interface for medical training. On the left, there are two video thumbnails, both titled "Inzision". The top thumbnail shows a hand using a scalpel on a diagram of a hand. The bottom thumbnail shows a close-up of a scalpel cutting a piece of orange material. To the right of the videos is a text panel with a title "Inzision am Koronargefäß" and a list of options: "Intimaverletzung", "Unvollständige Inzision", and "Venendurchtrennung". The text describes the procedure for a coronary artery incision, including palpation, incision, and the use of a "Pottscher" instrument.

Inzision am Koronargefäß

- Intimaverletzung
- Unvollständige Inzision
- Venendurchtrennung

Vor der Inzision wird das **Koronargefäß** palpiert, dann wird das Gefäß poststenotisch in der Mitte inzidiert. Anschließend wird das blutende Koronargefäß vorsichtig abgetupft. Mit einem Stieltupfer wird der koronare Blutzufuß abgedrückt. Danach wird das Koronargefäß vorwärts und anschließend rückwärts mit der **schrägen Pottscher** (Vorwärts- und rückwärts-Pottscher) eingeschritten. Die Gesamtlänge des Schnitts beträgt ungefähr 1 cm.

Reuse of complete documents

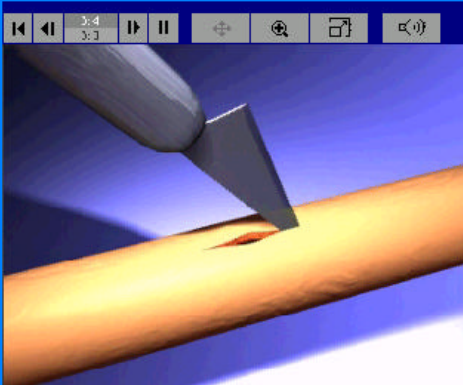
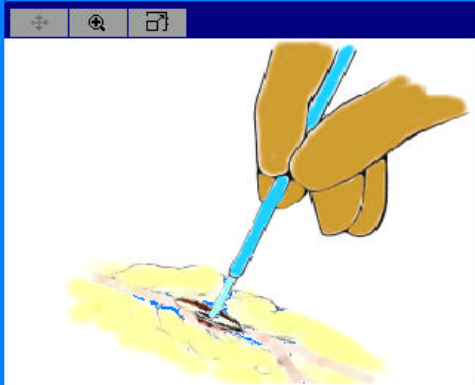
Kind of Reuse

Inzision Irzision am Koronargefäß

ACME Publisher

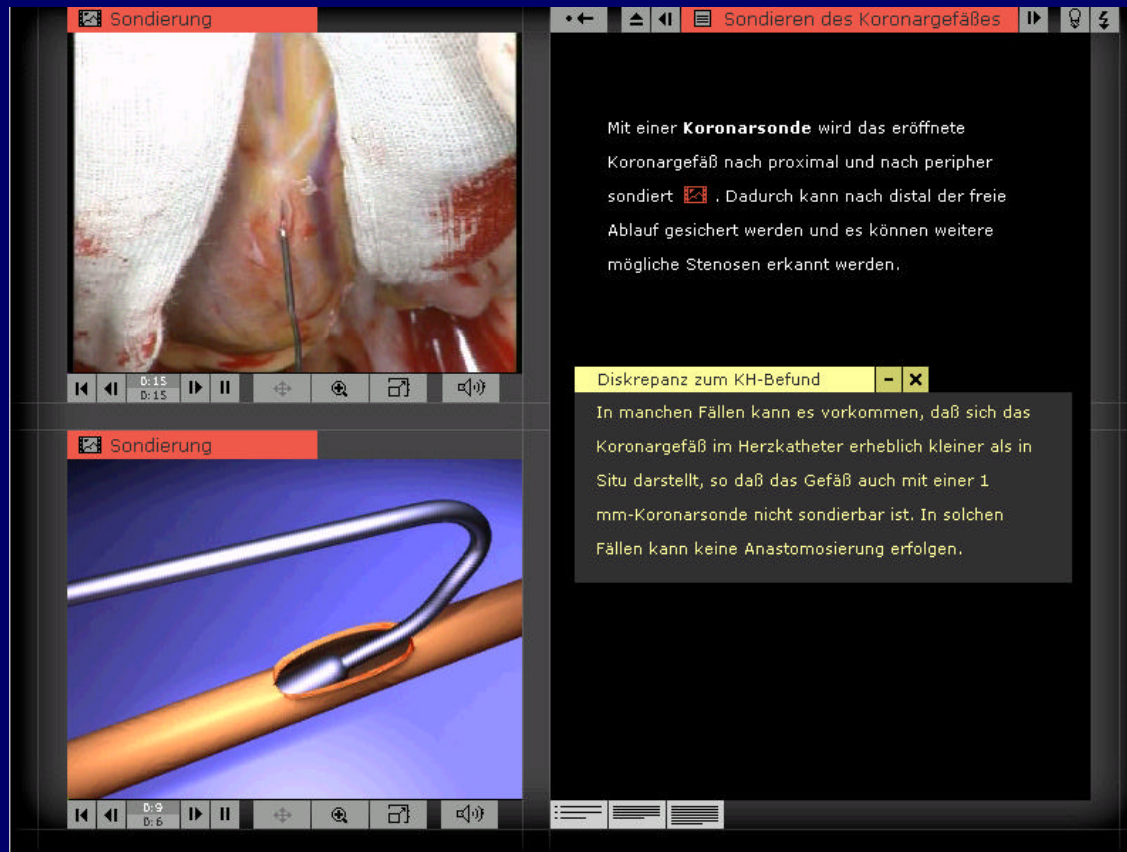
Vor der Inzision wird das **Koronargefäß** palpiert, dann wird das Gefäß poststenotisch in der Mitte inzidiert. Anschließend wird das blutende Koronargefäß vorsichtig abgetupft. Mit einem Stieltupfer wird der koronare Blutzufluß abgedrückt.

