

# IEEE CBMS 2015

The 28<sup>th</sup> IEEE International Symposium on Computer-Based Medical Systems

São Carlos and Ribeirão Preto, Brazil  
June 22<sup>nd</sup> – 25<sup>th</sup>, 2015

## Conference Program

CBMS 2015



### Organization



### Sponsors





**\*\*\*\*\* 28<sup>th</sup> IEEE International Symposium on Computer-Based Medical Systems at a glance \*\*\*\*\***

**A Step Towards the Automated Diagnosis of Parkinson's Disease: Analyzing Handwriting Movements**

*Clayton R. Pereira, Danilo R. Pereira, Francisco A. da Silva, Luis A. M. Pereira, Silke A. T. Weber,*

Schedule	Monday – 22/06/2015	Tuesday – 23/06/2015	Wednesday – 24/06/2015	Thursday – 25/06/2015
7:00				Transfer from USP São Carlos to USP Ribeirão Preto
Morning	Registration	Registration	Registration	Registration
	Opening Session Invited Talk Sameer Antani	D&F 1 CDE 1 E1	Invited Talk Rodney Long	Mini-Course Part 1 Rangaraj Rangayyan
Lunch	F 1 G 1	Invited Talk Rangaraj Rangayyan	B&G 2 IT 1	Mini-Course Part 2 Rangaraj Rangayyan
	F 2 B 1 H 1	A&B 1 D 1 C&E 1	H 2 IT 2	LUNCH BREAK
Afternoon	COFFEE – BREAK AND WARMING UP (POSTER)	PANEL	COFFEE – BREAK	Invited Talk Marco Gutierrez
	F 3 RECEPTION	TRANSFER TO CONFERENCE DINNER	POSTER PRESENTATION GENERAL TRACK	COFFEE – BREAK
18h30		CONFERENCE DINNER		POSTER PRESENTATION WOP - CBMS
19h00–19h15				CLOSING CEREMONY
19h30				

Room 1	Auditorium Fernão Stella de Rodrigues Germano
Room 2	Auditorium Luis Favaro
Room 3	Auditorium CISC
Room 4	Auditorium CEAPS at Clinical Hospital at Ribeirão Preto of University of São Paulo (USP)



## Preface

The 28th IEEE International Symposium on Computer-Based Medical Systems was held at the University of São Paulo, Brazil. It was the first time that CBMS happened in South America. Since its beginning, CBMS has always been a truly international event, attracting contributors and attendees from all over the world. The 2015 edition was not different. We had a good response to our call for papers. Out of 150 submissions from 597 authors and 36 countries, we have selected 44 full papers, thus having 29% acceptance rate for this category. Besides, 18 (12%) short papers and 19 (13%) posters have been selected including both research and application oriented contributions. The papers were presented at 11 tracks distributed in 17 oral and two poster sessions. We would like to express our gratitude to all authors who submitted papers to CBMS 2015. Without their hard work, we would not have been able to organize such a high quality technical program.

Representatives from 31 countries participated in the organization of the symposium. We are grateful to all of them, to the area chairs and program committee members, for helping us to attract many high-level submissions from the different areas of computational medicine, for reviewing the submissions and for organizing the interesting technical sessions. CBMS 2015 introduced a special Industrial Track, aimed at strengthening the relationship between industry and academia, motivating the community on pursuing a productive partnership between both communities. Also for the first time, CBMS hosted the Workshop for Ongoing Projects in Computer-Based Medical Systems, a forum for presentation and discussion of research still under development but with promising results already achieved, aimed at attracting graduate students and young researchers. Finally, to increase student engagement even more, CBMS 2015 also held a mini-course on “*Analysis of Shape, Texture,*

*and Oriented Patterns in Biomedical Images*” by Prof. Rangaraj M. Rangayyan. We are greatly thankful to this year’s keynote speakers: (i) Sameer K. Antani – U.S National Library of medicine, National Institutes of Health, (ii) Rangaraj M. Rangayyan – University of Calgary, Alberta, Canada, (iii) L. Rodney Long – U.S National Library of medicine, National Institutes of Health, and (iv) Marco Antonio Gutierrez – The Hearth Institute (InCor), Brazil. We are happy to host this symposium at the University of São Paulo – USP, the largest Brazilian university. USP was founded in 1932, and currently has *campi* in eight cities in the São Paulo State. It has four hospitals providing education, clinical care and research activities that are among the best of the country. Its graduate and undergraduate courses cover virtually every knowledge area. CBMS 2015 was held in USP’s *campi* of São Carlos and Ribeirão Preto. The campus at São Carlos has strong activities in Computer Science and in Exact Sciences in general, hosting Engineering, Mathematics, and other schools. The campus at Ribeirão Preto targets mainly Health Sciences, with its Clinical Hospital and Schools of Medicine, Nursing and others. We thank especially to the Institute of Mathematics and Computer Science at São Carlos as well as the Ribeirão Preto Medical School, their staff and student volunteers for helping organizing CBMS 2015. We also express our gratitude to the IEEE Computer Society for providing guidance in organizing the symposium. We are grateful for your participation. We hope you enjoy the symposium and find many topics of interest to you in the technical program.

**CBMS 2015 PC Chairs:** Caetano Traina Jr. and Pedro Pereira Rodrigues.

**Publication Chair CBMS 2015:** Bridget Kane

**General Chairs:** Agma J. Machado Traina and Paulo M. Azevedo-Marques

## Monday June 22, 2015 – São Carlos/ICMC

Schedule	Monday – 22/06/2015		
08h00–08h20	Registration		
08h20–08h45	Opening Session ( Auditorium FERNÃO STELLA)		
08h45–10h15	Invited Talk - Sameer Antoni ( Auditorium FERNÃO STELLA)		
10h15–10h40	COFFEE – BREAK		
10h40-12h40	F 1 (Auditorium FERNÃO STELLA)	G 1 ( Auditorium LUIS FAVÁRO)	
12h40–13h30	LUNCH BREAK		
13h30–15h00	F 2 (Auditorium FERNÃO STELLA)	B 1 (Auditorium LUIS FAVÁRO)	H 1 (Auditorium CISC)
15h00–16h15	COFFEE – BREAK AND WARMING UP (POSTER) (HYPERSPACE PROF. LOIBEL – Chairs: Robson Cordeiro and Jose Rodrigues Jr.)		
16h15–18h00	F 3 (Auditorium FERNÃO STELLA)	B&G 1 ( Auditorium LUIS FAVÁRO)	
18h30	RECEPTION		

