



Università  
degli studi  
di Udine



# ICT for Cross-cultural Dissemination

## 2<sup>nd</sup> ANNUAL CONFERENCE

Valencia, Nov 14 – 15, 2005



# EU: Economic Cross Cultural Programme

## ICT for Cross-cultural Dissemination

### INSTITUTIONS INVOLVED

- **Universidad Politecnica de Valencia – Spain**
- **B.M. Birla Science Centre of Hyderabad – A.P.**
- **Università di Udine – Italy**
- **International Institute for Applicable Mathematics and Information Sciences – A.P. and Italy (IIAMS)**
- **Università di Genova – Italy**
- **Centre for Development of Advanced Computing (C-DAC) – Hyderabad & Pune**





# ACKNOWLEDGEMENTS

- **Ms. Thetis Tsitidou** Programme Manager EU Cross-Cultural Economic Programme
- **Prof. Maria Alpuente** Technical University Valencia
- **Dr. B.G.Sidharth** Director General of B.M.Birla Science Centre, Hyderabad
- **Dr. Stefano Rovetta** Università di Genova
- **Dr. Paolo Rosso** Technical University Valencia
- **Dr. Moreno Falaschi** Università di Siena





Technical University of Valencia, Nov 14, 2005



# ICT for Cross- Cultural Dissemination

## *Results and Perspectives*

Furio Honsell

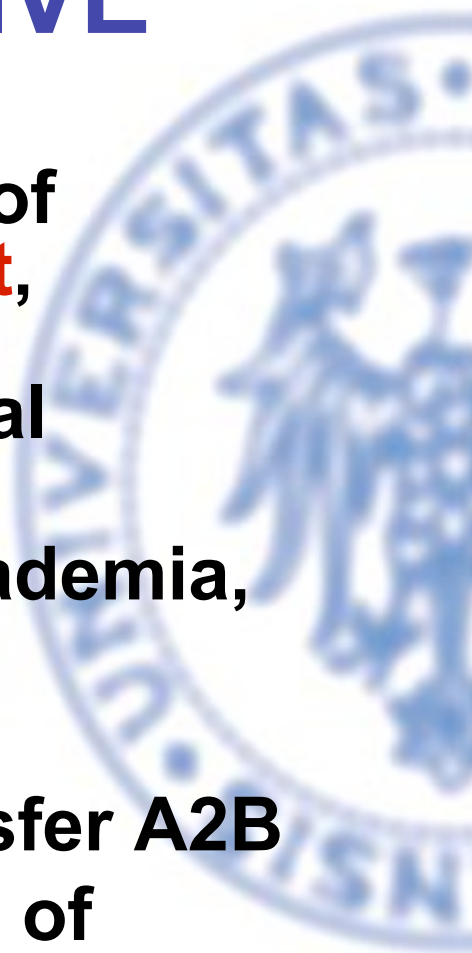
Università di Udine & IIAMIS





# OVERALL OBJECTIVE

- Build **communities**, i.e. **networks**, of developers and users of **intelligent, validated, VR/AR software portals/platforms** for Cross Cultural Fertilization
- **Enhance interactions** between Academia, Research Centres, Businesses,
  - Education and Training
  - Research and Technology Transfer A2B
  - Preservation and Dissemination of Cultural Heritage





# OUR VISION

**Informatics and Applicable Mathematics as general sciences of problem-solving, computation, simulation, modeling, data mining, ...**

**can play the role of a lingua franca , a medium, for cross-disciplinary dialogue between sciences and humanities**

**and for cross-cultural dialogue between diverse networks within Southern Europe and Southern India,**

**A cultural heritage superpower, and an emerging IT superpower, as well as a cultural heritage superpower, should join forces**

**NEED TO IMPROVE MUTUAL AWARENESS**







# THE ADJACIENCY MATRIX

- The potential beneficiaries of the project are various heterogenous communities of stakeholders
- A complex hypergraph/matrix is underpinning it
- Nodes:
  - Academia
  - Research Centres, Science and technology Parks
  - Businesses & Industry
  - Local Communities
  - ...
- **In Italy, Spain, Andhra Pradesh**
- Each **node** can be analyzed further into hyper-graphs,
  - e.g. Academia= Teaching body + students
- Each **hyperlink** can be further analyzed
  - e.g. A2B = Incubators, Knowledge Districts





# THE PROJECT

The Working Groups endeavour in various **complementary activities**:

- **Discover networks**: A2M, A2B
- **Improve platforms**: personalization, filtering, VR, AR, 3D, validation, maintenance
- **specify e-Contents**: digitization, semantic, intelligent, clustering tools
- **KEYWORDS**: reusability, rapid prototyping, lightweight, accessibility, quality control





# THE ULTIMATE DELIVERABLE

- **An intelligent, semantic, AR, portal/platform supporting**
  - A digital museum
  - A virtual laboratory
  - A virtual Science and Technology Park

