

JULY 11-14, 2010

EURO XXIV LISBON

24th European Conference on Operational Research

EURO XXIV LISBON

SPONSORED BY



CONTENTS

Welcome – President of EURO	v
Welcome – Chairs of Programme & Organizing Committees	vii
EURO Conference History	viii
Organizing Committee	viii
Programme Committee	ix
Institutional Support	x
Language	xiii
Transportation	xiii
Lunches	xiii
Coffee-Breaks	xiii
Guidelines for Session Chairs	xiv
Guidelines for Speakers	xv
Audio-Visual services	xv
Speaker information	xv
For assistance during your session	xv
Venue	xvi
Registration	xx
WIFI	xxi
General Information	xxii
Basic information	xxii
Useful telephone numbers	xxii
Working hours	xxii
Banks and money	xxii
Electricity network	xxii
Public transportation	xxii
Museums	xxiii
Social Events	xxiv
Welcome reception	xxiv
Musical show & banquet	xxiv
Boat trip	xxv
Group Meetings and Workshops	xxvi
Exhibitors	xxx
Overview	xxxv
Conference statistics	xxxv
Euro Awards and Prizes	xxxv
EURO Gold Medal 2010	xxxv
EURO Distinguished Service Medal (EDSM 2010)	xxxv
Management Science Strategic Innovation Prize (MSSIP 2010)	xxxv
EURO Doctoral Dissertation Award (EDDA 2010)	xxxvi
EURO Excellence in Practice Award 2010 (EEPA 2010)	xxxvi
ROADEF/EURO Challenge 2010	xxxvi
Overview of the Programme	xxxviii
Opening Session	xl
Closing Session	xl
Invited Speakers	xliv
Technical Sessions	1

WELCOME



It is my great pleasure, as President of EURO, to welcome you to EURO XXIV.

The primary objective of EURO is to promote OR in Europe and EURO conferences are a key opportunity to build the intellectual and social capital that are essential in defining and maintaining the identity of Operational Research. At a time when interdisciplinary collaboration is heralded as vitally important in seeking to resolve the complex challenges facing the world, I think it is important to remind ourselves of, to celebrate and perhaps to more actively promote and pursue the interdisciplinary nature of OR as part of our identity. The agreement signed by the national societies which came together to form EURO in 1975 *referred to representatives of diverse disciplines working together and a co-operation which respects no boundaries between disciplines*. As the field of OR and our conferences continue to grow, we should strive to balance depth of knowledge in our own specialisms with breadth of understanding of theory, method and practice in other areas within and beyond OR – complementing the need to nurture both bonding and bridging social capital.

I would like to thank Silvano Martello and José Paixão, the chairs of the Programme and Organising committees for EURO XXIV, their respective committees and the stream organisers, for their tremendous efforts in crafting a conference programme that will provide us with a wealth of opportunities to enhance our depth and breadth of understanding, to debate and discuss with old colleagues and to develop new collaborations. Please make the most of each and every one of these occasions – to celebrate success, to listen, to learn, to network and to relax and enjoy the delights of Lisbon. I hope that there will be something to interest, to enchant and to surprise you; and that you will leave with new ideas, new friends and new memories to treasure.

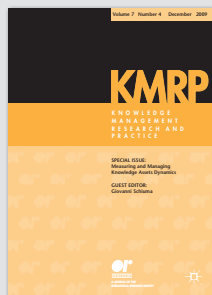
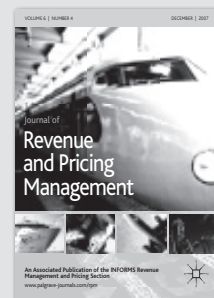
Valerie Belton, President of EURO

VISIT PALGRAVE MACMILLAN AT EURO XXIV LISBON

Come to **Stand 8, Building C6** to experience the Palgrave Macmillan OR/MS portfolio

- » Meet some of the editors from our journals including the *Journal of the Operational Research Society*, *OR Insight* and the *Journal of Simulation*
- » Find out about the improvements to *IAOR Online*
- » Browse the Palgrave Macmillan books in OR/MS

Diverse • International • Relevant



- » www.palgrave-journals.com/jors/
- » www.palgrave-journals.com/ori/
- » www.palgrave-journals.com/ejis/
- » www.palgrave-journals.com/kmrp/
- » www.palgrave-journals.com/jos/
- » www.palgrave-journals.com/iaor/
- » www.palgrave-journals.com/rpm/

We look forward to meeting you!

WELCOME

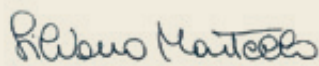
Dear conference participant,

It is with great pleasure that we welcome you to the soulful Lisbon and to EURO XXIV, the largest EURO conference ever. With over 700 sessions with total of 2351 presentations and approximately 2700 participants from 77 different countries, the meeting will provide a stimulating opportunity for a global interchange of ideas on all recent advances in Operational Research. The program is enriched by a distinguished set of twelve keynote lectures, and by two plenary lectures delivered by legendary scientists.

We would like to take this opportunity to express our sincere thanks to all who have supported us in preparing this event. We are grateful to the members of the Programme Committee, who organized twenty five streams of sessions, and to the stream organizers, who coordinated the invited sessions, and managed to attract so many researchers. We warmly thank the members of the Organizing Committee for a priceless dedication and hard working for putting all things together.

As is the tradition with EURO conferences a number of social events are scheduled but, we believe, that you will find something special in the EURO XXIV.

We wish you all an exciting, enjoyable meeting in Lisbon.

A handwritten signature in blue ink that reads "Silvano Martello".

Silvano Martello
Chair of Programme
Committee

A handwritten signature in blue ink that reads "J. Paixão".

José Pinto Paixão
Chair of Organizing
Committee

EURO CONFERENCE HISTORY



ORGANIZING COMMITTEE

José Pinto Paixão (chair)

Universidade de Lisboa – Portugal

Silvano Martello (Program Committee chair)

Università di Bologna – Italy

Gerhard Wäscher (EURO Vice-President)

Otto-von-Guericke-Universität Magdeburg – Germany

Ana Paula Póvoa

Universidade Técnica de Lisboa – Portugal

António Proença

Companhia CARRIS – Portugal

António Rodrigues

Universidade de Lisboa – Portugal

Domingos Cardoso

Universidade de Aveiro – Portugal

João Chambel Leitão

EDP, Electricidade de Portugal – Portugal

João Patrício

Instituto Politécnico de Tomar & Instituto de Telecomunicações – Portugal

João Telhada

Universidade de Lisboa – Portugal

Joaquim Borges Gouveia

GALP & Universidade de Aveiro – Portugal

José Fernando Oliveira

Universidade do Porto – Portugal

José Valério de Carvalho

Universidade do Minho – Portugal

Manuel Furtado Martins

REFER, EP – Portugal

Margarida Vaz Pato

Universidade Técnica de Lisboa – Portugal

Maria Eugénia Captivo

Universidade de Lisboa – Portugal



PROGRAMME COMMITTEE

Silvano Martello (chair)

Università di Bologna – Italy

José Pinto Paixão

Universidade de Lisboa, Portugal

Jacek Blazewicz

Politechnika Poznanska – Poland

Denis Bouyssou

Université Paris Dauphine – France

Edmund Burke

University of Nottingham – England

Marielle Christiansen

Norges Teknisk-Naturvitenskapelige
Universitet – Norway

Stefan Nickel

Universität Karlsruhe – Germany

José Fernando Oliveira

Universidade do Porto – Portugal

David Pisinger

Københavns Universitet – Denmark

Gerhard Wäscher

Otto-von-Guericke-Universität Magdeburg –
Germany

Gerhard-Wilhelm Weber

Middle East Technical University – Turkey

Gerhard Woeginger

Technische Universiteit Eindhoven –
The Netherlands

INSTITUTIONAL SUPPORT [1/2]



The Faculty of Science of the Universidade de Lisboa was established by decree on 19th April 1911. This means that next year the Faculty will be celebrating its centenary. From the day it was set up until 1985, the year the Faculty was transferred to its new facilities at Campo Grande, the Faculty of Science was housed in the building where the Polytechnic School (Escola Politécnica) once stood.

The Faculty of Science of the University of Lisbon (FCUL) is organized into 9 Departments, all of which conduct teaching and research in different fields: Animal Biology; Chemistry and Biochemistry; Geographical Engineering, Geophysics and Energy; Geology; Informatics; Mathematics; Physics; Plant Biology; Statistics and Operational Research.

Research activities at the Faculty of Science are performed in 33 Laboratories and Research Centers or Institutes embracing a variety of domains in Science and Technology. Many of those R&D activities are developed in conjunction with international teams and are funded both at national and European levels.

As an integrating organic unit of the Universidade de Lisboa, the roots of the Faculty of Science are also embedded in the history of the foundation of this institution.



The «Centro de Investigação Operacional» (CIO), The Operational Research Centre of the Faculty of Science, University of Lisbon, was created in 1994 to promote the area Operational Research in Portugal.

The mission of CIO is to produce outstanding research and has been classified as a Center of Excellence in the last two FCT evaluations, in 2002 and 2007. The Center has 68 members (42 of whom have doctorates) and 27 collaborators from several institutions.

The research activities of the Unit are focused on Operational Research, namely in the following areas:

- ➔ Combinatorial / Discrete Optimization,
- ➔ Network Optimization,
- ➔ Multicriteria Optimization,
- ➔ Decision Support Systems,
- ➔ Optimization in Finance,
- ➔ Neural Computation and Forecasting,
- ➔ Stochastic Optimization.



The University of Lisbon is a public, plural school providing solid education inspired by competitive research and the commitment to serve the community.

The University invests in the cultural, artistic, scientific and technological heritage of the academy, by consolidating talents and enhancing their integration into society.

The Portuguese University has very ancient origins which are associated with the request made to Pope Nicolas IV, in 1288, for the creation of a general study in Lisbon. The seat of the University changed locations until 1537 and in that span of time was either in Lisbon or Coimbra. It was ultimately transferred to Coimbra in 1537 where it remained as the only institution in the country. And only in the 20th century does higher education reappear in the capital with: the Medical and Surgical School of Lisbon (1836), the School of Pharmacy (1836), the Polytechnic School (1837) and the Higher Course of Arts (1859).

These four schools were united to form the Universidade de Lisboa, through the University Constitution of 19th April, 1911 – created by the decree of 22nd March, 1911 – and their titles changed to those we all know today. Recently, there have been more changes in these faculties and more research and education institutions have been incorporated.



The School of Communication and Media Studies is an institution of excellence in both teaching and research in the areas of communication, focusing on theoretical and practical knowledge.



FCCN (National Foundation for Scientific Computing) is a non-profit making private institution of public utility that was founded by public entities. Having begun its activity in January 1987, FCCN is now celebrating his 20th anniversary.

Main Attributions:

- ➔ Planning, management and operation of the national research and education network (RCTS – Rede Ciência, Tecnologia e Sociedade – Science, Technology and Society Network), a high performance network (Backbone using own optical fibre operating @10Gbps) that connects all public universities, most other higher education institutions, state laboratories, R&D institutions, public primary schools (1st, 2nd and 3rd grade) and secondary schools to the Internet. RCTS is a member of the GÉANT European research and education network;
- ➔ Supporting governmental bodies and the R&D community with national projects designed to educate people about the Information and Knowledge Society, for example: Virtual Campus (eduRoam); Digital Scientific Library (B-on); CERT.PT; Video-conferencing; VoIP network;
- ➔ Registry of the .pt domain/sub-domains (DNS.PT)
- ➔ Operating GigaPIX, a neutral Internet exchange that currently connects the main national ISPs.

INSTITUTIONAL SUPPORT [2/2]



The Association of
European Operational
Research Societies

EURO is the «Association of European Operational Research Societies» within IFORS, the «International Federation of Operational Research Societies». It is a «non profit» association domiciled in Switzerland. Its affairs are regulated by a Council consisting of representatives/alternates of all its members and an Executive Committee which constitutes its board of directors. Its aim is to promote Operational Research throughout Europe.

The members of EURO are normally full members of IFORS and comprise the national OR societies of countries located within or nearby (in a broad sense) Europe. Each member is represented in the EURO Council by two representatives, one of whom votes, if required. Council meetings are held annually, normally in conjunction with the EURO-k conferences.

The Council elects a President, a President-Elect, three Vice-Presidents, and a Secretary. These six EURO officers form the Executive Committee. The President-Elect serves for only one year whereas all others are elected for two years. Since 1993 the Executive Committee is assisted by a Permanent Secretariat.



The International Federation of Operational Research Societies (IFORS) is an umbrella organization comprising the national Operations Research societies of over forty five countries from four geographical regions: Asia Pacific, Europe, North America, South America.

Total membership is over 30 000 persons. IFORS' mission is to promote Operations Research as an academic discipline and a profession.