### Invited Talk

#### **[08:45–10:15] “Computer-Based Systems for Aiding Global Health Challenges”**

Speaker: Sameer Antani

U.S National Library of medicine, National Institute of Health

<http://lhncbc.nlm.nih.gov/personnel/sameer-antani>

*Abstract:* Opportunistic HIV and TB co-infections are a dual epidemic resulting in significant mortality. According to the WHO, they are estimated to be over one million people worldwide who have the diseases, and the burden of disease is particularly high in sub-Saharan Africa and of growing concern in Asia. Meanwhile, levels of multi-drug resistant TB are increasing in several parts of the world. TB is a major cause of death among people living with HIV/AIDS, whose impaired immune systems make them particularly vulnerable. X-ray screening is an effective low-cost approach to improve diagnosis and management, but difficult to carry out in low-resource regions of the world. NIH researchers, led by Sameer Antani, Ph.D., have developed a system based on machine learning algorithms for the automated screening of digital chest X-ray images for pulmonary abnormalities with a special focus on TB. The system is being beta-tested on a mobile chest X-ray truck traveling through various sites in rural western Kenya. Collaborators on this project include Indiana University School of Medicine, AMPATH – a large HIV treatment program, and Moi Teaching and Referral Hospital in Kenya. Wide use of this system would potentially enable a significant time reduction in effort and time, from days to minutes, in human expert radiological diagnosis and provide critical decision support to field clinical officers for early

appropriate treatment for the HIV positive population. The talk will describe elements of the system, the challenges in its design, the scientific advances, and also describe its impact. The talk will also briefly highlight a second project focusing on the malaria epidemic in parts of Asia and Africa, its treatment, and activities by NIH computational science researchers for developing systems to aid in medical research and clinical decision making.

#### **COFFEE – BREAK**

### **Session F 1 – Signal and Image Processing and Analysis**

Room: Fernão Stella de Rodrigues Germano

Chair: Aldo Von Wangenheim

Session F 1 – 10:40/12:40

#### **Use of Wavelet Multiresolution Analysis to Reduce Radiation Dose in Digital Mammography**

*Helder Cesar Rodrigues de Oliveira, Lucas Rodrigues Borges, Polyana Ferreira Nunes, Predrag R. Bakic, Andrew D. A. Maidment, Marcelo A. C. Vieira*

#### **Segmentation of Foveal Avascular Zone of the Retina Based on Morphological Alternating Sequential Filtering**

*Alexandre Gonçalves Silva, Marina Silva Fouto, André Tavares Da Silva, Rangel Arthur, Angélica Moises Arthur, Yuzo Iano, Jacqueline Mendonça Lopes de Faria*

#### **A Step Towards the Automated Diagnosis of Parkinson's Disease: Analyzing Handwriting Movements**

*Clayton R. Pereira, Danillo R. Pereira, Francisco A. da Silva, Luis A. M. Pereira, Silke A. T. Weber, Christian Hook, João P. Papa*

#### **Pattern Recognition of Lower Member Skin Ulcers in Medical Images with Machine Learning Algorithms**

*Jose Luis Seixas Junior, Sylvio Barbon Junior, Rafael Gomes Mantovani*

### **Session G 1 – Clinical and Healthcare Services Research**

Room: Luis Faváro

Chair: Thomas Deserno

Session G 1 – 10:40/12:40

#### **Application of Mobile Games to Support Clinical Data Collection for Patients with Niemann-Pick Disease**

*Richard Sinnott, Jun Han, William Hu, Xiaoxiao Ma, Kuai Yu*

#### **Informing EMR System Design through Investigation of Paper-Based Work Practices in a Non-Profit Clinic Serving a Vulnerable Population**

*Charlotte Tang*

#### **Using Smart Mobile Devices for Collecting Structured Data in Clinical Trials: Results From a Large-Scale Case Study**

*Johannes Schobel, Rüdiger Pryss, Manfred Reichert*

**User Experience (UX) of the Fall Risk Assessment Tool (FRAT-up)**

*Ather Nawaz, Jorunn Laegdheim Helbostad, Lorenzo Chiari, Federico Chesani, Luca Cattelani*

**Session F 2 – Signal and Image Processing and Analysis**

Room: Fernão Stella de Rodrigues Germano

Chair: Marcello Nogueira-Barbosa

Session F 2 – 13:30/15:00

**Stitched Multipanel Biomedical Figure Separation**

*K.C. Santosh, Sameer Antani, George Thoma*

**Evaluating Margin Sharpness Analysis on Similar Pulmonary Nodule Retrieval**

*José Raniery Ferreira Junior, Marcelo Costa Oliveira*

**Chest X-ray Image View Classification**

*Zhiyun Xue, Daekeun You, Sema Candemir, Stefan Jaeger, Sameer Antani, L. Rodney Long, George R. Thoma*

**Session B 1 – Data Analysis and Knowledge Discovery**

Room: Luis Faváro

Chair: Myra Spiliopoulou

Session B 1 – 13:30/15:00

**3D Markup of Radiological Images in ePAD, a Web-Based Image Annotation Tool**

*Dilvan A. Moreira, Cleber Hage, Edson F. Luque, Debra Willrett, Daniel L. Rubin*

**Multiscale Tetrahedral Meshes for FEM Simulations of Esophageal Injury**

*L. A. Neves, E. Pavarino, M. P. Souza, C. R. Valêncio, G. F. D. Zafalon, M. Z. do Nascimento, Thaína Tosta*

**Color and Texture Influence on Computer-Aided Diagnosis of Dermatological Ulcers**

*Marcos Vinicius Naves Bedo, Lucio Fernandes Dutra Santos, Willian Dener Oliveira, Gustavo Blanco, Agma Juci Machado Traina, Marco Andrey Cipriani Frade, Paulo Mazzoncini de Azevedo-Marques, Caetano Traina Junior*



## **Session H 1 – Medical Education and Collaboration**

Room: CISC Auditorium

Chair: Pedro Pereira Rodrigues

Session H 1 – 13:30/15:00

### **Clinical Training and Teamwork: Learning and Feedback**

*Bridget Kane, Saturnino Luz*

### **A Serious Game for Improving Community-Based Prevention of Neglected Diseases**

*Masood Masoodian, Saturnino Luz, Manuel Cesario, Raquel Rangel Cesario, Bill Rogers, Diones A. Borges*

### **Analyzing Softwares in Medical Education Focusing on Quality Standards**

*Paulo Ricardo Muniz Barros, Sílvia César Cazella, Cecília Dias Flores*

### **COFFEE – BREAK AND WARMING UP (POSTERS GT)**

## **Session F 3 – Signal and Image Processing and Analysis**

Room: Fernão Stella de Rodrigues Germano

Chair: Joaquim Felipe

Session F 3 – 16:15/18:00

### **Segmentation and Registration Methods in Short Axis Cardiac MRI and SPECT Images in Chagas Disease**

*Gustavo Canavaci Barizon, Leonardo Pippa Gadioli, André Schmidt, Marcus Vinícius Simões, Luiz Otávio Murta Junior*

