

# Activity of the Integrated Laboratory of Artificial Intelligence and Medical Informatics DISIT+DAIRI, Alessandria

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**PNR** 2021-2027  
Programma nazionale  
per la ricerca

6 GRANDI AMBITI DI R&I

Salute

Cultura umanistica, creatività, trasformazioni sociali, società dell'inclusione

Sicurezza per i sistemi sociali

Digitale, industria, aerospazio

Clima, energia, mobilità sostenibile

Prodotti alimentari, bioeconomia, risorse naturali, agricoltura, ambiente

Agenda 2030



Biotechnology  
and  
Health Technology

High performing  
computing big data  
and  
Artificial Intelligence



Dipartimento  
Attività Integrate  
Ricerca e Innovazione  
AO AL - ASL AL



AO SS Antonio e Biagio e Cesare Arrigo,  
Alessandria



DAIRI



DiSIT, Univ. Piemonte Orientale,  
Alessandria



Research in AI and Medical Informatics



10 researchers

**Consolidated know-how, international visibility**

- Since 1987, initially in cooperation with AO San Giovanni Battista, Torino
- International cooperations, projects, publications, awards

## 9. Definition and development of computer science methodologies in biomedicine

- *Development of CS methodologies and technological supports for the discovery, analysis, management and simulation of healthcare processes*

**Wide range of problems and methodologies**

# Integrated Laboratory of Artificial Intelligence and Medical Informatics



Dipartimento  
Attività Integrate  
Ricerca e Innovazione  
AO AL - ASL AL



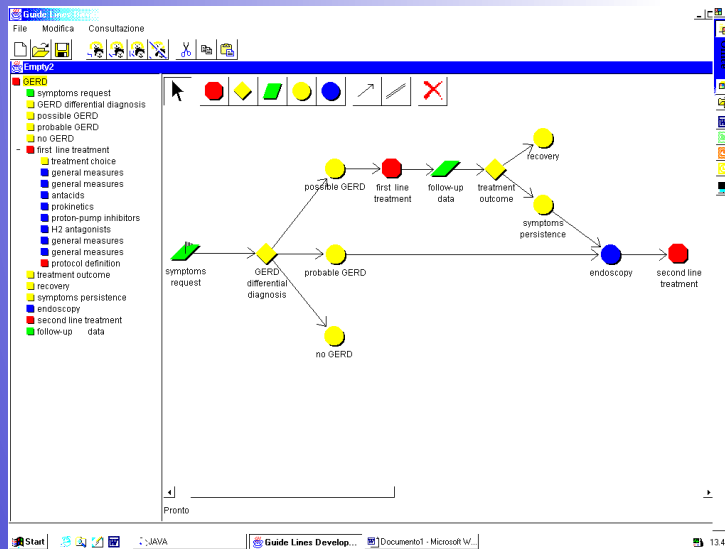
# Main research topics

## Computer-Interpretable medical guidelines

GLARE (Guideline Acquisition, Representation and Execution), since 1996

Decisions Support System

Adoption of AI techniques (e.g., temporal reasoning, model checking, decision theory)

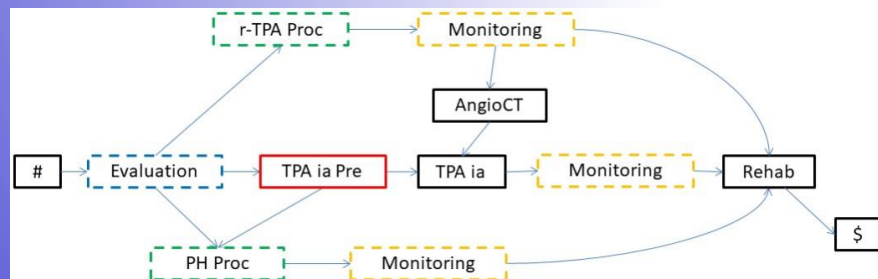
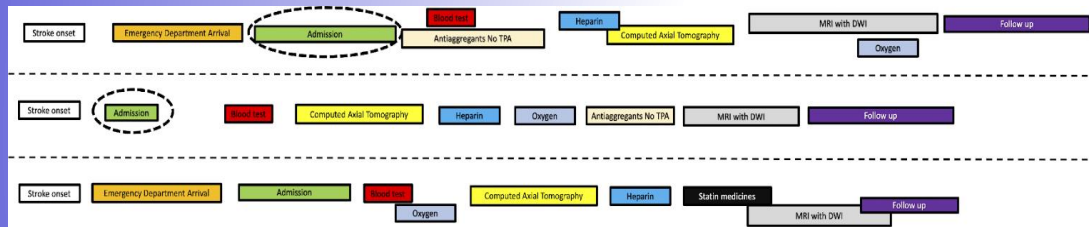


