

Clinical Information Retrieval to Support Teaching and Research in Radiology

E. Kaldoudi, D. Karaiskakis, J. Manavis

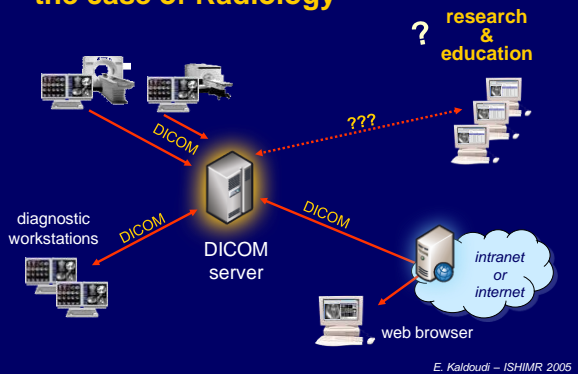
School of Medicine
Democritus University of Thrace - Greece

supporting medical teaching & research

- major achievement
 - ↳ information dissemination
 - ↳ towards advanced information management
- current challenge
 - ↳ bridge healthcare enterprise with academic and research environment
 - i.e. integrate clinical data with teaching and research software tools

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the case of Radiology

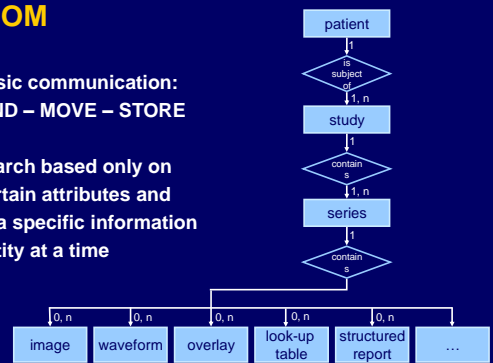


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DICOM

basic communication:
FIND – MOVE – STORE

search based only on certain attributes and of a specific information entity at a time



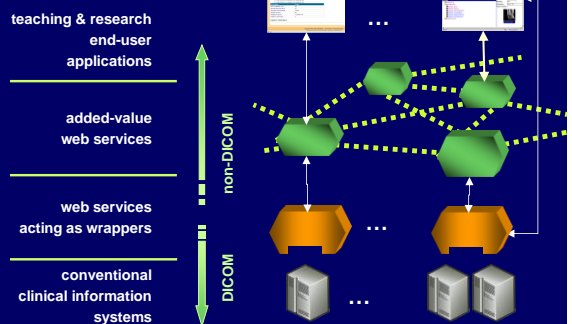
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requirements

- flexibility
 - ↳ change and adapt easily, and expand to cover emerging needs
- easiness to implement
 - ↳ does NOT require expensive infrastructure & long development times
- security
 - ↳ data anonymization & integrity
- adherence to open standards
 - ↳ accommodate synergy with disparate systems & the open standards academic and research infrastructure

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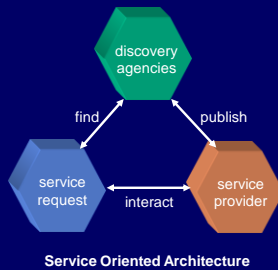
our approach



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web service paradigm

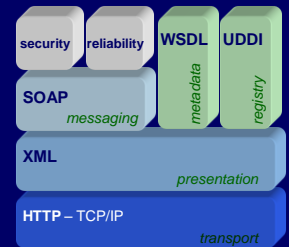
- middleware technology for program-to-program interactions
- URI-addressable software with certain functionality
- can act as wrappers for legacy applications



