

CENTRIA

Centre for Artificial Intelligence

<http://centria.fct.unl.pt/>

hosted at

Departamento de Informática - DI
Faculdade de Ciências e Tecnologia - FCT
Universidade Nova de Lisboa - UNL



CENTRIA Overview

- Objectives and Structure
- Organization and Management
- People and Global Funds
- Main Research Areas
- Graphical Evolution
 - People, Publications, PhD theses, Projects, Events, Funding
- Industrial Relations
- MSc and PhD programs
- Forthcoming Projects
- Strategic Goals
- Programatic Funding: yearly needs



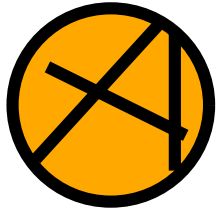
Objectives and Structure

- To promote research in AI and applications
 - Launch research projects
 - Stimulate national and international coöperations
 - Organize scientific events
 - Foster graduate and post-graduate activities
- Structured into three main AI research areas
 - Knowledge Representation and Reasoning & Logic Programming - **KRRLP**
 - Intelligent Information Systems - **IIS**
 - Soft Computing and Constraints - **SCC**



Organization and Management

- CENTRIA is one of 14 research centres of FCT-UNL
- Members
 - Effective Members are PhD holders formally accepted
 - Associate Members are collaborators of Effective Members
- Scientific Committee
 - Comprised of all Effective Members
- Management Board
 - The Director plus two Effective Members
 - Elected for a 3-year term
- International Advisory Board



Organization and Management

- Advisory Board

- **Professor Ryszard Michalschi**

- George Mason University, Fairfax VA

- **Professor Fernando Pereira**

- University of Pennsylvania, Philadelphia PA

- **Professor David S. Warren**

- State University of New York at Stony Brook, NY

- **Professor Jörg Siekmann**

- DFKI, Saarbrücken



Organization and Management

- Measurement of scientific productivity of CENTRIA members
 - which determines member base funding
- Based on number and quality of publications
- Promotes publications
 - in collaboration with external researchers
 - in high quality international journals and events
- Base points (high quality, international)
 - Books: Book (12), Chapter (4), Edition (3)
 - Journals: Article (6), Research Note or Extended Abstract (2)
 - Proceedings: Paper (4), Extended Abstract or Poster (2)
 - Thesis Supervisor: PhD (6), MSc (2)
- Extra rules
 - Points halved if National, and further halved if Less Qualified venue
 - Points increased 25/15 % for Int./Nat. collaboration

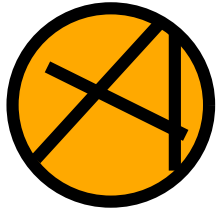


CENTRIA – People and Funds

- 41 researchers in 2003
 - 23 PhD holders (UNL staff all hold a PhD)
 - 18 PhD and MSc students (none UNL staff)

- Direct funding from Ministry of Science
 - Base funds per year: € 55.5 K
 - Programatic funds [1999-2002]: € 127.4 K

- Yearly funding from projects
 - Average [1999-2001]: € 148.5 K
 - Average [2002-2003]: € 153.3 K

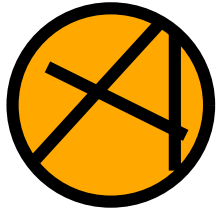


CENTRIA – Programatic Funds

Use of programatic funds 99-02

Books	€ 12.8 K	10%
Equipment	€ 25.1 K	20%
Post-docs	€ 89.5 K	70%

Total € 127.4 K



Overview of main research areas

Knowledge Representation and Reasoning
& Logic Programming - **KRRLP**

Soft Computing and Constraints - **SCC**

Intelligent Information Systems - **IIS**



Knowledge Representation and Reasoning & Logic Programming - KRRLP

- Foundations of rational computational logic agents, logic programs, knowledge base updates, and implementation
 - Knowledge Base Updates and Evolution
 - General framework for integrating several reasoning forms (fuzzy, possibilistic, probabilistic, and non-monotonic)
 - Distributed tabling and revision systems
 - Computational models and their implementation for a parallel and distributed logic programming language
- These topics have strong relations amongst themselves
 - Implementations are guided by the foundational results and their use in applications
 - They also relate to work in other areas of CENTRIA, such as those of Semantic Engines for the Web and of Intelligent Information Systems