Associação Portuguesa
de Investigação Operacional

The Portuguese OR Society, APDIO (Associação Portuguesa de Investigação Operacional) was founded on 1978, and is a member society of EURO and IFORS. It is about 500 members strong, and, among other initiatives, has a long record of organizing or supporting scientific events to promote OR — most notably, the 1986 EURO Conference and the 1993 IFORS Triennial Conference. On a more regular basis, it runs a biennial national conference, and supports the series of international conferences on Optimization.

LANGUAGE

The official language will be English. No simultaneous translation will be provided.

LUNCHES

Lunch will be served in the Cantina located right in front of the Aula Magna and very close to Tube Station «Cidade Universitária», from 11:30 to 14:30. You are kindly required to wear your badge. Vegetarian food is available.

COFFEE-BREAKS

Coffee, tea, juices and bottled water will be available during the conference works. Sweets and fresh fruit will be served regularly at special tables located in each building.

TRANSPORTATION

The support card «7 Colinas» is a contactless electronic card, which can be charged with electronic tickets and can be recharged for 1 year.

Your «7 Colinas» card is charged with 3 units of our 24h Carris/Metro ticket.

The 24h Carris/Metro ticket is valid both for Carris (Buses, Tramway, Funiculars and Elevator) and Metro (underground) networks, for unlimited trips during 24 h, since first validation.

Please remember that you must validate at each entrance in Carris transport vehicles, and at the entry and exit of Metro stations. The validation process for Carris transports is very simple, just place your card near the Validator inside vehicles and wait for the short beep and green light. For Metro, just place the card near the entrance and exit validators and wait for the doors to open.



GUIDELINES FOR SESSION CHAIRS

The role of the Chair is to coordinate and ensure the smooth running of the session. The Chair:

- Contacts the speakers before the session, to verify who will present and to preempt any technical problems.
- Begins and ends each session on time. Each session lasts 80 minutes, with 20 minutes allotted to each presentation at sessions with 4 speakers or less; 16 minutes, in the exceptional cases where there are 5 speakers at a session.
- Introduces the speaker and the title of each presentation.
- Ensures that presentations are made in the order shown in the program, to allow participants to jump between sessions. If a speaker cancels or does not attend, schedules should be respected rather than pushing every talk forward.
- Completes the session attendance form (there will be forms in the room).
- When appropriate, produce visual warnings to speakers as to the number of minutes (e.g., 5, 2) left by using simple gestures or prepared cards.
- Asks for questions and thanks the speaker.

VERY IMPORTANT

We ask Session Chairs to notify us about any lastminute changes or cancellations; these changes will be posted outside the meeting rooms.

GUIDELINES FOR SPEAKERS

Audio-Visual services

All session rooms will be equipped with DLP/LCD video projectors. Laptops or desktops, as well as overhead projectors, will be available in most rooms, or may be requested at least 15 minutes in advance. You may use your own laptop to ensure that you will make your presentation with the right version of the software and fonts installed, so that it looks like what you have planned and designed.

Please follow these guidelines to ensure a successful presentation:

- Bring your laptop along with the power supply cord to your session.
- You may need an adaptor to connect your computer to the local voltage (220) and wall plug type.
- If your laptop is a Mac, bring the required adapter for the external video output.
- Arrive at your session at least 10 minutes before it begins. All presenters in a session should set up and test the connection to the projector before the session begins.
- We encourage speakers to put their presentations on a USB data stick (USB pen) as a backup.

Speaker information

The location of your session is shown in the Abstracts section of the Conference Programme book and in the Master Track Schedule. Please be on time for your session, check in with the session chair, and test the A/V equipment.

Time your presentation to fit the allotted time (20 minutes for 4 speakers or less in a session, 16 minutes for the exceptional cases where there are 5 speakers at a session), including time for questions and audience participation. Presentations should be limited to key issues along with a brief summary. Feel free to bring along copies of your paper to distribute or to provide a handout with related information.

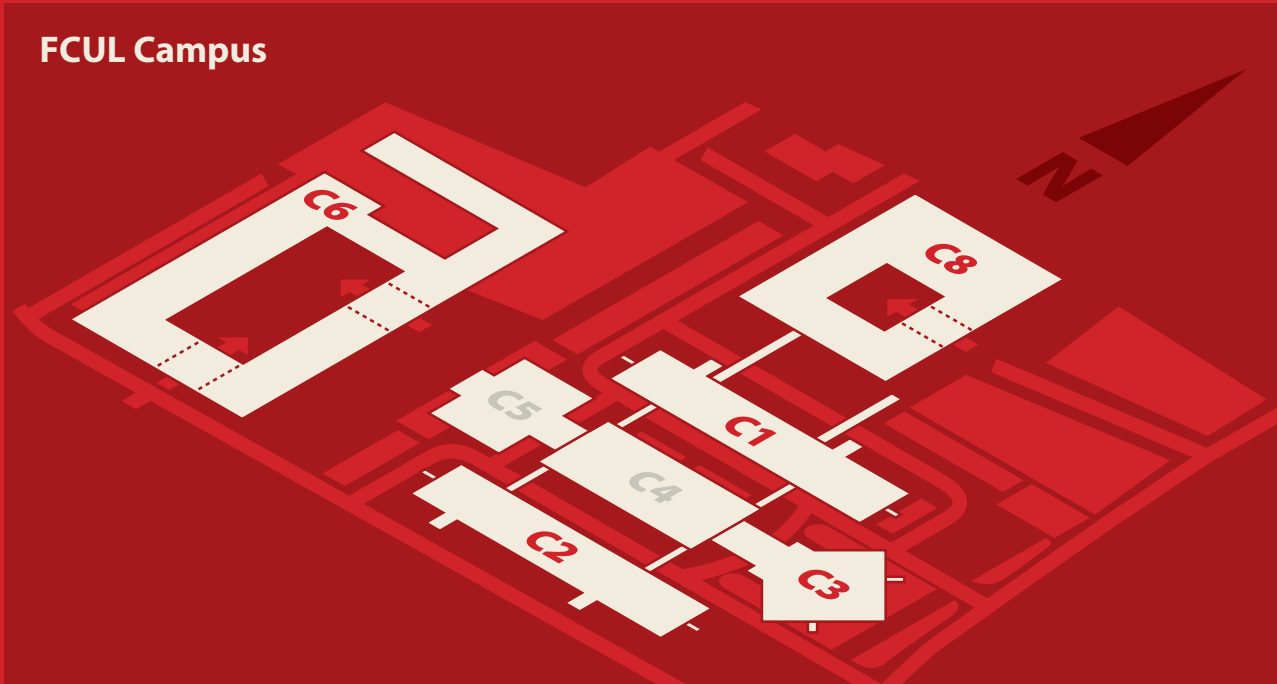
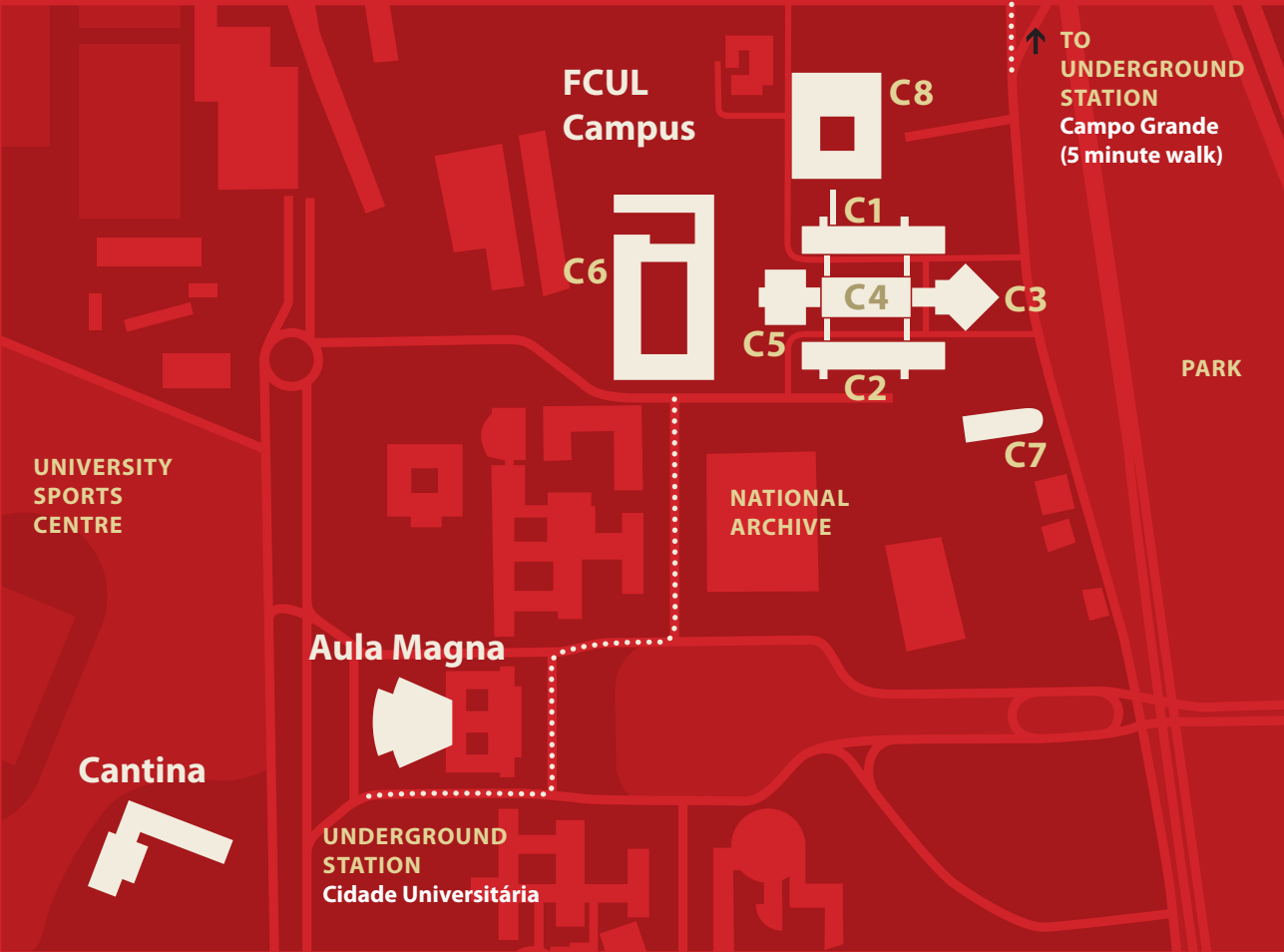
No proceedings with complete papers are produced for this meeting. To obtain complete copies of any papers abstracted in the program, please contact the authors directly at the address supplied with each abstract.

For assistance during your session

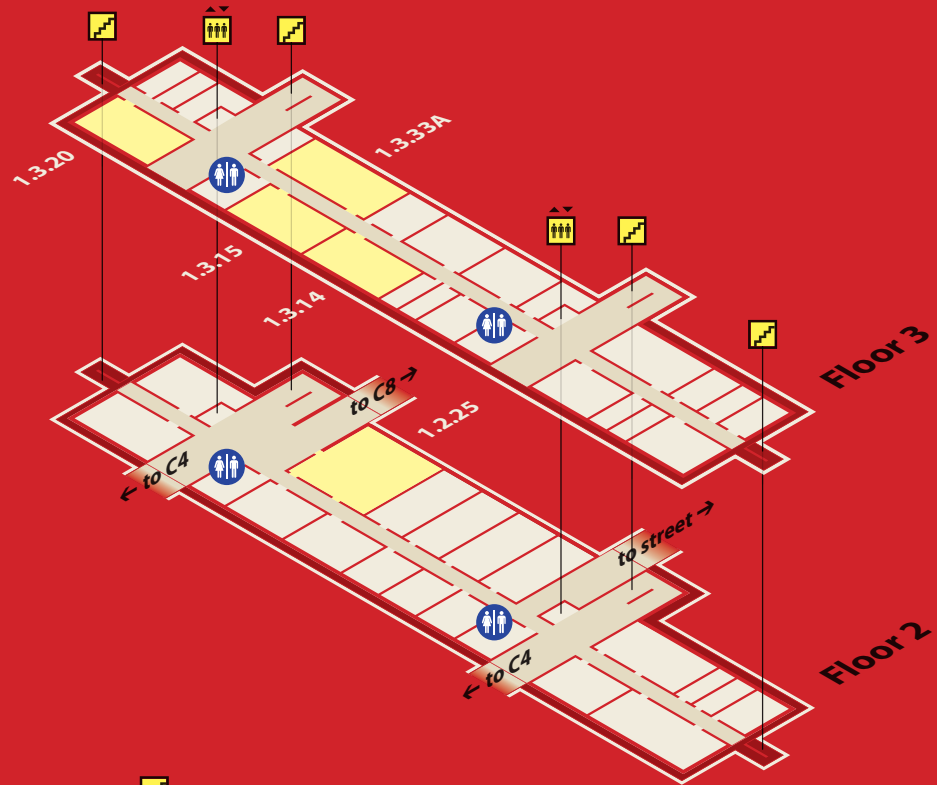
One or more session assistants (student volunteers) will be available at each room. If you have any problems in your session room related to AV needs, if you need a laptop or if you have any other requests, address a Student Volunteer in the area to ask for assistance.