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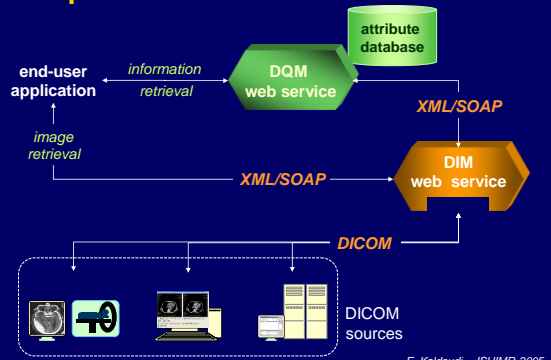
web service paradigm

- enable disparate systems to work together
- based on open internet standards
- broad industry support



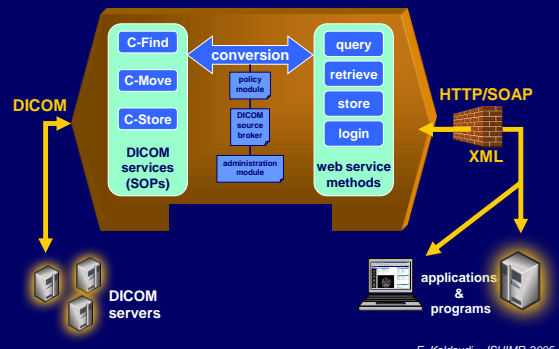
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complex DICOM search



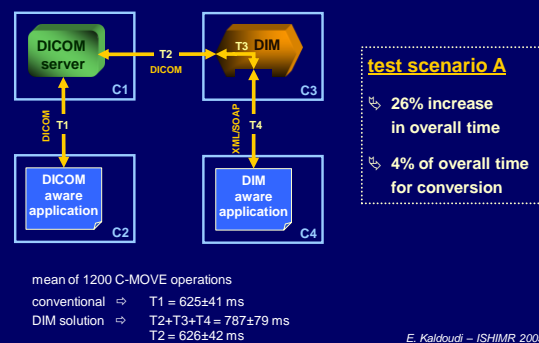
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DIM web service



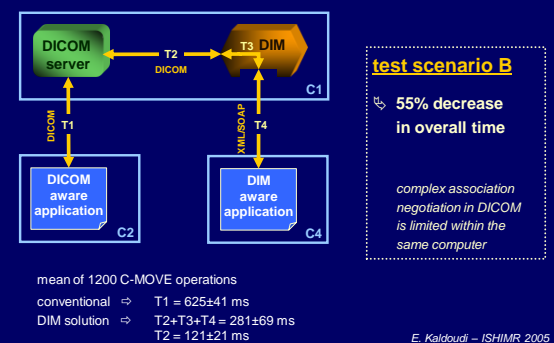
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performance issues



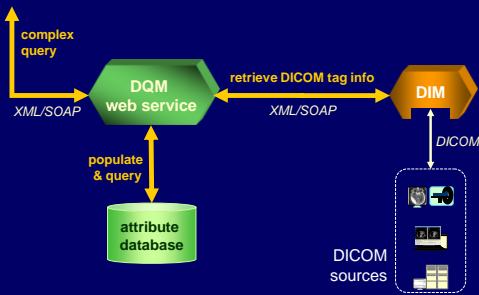
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performance issues



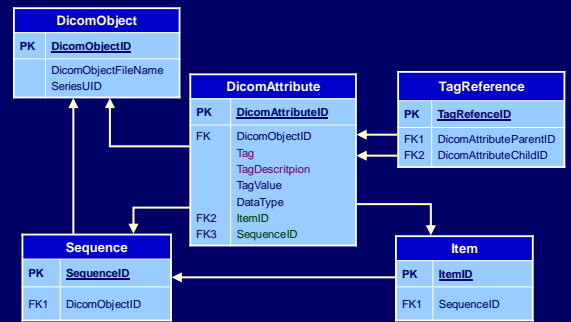
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DQM web service



