



FACULDADE · DE · CIÊNCIAS UNIVERSIDADE · DE · LISBOA

**LASIGE - LARGE-SCALE INFORMATIC SYSTEMS
LABORATORY**

ANNUAL REPORT

2003

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1 INTRODUCTION AND GENERAL REMARKS

This report presents the Research and Development activities carried out at LASIGE during the year 2003. The report adopts the structure of the previous reports (concerning 1999 to 2002). LASIGE hosts **four** research groups (since 2001):

- the Navigators on Distributed Systems group (<http://www.navigators.di.fc.ul.pt>)
- the XLDB group (formerly Massively Distributed Information Systems) (<http://xldb.fc.ul.pt/>)
- the Human-Computer Interaction and Multimedia group (<http://hcm.di.fc.ul.pt/>)
- the Dialnp - Distributed ALgorithms and Network Protocols group (<http://dialnp.di.fc.ul.pt>)

The permanent or long-term research staff of LASIGE is hosted in facilities of the FCUL (Faculty of Sciences) as members of FCUL faculty. Besides these implicit physical resources, LASIGE maintains the physical space inside the DI (Department of Informatics) premises, with some extra space for post-graduate students.

As in the previous year, the facilities, organized in open space, include: 3 desks for visiting scientists or short-, mid-term research assistants or associates, the secretarial and administration facilities, a meeting room with video and smart-board projection, and the laboratory, with several tables hosting the equipment of the research groups, and serving as working positions for students and researchers. LASIGE has its own server and printers to provide accounts and storage space for researchers. Connectivity is assured through the Informatics Department → FCUL → FCCN networking infrastructures.

2003 has witnessed the continuation of several projects (national and international) – most of them initiated in 2000/2001 - see list of project in the following sections, and the preparation of several initiatives concerning participation in FP6 Integrated Projects and Networks. The activity associated with the base funding agency - FCT (Fundação para a Ciência e Tecnologia) – was minimal: projects have been proposed by the different groups of the unit in the March/April 2002 Call, and feedback was only received in December 2003. The FCT budget regarding the second half of 2002 year was not received until the end of 2003, and no payment regarding the year of 2003 has been received up to May 2004 (the date of this writing).

LASIGE should have been evaluated by an external panel of evaluators during the year 2002. Eventually an evaluation took place at the end of 2003. The results from the evaluation process were known in early 2004 and, as a consequence of this process, LASIGE rating changed from Excellent to Very Good. The LASIGE assessment of the evaluation process is very negative, as noted in the response to the panel provided in the annexes.

2 STAFF

The non-permanent staff of LASIGE continued to grow in 2003 from 2002. Considering this expansion, LASIGE is now providing physical space and infrastructure for a significant number of students and researchers. Dra. Ana Maria Afonso, who is taking charge of coordination of administrative and logistic activities, has continued to work with LASIGE for the whole of 2003. The fixed costs incurred by the hiring of a full time support staff are a jointly agreed cost by all the groups, assuming the importance of an efficient and professional management of R&D activities.

LASIGE as the following list collaborators.

Navigators		XLDB		HCIM		DialNP	
Paulo Veríssimo	PhD	Mário Jorge Silva	PhD	Nuno Guimarães	PhD	Luís E. Rodrigues	PhD
Nuno F. Neves	PhD	Luís Bernardo	PhD	Luís M. Carriço	PhD	Hugo Miranda	MSc
António Casimiro	PhD	Ana Paula Afonso	BSc	Pedro A. Antunes	PhD	Filipe Araújo	MSc
Miguel P. Correia	PhD	António Ferreira	MSc	Thibault Langlois	PhD	Alexandre Pinto	BSc
José Rufino	PhD	Francisco Couto	MSc	Teresa Chambel	PhD	Ricardo Almeida	BSc
Nuno M. Neves	MSc	Bruno Martins	BSc	Carlos Duarte	MSc	Nuno Carvalho	BSc
Pedro Martins	BSc	Daniel Gomes	BSc	Marco Sá	BSc	Maria João Monteiro	BSc
Paulo Sousa	BSc	Norman Noronha	BSc	Hugo Simões	Undgr		
Luís Sardinha	BSc	Miguel Costa	BSc	Rui Lopes	Undgr		
Tiago Jorge	Undgr	Pooja Jain	BSc	Miguel Rodrigues	Undgr		
Pan Jieke	Undgr	Bhuwan Tiwari	BSc	Amadeu Dias	Undgr		
José Pascoal	Undgr	André Santos	Undgr				
João Sequeira	Undgr	Henrique Moniz	Undgr				
Bruno Gonçalves	Undgr						
Rafael ferraz	Undgr						
Ana Maria Afonso (BSc), Administration and Management Support							
PhD's	13	Other Collaborators		26			
MSc's	7	Admin & Mngmt		1			
		Total (end 2003)		47			

The following tables illustrate how the staff is distributed between Faculty and other researchers (hired or receiving research grants).

FCUL Faculty Members : 21							
Paulo Veríssimo	PhD	Mário Jorge Silva	PhD	Nuno M. Guimarães	PhD	Luís E. Rodrigues	PhD
Nuno F. Neves	PhD	Luís Bernardo(*)	PhD	Luís Carriço	PhD	Hugo Miranda	MSc
António Casimiro	PhD	Ana Paula Afonso	BSc	Pedro A. Antunes	PhD	Filipe Araújo	MSc
Miguel P. Correia	PhD	António Ferreira	MSc	Teresa Chambel	PhD	Alexandre Pinto	BSc
José Rufino (*)	PhD	Francisco Couto	MSc	Thibault Langlois	PhD	Ricardo Almeida	BSc
				Carlos Duarte	MSc		
LASIGE Staff (using LASIGE physical and technical resources) : 28							
Nuno M. Neves	MSc	Bruno Martins	BSc	Marco Sá	BSc	Nuno Carvalho	BSc
Pedro Martins	BSc	Daniel Gomes	BSc	Hugo Simões	Undgr	Maria João Monteiro	BSc
Paulo Sousa	BSc	Norman Noronha (*)	BSc	Rui Lopes	Undgr		
Luís Sardinha	BSc	Miguel Costa	BSc	Miguel Rodrigues	Undgr		
Tiago Jorge	Undgr	Pooja Jain	BSc	Amadeu Dias	Undgr		
Pan Jieke	Undgr	Bhuwan Tiwari (*)	BSc	Frederico Cruz	Undgr		
José Pascoal	Undgr	André Santos	Undgr				
João Sequeira	Undgr	Henrique Moniz (*)	Undgr				
Bruno Gonçalves	Undgr	Bruno Martins	BSc				
Rafael ferraz	Undgr						
Ana Maria Afonso (BSc), Administration and Management Support							

(*) Part of 2003

3 DESCRIPTION OF ACTIVITIES AND ACHIEVEMENTS

The tables below summarize the research-related activities carried out at LASIGE during the year of 2003. The comparison with the number of senior researchers (PhD's) provides a metric for the average scientific productivity.

	Books	Theses	Chapters	Papers (Intntl)	Papers (Nat)	Total Publics	Nr of Senior Researchers
2003	-	8	3	33	11	44	13
2002	-	5	2	25	-	32	8
2001	1	3	2	22	7	35	7
2000	-	5	1	27	8	41	6
1999	-	3	5	15	7	30	5

Summary of Results and Activities in 2002 (figures for 1999 - 2002 are presented for reference)

	Prototypes	Roles in Events	On going Theses	On going Projects	Total Staff	Nr of Senior Researchers
2003	19	27	12(D)+21(M)	17	47	13

2002	10	32	13(D)+23(M)	20	37	8
2001	4	17	16(D)+19(M)	17	35	7
2000	1	16	13(D)+25(M)	15	?	6
1999	1	17	12(D)+17(M)	9	?	5

Summary of Results and Activities in 2002 (figures for 1999 - 2002 are presented for reference)

3.1 Information dissemination and marketing

The information dissemination and marketing has been carried out and supported by the on-going activities of the Unit, namely:

- Projects (see projects in proper section)
- Talks, Workshops – see below

The LASIGE Web site has been maintained, and used to provide the required support for the initiatives taken during the reporting period - 2003 (recruiting, meetings, etc.). The URL is <http://lasige.di.fc.ul.pt>, with links to the groups pages and other sites related with LASIGE.

3.1.1 Talks and Visits sponsored directly by LASIGE in 2003

1. Ulrich Schmid

Technische Universität Wien, Embedded Computing Systems Group

Date: January 28th

Title: Hybrid Process and Link Failures in Synchronous, Partially Synchronous and Asynchronous System Models

Abstract: We introduce a novel hybrid failure model, which facilitates an accurate and detailed, yet simple, analysis of round-based synchronous, partially synchronous and asynchronous distributed algorithms. It captures process and link failures in both time and value domain and consists of two sub-models: The "physical failure model" reflects the physical structure of the underlying distributed system. It is primarily used for assumption coverage analysis. The more abstract "perception failure model" specifies the processes' perception of the physical failures. It is vastly simpler than the physical failure model and particularly suited to analyzing both resilience and running time of distributed algorithms. We demonstrate the utility of our model by two examples.

For synchronous systems, we show that it allows to solve deterministic consensus in presence of link failures. It is well-known from (Gray, 1978) that this problem is unsolvable if link failures may occur completely arbitrary. If one moderately restricts the number of link failures each processor may experience during sending and receiving, however, it turned out that most existing consensus algorithms can cope with a large number of link failures system-wide. Comparison with several new impossibility results and lower bounds reveals that this can in fact be done very efficiently. Our analysis of the assumption coverage in typical wireless system architectures reveals that such algorithms can be applied even in case of transient link failure rates up to 1/100.

For partially synchronous and asynchronous systems, we show how a suitably adopted variant of the randomized Byzantine agreement algorithm of (Srikanth & Toueg, 1987) works under our failure model. Its

probability of disagreement after K iterations turns out to be only $1/2^K$, which is the same as in the FLP model and thus much smaller than the lower bound $O(1/K)$ known for systems with general lossy links. We also survey the results of our analysis of the algorithm's running time and assumption coverage in typical wireless systems, and indicate that stubborn links are sufficient for this algorithm. Consequently, there is absolutely no need to employ a perfect communications subsystem, like TCP/IP, even in case of excessive link failure rates here.