VENUE [1/2]

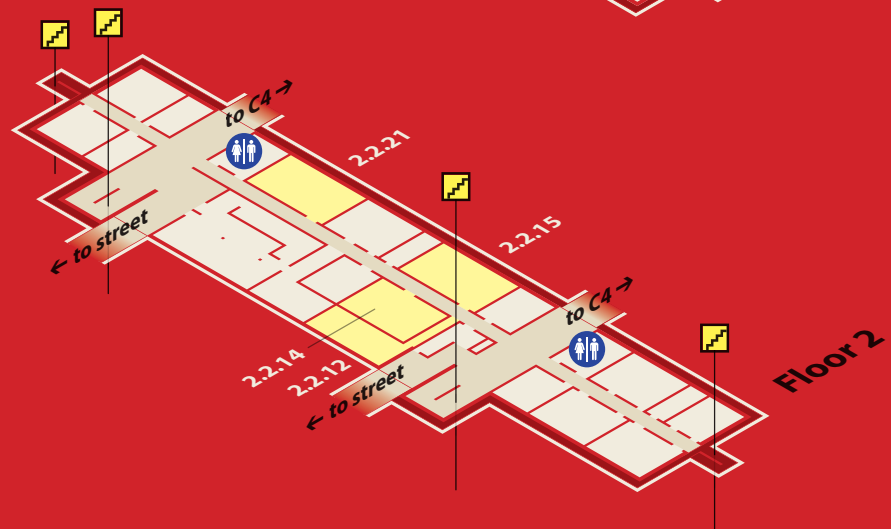
Universidade de Lisboa Faculdade de Ciências Campo Grande, Edifício C6 1749-016 Lisboa	T: +351 21 750 00 00 info.fc.ul@fc.ul.pt www.fc.ul.pt	GPS 38°45'23.63" N 9°09'18.88" W
---	---	--



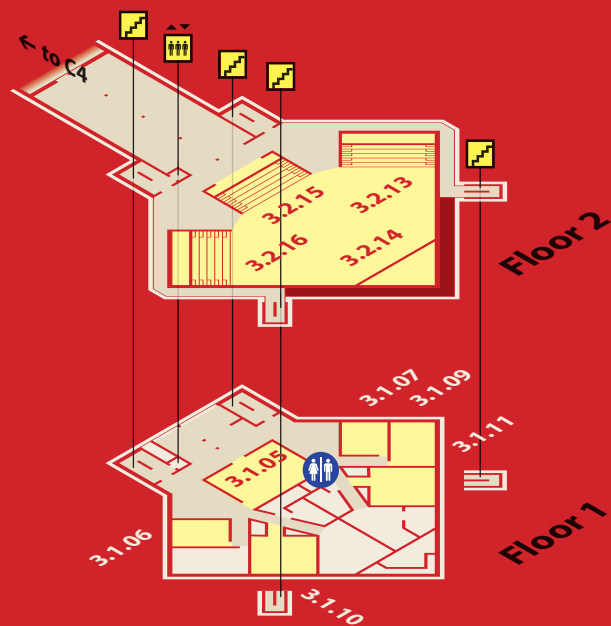
C1



C2

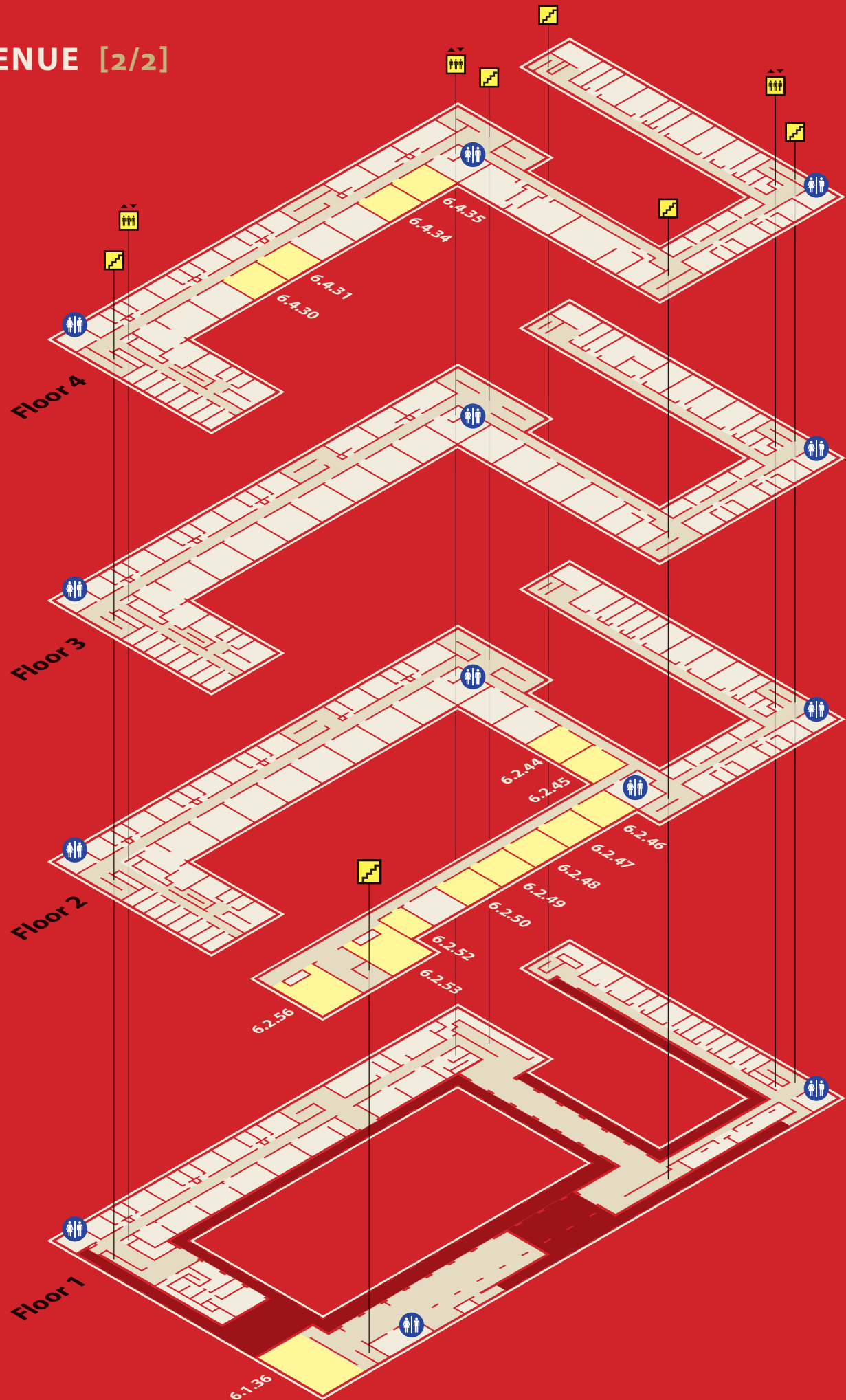


C3

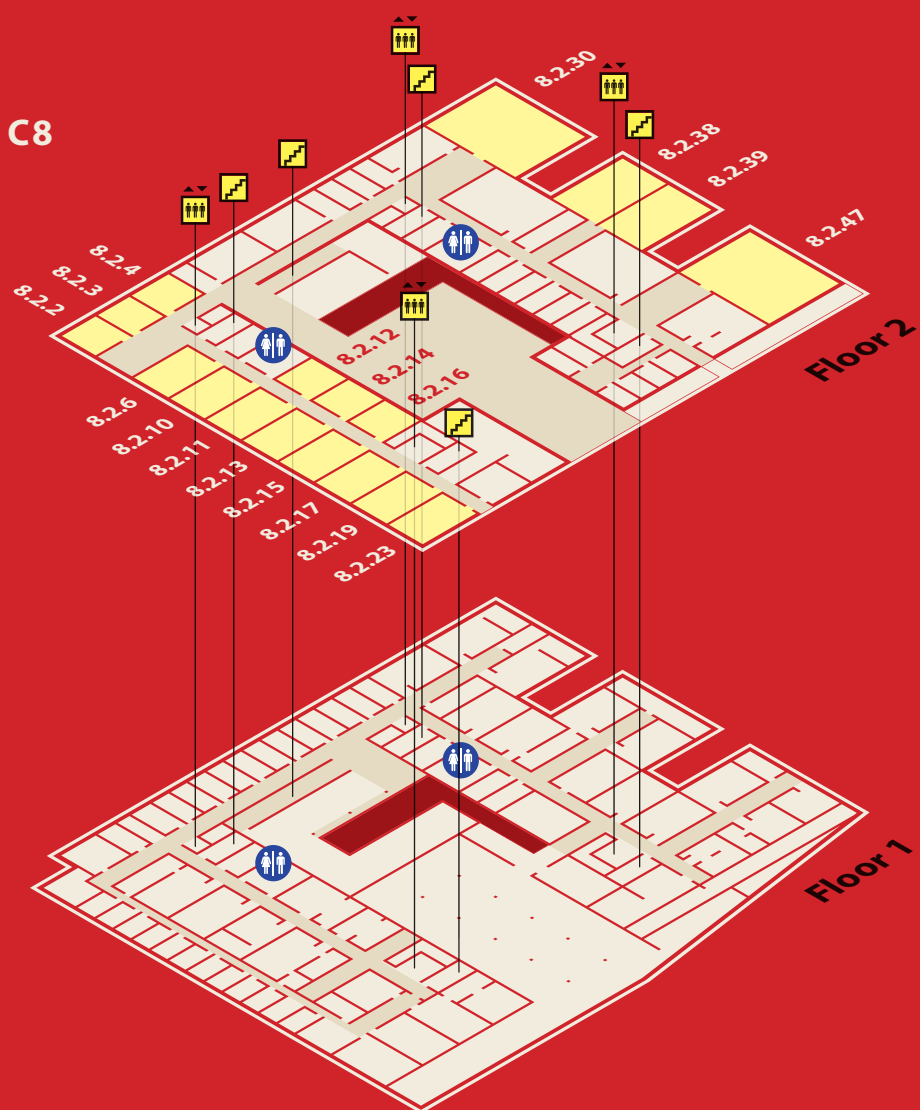


VENUE [2/2]

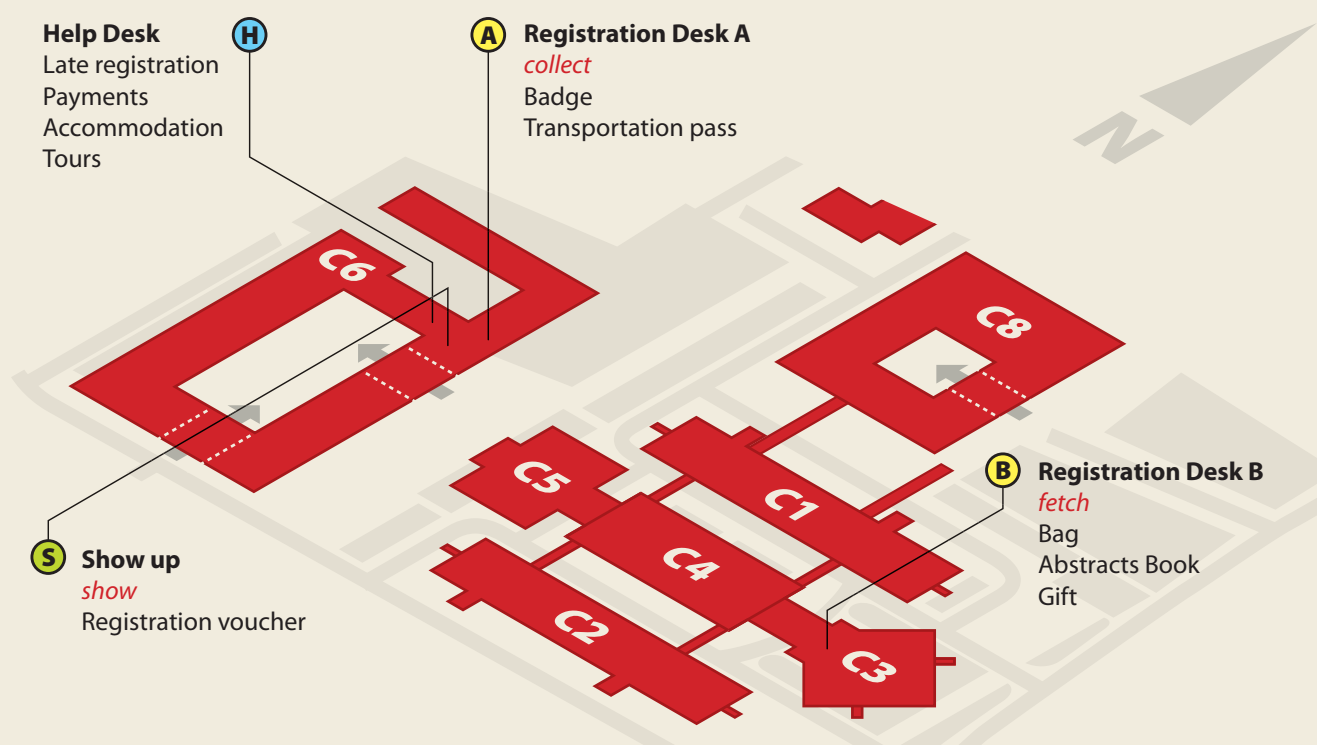
C6



C8



REGISTRATION



Registration desks

The registration desk will be located in the foyer (ground floor) of the Building C6 and inside Building C3 (first floor) as indicated on the map.