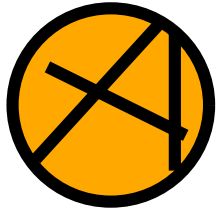
Soft Computing and Constraints - SCC

- Fundamental and applied research in Constraint Programming
 - Integration of local search and constraint propagation
 - Interaction of constraint propagation techniques with computational geometry methods
 - Set constraints, global, spatial, continuous domains, over-constrained, and fuzzy constraints solvers
 - Architectures for distributed constraint solvers
 - Extend research on multi-valued logics for digital circuits to applications in logic-based agents.
 - Modeling biophysical systems with non-linear constraints over continuous domains



Soft Computing and Constraints - SCC

- Fundamental and applied research in Machine Learning
 - Machine Learning, Concept Learning, and Data and Text Mining
 - Concept learning via fuzzy clustering
 - Self-organising maps, data mining, and inductive logic programming
 - Coupling of neural networks with genetic algorithms
- Applications
 - Applications of AI in Medicine and Bioinformatics
 - Interpretation of oceanographic data
 - Intelligent access to music data warehouses
 - General search texts and data mining in web pages



Intelligent Information Systems - IIS

- Semantic web tools:
 - KRR for the Semantic Web.
 - Semantic web based integration of heterogeneous databases.
 - Agents for classification of documents and definition of web ontologies.
 - Text mining is included in Soft Computing and Constraints.



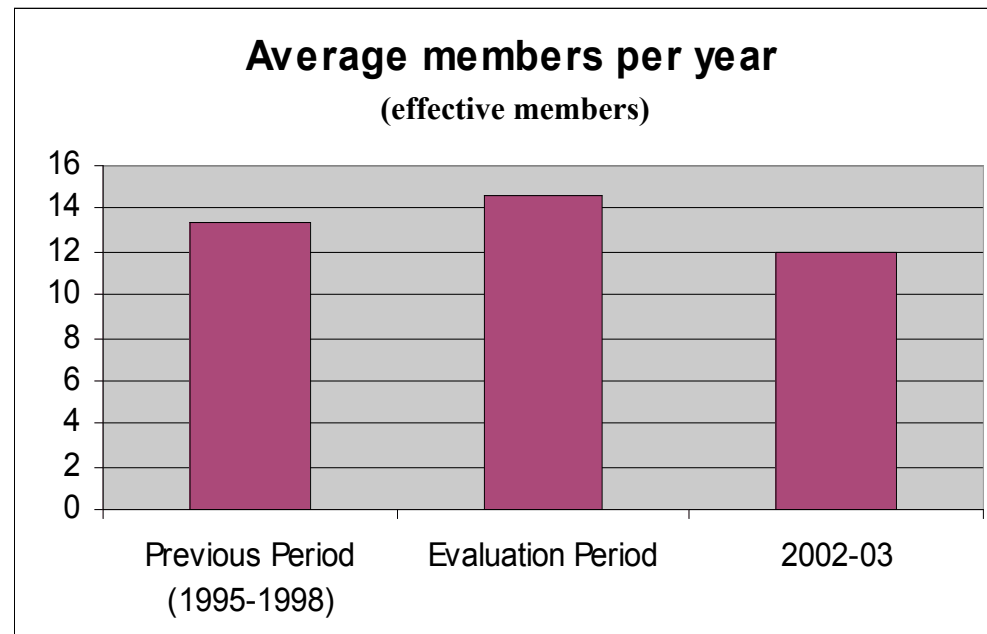
Intelligent Information Systems - IIS

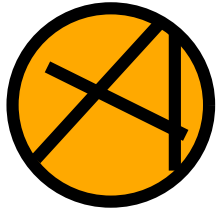
- Other ISS tools:

- Meeting and class scheduling; ERP for higher education institutions; natural language querying; integration into UML framework and use of UML editors.
- Retrieving and processing Portuguese documents; specialized tools for cooperative multimodal information-retrieval system.
- Building NL dialogue knowledge bases for the sentence interpretation from Information System description and Semantic Web ontology.
- Designing data warehouses and querying, with computer assisted multidimensional modeling and their physical design; XML web services for scheduling problems; single view maintenance of ORDB.

