

# SpaRCIM Participant Presentations

## Technical University of Madrid (UPM)

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School of Computer Science  
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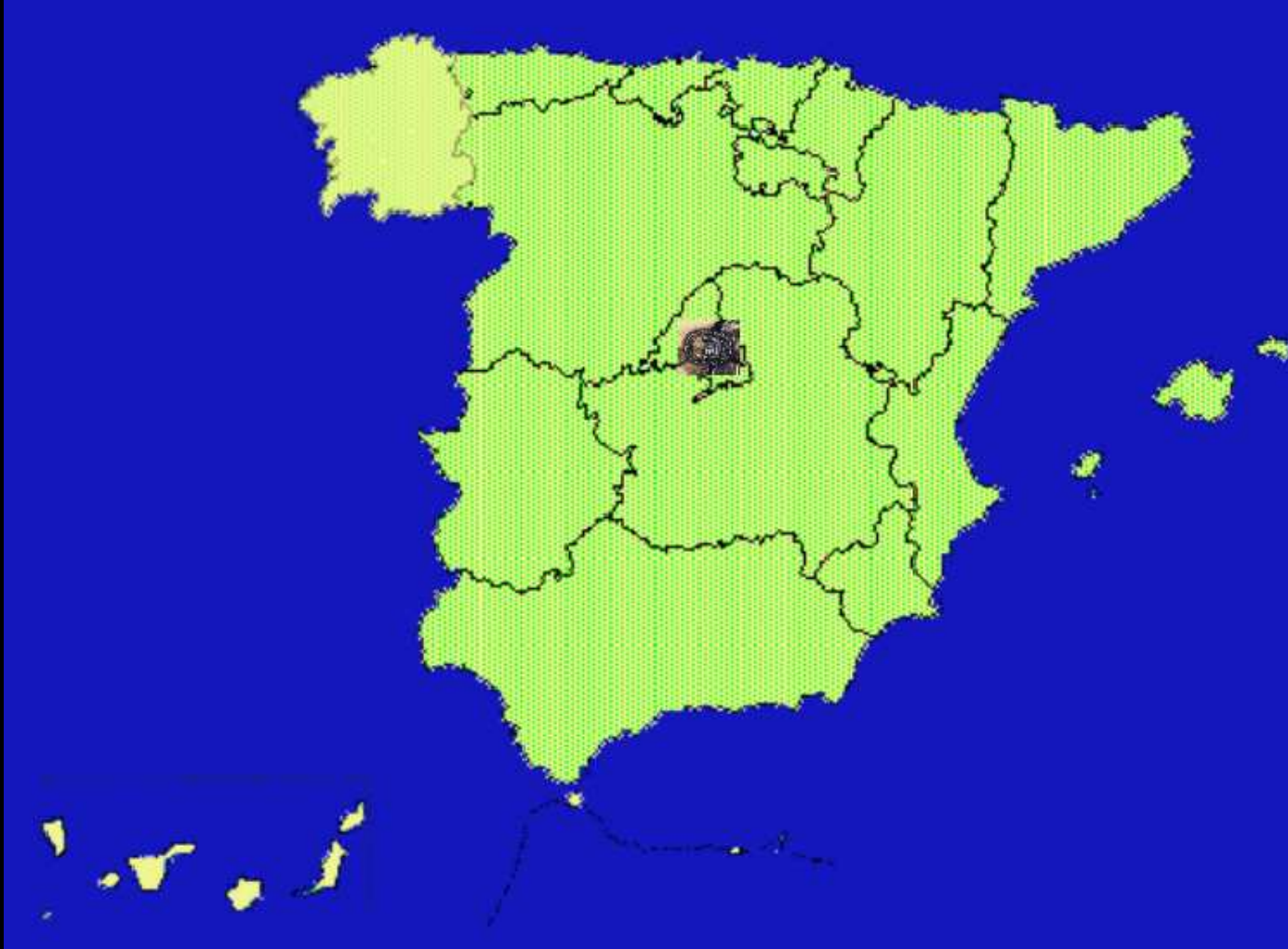


# SpaRCIM

- Spanish Research Consortium for Informatics and Mathematics
- 5 universities + research institute funded by Ministry of Science and Technology:
  - Rey Juan Carlos University (URJC)
  - **Technical University of Madrid (UPM)**
  - University of Málaga (UMA)
  - Technical University of Valencia (UPV)
  - Technical University of Catalonia (UPC)
  - Artificial Intelligence Research Institute (IIA)