Danach wird das Koronargefäß vorwärts und anschließend rückwärts mit der **schrägen Pottscher** (Vorwärts- und rückwärts-Pottscher) eingeschritten. Die Gesamtlänge des Schnitts beträgt ungefähr 1 cm.



Structural Reuse

Extent of Adaptation



The screenshot shows a medical video player interface. On the left, there are two video thumbnails, both titled "Sondierung". The top video shows a surgical procedure with a catheter inserted into a coronary artery. The bottom video is a 3D anatomical model of a coronary artery with a catheter inserted. On the right, a text overlay is displayed over the video player. The text describes the procedure of coronary catheterization and mentions a discrepancy between the catheterization findings and the angiogram. A yellow box highlights the text "Diskrepanz zum KH-Befund". A yellow arrow points from this box to a yellow callout box on the right side of the slide.

Sondierung

Sondieren des Koronargefäßes

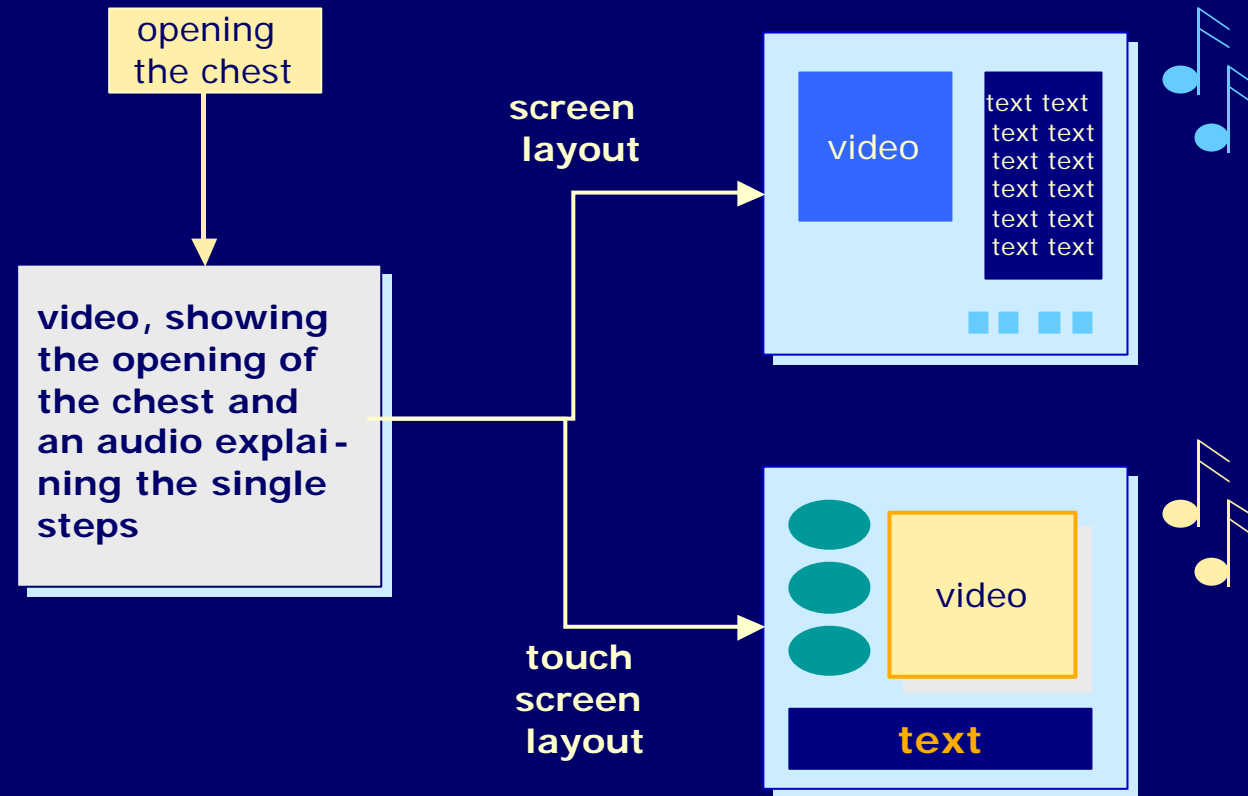
Mit einer **Koronarsonde** wird das eröffnete Koronargefäß nach proximal und nach peripher sondiert. Dadurch kann nach distal der freie Ablauf gesichert werden und es können weitere mögliche Stenosen erkannt werden.