### **Unsupervised Breast Masses Classification Through Optimum-Path Forest**

*Patricia. B. Ribeiro, Leandro. A. Passos Jr., Luis. A. da Silva, Kelton A. P. da Costa, João P. Papa, Roseli A. F. Romero*

### **Interactive Segmentation Relabeling for Classification of Whole-Slide Histopathology Imagery**

*Anoop Haridas, Filiz Bunyak, Kannappan Palaniappan*

### **Semiautomatic Classification of Benign versus Malignant Vertebral Compression Fractures using Texture and Gray-level Features in Magnetic Resonance Images**

*Lucas Frighetto-Pereira, Rafael Menezes-Reis, Guilherme Augusto Metzner, Rangaraj Mandayam Rangayyan, Paulo Mazzoncini de Azevedo-Marques, Marcello Henrique Nogueira-Barbosa*

## **Session B&G 1 – Data Analysis for Clinical and Knowledge Discovery**

Room: Luis Faváro

Chair: Adele Marshall

Session B&G 1 – 16:15/18:00

### **Obstructive Sleep Apnea diagnosis: the Bayesian network model revisited**

*Pedro Pereira Rodrigues, Daniela Ferreira Santos, Liliana Leite*

### **Can we classify the participants of a longitudinal epidemiological study from their previous evolution?**

*Uli Niemann, Tommy Hielscher, Myra Spiliopoulou, Henry Völzke, Jens-Peter Kühn*

### **Automatic Proposition Extraction from Dependency Trees: Helping Early Prediction of Alzheimer's Disease from Narratives**

*Andre Luiz Verucci da Cunha, Lucilene Bender de Sousa, Letícia Lessa Mansur, Sandra Maria Aluísio*

### **Reduction of Variables for Predicting Breast Cancer Survivability Using Principal Component Analysis**

*Sharaf Hussain, Naveen Zehra Quazilbash, Samita Bai, Shakeel Khoja*

## Tuesday June 23, 2015 – São Carlos/ICMC

Schedule	Tuesday – 23/06/2015		
08h00–08h30	Registration		
08h30–10h00	D&F 1 (Auditorium FERNÃO STELLA)	CDE 1 (Auditorium LUIS FAVÁRO)	E1 (Auditorium CISC)
10h00–10h20	COFFEE – BREAK		
10h20–12h20	Invited Talk - Rangaraj Rangayyan (Auditorium FERNÃO STELLA)		
12h15–13h30	LUNCH BREAK		
13h30–15h30	A&B 1 (Auditorium FERNÃO STELLA)	D 1 (Auditorium LUIS FAVÁRO)	C&E 1 (Auditorium CISC)
15h30–16h00	COFFEE – BREAK		
16h00–17h30	PANEL (Auditorium FERNÃO STELLA)		
19h00–19h15	TRANSFER TO CONFERENCE DINNER		
19h30	CONFERENCE DINNER		

### Session D&F 1 – Signal and Image Processing and Analysis with Decision Support

Room: Fernão Stella de Rodrigues Germano

Chair: Fatima Nunes

Session D&F 1 – 08:30/10:00

#### **Vertebral Body Segmentation of Spine MR Images Using Superpixels**

*Paulo Duarte Barbieri, Glauco Vitor Pedrosa, Agma Juci Machado Traina, Marcello Henrique Nogueira-Barbosa*

#### **Blockwise Classification of Lung Patterns in Unsegmented CT Images**

Luiza D. Bagesteiro, Lucas F. Oliveira and Daniel Weingaertner

#### **Content-Based Image Retrieval of 3D Cardiac Models to Aid the Diagnosis of Congestive Heart Failure by Using Spectral Clustering**

*Leila C. C. Bergamasco, Rafael A. P. Oliveira, Harry Wechsler, Cainã Dajuda, Márcio Delamaro, Fátima L. S. Nunes*

#### **Development of an Effective Method and a Portable Device to Evaluate the Pupillary Reflex**

*Ronaldo Martins da Costa, Hedenir Machado Pinheiro, Leandro Luis Galdino de Oliveira, Eduardo N. R. Camilo, Gang Hua*

## **Session CDE 1 – Knowledge and Decision Support Systems**

Room: Luis Faváro

Chair: Marco Antonio Gutierrez

Session CDE 1 – 08:30/10:00

### **A Health Mobile Application and Architecture to Support and Automate in-home Consultation**

*Luciano Vieira de Araújo, Bianca Canezim Letti, Felipe Tozato Cantagalli, Gabriela Scardine Silva, Philippe Pilavjian Ehlert, Lara Miguel Quirino Araújo*

### **Performance Analysis of an Access Scheme Based on Weighted Polling for WBAN**

*Manoel Pontes Gomes, Shusaburo Motoyama*

### **mMamee: A mHealth Platform for Monitoring and Assessing Maternal Environmental Exposure**

*Katerina Karagiannaki, Stavros Chonianakis, Evridiki Patelarou, Athanasia Panousopoulou, Maria Papadopouli*

## **Session E 1 – System Integration and Security**

Room: CISC Auditorium

Chair: Paulo M. Azevedo-Marques

Session E 1 – 08:30/10:00

### **Secure and Private Management of Healthcare Databases for Data Mining**

*Noman Mohammed, Samira Barouti, Dima Alhadidi, Rui Chen*

### **Data Quality in HL7 Messages: A Real Case Analysis**

*Ricardo Jorge Teixeira Ferreira, Francisco Nuno Rocha Gonçalves, Ricardo João Cruz Correia*

### **Electronic Systems Interoperability Study: Based on the Interchange of Hospital Obstetrical Information**

*Zilma Nogueira Reis, Juliano de Souza Gaspar, Andreia Cristina de Souza, Marcelo Rodrigues dos Santos Junior, Thais Abreu Maia, Marcelo Rodrigues dos Santos*

### **Minimum Data Consensus: Essential Information to Continuing Healthcare**

*Milena Gomes Delfini, Newton Shydeo Brandão Miyoshi, Domingos Alves*

## Invited Talk

### [10:20–12:20] “Detection of Architectural Distortion in Prior Mammograms: Subtle Signs of Breast Cancer”

Speaker: Rangaraj M. Rangayyan

University of Calgary, Alberta, Canada

<http://people.ucalgary.ca/~ranga/>

*Abstract:* Architectural distortion is a subtle sign of breast cancer that could be missed in screening mammography. This seminar will present several computer techniques for the detection of architectural distortion in mammograms based on the analysis of oriented texture using Gabor filters, modeling of orientation fields by phase portraits, and modeling of the oriented structure of breast tissues. Screening mammograms obtained prior to the detection of cancer could contain subtle signs of breast cancer, in particular, architectural distortion. Several methods will be described for the characterization architectural distortion based on the analysis of the angular spread of power and other characteristics, fractal analysis, texture analysis, and measures of divergence. With a dataset of 106 prior mammograms of 56 interval-cancer cases and 52 mammograms of 13 normal cases, area under the receiver operating characteristic curve of up to 0.78 has been obtained. Free-response receiver operating characteristics have indicated sensitivity of 0.80 at fewer than 4 false positives per patient. The results indicate that digital image processing and pattern recognition techniques can help in the detection of breast cancer at early stages.