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database model



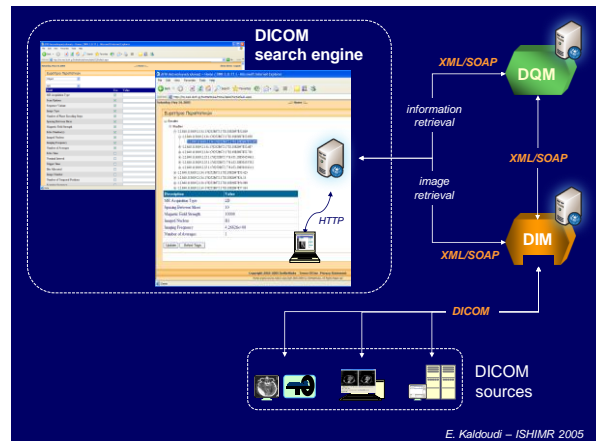
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implementation issues

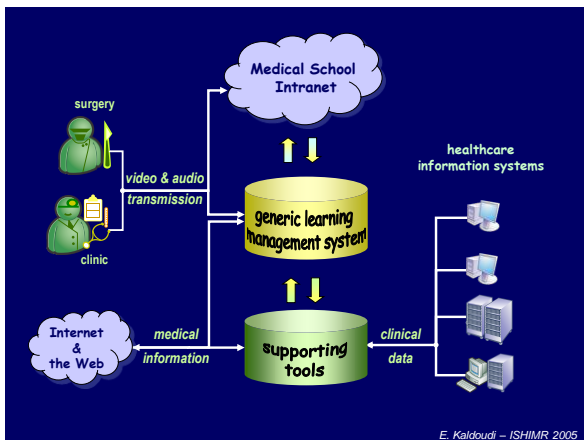
- technologies
 - ☞ C# (MS .Net Framework 1.1)
 - ☞ DicomObjects 4.1 (Medical Connections)
- system requirements
 - ☞ MS Internet Information Server >5.x
 - ☞ MS .Net Framework 1.1
 - ☞ MS SQL Server 2000 Desktop Engine (MSDE)
- security
 - ☞ SSL, user authentication, role-based data anonymization

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

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DIM testing set-up

DICOM server - eFilm workstation v1.5.3
on Intel Pentium 4 processor at 2.8 GHz, 1GB RAM (unit C1)

DICOM aware application
DIM web service
DIM web service aware application } on Intel Pentium 4 processor at 2.8 GHz,
and 512 MB RAM
(units C2-C4)

testing data - DICOM C-MOVE operation
performed for 1200 different DICOM objects
in a hospital 100 MB/s LAN

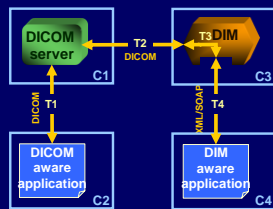
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DIM testing set-up ⇒ scenario A

T1=625 ± 41 ms
T2=626 ± 42 ms
T3=27 ± 11 ms
T4=134 ± 66 ms

DIM solution:
26% increase in time
4% for data conversion

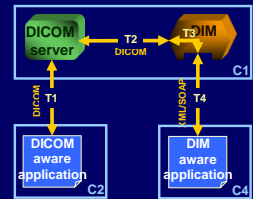


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DIM testing set-up ⇒ scenario B

T1=625 ± 41 ms (in A: 625 ± 41)
T2=121 ± 21 ms (in A: 626 ± 42)
T3=28 ± 12 ms (in A: 27 ± 11)
T4=132 ± 65 ms (in A: 134 ± 66)

DIM solution:
55% decrease in time



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DICOM search engine

dynamic user interface

- XML based description of interface elements
 - ↳ add/change interface elements
 - ↳ support multilinguality
 - ↳ facilitate personalization
- values for drop-down and checkbox lists automatically updated according to database

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further work

- towards a cluster of web services
 - ↳ 1st tier: facades for legacy systems
 - ↳ 2nd tier: added value services:
data mining & knowledge extraction
- special purpose end-user applications for
 - ↳ medical teaching file authoring
 - ↳ advanced data processing

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