



FACULDADE DE CIÊNCIAS UNIVERSIDADE DE LISBOA

FCT Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR

Presentation of LaSIGE

LaSIGE

Large-Scale Informatics Systems Laboratory

LaSIGE in a few words

- **Main Scientific Domain**

- *Informatics, a.k.a. Computer Science and Engineering*

- **Other Subdomains**

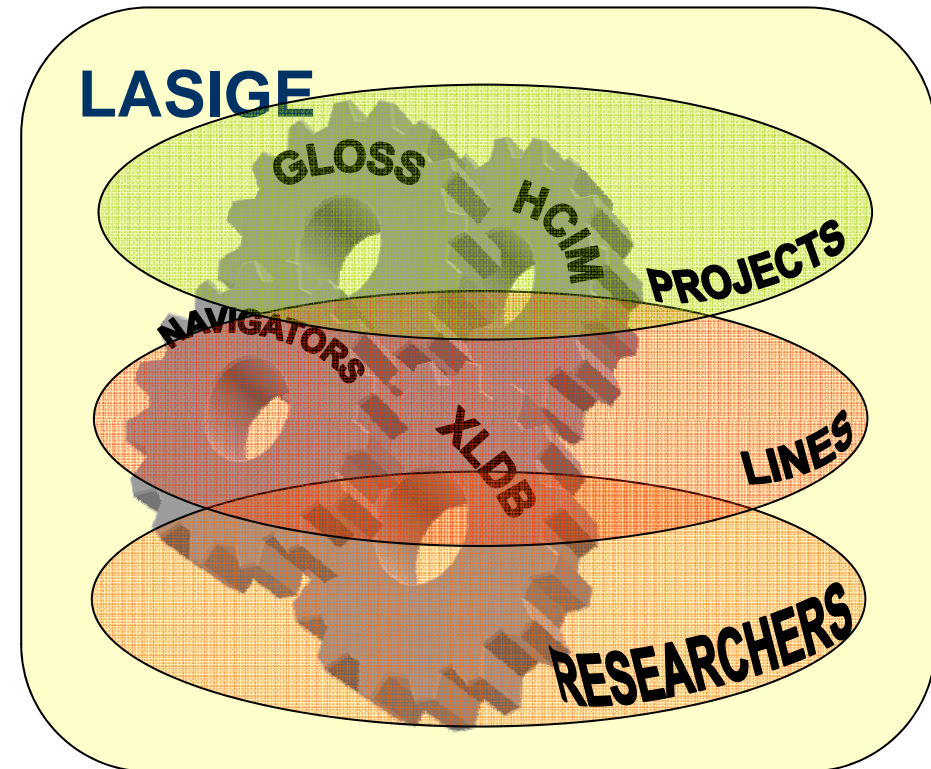
- Human Computer Interaction and Multimedia
- Information Management
- Net-centric Computing and Distributed Systems
- Security and Dependability

