



WEB SCIENCE BRASIL

Brazilian Institute for Web Science Research

Web Science

November 2010





WEB SCIENCE BRASIL

Brazilian Institute for Web Science Research

INCT - Instituto Brasileiro de Pesquisa em Ciência da Web



Mission

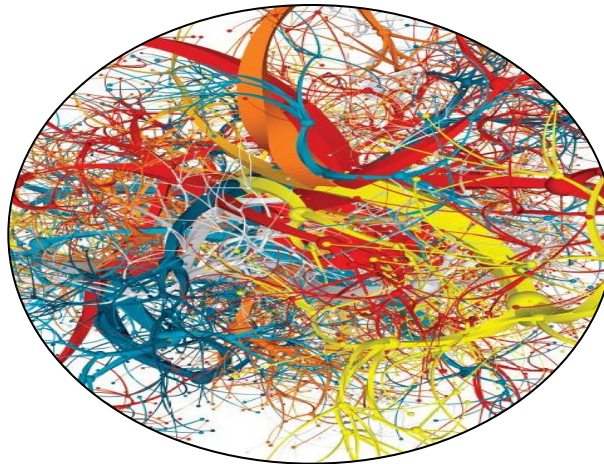


- To advance scientific research in themes related to the new discipline of Web Science;
- To educate professionals and researchers, to guarantee innovation and to promote interdisciplinary cooperation;
- To transfer knowledge to all sectors of society through comprehensive educational programs; and
- To transfer knowledge to industry and to the services sector through specific programs, including residencies in the Institute.

Motivation I



- The Web...
 - has an ever increasing impact in scientific research, technological development and society as a whole.



HENDLER, J. SHADBOLT, N., HALL, W., BERNERS-LEE, T., WEITZNER, D. “Web Science: An Interdisciplinary Approach to Understanding the Web”. Comm. of the ACM, 51, pp. 60-69, 2008.

Motivation II



- The Web is frequently viewed by web users and even by experts in CS as an application that **runs on the network**.
- However, it has its **own protocols, algorithms, and architectural principles**.
- Web Science is related to the concept of **emergent behavior**: how and why simple principles and other behaviors lead to complex structures and other phenomena, and how is it possible to anticipate them?
- The Web needs to be studied and understood as a **phenomenon** and also as an entity to which **engineering** must be applied to enable its future growth and to make available new functionalities.



Motivation III

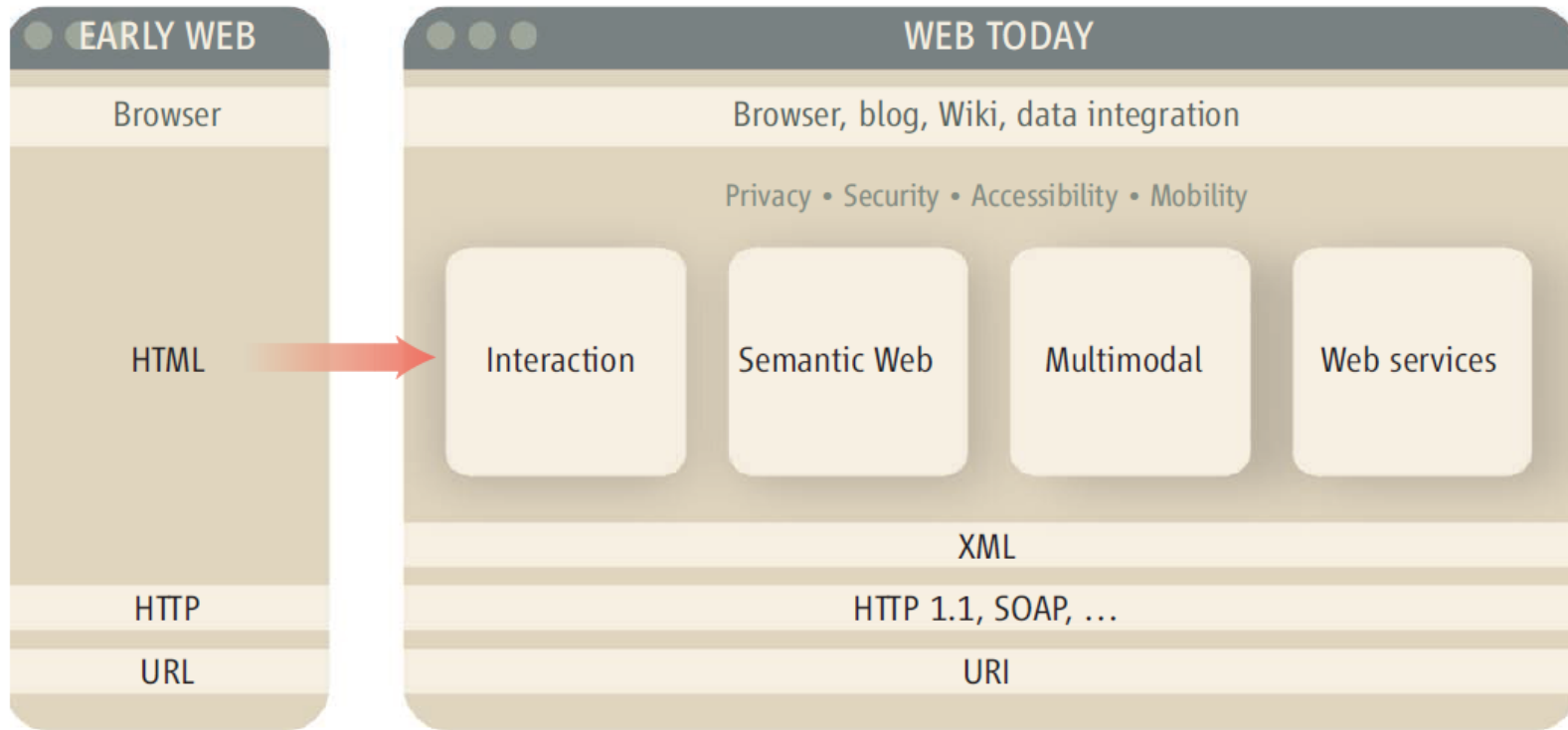
- In a Web Science agenda, the term **science** has **two meanings**.
- Natural sciences **analyze the natural world** and investigate microscopic laws that, when extrapolated to the macroscopic scale, are able to generate the observed behavior.
- Computer Science, though partially analytical, is **mainly synthetic**: it is interested in creating new languages and algorithms capable of producing novel computational results.
- Web Science is a **combination of both perspectives**: the Web is a space created by engineering, but humans create Web pages and their links, and their interactions form **emergent patterns** at the macroscopic scale.

Motivation IV



- Interactions at the macroscopic level are governed by **conventions** and **social norms**.
- Web Science, therefore, must be **inherently interdisciplinary**.
- Its goal is to **understand** the growth of the Web and to create procedures to enable more powerful and beneficial **novel patterns** to occur.

The Early Web and the Web Today



- **Yesterday:** Textual content expressed in HTML, exchanged via HTTP, viewed in a simple browser pointing at a URL
- **Today:** Variety of tools to access richer content
 - Scalable vector graphics, Semantic Web, multimodal devices, and description of services
 - Content expressed in XML, exchanged by new protocols (HTTP 1.1 and SOAP), addressed by URI schemas