Our presentation concludes with some promising directions of ongoing/future work in this area.

2. Danny Dolev

School of Engineering and Computer Science, The Hebrew University of Jerusalem

Date: December, 17th.

Title: Linear Time Byzantine Self-Stabilizing Clock Synchronization

Abstract: Awareness of the need for robustness in distributed systems increases as distributed systems become an integral part of day-to-day systems. Tolerating Byzantine faults and possessing self-stabilizing features are sensible and important requirements of distributed systems in general, and of a fundamental task such as clock synchronization in particular. There are efficient solutions for Byzantine non-stabilizing clock synchronization as well as for non-Byzantine self-stabilizing clock synchronization.

In contrast, current Byzantine self-stabilizing clock synchronization algorithms have exponential convergence time and are thus impractical. We present a linear time Byzantine self-stabilizing clock synchronization algorithm, which thus makes this task feasible. Our deterministic clock synchronization algorithm is based on the observation that all clock synchronization algorithms require events for re-synchronizing the clock values. These events usually need to happen synchronously at the different nodes. In these solutions this is fulfilled or aided by having the clocks initially close to each other and thus the actual clock values can be used for synchronizing the events. This implies that the clock values cannot differ arbitrarily, which necessarily renders these solutions to be non-stabilizing. Our scheme suggests using a tight pulse synchronization that is uncorrelated to the actual clock values. The synchronized pulses are used as the events for re-synchronizing the clock values.

3.1.2 Connections to industry and external institutions

LASIGE maintains a fair amount of connections to local and international industry, which derive mainly from the projects it is associated with. As examples, we can name: Critical Software (PT), INXL (PT), IBM Zurich Research Lab (CH), Tradezone (UK), NHS Trust (UK), Rockwell-Collins (FR), CISA (UK), Deutsche Telekom (DE), FCCN (PT), GMD (DE), CESSI (FR), CTT (PT), ParaRede (PT), OctalTV (PT), SONAE (PT), PRAXIA (PT), RTP (PT), Oracle (PT).

More specific collaborations include:

- Continuation from 2002 - Research project sponsored by Microsoft Research (Protocolos de difusão probabilista para suporte a aplicações multi-utilizador em grande-escala).
- Continuation from 2002 - Collaboration with EPFL (Prof. Rachid Guerraoui).
- Collaboration with CMAF - Centro de Matemática e Aplicações Fundamentais da Universidade de Lisboa, CalTech: California Institute of Technology, and the Technical University of Berlin, in the study, design and development of hypervideos for communicating and learning mathematics, since 2000.
- Collaboration with FCCN – Research project sponsored by FCCN (based on the Tumba Search Engine).

3.2 Publications

3.2.1 Theses

1. **António Casimiro Ferreira Costa.** Timely Actions in the Presence of Uncertain Timeliness. FCUL, Abril de 2003. (PhD Thesis), *Advisor: P. Verissimo.*
2. **Cláudia Carvalho.** Infra-estrutura de Chave Pública do Ministério da Justiça. FCUL, Abril de 2003. (MSc Thesis), *Advisor N. F. Neves.*
3. **João P. Campos.** Versus: a Web Data Repository with Time Support. (MSc Thesis). Faculdade de Ciências da Universidade de Lisboa. Available as FCUL Technical Report DI/FCUL 03-8. May 2003. *Advisor: Mário Silva*
4. **João Travassos Cabral Martins.** A Replica Consistency Algorithm for GlobData. 2003. MSc Thesis. *Advisor: Luís Rodrigues.*
5. **José Manuel Sousa Matos Rufino.** Computational System for Real-Time Distributed Control. Instituto Superior Técnico – UTL, Fevereiro de 2003. (PhD Thesis), *Advisor: Paulo Verissimo.*
6. **Maria Teresa C. Chambel,** “Video Based Hypermedia Spaces for Learning Contexts”, Faculty of Sciences, University of Lisbon, July 2003. (PhD thesis). *Advisor: Nuno Guimarães*
7. **Miguel Nuno Dias Alves Pupo Correia.** Intrusion Tolerance based on Architectural Hybridization, FCUL, Dezembro de 2003. (PhD Thesis), *Advisor: Paulo Verissimo.*
8. **Pedro Filipe Pereira Campos,** “Abalearn: Uma abordagem Sensível ao Risco para a Aprendizagem Automática do Abalone”, Instituto Superior Técnico, Universidade Técnica de Lisboa, September 2003. (Msc thesis). *Advisor: Thibault Langlois*
9. **Pedro Miguel Rebelo Martins.** Concretização de uma Timely Computing Base. FCUL, Fevereiro de 2003. (MSc Thesis), *Advisor: P. Verissimo.*

3.2.2 Chapters of books and Papers in collections

1. Paulo Veríssimo. Uncertainty and Predictability: Can they be reconciled? In Future Directions in Distributed Computing, André Schiper, Alexander A. Shvartsman, Hakim Weatherspoon, Ben Y. Zhao (eds.), pp. 108-113, Springer Verlag LNCS 2584, May 2003.
2. Paulo Veríssimo, Nuno Ferreira Neves, Miguel Correia. Intrusion-Tolerant Architectures: Concepts and Design. In Architecting Dependable Systems, R. de Lemos, C. Gacek, A. Romanovsky (eds.), pp. 3-36, Springer-Verlag LNCS 2677, 2003.
3. Pedro Campos and Thibault Langlois, "Abalearn, a Risk-Sensitive Approach to Self-play Learning in Abalone", European Conference on Machine Learning (ECML), in Lecture Notes in Artificial Intelligence, pp 35—46, Croatia, September 2003 (ISSN 0302-9743).

3.2.3 Papers in journals and conferences with referees

1. António Serralheiro, Isabel Trancoso, Diamantino Caseiro, Teresa Chambel, Luís Carriço, and Nuno Guimarães, "Towards a Repository of Digital Talking Books", In Proceedings of the 8th European Conference on Speech Communication and Technology, EuroSpeech'03, Geneva, Switzerland, 14 September 2003.
2. Bruno Martins, Mário J. Silva, Web Information Retrieval with Result Set Clustering. NLTR 2003 - Natural Language and Text Retrieval Workshop at EPIA'03, 2003
3. Carlos Duarte, Teresa Chambel, Luís Carriço, Nuno Guimarães, and Hugo Simões, "A Multimodal Interface for Digital Talking Books", In Proceedings of WWW/Internet'2003, International Association for Development of the Information Society, IADIS, Algarve, Portugal, 5-8 November 2003.
4. Carlos Duarte, Luís Carriço, Nuno Guimarães, and Teresa Chambel, "Producing DTB from Audio Tapes", In Proceedings of the 5th International Conference in Enterprise Information Systems, ICEIS'03, Agnes, France, 23-26 April 2003.
5. Carlos Duarte, Luís Carriço, Hugo Simões, Teresa Chambel, and Nuno Guimarães, "Avaliação de Aspectos de Sincronização de Livros Falados Digitais", In Proceedings of the Workshop de Sistemas de Informação Multimédia, Cooperativos e Distribuídos, Coop-Media 2003, ISEP Porto, Portugal, 8 October 2003.
6. Daniel Gomes, Mário J. Silva, A Characterization of the Portuguese Web. 3rd ECDL Workshop on Web Archives. Trondheim, Norway, August 2003.
7. Francisco Couto, Pooja Jain, Mário J. Silva, Pedro Coutinho, ReBIL: Relating Biological Information through Literature. 1st Annual Meeting of Portuguese Proteomic Network - ProCura: Functional Genomics And Proteomics, Inst. Nacional de Saúde Dr Ricardo Jorge, Lisboa, 17th November, 2003.
8. Francisco Couto, Mário J. Silva, Pedro Coutinho, ProFAL: PROtein Functional Annotation through Literature. JISBD 2003 - VIII Jornadas de Ingeniería del Software y Bases de Datos, Alicante, Spain, November, 2003.

9. Francisco Couto, Mário J. Silva, Pedro Coutinho, Curating Extracted Information through the Correlation between Structure and Function. Third meeting of the special interest group on Text Mining at the Intelligent Systems for Molecular Biology (ISMB), Brisbane, Australia, June, 2003.
10. Francisco Couto, Mário J. Silva, Pedro Coutinho, ReBIL: Relating Biological Information through Literature. Intelligent Systems for Molecular Biology (ISMB) (poster), Brisbane, Australia, June, 2003.
11. Mário J. Silva, O Papel da Meta-informação na Estratégia de Comunicação da Administração Pública. 1o. Congresso Nacional da Administração Pública: os Vectores da Mudança, Lisboa, Novembro de 2003.
12. Francisco Couto, Mário J. Silva, Pedro Coutinho, Improving Information Extraction through Biological Correlation, Data Mining and Text Mining for Bioinformatics Workshop at the ECML/PKDD2003, Dubrovnik-Cavtat, Croatia, September, 2003.
13. Hernani Mourão and Pedro Antunes, "Workflow Recovery Framework for Exception Handling: Involving the User," in Groupware: Design, Implementation and Use, J. Favela and D. Decouchant, Eds. 9th International Workshop on Groupware, CRIWG 2003. Autrans, France: Lecture Notes in Computer Science, Springer-Verlag, 2003, pp. 159-167. (ISBN: 3-540-20117-3).
14. Hernani Mourão and Pedro Antunes, "Suporte À Intervenção de Operadores No Tratamento de Excepções Em Fluxos de Trabalho", 4ª Conferência da Associação Portuguesa de Sistemas de Informação, Porto, 15-17 Outubro 2003.
15. Hernani Mourão and Pedro Antunes, "Workflow Recovery Framework for Exception Handling: Involving the User", Workshop de Sistemas de Informação Multimédia e Cooperativos, COOP-MEDIA '03, Porto, Portugal, October 8, 2003.
16. Hugo Miranda and Luís Rodrigues. Friends and Foes: Preventing Selfishness in Open Mobile Ad Hoc Networks International Workshop on Mobile Distributed Computing (MDC). Proceedings of the 23rd IEEE International Conference on Distributed Computing Systems Workshops, pp 440-445. Providence, Rhode Island USA, May 2003.
17. José Borbinha, Nuno Freire, Mário J. Silva, Bruno Martins, Internet Search Engines and OPACs: Getting the best of two worlds. EIPub 2003 - ICC/IFIP 7th International Conference on Electronic Publishing. Guimarães, Portugal. June 2003.
18. José Pereira, Luís Rodrigues and Rui Oliveira. Semantically Reliable Multicast: Definition, Implementation and Performance Evaluation. IEEE Transactions on Computers, Special Issue on Reliable Distributed Systems, (Vol 52, Nb. 2), pp. 150-165, February 2003.
19. José Pereira, Luís Rodrigues, Maria J. Monteiro, Rui Oliveira, Anne-Marie Kermerrec. NEEM: Network-friendly Epidemic Multicast. The 22nd Symposium on Reliable Distributed Systems, October, 2003, Florence, Italy.
20. Lau C. Lung, Miguel Correia, Nuno F. Neves, Paulo Veríssimo. A Simple Intrusion-Tolerant Reliable Multicast Protocol using the TTCB. In 21º Simpósio Brasileiro de Redes de Computadores. Natal, Brasil, pages 649-663, May 2003.