Diskrepanz zum KH-Befund

In manchen Fällen kann es vorkommen, daß sich das Koronargefäß im Herzkatheter erheblich kleiner als in Situ darstellt, so daß das Gefäß auch mit einer 1 mm-Koronarsonde nicht sondierbar ist. In solchen Fällen kann keine Anastomosierung erfolgen.

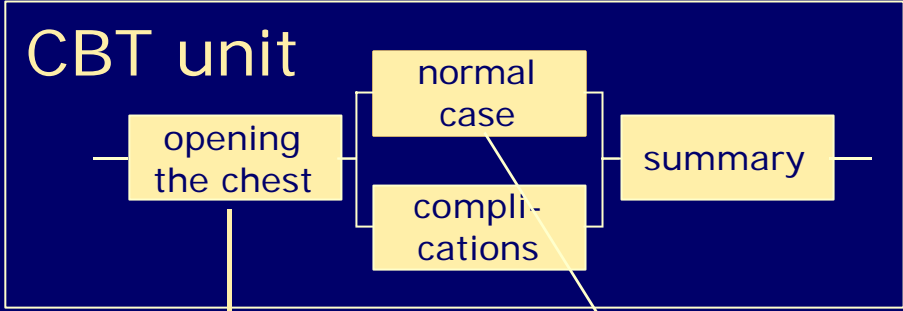
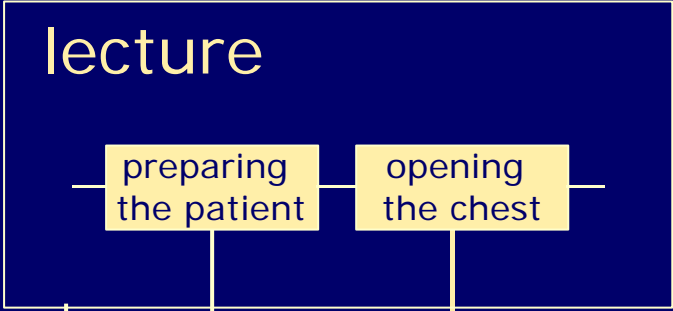
Adaptation to personal interests

Presentation-Neutrality



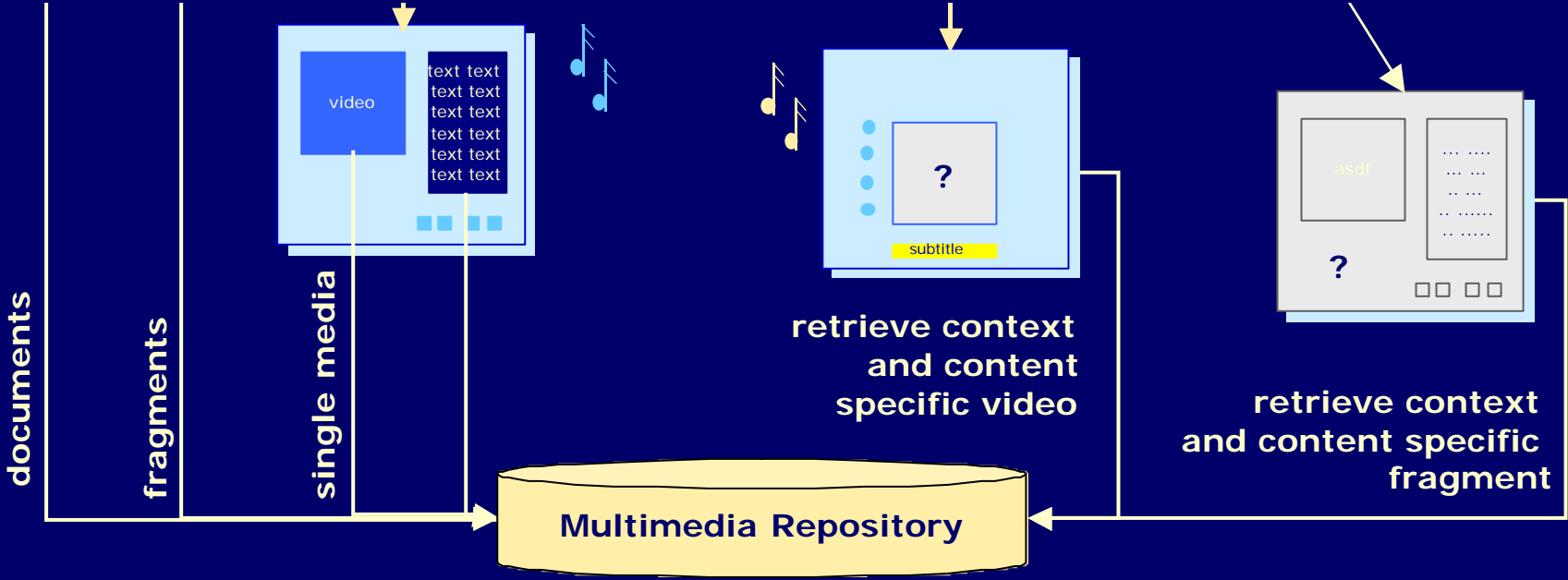
- separation of the structure of a multimedia composition from presentation-specific layout