### **Session A&B 1 – Big Data Analysis and Knowledge Discovery**

Room: Fernão Stella de Rodrigues Germano

Chair: Carolyn McGregor

Session A&B 1 – 13:30/15:30

#### **Predicting Teenager's Future Stress Level from Micro-blog**

*Yiping Li, Jing Huang, Hao Wang, Ling Feng*

#### **Mining Symptoms of Severe Mood Disorders in Large Internet Communities**

*Taridzo Chomutare, Eirik Årsand, Gunnar Hartvigsen*

#### **Challenges of Large-Scale Biomedical Workflows on the Cloud - A Case Study on the need for Reproducibility of Results**

*Sehrish Kanwal, Andrew Lonie, Richard O. Sinnott, Charlotte Anderson*

#### **Traceability and Provenance in Big Data Medical Systems**

*Richard McClatchey, Jetendr Shamdasani, Andrew Branson, Kamran Munir, Zsolt Kovacs, Giovanni Frisoni*

## **Session D 1 – Decision Support and Recommendation Systems**

Room: Luis Faváro

Chair: Caetano Traina Jr.

Session D 1 – 13:30/15:30

### **Using Bipartite Graphs for 3D Cardiac Model Retrieval**

*Leila C. C. Bergamasco, Hellyan Oliveira, Helton Bíscao, Harry Wechsler, Fátima L. S. Nunes*

### **Automated Detection of 3D Landmarks for the Elimination of Non-Biological Variation in Geometric Morphometric Analyses**

*Deepali Aneja, Siddharth R Vora, Esra D Camci, Linda G Shapiro, Timothy C Cox*

### **A Chronic Illness System using Biomedical Knowledge Sources and Relevance Feedback**

*Alessandra Alaniz Macedo, Juliana T. Polletini, Ethan V. Munson*

### **Discrete Conditional Phase-Type Model utilising a Multiclass Support Vector Machine for the Prediction of Retinopathy of Prematurity**

*Rebecca Rollins, Adele H. Marshall, Eibhlin McLoone, Sarah Chamney*

## **Session C&E 1 – Knowledge Representation and Analysis**

Room: CISC Auditorium

Chair: Ramon Moreno

Session C&E 1 – 13:30/15:20

### **A New Ontology-Based Method for Functional Composed Comparison of microRNAs**

*Mariana Yuri Sasazaki, Joaquim Cezar Felipe*

### **Ontology Network Definition for Motivational Interviewing Learning Driven by Semantic Context-Awareness**

*Vinícius Maran, Ricardo Pietrobon, Iara Augustin, José Palazzo Moreira de Oliveira*

### **A Comparative Analysis of Reference Architectures for Healthcare in the Ambient Assisted Living Domain**

*Lina María Garcés Rodríguez, Apostolos Ampatzoglou, Paris Avgeriou, Elisa Yumi Nakagawa*

### **Privacy-Aware Genome Mining: Server-Assisted Protocols for Private Set Intersection and Pattern Matching**

*Constantinos Patsakis, Athanasios Zigomitos, Agusti Solanas*

## **Panel – Translational Research: Priorities for Enabling Computer-Based Medical Systems Knowledge Representation and Analysis**

Room: Fernão Stella de Rodrigues Germano

Panel Moderators: Sameer Antani and Rodney Long, National Library of Medicine/NIH/USA

16:00/17:45

This panel is intended to offer CBMS 2015 attendees the opinions of expert researchers about the highest priority steps needed to take research from the lab to where it can make an impact on health care, and also guide focus areas for future CBMS meetings.

Invited researchers will share their expertise in CBMS theme areas, including:

- Image analysis and computational science,
- Clinical research and health informatics, and,
- Health policy.

The panel presentations will be followed by a discussion and question-and-answer period with the audience.

### **Topics and Panel Members**

#### **“Translational Research and Health Informatics”**

*Thomas M. Deserno, Department of Medical Informatics, Uniklinik RWTH Aachen, Germany*

**Abstract:** Translational research applies findings from basic science to enhance human health and well-being. The phrase is used as acronym addressing the application of computer-based medical systems (CBMS) to patients, or – in terms of the NIH – from the (work) bench to bedside (B2B). However, there is a lack of software, protocols, and interfaces (infrastructure) supporting fast and efficient B2B translation. In the past, medical data has been seen from the point of view of a healthcare provider (e.g., a hospital), and HIS/PACS have been developed based on HL7/DICOM standards. Currently, a patient-centered view on health data is focused, and personal health records (PHR) are put in practice. However, a research-centered view on the medical data is still missing. As of today, clinical trials and (rare disease) registries data is collected separately from any medical information system. Developed for the Clinical Trial Center Aachen (CTC-A), we have contributed system architectures and interfaces, which are based on Web services to exchange information that is coded according to the Clinical Data Interchange Standards Consortium (CDISC) operational data model (ODM). Annotated image repositories with integrated image analysis support translational research with signal- and image-based biomarkers as well as comprehensive evaluation of medical image processing.

**Bio:** Thomas M. Deserno (born as Lehmann) received the Diploma in electrical engineering, the PhD in computer science, and the habilitation in medical informatics from the RWTH Aachen University, Aachen, Germany, in 1992, 1998, and 2004, respectively. Since 2007, he is full professor at Uniklinik RWTH Aachen, where he is leading the Image & Data Management Group at the Department of Medical Informatics. His research interests include medical image processing applied to quantitative measurements for computer-assisted diagnoses and medical research in

controlled clinical trials, mobile health, as well as seamless workflow integration of image and signal analysis into the user's workflow. He serves as Data Security Officer for the Clinical Trial center Aachen (CTC-A). Dr. Deserno is senior member of the Institute of Electrical and Electronics Engineers (IEEE) and the Society of Photo-Optical Instrumentations Engineering (SPIE), where he is member of the Program Committee of the annually International Symposium of Medical Imaging (both, CAD and PACS tracks). He serves on the International Editorial Boards of Dentomaxillofacial Radiology, Methods of Information in Medicine, World Journal of Radiology, GMS Medical Informatics, Biometry and Epidemiology (MIBE), Acta Informatica Medica, and he is Co-editor Europe of the International Journal of Healthcare Information Systems and Informatics. In 2015, he became Associated Editor of SPIE Journal of Medical Imaging.

