

Teaching Files as Learning Modules in Undergraduate Medical Education

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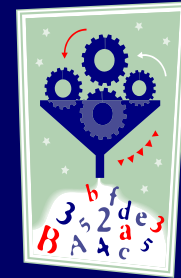
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medical education

information ⇒ **processed facts & data**



knowledge ⇒ **structured information with a purpose**

understanding ⇒ **conscious knowledge, achievement of explanation (implying experience & inquiring)**



supporting medical education

- **information dissemination**

- ↪ **electronic textbooks, atlases, medical & biological databases, scientific press, ...**

- **achieving knowledge & understanding**

- ↪ **creation, management and dissemination of digital teaching file collections**

- ↪ **self-evaluation tools and processes**

- ↪ **mediation of teacher-learner exchange**

teaching files in medicine

- **complete medical case presentations**
 - ↳ **history**
 - ↳ **findings (clinical, imaging, laboratory, ...)**
 - ↳ **diagnosis (& treatment)**
 - ↳ **discussion**
- **either complete reports
or with unknown parts and self-assessment questions**
- **up to now, intended mainly as ...**
 - ↳ **peer-reviewed archival information resources
for formal professional scientific communication**

current state in teaching files

- numerous professional collections on the web
- attempts for some standardization in the description of the content and structure
 - ↳ **Medical Imaging Resource Center:
MIRC network
by RSNA <http://www.rsna.org/mirc/>**
 - ↳ **MIRC server software for teaching file creation and dissemination, and/or**
 - ↳ **MIRC XML document schema for describing teaching files**

current state in teaching files

- a number of authoring tools with varying complexity & functionality
- variable degree of integration with healthcare information systems
 - ↗ import DICOM images in authoring tools
 - ↗ retrieve images directly from PACS via DICOM communication
 - ↗ indicate potential cases during the clinical workflow (IHE integration profile)

what needs to be addressed

? complex search & retrieve of clinical data

↳ based on educational criteria, as opposed to criteria that pertain to clinical patient management

? integration with the academic environment

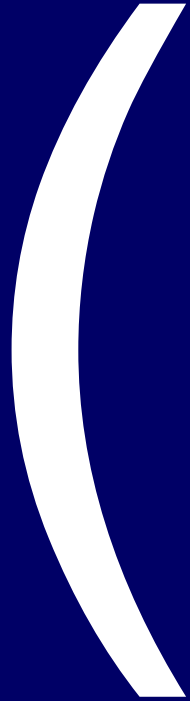
↳ via general purpose learning management systems (LMS) and related educational standards

from

peer-reviewed professional communication

to

educational modules integrated in undergraduate and graduate medical education



***information technology
supporting higher education***

learning management systems (LMS)

advanced web-based software that allows non-programmers to

- ↪ create, manage, present and share educational content
- ↪ create and deploy educational procedures and learning strategies
- ↪ support individualized instruction, and learner progress tracking (self-assessment and/or assessment)
- ↪ promote learner interactions and on-line collaboration
- ↪ help instructors and students organize their private educational portfolio and timetable
- ↪ support administrative tasks (registration, scoring, etc)

SCORM

Sharable Content Object Reference Model

Advanced Distributed Learning Initiative

(<http://www.adlnet.org/>)

- a set of standards to make educational content re-usable independently of the learning management system
 - ↳ model for assembling, labeling and packaging learning content
 - ↳ specifications for the run-time environment in an LMS
 - ↳ rules for sequencing content and navigation

SCORM

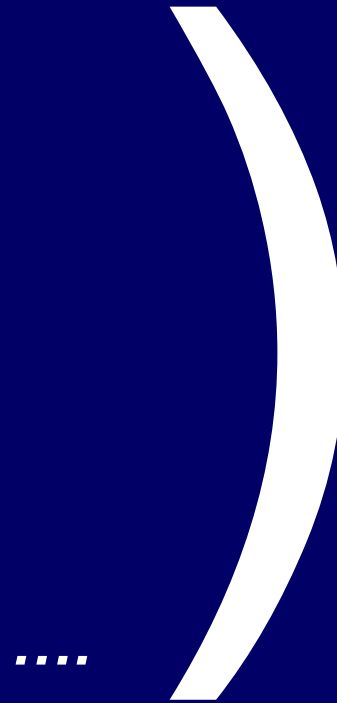
integrates developments from groups such as:

↪ **IMS:** IMS Global Learning Consortium Inc.