- **Leading Host Institution**

- Faculdade de Ciências da Universidade de Lisboa

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General Information

- **Structure**

- LASIGE as a group has a flat organisation
- Research-line centred

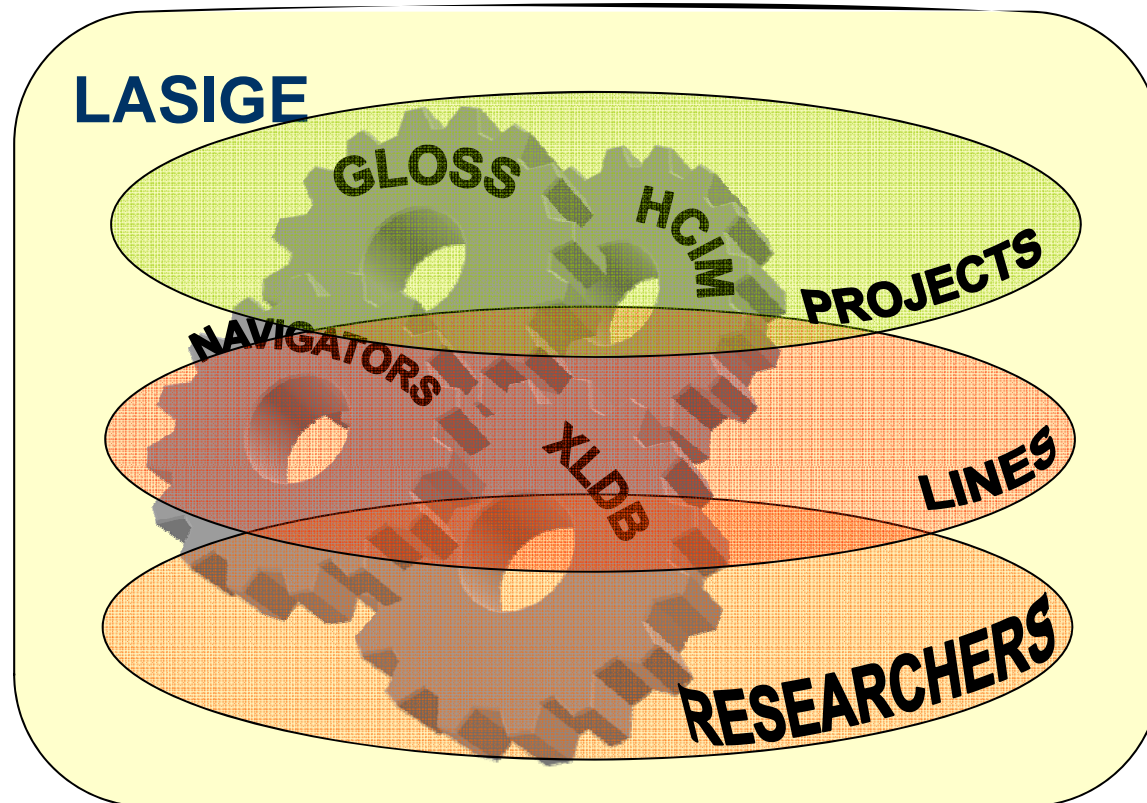
- **Strategic goals**

- pursue mid/long-term research objectives, structured by key set of research lines
- address top state-of-the-art themes, aligned with current trends of international research (e.g., EU, US)
- promote interdisciplinarity

- **Strategic Advisory**

- Prof. B. Randell, Prof. A. Figueiredo, Eng. J. Matias

General Information: a picture of LaSIGE



General Information: Current research lines *(Jan'09)*

- *Biomedical informatics*
- *Communication System Software and Middleware*
- *Fault/intrusion tolerance in open distributed systems*
- *Global Computing*
- *Human computer interaction and multimedia*
- *Information management*
- *Timeliness and adaptation in dependable systems*

General Information: modus operandi

- **Research strategy and operation:**

- promoted by Director and Scientific Council
- global procedures collectively decided and followed

- **Research lines:**

- key of organisation: support mid/long-term research objectives, aligned with international research trends
- normally developed by one team but can, when interdisciplinary, be steered by more than one team

General Information: modus operandi

- **Research teams:**

- steer day-to-day operation:

GLOSS, HCIM, NAVIGATORS, XLDB

- champions of one or more of LASIGE's research lines
- promoters of goal-oriented activities, such as R&D projects

- **Cooperative/competitive model:**

- research teams can team-up in these endeavours
- research teams share and compete for lab resources managed collectively by the Scientific Council

General Information: modus operandi

- *Duality*

research goals (lines) -- champions (teams):

- improves the dynamics of the laboratory
- has been a key factor of success for sustained growth

Facilities ...

Facilities: Bibliography

- **Free access to the DI and FCUL libraries**
 - with over 2260 registered titles in Informatics
- **On-the-shelf relevant titles available to researchers**
 - LaSIGE itself has an acquisition policy
- **FCT's *Biblioteca do Conhecimento Online (B-On)***
 - makes all relevant titles available on-line (e.g., ACM, IEEE,...)

Facilities: Computers and Laboratories

- **DI computing service runs:**
 - over 40 servers, circa 280 client posts, distributed by 11 labs, high-speed LAN and Internet networking
- **LaSIGE itself features:**
 - Its own network, servers, and over 40 working posts for researchers, plus a 20-post generic laboratory
- **Specialised facilities include:**
 - a 25+ computer farm for distributed systems experiments; a restricted and isolated network for security experiments; a cluster of high-performance servers for information integration experiments; an audio-video studio for HCI experiments
- **Member of worldwide computational experiments:**
 - PlanetLab, EmuLab, Leurré.

Facilities: Support

- **LaSIGE itself features:**
 - Full-time administrative coordinator
 - Part-time system administration team
- **DI services shared:**
 - Secretarial support
 - DI computing services

Main Achievements ...