**OPEN ENDED**





# THE JOINT LABORATORY INTERNATIONAL INSTITUTE FOR APPLICABLE MATHEMATICS AND INFORMATION SCIENCES

- **MISSION:**
- **foster and strengthen joint**
  - research programmes
  - education programmes
- **provide a platform for**
  - **Industry-Academia interaction and technology transfer**
  - **cross-cultural dissemination and fertilization**
- **between Italy and India – Southern Europe and Southern India**





# RESEARCH PROGRAMME OF IAMIS

- **Web Technologies**
- **Applicable Mathematics**
- **Information Filtering**
- **Virtual Reality**
- **Verification and Validation**
- **Computational Physics**
- **IT for preservation of Cultural Heritage**
- **Human Computer Interaction**
- **Digital Museums, Virtual Laboratories**





# The activities leading to IIAMIS

- **PhD Programme in Informatics and Applicable mathematics** started in 2002, currently 7 students involved in the areas of Semantics, Virtual Reality Modeling, Self-organized Neural Networks, Data Acquisition and on-line processing
- **Internationalized Master University Degree in Information Technology Programme** started in the academic year 02-03, 9 students involved in each of the 2 editions.
- **Series of Summer Schools on New Perspectives in Informatics** started in 2000, 20 participants in each of the 5 editions



# The activities leading to IIAMIS

- **Series of Indo-Italian Workshop on IT: Education, Research and Technology Transfer** started in 2002, 30 participants in each of the 3 editions
- **Sixth International Conference on New Frontiers of Fundamental and Computational Physics - Udine September 2004**
- The actions were sponsored by B.M. Birla Science Centre, the University of Udine, the Italian Ministry of University and Research, the EU-India ECCP

The latter two actions were carried out thanks to the support of the Italian Embassy in New Delhi



# The activities leading to IIAMIS

- The initiative capitalized on the impact of the **EU-India Cross-cultural Economic Programme** project: **Europe and India Past Present and Future** (EU-India Economic Cross Cultural Programme) 1999-2001 partners: L.P. Tessitori Soc. Ind. Udine, B.M. Birla Science Centre, CISM Udine, OPFZ Arsenal Vienna, Udine University
- Udine University is currently leading another EU project: **ICT for EU-India Cross-cultural dissemination** 2004-2006 partners: B.M. Birla Science Centre, Universities of Udine, Genoa and Valencia
- [Euindia.dimi.uniud.it](http://Euindia.dimi.uniud.it)







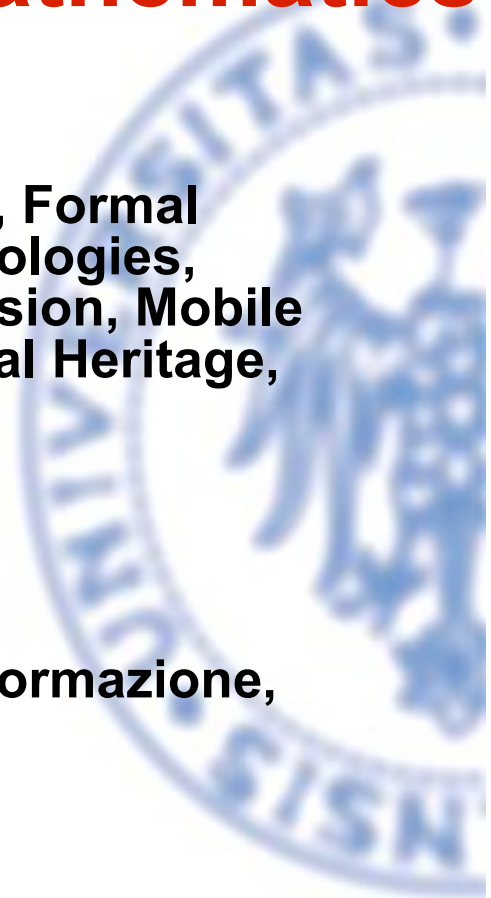
# Internationalized PhD Programme in Informatics and Applicable Mathematics

## TOPICS

**Immersive VR, Foundations of Computing, Formal Methods, Information Filtering, Web technologies, Computational Biotechnology, Artificial Vision, Mobile technologies, IT for preservation of Cultural Heritage,**

## PARTNERS

- **Università di Udine**
- **Università di Siena**
- **Istituto di Scienza e Tecnologia dell'Informazione, Pisa**
- **Universidad Politecnica de Valencia**
- **B.M.Birla Science Centre**
- **C-DAC Hyderabad Branch**
- **INRIA Sophia Antipolis**
- **Université de Nice**





# CURRENT ACTIVITIES OF THE INSTITUTE FOR APPLICABLE MATHEMATICS AND INFORMATION SCIENCES

- **Internationalized Master University Degree in Information Technology Programme**
    - Partners: University of Udine, B.M. Birla Science Centre
- 20 positions available for the Academic Year 2005-2006 (3 trainships in Italy available)