21. Luís Carriço, Rui Lopes, Miguel Rodrigues, Amadeu Dias and Pedro Antunes, "Making XML from Hypermedia Models", In Proceedings of WWW/ Internet'2003, International Association for Development of the Information Society, IADIS, Algarve, Portugal, 5-8 November 2003.
22. Luís Carriço, Nuno Guimarães, Carlos Duarte, Teresa Chambel, and Hugo Simões, "Spoken Books: Multimodal Interaction and Information Repurposing", In Proceedings of the 10th Human Computer Interaction International Conference, HCII'03, Lawrence Erlbaum Associates, Creete, Greece, 22-27 June 2003.
23. Luís Carriço, Rui Lopes, Miguel Rodrigues and Amadeu Dias, "XML na Modulação de Sistemas Hipermédia", In Actas da Primeira Workshop em XML, Aplicações e Tecnologias Associadas, XATA'03, Braga, Portugal, 13-14 February 2003.
24. Luís Rodrigues. The Road to a more Configurable and Adaptive Communication and Coordination Support. Proceedings of the 9th Workshop on Future Trends of Distributed Computing Systems, pp. 16-22. San Juan, Puerto Rico, May 2003.
25. Luís Rodrigues, Sidath Handurukande, José Pereira, Rachid Guerraoui, Anne-Marie Kermarrec. Adaptive Gossip-Based Broadcast. Proceedings of the International Conference on Dependable Systems and Networks (DSN), pp. 47-56, San Francisco, California, USA, June, 2003.
26. Luís Rodrigues and Michel Raynal. Atomic Broadcast in Asynchronous Crash-Recovery Distributed Systems and its use in Quorum-Based Replication. IEEE Transactions on Knowledge and Data Engineering. September/October 2003 (Vol. 15, No. 5), pp. 1206-1217.
27. Mário Guimarães and Luís Rodrigues. A Genetic Algorithm for Multicast Mapping in Publish-Subscribe Systems Proceedings of the 2nd IEEE International Symposium on Network Computing and Applications, pp. 67-74, April 16-18, 2003, Cambridge, MA, USA.
28. Maria J. Monteiro, José Pereira, Luís Rodrigues. Integration of Flight Simulator 2002 with an epidemic multicast protocol. International Workshop on Large-Scale Group Communication,(in conjunction with The 22nd Symposium on Reliable Distributed Systems), October, 2003, Florence, Italy.
29. Maria J. Monteiro, José Pereira, Luís Rodrigues. Integração do Flight Simulator 2002 com um protocolo de difusão epidémica. Actas da Sexta Conferência sobre Redes de Computadores (CRC'03). Setembro, 2003, Bragança, Portugal.
30. Mário J. Silva, The Case for a Portuguese Web Search Engine, IADIS International Conference WWW Internet 2003. November 2003.
31. Mário J. Silva, Searching and Archiving the Web with Tumba! CAPSI 2003 - 4a. Conferência da Associação Portuguesa de Sistemas de Informação. November 2003.
32. Miguel Costa, Mário J. Silva, Sidra: a Flexible Distributed Indexing and Ranking Architecture for Web Search. JISBD 2003 - VIII Jornadas de Ingeniería del Software y Bases de Datos, Alicante, Spain, November, 2003.
33. Nuno Carvalho, Filipe Araújo, Luís Rodrigues. IndiQoS: um Sistema Publicação-Subscrição com Qualidade de Serviço, Actas da Sexta Conferência sobre Redes de Computadores (CRC'03), Setembro, 2003, Bragança, Portugal

34. Paulo Veríssimo, Jorg Kaiser, António Casimiro. An architecture to support interaction via Generic Events. In *24th IEEE Real-time Systems Symposium, Work in Progress Proceedings*, Cancun, Mexico, December 2003.
35. Paulo Veríssimo, António Casimiro. Event-Driven Support of Real-Time Sentient Objects. In *Proceedings of the 8th IEEE International Workshop on Object-oriented Real-time Dependable Systems*, Guadalajara, Mexico, January 2003
36. Pedro Antunes and Carlos Costa, "Perceived Value: A Low-Cost Approach to Evaluate Meetingware", In *Groupware: Design, Implementation and Use*, J. Favela and D. Decouchant, Eds. 9th International Workshop on Groupware - CRIWG 2003. Autrans, France: Lecture Notes in Computer Science, Springer-Verlag, 2003, pp. 109-125. (ISBN: 3-540-20117-3).
37. Pedro Antunes and Carlos Costa, "From Genre Analysis to the Design of Meetingware," M. Pendergast, K. Schmidt, C. Simone, and M. Tremaine, Eds. *Proceedings of the 2003 International ACM SIGGROUP Conference on Supporting Group Work, GROUP '03*. Sanibel Island, Florida: ACM Press, 2003, pp. 302-310. (ISBN: 1-58113-693-5).
38. Pedro Antunes and Luís Carriço, "Modeling the Information Structures of Meetingware", In *Proceedings of the Workshop de Sistemas de Informação Multimédia, Cooperativos e Distribuídos, Coop-Media 2003*, ISEP Porto, Portugal, 8 October 2003.
39. Rachel Aires, Sandra Aluísio, Paulo Quaresma, Diana Santos, and Mário Silva, An initial proposal for cooperative evaluation on information retrieval in portuguese, in *Computational Processing of the Portuguese Language, 6th International Workshop, PROPOR 2003, (Procs.)*, Nuno J. Mamede, Jorge Baptista, Isabel Trancoso and Maria das Graças Volpe Nunes (Eds.), LNCS, vol. 2721, Springer, pages 227–234, Faro, Portugal, June 2003.
40. Rui Lopes, Miguel Rodrigues, Amadeu Dias and Luís Carriço, "Arquitecturas XML para Concretização de Modelos Hipermédia", In *Proceedings of the 4ª Conferência da Associação Portuguesa de Sistemas de Informação*, Porto, Portugal, 15-17 October 2003.
41. Thibault Langlois and Pedro Campos, "Abalearn, a programs that learns how to play Abalone", *International Computer Game Association Journal*, December 2003, (ISSN 1389-6911)
42. Tom Apostol, Teresa Chambel, José Francisco Rodrigues, and Lara Santos, "Video Based Hypermedia for Communicating Mathematics", *5th International Congress on Industrial and Applied Mathematics, ICIAM'03*, Sydney, Australia, July 2003.

3.2.4 Other Publications (technical reports)

1. A. Adelsbach, C. Cachin, S. Creese, Y. Deswarte, K. Kursawe, J.-C. Laprie, David Powell, B. Randell, J. Riordan, P. Ryan, W. Simmonds, Robert J. Stroud, Paulo Veríssimo, M. Waidner, A. Wespi. *Conceptual Model and Architecture of MAFTIA*. Technical Report DI/FCUL TR-03-1. Department of Computer Science, University of Lisbon. February 2003.

2. C. Brudna, V. Cahill, António Casimiro, R. Cunningham, Jorg Kaiser, R. Meier, Paulo Veríssimo. Preliminary definition of CORTEX system architecture. Technical Report DI/FCUL TR -03-17. Department of Computer Science, University of Lisbon. July 2003.
3. Francisco Couto, Mário J. Silva, Pedro Coutinho, Implementation of a Functional Semantic Similarity Measure between Gene-Products. FCUL Technical Report DI/FCUL TR 3-29. November 2003.
4. Francisco Couto, Mário J. Silva, Bioinformática - Exploração da Informação, centroatlantico.pt magazine, nº 3 October 2003.
5. Francisco Couto, Bruno Martins, Mário J. Silva, Pedro Coutinho, Classifying Biomedical Articles using Web Resources: application to KDD Cup 02. FCUL Technical Report DI/FCUL TR 3-24. July 2003.
6. Daniel Gomes, Mário J. Silva, Collecting Statistics about the Portuguese Web. FCUL Technical Report DI/FCUL TR 03-10. June 2003.
7. G. Biegel, G. Blair, V. Cahill, António Casimiro, K. Cheverst, R. Cunningham, A. Fitzpatrick, A. Friday, G. Gaertner, B. Hughes, J. Kaiser, R. Meier, N. Riegers, Paulo Veríssimo. Definition of Application Scenarios. Technical Report DI/FCUL TR-03-14. Department of Computer Science, University of Lisbon. July 2003.
8. G. Biegel, C. Brudna, António Casimiro, J. Kaiser, C. Liu, C. Mitidieri, Paulo Veríssimo. Preliminary definition of CORTEX interaction model. Technical Report DI/FCUL TR -03-16. Department of Computer Science, University of Lisbon. July 2003.
9. G. Biegel, G. Blair, C. Brudna, V. Cahill, António Casimiro, S. Clarke, H. Duran-Limon, A. Fitzpatrick, A. Friday, B. Hughes, J. Kaiser, R. Meier, V. Reynolds, Paulo Veríssimo, M. Wu. The CORTEX Programming Model. Technical Report DI/FCUL TR -03-19. Department of Computer Science, University of Lisbon. July 2003.
10. Gordon Blair, C. Brudna, V. Cahill, António Casimiro, R. Cunningham, H. Duran-Limon, J. Kaiser, Pedro Martins, Paulo Veríssimo. Preliminary Specification of Basic Services and Protocols. Technical Report DI/FCUL TR -03-18. Department of Computer Science, University of Lisbon. July 2003.
11. Gordon Blair, K. Cheverst, H. Duran-Limon, A. Friday, G. Samartzidis, T. Sivaharan, P. Sousa, M. Wu. Analysis and Design of Application Scenarios. Technical Report DI/FCUL TR -03-21. Department of Computer Science, University of Lisbon. July 2003.
12. Mário J. Silva, The Case for a Portuguese Web Search Engine. FCUL Technical Report DI/FCUL TR-03-3. March 2003.
13. Mário J. Silva, Miguel Costa, Bruno Martins, Avaliação de Sistemas de Recuperação de Informação da Web em Português: Uma Proposta Inicial à Comunidade. FCUL Technical report DI/FCUL TR-03-11. March 2003.
14. Miguel Correia, Nuno F. Neves, Lau C. Lung, Paulo Veríssimo. A Wormhole-based Intrusion-Tolerant Group Communication System - WIT-GCS. *The 5th Cabernet Plenary Workshop*, November 2003.
15. Miguel Correia, N. F. Neves, L. C. Lung, P. Veríssimo. Low Complexity Byzantine-Resilient Consensus. Technical Report DI/FCUL TR -03-25. Department of Computer Science, University of Lisbon. August 2003.