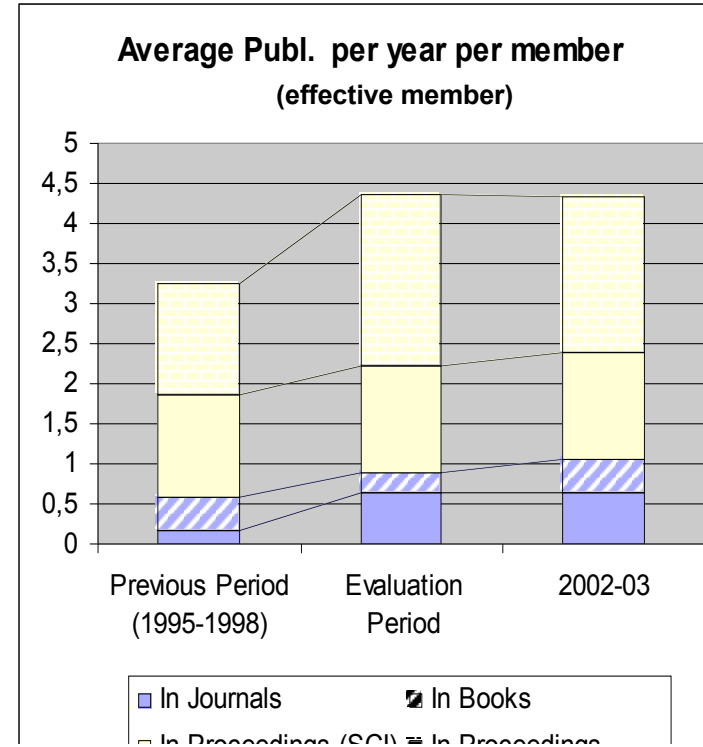
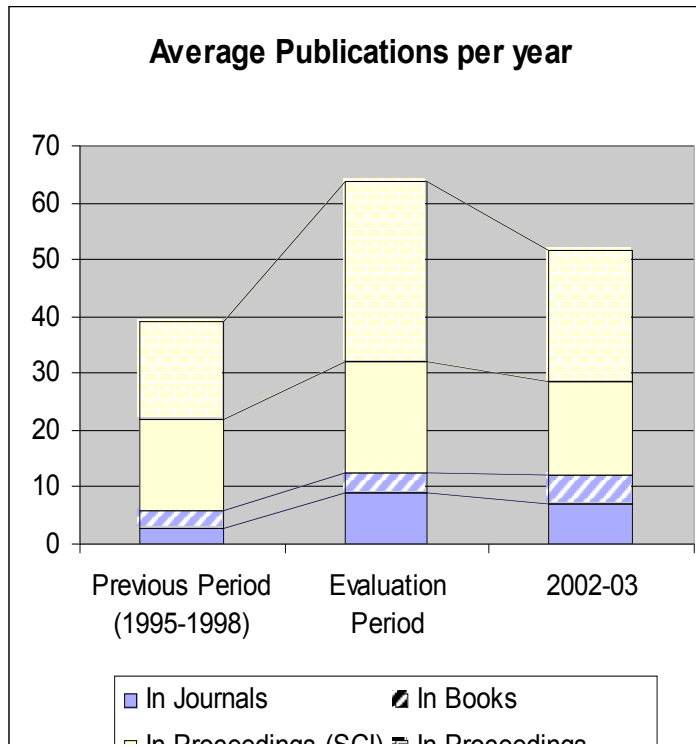