- ... in the international arena

Past ...

IST program, European Commission Portuguese participation, TOP 15

Almost exclusively Lasige

Organização	Financiamento (€)
Inesc - Inst De Engenharia De Sistemas E Computadores	5.136.168
Portugal Telecom Inovacao, S.A.	3.414.604
Associacao Para O Desenvolvimento Das Telecomunicacoes E Tecnicas De Informatica	2.874.028
Fundacao Da Faculdade De Ciencias Da Universidade De Lisboa	2.426.248
Uninova - Instituto De Desenvolvimento De Novas Tecnologias	1.924.922
Instituto Superior Tecnico - Unversidade Tecnica De Lisboa	1.444.961
Formacao, Desenvolvimento E Investigacao	1.191.501
Alfamicro - Sistemas De Computadores, Lda	1.065.694
Nv Negocios Digitais, Sa	876.341
Universidade Do Minho	802.204
Universidade De Aveiro	757.764
Chipidea Microelectronics Ltd	725.379
Skysoft Portugal - Software E Tecnologias De Informacao, S.A.	722.855
Instituto De Telecomunicacoes	634.238
Faculdade De Engenharia Da Universidade Do Porto	598.082

January 2003

Present (and near past) ...

FP5_Future and Emerging Technologies: Global Computing

MIKADO

Mobile Calculi based on Domains

40 months until Apr 2005; 5 sites.



Architectures for Mobility

40 months until Apr 2005; 8 sites.

FP6_FET: Global Computing



Software Engineering for Service-Oriented Overlay Computers

48 months until Aug 2009; 19 sites.

MAJOR TOPIC IN EU FP-6,
DARPA, NSF, R&D AGENDAS

FP5-FP6 IST Trust and Security

- Investigate and apply the '*tolerance paradigm*' systematically

International Projects

-*MAFTIA*: Malicious- and Accidental-Fault Tolerance for Internet Applications



- *CaberNet*: Network of Excellence in Distributed and Dependable Computing Systems



MAJOR TOPIC IN EU FP-7,
DARPA, NSF, R&D AGENDAS

FP5-FP6 IST Trust and Security

- Investigate *critical information infrastructures*, and make them resilient to failures and malicious attacks

International Projects

- *CRUTIAL*: Critical UTility
InfrastructurAL Resilience



- *RESIST*: Resilience for
Survivability in IST



(Plus 2 Coordinated Actions)



... And many more in recent years

- **European Funded projects:**

ARTIST, 2002-2005
CaberNet, 2000-2004
CORTEX, 2001-2004
CRUTIAL, 2006-2008
DYNAMO, 2004-2009
ESFORS, 2005-2007
GORDA, 2004-2007
HIDENETS, 2006-2008
MAFTIA, 2000-2003
RESIST, 2006-2008
SecurIST, 2004-2007
AIR ESA/ITI, 2006-2007
MiNEMA, 2003-2007

Research leadership in EU IST

LaSIGE was involved in:

- **EU Consultation for the delineation of what become known as the Global Computing initiative @ FP5 (meeting in Edinburgh, Autumn 2000)**
- **Contribution to the definition of the next FET Work Programme (2009-2010) @ FP7**
- **One of the main contributors to the FP7 European Research Agenda on Security and Dependability**
- **The series of high-level bi-lateral EU-US summits on security and dependability since 2000, having hosted one**

Main Achievements ...

- **Some metrics...**

Main Achievements (2003-2006): Results and productivity

- Sustained level of high quality research activity
- Critical mass in mobilisation of research assets
- Over *40 prototypes* produced, some public
- Average *4,5 publications/year* per senior researcher
- Yearly increasing level of publications
- Around *200 publications* in international journal, conference and workshops

Main Achievements: Relevance and impact

- **Researchers regularly cited by peers (accumulated) (1)**
 - **6400+** *unique accumulated non-self citations* for total of current 33 PhD researchers
 - top *5 most cited researchers* have more than **750** citations each and an H-index greater or equal to **11 (all non-self)**
 - top *10 most cited researchers* have more than **400** citations and an H-index greater or equal to **8 (all non-self)**
- **Several national and international *prizes***
- **Fitness with international scenario, measured by:**
 - Alignment of research lines with EU/US priorities (e.g., EC, NSF)
 - Contributions to EU (US) R&D strategy, EU projects, keynotes