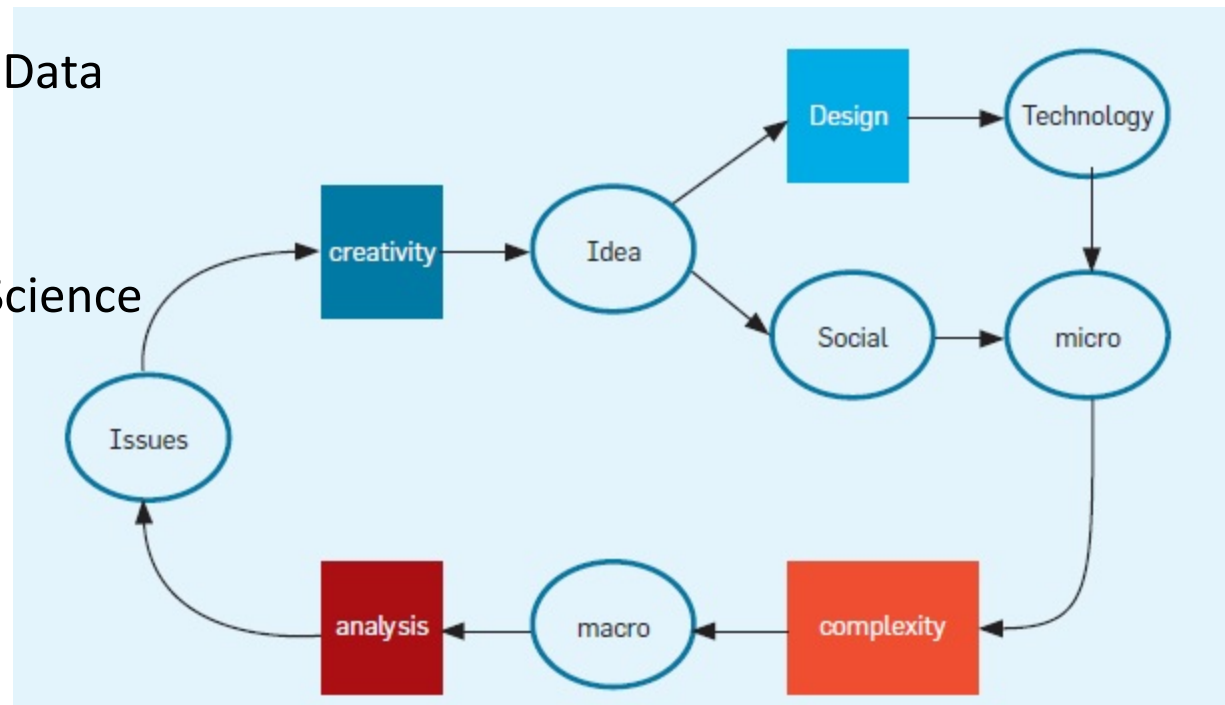




A Research Agenda for Web Science

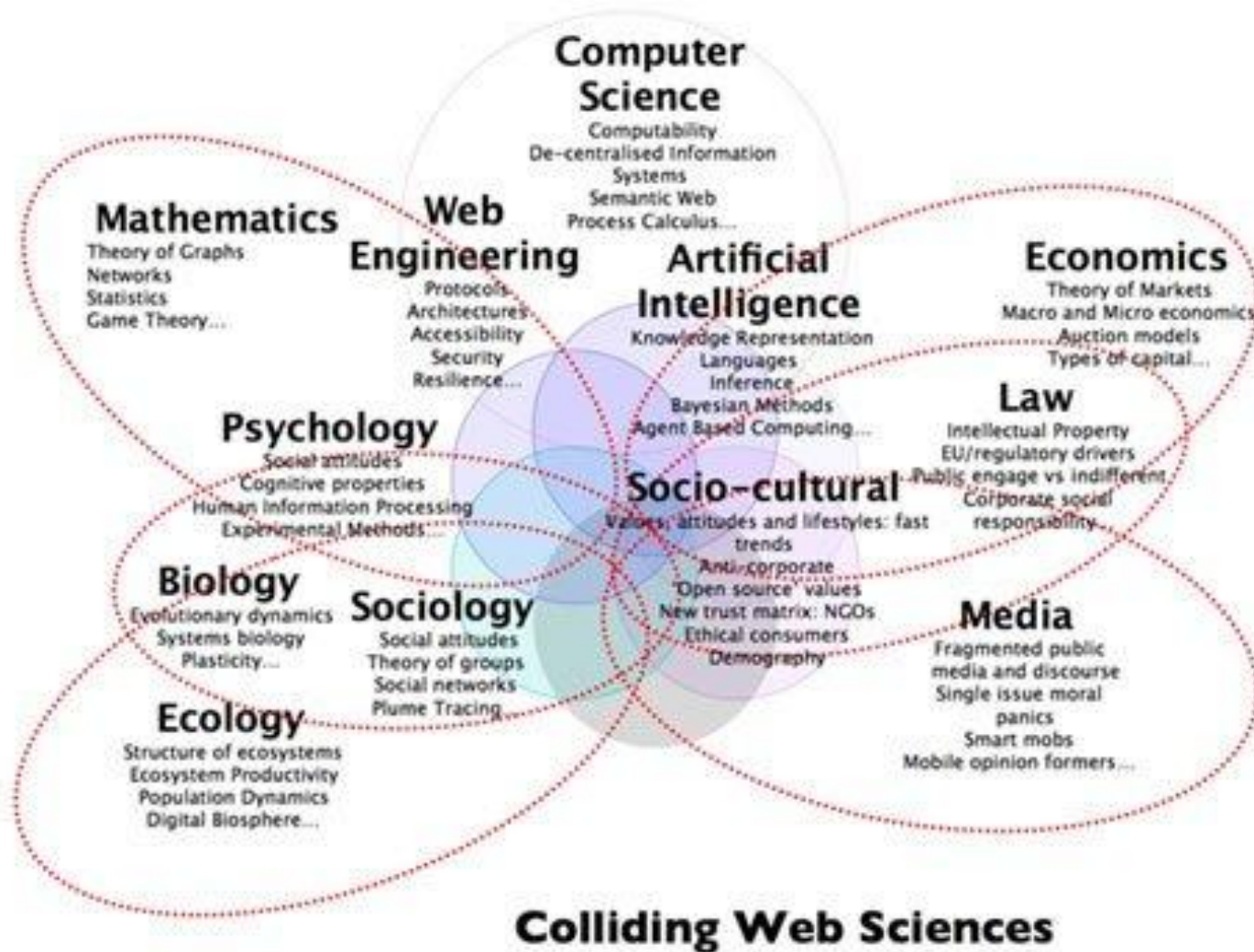
A vision with **five dimensions**

- People and Society
- Software Technologies for Web Applications
- Management of Web Data
- Web Infrastructure
- Foundations of Web Science

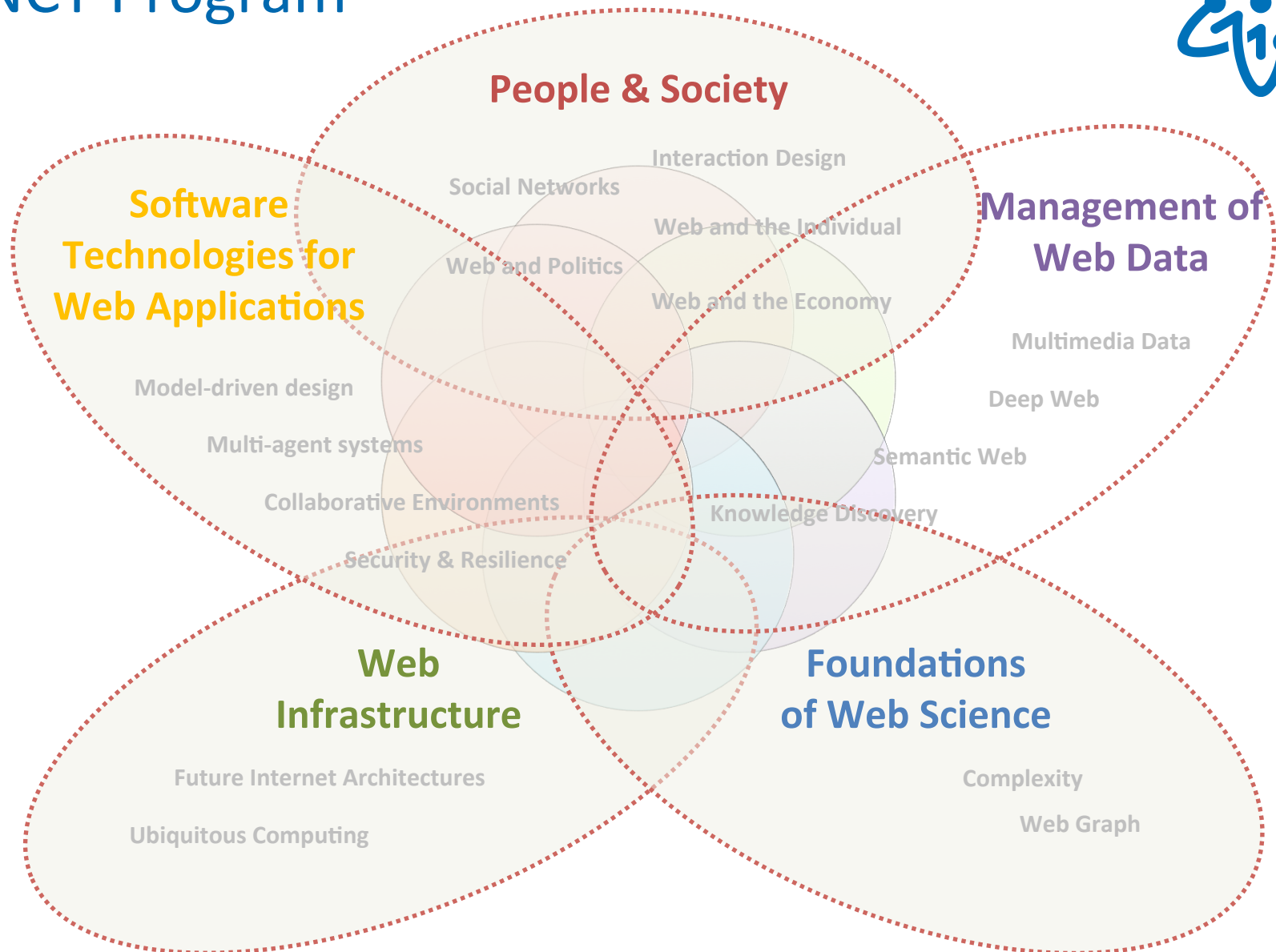


Communications of the ACM
July 2008

Web Sciences



INCT Program



People and Society



- The Institute will contribute to a **better understanding of how people interact** with Web resources, the dynamics of social networks, and the impact of the Web on the individuals.
- It will deal with interfaces for users with **special needs**.
- It will contribute to the analysis of how **political activities** use the Web and how **research in Economics** may benefit from data extracted from the Web.

Software Technologies for Web Applications



- The Institute's activities will contribute to the development of Web applications involving thousands of independent with processes **autonomic computing** capabilities and also capable of **self organization**
- Activities will also comprehend the creation of novel techniques to develop virtual worlds for collaboration on the Web, including e-learning as one of its target applications.