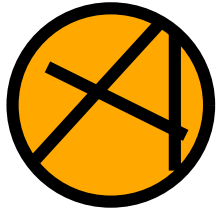
Evolution Graphics - evaluation period





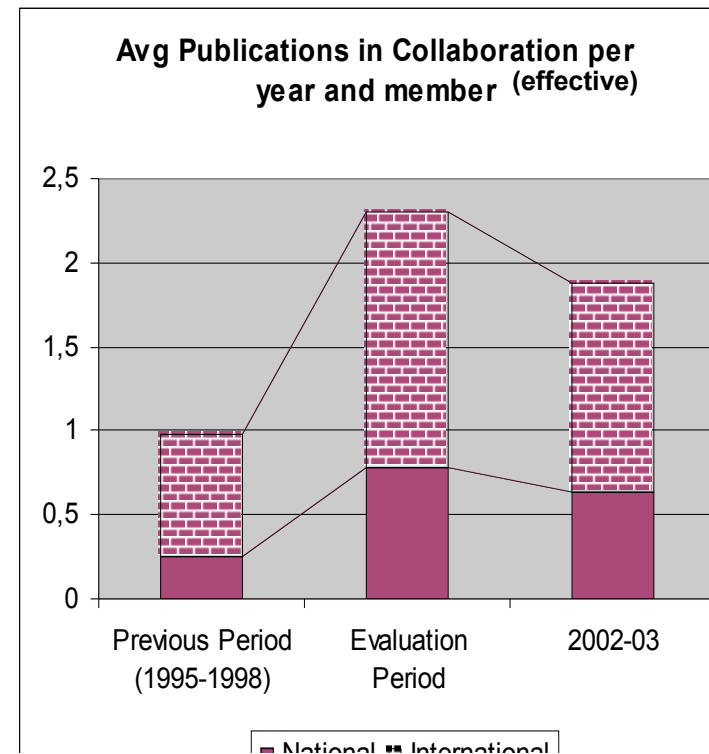
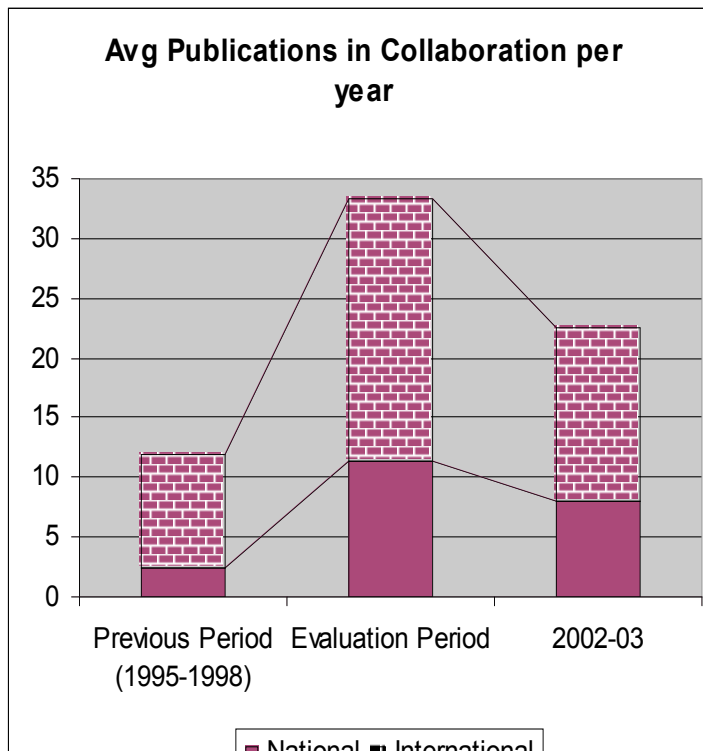
Evolution Graphics - evaluation period





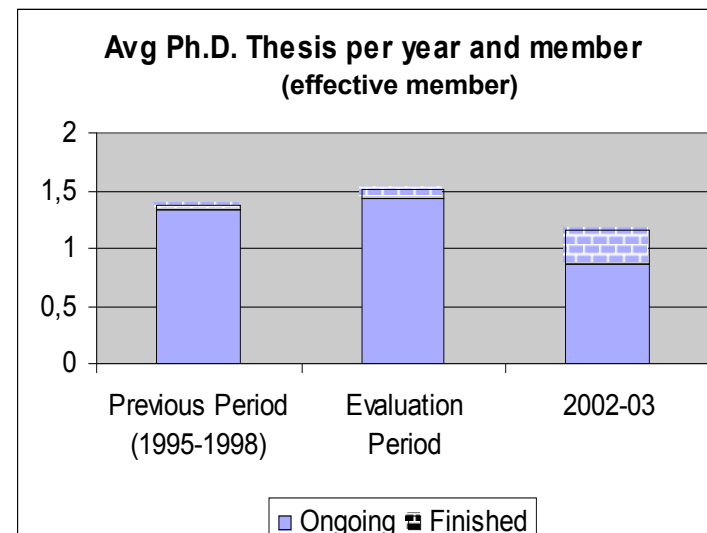
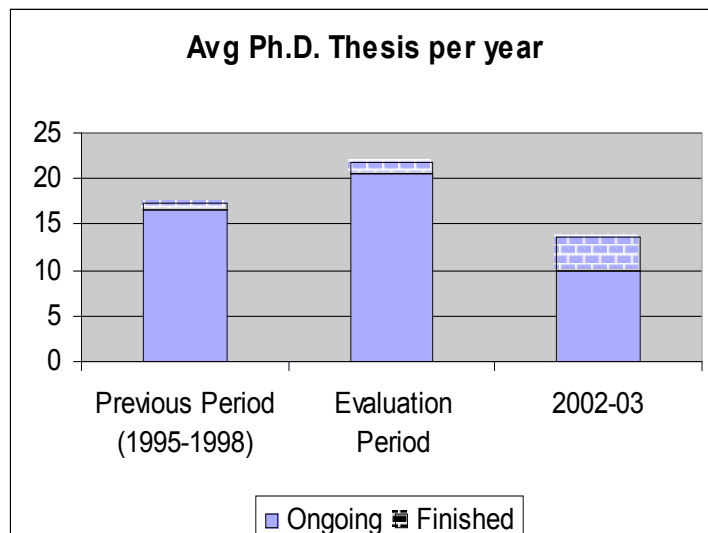
Evolution Graphics - evaluation period