(1) SOURCE – Google Scholar + CIDS post-filtering (cleaned, exclusive of self-citations)

Main Achievements (2003-2006): Relevance and impact

- **Organisations and distinguished presences**
 - 10+ *organisations* of conferences or workshops; and numerous *roles* in international scientific organisations;
 - 10+ *keynote speeches or invited talks* at int'l conferences;
 - 6 *tutorials* at reputed int'l conferences
- **Recognition**
 - 140+ participations in *international program committees*
 - took part in 10+ *international evaluations*

Main Achievements (2003-2006): Feasibility and outputs

- **Publications with foreign collaborators:**
 - **60+** papers *co-authored* with *foreign* researchers
- **Successful participation and performance in research projects**
 - **25** projects (**10** international)
 - *coordinated* one EU project
- **Involvement in several R&D contracts with *industry***
- **Participation in the Carnegie Mellon|Portugal *partnership*, where Lasige researchers coordinate the security and dependability program**

Main Achievements (2003-2006): Training and mentoring

- **Steady growth in number of PhD and MSc students**
 - theses completed: **28 MSc** and **8 PhD**
 - theses ongoing (on average): **30 MSc** and **30 PhD**
- **Heavy involvement of LASIGE faculty in FCUL graduate programs**
 - Doutoramento em Informática, Doutoramento em Informática CMU-FCUL, Mestrado em BioInformática, Mestrado em Engenharia Informática, Mestrado em Gestão de Informação, Mestrado em Informática, Mestrado em Informática BioMédica, Mestrado em Segurança Informática CMU-FCUL, Curso de Especialização em Informática.

Some details ...

Recent Prizes

- **Elevation to ACM Fellow - 2009**
- **Elevation to IEEE Fellow - 2008**
- **IBM Scientific Prize 2007**
- **IBM Scientific Prize 2004**
- **Final eight, Descartes European Science Award 2004**
- **Best Paper Awards: W4A'08, ICEIS2007, ECDL'06, Pervasive Health 2009, CSCWD'09, DISC 2009, SBRC 2009, ECSA 2010**
- **Innovation Young Engineer Prize (Portuguese Engineers Guild) 2004**
- **First in Portuguese tasks at GeoCLEF 2006**

Multidisciplinary Activities

- **Post-Graduate and Master Programmes**

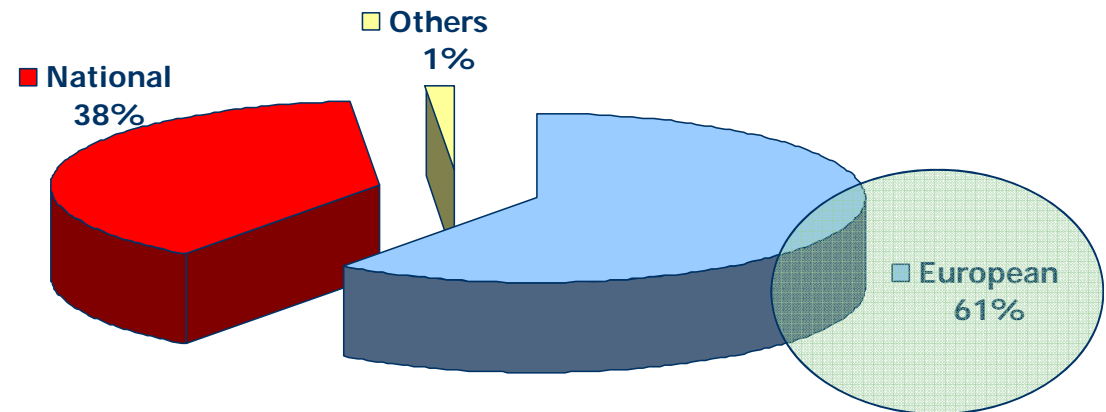
- Bio-informatics
- Information Tech's Applied to Biological and Medical Sciences

- **Research Projects**

- JoinTS - Joint psychological TherapieS
- MAFTIA - Dependability and security of large distributed applic's
- Linguateca - Center for Portuguese language, with linguists

