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2003 Report of Activities

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April 2004

Contents

1 CENTRIA 2003 report of activities

The present report was unanimously approved by the Scientific Committee of CENTRIA in April 2004. The plans approved in 2002 for 2003 were on the whole successfully carried out.

It is most noteworthy that, pursuant to its new strategic ends, the centre hired in 2002, for periods (renewable) of 1 year, five new foreign postdocs, four having started in September 1st, and a fifth in February 1st, from five different countries: China, France, Germany, Italy, and USA. All the scholarships were renewed for the whole of 2003, except for the French researcher, who opted to return to France in October.

One major activity in 2003 was to setup a joint distributed european MSc degree in Computational Logic with T.U Dresden, in the context of project CoLognet. This is to be extended to other universities, namely T.U. Wien, U.P. Madrid, and U. Bolzano for making an to a Erasmus Mundus application in April 2004. This involved the creation of the new MSc in Computational Logic (CL) at UNL to start in September 2004. Cf. http://centria.di.fct.unl.pt/ lmp/mestrado for more information and updates.

The reconfiguration of MEI, the departments MSc in Computer Science, began in Septemebr 2003, and afforded us with the opportunity to include in it AI and Information Technology profiles, the latter including a semantic net component, also figuring prominently in the CL MSc.

The emphasis on semantic web is important since a major new European 4-year contract for a FP6 network of excellence was was prepared and signed in 2003, entitled "REWERSE - Reasoning on the Web with Rules and Semantics", to start in March 1st 2004. It involves all 3 major areas of CENTRIA, and should thereby contribute to cross-fertilizing competence, and securing improved linkage amongst them. An introductory overview of this project is given in [74]

An international European supported project was submitted in October, namely an Asian-Link programme one with T.U.Dresden, Jakarta U., and Hanoi U., on Computational Logic education, which has since been approved, to start in 2004.

Steps began to be taken towards a joint proposal with T.U. Dresden to the German DFG Graduiertenkoleggs programme, in order to setup a Research and Training collaboration and PhD student insertion, to be submitted in May 04. Experimental tele-teaching joint seminar sessions for this purpose, supported by CoLogNet, began in September.

Our evolution can then best be gauged by comparing the plans with the present report: an overall positive evolution. The global indicators in the tables in Section 7 show and highlight, with respect to 2003 compared with 2002, that:

- Regarding publications: The total number of publications increased from 46 to 58. The number of journal publications decreased from 9 to 6, but 2 accepted journal publications are waiting publication beginning of 2004. One needs to take into account that journal publications have irregular and delayed appearance timings, and thus difficult to compare of a year's time interval. Nevertheless, we should be increasing journal publications more, and we will do this with funding incentives to members doing it. On the brighter side,the number of publications in SCI (Science Citation Index) venues more than doubled, from 10 to 21. Let's hope more of these will find their way into journals shortly. The publications in collaboration with non-members have increased notably, up from 19 to 29, which signifying both greater national and international involvement.

- Regarding projects: The number of ongoing projects remains at the same level, though projects approved and signed in 2003 but only starting in 2004 are not counted in the Research Project graphic. Projects long submitted to FCT are still awaiting evaluation...

- Regarding Events organization: This figure went from a more normal 2 to a high of 4. Moreover, we already know that this will be sustained in 2004.

- Postgraduate MSc and PhD students: The overall attraction of the centre for these postgraduate students continues. Their overall of number went from 26 in 2002 to 23 in 2003, but the number of concluded theses increased from 5 in 2002 to 7 in 2003. It is expected that with the launching of international MSc and PhD distributed courses in 2004, the overall

number will increase. One must understand though that the national funding for postgraduate scholarships has not only diminished, but the usual two calls per year were reduced to 1 in 2003...

Other indicators, including a more detailed examination of types of publication, and publications by each subarea, are to be found in the annexes, and mentioned in each of the subarea reports.

The 2003 budget was executed according to plan. Unfortunately, the delay in CENTRIA's international evaluation by FCT (scheduled initially for September 2001, it finally took place end of January 04, when we were again consistently rated "VERY GOOD") has meant that no programmatic funding was considered (let alone awarded). Moreover, FCT has not to this day (beginning of April 04) provided us with any 2003 funding, whereas the 2nd semester of 2002 funding was received end of December 2003!

Thus no programmatic funding was available at all, and hence, to continue the previously programmatically supported scholarships for foreign postdocs recommended by the evaluators, the centre had to resort to running costs funding, and partly suspend availability of funds to researchers in the fourth quarter of 2003 (fortunately most conferences had taken place by then).

The distribution of the running funds among the members was made as usual on the basis of publication productivity, in number and type, according to a pre-defined set of rules we have been using for the past years. We intend to make good in the 2004 budget the revision of points assigned to each publication type to further encourage publication in journals and highly recognized conferences.

The Advisory Committee was duly notified of last year's report and informally congratulated us on the activities reported. No specific recommendations were made.

The detailed rendition of each of the subareas' activities is to be found below. The plans for 2004 and beyond, some already mentioned in our 2001 trienal report, consist in 4 major overall internal projects (2002-05) submitted to POSI, according to FCT's new instructions.

A number of scientific bridges were pursued between the subareas, to reinforce the unity and cross-fertilization within the Centre. The activities of 2003 and the projects for 2002-05 further detail the construction of these bridges. In particular, we have also singled out above the significant REWERSE project.

1.1 Subarea: Knowledge Representation and Reasoning, and Logic Programming

The research work on "Knowledge Representation and Reasoning, and Logic Programming" continued in 2003 in foundations of logic programming for knowledge representation and reasoning, applications and implementation of logic programming systems, as can be gauged from the publications. Special attention has been devoted to applications in the domain of the Semantic Web.

The scientific projects covering this activity were FLUX, POLAR (with Málaga), TARDE, IQN Rational Mobile Agents and Systems of Agents (with Dresden), "Extensions au Logiciel Libre GNU Prolog" project (with INRIA), AJACS, SIIUE, and the networks Network of Excellence in Computational Logic - CoLogNet, Network of Excellence in Inductive Logic Programming - ILPnet2.

CENTRIA members co-organized the following scientific meetings in this area:

- João Leite co-organized (jointly with Andrea Omicini, Leon Sterling and Paolo Torroni) the *1st Workshop on Declarative Agent Languages and Technologies* (DALT'03), July 2003, Melbourne, Australia. Satellite workshop of the 2nd International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS'03).

- Reinhard Kahle co-organized (jointly with Paola Bruscoli, Birgit Elbl, Sylvia Epp, Bertram Fronhfer, Axel Gromann, Alessio Guglielmi, Steffen Hölldobler, Aning Song, Mariana Stantcheva and Charles Stewart) the *Summer School and Workshop on Proof Theory, Computation and Complexity*, 23 June–4 July 2003, TU Dresden, Germany.

The international collaboration was strengthened and continued with U. Ferrara, U. Bologna, U. Pisa, U. Malaga, U. Dresden, INRIA, and U. Linköping, through projects and visits, and witnessed in most cases by the publication of co-authored papers. The collaboration with T.U. Dresden involved a course there by L.M.Pereira on "Computational Agents", where he spent one month of his sabbatical.

A Marie-Curie Research and Training Network european project was submitted in November, pertaining to the subject of "Trusted Agents", with another 5 partners.

A major publication in the "New Generation Computing" journal [10] reports on the consolidated results bridging the KRR topic in the KRRLP area and the learning topic in the SCC area, accompanied by an implementation (http://lia.deis.unibo.it/Software/gbr/).

In January of 2003, João Leite's book on the specification and semantics of Evolving Knowledge Bases [2] was published.

One postdoc (Kahle) had his scholarship extended, and his Marie-Curie application approved. He subsequently accepted an invited Assistant Professor post in Coimbra, but continues as a member of our centre. The posdoc Greg Wheeler continued his work within CENTRIA in this area and on epistemology and artificial intelligence [65].

The education and training aspects have been covered by our MSc in Computer Science, and a joint Distributed Masters in Computational Logic being put together in the context of CoLogNet, as explained in the introduction.