### **“Policy, Practice, State of the Art and the Difficulty of Implementation”**

*Bridget Kane, Public Health and Primary Care, School of Medicine, Trinity College, Dublin, Ireland*

**Abstract:** When we consider the rate of technological development, and our general policy to utilize advances in technology to deliver the highest levels of care to patients; and when we look around us at the realities of how technology is regularly applied, a large gap or chasm is apparent between what we could do and what we are actually doing. Although policy may exist that strives to deliver advanced care services utilizing state of the art in technology, how can we account for the differences we know exist between what is, and what is possible? In this paper the role for CBMS in helping to bridge this gap between policies, applying state of the art technology to current practices is discussed

**Bio:** Bridget Kane was awarded her PhD in Computer Science, following her analysis of the dynamics of multidisciplinary medical teamwork (MDT) and the use of ICT in 2008. Since then she has conducted applied research in the area of MDTs and their meetings. She is currently engaged in geographical analysis of resources and urgent and emergency care activity in Ireland, in the context of social deprivation, to examine if policy on social equity in the provision of service is being fulfilled. Before undertaking her PhD, Bridget worked as a Departmental Manager in a Pathology Laboratory and led the implementation of a Pathology Information System. She holds an MSc in Health Informatics and MSc Management (Organization Behaviour) as well as Fellowship of the Institute of Biomedical Sciences and Cytotechnologist Membership of the International Academy for Cytology.

### **“Imaging Informatics in Medicine”**

*Paulo M. Azevedo-Marques, Internal Medicine Department, University of São Paulo (USP), School of Medicine, in Ribeirão Preto, SP, Brazil*

**Abstract:** Translational research is a research paradigm alternative to the dichotomy of basic research and applied research. Translational research usually moves in a bidirectional manner from one type of research to another—from basic research to patient-oriented research, to population-based research, and back—and involves collaboration among scientists from multiple disciplines. Translational research embraces a multidirectional and multidisciplinary integration of basic research, patient-oriented research, and population-based research, with the long-term aim of improving the health of the public. Imaging Informatics in Medicine is an important area for development of translational researches. So, the question that arises is how to explore the potential for developing translational research in a real medical imaging environment?



**Bio:** Paulo Mazzoncini de Azevedo-Marques is a full-time Associate Professor of Medical Physics and Biomedical Informatics with the Internal Medicine Department, University of São Paulo (USP), School of Medicine, in Ribeirão Preto, SP, Brazil. He received his B.Sc. and M.Sc. degrees in Electrical Engineering and his Ph.D. in Applied Physics from USP. He has previously worked on medical imaging quality control; since 1996, his researches are mainly focused on imaging informatics in medicine. He held a research associate position at the University of Chicago in 2001, where he worked on medical image processing for computer-aided diagnosis (CAD) and content-based image retrieval (CBIR), under the supervision of Professor Kunio Doi. He is the coordinator of the Medical Physics and Biomedical Informatics facility at the University Medical Center at Ribeirão Preto Medical School and he is the elected Vice-President of the Brazilian Health Informatics Association (SBIS) for 2015-2016 biennium.

**“Data Challenges and Opportunities in Medical Analyses and Computational Science”**

*Richard McClatchey, FET – Computer Science and Creative Technologies, University of the West of England, Bristol*

**Abstract:** The last decade has seen massive increases in computing power and data storage capacity enabling new applications that can handle increasingly complex and large volumes of data and images. Advances in network speed have enabled applications to be distributed over the web, providing the potential for improved resource utilization and on-demand sharing. Medical informatics is one domain where these technological advances can bring significant benefit both for scientific research and for day-to-day clinical provision. With the arrival of a deluge of digitized information resulting from advances in the medical domain, clinical research is faced with increasing problems of data management and provenance in data analysis. Over the past two decades, Grid and Cloud computing have emerged as infrastructures for supporting large-scale research in bio-medical domains. Emphasis has now shifted from the development of such infrastructures, to the provision of services through which medical researchers can access data and algorithms to facilitate their programs of research. Challenges persist in the areas of facilitating shared, (potentially distributed) large-scale analyses, in reproducibility of complex research workflows and outcomes, in the preservation of data sets and algorithms for collaborative study and in the fusion of heterogeneous data sets into usable information and knowledge.

**Bio:** Prof. McClatchey has been research active for the past 30 years and has led many projects funded by industry and by the EC in the areas of large-scale distributed data and process management, in data and meta-data modelling and in systems design and integration. Currently a Fellow of both the British Computer Society and the Institute of Engineering and Technology with a PhD in Physics (Sheffield, 1982) and DPhil in Computer Science (West of England, UWE 1999), McClatchey has published over 200 papers and has held the Chair of Applied Computer Science at UWE since 2000. His current research interest lies in Cloud data and knowledge management and particularly in their application in medical applications; he has developed considerable experience of collaboration with industry. He leads the Centre for Complex Cooperative Systems at UWE and is active in collaborative projects at CERN, and with many international partners in numerous EC projects including Health-e-Child, neuGRID/N4U and CRISTAL-ISE. He has chaired several international conferences and workshops during his 25 years at UWE, Bristol, he has over 20 postgraduate PhD/DPhil/MPhil completions to his name and has examined PhDs across Europe.

Recently he contributed a chapter to a landmark book commemorating 60 years of technology transfer from CERN to European industry.

### **“Health Informatics and Industry”**

*Carolyn McGregor, Health Informatics, University of Ontario Institute of Technology, Canada*

**Abstract:** The effective use of Big Data enabled computer based medical systems have the potential to improve health outcomes and reduce costs and many believe that it has the potential to be the next most disruptive influence on healthcare since genomics. Research showing the potential use of Big Data for earlier condition onset detection and condition classification is emerging across many areas but to enable a disruptive impact systemic translational research approaches to create effective change in healthcare using Big Data platforms and techniques are needed. The Artemis project will be presented which is demonstrating a Big Data platform for real-time streaming analytics and temporal data mining in and out of the cloud in Canada, USA and China. Artemis and Artemis Cloud have been used to perform clinical research within many condition contexts in neonatal care and its application is now being pursued beyond critical care including its use for health monitoring on long range space flight. Translational research as it relates to Big Data enabled computer-based medical systems generally and the Artemis project specifically will be presented.

**Bio:** Professor Carolyn McGregor is the Canada Research Chair in Health Informatics at the University Of Ontario Institute Of Technology, Canada. Dr. McGregor has led pioneering research in Big Data, analytics, event stream processing, temporal data stream data mining, business process modelling, patient journey modelling and cloud computing. In the 1990s she led two of the earliest business analytics implementations in Australia for one of the largest banks and the largest retailer. She now progresses her research within the context of critical care medicine, mental health, astronaut health and military and civilian tactical training. She has been awarded over \$10 million in research, consultancy and infrastructure funding. She has led the establishment of two IT start-up companies internationally and has published over 130 research publications and 7 patents internationally. She has extensive collaborative relationships with healthcare organizations, researchers and industry in several countries around the world including Canada, Australia, USA, China and Ireland. In 2013 her Artemis project was awarded the Information Technology Association of Canada (ITAC) Ingenious Award in the Not for Profit Category. In 2014 she was awarded membership in the Order of Australia, general division, for significant service to science and innovation through health care information systems. She is regularly called upon by the media as an international specialist in health informatics and Big Data.