Management of Web Data



- Efforts to solve essential problems in **searching data** and **organizing content** on the Web.
- Tools and techniques to **manage multimedia data** on the Web, to **search databases** available on the Web, to confer **semantics** on Web pages, and to develop new models for searching data on the Web.

Web Infrastructure



- Research efforts will investigate the design and implementation of **novel computer network architectures** that will enable the Web of the future.
- They will also contribute to extend Web applications to operate on **mobile computing platforms**.

Foundations on Web Science



- To investigate properties of the **Web graph**, to develop novel combinatorial methods involving the graph to investigate metaheuristics in the context of the **mathematics of the Web**
- To investigate modeling techniques that address issues related to **robustness** and to the **complex interactions** among Web applications and their users.

Research Team



The Institute comprises approximately 106 PhD researchers, with high publication profile, led by 6 senior researchers. The research team includes:

- 7 researchers with the highest level of productivity grant from the CNPq (1A)
- 3 researchers awarded the Ordem Nacional do Mérito Científico at the Grand Cross class
- 6 researchers awarded the Ordem Nacional do Mérito Científico at the “Comendador” class
- 4 members of the Brazilian Academy of Science
- a total of 55 researchers with productivity grants from the CNPq

INCT Governnance (responsibilities of the Steering Committee)



Institutions

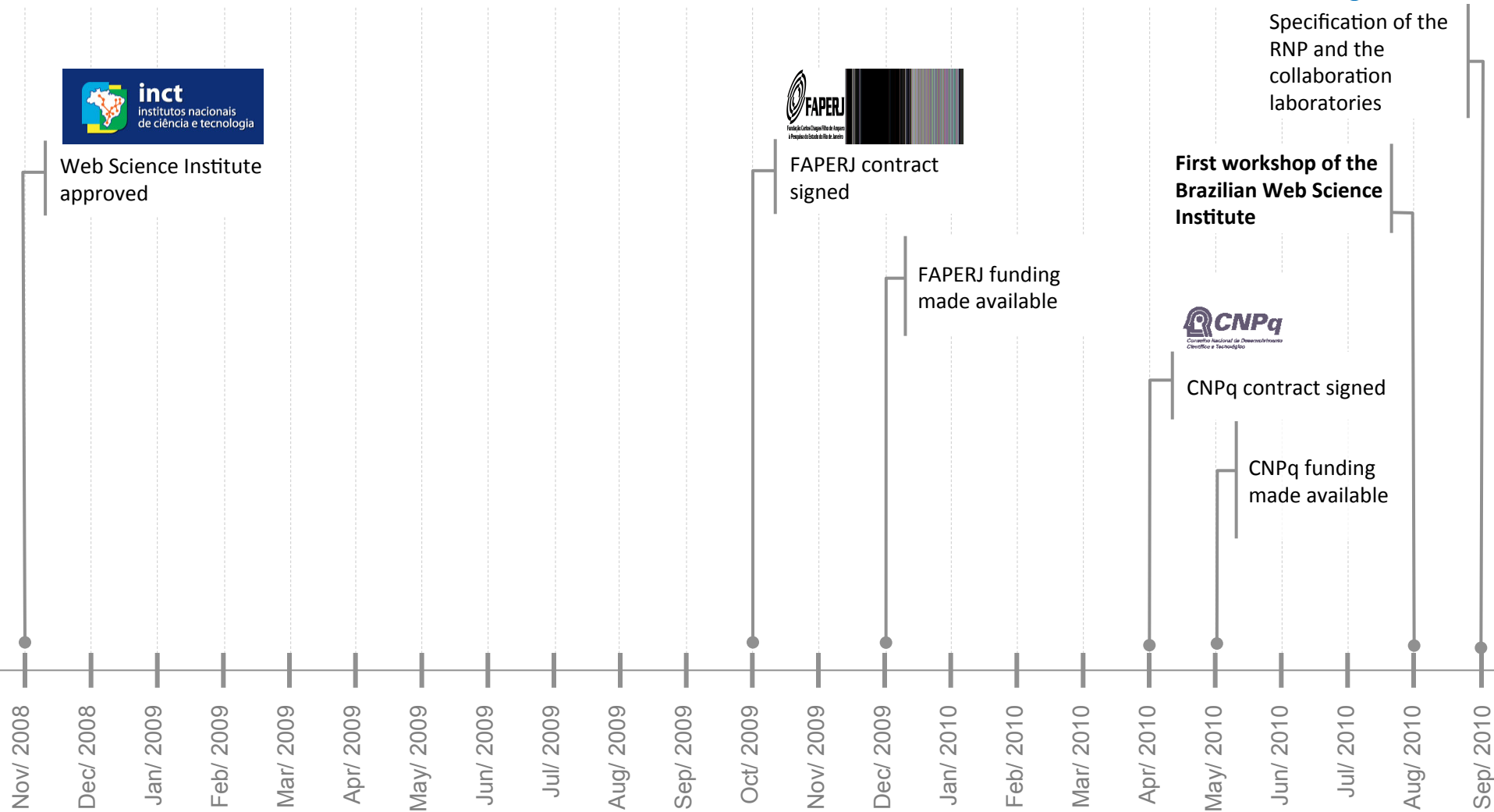
- Informatics Department – PUC-Rio
- Systems and Computer Engineering Program – UFRJ
- Computation Institute – UNICAMP
- UERJ
- UENF
- UNIRio
- UFRn
- UFC
- Rede Nacional de Pesquisa (National Research Network)



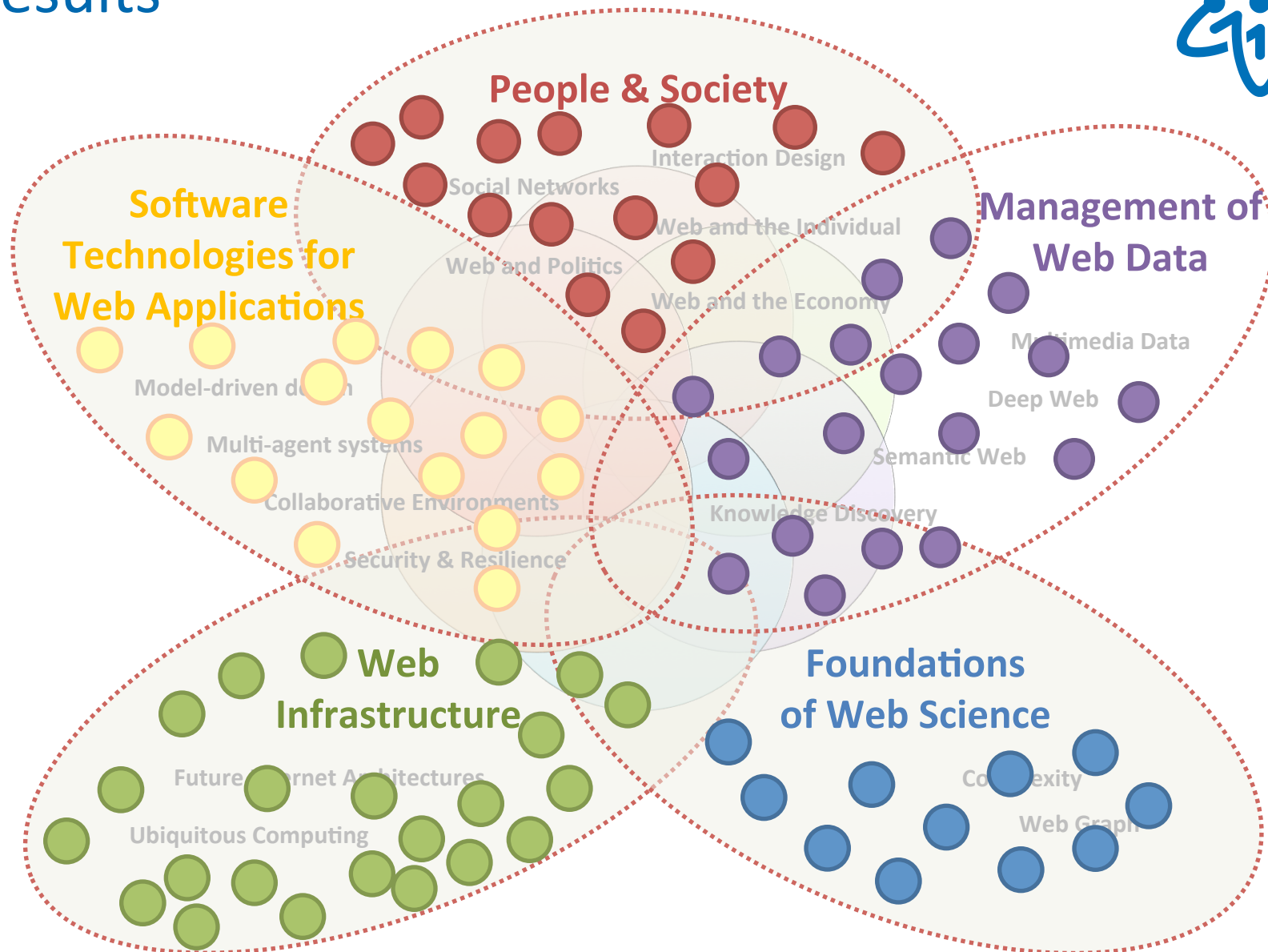
International Cooperation

- DERI - Digital Enterprise Research Institute (<http://www.deri.ie>): recognized as one of the leading research institutes on Web Science
- L3S Research Center (<http://www.l3s.de>): focuses on the development of state-of-the-art methods to leverage the areas of Knowledge, Information, and Learning.
- The David R. Cheriton School of Computer Science, U. of Waterloo (<http://www.cs.uwaterloo.ca>)
- LIP6 – Laboratoire d’Informatique de Paris VI (<http://www.lip6.fr>)
- LERO - Home - Lero is the Irish Software Engineering Research Centre - <http://www.lero.ie/>

Timeline



Results



Workshop .



