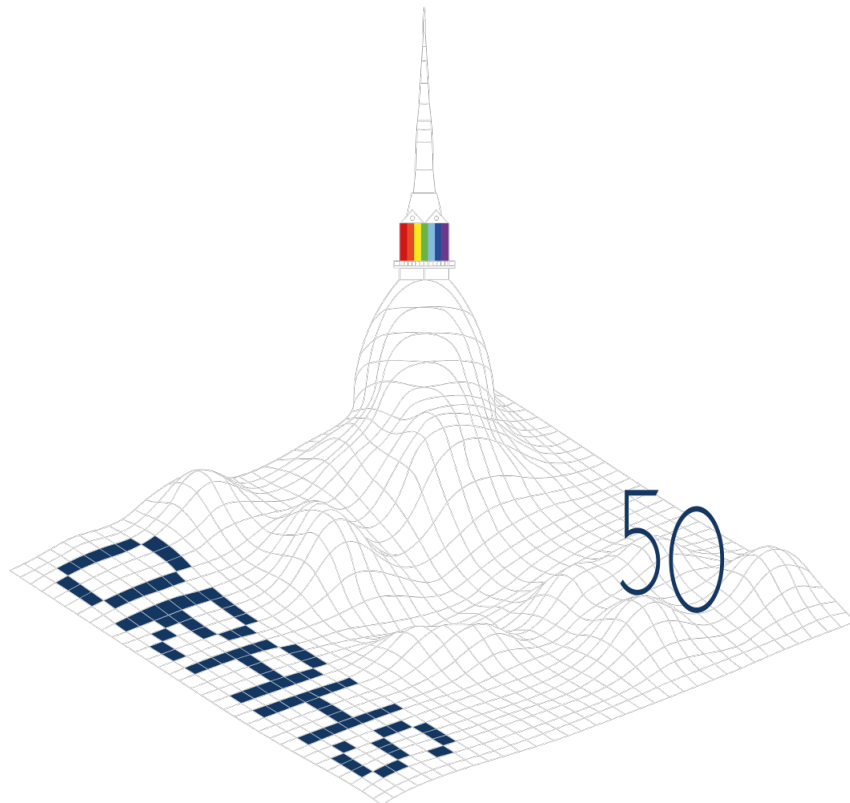


ORAHS 2024

50th annual meeting
of the EURO Working Group
on Operational Research
Applied to Health Services

July 14th-20th, 2024
Torino, Italy

CONFERENCE BOOKLET



ORAHS 2024 Committees

Scientific Committee

Roberto Aringhieri (ORAHS Joint Coordinator), University of Turin, Italy
Sally Brailsford, University of Southampton, GB
Giuliana Carello, Polytechnic of Milan, Italy
Mike Carter, University of Toronto, Canada
Leonid Churilov, University of Melbourne, Australia
Fredrik Dahl, Norwegian Computing Center, Norway
Patrick Hirsch, BOKU University, Austria
Ettore Lanzarone, University of Bergamo, Italy
Stefan Nickel, Karlsruhe Institute of Technology, Germany
Marion Rauner, University of Vienna, Austria
Melanie Reuter-Oppermann (ORAHS Joint Coordinator), Maastricht University, NL
Giovanni Righini, University of Milano, Italy
Sandy Rutherford, Simon Fraser University, Canada
Elena Tànfani, University of Genova, Italy
Christos Vasilakis, University of Bath, GB
Joe Viana, BI Norwegian Business School, Norway

Organising Committee

Roberto Aringhieri, University of Turin [Conference Chair]
Paola Cappanera, University of Florence
Giuliana Carello, Polytechnic of Milan [GO Health! co-Chair]
Alessandro Druetto, University of Turin [Web chair]
Davide Duma, University of Pavia [Doctoral Colloquium co-Chair]
Rosita Guido, University of Calabria
Paolo Landa, Université Laval [Program Chair]
Ettore Lanzarone, University of Bergamo
Sara Mattia, CNR-IASI
Melanie Reuter-Oppermann, University of Twente [Doctoral Colloquium co-Chair]
Elena Tànfani, University of Genova [GO Health! co-Chair]

Local Committee at Computer Science Department, University of Turin

Alice Daldossi, Alberto Guastalla, Andrea Grosso, Pierre Hosteins.

Welcome to Turin!

In January 1975 the first European Congress on Operations Research (EURO 1) was held in Brussels. EURO 1 marked the establishment of a European Association of Operational Research (O.R.) Societies and the creation of a number of European Working Groups (EWG), one of which being O.R. Applied to Health Services. The broad aim of this working group is to promote co-operation between European O.R. Scientists engaged to work in the health services.

The first meeting of that working group was held in September 1975 in Exeter, England, attended by 14 representatives, covering the countries of Denmark, Germany (West), Greece, Ireland, The Netherlands and the United Kingdom.