16. P. Barron, G. Biegel, Vinny Cahill, António Casimiro, S. Clarke, R. Cunningham, A. Fitzpatrick, G. Gaertner, B. Hughes, Jorg Kaiser, R. Meier, Paulo Veríssimo. Preliminary definition of CORTEX programming model. Technical Report DI/FCUL TR -03-15. Department of Computer Science, University of Lisbon. July 2003.
17. Paulo Sousa, Pedro Martins, António Casimiro, Paulo Veríssimo. Concretização de um cenário de carros cooperantes num ambiente móvel sem fios. Technical Report DI/FCUL TR -03-23. Department of Computer Science, University of Lisbon. July 2003.
18. Paulo Veríssimo, Nuno F. Neves, Miguel Correia, Intrusion-Tolerant Architectures: Concepts and Design. Technical Report DI/FCUL TR03-5, Department of Informatics, University of Lisboa, 2003.
19. Vinny Cahill, António Casimiro, Jorg Kaiser, Pedro Martins, V. Reynolds, Paulo Sousa, Paulo Veríssimo, M. Wu. Proof-of-concept prototypes. Technical Report DI/FCUL TR -03-20. Department of Computer Science, University of Lisbon. July 2003.

3.3 Prototypes

1. APEG - Arabidopsis Pollen Expressed Genes.
2. Appia, a framework for protocol composition (<http://appia.di.fc.ul.pt/>)
3. CAC - Correlate Annotation's Components.
4. Copla, a middleware tool for the replication of object-oriented databases (developed in the context of the GlobData project)
5. DiTaBBu, a framework for production of Digital Talking Books
6. FiGO - Finding GO terms in unstructured text.
7. FuSSiMeG - Functional Semantic Similarity Measure between Gene-Products.
8. HTIMEL : *HTML with Time Extensions*, A model and a language to support true integration of dynamic media (such as video and audio) on the Web, as extensions to HTML and existing Web tools.
9. Hypervideo prototypes in HTIMEL for Literary Studies; The Story of Pi; and Touching Soap Films. The Sr.Ventura Digital Talking Book in HTIMEL.
10. ProFAL (bioProducts Functional Annotation through Literature) - information system for automatic annotation of biological databases.
11. SIDRA, Web data indexing and ranking system.
12. TCB version 1.11, August 2003, RTAI 24.1.10 version (<http://www.navigators.di.fc.ul.pt/software/tcb/>)
13. TTCB, Trusted Timely Computing Base 1.11, August 2003, <http://www.navigators.di.fc.ul.pt/software/ttcb/>
14. Tumba! – Search engine for the Portuguese Web (<http://tumba.pt>)
15. Versus, Web Data Management System, with versioning and parallel loading/updating capabilities.
16. WebCAT, a Web Contents Analysis Tool.
17. Viúva Negra, Web Crawler built upon Versus and WebCAT
18. WebStore, a repository for Web contents.
19. WeBTC - Web Biological Text Classification.

3.4 Organisation of and presence in events

3.4.1 Presence in International Program Committees

1. Luís Rodrigues. (PC member) CRC'03, 6a Conferência sobre Redes de Computadores, Tecnologias e Aplicações, Setembro, Bragança, Portugal. 2003.
2. Luís Rodrigues. (PC member) International Workshop on Large-Scale Group Communication, October 5, 2003, Florence, Italy, in conjunction with 22nd Symposium on Reliable Distributed Systems (SRDS'2003).
3. Luís Rodrigues. (PC member) Workshop on European Research on Middleware and Architectures for Complex and Embedded Cooperative Systems, in conjunction with The Sixth International Symposium on Autonomous Decentralized Systems, Pisa, Italy, April, 2003.
4. Luís Rodrigues. (PC member) Future Trends on Distributed Computing Systems, Porto-Rico, May 28-30, 2003.
5. Luís Rodrigues. (PC member) FIP/ACM International Conference on Distributed Systems Platforms, Middleware 2003. Rio de Janeiro, Brazil. Junho de 2003.
6. Luís Rodrigues. (PC member) 7th Annual International Conference On Principles of Distributed Systems (OPODIS'03). December 10-13, Guyane, Martinique, 2003.
7. Luís Rodrigues. (PC member) The 23rd IEEE International Conference on Distributed Computing Systems (ICDCS '03). Fault Tolerant and Dependable Systems track. Providence, Rhode Island, USA, May 2003.
8. Mário Silva. (PC member) JISBD'03, VIII Jornadas de Ingeniería del Software y Bases de Datos, Alicante, España, 12-14 Noviembre 2003.
9. Miguel Correia (PC member) WSeg 2003 - Workshop em Segurança de Sistemas Computacionais, Natal, Brasil, Maio 2003
10. Nuno F. Neves (PC member) IEEE International Conference on Dependable Systems and Networks (DSN-2003), S. Francisco, USA, June 2003
11. Nuno F. Neves (PC member) Workshop on Reliable and Secure Middleware, Sicily, Italy, November 2003
12. Nuno F. Neves (PC member) ACM Workshop on Survivable and Self-Regenerative Systems, Washington, USA, October 2003
13. Paulo Veríssimo. IEEE International Conference on Dependable Systems and Networks (DSN-2003), S. Francisco, USA, June 2003
14. Paulo Veríssimo (PC member) IEEE 22nd Symposium on Reliable Distributed Systems (SRDS 2003), Firenze, Italy, October 2003.
15. Paulo Veríssimo (PC member) IEEE International Symposium on Autonomous Decentralized Systems ISADS 03, Pisa Italy, April 2003.
16. Paulo Veríssimo (PC member) 1st Latin-American Symposium on Dependable Computing, S. Paulo, Brasil, October 2003
17. Paulo Veríssimo (PC member) 9th IEEE International Workshop on Object-oriented Real-time Dependable Systems (WORDS 2003), Capri Island, Italy, October 2003
18. Paulo Veríssimo (PC member) 5th IFAC International Conference on Fieldbus Systems and their Applications, Aveiro, Portugal, July 2003

19. Paulo Veríssimo (PC member) PoDSy 2003 Workshop on Principles of Dependable Systems, S. Francisco, USA, June 2003
20. Paulo Veríssimo (PC member) 27th IFAC/IFIP Workshop on Real-Time Programming, Lagow, Poland, May 2003
21. Paulo Veríssimo (PC member) ICSE 2003 Workshop on Software Architectures for Dependable Systems, Portland, USA, May 2003
22. Paulo Veríssimo (PC member) 21º Simpósio Brasileiro de Redes de Computadores, Natal, Brasil, Maio 2003
23. Paulo Veríssimo (PC member) WSeg 2003 - Workshop em Segurança de Sistemas Computacionais, Natal, Brasil, Maio 2003
24. Pedro Antunes (PC member) 9th International Workshop on Groupware - CRIWG 2003. Grenoble, France, September, 2003.
25. Pedro Antunes (PC member) III Jornadas Iberoamericanas de Ingeniería de Software e Ingeniería de Conocimiento. Chile, November, 2003.
26. Pedro Antunes (PC member) 5th International Conference On Enterprise Information Systems, ICEIS 2003. Angers, France, April, 2003.
27. Teresa Chambel (PC member) E-Learn'2003 : "ACE World Conference on ELearning", Phoenix, Arizona, USA, November 7-11, 2003.

3.4.2 Participation/Sponsorship in the Organisation of International Scientific Events

1. Luís Rodrigues, Workshop co-organizer, Workshop on Adaptive Distributed Systems September 30, 2003 Sorrento, Italy. In conjunction with the 17th International Symposium on Distributed Computing (DISC 2003).
2. Mário J. Silva, Workshop Organizer, Session on Meta-data at the eContent Project Concertation Meeting (5th RTD Framework Programme on e-content), Luxembourg, January 2003.
3. Paulo Verissimo . Chair of the Steering Committee of the IEEE International Conference on Dependable Systems and Networks (DSN-2003), S. Francisco, USA, June 2003.

3.4.3 Other Roles in International Scientific Organizations

1. Mário J. Silva, Proposal Evaluator for the European Commission 6th RTD Framework Programme on eHealth, May 2003.
2. Mário J. Silva, Project Reviewer for the European Commission 5th RTD Framework Programme on e-content, January 2003, project EULIS (European Land Information Service), January 2003.
3. Mário J. Silva, Project Reviewer for the European Commission 5th RTD Framework Programme on e-content, January 2003, project EMUCAST (European Music Web and Broad CAST), January, 2003.
4. Mário J. Silva, Project Reviewer for the European Commission 5th RTD Framework Programme on e-content, project EUROREGIONMAP (EuroRegionalMap: incremental development of a Pan-European Database at Medium Scale), January, 2003.

5. Mário J. Silva, Project Reviewer for the European Commission 5th RTD Framework Programme on Information Society Technologies, project #MASS (Information Management and interoperability of content for distributed Systems of high volume data repositories through multi agent Systems), September 2003.
6. Paulo Veríssimo. Chair of the IEEE Technical Committee on Fault Tolerant Computing.
7. Pedro Antunes. Project Reviewer, COMPETENT (Competence for Trans-European Networks, C28019), European Commission, E-Ten Program, Area 2.8 – Education and Training. December 2003.