	Tue 24	Wed 25
8:00 - 8:45	Registration	
8:45 - 9:00	Workshop Welcome and Opening – Carlos José Pereira de Lucena	
9:00 - 10:00	<i>Keynote</i> <i>Session chair: Carlos José Pereira de Lucena</i> From Disasters to WoW: Using Web Science to understand and enable 21st century multidimensional networks <i>Noshir Contractor – Northwestern University, USA</i>	<i>Keynote</i> <i>Session chair: Cláudia Bauzer de Medeiros</i> Evolving the Internet: the Role of Linked Data <i>Stefan Decker – DERI, Ireland</i>
10:00 - 10:30	COFFEE-BREAK	COFFEE-BREAK
10:30 - 12:00	<i>Technical session</i> <i>Session chair: Geraldo Xexéo</i> <ul style="list-style-type: none"> The Trace of Sociability in Web Accessibility Technologies <i>de Souza, C.S.; Monteiro, I.T. – PUC-Rio</i> Web of Things: The Collaborative Interaction Designer Point of View <i>Velloso, E.; Raposo, A.; Fuks, H. – PUC-Rio</i> Promoting the Commons: the Public Software Website and the Public Brand Agreement <i>Soares, M.V.B.; França, F.M.G.; Fonseca, M.G.D. – PESC/COPPE, IE-UFRJ</i> Ideas to broaden Electronic Democracy <i>Araujo, R.M.; Diirr, B.; Engiel, P.; Tavares, R.L.; Gomes, J.; Cappelli, C.; Pimentel, M. – UNIRIO</i> Identifying Patterns of Temporal and Geo-Referenced Content Generated by Mobile Social Users <i>Malcher, M.A.; Endler, M.; Breitman, K. – PUC-Rio</i> Research notes on the emerging concepts of digital heritage in Brazil <i>Dantas, C.G.; Dodebei, V. – UNIRIO</i> An End-user Domain-specific Model to Drive Dynamic User Agents Adaptations <i>Nunes, I.; Barbosa, S.D.J.; Lucena, C.J.P. – PUC-Rio</i> 	<i>Technical session</i> <i>Session chair: Uirá Kulesza</i> <ul style="list-style-type: none"> A Research Agenda Concerning Dependability of Web-Based Systems <i>Staa, A.v. – PUC-Rio</i> Software Transparency <i>Leite, J.C.S.P.; Cappelli, C. – PUC-Rio, UNIRIO</i> W-Ray: A Strategy to Publish Deep Web Geographic Data <i>Piccinini, H.; Casanova, M. A.; Cavalieri, M.; Furtado, A.L. – PUC-Rio, IBGE</i> Handling and Publishing Wireless Sensor Network Data: a hands-on experiment <i>Koga, I. K.; Medeiros, C. B.; Branquinho, O. – UNICAMP, PUC-Campinas</i> Web Knowledge Representation with Autonomic Ontologies <i>Brandão, S.; Oliveira, J.; de Souza, J. – UFRJ</i> Hedge detection using the RelHunter approach <i>Fernandes, E.R.; Crestana, C.E.M.; Milidiú, R.L. – PUC-Rio</i> Extracting Web Data Connections for Identifying Similar Interests in Microblogging <i>Vrabl, S. D. P.; Oliveira, J.; Motta, C. L. R. – UFRJ</i>
12:00 - 12:20	collaboration-focused discussion (organized by Geraldo Xexéo)	collaboration-focused discussion (organized by Geraldo Xexéo)

Workshop..



12:20 - 13:20	LUNCH	LUNCH
13:20 - 14:40	<p><i>Technical session</i> <i>Session chair: Karin Breitman</i></p> <ul style="list-style-type: none"> ▪ Users' perception of the web as a single environment <i>Nicolaci-da-Costa, A.M.; Abreu, R. A. S. – PUC-Rio</i> ▪ Analyzing Collaboration in Software Development Processes through Social Networks <i>Magdaleno, A.M.; Werner, C.M.L.; Araujo, R.M. – PESC-COPPE, UNIRIO</i> ▪ Improving Collaborative Knowledge Flow Design on Social Networks through Autonomic Computing Systems Properties <i>Silva, R.; Oliveira, J.; de Souza, J. – UFRJ</i> ▪ Modeling POMDPs for generating and simulating stock investment policies <i>Baffa, A.C.E.; Ciarlini, A.E.M. – UNIRIO</i> ▪ A Model for Interactive TV Storytelling <i>Camanho, M.M.; Ciarlini, A.E.M.; Furtado, A.L.; Pozzer, C. T.; Feijó, B. – UNIRIO, PUC-Rio, UFSM</i> ▪ Component-based Web Clients For Scientific Data Exploration Using The DCC Framework <i>Santanchè, A.; Baumann, P. – UNIFACS, UNICAMP, Jacobs University Alemanha</i> 	<p><i>Technical session</i> <i>Session chair: Marco Antonio Casanova</i></p> <ul style="list-style-type: none"> ▪ Using Jason to Develop Normative Agents <i>Santos Neto, B.F.; Silva, V.T.; Lucena, C.J.P. – PUC-Rio, UFF</i> ▪ Automating the Product Derivation Process of Multi-Agent Systems Product Lines <i>Cirilo, E.J.R.; Nunes, I.; Kulesza, U.; Lucena, C.J.P. – PUC-Rio, UFRN</i> ▪ Some remarks on the geodetic number of a graph <i>Dourado, M.C.; Protti, F.; Rautenbach, D.; Szwarcfiter, J.L. – UFRJ</i> ▪ SER-Based Web Graph Decontamination <i>Gonçalves, V.C.F.; França, F.M.G.; Maculan, N.; Lima, P.M.V. – UFRJ, UFRRJ</i> ▪ The Design of Multi-facility Backbone Networks under Uncertain Multi-classes of Traffic <i>Andrade, R.; Lisser, A.; Maculan, N. – UFRJ</i> ▪ A Combined Parallel Lagrangian Decomposition and Cutting-Plane Generation for Maximum Stable Set Problems <i>Campelo, M.; Corrêa, R. – UFC</i>
14:40 - 15:40	<p><i>Keynote</i> <i>Session chair: Edmundo Albuquerque de Souza e Silva</i></p> <ul style="list-style-type: none"> ▪ Towards a Network Measurement Science <i>Don Towsley – University of Massachusetts</i> 	<p><i>Keynote</i> <i>Session chair: _____</i></p> <ul style="list-style-type: none"> ▪ A Web-based Framework for Collaborative Innovation <i>Don Cowan – UWaterloo, Canada</i>

Workshop...



15:40 - 16:00	COFFEE-BREAK	COFFEE-BREAK
16:00 - 17:00	<p><i>Technical session</i> <i>Session chair: Ângelo Ciarlini</i></p> <ul style="list-style-type: none"> ▪ Design of a testbed for R&D in network architectures <i>Abelém, A. J. G.; Machado, I.; Stanton M. A.; Carvalho, T. M.B. – UFPA, RNP, UFF, USP</i> ▪ Impact of Operating Systems on Wireless Sensor Networks (Security) Applications and Testbeds <i>Margi, C. B.; Oliveira, B. T.; Sousa, G. T.; Simplicio Jr., M. A.; Barreto, P. S. L. M.; Carvalho, T. C. M. C.; Naslund, M.; Gold, R. – USP, PCS-USP, Ericsson Suécia</i> ▪ Measurement Infrastructures for Future Internet Testbeds <i>Monteiro, J. A. S. – UNIFACS</i> ▪ Estimating Self-Sustainability in Peer-to-Peer Swarming Systems <i>Menasché, D.S.; Rochay, A.A.A.; Souza e Silva, E.A.; Leão, R.; Towsley, D.; Venkataramani, A. – University of Massachusetts, UFRJ</i> 	<p><i>collaboration-focused discussion (organized by Geraldo Xexéo)</i></p>
17:00 - 18:00	<p>Panel: Why Web Science is NOT Computer Science <i>Moderator: Daniel Schwabe</i> <i>Panelists:</i></p> <p style="padding-left: 40px;"><i>Noshir Contractor (Northwestern University, USA)</i> <i>Don Cowan (University of Waterloo, Canada)</i> <i>Stefan Decker (DERI, Ireland)</i> <i>Don Towsley (University of Massachusetts, USA)</i></p>	<p>closing notes (10 min)</p>
18:00 - 21:00	COCKTAIL	

Major Results



People and Society

Interaction Design

- de Souza, C.S. and Monteiro, I.T. [The Trace of Sociability in Web Accessibility Technologies \(unrevised\)](#), First Workshop of the Brazilian Institute for Web Science Research, Rio de Janeiro, 2010 (**Check for [\[revised version online\]](#).**)
 - PUC-Rio
 - Goals: G2, G3 and G4
 - We report an empirical study where we found that sociability models may be invisibly encoded in Waccessibility tools. Our position is that the scientific foundations of CS may make it difficult for computer scientists to realize and deal with the cultural determination of technologies they help create.
- Velloso, E., Raposo, A., Fuks, H. [Web of Things: The Collaborative Interaction Designer Point of View](#), First Workshop of the Brazilian Institute for Web Science Research (Position paper), Rio de Janeiro, 2010
 - PUC-Rio
 - *Investigate new interaction techniques and paradigms on the Web*
 - This position paper describes the authors' vision of the future of the Web and how nontraditional interfaces, Semantic Web technologies and Multi-Agent Systems are possible solutions for Ubiquitous Computing issues.