# Technical University of Madrid (UPM)



# Technical University of Madrid (UPM)

- Public University
- All engineering areas, computer science, architecture
- Largest participant in Spanish Information Technologies Program (TIC) (11.7%)
- Largest Spanish participant in EU programs (followed by Sema Group and UPC, CSIC, Telefónica)



# Computer Science and Applied Mathematics at UPM

- ~ 300 researchers, 30 adm.support staff
- Annual turnover (last 5 years)  $>1,000,000E$
- EU 30%, Industry 10%, Government 60%,
- On average over  $>100$  publications per year
- 3 patents, 10 major SW products (last 5 yr.)
- ~20 EU R&D contracts/year (last 5 yr.)
- Several spinoffs, spinoff incubator, regional and national support for technology transfer



# Researchers involved in proposal

- Coordinators:
  - Juan José Moreno-Navarro (SpaRCIM Dir.)
  - Manuel Hermenegildo
  - Roberto San José
- Many more researchers involved. Partial list:
  - Enric Trillas, Ana García Serrano, Jim Lipton, Francisco Bueno, Germán Puebla, Julio Mariño, Angel Herránz, Daniel Cabeza, Manuel Carro, Pedro López, Nick Swoboda, Susana Hernández, Jesús Correas, Félix García Merayo, Claudio Vaucheret, José Morales, Jose Manuel Gómez, ...



# Groups and lines of research–I

- Includes some of the most representative Spanish groups in Computer Science.
- Groups already in ERCIM listed first (these are the groups which have prepared the application).
- Open to other UPM quality groups (list of related research groups and lines of research follows).



# Groups and lines of research–II

- The Languages and Methodologies Laboratory / Babel Group  
(Coord.: Juan-José Moreno)
  - All aspects related to programming languages: design, semantics, implementation, applications, and education. In particular, there are two main research topics: declarative programming and specification languages.



# Groups and lines of research–III

- **CLIP: The Computational Logic, Implementation, and Parallelism Lab**  
(Coord.: Manuel Hermenegildo)
  - Advanced program development tools, Global program analysis, Optimization, Verification, Abstract interpretation, Abstract machines, Parallelizing compilers, Constraint/Logic/Functional programming theory and implementation.



# Groups and lines of research–IV

- **Environmental Software and Modeling Group**  
(Coord.: Roberto San José)
  - Air Quality Modeling and Air Quality Measuring: Nesting Meteorological Modeling, Mesoscale Meteorological Modeling, Atmospheric Chemistry Modeling, High spatial and temporal resolution emission models, Satellite Imaginery, Deposition/emission flux modeling



# Participation in Research Projects-I

- Networks, e.g.:
  - CoLogNet (UPM area managers) (with UPV, UMA).
  - AGENTLINK (UPM with IIIA, UPV, UMA)
- Coordinators of several EU projects.
- Participation in numerous EU projects.
- Numerous national projects
- Often with participation of other EU ERCIM members



# Participation in Research Projects-II

- In the following areas:
  - Declarative Programming Paradigms
  - Pervasive Computation
  - Constraints
  - Formal and Decl. Methods for SW Construction
  - Parallelism
  - Open Source Software
  - Automatic Web-Site Generation Tech.
- Example: ESPRIT Discipl (coordinated by

ERCIM!



# Partnerships

- Industrial partners (last five years) include:
  - Eliop S.A., Sowftcare, Software A.G., Microsoft Ibérica, Ibermática, Microsoft (US), ILOG (France), SICS (Sw), Motorola (US), CoSyTec (France), ...
- Academic partners (last five years) include:
  - SICS (Swe), DFKI (Ge), INRIA (Fr), U. New Mexico and NMSU (USA), C.A..U. Kiel, U. Aachen (Ge), U. Cambridge (UK), U. Bristol (UK), U. Paris (Fr), Ecole Normale Paris (Fr), U. Pol. de Valencia (Es), U. Complutense de Madrid (Es), U. Málaga (Es), U. Pisa (It), U. Portland (USA), U. Federico Santa María (Ch), U. P. Méjico (Me), T.U. Zurich (Sw), U. Tel Aviv (Israel), K.U. Leuven (Be), U. Nova Lisboa (Pt), ...