Please present your Registration Voucher at the Show Up Desk located in the foyer (ground floor) of the C6 Building as indicated in the map.

After receiving your Badge and Public Transportation Pass at Registration Desk A, you should go to Building C3 for collecting, from Registration Desk B, your Bag, the Abstracts Book and a special Gift.

Opening hours of the Registration Desk:

- ➔ Sunday 10:00 – 19:00
- ➔ Monday 08:00 – 18:00
- ➔ Tuesday 08:30 – 18:00
- ➔ Wednesday 09:00 – 18:00

There will also be a Help Desk located in the foyer (ground floor) of the C6 Building as indicated in the map, to deal with Late Registration, Payments and any issue regarding Accommodation or Tours.

A GOOD PIECE OF ADVICE

We recommend that you pick up your registration material as soon as you arrive on Sunday to avoid having to queue on Monday morning.

Registration Fee, Badges

All participants and exhibitors are required to register. Registered participants and exhibitors will receive a badge that authorizes them access to the conference venue. Participants and exhibitors are requested to display their badge at all times.

The registration fee for a **full delegate** (regular or student) covers the following:

- ➔ Participation in all sessions
- ➔ Access to the exhibition area
- ➔ Conference materials (Bag, Final Program, Book of Abstracts)
- ➔ Transfer from the Lisbon International Airport to hotels in the central area of the city (July 9–12)
- ➔ Welcome Reception (July 11, 19:00 – 23:00)
- ➔ Travel card for public transport operators (Carris and Metro), covering 3 full days
- ➔ Coffee breaks and lunches (July 12–14)
- ➔ Boat trip (July 11 – 12:00, July 12 – 20:00 or July 14 – 20:00)

The registration fee for an **accompanying person** covers the following:

- ➔ Transfer from the Lisbon International Airport to hotels in the central area of the city (July 9–12)
- ➔ Welcome Reception (July 11, 19:00 – 23:00)
- ➔ Boat trip (July 11 – 12:00, July 12 – 20:00 or July 14 – 20:00)
- ➔ Lisbon-Estoril-Sintra one day tour with lunch (July 12 – 9:00)
- ➔ Travel card for public transport operators (Carris and Metro), covering 3 full days
- ➔ Conference Lunches (July 13–14)

REMEMBER

Please note that the conference dinner IS NOT INCLUDED in the registration fee.

WIFI

FCUL has a wide coverage of wireless internet access by eduroam network.

There are two options to use the network:

A) YOU ALREADY USE EDUROAM

Simply use it as if you were on your own institution. All credentials should include the entire mail designation in the login box.

B) YOU NEVER USED EDUROAM

Then, you should configure eduroam in your computer, palmtop or cellphone. All of those types of equipment, if properly equipped for wifi usage, should detect automatically eduroam. However, if configuration is required, please use the following parameters:

- ➔ SSID: eduroam
- ➔ Security type: WPA-Enterprise
- ➔ Encryption type: TKIP
- ➔ Network authentication method: Microsoft Protected EAP (PEAP)
- ➔ No server certificate should be validated
- ➔ Authentication method: Secured password (EAP-MSCHAP v2)
- ➔ Usage of windows login credentials should be unchecked

b1) Your institution is a member of the eduroam project, although you never used it

Use your complete email address and password as credentials

b2) Your institution is not a member of the eduroam project

Please, contact people at the Help desk in order to get a conference specific account that you can freely use during the conference days.

Alternatively, wired connection to the internet will be made available in rooms 6.4.34, 6.4.35 and 1.2.25. You are required to use a special account which details you can obtain from the Help desk.

GENERAL INFORMATION

Basic information

- **Lisbon Time Zone:** GMT/UTC + 1 in Summer
- **Portugal's currency unit:** the Euro (€).

Useful telephone numbers

- **Emergency Phone Number:** 112
- **Lisbon Airport:** 21 841 35 00 / 21 841 37 00
- **Taxis:** 21 793 27 56
- **Hospital Santa Maria:** 21 780 50 00 /
21 780 51 11 / 21 780 52 22
- **British Hospital:** 21 394 31 00 / 21 721 34 00

Working hours

- **Banks:** 08:30 – 15:00 (Monday to Friday).
- **Buses:** 06:30 – 24:00 (everyday, some buses run all night)
- **Metro:** 06:30 – 01:00 (everyday)
- **Pharmacies:** 09:00 – 13:00, 15:00 – 19:00 (Monday to Friday; some are open 24 hours a day, everyday)
- **Shops:** 09:00 – 13:00, 15:00 – 19:00 (Monday to Friday), 9:00 – 13:00 (Saturdays)
- **Shopping Malls:** 10:00 – 22:00 or 24:00 (everyday, with few exceptions)
- **Embassies:** 09:00 – 15:00 (Monday to Friday)

Banks and money

Major credit cards are accepted in most hotels, shops and restaurants. Travellers' cheques and currency can be exchanged at hotels or at a bank. Automatic exchanging and cash withdrawal machines linked to international networks are also widely available.

Electricity network

Voltage: 220/380 volts at a frequency of 50 Hertz. All sockets follow European standards. To use American-type plugs, a 220-volt transformer should be used together with an adapter plug.

Public transportation

How to arrive at Lisbon

- **By Air.** Lisbon's International Airport, 7 Km from the city centre, has daily flights to and from the major cities in Europe and the world.
- **By Car.** You may calculate your route through www.viamichelin.com.
In Portugal, traffic drives on the right-hand side of the road and international traffic signs are used. Speed limits are: 120 Km/h on highways, 90 km/h on roads and 50 Km/h in urban areas.
- **By Train.** International trains arrive in Lisboa at the two main railway stations: «Santa Apolónia» (near River Tagus and not so far from city centre) and «Gare do Oriente» (beside to «Parque das Nações»). Both stations have direct bus connections to the city centre. The latter also has an underground connection («Metro»).

Public transportation from this airport

NOTE

There is no underground station (Metro) at the Airport.

→ Special Buses

CarrisTur operates two special bus lines that serve the airport and most central hotels:

AeroBus (#91)

Airport ▶ City Center ▶ Cais do Sodré

Aeroshuttle (#96)

City Center ▶ Airport ▶ Parque das Nações

For full details please consult

www.carristur.pt. Conference participants are welcome to use this service at the appointed dates and hours, by producing the voucher issued for that purpose.

→ Taxis. Available right outside the arrival and departure halls.

→ Carris Buses

#5 Estação do Oriente ▶ Aeroporto ▶ Areeiro

#22 Portela ▶ Aeroporto ▶ Marquês de Pombal

#44 Moscavide ▶ Aeroporto ▶ Cais do Sodré

#45 Prior Velho ▶ Aeroporto ▶ Cais do Sodré

#83 Portela ▶ Aeroporto ▶ Amoreiras

Public transport fares

→ Taxis. In Lisbon, taxis work with two main rates: Rate 1 works during the day, from 6:00 until 21:00, and rate 2 from 21:00 to 6:00 and the price of this rate is 20% more expensive. Outside the city boundaries another tariff is calculated by the Km (€ 0.35 / Km). Typically, a taxi from the airport to the city centre should cost € 6–10 (depending on traffic and distance). **Taxi Voucher:** prepaid taxi service starting at €13.28, on sale at the 'arrivals' terminal, on the «Information Desk».

→ Combined Metro/Carris Fares. Buses and the underground/subway («Metro») use electronic reusable cards called «7 Colinas» or «Viva». These cards can be bought in vending machines inside Metro Stations and you can buy trips or load money on the card. Reusable card (7colinas or Viva): € 0.50. Zapping – add money (€ 2 to €15) to your reusable card and use either Metro (€ 0.85 per 1 zone trip) or Carris services (€ 0.85 per trip). One day ticket: € 3.75

→ Metro Fares. The Lisbon Metro has four lines distinguished by colours: blue, yellow, green and red. Tickets must be purchased from machines. After that, the tickets must be validated at the automatic doors. The ticket is valid for those switching lines too. One Trip fare: € 0.85 = 1 zone (Lisbon), € 1.15 = 2 zones (Lisbon & surroundings). Ten trips: € 7.3.

→ Carris Fares. On board fare: € 1.45. Pre-paid trip: € 0.81.

Museums

Antique and fine arts

→ Museu Calouste Gulbenkian www.museu.gulbenkian.pt

→ Museu Nacional de Arte Antiga www.mnarteantiga-ipmuseus.pt

→ Museu dos Coches www.museudoscoces.pt

→ Museu Fundação Oriente www.museudooriente.pt

Modern and contemporary arts

→ Centro de Arte Moderna www.cam.gulbenkian.pt

→ The Berardo Collection www.berardocollection.com

SOCIAL EVENTS

Welcome reception

Lisbon «arraial» – Sunday, July 11, 19:00–22:30
Faculty of Science, allee between the Building C5 and the Building C6

A typical Lisbon «arraial» (popular party) might be the right way to set up the atmosphere for the EURO XXIV. We believe that a Barbecue with different types of meat, codfish, portuguese wines and the popular «Marchas» (parades), will be the perfect ingredients for an entertaining evening for seeing old friends and meeting new people.

Soccer fans will be able to watch the World Cup Final on a big screen in Rooms 3.2.13, 3.2.14, 3.2.15 and 3.2.16.

Musical show & banquet

Tuesday, July 13, 19:30
Pavilhão Atlântico – Parque das Nações¹

An exclusive performance of Antonio Chainho with his very new show «Lisgoa» will take place at the beginning of the Conference Banquet. The participants at the dinner will have a unique opportunity to listen to the beautiful sound of the Portuguese guitar accompanying the worldwide known Fado and the exquisite combination with the Indian music.

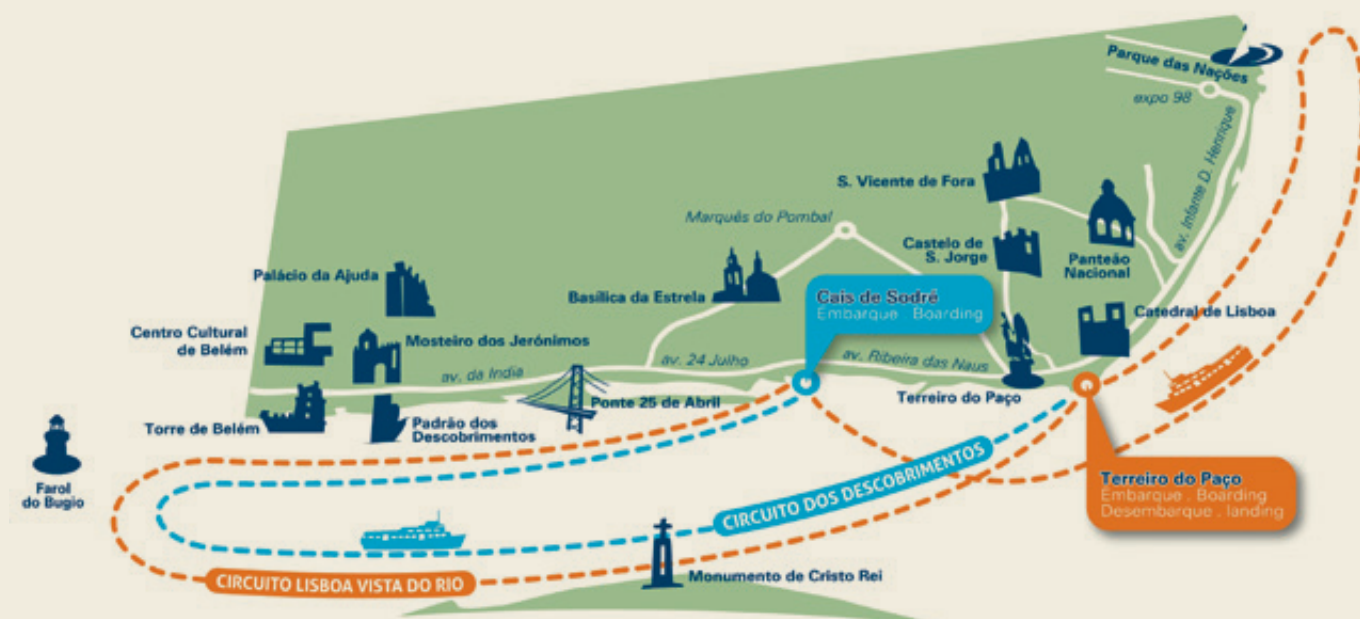
The meal will consist of two main courses and desserts, accompanied by Portuguese wines. Environment music will be performed during dessert by Gonzaga Coutinho and his Group. Right after a few short speeches, the musical group will play music of the world, nice for listening or dancing.