Major Results



People and Society

Social Networks

- Dantas, C.G., Dodebei, V. [Research notes on the emerging concepts of digital heritage in Brazil](#), [Catac 2010 <http://www.cataconference.org/>], Vancouver, 15-18 June, 2010.
 - UNIRIO
 - *Configuration and conceptualization of digital heritage in social networks*
 - This paper focuses on the analysis of a government experience with social media intended to prepare an official report, which follows the Unesco guidelines in general, but falls short in the discussion of born-digital heritage
- Gonçalves, J.C.A.R. Santoro, F.M., Baião, F.A. [A case study on designing business processes based on collaborative and mining approaches](#), [CSCWD](#), China, April 2010
 - UNIRIO
 - Definition of mechanisms for knowledge discovery and organization from narrative social content
 - This paper presents the Story Mining Method, which aims to discover and represent business processes through free-form narratives and text mining/natural language techniques for text translation into process models.
- Leite, J.C.S.P; Cappelli, C. [Softwaretransparenz](#) WIRTSCHAFTSINFORMATIK Ausgabe Nr.: 2010-03
 - PUC-Rio, UNIRIO
 - G6 (Support Intentional Social Networks) Software Technologies for Web Applications - Model Driven Design and Implementation of Web Applications G1 (Define a model-driven framework to support specification, design and implementation of Web applications, seen as part of men-machine teams.)

Major Results



People and Society

Social Networks

- Magdaleno, A.M.; Werner, C.M.L.; Araujo, R.M. [Estudo de Ferramentas de Mineração, Visualização e Análise de Redes Sociais](#), Relatório Técnico ES-735, PESC-COPPE, Rio de Janeiro, 2010
 - PESC-COPPE, UNIRIO
 - *Definition of models for social networks analysis and mining in order to discover patterns, needs and requirements for collaboration support*
- Magdaleno, A.M.; Werner, C.M.L.; Araujo, R.M. [Analyzing Collaboration in Software Development Processes through Social Networks](#), First Workshop of the Brazilian Institute for Web Science Research (Position paper), Rio de Janeiro, 2010
 - PESC-COPPE, UNIRIO
 - *Definition of models for social networks analysis and mining in order to discover patterns, needs and requirements for collaboration support*
 - This paper defends that two distinct characteristics of software development models – collaboration and discipline – can be the drivers to tailor software processes. This article focuses on collaboration analysis through social networks.
- Santos, T.A., Araujo, R.M., Magdaleno, A.M. [Identifying Collaboration Patterns in Software Development Social Networks](#), [INFOCOMP](#), Lavras, 2010 (submitted)
 - UNIRIO, UFRJ
 - *Definition of models for social networks analysis and mining in order to discover patterns, needs and requirements for collaboration support*
 - This paper proposes an approach based on social networks analysis to identify collaboration patterns in software development process instances which can be used as a resource for collaboration awareness and understanding.

Major Results



People and Society

Social Networks

- Silva, R.; Oliveira, J.; de Souza, J., [Improving Collaborative Knowledge Flow Design on Social Networks through Autonomic Computing Systems Properties](#), [In: submitted to First Workshop of the Brazilian Institute for Web Science Research], Rio de Janeiro, 2010.
 - COPPE/UFRJ
 - Incorporate autonomic characteristics into the control of social networks.
 - Autonomic computing is an approach to systems management that can give them the ability to perform management activities based on situations they observe in its environment. Social networks are groups of links that organize people, groups, and institutions in an equalitarian and democratic way around a common objective. Its members can collect and disseminate data, information, and knowledge in a collaborative way. For that, the design of the entire social network is very important and must be improved to facilitate the collaboration. This paper discusses how autonomic computing is being applied to improve the knowledge flow over social networks, and propose a generic architecture based on autonomic elements.

Major Results



People and Society

Social Networks

- Soares, M.V.B.; França, F.M.G.; Fonseca, M.G.D. [Promoting the Commons: the Public Software Website and the Public Brand Agreement](#), [In: submitted to the First Workshop of the Brazilian Institute for Web Science Research], Rio de Janeiro, 2010
 - COPPE/UFRJ
 - G5. Investigate current tools and interaction paradigms for empowering users to adapt and extend content and services on the Web; G7. Investigate new interaction techniques and paradigms on the Web; G8. Investigate the socio-pragmatics of human interaction with information through Web application, the social and legal rules governing information uses.
 - This article provides an explanation, based on the reduction of transaction cost, of why Brazilian Government is promoting a particular commons, through an Internet website named Brazilian Public Software and through the construction of the Public Brand Agreement.
- Vrabl, S. D. P.; Oliveira, J.; Motta, C. L. R. [Extracting Web Data Connections for Identifying Similar Interests in Microblogging](#), [In: submitted to First Workshop of the Brazilian Institute for Web Science Research], Rio de Janeiro, 2010.
 - COPPE/UFRJ
 - Definition of mechanisms for knowledge discovery and organization from narrative social content.

This paper proposes a social match model for identifying people with similar interests. Based on Twitter's data, we developed level of knowledge indicators and identified profile traces, which together, can offer a more precise people recommendation. The goal is strengthening

Major Results



People and Society

Web and Politics

- Araujo, R.M., Diirr, B., Engiel, P., Tavares, R.L., Gomes, J., Cappelli, C., Pimentel, M. [Ideas to broaden Electronic Democracy](#), First Workshop of the Brazilian Institute for Web Science Research (Position paper), Rio de Janeiro, 2010
 - UNIRIO
 - *Analysis of Web use by social movements*
 - This paper discusses the views, outcomes and future work of AGORA research project. Its main objective is to define approaches and applications to support different levels of participation in democratic contexts.

Web and the Economy

- Baffa, A.C.E.; Ciarlini, A.E.M. [Modeling POMDPs for generating and simulating stock investment policies](#). In: Proceedings of the 2010 ACM Symposium on Applied Computing [SAC 2010](#), Sierre, Switzerland, March 2010. DOI Information: 10.1145/1774088.1774585
 - UNIRIO
 - Development of a decision support framework based on data from the Semantic Web
 - This paper presents a tool to formally model stock investment contexts as Partially Observable Markov Decision Processes, so that investment policies can be generated and simulated, taking into consideration the accuracy of Technical Analysis techniques.

Major Results



Software Technologies for Web Applications

A Multi-Agent Systems Approach for Developing Autonomic Web Applications

- Nunes, I., Barbosa, S.D.J., Lucena, C.J.P. [An End-user Domain-specific Model to Drive Dynamic User Agents Adaptations](#). The 22nd International Conference on Software Engineering and Knowledge Engineering, [SEKE 2010](#). San Francisco Bay, USA, 1-3 July 2010.
 - PUC-Rio
 - *G1. Design techniques to improve the development of autonomic Web applications*
 - Our metamodel provides a domain-specific language that empowers users to express their preferences to program their agents, together with a MAS architecture that modularizes variability into agent abstractions.
- Nunes, I., Barbosa, S.D.J., Lucena, C.J.P. [Supporting the Development of Personal Assistance Software](#), Autosoft 2010, Salvador, Brazil, September 27, 2010.
 - *G2. Define a framework to support the development of autonomic Web applications.*
 - In this paper we present a framework for developing personal assistance software, which follows a reference architecture previously proposed for this application domain.

Major Results



Software Technologies for Web Applications

A Multi-Agent Systems Approach for Developing Autonomic Web Applications

- Nunes, I.; Barbosa, S.D.J., Lucena, C.J.P. [Increasing Users' Trust on Personal Assistance Software using a Domain-neutral High-level User Model](#), [ISoLA 2010](#), Heraclion, Crete, 18-20 October 2010
 - G1. Design techniques to improve the development of autonomic Web applications
 - This paper focuses on describing a domain-neutral user metamodel, a two-level software architecture that supports the development of systems with high-level user models and a mechanism that keeps this model consistent with the underlying implementation.
- Santos Neto, B.F., Silva, V.T., Lucena, C.J.P. [Using Jason to Develop Normative Agents](#). Brazilian Symposium on Artificial Intelligence (SBIA) , [SBIA 2010](#). São Bernardo do Campo, BR, 23-28 October 2010.
 - PUC-Rio, UFF
 - *G2. Define a framework to support the development of autonomic Web applications.*
 - Norms have become one of the most promising mechanisms of social control to ensure a desirable social order in open multi-agent systems where autonomous, heterogeneous and independently designed entities can work towards similar or different ends. This paper proposes an implementation to the Jason platform to build goal-oriented agents that can reason about norms.