Funding Sources

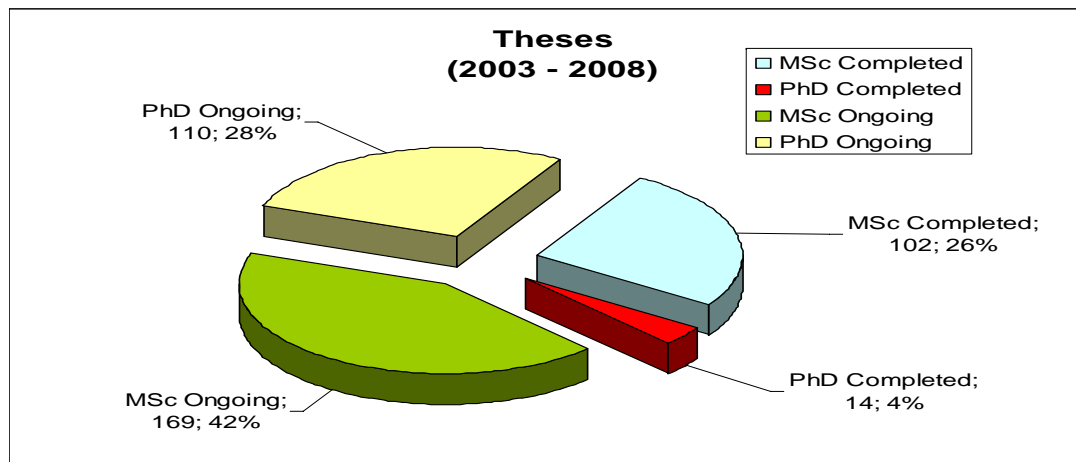
- **Baseline financing**
 - Multi-annual amounts from FCT
- **Competitive financing**
 - FCT projects
 - EU-IST projects



General Indicators (2003-2008)

	Concluded Theses		
	PhD Theses	MSc Theses	TOTAL
2003	4	5	9
2004	1	6	7
2005	1	6	7
2006	2	11	13
2007	4	36	40
2008	2	38	40

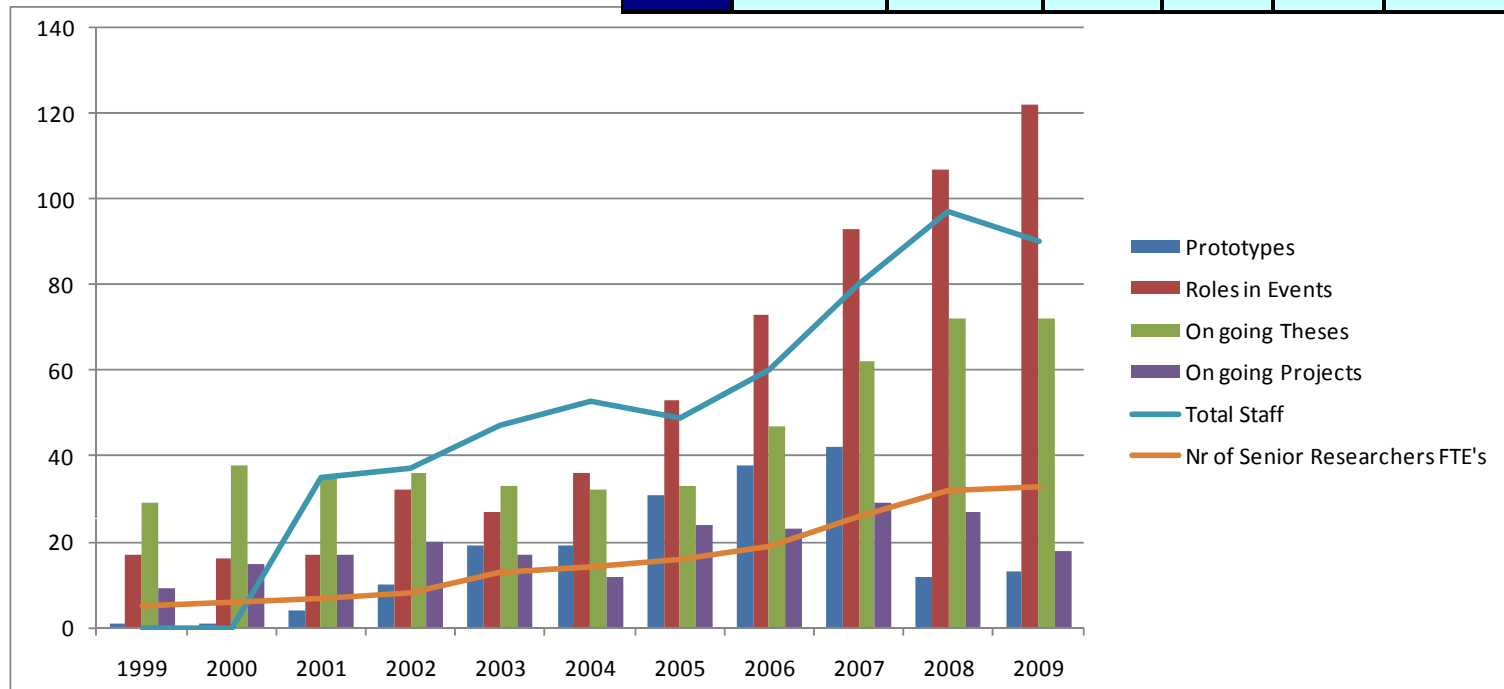
	Ongoing Theses		
	PhD	MSc	TOTAL
2003	12	21	33
2004	13	19	32
2005	14	19	33
2006	20	27	47
2007	19	43	62
2008	32	40	72