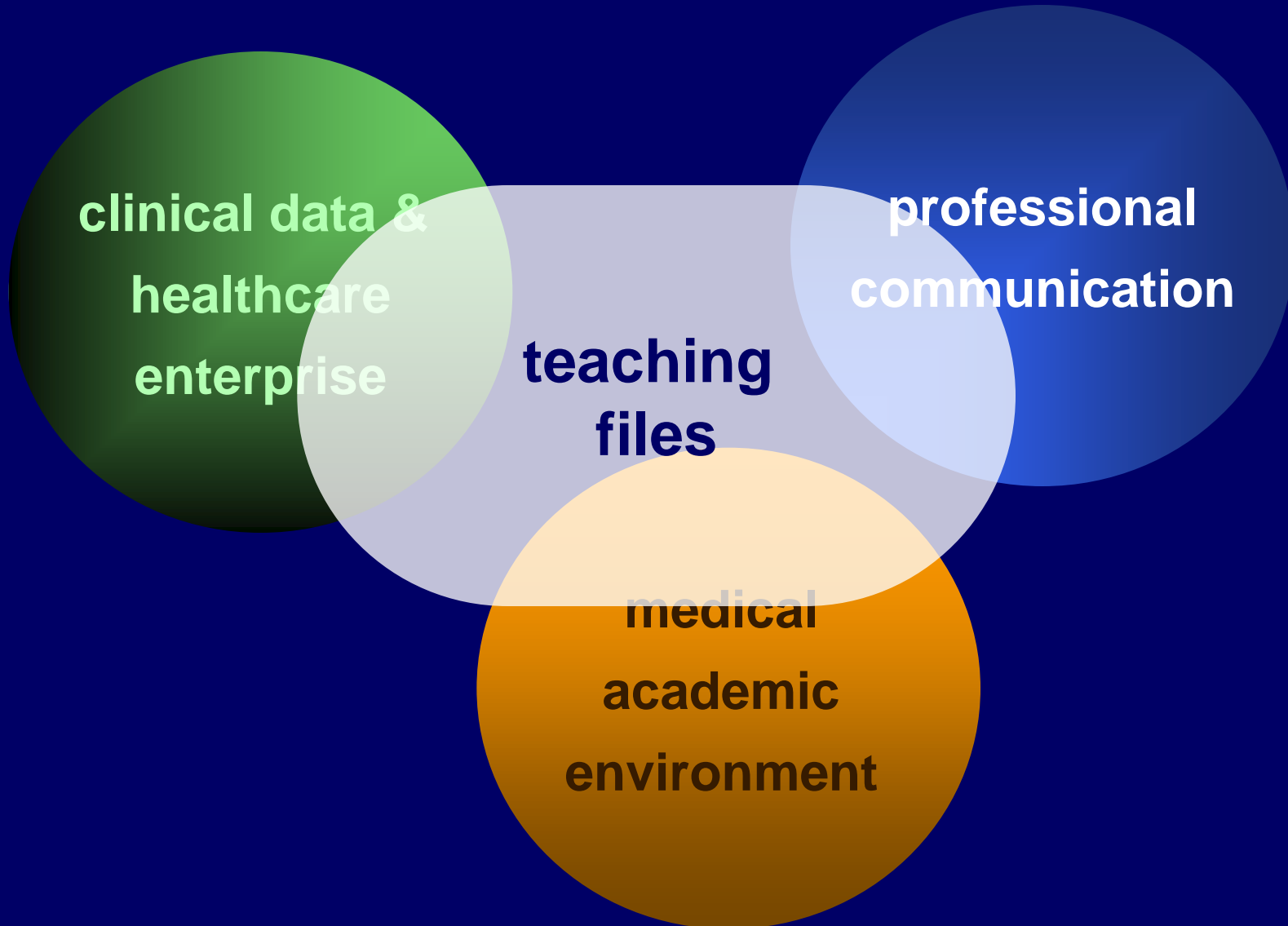
↪ **AICC:** Aviation Industry CBT Committee

↪ **ARIADNE:** Alliance of Remote Instructional Authoring & Distribution Networks for Europe