Publishing in collaboration with non-members



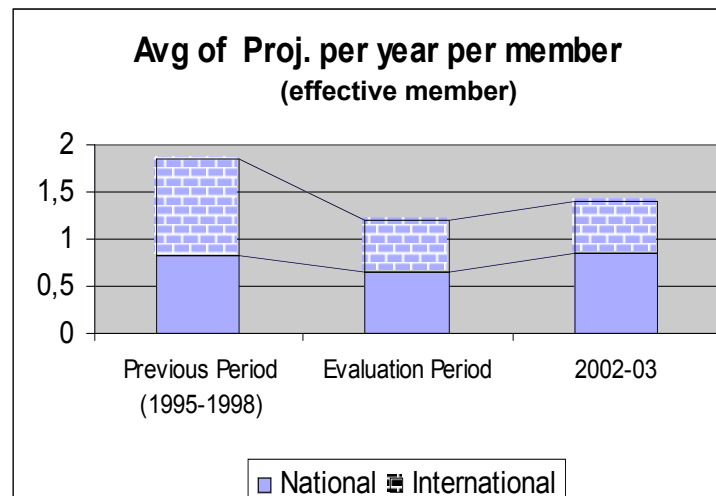
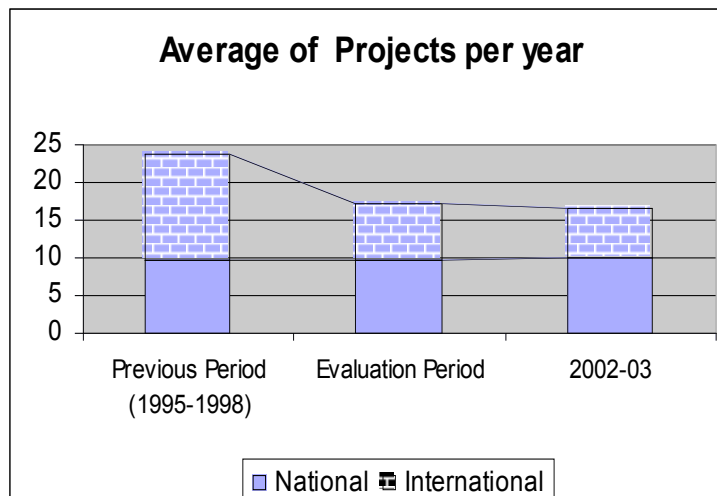