3.5 Post-graduate training

Senior members of LASIGE have been or are currently involved in the teaching and advisory work of post graduate studies, both at MSc and PhD level, as listed below.

3.5.1 Table of Doctor (PhD) dissertations

(Dates in parentheses mean probable date of conclusion)

Author	Supervisor	Thesis Theme or Title	Date
Ana Paula Afonso	M. Silva	Methodological Contributions for the Development of Mobile Information	2004
Bruno Martins	M. Silva	Clustering Web Search Results	(2005)
Carlos A. Duarte	L. Carriço	Design and Evaluation of Adaptive Multimodal Systems	(2005)
Daniel Gomes	M. Silva	Integration of Web Data	(2005)
Filipe Araújo	L. Rodrigues	Indirect Communication Systems with QoS	(2005)
Francisco Couto	M. Silva	Relating Biological Information through Literature	(2005)
Hernani Mourão	P. Antunes	Exceptions in WF Systems and their Organizational Impact	(2005)
Hugo Miranda	L. Rodrigues	Middleware for mobile systems	(2006)
João Rodrigues	L. Rodrigues	Real-time protocol kernels	(2005)
Paulo Carreira	M. Silva (*)	Integration and transformation heterogeneous schemas and data.	(2005)
Paulo Sousa	P. Veríssimo	Adaptação Confiável	(2005)
Pedro Martins	P. Veríssimo	A Coerência Temporal nos Modelos de Sistemas Baseados em Eventos	(2005)

(*) co-supervisor

António Casimiro	P. Veríssimo	Timely Actions in Presence of Uncertain Timeliness	(concluded)
José Rufino	P. Veríssimo	Field Bus Distributed Systems	(concluded)
Miguel Correia	P. Veríssimo	Configuration and Managmt. of Attack Tolerant Syst	(concluded)
Teresa Chambel	N. Guimarães	Video Based Hypermedia Spaces for Learning Contexts	(concluded)

3.5.2 Table of Master (MSc) dissertations (Dates in parentheses mean probable date of conclusion)

Author	Supervisor	Thesis Title	Date
Alexandre Pinto	L. Rodrigues	Modular support for light-weight groups	(2004)
Bruno Martins	M. Silva	Inter-Document Similarity in Web Searches	(2004)
Duarte Freitas	T. Langlois	Técnicas de Aprendizagem por Reforço para Sistemas Multi-Agentes	(2004)
Filipe Simões	P. Antunes	Internet Voting: Algorithmic Aspects	(2005)
Gonçalo Pombeiro	P. Antunes	Integration of Soft Systems Methodology and UML	(2005)
Joana Pereira	L. Carriço	Cognitive Models for Visual-Impaired Evaluation	(2004)
João Ramires	P. Antunes	Negotiating Requirements in the SW Development Process	(2004)
Jorge Gonçalves	P. Antunes	Mobile Workflow	(2005)
Licínio Pereira	P. Antunes	Electronic Meetings with PDA	(2004)
Luis Rafael	L. Carriço	Evaluation of DBMS Performance on Large Databases	(2004)
Manuel Costa	L. Carriço	Support Software Project Management	(2004)

Manuel Mendonça	N. F. Neves	A Protocol for Secure Updates of Point of Sale Applications	(2004)
Miguel Costa	M. Silva	SIDRA: A Flexible Distributed Indexing and Ranking System	(2004)
Norman Noronha	M. Silva	Request (Validating Semantic Searches)	(2004)
Nuno Carvalho	L.Rodrigues	A Publish-Subscribe System with QoS support	(2005)
Paula André	P. Antunes	A Collab Env for Cartogr. and Geological Data Acquisition	(2004)
Pooja Jain	M. Silva	A Literature Mining Approach towards Gene Function Prediction	(2004)
Ricardo Almeida	L.Rodrigues	Replication and Recovery in OODB's	(2005)
Rui R. Pinto	P. Antunes	Internet Voting: The Human-Computer Interface	(2005)
Víctor Lopes	L. Carriço	Comparing Local and Distant Learning	(2004)
Zélio Maximiano	P. Antunes	Integrated Electronic Meeting Environment using .NET	(2005)

Cláudia Carvalho	N. F. Neves	Public Key Infrastructure of the Justice Department	(concluded)
João Campos	M. Silva	Versus: a Web Data Repository with Time Support	(concluded)
João Martins	L. Rodrigues	Replica Consistency Algorithm for Globdata	(concluded)
Pedro Martins	P. Verissimo	Concretização de uma Timely Computing Base	(concluded)

3.5.3 Participation in and coordination of Post-Graduate Programs

3.5.3.1 Coordination of Post-Graduate Programs

1. Mário J. Silva. Coordinator of the FCUL/IGC Graduate Programme in Bioinformatics
2. Mário J. Silva. Coordinator of the FCUL Graduate Programme in Informatics

3.5.3.2 Lectures

Course	Prepared & Taught by	Where
Análise de Sistemas	Pedro Antunes	PG FCUL
Computação Móvel	Mário J. Silva	PG FCUL
Confiabilidade e Segurança de Sistemas de Informação	Paulo Verissimo	PG FCUL
Configuração e Gestão de Sistemas Distribuídos	Paulo Verissimo & Teresa Chambel	PG FCUL
Introduction to Bioinformatics	Mário J. Silva	PG FCUL/IGC
Publicação Digital	Mário J. Silva	PG FCUL
Segurança e Confiabilidade em Sistemas Informáticos	Nuno Ferreira Neves	PG FCUL
Segurança em Sistemas e Redes	Paulo Verissimo & Nuno Neves	PG FCUL
Semântica das Linguagens de Programação	T. Langlois	PG FCUL
Seminário em Redes e Sistemas Distribuídos I	L. Rodrigues & N. Neves & A. Casimiro & P. Verissimo	PG FCUL
Seminário em Redes e Sistemas Distribuídos II	L. Rodrigues & N. Neves & A. Casimiro & P. Verissimo	PG FCUL
Sistemas Hipermedia	Luís Carriço	PG FCUL
Sistemas Informáticos Industriais	António Casimiro & Paulo Verissimo	PG FCUL
Tecnologias de Segurança	Nuno Ferreira Neves	PG FCUL
Tolerância a Falhas Distribuída	Luís Rodrigues	PG FCUL
Tópicos Avançados em Sistemas de Informação	N.Guimarães, P.Antunes, L.Carriço, M.Silva	PG FCUL

PG FCUL: Post Graduate Programmes at FCUL

PG FCUL/IGC: Post Graduate Program at FCUL and Gulbenkian Institute of Science of the Calouste Gulbenkian Foundation (IGC)

3.6 Participation in R&D and Consulting Projects

Members of LASIGE have been involved in a number of projects and consulting actions during 2002, as listed below. Some new projects have started in 2002. Overall, LASIGE has hosted 17 projects, many with international collaboration.

Project Name	Funded by	Start/End Date/Year
1. ARTIST	EU-IST	2002-2005
2. CaberNet	EU-IST	2000- ...
3. COPE	FCT	2002-2004
4. CORTEX	EU-IST	2000-2002
5. DEFEATS	FCT	2000-2003
6. GREASE	FCT (**)	2003-2006
7. INDIQoS	FCT	2002-2005
8. IPSOM	FCT Sapiens	2001-2004
9. MAFTIA	EU-IST	2001-2003
10. MOOSCo	FCT Sapiens	2001-2003
11. ReBIL	(*)	2001-2004
12. RUMOR	FCT	2002-2005
13. SemP2P	Microsoft Research	2001-2003
14. SHIFT	FCT	2001-2004
15. StrongRep	FCT	2002-2005
16. TUMBA	FCCN	2001-2004
17. XMLBASE	FCCN, FCT	2000-2004

(*) Funded with profits from previous contracts.

(**) Funded with profits from previous contracts until December 2003.

A brief description of each project is presented next.

3.6.1 ARTIST - NoE in Advanced Real-Time Systems

Objectives: Coordinate the R&D effort in the area of Advanced Real-time Systems so as to: i) Improve awareness of academics and industry in the area, especially about existing innovative results and technologies, standards and regulations; ii) Define innovative and relevant work directions, identify obstacles to scientific and technological progress and propose adequate strategies for circumventing them.

Actions:

- *Hard Real-Time Systems* — Consolidate and further improve a strong European competence and know-how that is strategic for safety or mission critical applications (Synchronous languages -TTA- Fixed priority scheduling).
- *Component-based Design and Development* --- Transfer, enhance interaction between teams working on compositionality/composability problems and software and systems engineering teams involved in the definition of standards e.g. UML, SDL.
- *Adaptive Real-Time Systems for Quality of Service (QoS) Management* --- Soft real-time approaches and technology for telecommunications, large open systems and networks Teams with expertise in real-time operating systems and middleware.

Methodology: Focus on system-centric approaches by adapting or further extending them to real-time software and hardware technology. Consider generic approaches and will not privilege particular application areas. Use a diverse selection of suitable applications to evaluate and further specialize the approaches, whenever appropriate. Establish good contact and interaction with application specific projects for essential technologies and infrastructure as well as relevant projects on control theory and dynamic systems.

Team at LASIGE: Paulo Veríssimo, António Casimiro

Partners: INRIA, VERIMAG, TU Wien, Uppsala Univ. Univ. Saarlandes, PARADES, OFFIS, Aalborg Univ, Eindhoven TU, CEA/Saclay, IRISA, Lancaster Univ., ENS Cachan, Univ. Twente, Mälardalen Univ., Univ. York, Univ. Pavia, S.Sup. S.Anna Pisa, Univ. Cantabria, Univ. Aveiro, TU Catalonia, FCUL, Univ. CarlosIII Madrid

Funding: European Commission - IST Programme (Project Number IST-2001-34820).

3.6.2 CaberNet Network of Excellence in Distributed and Dependable Computing Systems

Objectives: The mission of CaberNet is to coordinate top-ranking European research in distributed and dependable systems, to make that research accessible to governments and industries and to further the quality of education concerning such systems. CaberNet addresses all aspects of the design of networked computer systems. These systems can range from embedded systems used to control an aircraft in flight to globe-spanning applications searching for information on the World-Wide Web.