PhD and MSc theses

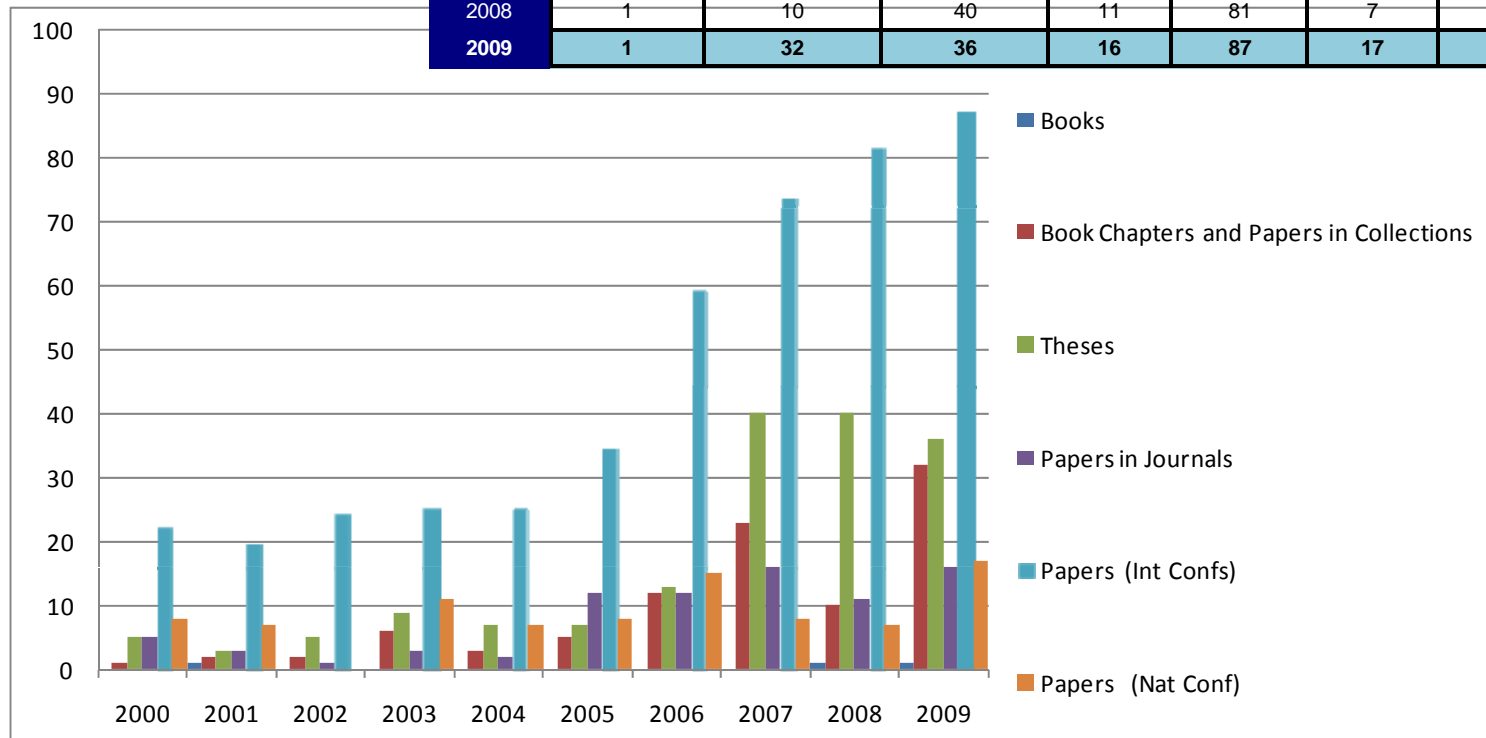
General Indicators (2003-2009)