# Participation in research policy

- UPM members have or have had important policy responsibilities.
- Juan José Moreno Navarro:
  - Currently in charge of the Spanish Research Program in Information and Communication Technologies (Ministry of Science and Technology), Spanish representative in the EU VI Program Framework IST Committee, Member of the editorial board of the Electronic Journal of Functional and Logic Programming, SpaRCIM Director.



# Participation in research policy

- Manuel Hermenegildo:
  - ISTAG Member, EAPLS board, Associate Ed. of several international journals, former Director of the Spanish Research Directorate, Prince of Asturias Endowed Chair in IST, UNM (USA), Invited speaker at Danish EU presidency ERC meeting, Panel Member ACM 50th Anniversary Workshop on Future Directions in CS, Invited talks, tutorials, PC chairmanships, etc.



# Participation in research policy

- Others: Gonzalo Leon, Roberto San José, Vicente Ortega, Enric Trillas, Fernando Aldana, ...
- Members of many steering committees of conferences, international bodies, etc.



# Interests in ERCIM WGs -I

- UPM currently participates in the ERCIM working groups:
  - Constraints
  - Environmental Modeling(co-founders in both cases, prizes)



# Interests in ERCIM WGs -II

- Interest in previous groups:
  - Parallel Processing Network
  - Programming Language Technologies
- Also interest in:
  - Formal Methods for Industrial Critical Systems
  - Soft Computing
  - Matrix Computations and Statistics
  - Applications of Numerical Mathematics in Science



# Other groups and lines of research–I

- Other groups and lines of research:
  - Soft computing
  - Robotic vision
  - Agent Systems
  - Software Engineering
  - Computer systems engineering
  - Computer architecture
  - Computer hardware technology
  - Operating systems



# Other groups and lines of research–II

- Other groups and lines of research (Contd.):
  - Teledetection
  - Oral communication
  - Intelligent Systems
  - Artificial Intelligence
  - Expert systems
  - Search and learning
  - Knowledge engineering
  - Natural language processing



# Other groups and lines of research–III

- Other groups and lines of research (Contd.):
  - Molecular computing
  - Ontologies
  - Verification of knowledge-based systems
  - Validation and industrial applications
  - Numerical analysis
  - Decision analysis
  - Statistics
  - Neural nets and genetic algorithms



# Other groups and lines of research–IV

- Other groups and lines of research (Contd.):
  - Natural computing
  - Scientific and automatic discovery
  - Medical informatics
  - New technologies to support the disabled
  - Analog and digital electronics
  - Radio and magnetism
  - Image and signal analysis and processing
  - Optical computing



# Selected Sci. fields of competence

- Software:
  - adaptive programs and systems, compilers, component based programming, constraint programming, coordination languages, distributed and parallel systems, domain specific languages, embedded systems, interactive software and systems , operating systems, real time and high performance programming, software optimisation, software specification, analysis and testing, structured documentation, trace analysis.



# Selected Sci. fields of competence

- Theory of computation:
  - concurrency, correctness proofs and verification , cryptography, complexity and security , formal methods, fuzzy logics.
- Computing methodologies:
  - autonomous systems, information visualisation, language engineering, machine learning , robotics and intelligent vehicles, visual. and virtual reality.



# Selected Sci. fields of competence

- Information systems:
  - coding, indexing and retrieval, data mining, knowledge management , man machine interaction.
- Information and communication technology:
  - computer supported co-operative working, e-commerce, IP protocols, routing and real time services, mobile and wireless computing, network architecture and management, WWW applications.
- Some could be added!



# Expectations-I

- Actively participate in current groups
- Participate in PhD mobility program
- Possibly reactivate some groups (e.g., Programming Languages)
- Add fields of competence
- Help start new projects or even *mini-programs*, coordinated by ERCIM



# Expectations-II

- Multi-directional help with policy issues:
  - Help identify shortcomings in current policy
  - Help address low position of EU in CS
  - Help influence policy  
IST PComm, IST AG, EAPLS, Spanish MCyT (+ESF, ERC, ...)
  - Collaboration with US
  - Represent all CS and related Applied Math research
  - Towards a (possibly virtual) institute structure in Spain and Europe.



# Conclusions