Network diagram



¹ You can get to Parque das Nações travelling by tube to Station Oriente (final point for the Red Line).



Boat trip

Enjoy Lisbon from the Tagus River

EURO XXIV Organization with the support of Transtejo are very pleased to give the participants and the registered accompanying persons a unique opportunity to go on a pleasant cruise and experience magical moments, with an amazing view of the city and all the monuments along the River, in the background.

The Boat Trip takes place on a Transtejo vessel especially transformed for tourist and leisure time and it lasts around two hours.

You can choose the date for enjoying your boat trip, from the following alternative schedules:

- ➔ July 11 (12:00)
- ➔ July 12 (20:00)
- ➔ or July 13 (20:00)

You can board the in Cais do Sodré² by handling your voucher³ to the Euro XXIV Student Volunteers and go downstream to see the historical part of the city.

For safety reasons, the capacity of the Boat will be strictly respected. So, the Organizing Committee will follow a first-come, first-served policy for issuing the vouchers referring to each day's trip.

¹ Cais do Sodré is an intermodal station for Underground (Green Line), Buses, Railways (Estoril Line) and Boats (Cacilhas, Seixal and Montijo).

² Your Voucher will be sent by email or, if you prefer, it may be collected from the Help Desk (Building C6).

GROUP MEETINGS AND WORKSHOPS [1/2]

Optimization Modeling with MPL and Python: New Features, New Trends and Free Software

Sunday, July 11, 12:00–16:00, Room 6.2.49

Maximal Software will be offering a pre-conference workshop on Sunday afternoon 12:00–16:00 before the opening session. The workshop will cover a wide range of topics related to optimization modeling and the MPL Modeling System and is organized in 3 main parts (each is self-contained, so you can attend only the parts you are interested in):

In the first part, we will start by introducing Maximal Software and give some background on history and development of the MPL Modeling System. This will be followed explanation of the new Free Development and Academic programs for MPL. We will also talk about an open-source project managed by MPL, the CoinMP solver. The first part will take about one hour (12:00–13:00).

In the second part of the workshop (13:00–14:30), we will concentrate on the MPL Modeling System itself, how to formulate models in MPL, connecting them to data sources, and solve the models using state-of-the-art, industrial strength solvers, such as CPLEX and GUROBI. We will also cover how to achieve optimal solution performance through efficient modeling techniques, solver tuning and choosing the right software and hardware tools.

In the third and final part of the workshop (14:30–16:00), we will switch over to how to build and deploy optimization applications. For this we introduce two software offerings by Maximal Software, OptiMax Component Library, which allows you to embed optimization into various different programming languages, and then the

MPL for Python, a new scripting and library interface for MPL that takes full advantage of the many powerful features of Python.

For those that have not seen or used Python before, we will offer also a short tutorial, that demonstrates why Python is such a cool language for optimization and scientific computing. With free libraries such as Matplotlib, Scipy, and Numpy, it offers much of the same functionality as MATLAB, basically for free (Python is open-source).

At the end, we will also give you the opportunity to fill out the application form to receive the free full-size copy of the MPL Modeling System. The workshop is open to all registered participants of the EURO conference. Registration is not required and walk-ins are welcome. For more information and a detailed schedule of the workshop, please go to:

www.maximalsoftware.com/seminar/LisbonJul2010/

8th EUROPT Workshop «Advances in Continuous Optimization»

July 9-10, University of Aveiro

www.europt2010.com

OR Running on Public Transport

Sunday, July 11, 14:00–16:30, Room 6.2.53

A EURO XXIV satellite workshop organized by CIO (Portuguese OR center), to bring together University and Transport Companies communities, sharing experiences, successes, difficulties and future challenges.

<http://home.isa.utl.pt/~martaoliv/OR/WorkshopORRPT.html>

GAMS Workshop

How can I make this work... arrgghh?

Sunday, July 11, 14:00–16:00, Room 6.2.50

From its beginning in the 1970 at the World Bank till today, GAMS, the General Algebraic Modeling System, has evolved continuously in response to more demanding user requirements, evolving computing environments and advances in the theory and practice of mathematical programming. This makes it a very powerful but complex tool with capabilities not every user might know about. After an overview of the GAMS system we will present a few issues or questions our support team was confronted with and demonstrate specific solutions for them. At the same time we will discuss effective ways to approach these issues in general. We would like to include your issues & questions during the workshop and encourage you to send them to us so we can present them, along with our suggested solutions. Each issue/problem sent to euro2010@gams.com beforehand and used during the workshop will be awarded a prize.

The 1st IRSES – Marie Curie Workshop on Industrial Extensions to Production Planning and Scheduling

Sunday, July 11, 15:00–17:00, Room 6.2.48

The aim of this workshop is to discuss the appropriateness of the plans for the overall management of the FP7 Exchange Programme project "PPEExt", namely the coordination of the work-packages, the awareness of output Indicators and Deliverables, the dissemination of the results, and the usage of a platform to promote collaboration.

State of the Art Workshop

A workshop related to EURO XXIV / EUROPT / EURO ORD / EUROMSC / Ethics

Sunday, July 11, 10:00–14:00, Room 6.2.52

Mutual session of special researchers of Euro working groups:

- OR and Developing Countries
- Ethics and OR
- Methodology of Societal Complexity
- Optimization
- Multiple Criteria Decision Aiding

Organized by:

- Prof. Dr. Dorien DeTombe
- Prof. Dr. Cathal Brugha
- Prof. Dr. Gerhard-Wilhelm Weber
- Prof. Dr. Fred Wenstop

Several presenters give an overview of their field, overview of recent research and discussion about future research question in their field open for discussion, no fee required.

INFO

Dorien DeTombe – Chair EUROMSC

International Research Society on Methodology of Societal Complexity

P.O. Box. 3286, NL-1001 AB Amsterdam, The Netherlands

Tel: +31 20 6927526 – detombe@nosmo.nl

www.complexitycourse.org/doriendetombe.html

Real-world extensions for Lotsizing and Scheduling problems

Sunday, July 11, 15:00-17:00, Room 6.2.48

Organizer

- Bernardo Almada-Lobo, FEUP, University of Porto

GROUP MEETINGS AND WORKSHOPS [2/2]

International Conference on Modeling, Optimization and Dynamics

July 4-10, 2010, Faculty of Sciences of
University of Porto

The conference scientific scope is to focus the fields of Modeling, Optimization and Dynamics and their applications to biology, economy, industry, physics, psychology and finances assuming the scientific relevance of presenting innovative applications as well as merging issues in these areas that will lead to future works and collaborations.

This multidisciplinary aspect will promote the exchange of experiences and knowledge between experts and young researchers as well as the research activity in several new fields in mathematical sciences and their applications.

The Scientific Committee has the following elements:

- Alberto Adrego Pinto (University of Porto)
- Alipio Jorge (University of Porto)
- Branzei Rodica («Alexandru Ioan Cuza» University)
- Bruno Oliveira (University of Porto)
- Dalila Fontes (University of Porto)
- Diogo Gomes (Instituto Superior Técnico)
- Diogo Pinheiro (Technical University of Lisbon)
- Erik Kropat (Universität der Bundeswehr München)
- Flávio Ferreira (Polytechnic Institute of Porto)
- Gerhard-Wilhelm Weber (Middle East Technical University, Turkey)
- Hakan Öktem (Middle East Technical University, Turkey)
- Hubertus Th. Jongen (RWTH Aachen University)
- João Gama (University of Porto)
- João Lopes Dias (Technical University of Lisbon)
- J. Tenreiro Machado (Polytechnic Institute of Porto)
- João Telhada (University of Lisbon)
- Jorge Pacheco (University of Minho)
- Jorge Buescu (University of Lisbon)
- José Leonel Rocha (Polytechnic Institute of Lisbon)
- José Cruz (University of Minho)
- Leandro Silva Almeida (University of Minho)
- Luís Barreira (Instituto Superior Técnico)
- Marat Akhmet (Middle East Technical University, Turkey)
- Margarida Brito (University of Porto)
- Maria Paula Brito (University of Porto)
- Mário Bessa (University of Porto and IPC)
- Marta Faias (University of Lisbon)
- Nico Stollenwerk (University of Lisbon)
- Pavel Brazdil (University of Porto)
- Pedro Campos (University of Porto)
- Rui Gonçalves (University of Porto)
- Sara Fernandes (University of Evora)
- Semyon Yakubovich (University of Porto)
- Silvio Gama (University of Porto)
- Susan Jenkins (Berkeley)
- Vladimiro Miranda (University of Porto)
- Zeev Volkovich (Ort Braude Academic College, Israel)
- Zélia Rocha (University of Porto)

<http://sites.google.com/site/workshopeuro2010/>

A EURO ORD Workshop on OR for Developing Countries – Young Researchers and PhD Symposium

Saturday, July 10, 9:30–17:00, Room 6.2.53

This workshop provides an opportunity for doctoral students to present and discuss their research within a focused environment and with other academics and practitioners with similar interests in Operational Research (OR) and Development. It is organized by EURO ORD, the new EURO Working Group on OR for Development (<http://www2.ing.puc.cl/~fcrespo/eurofdv/>). The symposium will comprise plenary sessions, research clinics as well as the opportunity to have research dialogues led by senior academics working in the field.

www2.ing.puc.cl/~fcrespo/eurofdv/Lisbonconference/index.html

IBM® ILOG Optimization Pre-Conference Workshop

Sunday, July 11, 13:30–16:30, Room 6.1.36

Join the IBM ILOG Optimization team for a stimulating pre-conference workshop, featuring the latest performance enhancements in the IBM ILOG CPLEX Optimizer and a session on “What’s New in IBM ILOG CPLEX Optimization Studio.” CPLEX Optimization Studio is a comprehensive OR toolkit that enables you to develop and deploy mathematical programming and constraint programming models from a powerful IDE built on OPL, through programmatic APIs, or through third party modeling environments, using available connectors to MATLAB® and Microsoft® Excel®. During this workshop, we will also share details on the IBM Academic Initiative program specifically for the Operations Research teaching community, and how academic researchers and faculty member can get no-charge access to IBM ILOG CPLEX Optimization Studio!

DSS 2010 – the 15th IFIP WG 8.3 International Conference on Decision Support Systems

July 7-10, University of Lisbon

The 15th IFIP WG 8.3 International Conference on Decision Support Systems (DSS 2010) will be held July 7-10, 2010, at the University of Lisbon, Portugal. The conference is devoted to the theme "Bridging the socio-technical gap in DSS – Challenges for the next decade". Submissions from academics and practitioners are invited and showcases of real case studies will be especially welcomed. Manuscripts will be peer-reviewed. The acceptance of the contributions will be based on the originality of the work, the relevance for the conference theme and its overall quality. Best accepted papers will be published as chapters of a book with the conference theme, published and distributed by IOSPress.

Authors of the best papers will be invited to submit extended versions to special issues of such international scientific journals as Group Decision and Negotiation (GDN), Intelligent Decision Technologies International Journal (IDTJ), International Journal of Decision Support System Technology (IJDSST), and the Journal of Decision Systems (JDS).

Organized by

- ➔ João Telhada
- ➔ Carlos Teixeira
- ➔ Rita Almeida Ribeiro
- ➔ Ana Respício

<http://dss2010.di.fc.ul.pt>



AMPL Optimization www.ampl.com

AMPL is a comprehensive and powerful algebraic modeling language for linear and nonlinear optimization problems, in discrete or continuous variables.

Developed at Bell Laboratories, AMPL lets you use common notation and familiar concepts to formulate optimization models and examine solutions, while the computer manages communication with an appropriate solver.

AMPL's flexibility and convenience render it ideal for rapid prototyping and model development, while its speed and control options make it an especially efficient choice for repeated production runs.



AIMMS www.aimms.com

AIMMS is the Advanced Integrated Mathematical Modeling System, a software tool for developing and deploying optimization models.

AIMMS enables fast model formulation in a tree structure without having to learn a programming language, and links seamlessly to a range of mathematical solvers. AIMMS offers procedural execution and flexible modeling concepts such as rolling horizons, column generation, outer approximation for MINLP, multi-start for NLP, Stochastic Programming, Benders decomposition, Robust Optimization, etc.