Describing Multimedia - an Enabling Feature



annotation

authoring



Cardio-OP - The Prototypical Solutions

and support
of

Content-based
access

Authoring

Presentation

Transport

for the
management of

Atomic Media

Metadata

Multimedia-
Documents

DBMS-
Support

Object-relational Platform

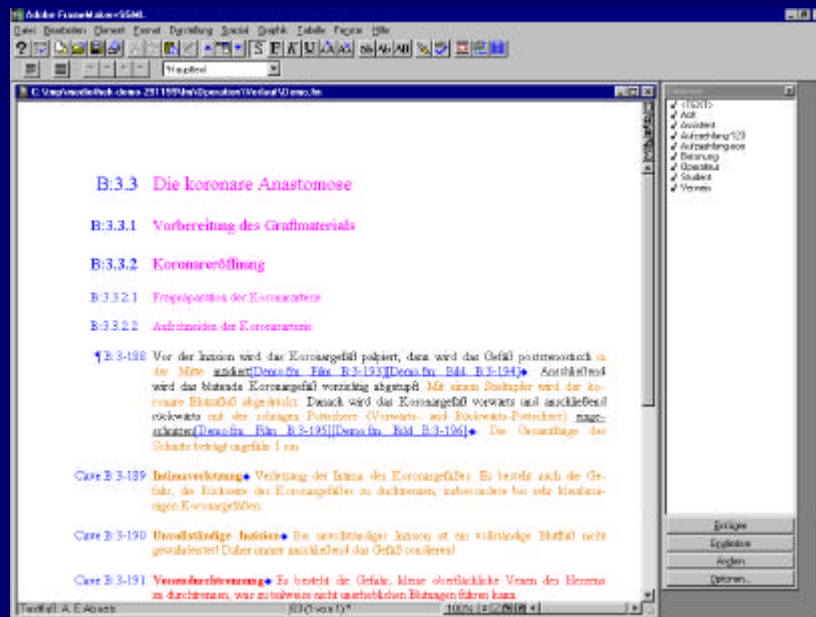
Metadata in Cardio-OP

- Content-specific metadata
 - concept hierarchy with standardised vocabulary in cardiac surgery (> 1700 concepts, ~ 7000 terms)
 - simple boolean query operators for retrieval according to the concepts
 - concepts managed by metadata workbench based on DBMS
- No problem to identify and create metadata
- Serious problem with offering appropriate tools integrated into multimedia tools for the handling of metadata

Impact of the approach

- Changed the way multimedia content is created
 - pre-processing of media focuses on content fragments
 - „Corporate Identity“ given by designer
 - authoring restricted to structural composition of content to create building blocks to be reused
- Rich description of multimedia content required
 - annotation of any building block
 - capture as much semantics as possible
- Presentation environment triggers content adaptation
 - able to adapt multimedia content to user needs by exploiting knowledge on structure and annotation of material