During 2003, CENTRIA's member participating in this area continued their work on further establishment of bridges between the research areas of Knowledge Representation and Non-monotonic Reasoning and of Multi-Agent Systems. An important step towards the establishment of the aforementioned bridges was João Leite's co-organisation (jointly with A. Omicini L. Sterling and P. Torroni) of the 1st Workshop on Declarative Agent Languages and Technologies (DALT'03) [5, 82], a satellite workshop of the 2nd International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS'03), and of the 4th Workshop on Computational Logic in Multiagent Systems (CLIMA IV)[4](jointly with J. Dix), that only took place in the beginning of January 2004.

The development of standard Prolog technology for the Semantic Web has been a major time-consuming activity in this area of CENTRIA but resulted in the development of a W3C conformant parser, an IRI parser and resolver of relative IRI and URI references, a RuleML 0.80 compliant parser for the UR-HornLog fragment, and a RDF parser and engine. The RuleML language was extended to handle default and explicit negation, as well as EVOLP constructs for dynamic evolution of knowledge-bases. These tools were reported in [26]. The research attracted interest from the RuleML initiative responsible Harold Boley, who was visited CENTRIA for 1 week. The joint work with Harold Boley resulted in the adoption in RuleML 0.85 of default and explicit negation [70] and clarification regarding the unification of global and local names in RuleML. The tools are being extended to handle the latest RuleML 0.85 and the W3C RDF reccommendation of 10th February 2004, in collaboration with Peter Novak and Martin Balaz from the Faculty of Mathematics, Physics and Informatics of the University of Bratislava. Both Peter Novak and Martin Balaz visited CENTRIA for 3 months with a scholarship funded by CologNet Network.

Mainly within the ongoing project FLUX, foundational work on logic programming updates has been developed, and applications studied. Regarding foundational work, a study on the semantics of logic programs updates has been carried out, principles were identified to characterize some less desired result of the extant approaches [22], and a new semantics obeying those principles has been defined [77][1].

The application of logic programs updates, and in particular of the aforementioned language EVOLP, to model dynamic agents was studied [25, 24]. Particular emphasis was placed on the specification of agents for the internet, and on the usage of EVOLP as a component of RuleML [23]. Further studies of applications of updates, and other non-monotonic reasoning mechanisms such as preferences, to agents and agents' architectures had been carried out [31, 32, 33, 14], and the MSc. thesis [68].

The work on applications of updates, within FLUX, to model legal knowledge continued during 2003. It was possible to propose a methodology to model some aspects of the legal knowledge,

[1] This publication only appeared in January 2004, though all the work has been done in 2003

namely the evolution of laws and the existence of legal providers with different priorities [38, 37]. The methodology was successfully applied to model specific legal situations.

Regarding reasoning with imprecise, incomplete, vague and paraconsistent information in logic programming, we have followed two main directions, in international collaboration. In the one hand, we have proposed a sorted multi-adjoint logic programming framework and studied the termination conditions of the immediate consequences operator, which will appear in [80], and extends the preliminary results in [30] . This work resulted from the cooperation with Manuel Ojeda-Aciego and Jesús Medina from the group of Dept. Matemática Aplicada E.T.S.I. Informática da Universidade de Málaga, supported by the POLAR project. The embeddings of a large number of logic programming based semantics in the sorted framework have been extensively studied, and the outcome was a publication submitted in December 2003 and already accepted for publication in 2004 [81]. In the other hand, we have explored the use of Paraconsistent Answer Sets to represent Rough Knowledge Bases [64, 12], in collaboration with Aida Vitória and Jan Maluskinski from Linköping University. This line of research has been very fruitful and a new paper [84] where conditions on quantitative measures have been incorporated in the language was accepted for publication in 2004.

Regarding paraconsistent reasoning in extended logic programming, we have shown that the dependency on contradiction propagation was also shown to hold [21] for the framework of paraconsistent and paracomplete versions of antitonic logic programs [76]. The later work was accepted for publication in 2003, but it is still in press. We have also started to investigate a model theory for Paraconsistent Extended Logic Programs based on Substructural Logics, and preliminary results were presented at Altea by the PhD. student João Alcântara, where participation was by invitation. We expect during 2004 to attain substantial new results.

We have developed and benchmarked distributed tabling procedures with termination detection, for definite logic programs. This work is reported in a submitted MSc. dissertation by Miguel Bento Alves. It has been shown that a centralized termination detection is preferable to a fully distributed one, with linear overhead in message complexity.

Regarding implementation of logic programming, the collaboration with INRIA centered on improvements to the GNU Prolog language implementation (which also happens to be the basis for ISCO and ISTO, developed in project SIIUE as described in the next section) started in 2002, having already produced a prototype for contextual logic programming. The project has been renewed for 2003, having led to prototype implementations of multi-threaded Prolog programs and an initial Prolog/Gnome binding.

Still related to the topics of implementations, we have developed and benchmarked distributed tabling procedures with termination detection, for definite logic programs. This work is reported in a submitted MSc. dissertation by Miguel Bento Alves. It has been shown that a centralized termination detection is preferable to a fully distributed one, with linear overhead in message complexity.

Work on computational models of scientific reasoning continued, resulting in publications [32, 65]. Work on modelling societal behaviour continued too, giving rise to publications [53, 54, 55] and a PhD thesis submitted in October 03 (to be reported in 2004).

1.2 Subarea: Intelligent Information Systems

In this area research work was done on the following topics: semantic web definition, tools for semantic web based integration of heterogeneous databases, information retrieval systems, intelligent agents for automatic classification of documents, definition of semantic web ontologies, natural language dialogue systems for information retrieval from intelligent Information systems, and Designing Dataware house exploring relation among Relational Databases and XML seen as a hierarchical data repository.

The research work was partly developed within the following projects: COOPERATIVE - Automatic Clustering and Visualization of Legal Documents in a Cooperative Information Retrieval Web System (POSI/40197/CHS/2001); ABC Intelligent Access to Legal Knowledge Bases(POSI-I&D in consortium ref. 6192); DIRPI - Development and Integration of Resources for Infor-

mation Retrieval (ICCTI/CAPES bilateral project); SIIUE -Univ. Évora's Integrated Information System (funded by Univ Évora); AJACS – Yet Another Java Constraint Programming System (POSI/40197/CHS/2002); GODE -Gestão dos Orgãos e Deputados Eleitos da Assembleia da República (Funded by Portuguese Parlament).

International cooperation included the visit of Renata Vieira and Vera Lima to work in the development of computational resources for the Portuguese language; and Daniel Diaz to work on extensions to GNU Prolog. Paulo Quaresma visited Porto Alegre, Brasil, in the scope of ICCTI/CAPES bilateral project.

In conjunction with the area of Knowledge Representation and Reasoning and Logic Programming, work had been done on the development of standard Prolog technology for the Semantic Web, as described in the previous section.

In the areas of information retrieval systems, intelligent agents for automatic classification of documents, definition of semantic web ontologies, natural language dialogue systems for information retrieval from intelligent Information systems, we have been developing a logic programming based dialogue system that enables the access in natural language to a web law information retrieval system. The documents in the IR system are composed by the set of documents produced by the Portuguese Attorney General since 1940 extended with the Portuguese Supreme Courts Decisions. These documents were analyzed and an ontology describing their structure was defined. Then, they were automatically parsed and a (partial) semantic structure was created. The ontology and the semantic content was represented in OWL (Ontologie Web Language). The developed system has the capability of inferring user attitudes and due to the documents web semantics classification is able to reason using the documents semantic content. During 2003 research was done aiming to develop more powerful information retrieval systems. This work was supported by the COOPERATIVE project and the ABC project. Work was, also, done in order to propose an architecture for information retrieval systems and dialog interactions [46, 19, 47, 45] and aiming to develop and evaluate new document classification algorithms [36]. In the context of the ABC project work was done aiming to build a working prototype for a more powerful information retrieval system [16, 52, 51]. Work in the area of natural language dialogue systems for information retrieval from intelligent Information systems is reported in [17, 50, 49, 48, 19]

In the context of the collaboration project, DIRPI, 4 missions were done between Brasil and Portugal and join work was produced. This work was published in [34, 20].

Work in intelligent agents for automatic classification of documents and definition of semantic web ontologies, was also done during this year [36, 16]. In this area has worked José Saias who passed his MSc exam in December 2003 with a thesis on Automatic Extraction of Semantic Web Ontologies.