	Prototypes	Roles in Events	On going Theses	On going Projects	Total Staff	Nr of Senior Researchers FTE's
2003	19	27	33	17	47	13
2004	19	36	32	12	53	14
2005	31	53	33	24	49	16
2006	38	73	47	23	60	19
2007	42	93	62	29	80	26
2008	12	107	72	27	97	32
2009	13	122	72	18	90	33



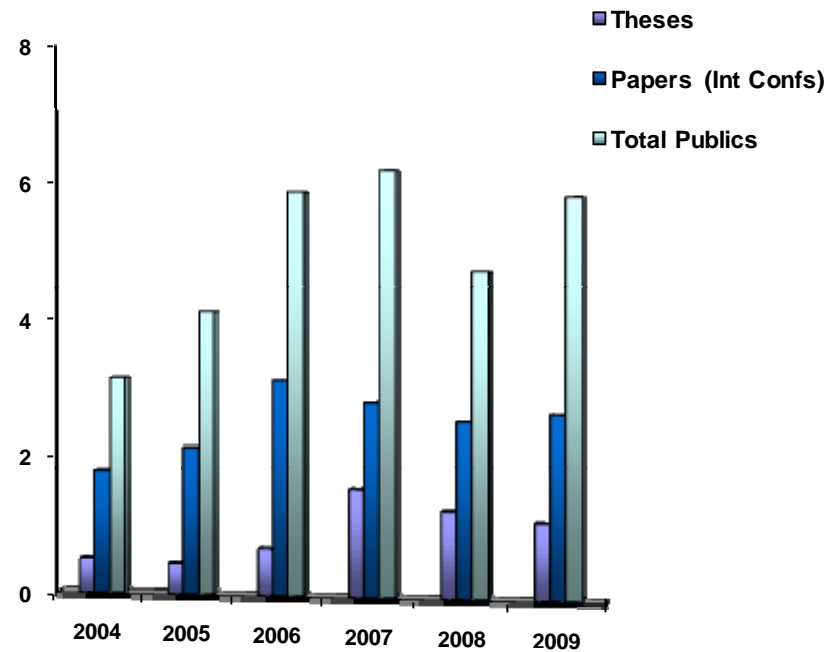
General Indicators (2003-2009)

	Books	Book Chapters and Papers in Collections	Theses	Papers in Journals	Papers (Int Confs)	Papers (Nat Conf)	Total Publics	Nr of Senior Researchers (FTE's)
2003	0	6	9	3	25	11	54	13
2004	0	3	7	2	25	7	44	14
2005	0	5	7	12	34	8	66	16
2006	0	12	13	12	59	15	111	19
2007	0	23	40	16	73	8	160	26
2008	1	10	40	11	81	7	150	32
2009	1	32	36	16	87	17	189	33



General Indicators (2003-2009)

Productivity (papers per senior researcher)



The Future...

Future Vision (2007-2010): External Challenges

- **National S&T scenario and university system will go through deep changes**
 - Also changes in national/European funding systems
- **Shift to competitive international research arena**
 - Research units must acquire critical mass and capacity of intervention there
- **This implies not only sheer dimension but also, and especially for a small and limited-resources country, *maximum efficiency and effectiveness of research results* and *networking***

How have we replied?

Addressing Vision (2007-2010): Internal Challenges

- **homogeneous** coordination
- **cooperative/competitive** management model
- from group-centred to **research-line centred strategy**
- research lines: **interdisciplinary**, attention to **trends** of international **research funding**
- PhDs, trainees: **sustained growth** of number, continued **quality control and improvement**
- improve **internationalization** of unit and individual members

Addressing Vision (2007-2010): Internal Challenges (cont.)