↪ **IEEE LTSC:** IEEE Learning Technology Standards Committee



teaching files in the medical environment

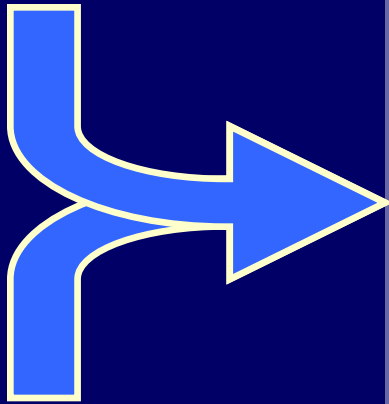


requirements

- **complex search and retrieval of clinical data via healthcare standard interfaces (DICOM in the case of radiology)**
- **integration with commonly available formats and notions for teaching file distribution in professional medical practice (e.g. MIRC specifications)**
- **integration with general purpose learning management systems (via appropriate e-learning standards, e.g. SCORM)**
- **basic standalone functionality, irrespective of the existence of a fully deployed PACS or clinical information system and/or learning management system**

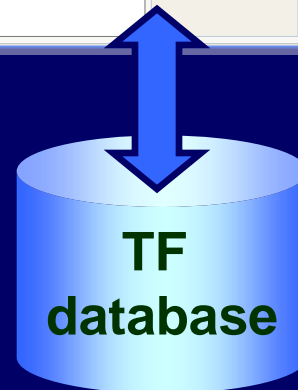
a new teaching file authoring environment

complex
DICOM search
& retrieve

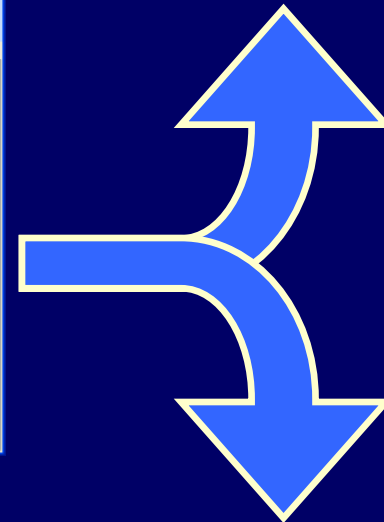


conventional
data entry

**teaching file
authoring tool**



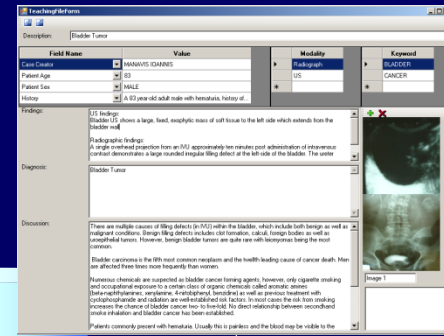
export in SCORM for
integration in LMS



export in standard
presentation formats
(pdf, html & MIRC)

retrieving clinical data

teaching file authoring tool



teaching & research
end-user
applications

added-value
web services

web services
acting as
application wrappers

conventional
clinical information
systems

teaching file authoring tool

Teaching File Authoring Tool

Bladder Tumor


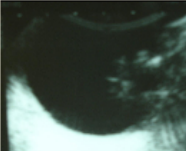
- Image 1
- Image 2
- Quiz 1
 - What is the most possible symptom with which
 - urine retention
 - pelvic pain
 - hematuria
 - back pain
 - With the patient history and the evidence pres
 - calculi
 - blood clot
 - foreign body
 - bladder tumor

Bladder Tumor

button1

Creator	MANAVIS IOANNIS
History	A 83 year-old adult male with hematuria, history of tobacco use
Patient Sex	MALE
Patient Age	83
Findings	US findings: Bladder US shows a large, fixed, exophytic mass of soft tissue to the left side which extends from the bladder wall. Radiographic findings: A single overhead projection from an IVU approximately ten minutes post administration of intravenous contrast demonstrates a large rounded irregular filling defect at the left-side of the bladder. The ureter appears attenuated at the point of bladder insertion, but there is no evidence of obstruction. Enlarged prostate.
Diagnosis	Bladder Tumor
Discussion	There are multiple causes of filling defects (in IVU) within the bladder, which include both benign as well as malignant conditions. Benign filling defects includes clot formation, calculi, foreign bodies as well as uroepithelial tumors. However, benign bladder tumors are quite rare with leiomyomas being the most common. Bladder carcinoma is the fifth most common neoplasm and the twelfth leading cause of cancer death. Men are affected three times more frequently than women. Numerous chemicals are suspected as bladder cancer forming agents, however, only cigarette smoking and occupational exposure to a certain class of organic chemicals called aromatic amines (b