The SIIUE project has been continuing to expand its scope. SIIUE is based on the ISCO language, which integrates several paradigms around Logic Programming. Developments were made in 2003 which delve further into the specification and implementation of a new language, ISTO, based on our previous work and making use of an improved form of Contextual Logic Programming together with Constraint reasoning which will lead to a powerful tool for the construction of real-world information systems. Work has also started in the direction of making ISTO and Contextual Logic Programming an appropriate formalism in which to specify and implement agents in a Semantic Web setting.

The collaboration with INRIA centered on improvements to the GNU Prolog language implementation (which also happens to be the basis for ISCO and ISTO) started in 2002, having already produced a prototype for contextual logic programming. The project has been renewed for 2003, having led to prototype implementations of multi-threaded prolog programs and an initial Prolog/Gnome binding.

Due to Universidade de Évora's initiative of restructuring *all* of its undergraduate study programmes, the board of directors of U. Évora funded a 1-year project based on SIIUE, entitled "SIIUE.sac: the Academic Information System", which involves several CENTRIA researchers and aims at the complete design and development of a new information system geared towards the meeting of academic information needs. This project took place entirely in 2003 and resulted in the University's current production academic services system. Several related projects are slated

for execution in 2004, including systems to deal with scientific information and e-learning support.

A logic programming based dialogue system with the capability of inferring user attitudes and accessing heterogeneous external relational databases (the SIIUE) while doing syntactic and semantic sentence parsing is under developement.

Besides, the SIIUE project will continue its expansion phase in which several other related sub-projects are expected to start, some of which are application-related while others are more research-oriented. The latter include the integration of Contextual Logic Programming (CxLP) concepts in ISCO and the development of language features to support:

- Temporal information.
- Schema evolution.
- Reliable and convenient access control.
- Semantic Web integration.

1.3 Subarea: Soft Computing and Constraints

Work has proceeded in project Proteins, aiming at finding the 3D-structure of proteins from distance constraints between pairs of atoms, obtained from Nuclear Magnetic Resonance data. Ludwig Krippahl has produced the first version of a constraint solver method that may handle global constraints for this problem, namely that guarantee the same relative position of sets os more than 2 atoms [39]. This and previous work were incorporated in his Ph.D. thesis, defended in December [71]. Marco Correia has also made good progress in the study of heuristics that could be used to speed up the search interleaved with the propagation of distance constraints for this problem of 3D-structure determination. His work is fully described in his M.Sc. thesis, that should be submitted in the beginning of 2004. The work developed in this area has led to the inclusion of Pedro Barahona and Ludwig Krippahl in the workpackage on Bioinformatics of the Rewerse Network of Excellence.

Still integrated in the Proteins project, Jorge Cruz also finalised his work on the implementation of a constraint solver for continuous domains that maintains global-hull consistency, a higher order type of consistency required in some applications [13].

Another kind of applications where this type of consistency is in the handling of differential equations as constraints. In this year, the full formalization of the approach was finalised and a prototype was implemented [28, 29]. Moreover, its applicability in the modelling of deep models in medical related applications was demonstrated [27] in the AIME'03 conference (Artificial Intelligence in Medicine in Europe) where Pedro Barahona acted as Workshop and Tutorials Chairman [3]. The work on constraint reasoning with differential equations was the main topic of the Ph.D. thesis of Jorge Cruz successfully finished in November [67]. Its quality led to an invitation to participate in a proposal for a FET European project consortium, that aims at developing support to conceptual design by incorporating constraint solving at the early stages of conception.

The work on finite domain and set constraints and its complementarity with alternative SAT approaches was delayed given the delay in the funding of project Practic (whose funding started in January 2004). Hence the main activity in this area was the updating of research work produced by Francisco Azevedo in his Ph.D. thesis [1, 66]. The work in optimal correction of unfeasible linear constraints was also a follow up of Paula Amaral Ph.D. thesis. Two papers were submitted for specialised journals [79, 78].

Still in the area of Constraints, the collaboration with T.U. Dresden, in the context of the above mentioned MSc. in Computational Logics, involved a course lectured there by P. Barahona on "Constraint Programming".

The work on implementation of logic programming and constraint systems has slowly progressed within the AJACS project. We have been running into material difficulties as FCT has, as of April 2003, not yet transferred any funds. Additionally there have been hardware issues as the equipment on which the project was to be tested has been slowly deteriorating. Nevertheless, a basis for the

definition of an efficient computational model for AJACS, based on Distributed Shared Memory (DSM) systems, has been established and a prototype is presently in use.

The learning topic of the SCC area, is where three of the postdocs hired by CENTRIA, Marco Castellani, Agnés Braud and Ning Chen, have mostly focussed their research. Except for Agnés Braud, their scholarship was extended to the end of 2003. Meanwhile, Marco Castellani got a Post-doc scholarship from FCT, but Agnés Braud application to FCT and Marie Curie was not successful and she did not reapply, and left in October. The continuation of Ning Chen was still pending on the success of scholarship applications.

A project on "Remote Detection of Mediterranean Water Eddies in the Northeast Atlantic (RENA)" was jointly submitted to ESA and GRICES, with the Instituto de Oceanografia (IO-FC/UL), whose evaluation is still pending. The main goal of this project is to reveal meaningful regions for the identification of oceanographic phenomena (i.e. upwelling and eddy detection) using sea surface temperature maps from satellite images. This submission follows research work being carried out by several CENTRIA members and post-docs.

Susana Nascimento, who was already with our centre, was hired by the department as an Assistant Professor, thereby helping to consolidate the Learning topic. She has been exploiting the main core of her PhD thesis, namely fuzzy clustering with proportional membership (FCPM) for mining typological structures, which has been submitted and published in the IEEE Transactions on Fuzzy Systems journal [11]. In the project, she has been exploring fuzzy clustering techniques for the problem of colour image segmentation, which has been developed in collaboration with Ning Chen. The work developed so far comprises three steps: (i) data reduction, by vector quantization and data aggregation, which produces a set of weighted feature vectors; (ii) Image segmentation applying a weighted fuzzy c-means algorithm (w-FCM); (iii) visualization of segmented images: obtained by defuzzyfying membership values. At present, possible techniques for an objective evaluation of segmentation quality are being investigated. Ning Chen is also collaborating with Nuno Marques in border detection using SOM neural networks which has resulted in the publication [41].

Marco Castellani has also been working in this project with Nuno Marques, and has finished a first version of a system working with Evolutionary Programing for Neural Network training. Several publications are expected as a result of this more fundamental work. Additionally, further studies have been made on several areas related with neural networks, namely: Spiking Neuron Models (an early study performed by Doctor Castellani), Data Mining algorithms using neural networks (namely using IBM's Intelligent Miner package) and SOM neural networks. In this latter case, the use of SOM networks for temporal sequence processing was continued by Gabriela Guimarães, despite her leave from Portugal [7].

Nuno Marques has also continued his work on the areas of Text Mining and Neural Networks. The work on text mining has continued in collaboration with Doctor Agès Braud and has resulted in the publication [40]. He has also been colaborating with Ning Chen, following early research by the latter, on Web-Services modules for Data Mining [42].

Also more fundamental work regarding the POS-tagger has continued with the help of last-year Computer Science students, one paper has been submitted and accepted for publication (in 2004). Some early contacts have started with Prof. Mario Vieira de Carvalho in CESEM- FCT/UNL, regarding the development of Project Music Query (a relational Database for musical research).

It is also worth noting that a major publication in the "New Generation Computing" journal [10] reports on the consolidated results bridging the KRR topic in the KRRLP area and the learning topic in the SCC area, accompanied by an implementation.

Still the bridge between the SCC and KRRLP areas is being explored by the work on Statistical Defaults for uncertain reasoning, being developed with the collaboration of the pos-doc Gregory Wheeler.

2 List of ongoing projects in 2003

Name	ILPnet2 - the Network of Excellence in Inductive Logic Programming
Status	Ongoing
Funding Institution	EU-IST
Funding for 2003	500 (our part)
Principal researcher	Luís Moniz Pereira (national part)
Participants (ours)	CENTRIA
Description	Development and use of Inductive Logic Programming for Machine Learning.
Results	Participation in network activities.