Major Results



Software Technologies for Web Applications

A Multi-Agent Systems Approach for Developing Autonomic Web Applications

- José Viterbo, Markus Endler, Gustavo Baptista, A Two-tier Approach for Decentralized Reasoning in Ambient Intelligence, IEEE Intelligent Systems, 2010 (accepted)
 - PUC-Rio
 - *GI. Design techniques to improve the development of autonomic Web applications*
 - Defines a distributed algorithm for cooperative detection of context situations in mobile and ubiquitous computing based on ontologies.

Major Results



Software Technologies for Web Applications

Model-driven Design and Implementation of Web Applications

- Cirilo, E.J.R., Nunes, I., Kulesza, U., Lucena, C.J.P. [Automating the Product Derivation Process of Multi-Agent Systems Product Lines](#), Journal of Systems and Software (submitted), 2010. Extended version of the paper presented in the XXIII Simpósio Brasileiro de Engenharia de Software (SBES 2009), Fortaleza, Brazil, pp. 12-21.
 - PUC-Rio, UFRN
 - *G3. Develop methodologies, empirical studies and tools to support the development of software product lines for the Web context*
 - In this paper, we present an approach that addresses the application engineering process of MAS-PLs. The main goal of our approach is to provide models to capture the configuration knowledge associated with agent abstractions, thus enabling the MAS-PL variability management and automatic product derivation. Our approach is implemented as an extension of the GenArch product derivation tool.
- Cowan, D., Alencar, P., McGarry, F., Lucena, C., Nunes, I. [A Web-based Framework for Collaborative Innovation](#). First Workshop of the Brazilian Institute for Web Science Research (Position paper), 2010.
 - UWaterloo, PUC-Rio
 - *G1. Define a model-driven framework to support specification, design and implementation of Web applications, seen as part of men-machine teams*
 - This paper describes a framework to support the social and technical principles which underlie current and future web-based CI. It will also present the evolving technologies being developed to support CI and examples of web-based systems for CI in specific fields such as environment, cultural heritage, socio-economic development and health.

Major Results



Software Technologies for Web Applications

Model-driven Design and Implementation of Web Applications

- Gadelha, B., Cirilo, E., Gerosa, M.A., Castro Jr, A., Fuks H., Lucena, C.J.P. [An Approach for Developing Component-based Groupware Product Lines using the Groupware Workbench](#). The 14th International Software Product Line Conference (SPLC 2010), [SPLC 2010](#). Jeju Island, South Korea, 13 - 17 September 2010.
 - PUC-Rio, USP, UFAM
 - *G3. Develop methodologies, empirical studies and tools to support the development of software product lines for the Web context*
 - In this paper we propose the development of a Collablet product line using the Groupware Workbench. This approach combines the benefits of Software Product Lines and software components providing a systematic way for tailoring customized groupware through the use of Collablets automatically derived from product lines.
- Staa, A.v. [A Research Agenda Concerning Dependability of Web-Based Systems](#)
 - PUC-Rio
 - Define a model-driven framework to support specification, design and implementation of Web applications, seen as part of men-machine teams
 - A model-based approach to develop dependable web-based systems is proposed. The main macro-functionalities of a meta-environment supporting this approach are described.

Major Results



Software Technologies for Web Applications

Web-based Collaborative Virtual Environments

- Camanho, M.M.; Ciarlini, A.E.M.; Furtado, A.L.; Pozzer, C. T.; Feijó, B. [A Model for Interactive TV Storytelling](#). In: SBGAMES 2009 - VIII Brazilian Symposium on Games and Digital Entertainment, IEEE CS Digital Library, pp.197 – 206, Nov. 2009
 - UNIRIO, PUC-Rio, UFSM
 - Interactive storytelling for cultural content production and e-learning in the Web
 - This paper presents a model for interactive TV storytelling to cope with requirements of quality and diversity of narratives and requirements more related to the medium, such as comfort in user interaction, responsiveness and scalability.
- Ciarlini, A.E.M. ; Barbosa, S.D.J. ; Casanova, M.A. ; Furtado, A.L. [Event Relations in Plan-Based Plot Composition](#). Computers in Entertainment: CIE, v. 7, Dez. 2009. ISSN:1544-3574 (DOI Information: 10.1145/1658866.1658874)
 - UNIRIO, PUC-Rio
 - Interactive storytelling for Web-based collaborative virtual worlds
 - This paper presents a conceptual model and a set of facilities for interactive plot composition and adaptation dealing with syntagmatic, paradigmatic, antithetic and meronymic relations between the constituent events.
- Ciarlini, A.E.M.; Casanova, M.A.; Furtado, A.L.; Veloso, P.A.S. [Modeling interactive storytelling genres as application domains](#). Journal of Intelligent Information Systems. ISSN: 0925-9902. To be published. On line version available. DOI Information: 10.1007/s10844-009-0108-5
 - UNIRIO, PUC-Rio, COPPE/UFRJ
 - Interactive storytelling for Web-based collaborative virtual worlds
 - In this paper, we introduce a formalism to specify interactive storytelling genres in the context of digital entertainment, adopting an information systems approach.

Major Results



Software Technologies for Web Applications

Web-based Collaborative Virtual Environments

- de Menezes, H.J., de Andrade, L.C.V., Siqueira, S.W.M.. Sequencing Concepts for Supporting an E-Learning Class: An Approach based on ontologies and the structure of signs, [WWW/INTERNET 2010](#), Romania, October 2010 (submitted)
 - UNIRIO
 - G3. Interactive storytelling for cultural content production and e-learning in the Web
 - This paper presents the sequencing of concepts according to the specification of possible paths in a domain ontology. Then, it is possible to select the related learning objects, building the material for an E-Learning Class.
- Lima, E.S.; Pozzer, C.T.; D'Ornellas, M.; Ciarlini, A.E.M., Feijó, B., Furtado, A.L. [Virtual Cinematography Director for Interactive Storytelling](#). Proc. Int. Conf. on Advances in Computer Entertainment Technology (ACE2009). New York: ACM, 2009. v.422. p.263 – 270. DOI Information: 10.1145/1690388.1690432. Oct. 2009
 - UFSM, UNIRIO, PUC-Rio
 - Interactive storytelling for Web-based collaborative virtual worlds
 - This paper proposes an intelligent cinematography director, based on SVMs, for plot-based storytelling systems. The role of the director is to select in real-time the camera shots that best fit for the scenes and present the content in an interesting and coherent manner.

Major Results



Software Technologies for Web Applications

Web-based Collaborative Virtual Environments

- Felipe Quintella, Luciano Soares, Alberto Raposo, [DWeb3D: A toolkit for developing X3D applications in a simplified environment](#), [Web3D](#) International Conference on 3D Web Technology, 2010. Los Angeles, 24-25 July, 2010.
 - PUC-Rio
 - *G1. Investigate the Web as a means for eScience and eLearning through CVEs*
 - DWeb3d is a toolkit to help the development of dynamic X3D applications, showing that it is possible to simplify the development process, increasing the access to developers.

Major Results



Management of Web Data

Managing Web Multimedia Data

- Brandão, S.; Oliveira, J.; de Souza, J., [Web Knowledge Representation with Autonomic Ontologies](#), [In: submitted to First Workshop of the Brazilian Institute for Web Science Research], Rio de Janeiro, 2010.
 - UFRJ
 - Definition of a method for the description, discovery and automated composition of semantic Web services.
 - The success of the semantic web is intrinsically related to the use of ontologies. This important role given to ontologies in the semantic web implies increasing need for development and maintenance of domain ontologies, even with the scarcity of tools supporting the life cycle from creation to management and adaptation. In this article, we presented an ongoing doctoral work that focus on the Web knowledge representation available with domain ontologies and processing of this knowledge autonomously through a systematic evaluation and redesign of the ontology.
- Santanchè, A.; Baumann, P. [Component-based Web Clients For Scientific Data Exploration Using The DCC Framework](#), [Short paper, <http://www.giscience2010.org/GIScience> 2010 Conference], Zurich, Sept 2010.
 - UNIFACS, UNICAMP, Jacobs University Alemanha
 - Managing the Web Multimedia data - Definition of new multimedia data descriptors and of storage structures to support their indexing, reuse and composition on the Web
 - Paper presents how multimedia scientific data can be published and managed on the Web using components and Web Services.

Major Results



Management of Web Data

Accessing the Deep Web

- Casanova, M. A., Lauschner, T., Leme, L. A. P. P., Breitman, K. K., Furtado, A. L., Vidal, V. M. P. [Revising the Constraints of the Mediated Schema](#), MCC-06/10, [Monografias em Ciência da Computação](#), Departamento de Informática, PUC-Rio, May 2010.
 - PUC-Rio
 - *Definition of heuristics for database identification, mediated schema definition and schema matching*
 - This paper addresses the problem of changing the constraints of a mediated schema to accommodate the set of constraints of a new export schema.
- Casanova, M. A., Furtado, A. L., Macêdo, J. A. F., Vidal, V. M. P. [Extralite Schemas with Role Hierarchies](#), MCC-09/10, [Monografias em Ciência da Computação](#), Departamento de Informática, PUC-Rio, June 2010.
 - PUC-Rio, UFC
 - *Definition of heuristics for database identification, mediated schema definition and schema matching*
 - This paper addresses the problems of testing strict satisfiability and deciding logical implication for extralite schemas with role hierarchies.