AIMMS offers an integrated GUI to visualize and interpret results. Data can be exchanged with many sources, from XML- and text-files to Excel and databases. Finally, models can be integrated with other applications via options such as the COM object, the Excel add-in and Web Services.



GAMS www.gams.com

Bridging the gap: The General Algebraic Modeling System (GAMS) has been continually evolved to reflect insights gained from more than twenty years of close collaboration with both the world's leading software creators for optimization techniques and successful clients from academia, authorities, and industry.

Please come visit us at our booth, attend our software demonstration for a tour through our recent enhancements, or participate in our free pre-conference workshop with hands-on exercises on Sunday.

OptiRisk Systems is a UK-based company with a global reach that provides products and services for Optimisation and Risk Management solutions. OptiRisk serves customers across a number of business sectors including finance, defence, transportation and supply chain logistics.

OptiRisk Systems offers products and services in the area of Optimisation, Risk Modelling, Portfolio Planning, Asset and Liability Management, Supply Chain Management, Strategic & Tactical Management, Scheduling of Transport Assets.

Knowledge, information and quality these are the three things that shape Springer Science+Business Medias business activities. We develop, manage and disseminate knowledge through books, journals and the Internet. We work with the worlds best academics and authors in long-standing loyal partnerships based on mutual trust and we are always open to new input.

We aim to offer excellence more than 150 Nobel prize-winners have published with Springer to the present date. Many of our publications are considered authoritative works in their field, read by academics and students, used by libraries and universities, academic professionals and practitioners in various branches of industry.

- Leading global scientific publisher, delivering quality content through innovative information products and services, as well as a trusted provider of local-language professional publications in Europe, especially in Germany and the Netherlands
- Around 60 publishing houses in about 20 countries in Europe, Asia and the USA
- Springer eBook Collection with more than 34,000 titles available on www.springerlink.com
- Product range across all media for high-quality content (books, journals, newsletters, CD-ROMs, online platforms, protocols, databases and conferences)
- Some 2,000 journals and more than 6,500 new book titles every year in the STM sector; backlist of more than 45,000 titles
- 6 main publishing fields: science, technology, medicine, architecture, business and transport

EXHIBITORS [2/3]



FICO www.fico.com/xpress

FICO combines optimization with world-class predictive analytics and decision management tools to help businesses make connected, optimal and forward-looking decisions. We offer the FICO Xpress Optimization Suite – developed by Dash Optimization, and acquired by FICO two years ago. With its unique Mosel modeling language, FICO Xpress leverages 25+ years of experience in optimization to give you unprecedented flexibility and power. Come see why many OR leaders – including Edelman Winner American Airlines, which recently chose Xpress over all competitors for an Enterprise License – are calling the FICO Xpress Optimization Suite the new leader in optimization.



Elsevier www.elsevier.com/mathematics

Elsevier is the leading journals publisher in the field, working in partnership with the global academic community to publish 12 of the 20 top ranked journals in the 'Operations Research and Management Science' category in the Social Sciences Citation Index*, including the European Journal of Operational Research. Within the 'Discrete Mathematics' category Elsevier provides a forum for mathematical, computational and applied aspects of research in areas of combinatorial, algorithmic and applicable discrete mathematics.



Taylor & Francis www.tandf.co.uk/journals

Building on two centuries' experience, Taylor & Francis has grown rapidly over the last two decades to become a leading international academic publisher. Operating from a network of 20 global offices, the Taylor & Francis Group publishes more than 1,500 journals and around 1,800 new books each year. Come along to our stand to pick up a FREE Journal sample. A selection of books will be on display where discounted rates are available up to 4 weeks after the conference finishes, so don't forget to take an order form!

Palgrave Macmillan www.palgrave-journals.com

Palgrave Macmillan is a global academic and business publisher, serving learning and scholarship in the academic and professional worlds. We publish journals, textbooks, monographs and professional and reference works in print and online. Our portfolio in OR/MS is a key focus for our business.

We are proud to be the publisher of the UK's prestigious OR Society. Their journal collection is diverse, international and relevant.

Diverse, because in five journals it covers academic and practitioner approaches to OR/MS, information systems, discrete event simulation and knowledge management. International, because its contributors and readers are from a broad global base. Relevant, because of the increasing benefits OR can bring to international business and management today. Come and meet the Editors of Journal of the Operational Research Society, OR Insight and the Journal of Simulation on the Palgrave stand. They will be happy to answer your questions on anything from submitting an article to how to get these journals into your libraries.

Palgrave Macmillan also publishes the new and improved International Abstracts in Operations Research Online, a journal from IFORS. It is the definitive database of the world's OR/MS literature. It consists of 64,000 abstracts from over 1200 individual journal titles, going back more than 20 years. It has a new more powerful search engine and from the Autumn it will be updated weekly. Sign up for a 2 week test drive at our stand!

We will also have other related journals and books for sale on our stand! We are proud to be supporting EURO 2010 and we look forward to meeting you.



Maximal Software www.maximalsoftware.com

Sign-up for your FREE development copy of MPL at the Maximal Software Exhibit Booth!

Maximal Software is giving away a FREE development license of the MPL Modeling System to every registered participant at the EURO 2010 Lisbon Conference. To sign up for your free copy, or just to find out why we are now giving away development copies of our MPL software, please come visit us at our exhibit booth during the conference (Building C6). Alternatively, you can also attend our presentation (TC-21) on Tuesday, 12:20–13:40, or attend our pre-conference Maximal Workshop on Sunday, 12:00–16:00, where our free software offerings for both academic and commercial users will be described in detail.

During this EURO conference, we will also be introducing for the first time «MPL for Python», a new scripting and component library interface for MPL that takes full advantage of the many powerful features of Python.



IBM www.ibm.com/software/websphere/products/optimization/

ILOG is now a part of IBM. The combination of ILOG and IBM brings together the sophisticated analytics and consulting expertise of IBM Research and IBM Global Business Services and IBM's industry-leading ILOG Optimization technology. Already, over 1,300 corporations and government organizations use IBM(R) ILOG CPLEX(R) Optimization Studio to support their mission-critical decisions. And to train the next generation of business and technology leaders, the IBM Academic Initiative is now providing ILOG Optimization products to academics for free.

Come by our stand to learn how to use ILOG Optimization in teaching and research through the IBM Academic Initiative. And learn about IBM ILOG CPLEX Optimization Studio – a comprehensive optimization toolkit that enables the development and deployment of mathematical programming and constraint programming models. See how ILOG CPLEX Optimization Studio leverages the unmatched speed, reliability and robustness of IBM ILOG CPLEX Optimizer, and explore its support for multiple development interfaces: a powerful integrated development environment (IDE) built on the Optimization Programming Language (OPL), programmatic APIs, and 3rd party connectors to MATLAB® and Microsoft® Excel®.

OVERVIEW

Conference statistics

(As of June 30, 2010)

Number of Presentations: **2351**

Number of Sessions: **704**

Number of Registrations: **2680**

Conference participants per country:

Algeria	18	Greece	63	Peru	2
Argentina	3	Guatemala	1	Philippines	1
Australia	25	Hong Kong	10	Poland	51
Austria	44	Hungary	13	Portugal	295
Bangladesh	1	India	21	Romania	8
Belarus	1	Indonesia	2	Russian Federation	41
Belgium	79	Iran, Islamic Republic	44	Saudi Arabia	2
Bolivia	1	Ireland	10	Serbia	29
Bosnia and Herzegovina	1	Israel	23	Sierra Leone	1
Brazil	84	Italy	144	Singapore	4
Bulgaria	2	Ivory Coast	1	Slovakia	4
Canada	62	Japan	51	Slovenia	17
Chile	19	Jordan	1	South Africa	8
China	7	Korea South	6	Spain	183
Colombia	12	Latvia	5	Sweden	25
Croatia	12	Lithuania	9	Switzerland	40
Cyprus	1	Luxembourg	5	Taiwan	49
Czech Republic	30	Malaysia	3	Tunisia	13
Denmark	30	Mexico	8	Turkey	195
Egypt	2	Morocco	2	Ukraine	9
Estonia	1	Netherlands	56	United Kingdom	176
Ethiopia	2	New Zealand	5	United States	100
Finland	24	Nigeria	3	Venezuela	2
France	171	Norway	20	Zimbabwe	1
Germany	281	Pakistan	1		
Ghana	1	Paraguay	3		

EURO Gold Medal 2010

The EURO Gold Medal is the highest distinction within OR in Europe. It is conferred on a prominent person for an outstanding contribution to Operational Research. The award will be officially bestowed at the opening plenary session of the EURO XXIV Conference in Lisbon, if there is a suitable candidate.

The EURO Gold Medal is awarded for a body of work in operational research, preferably published over a period of several years. Although recent work is not excluded, care should be taken to allow the contribution to stand the test of time. The potential prize recipient should have a recognized stature in the European OR community. Significance, innovation, depth, and scientific excellence should be stressed.

Jury of the EURO Gold Medal 2010

- Soren Asmussen (Denmark)
- Aharon Ben-Tal (Israel)
- Ruediger Schultz (Germany)
- Henk Zijm (The Netherlands)
- Laurence Wolsey (Belgium) – Chair

Past laureates are:

H.J. Zimmermann (1985),
P. Hansen and A.H.G. Rinnooy Kan (1986),
E.M.L. Beale (1988, posthumously),
C. Berge (1989), J. Blazewicz,
R. Slowinski, and J. Weglarz (1991),
B. Roy (1992), J.-P. Brans, and L. Wolsey (1994),
D. de Werra (1995),
R.E. Burkard, and J.K. Lenstra (1997),
P. Toth (1998), E. Balas (2001),
A. Prékopa (2003), M. Groetschel (2004),
L.N. Van Wassenhove (2006), A. Ben-Tal (2007),
J.F. Benders (2009) and F.P. Kelly (2009).

EURO Distinguished Service Medal (EDSM 2010)

The EDSM (EURO Distinguished Service Medal) is awarded for recognition of distinguished service to the Association of European OR Societies (EURO) and to the profession of OR.

The EDSM 2010 will be given to an individual who has served the European OR community and the profession effectively for many years. No currently active officer of EURO (Executive Committee member, EDSM 2010 jury member, Organising and Programme Committees Chairpersons of the EURO XXIV Conference) is eligible.

The laureate will receive a medal, a diploma and will be invited to all future EURO Conferences without payment of the registration fees.

The members of the EDSM 2010 jury are:

- Tuula Kinnunen (Chairperson)
- Alexis Tsoukias
- Zilla Sunuany-Stern
- Rainer Burkard
- Jan Weglarz

Management Science Strategic Innovation Prize (MSSIP 2010)

The MSSIP Prize is awarded for an outstanding innovative contribution to Management Science/OR each year when a EURO Conference takes place. This time the subject is Optimization in Telecommunications and the prize will be awarded at the EURO XXIV, in session WE-02. The submitted work should consist of a recent paper in which a theoretical result or a practical implementation is explained. The prize is sponsored by SAP AG (12 000 Euro).

EURO Doctoral Dissertation Award (EDDA 2010)

The EDDA (EURO Doctoral Dissertation Award) is a EURO instrument. It consists of a prize that is awarded at each EURO-K conference. The purpose of the prize is to distinguish an outstanding PhD thesis in Operational Research defended in the countries having an OR society that is member of EURO. It will be awarded for the fifth time at the closing session of the EURO XXIV conference and the finalists will present their work in session TF-05.

The jury consists of

- Mikael Rönqvist (Chairman)
- Jacques Teghem (Chairman of the 2012 edition of the EDDA)
- Silvano Martello (Chairman of the 2013 edition of the EDDA)
- Hartmut Stadler
- Ahti Salo

EURO Excellence in Practice Award 2010 (EEPA 2010)

The purposes of the competition are to:

- recognise outstanding accomplishments in the practice of Operational Research
- attract more application-oriented papers to EURO Conferences
- promote the practice of Operational Research in general

The application is open to Operational Research specialists from any part of the world.

The jury selects a short-list of finalists who will present their work in session TA-05. There is no registration fee for one author of each of the finalist presentations. The winner will be determined by the jury at the end of the special session and will be announced by the chairman of the jury during the closing session of the EURO Conference.

The criteria for the evaluation of the papers are:

- scientific quality
- relevance to Operational Research
- originality in methodology, implementations and/ or field of application
- a real impact to practice
- appreciation by the organisation involved with the application

Jury of the EEPA 2010

- Maria Grazia Speranza (Chair)
- Michel Bierlaire
- Edmund Burke
- Richard Eglese
- Oli B.G. Madsen

ROADEF/EURO Challenge 2010

Since 1999, the ROADEF challenge is an international operational research contest where teams have to solve an industrial optimization problem.

Thanks to the success of the previous six challenges, the French Operational Research (OR) and Decision Support Society (ROADEF) organizes for the first time jointly with the European Operational Research Society (EURO) the ROADEF/EURO challenge 2010, dedicated to a large-scale energy production management problem with varied constraints, in collaboration with EDF.