Name	IQN (International Quality Network) - Rational Mobile Agents and Systems of Agents
Status	Ongoing
Funding Institution	German DAAD
Funding for 2003	2.000 (our part)
Principal researcher	Luís Moniz Pereira (national part)
Participants (ours)	CENTRIA
Description	Centered around the research on Rational Mobile Agents and Systems we aim at amplification and strengthening of cooperation among the partners of the IQN, where special attention will be given to the fostering of young scientists. This shall be accomplished by the following measures: Further development of the International Masters Programme in Computational Logic aiming at the creation of a distributed Masters Programme; Joint supervision of Ph.D. theses within international cooperations ; Mutual exchange of professors, post-docs, Ph.D. students and master students in order to amplify education, research and lecturing ; Joint cooperation for the acquisition of further scientific research projects .
Results	4 visits in 2003.

Name	CoLogNet - European Network of Excellence in Computational Logic
Status	Ongoing
Funding Institution	EU-IST
Funding for 2003	21.000 (our part)
Principal researcher	Luís Moniz Pereira (national part)
Participants (ours)	CENTRIA
Description	Computational Logic has outgrown its humble beginnings and early expectations by far: with close to ten thousand people working worldwide in research and development of logic-related methods, with several dozen international conferences and workshops and more than one hundred international and national scientific societies related to research in logic addressing the growing richness and diversity of the field, and with the foundational role and importance these methods now assume in mathematics, computer science, artificial intelligence, cognitive science, linguistics and many engineering fields –where logic-related techniques are used inter alia to state and settle correctness issues – the field has diversified in ways that the pure logicians working in the early decades of the last century could have hardly anticipated. http://www.eurice.de/colognet/ .
Results	Participating in the Executive Council. Setting up of a distributed master in Computational Logic with T.U.Dresden. Participation in network activities.

Name	PROTEIN: Improving Constraint Solving to Predict Protein Structure
Status	Ongoing
Funding Institution	Fundação para a Ciência e Tecnologia
Funding for 2003	18.000 Euro
Principal researcher	Pedro Barahona
Participants	Ludwig Krippahl, Jorge Cruz, Marco Correia
Description	The project aims at developing advanced computing techniques, focussing in constraint programming, and to show how their integration with other techniques such as automated learning and meta-heuristics optimisation, can be used to solve a very important problem: the determination of protein structure from Nuclear Magnetic Resonance (NMR) spectroscopy
Results	3 publications ([13, 27, 39])

Name	PRACTIC: Processing and Reuse of Advanced Computational Techniques to Improve Constraint Solving
Status	Pending (starting January 2004)
Funding Institution	Fundação para a Ciência e Tecnologia
Principal researcher	Pedro Barahona
Participants	Francisco Azevedo
Description	The project aims at improving the resolution of constraint solving problems (possibly with some optimising function) involving variables in discrete domains, throughBoolean satisfaction (SAT) and constraint propagation over finite domains (CP), exploiting features such as machine learning and randomisation, and synergies between the two different approaches.
Results	No results yet.

Name	FLUX
Status	Ongoing
Start Date	2002
End Date	2005
Budget in 2003	22.053 Euro
Funding Institution	POSI
Principal researcher	José Alferes
Participants	CENTRIA and Declarativa - Serviços de Informática Lda.
Description	This project aims at establishing a flexible declarative language for the specification of dynamic knowledge, and to apply it to realistic application domains. During the first months of the project steps have been taken in the definition and prototypical implementation of that language, and experimentation was made in applying it to the domains of legal reasoning and of rational agents
Results	4 publications

Name	GODE – Gestão dos Orgãos e Deputados Eleitos da Assembleia da República
Status	Ongoing
Funding Institution	Portuguese Parlament
Funding for 2003	15000 Euro
Principal researcher	Joaquim Nunes Aparício
Participants	Prof Fernando Abreu, 2 graduate Students, 1 undergraduate student
Description	Design, development and Implementation of a Database system for management of the daily activity (meetings) of the deputies in the Portuguese Parlament.

Name	TARDE - Tabulation And Reasoning in a Distributed Prolog Environment
Status	Ongoing.
Funding Institution	POSI
Start Date	2001
End Date	2004
Budget in 2003	approx. 10000 Euro
Principal researcher	Carlos Viegas Damásio
Participants	CENTRIA/UNL and CITI/UNL
Description	The combination of tabling systems, reasoning systems and distributed programming is mandatory and promising. It is expected in this much-focused project to cross-fertilise the know-how in the implementation of PROLOG distributed systems with the know-how in tabling systems and reasoning techniques. This will result in building an advanced and efficient portable distributed logic programming system, incorporating the most recent semantical and operational techniques currently available. The initial 2 year project has been extended in order to achieve its objectives. Our focus is now the development of tools for the Semantic Web.
Results	9 publications, 3 software libraries

Name	POLAR
Status	Ongoing.
Start Date	2002
End Date	2003
Budget in 2003	1100 Euro
Funding Institution	Integrated actions of CRUP/Ministerio de Ciencia y Tecnologia.
Principal researcher	Carlos Viegas Damásio (portuguese side)
Participants	DI/FCT/UNL and Dept. Matemática Aplicada E.T.S.I. Informática da Universidade de Málaga.
Description	Started on November 2001, a cooperation research project on the integration of residuated logic programming with multi-adjoint logic program, competing proposals for the semantics of logic programs dealing with uncertainty, namely fuzzy and probabilistic reasoning.
Results	1 publication in 2003, plus two accepted publications in 2004.

Name	COOPERATIVE – Automatic Clustering and Visualization of Legal Documents in a Cooperative Information Retrieval Web System.
Status	Ongoing (2002–2004)
Budget in 2003	15.000 Euro
Funding Institution	FCT/MCES
Principal Researcher	Paulo Quaresma
Participants	Salvador Abreu, Irene Rodrigues, Teresa Gonçalves, José Saias, Luis Rosário, Luís Simões
Description	This project aims to build a cooperative web IR system applying knowledge representation, classification and clustering techniques to legal documents. Moreover, documents will be transformed from standard text bases to semantic web texts (OWL).
Results	5 papers and 4 visits in 2003.

Name	ABC – Intelligent Access to Knowledge Bases
Status	Ongoing (2002–2005)
Budget in 2003	25.000 Euro
Funding Institution	Agência de Inovação
Principal Researcher	Paulo Quaresma
Participants	Irene Rodrigues, Pedro Salgueiro, Ana Aires, Luís Rodrigues
Description	Development of an agent-based architecture composed by specialized interaction and information retrieval agents.
Results	5 papers and 3 visits in 2003

Name	DIRPI – Desenvolvimento e Integração de Recursos para a Pesquisa de Informação
Status	Ongoing (2002–2006)
Budget in 2003	3.000 Euro
Funding Institution	GRICES/CAPES
Principal Researcher	Paulo Quaresma
Participants	Renata Vieira (UNISINOS/Br)
Description	Develop natural language processing tools for the Portuguese language in order to increase the power of information retrieval systems.
Results	2 papers and 4 visits in 2003.

Name	AJACS – Yet Another Java Constraint Programming System
Status	Ongoing
Budget in 2003	6.000 Euro
Funding Institution	FCT SAPIENS (POSI)
Principal researcher	Salvador Abreu
Participants	Irene Rodrigues Lígia Ferreira
Description	This project aims at developing a dialect for the Java programming language, implementing the Constraint Programming paradigm over a distributed network of inexpensive workstations. We will develop a model for the representation of CSPs (Constraint Satisfaction Problems), susceptible of being efficently implemented in a network-aware object-oriented programming language, such as Java. This model will be the object of a prototype implementation on a distributed system made up of a cluster of 16 nodes, which will extend the presently existing cluster of 8 nodes. There will be two prototypes: a sequential and a parallel one. The system will also be used to prototype a class scheduling application, based on real-world data: University of Évora's Integrated Information System.
Results	Working prototype and 2 submitted (yet unpublished) conference articles.

Name	Extensions au Logiciel Libre GNU Prolog
Status	Ongoing
Budget in 2003	46.000 Euro
Funding Institution	INRIA/ICCTI
Principal researcher	Salvador Abreu
Participants	Pedro Patinho, Vítor Nogueira
Description	This project will lead to the development of several extensions to the GNU Prolog implementation, originally developed at INRIA. Planned enhancements include a novel approach to Contextual Logic Programming (CxLP), a multi-threading implementation and a graphical user-interface system.
Results	A prototype implementation of GNU Prolog/CX, various published article and several undergoing review.