<http://hcilab.uniud.it/masterIT/>

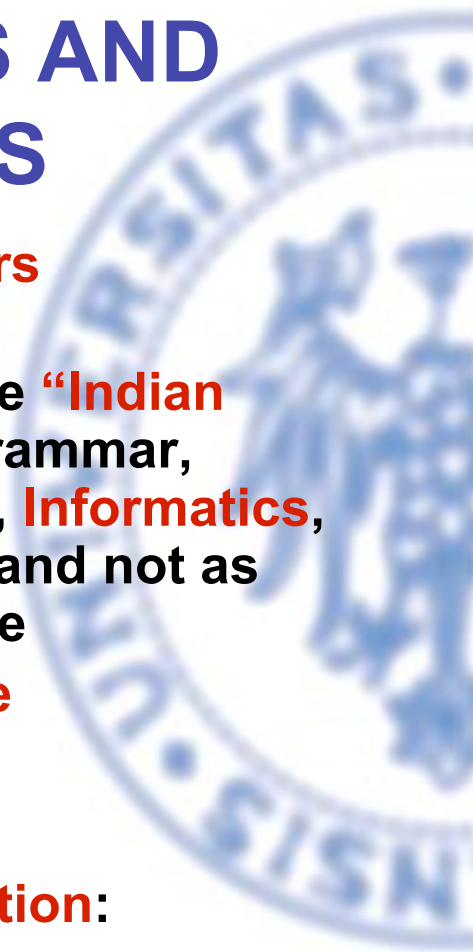
**New Programme**, funded by the Italian Minister is about to start, **more fellowships available**

- **New Programme for young Indian Researchers**, funded by the Italian Minister, **is about to start**



# CURRENT PROJECTS AT THE INSTITUTE FOR APPLICABLE MATHEMATICS AND INFORMATION SCIENCES

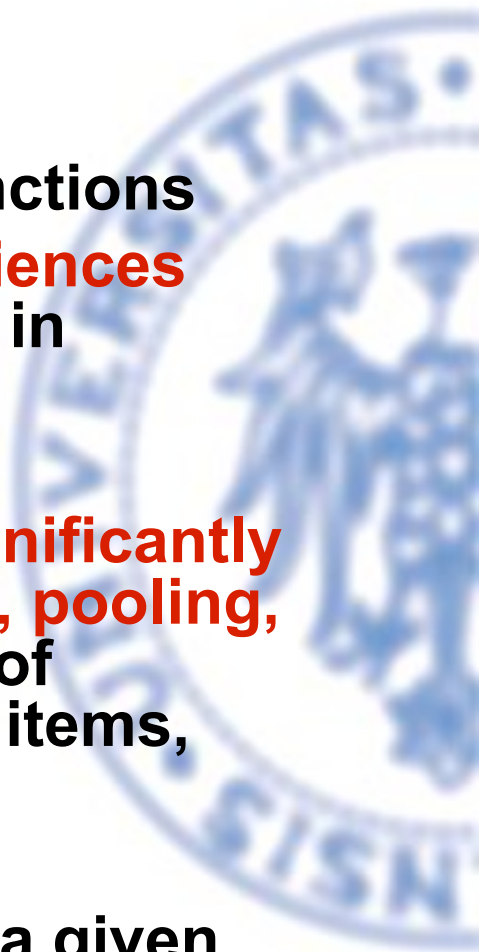
- **Design and implementation of a Students Careers Management System Generator**
- **Digital Library and annotated bibliography on the “Indian Contribution to Modern Science”** Astronomy, Grammar, Mathematics, Medicine are the traditional topics, **Informatics**, as the general science of effective computation and not as mere technological tool, is the novel perspective
- **Digital platforms for collections: e.g. art, science**
  - **Virtual Museums**
  - **Virtual Laboratories**
- **Intelligent Portals for Industry-Academia interaction: internships, technology transfer**
- **Digital Science and Technology Parks**





# The Problem of e-contents for cultural dissemination

- **Turing Thesis** applies to computable functions
- Is there an **analogue** for **cognitive experiences** such as those arising in **art, learning**, or in developing **intuitions** and **skills**?
- **OUR TENET: Digital portals enhance significantly the dissemination, fruition, appreciation, pooling, ultimately the experience, albeit virtual, of Collections**, whether these be of artistic items, other artifacts, science experiments, etc
- **Collections** are extremely **expressive** of a given **culture** and **worldview**, and hence an excellent medium for cross-cultural dissemination, awareness and fertilization





# Issues and Challenges in e-Contents

- **How do we digitize homogeneously, heterogeneous specimens?**
- **Which metadata are appropriate?**
- **How can we define reusable software?**
  - **Books, and other written documents**
  - **Pictures, videos, ...**
  - **Music and sound documents**
  - **Other pluridimensional artworks (e.g. sculptures, pottery, carpets, ...)**
  - **Artifacts (uses)**
  - **Processes (e.g. dance, cooking, ...)**
  - **Traditions**
  - **Knowledge (traditional medicine)**
  - **...**



# Issues and Challenges in e-Contents

- **How do we render the object's:**
  - History
  - Context in which it was produced and preserved
  - Use
  - ...
- **How can we take advantage of Immersive VR in order to restore or repair the object?**
- **How can we take advantage of Immersive VR in order to interact with the object?**
- **How can we take advantage on personalized intelligent filtering tools?**
- **How can digital objects, e-contents be reused?**
- ...