## Wednesday June 24, 2015 – São Carlos/ICMC

Schedule	Wednesday – 24/06/2015	
08h00–08h20	Registration	
08h20–08h45		
08h45–10h15	Invited Talk - Rodney Long (Auditorium FERNÃO STELLA)	
10h15–10h40	COFFEE – BREAK	
10h40–12h40	B&G 2 (Auditorium FERNÃO STELLA)	IT 1 (Auditorium LUIS FAVÁRO)
12h40–14h00	LUNCH BREAK	
14h00–15h30	H 2 (Auditorium FERNÃO STELLA)	IT 2 (Auditorium LUIS FAVÁRO)
15h30–16h00	COFFEE – BREAK	
16h00–17h30	POSTER PRESENTATION GENERAL TRACK (HYPERSPACE PROF. LOIBEL)	

### Invited Talk

#### **[08:45–10:15] “Practical Computer-Based Systems for Biomedicine”**

Speaker: L. Rodney Long

U.S National Library of medicine, National Institute of Health

<http://lhncbc.nlm.nih.gov/personnel/leonard-long>

*Abstract:* The continued evolution of computer hardware and software has a dramatic impact on many aspects of modern life, including the ways we communicate, educate, travel, transact business, and, of course, the ways we manage and carry out clinical care and conduct biomedical research. The introduction of new technologies, even successful ones, usually includes exploratory efforts, including false starts and failures, and accomplishments that seem to have innovative merit, but ultimately fail due to inability to meet a practical need. In this talk, I will focus on our work that includes the building of software tools for biomedical database implementation, manual and automated image segmentation, online medical proficiency assessment, and automated disease classification from images and related clinical information. I will use our experiences in these R&D efforts as a microcosm to illustrate and comment on what “works”, what does not work, and the technological/collaborative approaches that will likely be required for productive biomedical applications in the near term.

## **Session B&G 2 – Data Analysis for Clinical and Healthcare**

Room: Fernão Stella de Rodrigues Germano

Chair: Agma J. Machado Traina

Session B&G2 – 10:40/12:40

### **Predicting Cardiopulmonary Response to Incremental Exercise Test**

*Elena Baralis, Tania Cerquitelli, Silvia Chiusano, Andrea Giordano, Alessandro Mezzani, Davide Susta, Xin Xiao*

### **Preliminary Study for a Bayesian Network Prognostic Model for Chron's Disease**

*Cláudia Camila Dias, Fernando Magro, Pedro Pereira Rodrigues*

### **Gaussian Process-based Feature Selection for Wavelet Parameters: Predicting Acute Hypotensive Episodes from Physiological Signals**

*Franck Derroncourt, Kalyan Veeramachaneni, Una-May O'Reilly*

## **Session IT 1 – Industrial Track 1**

Room: Luis Faváro

Chair: Daniel Katz

Session IT 1 – 10:40/12:40

### **Hippocrates: A Context-aware, Collaboration Enabling Search Tool**

*Georgios Aravanis, Anca Bucur, Mykola Pechenizkiy*

### **Lyria PACS A case study saves ten million dollars in a Brazilian Hospital**

*Diego Fiori Carvalho, Jose Antonio Camacho Guerrero, Paulo M. Azevedo-Marques, Alessandra Alaniz Macedo*

### **Ubiquitous System for Stroke Monitoring and Alert**

*Allan Barcelos, Sandro J. Rigo, Jorge L. V. Barbosa*

### **Second Opinion System for Emergency Cardiology in Brazil**

*Ramon Alfredo Moreno, Marco Antonio Gutierrez, Mucio Tavares de Oliveira Junior, Vinicius Lima, Norberto Alves Ferreira*

## **Session H 2 – Medical Education and Collaboration**

Room: Fernão Stella de Rodrigues Germano

Chair: Bridget Kane

Session H 2 – 14:00/15:40

### **Developing an Educational Medical Game using AgilePASSI Multi-Agent Methodology**

*Vitor Manuel Fragoso Ferreira, Julio Cesar Cavalcanti Carvalho, Rosa Maria E. Moreira da Costa, Vera Maria Benjamim Werneck*

### **Generating Facial Emotions for Diagnosis and Training**

*Rafael Luiz Testa, Antônio Henrique Nunes Muniz, Liseth Urpy Segundo Carpio, Cristiana Castanho de Almeida Rocca, Ariane Machado Lima, Fátima de Lourdes dos Santos Nunes Marques*

### **Region-Specific Automated Feedback in Temporal Bone Surgery Simulation**

*Sudanthi Wijewickrema, Ioanna Ioannou, Yun Zhou, Patorn Piroomchai, James Bailey, Gregor Kennedy, Stephen O'Leary*

### **Applying Natural Language Processing, Information Retrieval and Machine Learning to Decision Support in Medical Coordination in an Emergency Medicine Context**

*Juliana Tarossi Pollettini, Hugo Cesar Pessotti, Antonio Pazin Filho, Evandro Eduardo Seron Ruiz, Mário Sérgio Adolfo Junior*

## **Session IT 1 – Industrial Track 2**

Room: Luis Faváro

Chair: Ricardo Cruz-Correia

Session IT 2 – 14:00/15:00

### **Development of a Low-Cost Insulin Infusion Pump: Lessons Learned from an Industry Case**

*Luiz Eduardo G. Martins, Hanniere de Faria, Lucas Vecchete, Tatiana Cunha, Tiago de Oliveira, Dulce E. Casarini, Juliana Almada Colucci*

### **Federated Service-based Authentication Provisioning for Distributed Diagnostic Imaging Systems**

*Hassan Sharghi, Weina Ma, Kamran Sartipi*

### **Regional Anaesthesia Simulator and Assistant (RASimAs): Medical Image Processing Supporting Anaesthesiologists in Training and Performance of Local Blocks**

*Thomas M. Deserno, Julia E. E. de Oliveira, Oliver Grottke*

## **Poster Presentation – General Track**

Chair: Marcela Xavier Ribeiro

Hyperspace Prof. Loibel - 16:00/17:30

### **Mobile Crowd Sensing in Clinical and Psychological Trials - A Case Study**

*Rüdiger Pryss, Manfred Reichert, Jochen Herrmann, Berthold Langguth, Winfried Schlee*