Name	SIIUE.sac – Universidade de Évora's Integrated Information System
Status	Ongoing
Budget in 2003	48.000 Euro
Funding Institution	Universidade de Évora
Principal researcher	Salvador Abreu
Participants	Lígia Ferreira
Description	Design and implementation of a logic language to build web-based information systems, featuring transparent use of hetherogeneous databases. Application to the academic management of the University.
Results	several publications and a production system. in 2003.

3 List of M.Sc. and Ph.D. students and topics in 2003

3.1 M.Sc. Students

Name	Miguel Bento Alves
Degree	M.Sc.
Supervisor	Carlos Viegas Damásio
Topic	Distributed tabled query evaluation of logic programs
Start date	March 2001
Finish date	March 2004 (dissertation submitted)

Name	Mattias Engberg
Degree	M.Sc. in Computer Science, No. LITH-ITN-KTS-EX03/021-SE, Dept. of Science and Technology (ITN), Linköping University, NorrkÄoping, Sweden
Supervisor	Pierandelo Dell'Acqua and Luís Moniz Pereira
Topic	An implementation of a rational, reactive agent
Start date	October 2002
Finish date	July 2003

Name	Marco Correia
Degree	M.Sc.
Supervisor	Pedro Barahona
Topic	Study of Heuristics for the Protein Structure Prediction Problem
Start date	October 2002
Finish date	March 2004 (dissertation submitted)

Name	Joaquim Godinho
Degree	MSC.
Supervisor	Salvador Abreu
Topic	
Start date	June 2001
Finish date	September 2004 (expected)

Name	David Mendes
Degree	MSC.
Supervisor	Salvador Abreu
Topic	Integration of Prolog and Java
Start date	June 2001
Finish date	April 2004 (dissertation submitted)

Name	Agostinho Monteiro
Degree	M.Sc.
Supervisor	Luís Moniz Pereira
Topic	Aplicação da Programação em Lógica Dinâmica ao Raciocínio Legal - O caso da Protecção Fitossanitária de Vegetais
Start date	Março 2001
Finish date	January 2003

Name	Pedro Patinho
Degree	MSC.
Supervisor	Salvador Abreu
Topic	Extensions to the GNU Prolog system
Start date	December 2002
Finish date	December 2004 (expected)

Name	Luis Rosário
Degree	M.Sc.
Supervisor	Paulo Quaresma
Topic	Resolução de anáforas e o seu impacto em sistemas de pesquisa de informação
Start date	October 2002
Finish date	September 2004

Name	José Saias
Degree	M.Sc.
Supervisor	Paulo Quaresma
Topic	Utilização de informação semântica em sistemas de pesquisa de informação
Start date	October 2002
Finish date	December 2003

Name	João Silva
Degree	M.Sc.
Supervisor	Joaquim N. Aparício
Topic	Object Oriented Databases
Start date	2002
Finish date	December 2003

Name	Albertina da Conceição Dias
Degree	M.Sc. in Statistics and Information Management
Supervisor	Joaquim N. Aparício
Topic	Sistemas de Informação e Decisão: O impacto da implementação de DataWarehouses nos Bancos e Seguradoras
Start date	2002
Finish date	December 2003

3.2 Ph.D. Students

Name	João Fernando Lima Alcântara
Degree	Ph.D.
Supervisor	Carlos Viegas Damásio and Luís Moniz Pereira
Topic	Abduction and Belief Revision in Uncertain Logic Programming Systems
Start date	September 2001
Finish date	September 2005 (expected)

Name	Iara de Almeida
Degree	Ph.D.
Supervisor	José Alferes
Topic	Argumentation and cooperation in multi-agent logic programming systems, with application to distributed diagnosis
Start date	October 1997
Finish date	June 2005 (Expected)

Name	Federico Banti
Degree	Ph.D.
Supervisor	José Alferes
Topic	A language for executing and reasoning about evolution of logic based agents
Start date	October 2003
Finish date	2006 (expected)

Name	Jorge Cruz
Degree	Ph.D.
Supervisor	Pedro Barahona
Topic	Non-linear Constraints over Continuous Domains Including Differential Equations
Start date	October 1997
Finish date	November 2003

Name	Lígia Ferreira
Degree	Ph.D.
Supervisor	Salvador Abreu
Topic	Constraint Programming Toolkits for Parallel Execution
Start date	June 1999
Finish date	September 2004 (expected)

Name	Teresa Gonçalves
Degree	M.Sc.
Supervisor	Paulo Quaresma
Topic	Using Support Vector Machines for the classification of documents
Start date	October 2003
Finish date	October 2006

Name	Juan Carlos Acosta Guadarrama
Degree	Ph.D. in Computer Science, UNL
Supervisor	Luís Moniz Pereira
Topic	Belief revision and updating in logic programs
Start date	September 2003
Finish date	September 2007 (expected)

Name	Ludwig Krippahl
Degree	Ph.D.
Supervisor	Pedro Barahona (co-supervisor)
Topic	Spatial Constraint Solving and its Application in Protein Structure Determination
Start date	October 1999
Finish date	December 2003

Name	Vítor Nogueira
Degree	Ph.D.
Supervisor	Salvador Abreu and Gabriel David (Faculty of Engineering, University of Porto)
Topic	Constraint and Logic Languages for Hetherogeneous Database Systems
Start date	October 2001
Finish date	June 2005 (expected)

Name	Valéria Pequeno
Degree	Ph.D.
Supervisor	Joaquim N. Aparício
Topic	Object Oriented DataWarehousing
Start date	2001
Finish date	(expected) 2005

Name	Luis Quintano
Degree	Phd
Supervisor	Irene Pimenta Rodrigues
Topic	Natural Language Dialogues for IR from BD
Start date	October 2003
Finish date	June 2006 (expected)

Name	Jorge Simão
Degree	Ph.D.
Supervisor	Luís Moniz
Topic	Computational Modeling and Simulation of Human Social Behavior
Start date	September 2001
Finish date	February 2004

4 Publications

4.1 Books

[1] Francisco Azevedo. *Constraint Solving over Multi-valued Logics - Application to Digital Circuits*, volume 91 of *Frontiers of Artificial Intelligence and Applications*. IOS Press, 1st edition, 2003.

[2] J. A. Leite. *Evolving Knowledge Bases*, volume 81 of *Frontiers of Artificial Intelligence and Applications*. IOS Press, 1st edition, 2003.

4.2 Edited books and journal special issues

[3] M. Dojat, E. Keravnou, and P. Barahona, editors. *Artificial Intelligence in Medicine, 9th Conference on Artificial Intelligence in Medicine in Europe, AIME 2003*, volume 2780 of *LNAI*. Springer, 2003.

[4] J. Leite and J. Dix, editors. *Pre-Procs. of the 4th Workshop on Computational Logic in Multiagent Systems (CLIMA IV)*, volume 1 of *ITZ Berichte*, Clausthal-Zellerfeld, December 2003. PapierFlieger.

[5] J. A. Leite, A. Omicini, L. Sterling, and P. Torroni, editors. *Pre-Procs. of the 1st International Workshop on Declarative Agent Languages and Technologies (DALT'03)*, 2003.

[6] Fernando Moura-Pires and Salvador Abreu, editors. *Progress in Artificial Intelligence, 11th Protuguese Conference on Artificial Intelligence, EPIA 2003, Beja, Portugal, December 4-7, 2003, Proceedings*, volume 2902 of *Lecture Notes in Computer Science*. Springer, 2003. ISBN 3-540-20589-6.

4.3 In International Journals

[7] G. Guimarães, V. Sousa-Lobo, and F. Moura-Pires. A taxonomy of self-organizing maps for temporal sequence processing. *Intelligent Data Analysis*, 7:269–290, 2003.

[8] Reinhard Kahle. Universes over Frege structures. *Annals of Pure and Applied Logic*, 119(1–3):191–223, 2003.

[9] Reinhard Kahle and Thomas Studer. Least fixed points in applicative theories. *Bulletin of Symbolic Logic*, 9(1):94, 2003. Abstract for the Logic Colloquium 2002.

[10] E. Lamma, L. M. Pereira, and F. Riguzzi. Belief revision via lamarckian evolution. *New Generation Computing*, 21(3):247–275, August 2003.

[11] S. Nascimento, B. Mirkin, and F. Moura-Pires. Modeling proportional membership in fuzzy clustering. *IEEE Transactions on Fuzzy Systems- Fuzzy Systems in Knowledge Discovery and Data Mining*, 2(11):173–186, 2003.

