A Multi-Agent Architecture for Health Information Systems

L. Palazzo, P. Sernani, A. Claudi, G. Dolcini, G. Biancucci and A. F. Dragoni

Università Politecnica delle Marche
Outline

• Introduction: HIS requirements
• Why agents?
• The proposed architecture
• Use Case
• Conclusions
EHR & HIS: Requirements

- Localization and availability of health records
- Supporting healthcare processes
- Respecting the federated architecture of healthcare facilities
- Integration with legacy systems
- Scalability, modularity, reliability
- Security and Privacy
Solutions

- Cloud computing
  - Remote access to centralized data
- Service Oriented Architectures
  - Federation and decentralization
- Multi-Agent Systems
Agents

Autonomous entities, with social ability, reactive and proactive.

Multi-agent systems: agent community

- Cooperation or competition
- Every agent has a partial knowledge of the world
- Complex problem solved with agent interactions
Why Agents for HIS?

- Distribution
- High modularity
- Robustness
- Integration with legacy systems
Platforms

District A
- Client Platform
- Client Platform
- Client Platform

District Platform A
- Local Platform 1
- Local Platform 2
- Local Platform n

District B
- Client Platform
- Client Platform
- Client Platform

District Platform B
- Local Platform 1
- Local Platform 2
- Local Platform n
Local Platforms

Local Platform 1
- DocumentHandlers
- LocalDBWrapper
- Clinical Document Repository
- Service Agents
- AMS
- DF

Local Platform 2
- DocumentHandlers
- LocalDBWrapper
- Clinical Document Repository
- Service Agents
- AMS
- DF
LocalDBWrappers

- The legacy systems are encapsulated within such agents
- They allow to abstract data representation
They read, modify, insert clinical reports, laboratory tests, prescriptions, etc.
Gateway

- It catches client requests
- It retrieves clinical information and documents
DFs

- **DF_Inter-District:**
  All the remote gateways are registered, permitting them to communicate

- **DF_Intra-District:**
  All the LocalDBWrappers of the district are registered, permitting the gateway to obtain all the references to clinical documents
LoginServer

- It manages the authentication phase
- Encryption: HTTPS MTP
Client Platform

Examples:

- Software/mobile apps to access to Patient Summary or EHR
- Software to update health records by general practitioners
- ...
Clinical Documents Research

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Documents Retrieving

Client Agent

DocumentHandler@DistrictPlatformA

Inform(DocumentContent)

Request(DocumentID)

Inform(DocumentContent)

Request(DocumentID)

DocumentHandler@DistrictPlatformN
Use case

- Emergency: a first-aid doctor needs to know a patient's clinical history (problems, allergies, current medicines, etc.)
- Solution: a mobile app to consult the EHR, especially the Patient Summary
Patient Summary

It summarizes a patient's clinical history and it can be useful:

- In emergency situations
- To improve the communication between family doctor and health facilities
- To coordinate the work of several specialists
- ...

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The client application has to allow:

- The doctor's login
- To display all available versions of the Patient Summary, giving the patient's tax code
- To display all clinical information of a specific version
Implementation
Conclusions

MAS can:

• Improve interoperability

• Integrate with legacy systems, preserving made investments

• Integrate future technologies/applications

This step requires a joint effort by IT companies, local governments and healthcare organizations.
Thank you for your attention.

Email: p.sernani@univpm.it
Web: http://airtlab.dii.univpm.it/