### **Reconfigurable Embedded System for ECG Signal Acquisition**

*Marcel Seiji Kay, Fábio Iaione*

### **Unsupervised Segmentation of Leukocytes Images Using Thresholding Neighborhood Valley-Emphasis**

*Thaína Aparecida Azevedo Tosta, Andréssa Finzi de Abreu, Leandro Alves Neves, Bruno Augusto Nassif Travençolo, Marcelo Zanchetta do Nascimento*

### **A Portable System to Support Electrocardiography in Emergency Care**

*Robson Pequeno, Normando Carvalho, Katia Galdino, Carlos de Almeida, Luis Maior, Breno Polanski, Genilson Medeiros, Francisco Ferreira, Jessica Laisa*

### **Preventing Risk Situations at Type-II Diabetes Mellitus Patients Through Continuous Glucose Monitoring and Prediction-based Teleconsults**

*Huber Nieto-Chaupis, Mitsuko Caballero, H. Matta-Solis, R. Perez-Siguas, Sheila Blas, E. Carranza-Manrique, Edith Contreras, Gloria Quispe, Sandy Ramirez, J. Rocha*

### **A Method for Real-time Stimulation and Response Monitoring using Big Data and Its Application to Tactical Training**

*Carolyn McGregor, Brendan Bonnis, Brodie Stanfield, Michael Stanfield*

### **Use of 3D Printing in Surgical Planning: Strategies for Risk Analysis and User Involvement**

*Carlo Rondinoni, Felipe Wilker Grillo, Caio Marconato Matias, Marcelo Volpon Santos, Pedro Yoshito Noritomi, Jorge Vicente Lopes da Silva, Antonio Adilton Oliveira Carneiro, Antonio Carlos dos Santos, Helio Rubens Machado*

### **Segmentation of Blood Vessels in Retinal Images based on Nonlinear Filtering**

*Vinicius Ruela Pereira Borges, Denise Junqueira dos Santos, Branko Popovic, Douglas Farias Cordeiro*

### **ICT Solutions for Health Education Model**

*Domenico Mirarchi, Patrizia Vizza, Mario Cannataro, Pietro Hiram Guzzi, Giuseppe Tradigo, Pierangelo Veltri*

### **Serious Gaming for Orthotopic Liver Transplantation Anesthesia**

*Daniel Katz, Ryan Wang*

## Thursday June 25, 2015 – Ribeirão Preto/FMRP

Schedule	Thursday – 25/06/2015
08h00–08h20	Registration
08h20–08h45	
08h45–10h15	Mini-Course Part 1 - “Analysis of Shape, Texture, and Oriented Patterns in Biomedical Images” Rangaraj Rangayyan
10h15–10h40	COFFEE – BREAK
10h40–12h00	Mini-Course Part 2 - “Analysis of Shape, Texture, and Oriented Patterns in Biomedical Images” Rangaraj Rangayyan
12h00–12h15	
12h15–12h40	LUNCH BREAK
12h40–13h30	
13h30–15h00	Invited Talk Marco Gutierrez (Auditorium CEAPS)
15h00–15h30	COFFEE – BREAK
15h30–16h00	POSTER PRESENTATION
16h00–16h15	WOP – CBMS
16h15–17h30	(Auditorium CEAPS)
17h30–18h00	CLOSING CEREMONY

### Invited Talk

#### **[13:30–15:00] “Advances and Progresses in Hospital Information Systems”**

Speaker: Marco Antonio Gutierrez

Instituto do Coração (InCor) - University of São Paulo, Brazil

[http://www.incor.usp.br/spdweb/pessoas/marco\\_gutierrez.htm](http://www.incor.usp.br/spdweb/pessoas/marco_gutierrez.htm)

*Abstract:* After more than one decade in the 21st century, for the vast majority of patients, a simple consultation, prescription or an exam report is still based on a collection of papers with details of his or her clinical history. This paper based collection of health registers may difficult the exchange of information between actors in the health system may induce errors in the decision process and also may turn the assistance process inefficient. However, this well-known scenario in most of the hospitals can be minimized with the use of Information Technology (IT). The use of IT in the assistance process has the potential to reduce dramatically the number of fails involved in a paper based process and also contribute to the reduction of costs in the Healthcare system. The advances and progresses in hospital information systems (HIS), as a tool to support the assistance processes, have been contributed to change this typical scenario and this talk will cover the principal steps, barriers and strategies in the HIS adoption, as well as its contribution to change the patient care.

## **Poster Presentation – Wop CBMS**

Chair: Paulo M. Azevedo-Marques

Room: Auditorium CEAPS at Clinical Hospital at Ribeirão Preto of  
University of São Paulo (USP) - 16:00/17:30

### **Human Centric ICT Support to Young Persons with Mental Disorders**

*Bo Hu, Aisha Naseer*

### **A Risk Analysis Model for PACS Environments in the Cloud**

*Saulo da Silva Cordeiro, Paulo Mazzoncini de Azevedo-Marques, Fábio Sant' Ana, Kátia Suzuki*

### **A Reference Architecture for Healthcare Supportive Home Systems**

*Lina María Garcés Rodríguez, Apostolos Ampatzoglou, Paris Avgeriou, Elisa Yumi Nakagawa*

### **Automatic Pulmonary Abnormality Screening using Thoracic Edge Map**

*K.C. Santosh, Szilard Vajda, Sameer Antani, George Thoma*

### **Prehospital Electronic Record with use of Mobile Devices in the SAMU's Ambulances in Ribeirão Preto-Brazil**

*Alexandre Freitas Duarte, Hilton Vicente César, André Luis Mendes Marques, Paulo Mazzoncini de Azevedo-Marques, Gerson Alves Pereira Júnior*

### **Designing Medical Interactive Systems via Assessment of Human Mental Workload**

*Luca Longo*

### **Technology Enhanced Integration of Hospital and Primary Care in the M'boi Mirim Neighborhood of São Paulo City**

*Alexandre Hannud Abdo, Ana Delgado, Ana Mafra, Tatiane Ocon Nascimento, Mario Bracco*