[12] Aida Vitória, Carlos Viegas Damásio, and Jan Maluszynski. From rough sets to rough knowledge bases. *Fundamenta Informaticae*, 57(2-4):215–246, 2003.

4.4 Book chapters

[13] J. Cruz and P. Barahona. Maintaining Global-Hull Consistency with Local Search for Continuous CSPs. In Sophia-Antipolis, C.Bliek, C. Jermann, and A. Neumaier, editors, *1st Int. Ws. on Global Constrained Optimization and Constraint Satisfaction, Cocos'02 (Selected Papers)*, volume 2861 of *LNCS*, pages 178–193. Springer, 2003.

[14] P. Dell'Acqua and L. M. Pereira. Prefering and updating in logic-based agents. In Bartenstein, Geske, Hannebauer, and Yoshie, editors, *Web-Knowledge Management and Decision Support*, volume 2543 of *LNAI*, pages 69–71. Springer, 2003.

[15] Akira Ishikawa, Paulo Quaresma, and Rolf Schwitter. Knowledge acquisition and knowledge representation. In Bartenstein, Geske, Hannebauer, and Yoshie, editors, *Web-Knowledge Management and Decision Support*, volume 2543 of *LNAI*, pages 69–71. Springer, 2003.

[16] Paulo Quaresma and Irene Pimenta Rodrigues. PGR: Portuguese attorney general's office decisions on the web. In Bartenstein, Geske, Hannebauer, and Yoshie, editors, *Web-Knowledge Management and Decision Support*, volume 2543 of *LNAI*, pages 51–61. Springer, 2003.

[17] Luis Quintano, Salvador Abreu, and Irene Rodrigues. Relational information retrieval through natural language analysis. In Oskar Bartenstein, Ulrich Geske, Markus Hannebauer, and Osama Yoshie, editors, *Web Knowledge Management and Decision Support*, volume 2543 of *Lecture Notes in Computer Science*, pages 86–99. Springer, 2003. ISBN 3-540-00680-X.

4.5 In Proceedings of International Conferences

[18] Salvador Abreu and Daniel Diaz. Objective: in Minimum Context. In Catuscia Palamidessi, editor, *Logic Programming, 19th International Conference, ICLP 2003, Mumbai, India, December 9-13, 2003, Proceedings*, volume 2916 of *Lecture Notes in Computer Science*, pages 128–147. Springer-Verlag, 2003. ISBN 3-540-20642-6.

[19] Salvador Abreu, Paulo Quaresma, Luis Quintano, and Irene Rodrigues. A dialogue manager for accessing databases. In H. Jaakkola, H. Kangassalo, and E. Kawaguchi, editors, *Information Modelling and Knowledge Bases XV*, volume 105 of *Frontiers in Artificial Intelligence and Applications*, pages 213–224. IOS Press, June 2003. ISBN 1-58603-396-4.

[20] Rachel Aires, Sandra Aluísio, Paulo Quaresma, Diana Santos, and Mário Silva. An initial proposal for cooperative evaluation on information retrieval in portuguese. In N. Mamede, J. Baptista, and M. Volpe Nunes, editors, *Computational Processing of the Portuguese Language: 6th International Workshop, PROPOR'2003*, Lecture Notes in Artificial Intelligence LNCS/LNAI 2721, pages 227–234. Springer-Verlag, June 2003.

[21] João Alcântara, Carlos Viegas Damásio, and Luís Moniz Pereira. On contradictions and their propagation in paraconsistent logic programs. In *III World Congress on Paraconsistency (WCP3)*, Toulouse, France, July 2003.

[22] J. J. Alferes, F. Banti, and A. Brogi. A principled semantics logic programs updates. In Brewka and Peppas, editors, *Nonmonotonic Reasoning, Action, and Change (NRAC'03),*. Workshop at IJCAI'03, 2003.

[23] J. J. Alferes, A. Brogi, J. A. Leite, and L. M. Pereira. An evolvable rule-based e-mail agent. In S. Abreu and F. Moura Pires, editors, *Progress in Artificial Intelligence, Procs. 11th Portuguese Int. Conf. on Artificial Intelligence (EPIA'03)*, volume 2902 of *LNAI*, pages 394–408. Springer, 2003.

[24] J. J. Alferes, A. Brogi, J. A. Leite, and L. M. Pereira. An evolving agent with evolp. In Francesco Buccafurri, editor, *Procs. of the 2003 APPIA-GULP-PRODE Joint Conference on Declarative Programming (AGP'2003)*, Reggio Calabria, Italy, September 2003. Universita "Mediterranea" di Reggio Calabria.

[25] J. J. Alferes, A. Brogi, J. A. Leite, and L. M. Pereira. Logic programming for evolving agents. In Matthias Klusch, Sascha Ossowski, Andrea Omicini, and Heimo Laamanen, editors, *Cooperative Information Agents VII, 7th International Workshop, CIA 2003*, volume 2782 of *Lecture Notes in Computer Science*, pages 281–297. Springer, 2003.

[26] José Júlio Alferes, Carlos Viegas Damásio, and Luís Moniz Pereira. Semantic web logic programming tools. In François Bry, Nicola Henze, and Jan Maluszynski, editors, *Principles and Practice of Semantic Web Reasoning, International Workshop, PPSWR 2003, Mumbai, India, December 8, 2003, Proceedings*, volume 2901 of *Lecture Notes in Computer Science*, pages 16–32. Springer, 2003.

[27] J. Cruz and P. Barahona. Constraint Reasoning in Deep Biomedical Models. In M. Dojat, E. Keravnou, and P. Barahona, editors, *9th Conference on Artificial Intelligence in Medicine in Europe, AIME'2003*, volume 2780 of *LNAI*, pages 324–334. Springer, 2003.

[28] J. Cruz and P. Barahona. Constraint Reasoning with Differential Equations. In *Proceedings of the International Conference on Numerical Analysis and Computational Mathematics, NACoM-2003*, pages 38–41. Anglia Polytechnic University (APU), Cambridge, UK, 2003.

[29] J. Cruz and P. Barahona. Constraint Satisfaction Differential Problems. In Francesca Rossi, editor, *Principles and Practice of Constraint Programming, CP'2003*, volume 2833 of *LNAI*, pages 259–273. Springer, 2003.

[30] Carlos Viegas Damásio and Manuel Ojeda-Aciego. On termination of a tabulation procedure for residuated logic programming. In *Workshop on Termination (WST'03)*, pages 40–43, Valencia, Spain, June 2003.

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[43] Vitor Nogueira, Salvador Abreu, and Gabriel David. Using Contextual Logic Programming for Temporal Reasoning. In Ernesto Pimentel, Nieves R. Brisaboa, and Jaime Gómez, editors, *VIII Jornadas Ingeniería del Software y Bases de Datos (JISBD 2003), 12-14 Noviembre 2003, Alicante*, pages 479–490, 2003. ISBN 84-688-3836-5.

[44] Valéria Magalhães Pequeno and Joaquim Nunes Aparício. A formal model for object-relational databases. In *5th International Conference on Enterprise Information Systems, ICEIS03*, pages 327–333, 2003.

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[50] Luis Quintano and Irene Rodrigues. Natural language querying over information systems. In Hans Dijkman, Petra Smulders, Bas Cordewener, and Kurt de Belder, editors, *9th International Conference of European University Information Systems*, pages 507–512. The Universiteit van Amsterdam, 2003.

[51] José Saias and Paulo Quaresma. A methodology to create ontology-based information retrieval systems. In Fernando Moura-Pires and Salvador Abreu, editors, *Progress in Artificial Intelligence, 11th Portuguese Conference on Artificial Intelligence, EPIA 2003*, volume 2902 of *Lecture Notes in Computer Science*, pages 424–434, Beja, Portugal, December 2003. Springer.

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4.6 Other publications

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5 Missions

Salvador Abreu

- Faro, Portugal, June 2003: Salvador Abreu
  Purpose: participation in the PROPOR'03 conference.
- Amsterdam, The Netherlands, July 2003: Luís Quintano
  Purpose: participation in the EUNIS'03 conference.
- Porto, Portugal, July 2003: Salvador Abreu
  Purpose: MSc. thesis jury.
- Covilhã, Portugal, September 2003: Salvador Abreu
  Purpose: PhD. thesis jury.
- Évora, Portugal, November 2003: Salvador Abreu
  Purpose: participation in the Cognitive Sciences Congress organized by Universidade de Évora.
- Alicante, Spain, November 2003: Vitor Nogueira
  Purpose: participation in the JISBD'03 conference.
- Beja, Portugal, December 2003: Salvador Abreu
  Purpose: chairing the EPIA'03 conference.
- Mumbai, India, December 2003: Salvador Abreu
  Purpose: attending the ICLP'03 conference.