The above paragraph is the initial part of the report on the first meeting edited by Duncan Boldy, first chairman of the EWG ORAHS. From 1975 to 2023, the EWG ORAHS organised 49 annual meetings, 2 EURO Summer/Winter Institutes, and one EURO PhD School. The EWG ORAHS visited 19 European countries plus Brazil and Canada. The number of participants at the annual meeting has grown over the years making the ORAHS conference one of the most important OR conferences in Healthcare.

The **50th ORAHS conference** is intended as an opportunity to ponder on 50 years of health operational research and its practical and methodological impact. The conference's theme can therefore only be "*Making an impact. Reflecting on 50 years of healthcare operational research*". This theme will be explored through plenaries and special sessions in addition to the usual regular talk, discussion, and poster sessions. Further, all submitted posters by doctoral students will be nominated for the Steve Gallivan Award.

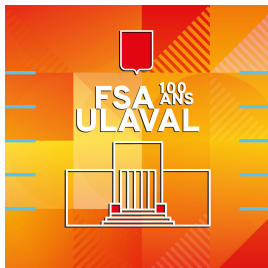
Doing research in OR for healthcare can have a twofold value. On the one hand, our research aspires to provide contributions from a methodological point of view (innovative models, improved algorithms, ...). On the other hand, we would like to contribute to improving the quality of life of patients and citizens by improving the services offered by national healthcare systems. This twofold perspective will be addressed during the conference.



Thanks for attending ORAHS 2024 and welcome to Turin!

for the organising committee, Roberto Aringhieri

Scientific sponsors



Endorsers



Da un secolo, oltre.

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Program at a glance

Saturday 13 July, 10:30 – 17:45: Doctoral Colloquium, Complesso Aldo Moro, Room S7 ([map](#)).

Saturday 13 July, 21:00 – : Doctoral Colloquium dinner, [Ristotram](#). Starting point at Piazza Carlo Emanuele II (known also as Piazza Carlina, [map](#)).

Sunday 14 July, 9:00 – 17:00: Doctoral Colloquium, Complesso Aldo Moro, Room S7 ([map](#)).

Sunday 14 July, 17:30 – 20:30: Welcome Reception, Complesso Aldo Moro ([map](#)).

Monday 15 July – Complesso Aldo Moro

	9:00 - 9:30	9:30 - 10:30	11:00 - 12:30	13:50 - 15:00	15:30 - 16:40
Auditorium	MA-1: Opening	MB-1: Plenary Stefan Nickel	—	—	—
Room S1	—	—	—	—	—
Room S2	—	—	MC-3: Evaluation and Implementation	MD-3: Integrated Planning in Healthcare /1	ME-3: Pharmaceuticals Public Policy and Regulation
Room S3	—	—	MC-4: Analytics for Mis/Disinformation in Healthcare	MD-4: Cost Effectiveness	ME-4: Home Care /1
Room S6	—	—	MC-5: (Multi)Appointment /1	MD-5: Emergency Department /1	ME-5: Workforce Planning

Monday 15 July, 16:30 – 19:30: Guided Tour of the City Centre of Turin. Details in the [program](#).

Tuesday 16 July – Complesso Aldo Moro

	9:00 - 10:30	11:00 - 12:30	14:00 - 15:30	16:00 - 17:30
Auditorium	—	—	TC-1: Poster session	—
Room S1	—	TB-2: Advances in Health Economics and Healthcare Management	—	—
Room S2	TA-3: Healthcare Logistics /1	TB-3: Humanitarian Logistics and Blood Supply	—	TD-3: Patient flow
Room S3	TA-4: Epidemiology and Prevention	TB-4: Modeling and Simulation /1	—	TD-4: Discussion session
Room S6	TA-5: Operating Room Scheduling /1	TB-5: Healthcare Management /1	TC-5: IHTC-2024	TD-5: Ambulance Management

Wednesday 17 July, 8:00 – 19:30: Boat trip on Lago Maggiore. Details in the [program](#).

Thursday 18 July – Complesso Aldo Moro				
	9:30 - 10:30	11:00 - 12:30	14:00 - 15:30	16:00 - 17:30
Auditorium	HA-1: Plenary Carl May	—	—	HD-1: Business meeting
Room S1	—	HB-2: Analytics	—	—
Room S2	—	HB-3: Transportation in Healthcare and Social Services	HC-3: Emergency Medical Services	—
Room S3	—	HB-4: Modeling and Simulation /2	HC-4: Healthcare Management /2	—
Room S6	—	HB-5: Operating Room Scheduling /2	HC-5: Emergency Department /2	—

Thursday 18 July, 20:00 – : Conference Dinner along the quay of the Po River at the Porto Urbano ([map](#)).

Friday 19 July – Complesso Aldo Moro				
	9:20 - 10:30	11:00 - 12:30	14:00 - 15:30	15:30 - 16:00
Auditorium	—	—	—	FD-1: Closing
Room S1	—	—	—	—
Room S2	FA-3: Integrated Planning in Healthcare /2	FB-3: Healthcare Logistics /2	FC-3: Patient and Resource Scheduling	—
Room S3	FA-4: Home Care /2	FB-4: Artificial Intelligence	FC-4: Policies and Networks	—
Room S6	FA-5: Emergency Department /3	FB-5: (Multi)Appointment /2	FC-5: Healthcare Management /3	—

Friday 19 July, 9:00 – 16:30: GO Health!, Complesso Aldo Moro, Room S1 ([program](#), [map](#)).