Methodology: The Distributed and dependable systems research is fundamental to all these areas. CaberNet has demonstrated that the topic of distributed and dependable computing systems is particularly appropriate for a Network of Excellence since, by its very nature, it provides an arena for investigating: (i) the problems of large scale distributed systems from an unusually broad perspective, and (ii) the contributions to the operation of a NoE that such distributed systems make. One of the major benefits of the Network of Excellence will be in what it facilitates rather than what it provides. In

particular, the partners will be able to work together more effectively on collaborative projects of wider interest and relevance than simply the conduct of advanced research. During the lifetime of this network we plan to consolidate and to build on the considerable momentum that we have achieved to date. Further, having established a genuine Europe-wide community of research groups in distributed and dependable computing systems, we now aim to define a shared vision of the future of RTD in this research area.

Team at LASIGE: Navigators Group.

Partners: A currently very large group of research groups across Europe

Funding: European Commission - IST Programme.

3.6.3 COPE: Secure and Reliable Parallel Processing

Objectives: This project aims (i) to investigate new interaction models in a way that more complex and dynamic parallel applications can be build, (ii) to research new mechanisms that will allow the detection and eventual recovery of failures in message-passing platforms that support the execution of parallel applications, (iii) to investigate mechanisms that will enhance the security of the overhaul system.

Methodology: The project will investigate those issues and a proof-of-concept prototype application will be built and validated.

Team at LASIGE: Nuno Ferreira Neves (coordinator), Paulo Veríssimo, Luís Sardinha

Partners: LASIGE, CISUC-FCT/UC

Funding: FCT (POS/CHS/39815/2001), total project award amount: 35,000 Euro

3.6.4 CORTEX: CO-operating Real-time senTient objects: architecture and EXperimental evaluation

Objectives: The key objective of CORTEX is to explore the fundamental theoretical and engineering issues necessary to support the use of sentient objects to construct large-scale proactive applications and thereby to validate the use of sentient objects as a viable approach to the construction of such applications..

Methodology: The CORTEX project is divided into four technical work packages and three other work packages specifically devoted to project management, assessment and dissemination of the results. Upstream is the programming model definition (WP1), which is then refined by concurrently addressing the interaction model and the adequate system architecture (WP2 and WP3), including the necessary middleware services. The demonstrator (WP4) will consolidate the results of the previous work packages, and provide a final evaluation of the project's findings. Due to the nature of this project, specifically oriented to advanced research on new technologies and paradigms, the work will progress accordingly to a spiral methodology, where results are cyclically improved and refined.

Therefore, during the course of the project we plan to produce intermediate deliverables with preliminary definitions and specifications, not necessarily coinciding with the end of particular tasks. The other three work packages are obviously outside of this production cycle, at least in the early stages, since they are not concerned with conceptual problems

Team at LASIGE: Paulo Veríssimo, António Casimiro, Pedro Martins, Paulo Sousa

Partners: LASIGE, Trinity College Dublin (IRL), University of Lancaster (U.K.), University of Ulm (D)

Funding: European Commission - IST Programme (Project Number IST-2000-26031), total project award amount: 2094MEuro.

3.6.5 DEFEATS - Distributed Fault and Attack Tolerant Systems Configuration

Objectives: Project DEFEATS aims to develop: (1) a framework for the configuration of dependable distributed services (including attack tolerance); and (2) a decomposition of attack tolerance mechanisms in reusable blocks and a set of guidelines for their composition. Other contributions will be the integration of a meta-level scheme with configuration, and the design of a dependable configuration platform. Comprehensive approaches to this set of problems are not known in the literature.

Methodology: Project DEFEATS has two lines of work. In the first place, the project will research mechanisms to build attack tolerant services and define a set of building blocks and guidelines to compose such services. The set of blocks will include attack-tolerant intrusion detection and attack-tolerant authentication services. Communication will be based on a group communication system, since such systems are particularly well suited for replicated services. In the second place, the project will define a framework for the configuration of dependable systems resilient to both accidental and intentional malicious faults, using the defined building blocks. There are several issues that will be considered: (1) the definition of a meta-level scheme to transparently configure a service in order that it is dependable; (2) the dependability of the configuration platform itself (including attack tolerance); (3) the interference between the dependability of the platform and the services that run over it. A demonstration prototype of an instantiation of the framework will be implemented and feedback will be taken for its further refinement.

Team at LASIGE: Paulo Veríssimo (coordinator), Nuno Ferreira Neves, Miguel Correia, Nuno C. Neves.

Partners: LASIGE

Funding: FCT (POSI/1999/CHS/33996), total project award amount: 29,500 Euro

3.6.6 GREASE – Geographic Reasoning for Search Engines

Objectives: GREASE researches methods, algorithms and software architecture for a system for helping users find Web pages with a scope matching their current location from hand-held computers. We

designate as "location" the meta-data or knowledge about the geographic position and as "scope" the manually or automatically generated meta-data describing the area of interest of web pages.

Methodology: The project develops a location-aware web search engine that matches against users' queries by "joining" the pages' information scopes and location data obtained from positioning devices connected to their hand-held computers. This entails devising indexes and search algorithms for automatically associating queries to web pages with similar scopes, and adapting information retrieval algorithms to rank documents based on the degree of matching between location and scopes.

Team: Mário Gaspar da Silva (coordinator), Diana Santos (advisor), Suely Oliveira (advisor), Ana Paula Afonso, Bruno Martins, Miguel Costa.

Funding: FCT (POSI/SRI/47071/2002 received 115,000.00 Euros grant)

3.6.7 INDIQoS: Quality of service (QoS) in indirect communication systems

Objectives: The project intends to study the development of indirect communication systems of the publish/subscribe type with quality of service parameters support.

Methodology: Indirect communication, based in publishers and subscribers, is becoming an alternative paradigm to direct communication. The main advantage of this paradigm relates to the independence of parts involved in communication, which do not need to know where other parts are and, in some architectures, do not even need to be simultaneously active. However, the architectures providing this service do not have the ability to ensure Quality of Service (QoS) and with indirect communication, traditional QoS mechanisms will be difficult to use, if not impossible, because parts should not know topology and positions involved in communication. This project intends to produce the necessary changes to the publisher-subscriber model in a way such that QoS should be viewed in an integrated way by applications, provider and data network.

Team: L. Rodrigues, F. Araújo, N. Carvalho

Partners: FCUL

Funding: FCT (POSI/CHS/41473/2001)

3.6.8 IPSOM: Indexing, Integration and Sound Retrieval in Multimedia Documents

Objectives: Design and development of supporting environments and supporting tools for indexing and search on sound/speech databases, with a particular emphasis on Sopken Books, originally produced for visually impaired users.

Methodology: The project proposes an evolutionary process that includes digitization, sound and text alignment, and reuse of the materials in heterogeneous contexts, both the original context related with visually impaired users, and other multimedia environments.

Team at LASIGE : Nuno M. Guimaraes, Teresa Chambel, Luís Carriço, Carlos Duarte, Hugo Simões, Rui Lopes, Miguel Rodrigues, Amadeu Dias

Partners : INESC Lisboa, National Library (Biblioteca Nacional)

Funding: National (FCT). 2001-2004.

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

Objectives: MAFTIA will investigate the 'tolerance paradigm' systematically, to propose an integrated architecture built on this paradigm, and to realise a concrete design used to support the dependability of many applications.

Methodology: Work will be done on three broad categories of objectives related to, (i) the architecture of MAFTIA: providing a framework that ensures the dependability of distributed applications in the face of a wide class of faults and attacks, (ii) the design of mechanisms and protocols: providing the required building blocks to implement large scale dependable applications: this will be addressed by means of four subclasses of objectives, dependable middleware, large scale intrusion detection systems, dependable trusted third parties and distributed authorisation mechanisms (iii) the assessment of our work: rigorously defining the basic concepts developed by MAFTIA and verifying results of the work on dependable middleware.

Team at LASIGE: Paulo Veríssimo, Nuno Ferreira Neves, Miguel Correia, Nuno C. Neves

Partners: LASIGE, University of Newcastle (U.K.), Defence & Evaluation Research Agency (UK), Universitat des Saarlandes (D), LAAS-CNRS (F), IBM Zurich Research Laboratory (CH).

Funding: European Commission - IST Programme (Project Number IST-1999-11583), total project award amount: 2527MEuro.

3.6.10 MOOSCo: MOO with Separation of Concerns

Objectives. The MOOSCo project, Multi-user Object-Oriented environments with Separation of Concerns, addresses the difficulties in applying a component-based approach in a vertical and integrated manner, from analysis to implementation, to the design of this class of systems. The project will define an architecture that will be applied in the MOOs context. MOO environments constitute a challenge for object-oriented distributed systems theory and practice due to its unique requirements for dependability, scalability, adaptability, usability, dynamic changes, non-functional domains to be considered, and efficiency. The project intends to design and implement an architecture to the support of multi-user object-oriented environments. The architecture is based on component composition and addresses three abstraction layers: user models, middleware abstractions, and infrastructure communication protocols.

Methodology: The project workplan is divided into several parts: (1) Identify the user models that are relevant for MOOs in order to classify the variabilities inherit to the MOO applications. (2) Design composable and customizable middleware abstractions to support user models and their variabilities and allow the construction of MOO application that are easily tuned and can evolve. Implement those abstractions as an object-oriented framework. (3) Design composable and customizable infrastructure protocols, offering different quality of service, to be used by the middleware abstractions. (4) Integrate the results from the previous tasks in a coherent architecture. (5) validate the results applying it to a concrete MOO system.

Team at LASIGE: Luís Rodrigues (coordinator), Pedro Antunes, Hugo Miranda, Alexandre Pinto, Sandra Teixeira.

Partners: LASIGE, INESC

Funding: FCT (Sapiens 33127/1999); total project award amount: 23,500 Euro, 2001-2003

3.6.11 ReBIL - Relating Biological Information through Literature

Objectives: ReBIL aims at extracting this knowledge from literature to complete and correct the knowledge about the biological entities stored in public databases.