# Results: E-Dvara PORTAL

The various prototype and experimental portals and platforms developed in the project have been merged in the **E-Dvara PORTAL**

- **Interactive**
- **Immersive VR**
- **Accessible**
- **Customisable, flexible, extendable**
- **Multimedia**
- **Open**
- **Featuring intelligent filtering tools to overcome cognitive discomfort disorienting and information overloading**





# Perspectives

- **Experiment, validate, disseminate, customise, maintain** the intelligent portal/platform among the various **communities of developers and end-users** currently involved in the projects:
  - for enhancing cross-cultural awareness, e.g. building virtual analogues of museums, collections at the University of Udine and B.M. Birla Science Centre
  - for enhancing the mission of the IIAMIS both in education, research and technology transfer



**B.M.BIRLA SCIENCE CENTRE – HYDERABAD UNIVERSITY OF UDINE  
INSTITUTE FOR APPLICABLE MATHEMATICS  
AND INFORMATION SCIENCES**

**3<sup>rd</sup> INDO-ITALIAN SUMMER SCHOOL on  
PERSPECTIVES IN INFORMATICS**

- **Models and Metamodels for Computation**  
Honsell, Di Zanutto, Maraspin (Udine University) -  
10 hrs
  - Computer Aided Formal Reasoning
  - Logical Frameworks
  - Agent and Process Calculi for Mobility
  - Interactive Theorem Provers
  - Computer Supported Collaborative Work
  - Digital Platforms





- **Virtual Reality Modeling:**

**Subhramanian, Vijay Kumar (B.M. Birla Science Centre and Udine University) –10 hrs**

- **Virtual Reality Modeling Languages**
- **A tool for modeling architectural content in 3D web sites**
- **A Case Study on Navigation Aids for 3D environments**

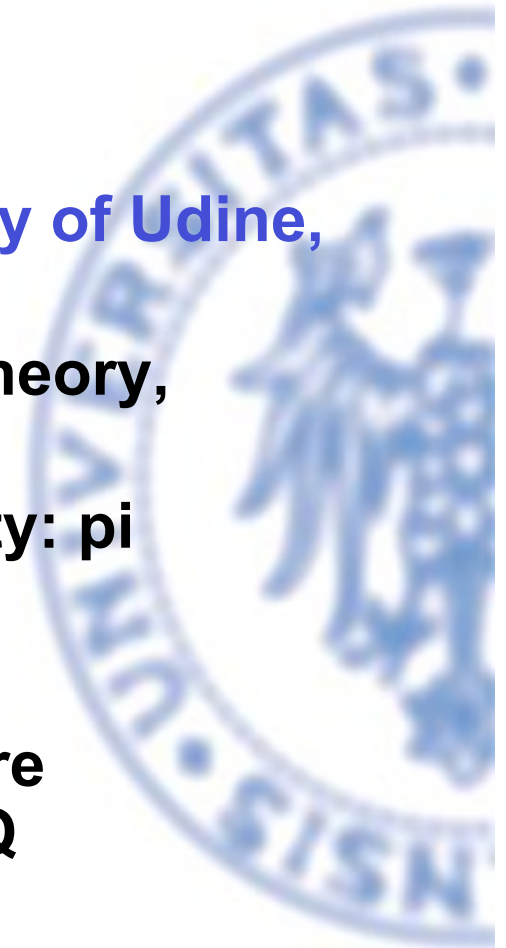




# Models and Metamodels for Computation

4 lectures: Honsell, Redamalla (University of Udine, BM Birla Science Centre)

- Lambda Calculus, Higher Order Type Theory, Logical Frameworks
- Processes and Agent Calculi for mobility: pi calculus, ambient calculus
- Coalgebraic semantics for OOL
- Interactive Theorem proving for Software Certification and Verification using COQ

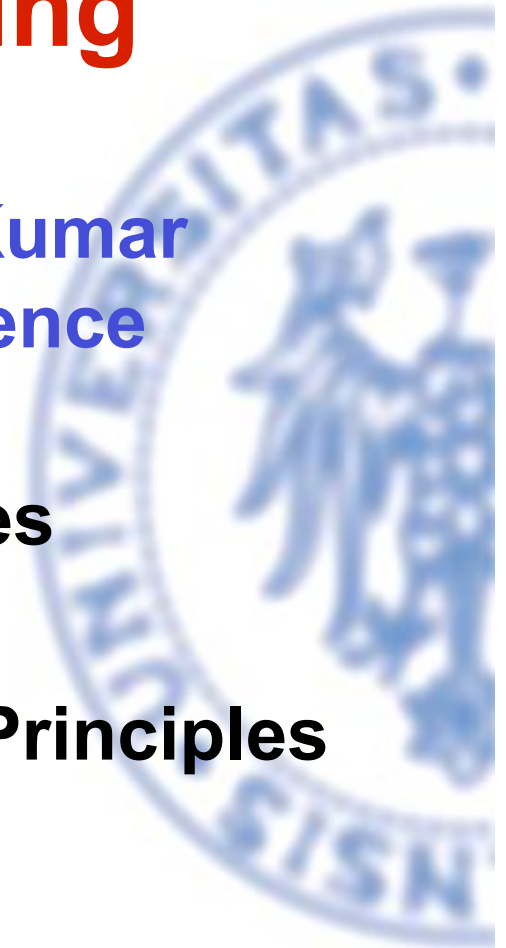




# Virtual Reality Modeling

6 lectures: Subramanian, Veejay Kumar  
(University of Udine, BM Birla Science  
Centre)