Images



Keywords

BLADDER
CANCER

Modalities

X-Ray
US

exporting teaching files → MIRC

```
<?xml version="1.0" encoding="UTF-8"?>
<MIRCdocument as-mode="false" display="mstf" first-tab="2"
path="documents/20060531141911506/MIRCdocument.xml">
<document-type>Radiologic Teaching File</document-type>
<publication-date>2006-05-31</publication-date>
<creator>Academic TF Author</creator>
<title>Bladder Cancer</title>
<author>
  <name>Manavis Ioannis</name>
  <affiliation>DUTH</affiliation>
  <contact></contact>
</author>
<keywords>Cancer Bladder</keywords>
<section heading="History" visible="yes">
  <p>A 83 year-old adult male with hematuria, history of tobacco use</p>
</section>
<section heading="Findings" visible="yes">
  <p>US findings: Bladder US shows a large, fixed, exophytic mass of soft tissue to
the left side which extends from the bladder wall.</p>
.....
</MIRCdocument>
```

creating quizzes

Teaching File Authoring Tool

Bladder Tumor

- Image 1
- Image 2
- Quiz 1
 - What is the most possible symptom with which
 - urine retention
 - pelvic pain
 - hematuria
 - back pain
 - With the patient history and the evidence pres
 - calculi
 - blood clot
 - foreign body
 - bladder tumor

Quiz 1

Question 1 Question 2

What is the most possible symptom with which the patient presented

Answers

	Text	Is Correct	Discussion	Weight
1	urine retention	<input type="checkbox"/>	bladder distention is observed	0
2	pelvic pain	<input type="checkbox"/>	e.g no acoustic shadow is observed	0
3	hematuria	<input checked="" type="checkbox"/>	The mass described above could cause hematuria	10
4	back pain	<input type="checkbox"/>	The radiological findings of a mass extruding from the bladder wal	0

TeachingFile Fields Images

	Field Name	Value	Visible
1	Creator	MANAVIS IOANNIS	<input checked="" type="checkbox"/>
2	History	A 83 year-old adult male with hematuria, history of tobacco use	<input type="checkbox"/>
3	Patient Sex	MALE	<input checked="" type="checkbox"/>
4	Patient Age	83	<input checked="" type="checkbox"/>
5	Findings	US findings: Bladder US shows a large, fixed, exophytic mass of soft tissue to the left side w	<input checked="" type="checkbox"/>
6	Diagnosis	Bladder Tumor	<input type="checkbox"/>
7	Discussion	There are multiple causes of filling defects (in IVU) within the bladder, which include both b	<input type="checkbox"/>

exporting teaching files → SCORM

Reload Scorm Player 1.2 - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://127.0.0.1:8080/reload-scorm-player/pages/LMSMain.htm> Go Links >>

Google Search 15 blocked AutoFill Options

Reload Scorm 1.2 Player about

What is the most possible symptom with which the patient presented [←](#) [prev](#) [next](#) [quit](#)

Lesson

- What is the most possible symptom with w
- With the patient history and the evidence presen
- Final Teaching File

Findings

US findings: Bladder US shows a large, fixed, exophytic mass of soft tissue to the left side which extends from the bladder wall Radiographic findings: A single overhead projection from an IVU approximately ten minutes post administration of intravenous contrast demonstrates a large rounded irregular filling defect at the left-side of the bladder. The ureter appears attenuated at the point of bladder insertion, but there is no evidence of obstruction. Enlarged prostate.