Evolution Graphics - evaluation period





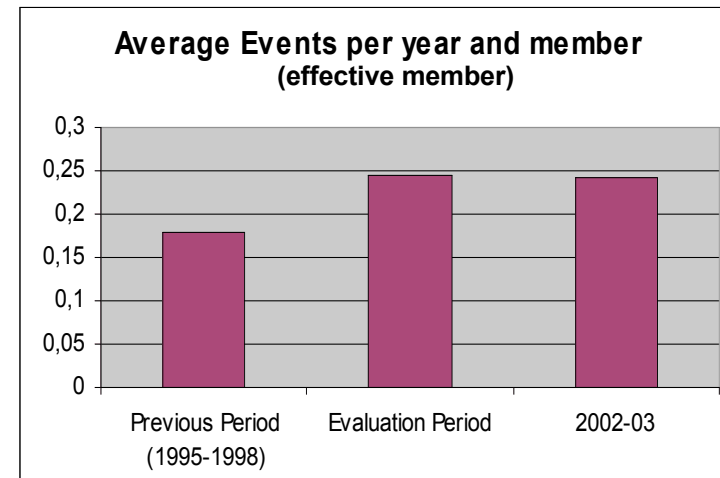
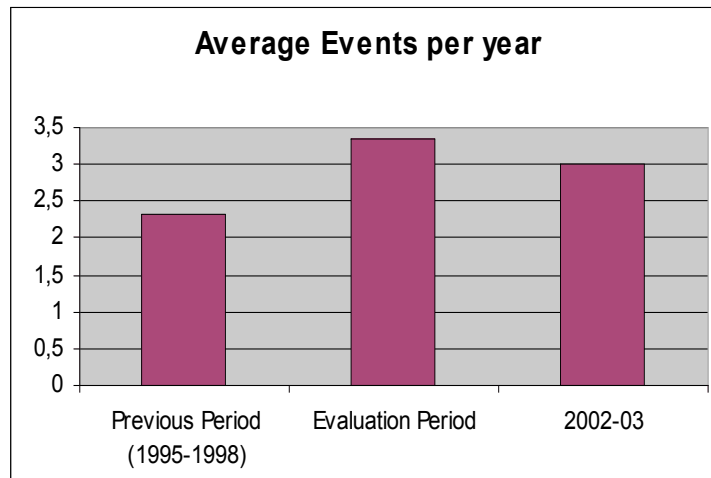
Evolution Graphics - evaluation period