### **Automatic Classification of Cancer Tumors using Image Annotations and Ontologies**

*Edson F. Luque, Daniel L. Rubin, Dilvan A. Moreira*

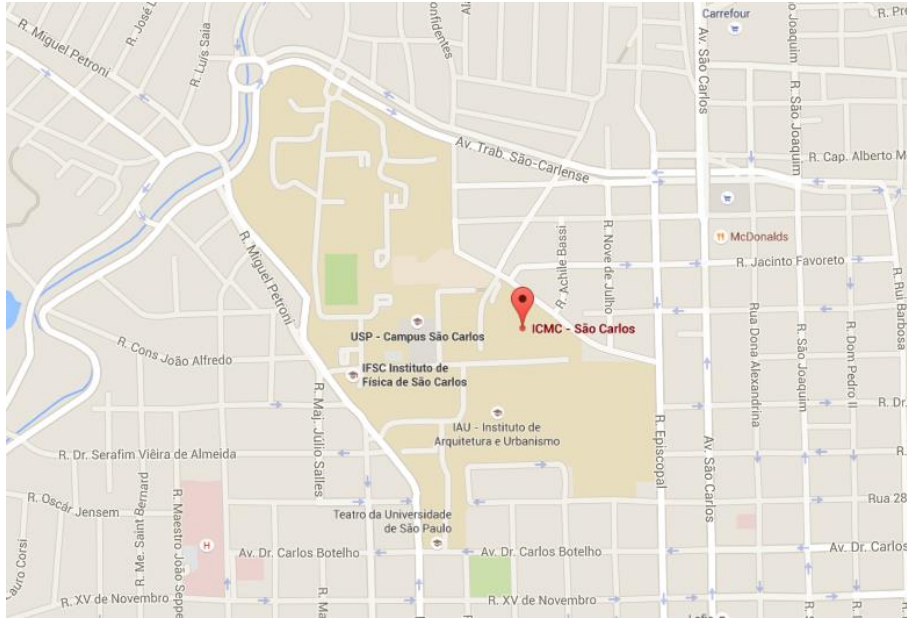
### **Exploiting Evolutionary approaches for Content-Based Medical Image Retrieval**

*Reginaldo Rocha, Priscila T. M. Saito, Pedro H. Bugatti*



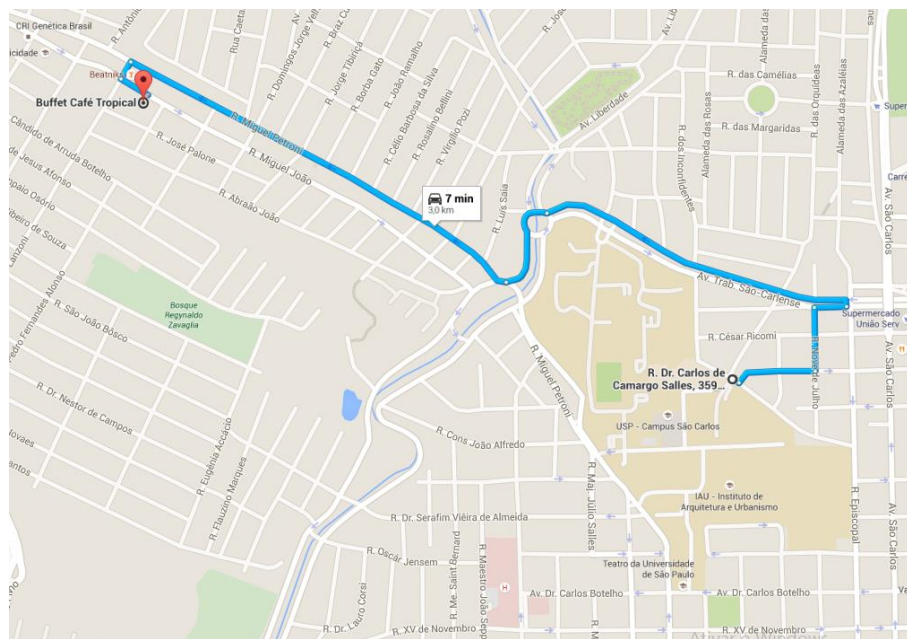
## CONFERENCE VENUE

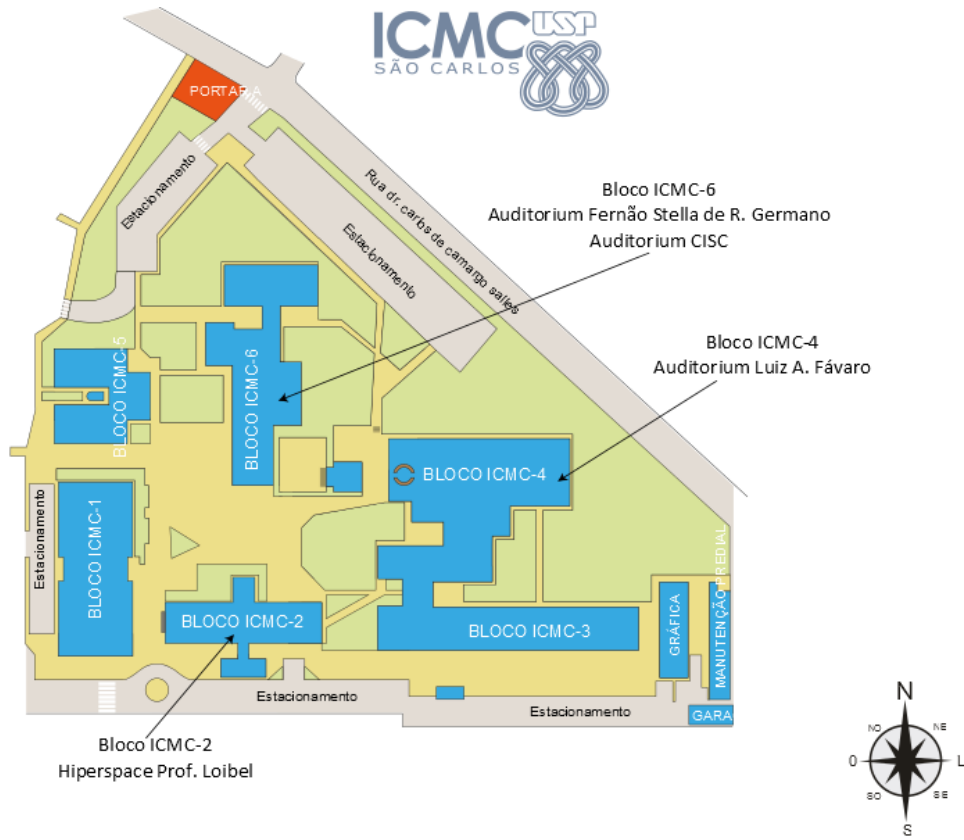
Institute of Mathematics and Computer Science – ICMC.  
Avenida Trabalhador São-Carlense, 400 – São Carlos/SP – Brazil.  
Welcome Reception, Monday 22, 2015, Hyperspace Prof. Loibel



## CONFERENCE DINNER VENUE

Buffet Café Tropical.  
Rua Miguel João, 1295 - Jardim Bandeirantes – São Carlos/SP – Brazil.  
Conference Dinner, Tuesday 23, 2015.





## WORKSHOP FOR ONGOING PROJECTS

Clinical Hospital at Ribeirão Preto of Universty of São Paulo.  
 Av. Bandeirantes, 3.900 - Campus Universitário - Ribeirão Preto/SP – Brazil.  
 WoP-CBMS, Thursday 25, 2015, CEAPS.

