



# Rey Juan Carlos University



Esperanza Marcos, David Rios

[e.marcos@escet.urjc.es](mailto:e.marcos@escet.urjc.es)

[d.rios@rct.urjc.es](mailto:d.rios@rct.urjc.es)

<http://www.urjc.es>



# The URJC environment





➤ **DEPARTAMENTOS INVOLVED IN ERCIM:**

- Department of Informatics, Statistics and Telematics
- Department of Applied Mathematics and Physics and Natural Sciences





# Global data

- Staff's figures: 108 lecturers (about 90 full time)
- Annual turnover: 1.200.000 Euros
- Government: 70%- Commerce/Industry: 30%
- PhD. Program in Informatics and Mathematical Modelling (about 38 students)
- High performance Computing and Virtual Reality Centre:
  - Beowulf Cluster (with Myrinet network)
  - Virtual Reality Cave
  - Virtual Reality Laboratory



## COLLABORATIONS:

- **Spanish Universities:** Technical University of Madrid, Technical University of Valencia, Technical University of Catalonia, etc.
- **European Universities:** Università degli Studi di Milano (Italy), Universität Zürich (Switzerland), Trinity College, Basel University, CNR-IAMI (It), U. Manchester (UK), Athens Univ. of Economics and Business (Gr), Helsinki Univ. of Technology (Fi), etc.
- **American Universities:** Duke University, Georgia Tech, UC Santa Cruz, U. Maryland, Anderson Cancer Center, etc.
- **Companies:** El Corte Inglés Informatics, Sema Group, ICM (Madrid Community), CRC Information Technologies, Intesys, Oracle Iberica, FENOSA, IEM, Eurostat, PWC, IPSA, INE, etc.



# URJC Research Lines





## ➤ Informatics Research

- ★ Software Engineering and Databases
- ★ Software Visualisation and Electronic Documentation
- ★ Artificial Intelligence
- ★ Human Computer Interaction
- ★ Computer Vision, Biometrics
- ★ Image analysis and synthesis
- ★ Robotics
- ★ Operating and Distributed Systems
- ★ Multimedia Communications
- ★ Free Software Engineering



## ➤ **Mathematics Research**

- ★ Decision Support Systems
- ★ Bayesian Analysis
- ★ Operations Research
- ★ Chaos Theory
- ★ Discrete Mathematics and Logic
- ★ Fluid Mechanics
- ★ No-Newtonian Geophysical Fluid Modelization
- ★ Partial Differential Equations (EDP) and Systems of EDP's.
- ★ Functional Analysis (Energy Methods) and Numerical Analysis (FEM)
- ★ Medical Image Reconstruction for PET modality





# Informatics



## Software Engineering and Databases

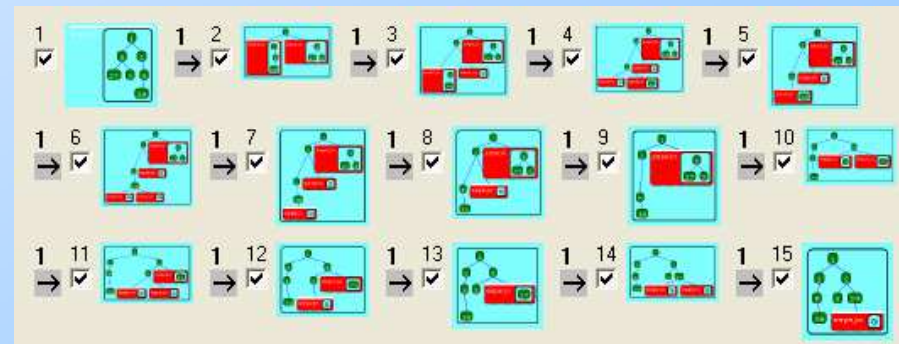
- Databases and Information Systems
  - ✓ Multimedia, Web and OO Databases
  - ✓ Data Warehousing
  - ✓ Conceptual Modelling
- Web Information System Developments
  - ✓ Agile Process for Web Developments
  - ✓ Agile Modelling Techniques for Web Developments
  - ✓ Web Digital Archives
- Philosophical Issues in Software Engineering



# Informatics

## Software Visualisation and electronic documentation

- ✓ Information visualization
- ✓ Visualization of software
- ✓ E-books and digital libraries
- ✓ Natural language processing
- ✓ E-learning
- ✓ Web applications
- ✓ Ubiquitous computing





# Informatics

## Artificial Intelligence

### Multi-agent Systems and Societies of Agents

#### *Co-ordination:*

- Service environments
- Agent societies (Software Engineering perspective)
- Peer-to-peer systems

#### *Communication:*

- Pragmatics: Agent Communication Languages (ACLs)
- Social Semantics for ACLs (agent-oriented SE, e-institutions)

### Applications

- transportation management (MCyT)
- e-markets (CAM)

### Challenges:

- Large-scale open service environments (co-ordination, security, HCI, mobile devices)



# Informatics

## Computer Vision, Biometrics, Image analysis and synthesis

- ✓ Computer Vision Applications
- ✓ Biometrics Pattern Recognition
- ✓ Medical Imaging
- ✓ Virtual reality
- ✓ Instruction Level Parallelism:
- ✓ Architectures
  - ★ Cluster-based architectures
  - ★ High capacity networks
  - ★ Heterogeneous computation
- ★ Algorithms
- ★ Hardware Software co-design



# Mathematics

## Chaos Theory and Non-linear Dynamics

- ✓ Neuroscience Applications
- ✓ Fractal structures in Astrophysics
- ✓ Non-linear Dynamics and Time Series Analysis
- ✓ Controlling Chaos
- ✓ Digital Communications using Chaos
- ✓ Dynamic of complex networks

### Chaos Pioneers



Henri Poincaré



Edward Lorenz



James Yorke



# Mathematics

## Operations Research and Statistics

- ✓ Decision Analysis
- ✓ Decision Support Systems
- ✓ Electronic Democracy
- ✓ Bayesian Statistics
- ✓ Data Mining
- ✓ Non-linear Optimisation
- ✓ Stochastic Programming



# Some Current Research Projects

## European Projects

- European Network of Excellence for Agile Methodologies Experiences
- European Network of Excellence on Digital Libraries (ERCIM)
- AgentLink II: A Network of Excellence for Agent-Based Computing
- VISOR-BASE: Distributed System for Facial Recognition
- PROENBIS: Business and Industrial Statistics
- TED: Towards Electronic Democracy



# Some Current Research Projects

## Spanish Projects

- Spanish Network on Databases
- Spanish Network on Philosophy Applied to Softw. Engineering for Information Systems
- Spanish Network on Medical Imaging
- Projects funded by Ministry of Science & Technology:
  - ★ DAWIS: Methodologies, Techniques and Architectures for Web Digital Archives
  - ★ Integration of e-books and programming environments
  - ★ SKADS: Social Knowledge Agents for Decision Support
  - ★ Efficient Representation and Visualisation of Tri-dimensional Objects in Low Cost Clusters
  - ★ Complete Architecture Based on Distributed Components for Fault Tolerant Systems with Different Service Qualities
  - ★ Data acquisition system, Processing and Reconstruction of images for Positron Emission Tomographers of high resolution.....





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