José Júlio Alferes

- Madrid, Spain, July 2003
  Purpose: Participation in a PhD examination board, at the Madrid Polytechnical University.
- Altea, Spain, October 2003
  Purpose: Invited Participation in the Workshop "Jornada de lógica y matemáticas aplicada a la programación" organized by David Pearce from Universidad Rey Juan Carlos.
- Beja, Portugal, December 2003: Salvador Abreu
  Purpose: participation in the EPIA'03 conference.

João Lima Alcântara

- Altea, Spain, October 2003
  Purpose: Invited Participation in the Workshop "Jornada de lógica y matemáticas aplicada a la programación" organized by David Pearce from Universidad Rey Juan Carlos.

Francisco Azevedo

- Kinsale, Ireland, 29 September - 3 October 2003
  Purpose: Participation in CP2003, Ninth International Conference on Principles and Practice of Constraint Programming.

Federico Banti

- Altea, Spain, August 2003
  Purpose: Invited Participation in the Workshop "Jornada de lógica y matemáticas aplicada a la programación" organized by David Pearce from Universidad Rey Juan Carlos.

Pedro Barahona

- Kinsale, Ireland, 29 September - 3 October 2003
  Purpose: Participation in CP2003, Ninth International Conference on Principles and Practice of Constraint Programming.
- Protaras, Cyprus, 19 - 22 October 2003
  Purpose: Participation in AIME'03, 9th Conference on Artificial Intelligence in Medicine in Europe.
- Cork Cork Constraint Computation Centre, University College Cork, Ireland, June 2003 October 2003
  Purpose: Discussion of a FET European Project proposal on Constraints and Conceptual Design.
- Beja, 4-7 December 2003
  Purpose: Participation in EPIA'03, 11th Portuguese Conference on Artificial Intelligence

Jorge Cruz

- Kinsale, Ireland, 29 September - 3 October 2003
  Purpose: Participation in CP2003, Ninth International Conference on Principles and Practice of Constraint Programming.
- Protaras, Cyprus, 19 - 22 October 2003
  Purpose: Participation in AIME'03, 9th Conference on Artificial Intelligence in Medicine in Europe.
- Anglia Polytechnic University, Cambridge, UK, 23-26 May 2003
  Purpose: Participation in the International Conference on Numerical Analysis & Computational Mathematics, NACoM-2003

Carlos Viegas Damásio

- London, UK, January 2003
  Purpose: Participation in the planning meeting of a submission to FP6 Network of Excellence on Reasoning with Rules in the Semantic Web
- Málaga, Spain, April 2003
  Purpose: Visit to Prof. Manuel Ojeda-Aciego and his team under the CRUP integrated action POLAR.

Reinhard Kahle

- Dresden, Feburary 2003
  Purpose: Visit of the Department Computer Science of the Technical University of Dresden invited by the International Quality Network *Rational Mobile Agents and Systems of Agents* as guest of Prof. Steffen Holldöbler, Dr. Bertram Fronhöfer and Dr. Pascal Hitzler.
- Dresden, June/July 2003
  Participation as co-organizer and lecturer in the Summer School and Workshop on Proof Theory, Computation and Complexity
- Dresden, November 2003
  Participation in CologNet Workshop on a Distributed Master Degree in Computational Logic (Erasmus Mundus Workshop)

Ludwig Krippahl

- Kinsale, Ireland, 29 September - 3 October 2003
  Purpose: Participation in CP2003, Ninth International Conference on Principles and Practice of Constraint Programming.

João Leite

- Acapulco, Mexico, August 2003
  Purpose: Participation in IJCAI 2003, 18th International Joint Conference on Artificial Intelligence.
- Altea, Spain, October 2003
  Purpose: Participation in the Workshop on Applications of Logic and Mathematics to Programming, II Seminarios Internacionales de Altea.
- Beja, Portugal, December 2003
  Purpose: Participation in the 11th Portuguese Conference on Artificial Intelligence.

Nuno C. Marques

- Anger, France 2003
  Purpose: Participation in 5th International Conference On Enterprise Information Systems.
- Beja, Portugal 2003
  Purpose: Participation in EPIA'2004 - Portuguese Bi-annual Meeting and Conference on Artificial Intelligence.

Luís Moniz Pereira

- Évora, November 2003
  Purpose: Participation Congresso em Neurociências Cognitivas.
- New Orleans, Louisiana, USA, January 2004
  Purpose: Participation Practical Aspects of Declarative Languages (PADL'03).
- Padova, Italy, November 2003
  Purpose: Participation in the CoLogNet Executive Council meeting.
- Lisbon, Portugal, April 2003
  Purpose: Participation in the CoLogNet Executive Council meeting.
- Dresden, Germany, November/December 2003
  Purpose: Participation in the MSc in Computational Logic teaching at Dresden, and organizing the european distributed MSc in Computational Logic.

Paulo Quaresma

- Porto Alegre, Brasil, January 2003
  Purpose: Collaboration in the scope of the GRICES/CAPES DIRPI research project for the development of computational resources for the Portuguese language. in the scope of the DIRPI project
- Madrid, Spain, May 2003
  Purpose: Participation in AWIC'03, Atlantic Web Intelligence Conference
- Kitakyushu, Japan, June 2003
  Purpose: Participation in EJCIMKB'03, European-Japanese Conference on Information Modelling and Knowledge Bases
- Edinburgh, Scotland, June 2003
  Purpose: Participation in ICAIL'03, International Conference on Artificial Intelligence and Law
- Reggio Calabria, Italy, September 2003
  Purpose: Participation in AGP'03, APPIA-GULP-PRODE Joint Conference on Declarative Programming
- Beja, Portugal, December 2003
  Purpose: Participation in EPIA'03, Portuguese Conference on Artificial Intelligence

- Utrecht, Netherlands, December 2003
  Purpose: Participation in JURIX, 16th Annual Conference on Legal Knowledge and Information Systems

Irene Pimenta Rodrigues

- Faro, Portugal, June 2003: Salvador Abreu
  Purpose: participation in the PROPOR'03 conference.
- Beja, Portugal, December 2003
  Purpose: Participation in EPIA'03, Portuguese Conference on Artificial Intelligence

Jorge Simão

- Évora, Portugal, November 2003
  Purpose: Participation in Congresso em Neurociências Cognitivas.
- Groningen, Holland, September 2003
  Purpose: Present a poster at 1st Conf. European Social Simulation Association (SIMSOC VI).
- Montpellier, France, April 2003
  Purpose: Present a paper at the Agent-Based Simulation 4 (ABS4).

6 Visitors

Aida Vitória University of Linköping, 2 weeks, March 2003.
Research on the encoding of rough sets querying languages into Answer Set Programming.

Alexander Bockmayr, University of Nancy, France, December 2004, 3 days, Ph.D. jury, discussion on application of constraints in bioinformatics.

Bertram Fronhoefer, Technical University Dresden, 4 days, September/October, 2003. Collaboration meeting to set up a double MSc degree in Computational Logic with UNL.

Cassiana Silva , UNISINOS, Porto Alegre, Brasil, 2 weeks, February 2003. Collaboration in the scope of the GRICES/CAPES DIRPI research project for the development of computational resources for the Portuguese language.

David Pearce, Rey Juan Carlos University, Madrid, 4 days, August 2003. Collaboration in approaches to revised stable models, and setting up colaboration with UNL.

Dov Gabbay, King's College, London, UK, 3 days, April 2003. Collaboration in CoLogNet.

Eckhard Bick , Denmark, 1 week, December 2003. Collaboration in the scope of the FCT COOPERATIVE research project.

Francesca Rossi, Padova University, Italy, 3 days, April 2003. Collaboration in CoLogNet.

Frédéric Benhamou, University of Nantes, France, November 2003, 3 days, Ph.D. Jury and discussion of joint European FET project proposal (includes constraints over differential equations).

Harold Boley Leader, Semantic Web Laboratory Institute for Information Technology - e-Business National Research Council of Canada and University of New Brunswick, Canada, 1 week, December 2003.
Integration of Default and Explicit Negation in the RuleML language.