Creation of Structured Text

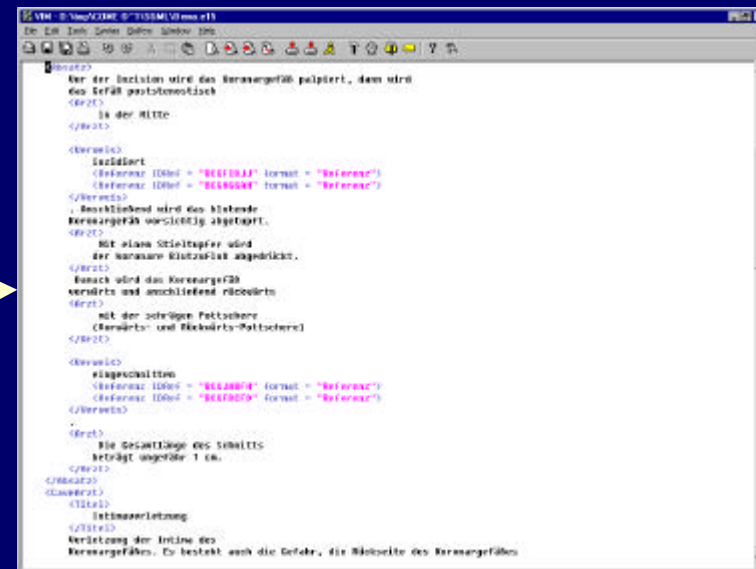


SGML-Editor



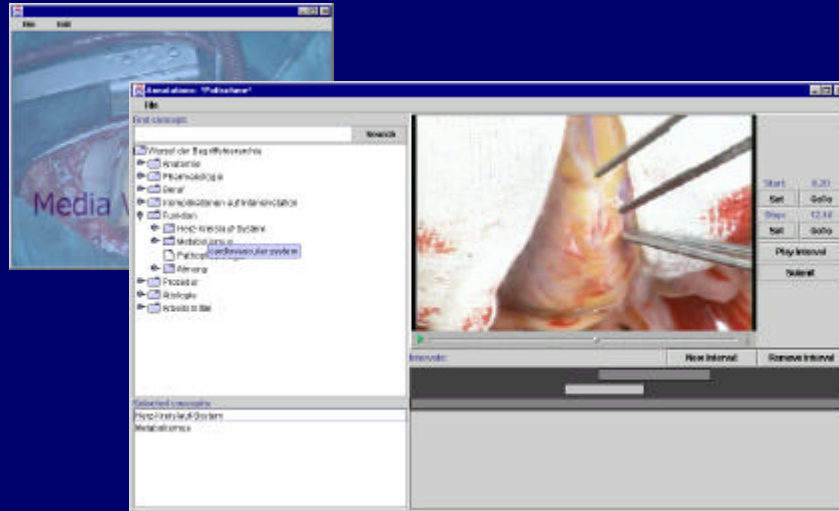
SGML-
Documents

- SGML-Document Editor
 - checks validity wrt DTDs
 - exports XML to Repository

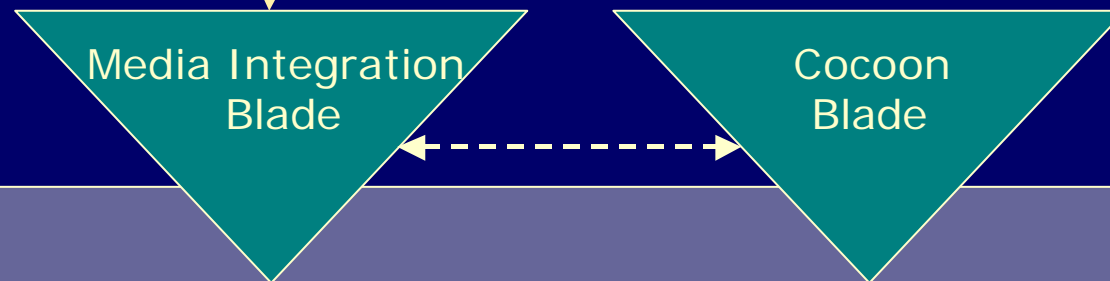


Viewer

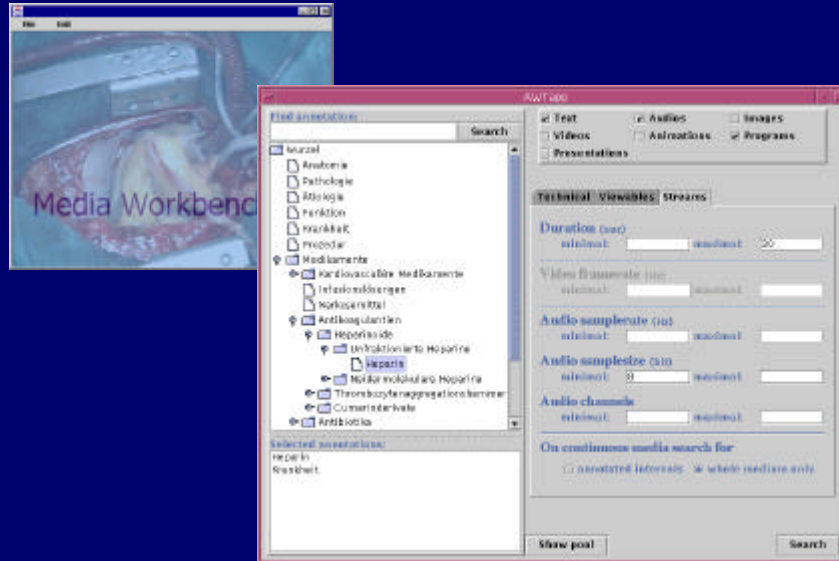
Media Workbench — Annotation of Media Data