- **Virtual Reality Modeling Languages**
- **Developing 3D websites**
- **A case study in Navigation Aids: Principles and Applications**







# *Our vision*

**A University  
as a strategic institution for the  
development of the region and  
its community**

**(innovative) knowledge and human capital have  
become the strategic resources for sustainable  
economic growth**





## 3 challenges

- **Technology**
- **Globalisation (globalism,glocalism)**
- **Competition**
  
- **Distributed learning**
- **Internationalization**
- **Partnership and alliances**

But we have to innovate our mentality, and often be brave enough to invent the rules along the way





# Università degli Studi di Udine

- **Three** deeply integrated **missions**
  - higher education
  - research
  - **service to our community**: for the social and cultural development and the transfer of technological innovation to the industrial system
- over 10.000 laurea degrees awarded since our foundation in 1978





# Università degli Studi di Udine

Fully implemented the Bologna and Sorbonne Agreements since the academic year 2000-2001

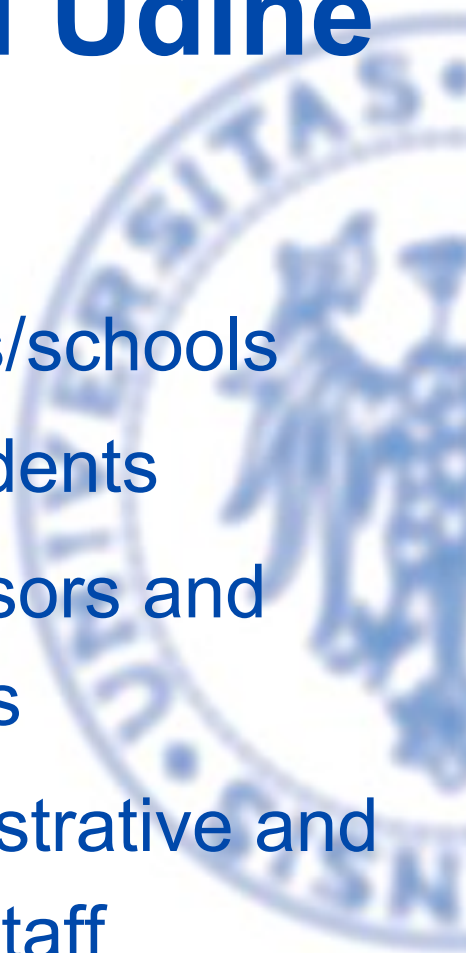
- Laurea (bachelor) 3 years degree
- First level Master 1 year degree
- Laurea Specialistica 2 years degree
- Second level Master 1 year degree
- PhD 3 years degree





# Università degli Studi di Udine

- **1978:**
  - 1 faculty/schools (Foreign Languages)
  - 607 students
  - 27 professors and assistants
  - 34 administrative and technical staff
- **2002:**
  - 10 faculties/schools
  - 15.635 students
  - 637 professors and researchers
  - 457 administrative and technical staff





# Our numbers

- 10 faculties
- 44 laurea degrees (both old and Bachelor)
- 10 masters
- 18 laurea specialistica
- 31 specialization schools (in Medicine, Veterinary Medicine, History of Art)
- 21 PhD courses
- ... over 18.000 people involved (including professors, permanent and temporary researchers, technical and administrative staff, languages teachers, PhD and ordinary students...)





# Our Masters

- Information Technology
- Euroculture
- European Transport Law
- Environment and Life
- Crop technology
- Language and Cultural Mediation for large social events
- Handicap
- e-learning
- Management of turistic enterprises







# The distributed Campus of the University of Udine

- Udine (Friuli VG region)
- Pordenone (Friuli VG region)
- Gorizia (Friuli VG region)
- Cormòns (Friuli VG region)
- Gemona (Friuli VG region)
- Mestre (Veneto region)