Jochen Trommer, Institute of Cognitive Science, University of Osnabrueck, Germany, July 9th, 2003. Collaboration in Erasmus students exchange. Talk "Perspectives on Cognitive Science".

Jan Senko, Martin Homola and Jozef Siska, U. Bratislava, Slovakia, 3 months, October/December 2003. Collaboration in preparation of a their MSc. thesis.

Joerg Siekmann, DFKI, Saarbrucken, 3 days, April 2003. Collaboration in CoLogNet, and advisory board of CENTRIA.

Manuel Hermenegildo, Madrid Polytechnical University, Spain, 3 days, April 2003. Collaboration in CoLogNet.

Manuel Ojeda-Aciego and Jesús Medina University of Málaga, 1 week, September 2003. Termination properties and conditions for residuated and multi-adjoint logic programs.

Peter Novak and Martin Balaz, U. Bratislava, Slovakia, 3 months, October/December 2003. Collaboration in preparation of a their PhD thesis.

Pierangelo Dell'Acqua, Linkoping University, Sweden, 1 month, July 2003. Collaboration in research on agents and joint papers.

Rove Chisman Lima , UNISINOS, Porto Alegre, Brasil, 1 week, May 2003. Collaboration in the scope of the GRICES/CAPES DIRPI research project for the development of computational resources for the Portuguese language.

Steffen Hoelldobler, Technical University Dresden, 4 days, September/October, 2003. Collaboration meeting to set up a double MSc degree in Computational Logic with UNL.

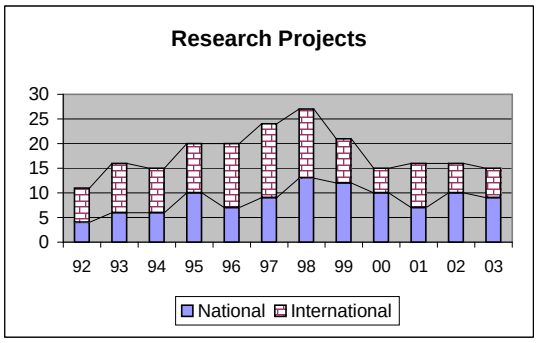
Susana Muñoz Hernandez, Madrid Polytechnical University, Spain, 1 month, May 2003. Collaboration in approaches to constructive negation. Final preparation of a her PhD thesis.

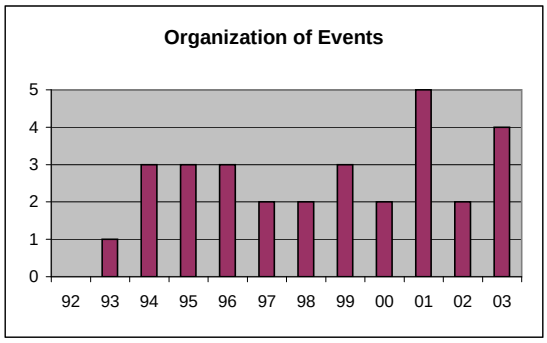
Toby Walsh, Cork University, Ireland, 3 days, April 2003. Collaboration in CoLogNet.

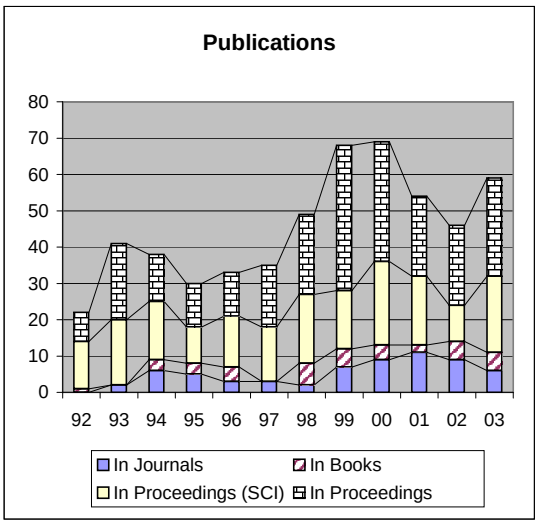
Vera Lima , PUCRS, Porto Alegre, Brasil, 1 week, June 2003. Collaboration in the scope of the GRICES/CAPES DIRPI research project for the development of computational resources for the Portuguese language.

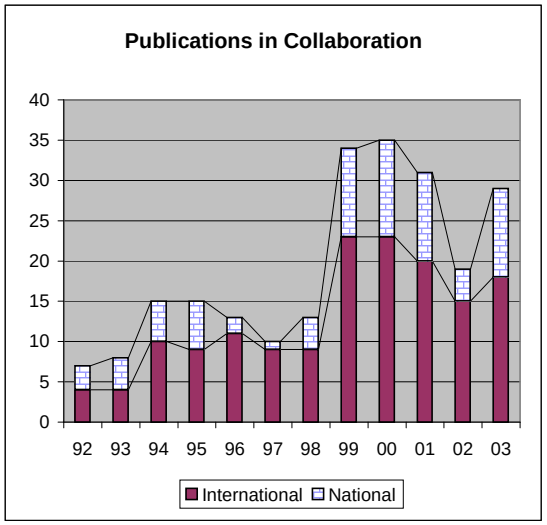
Vitor Santos-Costa , Federal University of Rio de Janeiro, 3 days, January 2003. Collaboration on the development of distributed shared-memory programming systems.

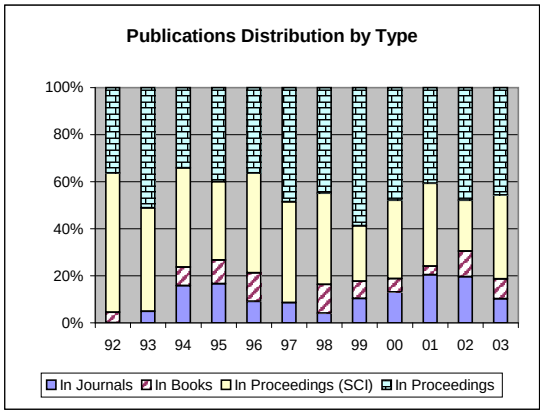
7 CENTRIA evolution graphics in 2003

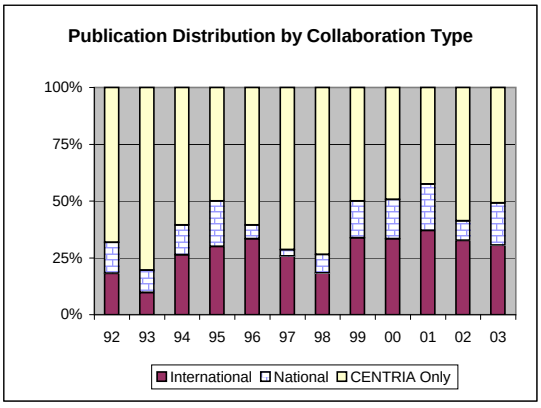


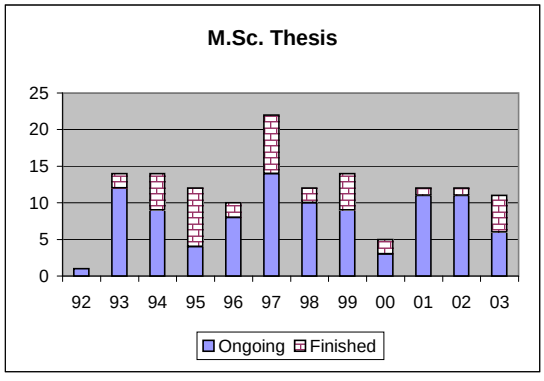


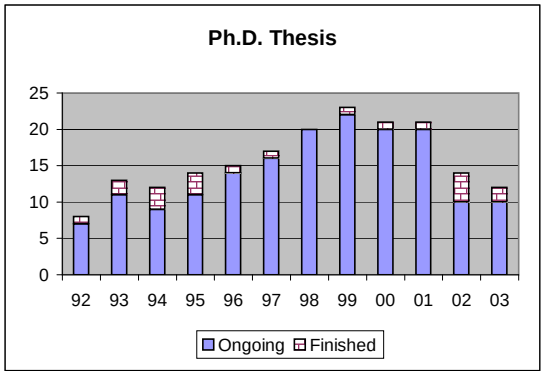












8 Other References

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