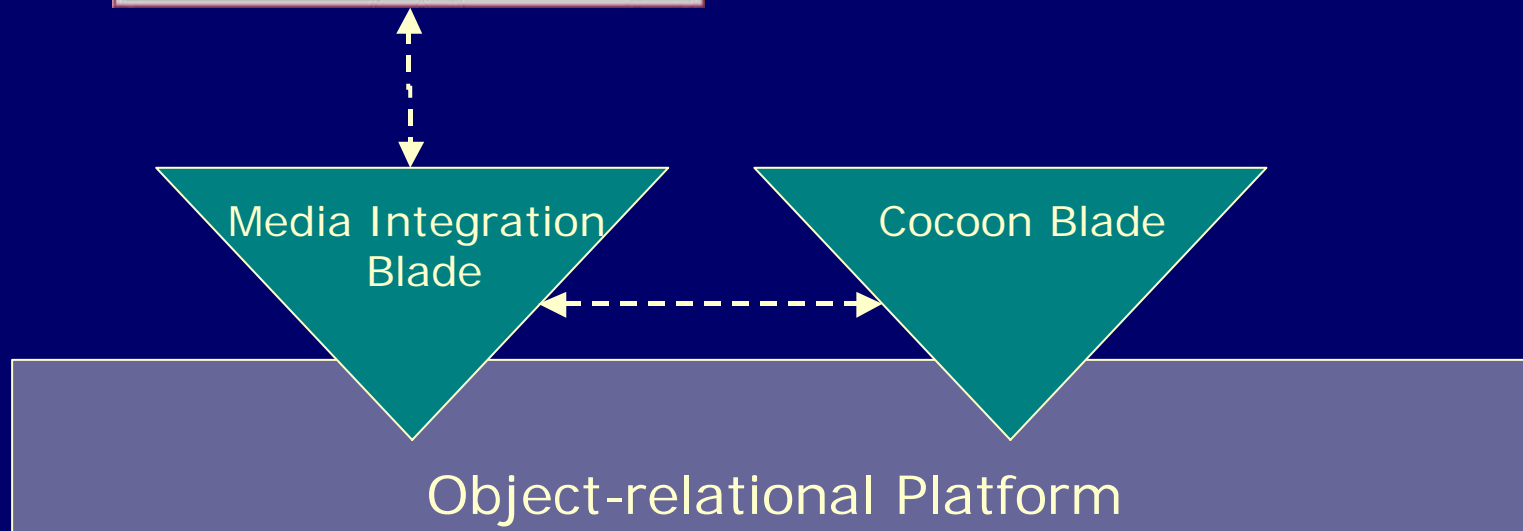
- Annotation Tool
- based on a model for a domain-specific standardized vocabulary



Media Workbench — metadata-based access



- Media Browser
- processes
 - technical metadata and annotated concepts
 - media-independent and media-specific features
 - intervals on continuous media