EDF will propose three prizes. In the junior category, young researchers have the opportunity to face up to a complex optimization problem occurred in industry. In the senior category, this challenge also allows qualified researchers to show their knowledge and demonstrate their know-how on practical problems. Last, a third prize dedicated to parallel computing methods is proposed for the first time.

Final results will be announced and prizes will be awarded at the EURO XXIV, in session WE-25. The qualified teams will be also invited to present their work on dedicated session stream.

OVERVIEW OF THE PROGRAMME [1/2]

Stream	Sunday, July 11 Monday, July 12							Tuesday, July 13						Wednesday, July 14					
	SA	MA	MB	MC	MD	ME	MF	TA	TB	TC	TD	TE	TF	WA	WB	WC	WD	WE	WF
Opening session																			
Closing session																			
Plenary talk – John F. Nash, Jr.																			
Plenary talk – Harold W. Kuhn																			
Keynote talk – Arkadi Nemirovski																			
Keynote talk – Noga Alon																			
Keynote talk – Rommert Dekker																			
Keynote talk – Elena Fernandez																			
Keynote talk – James J. Cochran																			
Keynote talk – Fran Ackermann																			
Keynote talk – Martine Labbé																			
Keynote talk – Pierre Hansen																			
Keynote talk – Berthold Vocking																			
Keynote talk – Paolo Toth																			
Keynote talk – Nelson Maculan																			
Keynote talk – Alexander Shapiro																			
Actuarial Sciences and Stochastic Calculus																			
Agent-Based Modeling																			
Agent-Based Modeling [c]																			
AIMMS User Meeting [c]																			
Algorithmic Decision Theory																			
Algorithmic Decision Theory [c]																			
Analytic Hierarchy Processes, Analytic Network Processes																			
Applications in Business Intelligence and Knowledge discovery																			
Boolean Programming																			
Combinatorial Optimization																			
Combinatorial Optimization [c]																			
Computational Biology, Bioinformatics and Medicine																			
Computational Statistics																			
Container Terminal Operations																			
Convex Optimization																			
Cooperative Game Theory																			
Cooperative Game Theory [c]																			
Cutting and Packing																			
Data Mining and Applications [c]																			
Data Mining and Decision Making																			
Data Mining in Early Warning Systems																			
Data Mining in the Financial Sector																			
DEA and Performance Measurement																			
Decision Making																			
Decision Support Systems																			

	Sunday, July 11 Monday, July 12							Tuesday, July 13							Wednesday, July 14						
	16:30-18:30	9:00-10:20	10:40-12:00	12:20-13:40	14:00-15:20	15:40-17:00	17:20-18:40	9:00-10:20	10:40-12:00	12:20-13:40	14:00-15:20	15:40-17:00	17:20-18:40	9:00-10:20	10:40-12:00	12:20-13:40	14:00-15:20	15:40-17:00	17:20-18:40		
Stream	SA	MA	MB	MC	MD	ME	MF	TA	TB	TC	TD	TE	TF	WA	WB	WC	WD	WE	WF		
Demand and Supply in Consumer Goods and Retailing																					
Demand, Pricing and Revenue Management																					
Discrete and Global Optimization																					
Discrete Optimal Control																					
Dynamic Programming																					
Dynamical Systems and Game Theory																					
Dynamical Systems and Mathematical Modelling in OR																					
Education, and Social Policy																					
EJOR																					
Emerging Applications of OR																					
Energy, Environment and Climate																					
Energy, Environment and Climate [c]																					
Engineering Optimization																					
EURO Doctoral Dissertation Award																					
EURO Excellence in Practice Award 2010																					
EURO Management Science Strategic Innovation Prize (MSSIP 2010)																					
Experimental Economics and Game Theory																					
Facilitated Modelling in OR																					
Facility Logistics																					
Financial Mathematics and OR																					
Financial Mathematics and OR [c]																					
Financial Modeling																					
Financial Optimization																					
Fuzzy Systems, Neural Networks & Artificial Intelligence																					
Fuzzy Systems, Neural Networks & Artificial Intelligence [c]																					
Geometric Clustering																					
Global Optimization																					
Graph Searching and Guarding																					
Graphs and Networks																					
Health Care Management																					
Health Care Management [c]																					
IBM Research Applications																					
Ill-posed Variational Problems – Theory, Methods and Applications																					
Inventory Management																					
Inventory Management [c]																					
Iterative Methods for Economic Models																					
Keynote Speakers																					
Knowledge Discovery and Data Mining																					
Life Insurance, Risk Management & OR																					
Linear and Conic Programming																					

OVERVIEW OF THE PROGRAMME [2/2]

Stream	SA	MA	MB	MC	MD	ME	MF	TA	TB	TC	TD	TE	TF	WA	WB	WC	WD	WE	WF
Location Analysis																			
Long Term Financial Decisions																			
Long Term Planning in Energy, Environment and Climate																			
Lot-sizing and Scheduling, Economic Order Quantity																			
Machine Learning and Its Applications																			
Maritime Logistics																			
Mathematical Programming																			
Mathematical Programming [c]																			
MCDA I: New Approaches and Applications																			
MCDA II: Axiomatic Basis, Meaningfulness, and other Issues																			
MCDA II: Axiomatic Basis, Meaningfulness, and other Issues [c]																			
Metaheuristics																			
Methodology of Societal Complexity																			
Mixed-Integer Non Linear Programming																			
Multi-Objective Optimization																			
Network Optimization																			
Network Optimization [c]																			
Nonconvex Programming: Local and Global Approaches																			
Nonlinear Programming																			
Nonlinear Programming [c]																			
Nonsmooth Optimization																			
Numerical Methods in Finance																			
Operational Research and Quantitative Models in Banking																			
Optimal Control																			
Optimization and Data Mining																			
Optimization for Sustainable Development																			
OR and Ethics																			
OR and Real Implementations																			
OR Applications in Industry																			
OR for Development and Developing Countries																			
OR for Development and Developing Countries [c]																			
OR for Madeira (and related challenges)																			
OR for Sustainable Development																			
OR in Agriculture and Forest Management																			
OR in Agriculture and Forest Management [c]																			
OR in Fisheries, Maritime Sciences and Related Aspects																			
OR in Military																			
OR in Oil Sector																			
OR in Sports																			
OR in Water Management																			
OR/MS: Beyond Mathematics																			

Stream	SA	MA	MB	MC	MD	ME	MF	TA	TB	TC	TD	TE	TF	WA	WB	WC	WD	WE	WF
Portfolio Decision Analysis																			
Preference Learning																			
Project Management and Scheduling																			
Project Management and Scheduling [c]																			
Public Transport																			
Public Transport [c]																			
Realistic Production Scheduling																			
Revenue Management																			
ROADEF/EURO challenge																			
Scheduling																			
Scheduling under Resource Constraints																			
SD Modeling in Sustainable Development																			
Semi-Infinite Optimization																			
Simulation Based Decision Support																			
Simulation Methods in Finance																			
Soft OR and Problem Structuring Methods																			
Software for OR/MS																			
Stochastic Modeling and Simulation																			
Stochastic Models for Service Operations																			
Stochastic Programming 1																			
Stochastic Programming 2																			
Stochastic Programming 2 [c]																			
Stochastic Valuation for Financial Markets																			
Supply Chain Planning																			
Supply Chain Planning [c]																			
Sustainable Living: Cognitive, Social, Economical, Ecological and World View																			
System Dynamics Modeling																			
Teaching OR/MS																			
Timetabling and Rostering																			
Transportation and Logistics																			
Transportation and Logistics [c]																			
Transportation Planning																			
Variational Inequalities, Complementarity Problems and Bilevel Programming																			
Vector and Set-Valued Optimization																			
Vehicle Routing																			
Vehicle Routing [c]																			
Young People for System Theory, Optimization and Education																			

OPENING SESSION

SUNDAY, 16:30–18:30

Faculty of Science, Building C3

Rooms 3.2.13, 3.2.14, 3.2.15 & 3.2.16

Chair: Silvano Martello, Chair of the Programme Committee

Welcome address

- Valerie Belton, the President of EURO (The Association of European Operational Research Societies)
- Joaquim Júdice, the President of APDIO (The Portuguese OR Society)
- António Nóvoa, Rector of the University of Lisbon
- José Mariano Gago, Minister for Science, Technology and Higher Education, Government of Portugal*

Awards

- Announcement of the EURO Management Science Strategic Innovation Prize (MSSIP 2010) on the topic of Optimization in Telecommunications – Eric Gourdin (Chair)
- Announcement of the finalists of the EURO Doctoral Dissertation Award (EDDA) – Mikael Rönnqvist (Chair)
- Announcement of the finalists for the EURO Excellent in Practice Award 2010 (EEPA 2010) – Maria Grazia Speranza (Chair)
- Announcement of the winner of the EURO Distinguished Service Award (EDSM) – Tuula Kinnunen (Chair)
- Announcement of the winner of the EURO Gold Medal – Lawrence Wolsey, the Chair of the Jury for the EURO Gold Medal Award

Plenary presentation

- The Laureate with the EURO Gold Medal

Latest information & special remarks

- Silvano Martello, Chair of the Programme Committee
- José Pinto Paixão, Chair of the Organizing Committee

* to be confirmed

CLOSING SESSION

WEDNESDAY, 17:20–18:30

Faculty of Science, Building C3

Rooms 3.2.13, 3.2.14, 3.2.15 & 3.2.16

Chair: José Pinto Paixão, Chair of the Organizing Committee

Awards

- Announcement of the winner of the EURO Management Science Strategic Innovation Prize (MSSIP 2010) on the topic of Optimization in Telecommunications – Eric Gourdin, Chair of the Jury for the MSSIP
- Announcement of the winner of the EURO Doctoral Dissertation Award (EDDA) – Mikael Rönnqvist, Chair of the Jury for EDDA

Calls

- IFORS 2011 – Janny M.Y. Leung, Chair of the Scientific Programme Committee
- EURO 2012 – Leonidas Sakalauskas (Lithuania), Chair of the Organizing Committee

Farewell Addresses

- Silvano Martello, Chair of the Programme Committee
- Valerie Belton, President of EURO
- José Pinto Paixão, Chair of the Organizing Committee

INVITED SPEAKERS [1/2]

Plenary Sessions

ME-01 Monday, 15:40–16:40 Aula Magna

CHAIR: DOMINIQUE DE WERRA, IMA, EPFL, FSB, EPFL, SWITZERLAND

John F. Nash, Jr.

Princeton University, USA

The Agencies Method for Modeling Coalitions and Cooperation in Games

Our work in this research project represents the beginning of an effort to study the game-theoretic phenomenon of cooperation in cooperative games (that is, in games where it is understood that the players MAY cooperate whenever they would naturally desire to do that so as to realize mutually advantageous benefits). (This project of work could be described as work along the lines of the (old) “Nash program”, seeking to reduce the study of “cooperative games” to the area of the (theoretically simpler) study of “equilibrium” in “non-cooperative games”).

The theoretical key for the inter-linking of these areas is the concept of the “evolution of cooperation” (in Nature) which has been studied both by theoretical biologists and by game theorists.

Our key idea for the reduction of a process realized through cooperation to a process achieved by actions taken independently (and separately) by the Players that are involved in the game context lies in the introduction of moves (or actions) of “acceptance” together with the supposition of an indefinitely repeated game context in which the Players may react (in punishing fashions) against unfavorable actions on the part of other Players. Our model designed for this purpose has the players strategically making “demands” in relation to the behavior of the other players.

And at the same time any Player also chooses, strategically, how he (or she) will allocate the resources available to a coalition if he (or she) has become accepted (through acceptance elections) to have that power. As it happens, in short, the studied model, for a game with three players, involved 39 strategic parameters to be controlled by the players, and we represented it in terms of 42 variables.

There was a substantial challenge of computation to find game theoretic solutions. These were sought in terms of PURE STRATEGIES. And the game example itself, although being described by a characteristic function giving rise to three numerical parameters setting the payoff benefits accessible by specific coalitions, was an “NTU game” rather than a game with “transferable utility”. However we have compared solution results with corresponding indications for the games deriving from the Shapley value or from the nucleolus.

The general context of computations is found to be quite challenging. We have used Mathematica in the connection with the work done up to now. There seem to be possibilities for refinements in the model structure and games of more than three players can also be studied.

TE-01 Tuesday, 15:40–16:40 Aula Magna

CHAIR: SILVANO MARTELLO, UNIVERSITY OF BOLOGNA, ITALY

Harold W. Kuhn

Princeton University, USA

A Tale of Three Eras: The Discovery and Rediscovery of the Hungarian Method

In the Fall of 1953, a translation of a paper of Jenő Egervary from Hungarian into English combined with a result of Denes König provided the basis of a good algorithm for the linear assignment problem. To honor the Hungarian mathematicians whose ideas had been used, it was called the Hungarian Method. In 2005, François Ollivier discovered that the posthumous papers of Carl G. J. Jacobi contain an algorithm that, when examined carefully, is essentially identical to the Hungarian Method. Since Jacobi died in 1851, this work was done over a hundred years prior to the publication of the Hungarian Method in 1955.