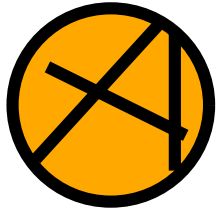




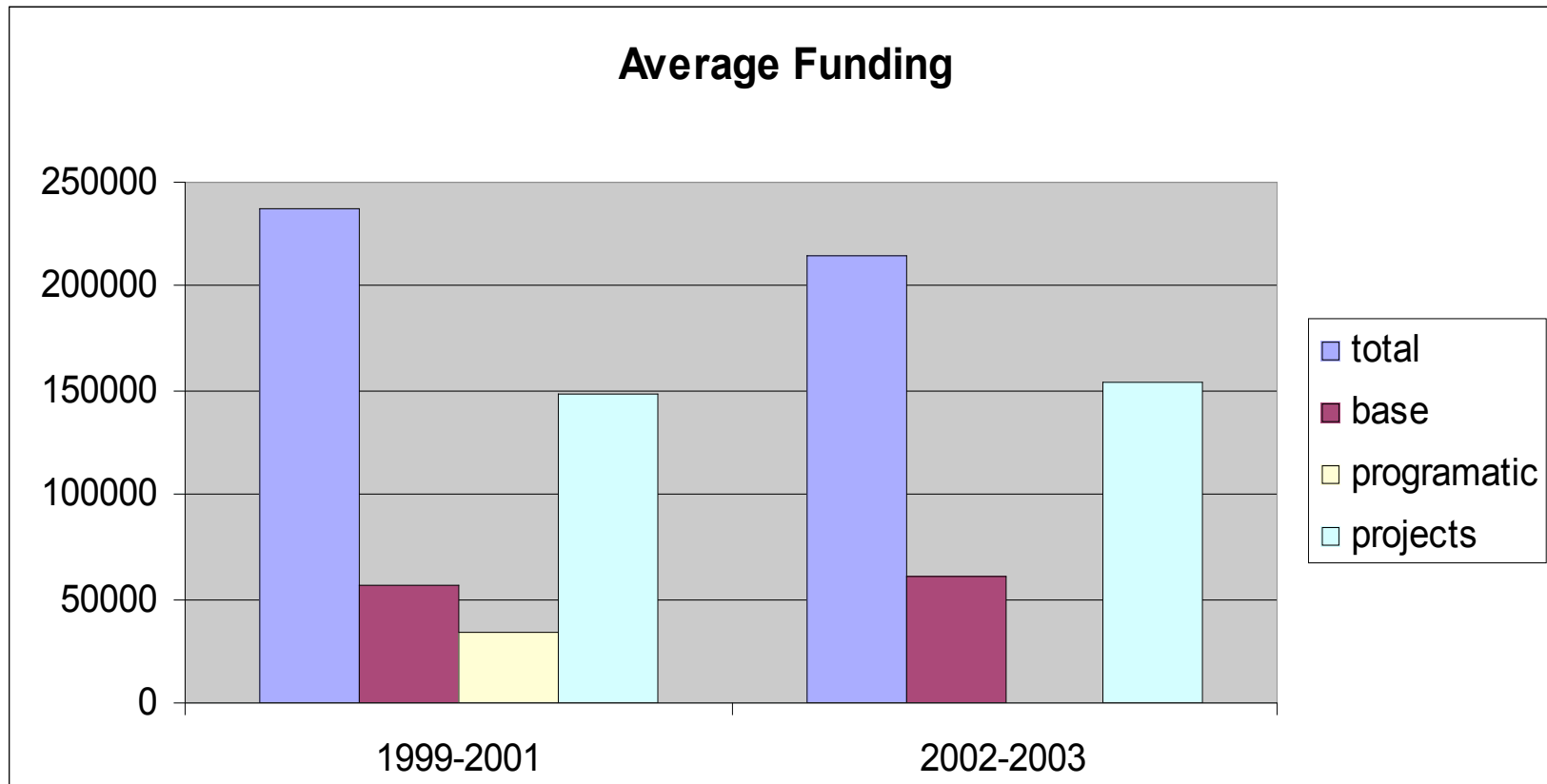
Evolution Graphics - evaluation period

Organization of Scientific Events





Evolution Graphics - evaluation period





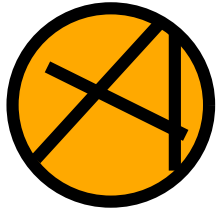
Industrial Relations

- Heurística
- Declarativa
- Portuguese Attorney General
- ParaRede
- Software AG
- Portuguese Parliament
- Marktest
- Systran
- Environment Institute
- XSB Inc
- European consortia



Master and PhD Programs

- **MSc in “Applied Artificial Intelligence”** (97 - 03)
 - UNL, U. Évora
<http://centria.fct.unl.pt/~lmp/miaa/miaa.html>
- **MSc in “Computer Science”** (03 - ..)
 - UNL
<http://www.di.fct.unl.pt/mei0304/>
- **European “MSc in Computational Logic”** (04 - ..)
 - T.U. Dresden, T.U. Vienna, U.P. Madrid
<http://centria.di.fct.unl.pt/~lmp/mestrado>
- **Joint “PhD in Computational Logic”** (under preparation)
 - T.U. Dresden Tele-teaching seminars commenced



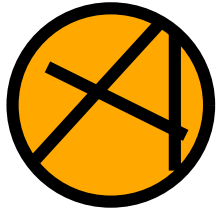
MSc Applied Artificial Intelligence (97 - 03)

1st Semester

- Análise de Corpora
- Aprendizagem e Data Mining
- Bases Dados e Data Warehousing
- Computação e Ciências Cognitivas
- Programação por Restrições
- Processamento Língua Natural 1
- Programação Declarativa
- Representação do Conhecimento

2nd Semester

- Agentes
- Aprendizagem Automática
- Processamento Língua Natural 2
- Programação Não-determinística
- Raciocínio Computacional
- Redes Neurais
- Vida Artificial



MSc in Computer Science (03 - ..)

1st Semester

Programação por Restrições

Representação do Conhecimento e Raciocínio

Text and Data Mining

Bases de Dados e Data Warehousing

Tecnologia de Sistemas de Informação Baseados na WEB

2nd Semester

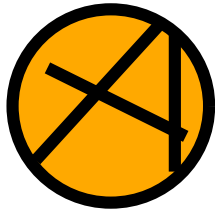
Processamento de Língua Natural

Agentes

Aprendizagem Automática

Tópicos Avançados de Inteligência Artificial

Tópicos de Representação de Conhecimento para a WEB



Study Programme Overview

Semester			
4.	Master Thesis credits: 30		
3.	Project credits: 12 (potentially extended by a module of 12 credits)		Advanced Modules (including seminars) credits in total: 36) (credits 3. sem.: 18)
2.	Advanced Logics (foundation module) credits: 9	Integrated Logic Systems (foundation module) credits: 9	(credits 2. sem.: 12)
1.	Foundations (foundation module) credits in total: 12 <div>The Science of Computational Logic credits: 6</div> <div>Bridging Course Introduction to Logic credits: 4</div> <div>Bridging Course Complexity Theory credits: 2</div> <div>Bridging Course Computer Algebra credits: 2</div>	LCP (foundation module) credits in total: 12 <div>Foundations of Constraint Programming credits: 3</div> <div>Foundations of Logic Programming credits: 3</div> <div>Bridging Course Logic Programming Engineering credits: 6</div> <div>Bridging Course Combinatorics & Analysis of Algorithms credits: 6</div>	(credits 1. sem.: 6)

Total amount of credits: 120

MSc Computational Logic (04 - ..)