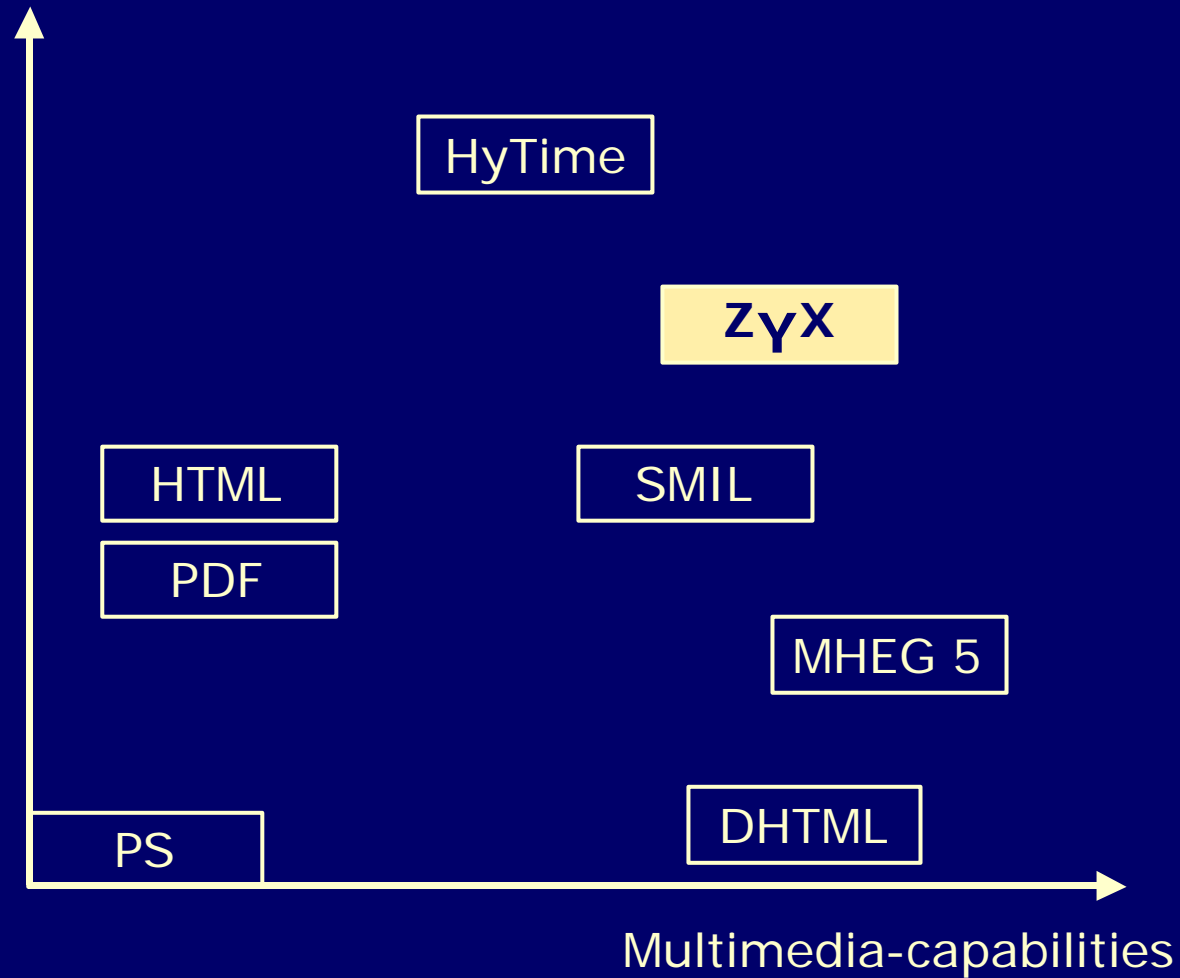


Authoring Wizard - structural authoring

- Individual, structural composition of media elements
- Z_YX as underlying document model
 - reuse of media components
 - separation of structure and layout
 - specification of templates
 - dynamic selection of components by query-elements at run time
 - specification of (potential) adaptation
 - contains & exploits metadata on multimedia material
- Overall goal
 - cover complexity of the Z_YX-document model
 - semi-automatic composition
 - tools for structural authoring (authoring wizard)

ZyX & others

explicit
representation
of semantics



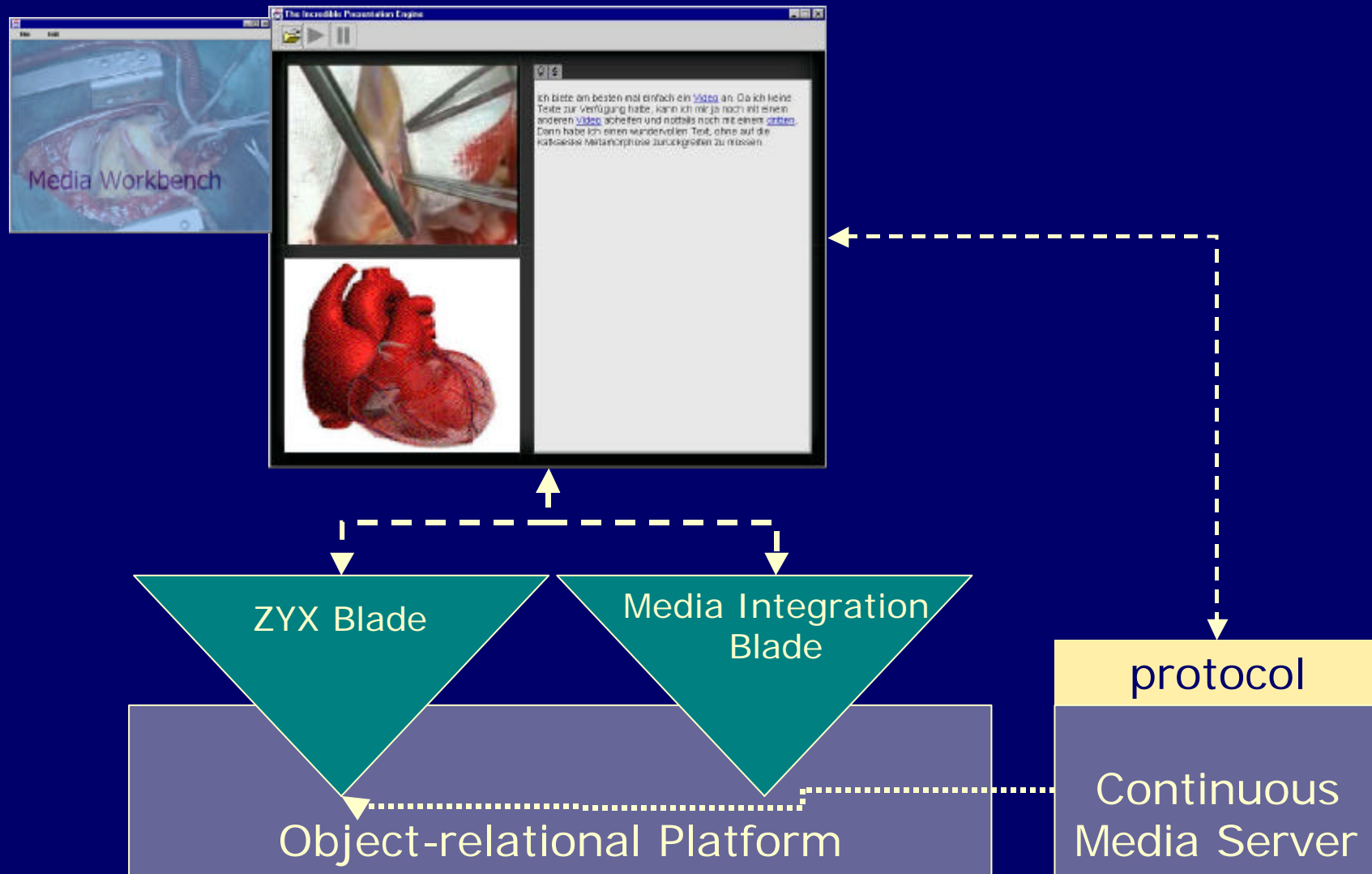
[Boll, Klas - IEEE TKDE 2000
Boll, Klas, Westermann - MMTA 2000]