This lecture will provide an account of the mathematical, academic, social and political worlds of Jacobi, König/Egervary, and Kuhn. As sharply different as they were (Prussian monarchy, Hungary under the Nazis and the Communists, and the post-war USA), they produced the same mathematical result.

The lecture will be self-contained, assuming little beyond the duality theory of linear programming. The Hungarian Method and Jacobi’s algorithm will be explained at an elementary level and will be illustrated by several examples.

Keynote Sessions

MA-01 Monday, 9:00–10:00 Aula Magna

CHAIR: GERHARD-WILHELM WEBER, MIDDLE EAST TECHNICAL UNIVERSITY, TURKEY,

Arkadi Nemirovski

Georgia Institute of Technology, USA

Safe tractable approximations of chance constraints

When optimizing under stochastic uncertainty, the entity of primary importance is a chance constraint

$$\text{Prob}_{\xi \sim P} \{f(x; \xi) \in Q\} \geq 1 - \varepsilon, \forall P \in \mathcal{P}$$

where x is the decision vector, ξ is a random perturbation with distribution P known to belong to a given family \mathcal{P} , Q is a given target set, and $\varepsilon \ll 1$ is a given tolerance. Aside of a handful of special cases, chance constraints are computationally intractable: first, it is difficult to check efficiently whether the constraint is satisfied at a given x , and second, the feasible set of a chance constraint typically is nonconvex, which makes it problematic to optimize under the constraint. Given these difficulties, a natural way to process a chance constraint is to replace it with its safe tractable approximation a tractable convex constraint with the feasible set contained in the one of the chance constraint. In the talk, we overview some recent results in this direction, with emphasis on chance versions of well-structured convex constraints (primarily, affinely perturbed scalar linear and linear matrix inequalities) and establish links between this topic and Robust Optimization.

MB-01 Monday, 10:40–11:40 Aula Magna

CHAIR: GERHARD J. WOEGINGER, EINDHOVEN UNIVERSITY OF TECHNOLOGY, NETHERLANDS,

Noga Alon

Tel Aviv University, Israel

The combinatorics of Social Choice

The early work of Condorcet in the 18th century, and that of Arrow and others in the 20th century, revealed the complex and interesting mathematical problems that arise in the theory of Social Choice, showing that the simple process of voting leads to strikingly counter-intuitive paradoxes. I will describe some of these, focusing on several recent intriguing examples whose analysis combine combinatorial and probabilistic ideas with techniques from Discrete Optimization and the theory of the VC dimension of range spaces.

MC-01 Monday, 12:20–13:20 Aula Magna

CHAIR: MARIELLE CHRISTIANSEN, NORWEGIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY, NORWAY,

Rommert Dekker

Erasmus University Rotterdam, Netherlands

Operations Research for Green Logistics

After years of talking, green logistics or environmental friendly supply chain management seems to have taken off in many companies. In fact, industry seems to embark on hundreds of new initiatives, although it may be more popular in certain countries than in others. That is on one hand surprising, because at first sight becoming green may cost industry money and we would expect more initiatives from governments. The attention for green logistics in the OR community, however seems to lag behind in this respect.

In this overview we will first indicate the importance of green aspects to logistics and supply chain management and the drivers behind it. Next we will give an overview of various aspects of green logistics. We start with extending the traditional cost objective in quantitative logistic studies with environmental criteria, like emissions, in the form of CO₂, NO_x and PM. In a following step we discuss the physical supply chain drivers such as transportation, facilities and products and highlight the fundamental green choices considered in this respect. Thereafter we focus on the soft drivers, by considering logistic concepts, decision support systems, sourcing and pricing in the supply chain. In doing so, we will highlight the contributions of OR so far to green logistics. In fact OR has contributed already a lot to green logistics by reducing costs in supply chains, although it most cases the environmental aspects were not addressed explicitly. Next we focus on those problems where a high contribution of Operations Research can be expected. These problems deal with congestions, with coordination in transports and the use of price mechanisms to improve efficiency and they occur in a great variety of cases. Hence there are many opportunities for Operations Research, both methodologically, problem oriented as well as supporting discipline in the many logistic studies.

INVITED SPEAKERS [2/2]

MD-01 Monday, 14:00–15:00 Aula Magna

CHAIR: STEFAN NICKEL, UNIVERSITÄT KARLSRUHE, GERMANY,

Elena Fernández

Technical University of Catalonia, Spain

Location problems on networks with routing

Various location problems on networks involve routing decisions related to sending flows between pairs of nodes, using the located facilities as final or intermediate nodes. In addition to the location of the facilities, these problems involve essential aspects of network design, as the arcs to be used must also be decided. This issue is one extra source of difficulty which, in practice, is reflected in formulations with a huge number of variables, highly inefficient even for relatively small size instances.

In this talk we discuss some problems of this type, including some hub location models, and their relation to network design. Alternative formulations are presented and recent advances leading to successful solution methods are introduced.

TA-01 Tuesday, 9:00–10:00 Aula Magna

CHAIR: JOSE FERNANDO OLIVEIRA, UNIVERSIDADE DO PORTO, PORTUGAL

James Cochran

Louisiana Tech University, USA

You want them to Remember? Then Make it Memorable!

Each of us has key concepts we want our students to understand and remember, but lecturing to students on these concepts often fails to engender their deep comprehension or long term retention. So how can instructors of operations research/management science effectively accomplish these pedagogical goals? In this session Professor Cochran will discuss the use of several interesting and novel active learning exercises, classroom cases, and live projects that can dramatically improve student comprehension and retention of key concepts. Throughout the session Professor Cochran will emphasize his points with live demonstrations of active learning exercises. Card tricks, classroom versions of television game shows, and a teaching case with integrated active learning will be featured. Because many of these exercises are easily transferable across topics, instructor/classroom styles, cultures, national borders, institutions, faculties, programs, levels of technology, and class sizes, it is very likely you will walk away from this session with ideas on how to improve your own teaching (indeed, Professor Cochran will be very disappointed if you don't!).

TB-01 Tuesday, 10:40–11:40 Aula Magna

CHAIR: VALERIE BELTON, UNIVERSITY OF STRATHCLYDE, UK

Fran Ackermann

Strathclyde University, United Kingdom

Problem Structuring Methods 'in the Dock': Arguing the case for Soft OR

Problem Structuring Methods (or Soft OR) have been around for nearly 40 years and yet these methods are still very much overlooked in the OR world. Whilst there is almost certainly a number of explanations for this, two key stumbling blocks are 1) the subjective nature of the modelling yielding insights rather than testable results, and 2) the demand on users to both manage content (through modelling) and manage processes (work WITH rather than on behalf of groups). This keynote presentation aims to put a case forward to support an increase in the use of these methods, either on their own to support clients with messy complex problems or in combination with more mathematical methods thus facilitating models that address a shared well understood objective, provide testable results, and are negotiated and thus owned by key stakeholders.

TC-01 Tuesday, 12:20–13:20 Aula Magna

CHAIR: DENIS BOUYSSOU, UNIVERSITÉ PARIS DAUPHINE, FRANCE

Martine Labbé

Université Libre de Bruxelles, Belgium

Bilevel programming and price optimization problems

Consider a general pricing model involving two levels of decision-making. The upper level (leader) imposes prices on a specified set of goods or services while the lower level (follower) optimizes its own objective function, taking into account the pricing scheme of the leader. This model belongs to the class of bilevel optimization problems where both objective functions are bilinear.

In this talk, we review this class of hierarchical problems from both theoretical and algorithmic points of view and then focus on two special cases. In the first one, tolls must be determined on a specified subset of arcs of a multicommodity transportation network. In this context the leader corresponds to the profit-maximizing owner of the network, and the follower to users travelling between nodes of the network. The users are assigned to shortest paths with respect to a generalized cost equal to the sum of the actual cost of travel plus a money equivalent of travel time. The second case consists in determining optimal prices for bundles of products given that each customer will buy the bundle that maximizes her/his own utility function.

Among others, we present complexity results, identify some polynomial cases and propose mixed integer linear formulations for those pricing problem.

TD-01 Tuesday, 14:00–15:00 Aula Magna

CHAIR: DAVID PISINGER, DTU MANAGEMENT, DENMARK

Pierre Hansen

MQG, GERAD and HEC Montreal, Quebec

Can the computer make scientific discoveries?

Is there a systematic method leading to scientific discovery? To this question, Francis Bacon answers yes, while both Albert Einstein and Karl Popper answer no. As in so many cases, enormous progress in computer power, and in its efficient use, renew the question. Taking examples from geometry, graph and number theory, physics and chemistry, we will illustrate some clear successes (and some failures). This will lead to some speculation on the balance between automation and inspiration in discovery.

WA-02 Wednesday, 10:40–11:40 3.1.14

CHAIR: M. GRAZIA SPERANZA, UNIVERSITY OF BRESCIA, ITALY

Berthold Vöcking*

Aachen University, Germany

A Combinatorial Approach to Secondary Spectrum Auctions

On the secondary spectrum market, licenses are valid only for local regions. Spectrum allocations have to take into account interferences between users in neighboring regions. We show that problem formulations for secondary spectrum auctions in well established, but rather technical models for wireless communication like, e.g., the protocol or the physical model, can be represented in terms of a plain combinatorial model in which interference conditions are described by a conflict graph. The conflict graphs obtained from the wireless models have an interesting combinatorial property: The so-called inductive independence can be bounded by a slowly growing function. We investigate how this property can be exploited for the design of approximation algorithms for efficient spectrum allocations.

*Joint work with Martin Hoefer and Thomas Kesselheim.

WB-02 Wednesday, 10:40–11:40 3.1.14

CHAIR: JOSÉ PAIXÃO, UNIVERSITY OF LISBON, PORTUGAL

Paolo Toth

University of Bologna, Italy

Exact and Heuristic Algorithms for the Vertex Coloring Problem

Given an undirected sparse graph $G = (V, E)$, where V is the vertex set and E the edge set, the Vertex Coloring Problem (VCP) requires to assign a color to each vertex in such a way that colors on adjacent vertices are different and the number of colors used is minimized. The VCP is a well known NP-hard problem, and has received a large attention in the literature, not only for its real world applications in many engineering fields (including scheduling, timetabling, register allocation, frequency assignment and communication networks), but also for its theoretical aspects and for its difficulty from the computational point of view.

In this talk, we review the main Integer Linear Programming formulations, exact algorithms, lower bounding procedures, heu-

ristic and Metaheuristic algorithms proposed for the VCP. Extensive computational experiments on benchmark instances from the literature are reported, comparing the performance of the most effective exact and heuristic algorithms.

WC-02 Wednesday, 12:20–13:20 3.1.14

CHAIR: JACEK BLAZEWICZ, POLITECHNIKA POZNANSKA, POLAND

Nelson Maculan

Universidade Federal do Rio de Janeiro, Brazil

The Discretizable Molecular Distance Geometry Problem

The function of a protein is determined by its 3D structure. Nuclear Magnetic Resonance (NMR) experiments provide distances between some pairs of atoms of a protein. The Molecular Distance Geometry Problem (MDGP) consists in finding all the atomic positions of the molecule by exploiting the distances generated by the NMR experiments. In practice, the MDGP is solved by continuous optimization methods.

We show that under a few realistic assumptions, the MDGP can be formulated as a search in a discrete space, where we call this MDGP subclass the Discretizable MDGP (DMDGP). We prove that the DMDGP is also NP-hard and we propose a Branch-and-Prune (BP).

The BP algorithm performs remarkably well in practice in terms of speed and solution accuracy. We present computational results on several artificial and real-life instances.

WD-02 Wednesday, 14:00–15:00 3.1.14

CHAIR: ULRIKE LEOPOLD-WILDBURGER, KARL-FRANZENS-UNIVERSITY, AUSTRIA

Alexander Shapiro

Georgia Institute of Technology, USA

Computational Complexity of Stochastic Programming

Stochastic programming is a popular approach to optimization under uncertainty. Its origins are going back to pioneering papers of Dantzig(1955) and Beale (1955). The traditional approach to solving stochastic programming problems is to construct scenarios representing what may happen in the future. From a modelling point of view such scenarios can be considered as a discretization of the underline (true) stochastic data process. Consequently, computational complexity of the obtained optimization problem is determined by the number of generated scenarios.

Unfortunately the number of scenarios needed to approximate the “true” distribution of the data process grows exponentially both with increase of the number of random parameters and number of stages. A way of dealing with this explosion of the number of scenarios is to use randomization approaches based on Monte Carlo sampling techniques. In this talk we discuss theoretical and computational aspects of the Monte Carlo sampling approach to solving two and multi-stage stochastic programming problems.