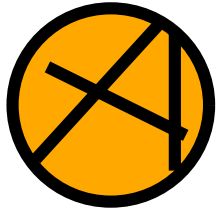
MSc in Computational Logic (04 - ..)

Advanced modules at UNL	ECTS points
Knowledge, Reasoning, and Agents Knowledge Representation Computational Reasoning Agents	12
Constraints Finite Domains Sets and Lists Continuous Domains	12
Logic and Computability Computability Theory Complements of Modal Logic	12
Semantic Web XML Technology Reasoning in the Semantic Web	12



Forthcoming Projects (04 - ..)

- NoE REVERSE "Reasoning in the Semantic Web", approved, starts March 2004.
- FCT, "PRACTIC - Advanced Techniques for Constraint and SAT resolution", approved, started January 2004.
- eContent EU program, "LOIS: Lexical Ontologies for legal Information Sharing", approved, starts February 2004.
- Bilateral coöperation with U. Bratislava, "Research and Teaching in LP", under evaluation.
- Marie Curie RTN (Research and Training Network), "PROTIS: Programming Trusted Intelligent Services", under evaluation.
- ESA (European Space Agency), "Remote Detection of Mediterranean Water Eddies in the Northeast Atlantic (RENA)", under evaluation.
- European FET project, "Conceptual Design", under evaluation.



Foreign students & postdocs

- Future foreign MSc students

The new MSc in Computational Logic shall bring these!

<u>Alban</u> : Latin America	(mail targeting done)
<u>Erasmus World</u> : non-european	(application under way, April 04)
<u>Asia Link</u> : Indonesia, Vietnam	(application under evaluation)

- Resident foreign PhD students

Federico Banti, Italy	Iara Almeida, Brazil
João Lima Alcântara, Brazil	Juan Acosta Guadarrama, Mexico

- Resident foreign postdocs

Veska Noncheva	Bulgaria	May 01-02	Learning & NL
Agnès Braud	France	Sept 02-03	Genetic Algorithms
Reinhard Kahle,	Tübingen	April 02 -	Proof Theory
Marco Castellani	Italy	June 02 -	Neural Networks
Gregory Wheeler	USA	Sept 02 -	Statistical Defaults
Ning Chen	China	Sept 02 -	Clustering



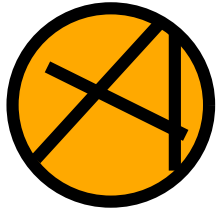
Synergies

- Synergistic topics betwixt CENTRIA areas
 - Semantic Web
 - Bio-informatics
 - Legislative Information Systems



Strategic Goals for 04-06

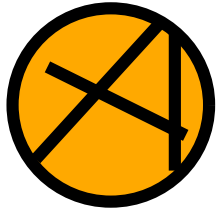
- Reinforce internationalization
 - Projects and networks (already mentioned)
 - Increase post-graduate education (the new distributed MSc, PhD)
 - Organize international scientific events (JELIA'04, CLIMA-V'04, ...)
 - Senior researcher visits and resident foreign post-docs
- Consolidate research areas
- Foster synergies within CENTRIA
- Promote links with UNL and national centres
- Explore potential service and societal needs
- Critical Manpower
 - Attract more MSc and PhD candidates



Programmatic funding: yearly needs

■ Books and journals	€ 2 K	
■ Scholarships	€ 80 K	2 Postdocs, 2 PhD, 2MSc
■ Missions	€ 30 K	1 mission / PhD
■ Technical support	€ 15 K	1 part time-technician
■ Administrative support	€ 30 K	1 high level assistant
■ Equipment infrastructure	€ 15 K	contribution to UNL
■ Advisory Board expenses	€ 5 K	

Total per year € 180 K



CENTRIA

The end