Methodology: Relevant facts discovered in molecular biology research, like in other fields, have been mainly published in scientific journals since the last century. Extracting knowledge from this large amount of unstructured information is a painful and hard task, even to an expert. The solution was to create and maintain structured databases (e.g. GenBank, SwissProt, ...) that collect and distribute biological information, in particular biological sequences. In the past few decades, the explosion of data has caused the exponential growth of these databases. As a result, the management of all this data can only be achieved by automatic annotation, which is the source of misannotations, underprediction and overprediction of properties found today in biologic databases. However, a substantial amount of knowledge is still only present in literature.

Team: Mário Gaspar da Silva (coordinator), Francisco Couto, Pedro Coutinho (Tech Univ Lisbon), Pooja Jain, Bhuwan Tiwari.

Funding: Funded with profits from previous contracts

3.6.12 RUMOR: Probabilistic Semantically Reliable Protocols

Objectives: To design new probabilistic multicast protocol that take message semantics into account to improve the quality of the service provided to applications.

Methodology: In recent years, two orthogonal promising approaches to improve the scalability of multicast protocols have emerged. One is the use of probabilistic epidemic protocols. These protocols support

the efficient dissemination of data among a large number of nodes providing probabilistic guarantee of delivery. The other is the use of semantic knowledge to support higher sustained throughput in groups with heterogeneous performance behavior. The Rumor project intends to conduct research in order to integrate both approaches in a single efficient large-scale multicast protocol. All large-scale applications that require the multicast of messages from a large number of members and that exhibit some degree of message obsolescence can potentially benefit from the results of this project.

Team: L. Rodrigues, M. J. Monteiro, A. Pinto, R. Almeida, J. Pereira (U. Minho), R. Oliveira (U. Minho)

Partners: U. Minho

Funding: FCT (POSI/CHS/40073/2001)

3.6.13 SEMP2P

Objectives: This project is studying the design, implementation and application of semantic probabilistic multicast protocols in the context of multi-player games. The knowledge about the semantics of the messages exchange among clients and servers is used to minimize the traffic overhead usually associated with probabilistic approaches, while preserving the highly decentralized and fault-tolerant characteristics of such protocols.

Team: L. Rodrigues, H. Miranda, S. Formigo, J. Pereira (U. Minho), A.-M. Kermarrec (Microsoft Cambridge)

Partners: U. Minho, Microsoft Cambridge

Funding: Microsoft Cambridge 2002-2003

3.6.14 SHIFT: Group Communication with Differentiated Messages

Objectives: The project intends to study the use of knowledge on the application semantics to improve the efficiency of group communication systems.

Methodology: The starting point of the project is the definition of semantic reliability, recently introduced by the project partners. The project intends to design and implement new algorithms and protocols that exploit the notion of semantic reliability. The project aims to study the use of this concept under different system assumptions and for different application classes with diverse consistency requirements. The project will first design models, create the algorithms and implement the protocols to offer services based on the notion of semantic reliability.

Team at LASIGE: Luís Rodrigues (coordinator), Hugo Miranda, Filipe Araújo, Alexandre Pinto.

Partners: LASIGE, U. Minho (Algoritmi)

Funding: FCT (Sapiens 32869/1999); total project award amount: 23,500 Euro, 2001-2003

3.6.15 StrongRep: Strongly Consistent Replicated Databases for Geographically Large-Scale Systems

Objectives: The project proposes to address the problem of maintaining strongly-consistent replicated data in a large-scale setting.

Methodology: To achieve its goals, the project intends to combine the recent research of replication management with broadcast protocols optimized for large-scale operation. The project departs from recent efforts to implement and optimize topology-aware broadcast algorithms, as well as semantically reliable algorithms and intends to configure and tune them in the specific application area of database replication. It is expected that the novel combination of these approaches can result in a solution that exhibits enough performance to sustain the management of the critical application data that strictly requires strong consistency.

Team: L. Rodrigues, R. Almeida, H. Miranda, A. Sousa (U. Minho), R. Oliveira (U. Minho)

Partners: U. Minho

Funding: FCT (POSI/CHS/41285/2001)

3.6.16 Tumba

Objectives: Technology transfer. Development of a Web search engine for the Portuguese Web.

Team: Mário Gaspar da Silva (coordinator), João Campos, Norman Noronha, Daniel Gomes, Bruno Martins, Miguel Costa

Funding: Funded with profits from previous contracts until December 2001; in December 2001 received funding of 39,900.00 euros for plus equipment and housing services worth 40,000.00 euros (FCCN); in 2003 received funding of 50,000.00 euros for plus equipment and housing services worth 50,000.00 euros (FCCN).

3.6.17 XMLBase - Semi-Structured Data Management

Objectives: The main goal of XMLBase is the research of analysis, design and implementation methods for systems for managing semi-structured data distributed over the Internet.

Methodology: XMLBase is a component-based framework for indexing and searching collections of XML (and HTML) documents. The framework is used to conduct multiple performance analysis measurements that will compare strategies for storing, versioning, indexing and querying XML data collections. This will provide a validation environment, upon which we will build a prototype Web application that will be used as a benchmark for comparing alternative strategies.

Team: Mário Gaspar da Silva (coordinator), Bruno Martins, Daniel Gomes, Miguel Costa, André Santos.

Funding: FCT (POSI / SRI / 40193 / 2001, received 35,000.00 euros grant) and FCCN.

4 CONCLUSION

4.1 Self Assessment of the fulfillment of LASIGE objectives and plan

The objectives of LASIGE are still consolidating in three main vectors:

- a. An effective scientific production with steady growth,
- b. A stable human and physical infrastructure, used with efficiency to support the research activities,
- c. The continuation of the links with external institutions, companies and public organizations through a number of projects that have continued through 2003.

4.2 Recommendations from the Advisory Board

The recommendations of the Advisory Board were as follows:

Technology transfer. LASIGE clearly needs to find a balanced position between ‘research’ and ‘deployment’ and on how to strengthen both, namely in making prototypes usable and known.

Business model and revenue model. To strengthen third-party funding and overcome the funding restrictions of Portuguese universities, appropriate business and revenue models should be sought.

Strategy building. It seems particularly important for LASIGE to establish a strong, long term vision, elaborated with respect to plan and position, which significantly transcends the next triennium.

Interpenetration of groups. Cooperation and mutual support for the strategy should be achieved among groups and individuals, through more intensive internal communication.

Branding. The mere presentation of the four action lines may hardly be enough to establish an identity and brand image. Departing from a strengthened strategy and internal organisation, the marketing and branding of LASIGE should be intensified.

A structured and substantial effort was not made to address these comments, mostly because of the great uncertainty created in the environment of LASIGE, both internal (FCUL), and external (FCT), which prevailed in great part of 2002 and 2003.

This has not hampered the laboratory's operation and achievements in a short term, as shown by the report, but the measures suggested are important in terms of future. We expect to be able to address these issues during 2004.

4.3 Prospects

As in 2003, the future of LASIGE is influenced and guided by the following external realities:

1. **LOCAL** The Department of Informatics has moved in early 2004 to new facilities, in the new building (C6). This allowed to duplicate the office space devoted to LASIGE activities. LASIGE has now two large offices, able to host 12 Phd students, 8 Master students and several undergrad studes. Still, given the significant growth of activities, it is likely that some of the LASIGE resources will be hosted in facilities shared by the Departament (namely, PhD students). Therefore, far from being ideal, there was a significant improvement in what concerns available physical space.
2. **NATIONAL** Two projects from the 2002 call were approved in December 2003, and started in late 2003 or early 2004. The experience of years 2002 and 2003 and the expectations concerning public funding for R&D activities are leading LASIGE to expand to other funding areas – either private or international (see below).
3. **INTERNATIONAL**. During 2003, a significant amount of effort was put by LASIGE members in trying to setup IST projects (Integrated Projects, Networks of Excellence, and STREPS). Unfortunately, the amount of success as been small, and only one 6th FP project has been approved so far.

5 ANNEXES

5.1 LASIGE Evaluation in 2003

FCT Fundação para a Ciência e a Tecnologia

MINISTÉRIO DA CIÊNCIA E DO ENSINO SUPERIOR

Portugal

RESEARCH UNIT NUMBER 13 / 408

COORDINATOR Nuno Manuel de Carvalho Ferreira Guimarães

RESEARCH UNIT NAME Laboratório de Sistemas Informáticos de Grande Escala
Fundação da Faculdade de Ciências da Universidade de Lisboa

Electrical and Computer Engineering

PANEL MEMBERS Luigia Carlucci Aiello, Tariq Durrani, Franco Maloberti, Moira C. Norrie, David Padua, Janak H. Patel, Christopher Rose, José Manuel Fonseca de Moura (Coordinator)

Overall Research Unit Quality

Excellent Very Good Good Fair Poor

Comments and recommendations regarding the Unit activities, research orientation, organization and application of funds

Electrical and Computer Engineering - 1 Very Good

Overall Research Unit Quality (4,4,4,3,5,2)

LASIGE is a very good research Unit that has been self-sufficient in funding and maintains a high level of activity. It is a well-organised centre and the scope of the unit in terms of the size and areas of research is well defined. The unit has benefited from having two senior research members of international reputation who have provided strong leadership in terms of the establishment of the unit and managing its growth. One of the strengths of this group is prototype building of hardware and software systems related to their research.

The faculty belongs to a relatively new department and this creates opportunities and challenges. The opportunities come out of the fact that they can grow in the areas needed by the department. The challenges are that the few senior researchers have a large share of responsibilities within the department. In particular, the Director is stepping down and becoming the Dean of the Faculty and this may strongly affect the future of the Unit, and of his research group. Although the Unit is convinced that they can survive his relinquishing most of the responsibilities within LASIGE, it is important that they recognise the challenges of the transition and the effects that this may have, especially with respect to his network of contacts with the external world, in particular with European sponsors.

The overall level quality of the research is very good and in some cases outstanding. In particular, Verissimo and Rodrigues are well recognized internationally. However, other areas are newer and weaker and have yet to achieve international recognition. This is reflected in the fact that some areas are publishing actively in the best conferences and journals for their field, while other areas are less active and are tending to publish in conferences and workshops peripheral to their main area of research.

The Navigators group (distributed systems group) (5) is very strong with work on fault and intrusion tolerance in open distributed systems and timeliness and adaptation in dependable systems. They have an excellent publication record in their field.