34 Mbit radiowave backbone connection (mainly for tele-tutoring, e-counselling, e-etc)

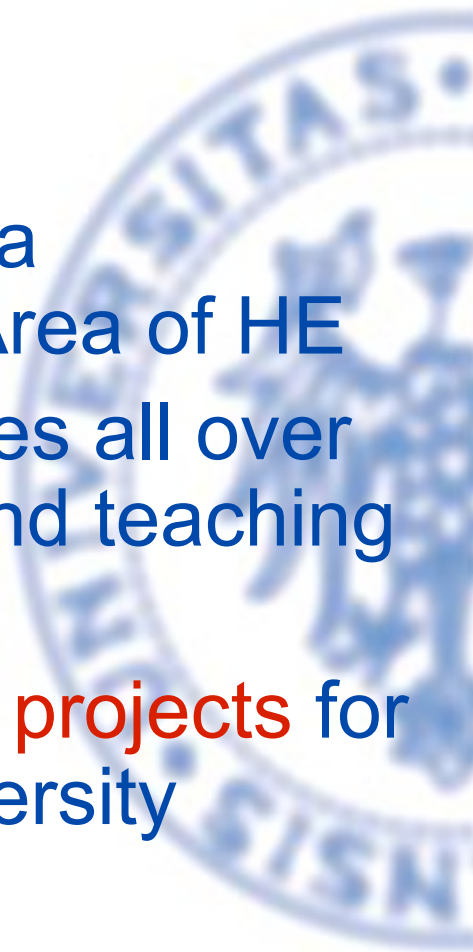




# Our international connection

Proactive in implementing the Bologna Declaration and build a European Area of HE

- Over 80 **MoU**'s with other universities all over the world, for **mobility** of students and teaching staff
- We're involved in various **TEMPUS projects** for offering advice in restructuring university offices
- Around 3% of our students take advantage of Socrates **mobility programmes**





# Key-concepts in internalization

- Develop joint degrees and coordinated curriculum planning
- Mobility and exchange of students
- “Stay abroad” becomes an integral part of the “home” studies
- Comparability and compatibility of of academic programs (ETCS)
- Common degrees





# The consortia and partnerships

- **Friuli Innovazione** – together with Agemont, Assindustria, CRF, CRUP Bank: for the transfer of the technological innovation to the local industrial sector
- **Friuli Formazione** – together with Udine's Chamber of Commerce: for permanent and continuing education
- **CIRMONT** – together with INRM: for the technological innovation in the Mountain Regions





# The Faculties/Schools

- **Foreign Languages**
- **Engineering**
- **Agricultural studies**
- **Science**
- Humanities
- **Medicine**
- **Economy and Business**
- **Educational Sciences**
- **Veterinary Medicine**
- **Law**





# The PhD Programmes

- Computer science, Mathematics
- Life Sciences:2
- Medicine and Surgery: 2
- Agriculture and Veterinary Science: 5
- Civil Engineering: 2
- Mechanical and Electronic engineering: 3
- Economical Sciences and Statistics: 3
- History of Art, Languages : 8





# Innovative Courses

- **Public Relations and Central-Eastern European Languages**
- **Management engineering**
- **Food Technologies**
- **Computer Science**
- Preservation of cultural Artifacts
- **Transplants, tele-medicine**
- **Banking and Finance**
- **Animal health**
- **International transport law**







# Research

- 28 **Departments** (50 laboraories)
- 5 **Interdepartmental Centres**: CIRD ( EDUCATION), CIFRA ( ENVIRONMENT), CARTESIO (TEINFORMATION SYSTEMS), CIFI ( FLUIDDYNAMICS) , CIRF (FRIULIAN LANGUAGE and CULTURE),
- **International Centre on Multilingualism**
- **Experimental Farm** (ca 1000 ha)
- **Clinical Hospital** (10 clinics, 312 beds)
- **Centre of di excellency** MATI on human physiology (muscular palsticity under stress, aging, microgravity, training)





# The numbers of our research

- 99 active MIUR projects (of which 21 are coordinated nationally)
- 29 UE projects
- 26 projects: ASI, MIPA, MAE, FSE
- 25 deposited **patents**:
  - 8 commercially utilized
  - 20 since 1999





# Research

- **Active european contracts:**
  - Accrescere il potenziale umano – VPQ
  - Agricoltura e pesca - IVPQ
  - Life Natura
  - Cooperazione con i Paesi dell'Est – IVPQ
  - Energia e ambiente – VPQ
  - Lingue minoritarie

1

5

2

1

2

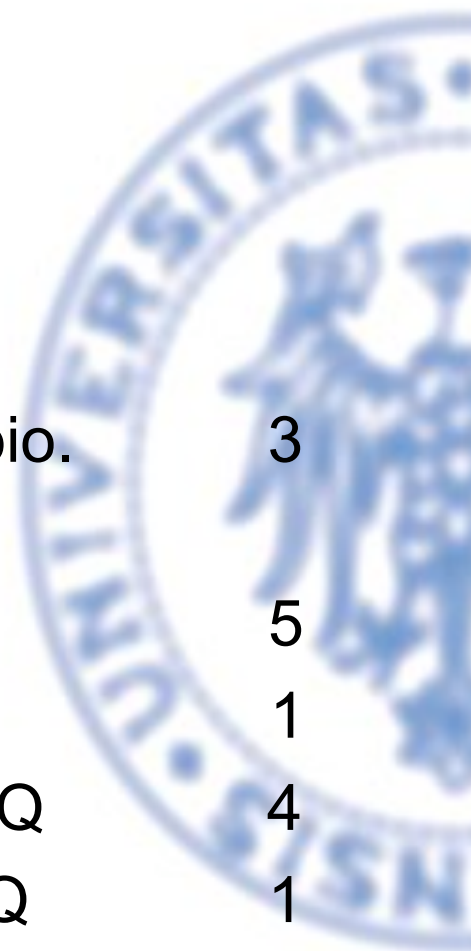
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# La ricerca