- Moved from a group-centred strategy to a research-line centred strategy
- Evolved to a more homogeneous coordination model
- Opened new, interdisciplinary research lines, always in line with current trends of international research
- Introduced a cooperative/competitive management model, based on the symbiosis between research goals (lines) and champions (teams)
- Promote the sustained growth of the number and quality of laboratory's PhDs, and of trainees
- Improve the already rather good internationalization of the unit and of its individual members

Addressing Vision (2007-2010): Strategic Associations

- **Portuguese S&T scenario features isolated units and associated laboratories**
 - LaSIGE and Instituto de Telecomunicações Laboratório Associado (IT-LA, <http://www.it.pt/>) recently announced a partnership between LaSIGE and IT-LA
 - Cabernet, ReSIST, MiNEMA, DynamO, Linguateca, ESFORS
- **Benefits**
 - Explore the large critical mass of such a large LA, and the extended coverage of ICT subjects, e.g. in national and international partnerships and projects
 - Explore complementarities between IT and LaSIGE

Addressing Vision (2007-2010): Networking

- **Networking has been a tradition of LaSIGE:**
 - Cabernet, ReSIST, MiNEMA, DynamO, Linguateca, ESFORS
- **INTERAC - Informal research units network (2007)**
 - Loosely-coupled virtual critical mass of over 160 PhDs
 - Mission: improve capacity of intervention and become a stimulating forum of complementary and multidisciplinary.
 - Founding research units
 - CCTC (<http://cctc.uminho.pt/>)
 - CISUC (<http://www.cisuc.uc.pt/>)
 - IEETA (<http://www.ieeta.pt/>)
 - LASIGE (<http://lasige.di.fc.ul.pt/>)

Addressing Vision (2007-2010): Networking (cont.)

- **INTERAC – common points of interest**

TOPICS	CCTC	CISUC	IEETA	LASIGE
Ambient Intelligence	X	X	X	X
Bioinformatics	X	X	X	X
Biomedical Informatics	X	X	X	X
Computer Networks	X	X	X	X
Distributed Systems	X	X		X
Human-Computer Inter. and Multimedia	X	X		X
Information Management		X		X
Secure and Dependable Computing	X	X	X	X
Software Engineering	X	X		X

Addressing Vision (2007-2010): Research

- **Biomedical Informatics**

- Investigate problems related to biological, clinical and epidemiological data management .

- **Communication and coordination support for dynamic systems**

- Investigate protocols, algorithms, models and middleware solutions to build reliable, scalable, adaptive and dependable Internet systems.

- **Global Computing**

- Investigate formal methods that ease the development and management of software systems under the emergent "Global Computing" paradigm.

Addressing Vision (2007-2010): Research (cont.)

- **Fault and Intrusion Tolerance in Open Distributed Systems**
 - Investigate models, protocols and architectures that are suitable for applications that need to automatically remain operational despite accidental faults or malicious attacks.
- **Human Computer Interaction and Multimedia**
 - Advanced HCI & Usability Studies, Learning & Mixed Media Environments, and Group Interaction Analysis & Design. Applied domains: organizational information systems, biomedical informatics, risk management, e-Health, e-Inclusion, e-Learning.

Addressing Vision (2007-2010): Research (cont.)

- **Information Management**

- Research on data management problems with a focus on data analyses, information integration and user access to large and complex data from heterogeneous platforms. Applied domains: geographic information retrieval, text mining and natural language processing, web archive and search, visualization.

- **Timeliness and Adaptation in Dependable Systems**

- Study of models, algorithms and platforms, aimed at improving the timeliness, security and safety aspects of distributed and complex embedded systems in open and unpredictable environments.

Addressing Vision (2007-2010): Funding Sources

- **Baseline financing**

- Improvement of multi-annual amounts from FCT
- Programatic financing

- **Competitive financing**

- Capacity improvement for FP7 and FCT programs
- Some projects assure financing through 2007/2009
 - ESA/ITI: AIR ESA/ITI
 - EU-IST: CRUTIAL, HIDDENETS, RESIST, SENSORIA
- New EU project proposals started or under evaluation (>2009)
 - Biomedical, e-Inclusion
 - Resilient Grids; Future Security Info&Event Management Systems

Special Requirements: External Realities

- **Local**
 - Modifications in the organization, operation and management frameworks of DI-LASIGE were improvement factor
- **National**
 - Expect multi-national funding to become above all steadier
- **International**
 - Effort to increase participation in IST projects has been paying
- **Framework Program 7 (EU)**
 - Attention from FCT to the non-100% funding models in FP7
 - VAT exemption for intra-communitarian business is crucial
- **Classification and Evaluation**
 - *Informatics, a.k.a. Computer Science and Engineering*
 - as with all systems, better classification improves evaluation

The end .

Thank you!