The DIALNP group (4.5) is a younger group but with several accomplishments. Some of their current topics are of great current interest like routing in sensor networks.

The Human-Computer Interaction and Multimedia group (4) has expertise in the field of hypermedia systems, particular in hypervideo. Currently they have some very interesting projects, namely the multimodal interaction and information repurposing, hypervideo work in learning environments. They have recently been working on the "digital talking book" which supports visually impaired readers. They have developed some high-quality demonstrators based on real content in terms of books and archives. Although, members of the group have published in top conferences in the field, there appears that a slight shift towards more peripheral conferences and workshops is occurring recently, and the group needs to be careful to ensure that it maintains standards.

The XLDB group (2) needs to better define its vision, areas of expertise and position within the international research community. The group is mainly addressing the topic of web search, using metadata repositories to aid the search process. This is a very active area of research and the group needs to position its research carefully to ensure that it can reach levels of recognised contribution. They should also try to publish more selectively, with the goal of publishing in top conferences in XML databases.

The centre provides good support to the researchers and one panellist commented on the enthusiasm of undergraduate and graduate researchers.

There is a lack of strategy and vision in terms of scientific direction and how to improve the overall research quality, in particular of the weaker groups. They do not seem to have a fair assessment of their current standing and they do not have specific development plans for the future. More self-evaluation and planning would be desirable.

In summary, the panel considers this to be a very good unit. However, evaluation scores of individual panellists varied from good to excellent and appears to be dependent on the particular set of groups visited by individual panellists.

5.2 Comment to the Report of the Evaluation Panel

LASIGE classification was set at VERY GOOD, a downgrade from the previous score of EXCELLENT. LASIGE has a negative position on both the process and its outcome. The reasons are:

(a) The panel performed poorly. It showed no proper knowledge of the unit or work under evaluation. The previous evaluation, the international advisory board comments, the activity reports and plans of the previous five (5) years were weakly evaluated. The meeting, scheduled two weeks in advance after two years of delay, took less than three hours. The overall process has shown that no real value has been given to the impact of the evaluation.

(b) The panel acted wrongly. The relation between the current status of LASIGE and the defined objectives (1999) was not considered. The panel did not consider achievements demonstrated by obvious indicators (publications, projects, theses, demonstrators). The panel evaluated sub-groups with no criteria (such as number of PhD's per group), and ignored the figures and impact of the projects. The discussion between each sub-group and a minor subset of the panel led to insufficient information and a distorted view of LASIGE as a whole (as the absurd grades by individual panel members show).

(c) The panel misunderstood the LASIGE's environment. The comments concerning the activity of (senior) members in the Department and Faculty lead to the conclusion that personal contributions and involvement are a liability. LASIGE considers that strong involvement in the Department and Faculty is a sign of professional quality and recognition. After the review, and as informally mentioned, Luís Rodrigues, whose quality was recognized in the evaluation, was appointed as Director. The panel's position is either naïve or gratuitous.

(d) LASIGE accepts as relevant the comments concerning each one of the sub-groups. However, under the evaluation conditions, the substantial ground for those comments is the list of publications. LASIGE accepts this as the main criterion but if other items are not considered, the usefulness of the visit is questionable. The evaluation framework (FCT) includes several other items. For the sake of clarity, the panel should be precise on these items.

LASIGE has always striven for improvement. We do not identify any decrease in quality from 1999 to 2004. Nor does the panel. Therefore, coming from an initial classification of EXCELLENT, LASIGE cannot value this outcome as a fair and credible one.

For further information, see factual data below.

Nuno M. Guimarães, Luis E. Rodrigues
LASIGE Directors

Lasige was evaluated for the first time in 1998, when a rating of Excellent was given.

Initial Presentation Highlights (June 29^h, 1998)

- Core : **4PhD** - Paulo Veríssimo, Nuno Guimarães, Mário Silva, Luís Rodrigues
 - Publications : more than 60% of the Conference Papers in ACM, IEEE Confs, Journal Publications in Kluwer, Academic Press, Springer Verlag
 - Participation in Scientific Events : IEEE, ACM Conferences (> 20 participations : from 92-98)
 - **SWOT**
 - **Strengths** : Experience (in research and development, project and organizational management); National and international credibility and links; A common systems and engineering culture and previous joint work.
 - **Weaknesses** : Infrastructure (space, computing, support staff) mostly built from scratch; Internal coherence and synergy of projects in its infancy; Structural limitation as a competitive employer of professional support staff
 - **Opportunities** : Fine tuning of a “selected” and “targeted” research staff; Concurrent Evolution in University curricula and FCUL infrastructure; New environment in the horizon (FP5, Post Y2K and Euro IT investment, FCT/MCT initiatives)
 - **Threats** : Competitiveness of industry and services for professional staff and graduate students; Delays in consolidating the Lab critical mass; Increased international competition for valuable human resources (US, Europe)
-

Evaluation Panel : Jaime Carbonell, Fernando Corbato, Sanjoy Mitter, Jose M. Fonseca de Moura (Coordinator)

Panel Report (1998)

The presentation of the Large-Scale Information Systems Laboratory of the Faculty of Science, University of Lisbon, (LASIGE), was given by Nuno Guimarães since the head, Paulo Veríssimo, was unable to be present. Overall, the oral presentation was excellent, one of the best we heard, being well-organized, structured and addressing the relevant information. The written proposal, was also well-done, being clear and to-the-point. The group size has increased from the 16 persons at the time of the written proposal to about 26 persons now of which 4 PhDs are the core. They currently have 5 PhDs with expectations of a continuing growth to 10 PhDs by the year 2000. Despite this limited size, the group activities cover a wide sampling of contemporary areas of interest in computer science. These include: networks, communications protocols, distributed algorithms, real-time, fault tolerance and mobility; databases, data mining, multimedia, publishing; and cooperative work, workflow, hypermedia.

The research agenda is very broad but the topics chosen for specific projects exhibit very good taste. The group has very good international contacts both by publishing in international journals and attending meetings and workshops. The publication productivity of the group at large is high.

Some of the group activity is in the form of producing system prototypes which demonstrate and advance particular areas of computer applications. Such activities offer students a chance to engage in state-of-the art techniques and are a legitimate form of system research. However the construction activities must be balanced with efforts to document their novelty and input. Suitable publications are the usual (but not the only) way of doing this and the group on Information Systems should be given extra seed fund support to allow balancing system work with publications and develop research infrastructure to help reducing dependence on short-term funding.

The research and administrative leadership of this group is particularly strong. Since the proposal was prepared the unit has grown significantly and it seems clear they are perceived as an excellent group by both outside PhD's and prospective students within Portugal. Their growth projections, although ambitious, may be feasible.

The group has special needs which we strongly recommend supporting:

- 1) Physical space to accommodate their projected growth;

- 2) Additional professional support staff of one person;
 3) Updating of the equipment infrastructure. In addition, we most strongly recommend:
 4) Scholarships for supporting two graduate students for Mário Silva;
 The research vision and management of this group is particularly good and they seem well-poised to keep evolving as the rapidly changing Computer Science field does. The overall rating of the group is **Excellent**.

Global indicators of Lasige, from 1999 to 2002

	Books	Theses	Chapters	Papers (Intntl)	Papers (Nat.)	Total Publics	Nr of Senior Researchers (PhD's)
2002	-	5	2	23	2	32	8
2001	1	3	2	22	7	35	7
2000	-	5	1	27	8	41	6
1999	-	3	5	15	7	30	5

	Prototypes	Roles in Events	On going Theses	Projects	Nr of Senior Researchers (PhD's)
2002	10	32	13(D)+23(M)	20	8
2001	4	17	16(D)+19(M)	17	7
2000	1	16	13(D)+25(M)	15	6
1999	1	17	12(D)+17(M)	9	5

Summary of Results and Activities in from 1999 to 2002

Projects carried out at LASIGE in 1999-2003

Project Name	Funded by	Years		Project Name	Funded by	Years
CaberNet	EU IST	2001-2004		MICRA	FCT	1999-2002
CORTEX	EU IST	2001-2004		MOOSCo	FCT	2001-2002
DEAR COTS	FCT	1999-2001		SAVE	FCT	2000-2001
DEFEATS	FCT	2000-2003		SemP2P	Microsoft Research	2001-2003
Electronic Democracy	FCT	2001-2002		SHIFT	FCT	2001-2002
GLOBDATA	EU IST	2000-2002		TOPCOM	FCT	1999-2001
IPSOM	FCT	2001-2004		XMLBASE	FCCN,FCT	2002-2004
RUMOR	FCT	2002-2005		IndiQoS	FCT	2002-2005
MAFTIA	EU IST	2000-2003		StrongRep	FCT	2002-2005
TUMBA	FCCN	2001-2003				

At the time of the 2003 evaluation, LASIGE had reached 10 senior members :

Nuno Manuel Guimarães, Paulo Jorge Verissimo, Luis Eduardo Rodrigues, Luís Manuel Carriço, Mario Jorge Silva, Antonio Casimiro Costa , Maria Teresa Chambel, Miguel Correia, Nuno Fuentecilla Neves, Pedro Alexandre Antunes

Comments from the Advisory Board, September 2002 Review

Technology transfer. LASIGE clearly needs to find a balanced position between 'research' and 'deployment' and on how to strengthen both, namely in making prototypes usable and known.

Business model and revenue model. To strengthen third-party funding and overcome the funding restrictions of Portuguese universities, appropriate business and revenue models should be sought

Strategy building. It seems particularly important for LASIGE to establish a strong, long term vision, elaborated with respect to plan and position, which significantly transcends the next triennium.

Interpenetration of groups. Cooperation and mutual support for the strategy should be achieved among groups and individuals, through more intensive internal communication.

Branding. The mere presentation of the four action lines may hardly be enough to establish an identity and brand image. Departing from a strengthened strategy and internal organisation, the marketing and branding of LASIGE should be intensified.

“In a word, LASIGE has been doing very well. It shows an excellent track record of publications and an impressive involvement in international and national projects and scientific events. The advice this Board finds appropriate, at this stage, is to suggest the continuation of the high-quality research activities carried out so far, but with careful attention to the recommendations that are given above.”

Lisboa, April 16^h, 2003

5.3 Financial Report of 2003

(Delivered separately)