- Contratti europei attivi:
  - Qualità della vita e gestione delle risorse bio. 3
  - Risorse genetiche in agricoltura
  - Società dell'informazione – VPQ 5
  - Tecnologie dell'informazione – IVPQ 1
  - Tecnologie industriali e dei materiali – IVPQ 4
  - Ricerca socio-economica finalizzata - IVPQ 1





# Excellencies

- **Public Relations and Central-Eastern European Languages**
- **Logistics and industrial management, (micro)mechanics, energy, environment technologies (waste management, recycling), geographical information systems (GIS)**
- **Food Technologies, genomics, agronomy, ecology, environmental certification, bioremediation,**
- **Information filtering, V&V, Operations Research, WEB technologies**
- Sound and image restoration, paper technologies, archaeology
- **Transplants, tele-medicine**
- **Observatory on economic convergence of CE Europe, Banking Techniques, Enterprise strategies in industrial districts**
- **Fish pathology, nutrition**
- **European transport law, Community Law**





# Relations between Universities and private enterprises

- Applied vs Industrial research  
**criticalities**
  - **communication**: expertise vs problems
  - **objectives**: methodologies vs realizations
  - **behaviour**: dissemination vs privacy
  - different **time scales and horizons**
  - **SME's** , districts



# University- private enterprises relations: perspectives in Udine

- University-Industry **Mixed Laboratories**
- **“First mile” incubators**, to encourage new/student entrepreneurship
- **Techno-seed**
- Science Park – **Knowledge and Technology district**







# University-Industry new perspectives in Udine

- Logistics and production management
- Metallurgy
- Environment technologies
- Food processing
- Information management
- Web technologies
- Rapid prototyping





# IT in Udine

- Udine University was the 5<sup>th</sup> University in Italy to establish a course in **Computer Science**, after Pisa, Torino, Bari, Salerno
- Currently we have 2+2 courses in the field
  - **Computer Science**
  - **Web Technologies and Multimedia**
  - **Multimedia Sciences and Technologies**
  - **Public Relations curriculum**





# e-activities in Udine

- **Mission Activities**
  - **Network based services to students:**
    - Online payments (tuition fees)
    - Examination-cycle
    - Students Identification card
    - Information services (curricula)
  - **E-learning**
    - remote lectures and consultations
  - **E-library**
    - Online Public Access Catalogue
    - Automated Loan procedures
    - Online access to CE-Rom archives
    - Online magazines and reviews





# e-activities in Udine

- **Information and cognitive filtering**
  - Web personalization: the infofactory project
- **HCI**
  - 3D Web sites
  - Virtual reality
  - Information visualization, visual data mining
  - Wireless Web, mobile devices
- **E-governement:**
  - Civic portal design (with local authorities)
  - Online museums: adaptive interfaces
  - Web portal of the Public Library Serives of the FVG Region





# e-activities in Udine

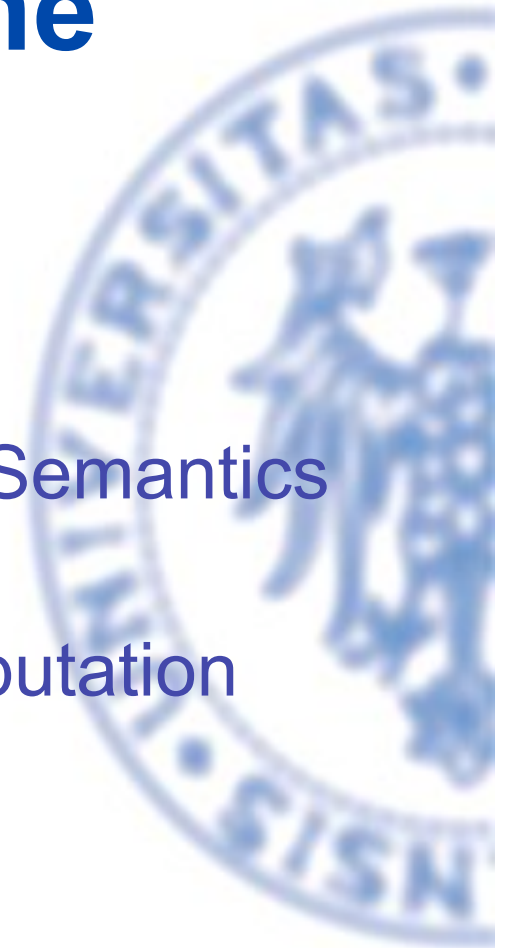
- **E-commerce**
  - Adaptive interfaces
  - Wireless system interfaces
- **E-learning**
  - Software and design specifications
  - Distance learning for Public Safety Corps
- **E-health**
  - National network in telepathology
  - Quality assessment of remotely acquired images
  - Call centre for telecare
  - Online localization of emergency services
  - Online clinical records