Adaptive Presentation-Engine

- Currently engine for Z γ X-documents
- integrated with repository
 - XML-based transfer of any data
 - adaptive streaming of continuous media out of repository
 - adaptation considers dynamically changing contexts

[Moser, Kraiß, Klas - VLDB 1995
Boll, Wandel, Klas - ACM MM 1999
Boll, Heinlein, Klas, Wandel - MIS 2000]

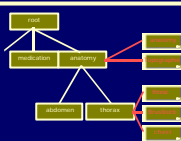
Adaptive ZyX Presentation-Engine



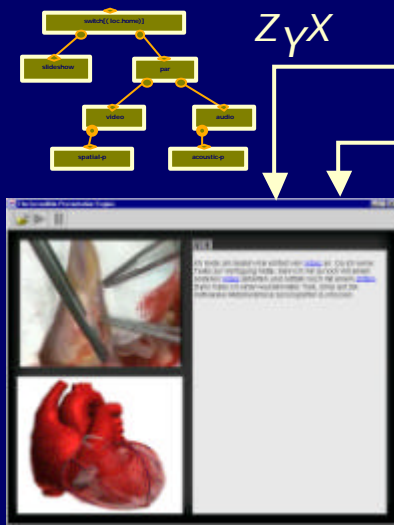
From media elements to multimedia presentations



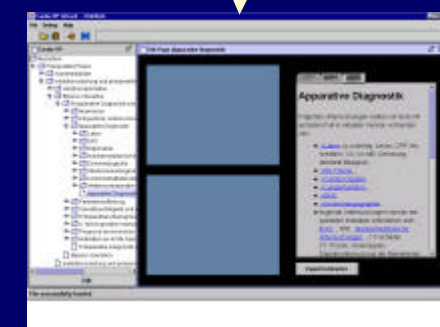
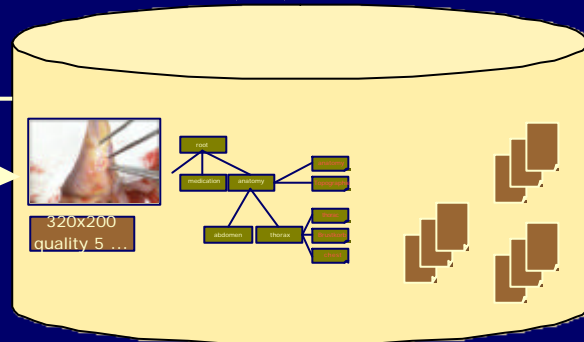
Media Workbench



SGML-Editor



Presentation-Engine



Authoring

Conclusion

- Generic solutions toward a new approach to create multimedia content
 - presentation neutral composition
 - composition of media-fragments
 - capabilities to adapt to different contexts

- Urgent need for methods and tools
 - integrated metadata generation and management
 - specification of description schemes on the level of **multimedia** presentations (e.g., SMIL, ZyX, ...)
 - specification of classification scheme system
 - looking forward to MPEG-7, MPEG-21 ?,
need to exploit MPEG -7
maybe have to go beyond MPEG-7



Thank you for your attention

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