- **Comorbidities** (ontologies, knowledge-based, probabilistic and temporal reasoning, CSP)
- **Education** (knowledge representation, decision support, simulation)
- **Multiple agents** (ontologies, decision support)
- **Conformance evaluation** (Answer Set Programming, ontologies)

# Main research topics

## Process Mining (PM)

SIM (Semantic Interactive Miner) Discovery of the model of the processes from patient traces

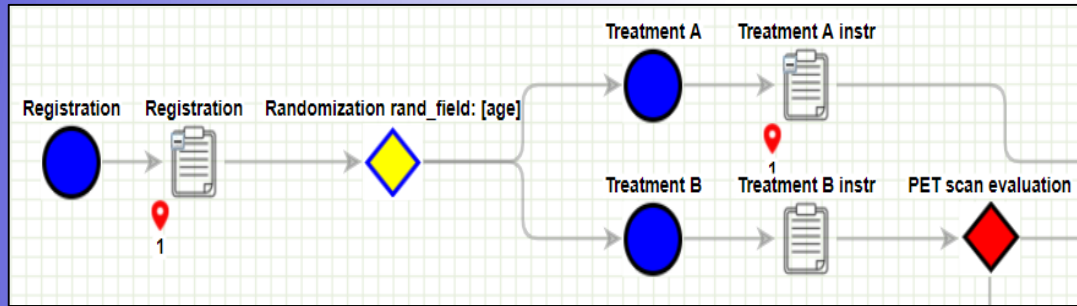


- Integration **domain knowledge** (ISA and Part-Of ontologies )
- Interactive with **domain experts**
- Supports **multiple abstraction levels**
  
- **Explainability**
- **Traces classification**

# Main research topics

## Clinical Trial Management

Intelligent data capture and analysis, based on an explicit representation of clinical trial processes



- Automatic supports for the analysis of **data correctness** and **completeness**
- **business intelligence** and **data mining** techniques for data analysis (e.g., dashboards)

RECORD	DAG	Registration	Treatment A instr	Follow up	Treatment B instr	Salvage month 2	Salvage month 6	adverse event
1 status_fil not present	NA	adverse					hematology adverse	
2 status_fil not present	NA		hematology				hematology adverse	
3 status_fil not present	NA				hematology adverse	registration hematology		
4 status_fil not present	NA							

# Main research topics

## Machine learning e deep learning

**Health-care** and **medical decision making** tools to support physicians (diagnostic and therapeutic decision making, prospective and retrospective analyses)

- **Multi-modal Machine Learning** for the analysis of **heterogeneous data** (e.g., texts, images)
- Automatic generation of **images** or **referrals**
- **Integration of clinical and multi-omics data** through Graph Neural Network



**MULTIMODAL**  
Machine Learning

# Main research topics

## Time Series (TS)

**Deep learning** techniques for the **classification** of time series derived from patient monitoring

## Advanced monitoring techniques for continuous patient assistance

**Wearable devices** + **deep learning** for patient monitoring (health status, vital signs) to alarm or prevent dangerous situations (e.g., falls of Parkinson patients)





# Lab Organization

## Responsible

Prof. Paolo Terenziani

## Site

DAIRI

## Researchers

DiSIT

Prof. Alessio Bottrighi, Prof. Massimo Canonico, Prof. Daniele Theseider Duprè, Prof.ssa Giuliana Annamaria Franceschinis, Prof. Giorgio Leonardi, Prof.ssa Stefania Montani, Dott. Marzio Alfio Pennisi, Dott. Luca Piovesan, Dott. Emanuele Rava, Prof. Giancarlo Ruffo

DAIRI

Dott.ssa Tatiana Bolgeo, Dott.ssa Costanza Massarino, Dott. Guglielmo Pacileo, Dott.ssa Annalisa Roveta, Dott.ssa Francesca Ugo



# Results 2022-23

- Journal publications: 9
- Conference Publications: 9
- Project submissions: 6
- Clinical studies: 3

## PROJECTS with GRANTS:

- **Healthcare support for remote HIV patients.** Gilead Sciences, 30K
- **LEArning Personalization with AI and of AI** (con UNITO, UNINA, ...).  
Fondazione Compagnia di San Paolo and Fondazione CDP,  
Bando Intelligenza Artificiale 2, 500 K