Major Results



Management of Web Data

Accessing the Deep Web

- Furtado, A. L., Barbosa, S. D. J., Casanova, M. A., Piccinini, H. [First version of a Prototype for Publishing Deep Web Data](#), MCC-11/10, [Monografias em Ciência da Computação](#), Departamento de Informática, PUC-Rio, July 2010.
- Leme, L. A. P. P., Casanova, M. A., Breitman, K.K., Furtado, A.L. [OWL Schema Matching](#), J. Brazilian Computer Society (2010) 16: 21–34. [JBACS](#), DOI: 10.1007/s13173-010-0005-3.
 - PUC-Rio
 - *Definition of heuristics for database identification, mediated schema definition and schema matching*
 - This paper describes an instance-based schema matching technique for an OWL dialect, proposes a data model for storing provenance data, and presents experimental results with real data downloaded from the Web.
- Piccinini, H., Casanova, M. A., Cavalieri, M., Furtado, A.L. [W-Ray: A Strategy to Publish Deep Web Geographic Data](#), accepted to the 4th International Workshop on Semantic and Conceptual Issues in GIS (SeCoGIS), SeCoGIS 2010, in conjunction with the 29th International Conference on Conceptual Modeling (ER 2010), [SeCoGIS 2010](#), Vancouver, BC, Canada, 1-4 November, 2010.
 - PUC-Rio, IBGE
 - *Definition of heuristics for database identification, mediated schema definition and schema matching*
 - This paper introduces an approach to address the problem of accessing data from the Deep Web. The approach relies on describing the data through sentences, and on publishing the sentences as Web pages.

Major Results



Accessing the Deep Web

- Sacramento, E.R., Vidal, V. M. P., Macêdo, J. A. F., Lóscio, B.F., Lopes, F. L. R., Lemos, F., Casanova, M. A. [Towards Automatic Generation of Application Ontologies](#), Proc. 12th International Conference on Enterprise Information Systems, [ICEIS 2010](#), Funchal, Madeira, Portugal, 8-12 June, 2010 (poster presentation).
 - UFC, PUC-Rio
 - *Definition of heuristics for database identification, mediated schema definition and schema matching*
 - This paper describes a strategy to automatically generate application ontologies and mappings, from a set of local ontologies, a domain ontology and the result of the matching between each local ontology and the domain ontology.

Major Results



Developing the Semantic Web

- Koga, I. K., Medeiros, C. B., Branquinho, O. [Handling and Publishing Wireless Sensor Network Data: a hands-on experiment](#). In IV eScience Workshop 2010, XXX Congresso da SBC (XXX Conference of the Brazilian Computer Society), [http://www.dcc.ufrj.br/~escience]. Belo Horizonte, MG, July 2010.
 - UNICAMP, PUC-Campinas
 - *G2. Definition of a method for the description, discovery and automated composition of semantic Web services*
 - Discussion of interoperability issues concerning flexible publication of real time sensor data on the Web, using semantic web standards and web services.
- Araújo, S.C.; Houben, G.J.; Schwabe, D.; Hidders, J. [Fusion – Visually Exploring and Eliciting Relationships in Linked Data, ISWC2010](#), Shanghai, 7-11 November, 2010
 - G4
 - This paper describes Fusion - a framework for closing the gap between the application model and the underlying ontologies in the Linked Data cloud. Fusion simplifies the definition of mappings by providing a visual user interface that integrates the exploratory process and the mapping process.
- Delicato, F.C.; Pires, P.F.; Pirmez, L.; Batista, T. [IEEE International Conference and Workshops on the Engineering of Computer-Based Systems](#), Proc. 17th IEEE International Conference and Workshops on the Engineering of Computer-Based Systems, pp. 410-417, UK, March, 2010.
 - UFRN, UFRJ
 - G4
 - This paper describes a SOA and web mashup based approach to integrate heterogeneous WSNs.

Major Results



Management of Web Data

Knowledge Discovery on the Web

- Leandro G. M. Alvim, Paula Vilela, Eduardo N. Motta, Ruy L. Milidiú. [Sentiment of Financial News: A Natural Language Processing Approach](#). In: [Proceedings of the 1st Workshop on Natural Language Processing Tools Applied to Discourse Analysis in Psychology \(2010\)](#), Buenos Aires, Argentina, May 10 - 14, 2010.
 - PUC-Rio
 - *Análise da Aplicabilidade da Solução em Outros Cenários*
 - We use basic Natural Language Processors to improve Sentiment Analysis quality for financial news. We also provide Petronews, a new annotated dataset containing news about Petrobras.
- Eraldo R. Fernandes, Carlos E. M. Crestana, Ruy L. Milidiú. [Hedge detection using the RelHunter approach](#). In: [Proceedings of the Fourteenth Conference on Computational Natural Language Learning Shared Task \(CoNLL 2010\)](#), Uppsala, Sweden, 2010 (to appear).
 - PUC-Rio
 - *Análise da Aplicabilidade da Solução em Outros Cenários*
 - We apply RelHunter to the CoNLL 2010 Shared Task - Closed Task 2: detection of hedge cues and their scopes. The F-score of our system is 54.05%, whereas the highest one is 57.32%.

Major Results



Management of Web Data

Knowledge Discovery on the Web

- Eraldo R. Fernandes, Cícero N. dos Santos, and Ruy L. Milidiú. [A Machine Learning Approach to Portuguese Clause Identification](#). In: Proceedings of the PROPOR'2010, Porto Alegre, Brasil, 55-64, 2010.
 - PUC-Rio, IFG, UNIFOR
 - *Análise da Aplicabilidade da Solução em Outros Cenários*
 - We propose and evaluate an Entropy Guided Transformation Learning system for Portuguese clause identification. This is the first machine-learning-based approach to this task.
- Eraldo R. Fernandes, Ruy L. Milidiú, Raúl P. Rentería. [RelHunter: A Machine Learning Method for Relation Extraction from Text](#). *Journal of the Brazilian Computer Society*, 2010. (to appear).
 - PUC-Rio
 - *Análise da Aplicabilidade da Solução em Outros Cenários*
- Ruy L. Milidiú, Leandro G. M. Alvim, Cícero N. dos Santos. [Daily Volume Forecasting Using High-Frequency Predictors](#). In: *Proceedings of the LASTED International Conference on Artificial Intelligence and Applications (AIA 2010)*, Innsbruck, Austria, February 15 – 17, 2010.
 - *Análise da Aplicabilidade da Solução em Outros Cenários*
 - PUC-Rio
 - We explore the use of intraday information to improve daily volume forecasting. Our SVM and PLS predictors show a remarkable quality when tested with the top nine high liquidity Bovespa stocks.

Major Results



Management of Web Data

Knowledge Discovery on the Web

- Cícero N. dos Santos, Ruy L. Milidiú, Carlos E. M. Crestana and Eraldo R. Fernandes. [ETL Ensembles for Chunking, NER and SRL](#). In: Proceedings of the 11th International Conference on Intelligent Text Processing and Computational Linguistics, A. Gelbukh (Ed.): CICLing 2010, LNCS 6008, pp. 100 - 112. Springer, Heidelberg (2010).
 - UNIFOR, PUC-Rio, IFG
 - *Análise da Aplicabilidade da Solução em Outros Cenários*
 - We apply ETL Ensembles for three basic Computational Linguistic tasks: Text Chunking, Named Entity Recognition and Semantic Role Labeling. Our systems performance is competitive with state-of-the-art.
- Pedro Henriques dos Santos Teixeira and Ruy L. Milidiú. [Data Stream Anomaly Detection through Principal Subspace Tracking](#). In: Proceedings of the 25th Symposium On Applied Computing, ACM-SAC'2010, Sierre, Switzerland, 2010.
 - PUC-Rio
 - *Análise da Aplicabilidade da Solução em Outros Cenários*
 - We introduce the Fast Rank-Adaptive row-Householder Subspace Tracking (FRAHST) algorithm for anomaly detection in multiple co-evolving data streams. This work received the **Best Paper Award** in the Information Systems theme at the Conference.

Major Results



Web Infrastructure

Future Internet Architectures

- Abelém, A. J. G.; Machado, I.; Stanton M. A.; Carvalho, T. M.B. [Design of a testbed for R&D in network architectures.](#), [In: submitted to First Workshop of the Brazilian Institute for Web Science Research], Rio de Janeiro, 2010.
 - UFPA, RNP, UFF, USP
 - Design and deploy a testbed for R&D in network architectures
 - This paper discusses the current state of research into large-scale network architectures to substitute the current Internet architecture and the adoption of a “clean slate” approach to Future Internet.
- Lopes Gomes, R. ; Moreira Jr, Waldir ; Cerqueira, E. ; Abelém, A. J. G. [Using Fuzzy Link Cost and Dynamic Choice of Link Quality Metrics to Achieve QoS and QoE in Wireless Mesh Networks.](#), [In: Journal of Network and Computer Applications, JNCA], DOI information: 10.1016/j.jnca.2010.03.026, 2010
 - UFPA, INESC-Porto, CISUC Portugal
 - Design, deployment and use of a wireless testbed for research on the impact of mobility on web applications
 - This paper presents a variation of the Wireless Mesh Network routing protocol Optimized Link State Routing (OLSR), to achieve QoS and QoE requirements for multimedia applications. The proposed FLC metric is based on a fuzzy system that uses two link quality metrics, namely expected transmission count (ETX) and minimum delay (MD), to define a new metric.