# Informatics in Udine

- **Verification and Vlidation**
  - Software dependability
- **Theoretical Computer Science**
  - Language Theory, Type Theory, Semantics
  - Algorithms
  - Foundations and models of Computation
- **Neural networks**
  - Image processing





# Mountain regions and their criticalities

- handicaps vs advantages of: **reduced accessibility**:
  - marginality, isolation, population decrease
  - lack of infrastructures
- **but**
  - resistance to homologation and cultural mass-globalization,
  - quality of life is potentially better
  - Possibility of learning from the experience of others in the area of environment sustainable growth

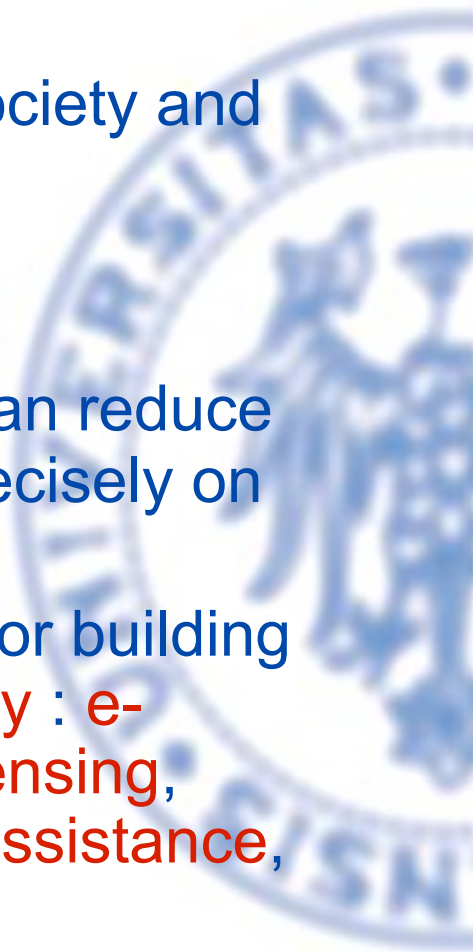






# Mountain Regions

- In the knowledge and digital information society and economy.
  - It can play major roles (e.g. free-time economy)
  - Increase its attractiveness
- IT technologies and e-enabled activities can reduce the impact of its handicaps, capitalizing precisely on its reduce accessibility
- Human capital and network infrastructure for building a **net-community** active in the **net-economy** : **e-governement, distance learning, remote sensing, distance e-services, distance e-work, teleassistance, e-commerce**
- promotion, animation





# E-Mountain Region projects

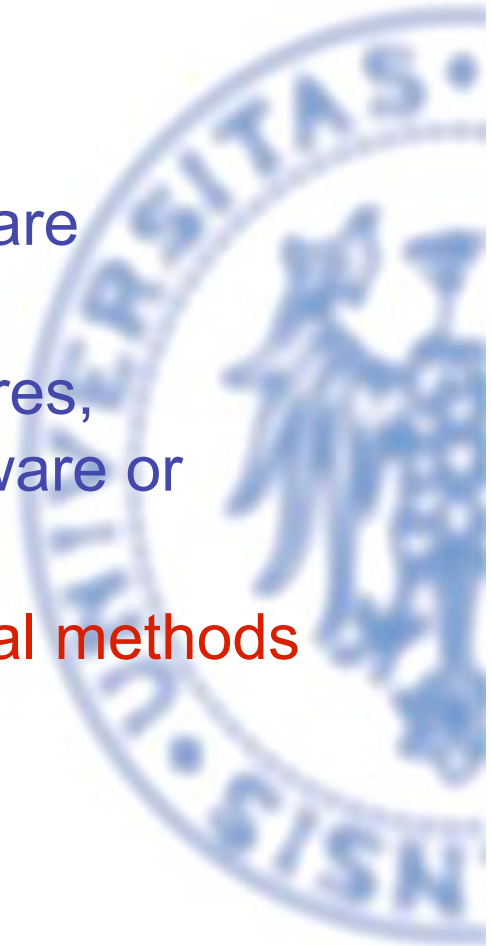
- Advanced internet applications
- 3D websites for tourism promotion
- Applications for preservation and study of mountain environment
- GIS
- Intelligent system for integrating and assessing satellite and aerial images with image and temporal databases for environment monitoring and natural disaster prevention
- telemedicine





# A case for Verification and Validation

- Life, environment or business critical software applications
- Digital woes: e.g. Y2K, Ariane, Patriot failures, Pentium Bug, bugs in mass produced software or widely distributed software
- Rigorous validation using **logic based formal methods**





# A case for non-technological skills in IT-enabled activities

- Before hardware innovation we need **innovation in mentality** and consequently in the **software design**
- Simplification, reorganization, reengineering, **reinventing**
- Goal is bridging distance, non-hierarchical structures, interactive
- Standards, codes
- in Udine we are (preparing to) form such **human, social, design skills**