Diagnosis

The mass described above could cause hematuria
Score : 10/10
OK

Discussion

Ερώτηση 1

What is the most possible symptom with which the patient presented

- urine retention
- pelvic pain
- hematuria
- back pain

OK

Image 2

implementation issues

- teaching file authoring tool

 - ↪ C# (MS .Net Framework 2.0)

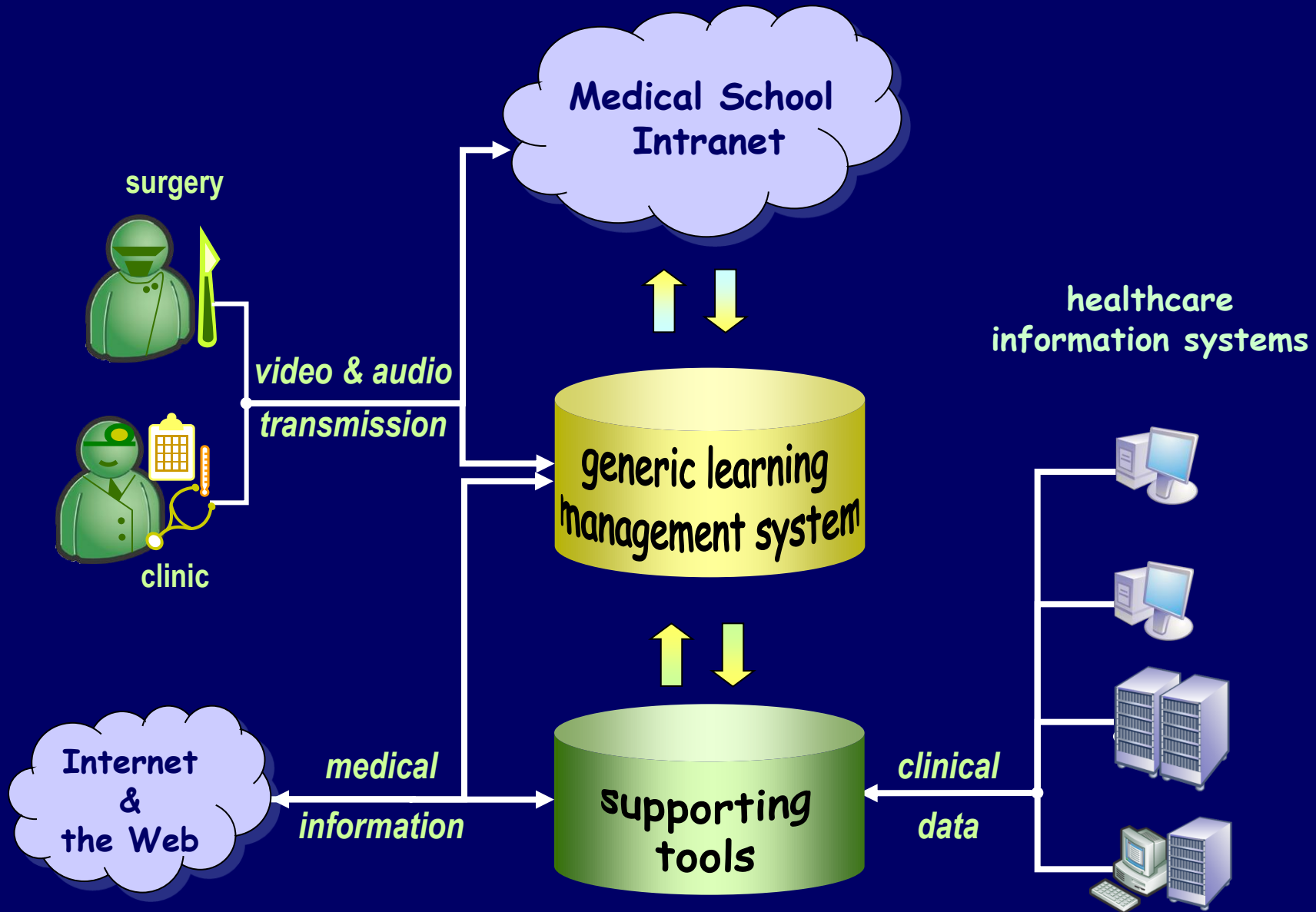
 - ↪ MS SQL Server 2000 Desktop Engine

- web services

 - ↪ C# (MS .Net Framework 2.0)

 - ↪ DicomObjects 4.1 (Medical Connections)

<http://iris.med.duth.gr/>



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- **Reforming Undergraduate Education in the School of Medicine, DUTH (2003-2008)**

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funding: EU Community Initiative Programme INTERREG III B ARCHIMED

cite as

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