Major Results



Web Infrastructure

Future Internet Architectures

- MARGI, C. B.; OLIVEIRA, B. T.; SOUSA, G. T.; SIMPLICIO Jr., M. A.; BARRETO, P. S. L. M.; CARVALHO, T. C. M. C.; NASLUND, M.; GOLD, R. [Impact of Operating Systems on Wireless Sensor Networks \(Security\) Applications and Testbeds](#), [ICCCN WiMAN 2010], Zurique - Suíça, August 2010
 - USP, PCS-USP, Ericsson Suécia
 - *Computer Networks - Wireless Sensor Networks & Security*
 - Given the WSN nodes resource constrained characteristics, designing energy-aware applications, communication protocols and security mechanisms are critical. In this paper, we develop a comparison between two different operating systems (Contiki and TinyOS) running on the same hardware platform (Crossbow TelosB) in terms of energy consumption and execution time for different tasks.
- Menasché, D.S.; Rochay, A.A.A.; Souza e Silva, E.A.; Leão, R.; Towsley, D.; Venkataramani [Estimating Self-Sustainability in Peer-to-Peer Swarming Systems](#), [IFIP Performance 2010](#), Namur - Bélgica, Novembro 2010, (to appear).
 - University of Massachusetts, UFRJ
 - Computer Networks - P2P systems - Evaluate performance of swarm based P2P systems
 - A P2P swarm is self-sustaining if all its blocks are collectively held by peers. How does the self-sustainability vary as a function of content popularity, peers capacity and file size? Proposed model to analyse self-sustainability.

Major Results



Web Infrastructure

Future Internet Architectures

- Monteiro, J. A. S. [Measurement Infrastructures for Future Internet Testbeds](#), In: submitted to First Workshop of the Brazilian Institute for Web Science Research, Rio de Janeiro, 2010.
 - UNIFACS
 - *Design and Implementation of a Measurement Infrastructure for the Testbed*
 - This position paper proposes an initial set of monitoring resources in order to open a discussion aiming at defining the measurement facility for our Future Internet subproject testbed.

Major Results



Foundations of Web Science

Algorithms and Complexity for the Web graph

- Edson N. Cáceres, Siang W. Song and Jayme L. Szwarcfiter, Parallel Algorithms for Maximal Cliques in Circle Graphs and Unrestricted Depth Search, RAIRO - Informatique Théorique et Applications -- accepted
 - UFMS, USP, UFRJ
 - *GI Define algorithms on graphs and / or negative results for combinatorial optimization*
 - This paper describes parallel algorithms for generating all the maximal cliques of a circle graph. The method employs an algorithm for performing unrestricted depth-first search in a general graph.
- Márcia R. Cerioli, Fabiano S. Oliveira and Jayme L. Szwarcfiter, Extreme cliques in interval graphs, Ars Combinatoria 94 (2010) pp. 103-114.
 - UFRJ
 - *GI Define algorithms on graphs and / or negative results for combinatorial optimization*
 - Interval graphs and the corresponding interval models are employed in many different applications. This work characterizes which maximal cliques can appear in the extremes of any interval model.

Major Results



Algorithms and Complexity for the Web graph

- Mitre C. Dourado, Fábio Protti and Jayme L. Szwarcfiter, Complexity results related to monophonic convexity, Discrete Applied Mathematics 158 (2010), pp. 1268-1274 - doi 10.1016/j.dam.2009.11.016
 - UFRJ
 - *G1 Define algorithms on graphs and / or negative results for combinatorial optimization*
 - The paper proves various complexity results for the monophonic complexity of graphs. In particular it is shown that the computation of the monophonic number of a graph is NP-hard and, in contrast, there exists a polynomial-time efficient algorithm for finding the hull number, within this convexity.
- Mitre C. Dourado, Fábio Protti, Dieter Rautenbach and Jayme L. Szwarcfiter, On the hull number of triangle-free graphs, SIAM Journal on Discrete Mathematics 23 (2010), PP. 2163-2172 - doi 10.1137/090751797
 - UFRJ
 - *G1 Define algorithms on graphs and / or negative results for combinatorial optimization*
 - The work describes some different bounds for the computation of the hull number of a graph which contain no triangles. Recall that the computation of the hull number is a NP-complete problem in general.

Major Results



Foundations of Web Science

Algorithms and Complexity for the Web graph

- Mitre C. Dourado, Fábio Protti, Dieter Rautenbach and Jayme L. Szwarcfiter, Some remarks on the geodetic number of a graph, Discrete Mathematics 320 (2010) pp. 832-837 - doi 10.1016/j.disc.2009.09.018
 - UFRJ, TU Ilmenau
 - *GI Define algorithms on graphs and / or negative results for combinatorial optimization*
 - The geodetic number of a graph is closely related to shortest paths and therefore plays a role in finding points with distance constraints in the web graph. This paper describes some properties of the geodetic number of a graph, including efficient algorithms for special cases, and negative complexity results.
- Gonçalves, V.C.F.; França, F.M.G.; Maculan, N. ; Lima, P.M.V. [SER-Based Web Graph Decontamination](#), [In: submitted to the First Workshop of the Brazilian Institute for Web Science Research], Rio de Janeiro, 2010
 - UFRJ, UFRRJ
 - *GI Define algorithms on graphs and / or negative results for combinatorial optimization*
 - This paper presents an asynchronous, topology independent, distributed decontamination algorithm which can be embedded into the behavior of web marshals.

Major Results



Foundations of Web Science

Algorithms and Complexity for the Web graph

- Marina Groshaus and Jayme L. Szwarcfiter, Biclique graphs and biclique matrices, Journal of Graph Theory 63 (2010), pp. 1-16 - doi 10.1002/jgt.20442
 - UBA Argentina, UFRJ
 - *G1 Define algorithms on graphs and / or negative results for combinatorial optimization*
 - This paper describes biclique matrices of a graph, in similar terms of the well known clique matrices. This concept is then employed in the characterization of biclique graphs, the intersection graph of the maximal bicliques of a graph.
- Min C. Lin, Francisco Soullignac and Jayme L. Szwarcfiter, The clique operator on circular-arc graphs, Discrete Applied Mathematics 158 (2010) pp. 1259-1267 - doi 10.1016/j.dam.2009.01.019
 - FCEN Argentina, UFRJ
 - *G1 Define algorithms on graphs and / or negative results for combinatorial optimization*

The application of the clique operator has been studied before for some classes of graphs. In this article we examine the clique operator applied to circular-arc graphs. We study the clique behaviour of this class and determine when a graph converges or diverges, under the application of such an operator

Major Results



Foundations of Web Science

Applied and Computational Mathematics / Optimization

- Rafael Andrade, Abdel Lisser, Nelson Maculan. The Design of Multi-facility Backbone Networks under Uncertain Multi-classes of Traffic. In: Proceedings of the ALIO-INFORMS 2010 - Buenos Aires, Argentina, 6-9 June 2010.
 - UFRJ
 - *Optimization - Development of new methods for implicit enumeration in Combinatorial optimization, column generation and cutting planes*
 - We present new advances for the design of multi-facility backbone networks under uncertainty. The design allows different modular capacities in order to meet future demands simulated from different distribution functions.
- Amitabh Basu, Manoel Campelo, Gérard Cornuéjols, Michele Conforti, Giacomo Zambelli. [On Lifting Integer Variables in Minimal Inequalities](#). In: IPCO 2010 - Integer Programming and Combinatorial Optimizatn, Lecture Notes in Computer Science, vol 6080, 85-95, doi: 10.1007/978-3-642-13036-6_7.
 - Carnegie Mellon University, UFC, Università di Padova, Université de Marseille
 - *Optimization - Development of new methods for implicit enumeration in Combinatorial optimization, column generation and cutting planes*
 - This paper contributes to the theory of cutting planes for mixed integer linear programs (MILPs). We study lifting functions for the nonbasic integer variables starting from minimal valid inequalities. We characterize precisely when the lifted coefficient is equal to the coefficient of the corresponding continuous variable in every minimal lifting. The answer is a nonconvex region that can be obtained as the union of convex polyhedra.

Major Results



Foundations of Web Science

Applied and Computational Mathematics / Optimization

- Manoel Campelo, Ricardo Corrêa. [A Combined Parallel Lagrangian Decomposition and Cutting-Plane Generation for Maximum Stable Set Problems](#). In: ISCO 2010 - International Symposium on Combinatorial Optimizaton. Electronic Notes in Discrete Mathematics, doi: 10.1016/j.endm.2010.05.064, 2010.
 - UFC
 - *Optimization - Development of new methods for implicit enumeration in Combinatorial optimization, column generation and cutting planes*
 - We propose an ILP formulation for the maximum k-partite induced subgraph problem. We investigate upper bounds provided by the solution, via a parallel sub-gradient algorithm, of a Lagrangian decomposition that breaks up this formulation into maximum weighted stable set problems. Computational experiments were carried out with a multi-threaded parallel implementation of our algorithm in a multi-core system.



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Thank you!