Saturday 20 July, 8:00 – 19:30: Mont Blanc from Punta Helbronner. Details in the [program](#).

Practical information

CONFERENCE VENUE

ORAHs 2024 will be held in the at the Complesso Aldo Moro (<https://orahs2024.di.unito.it/venue-pictures/>), one of the new buildings of the University of Turin. Such a new building is located in the really city centre close to the Mole Antonelliana and the unique National Museum of Cinema (less than 300 metres), to Piazza Vittorio Veneto (less than 500 metres) that is the largest arcaded square in Italy, 1 km far from the Museo Egizio (the largest Egyptian collection outside Egypt), Piazza Castello with Palazzo Madama (the first venue of the Italian Parliament) and Palazzo Reale, and within walking distance from many other cultural and tourist attractions.

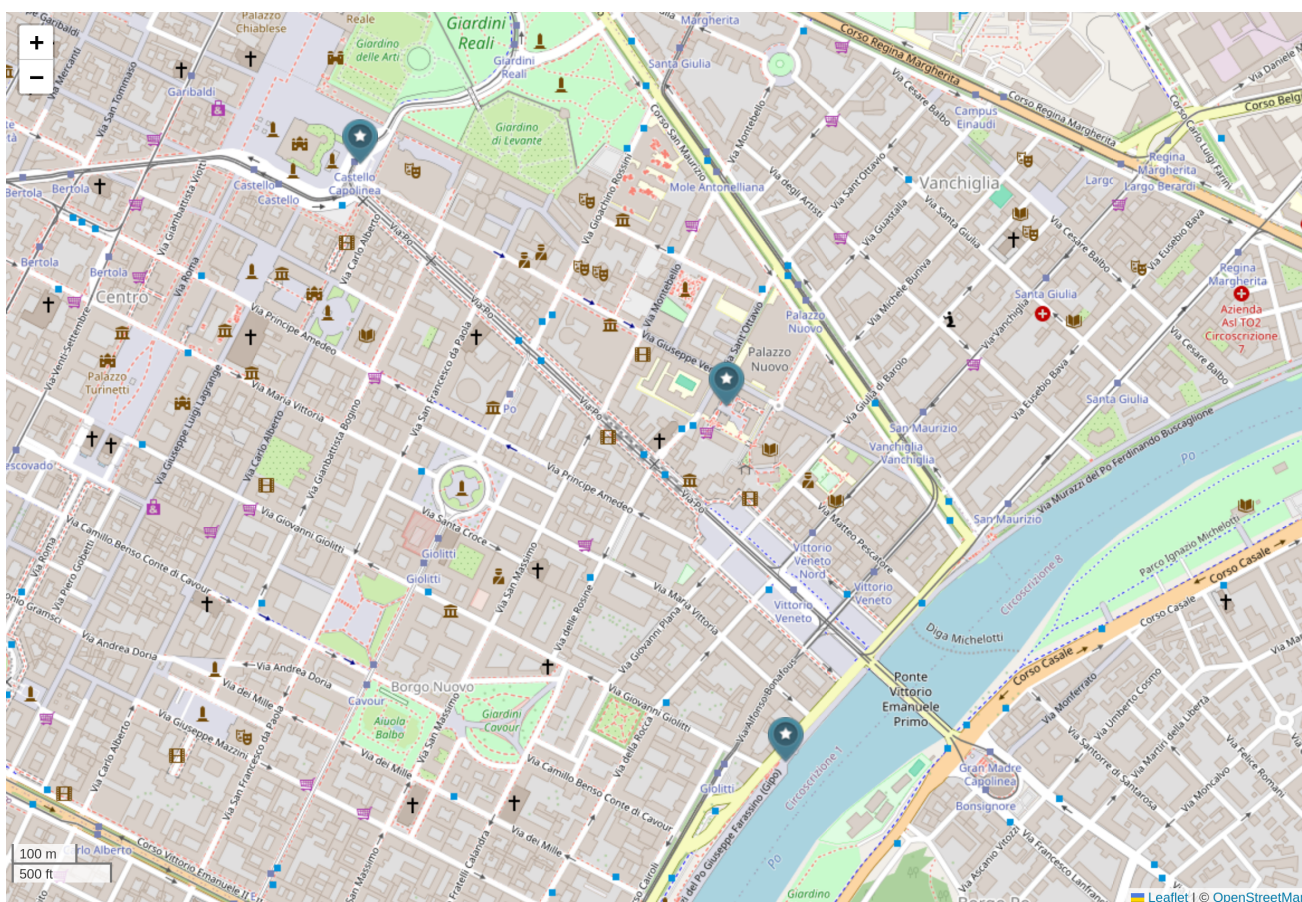
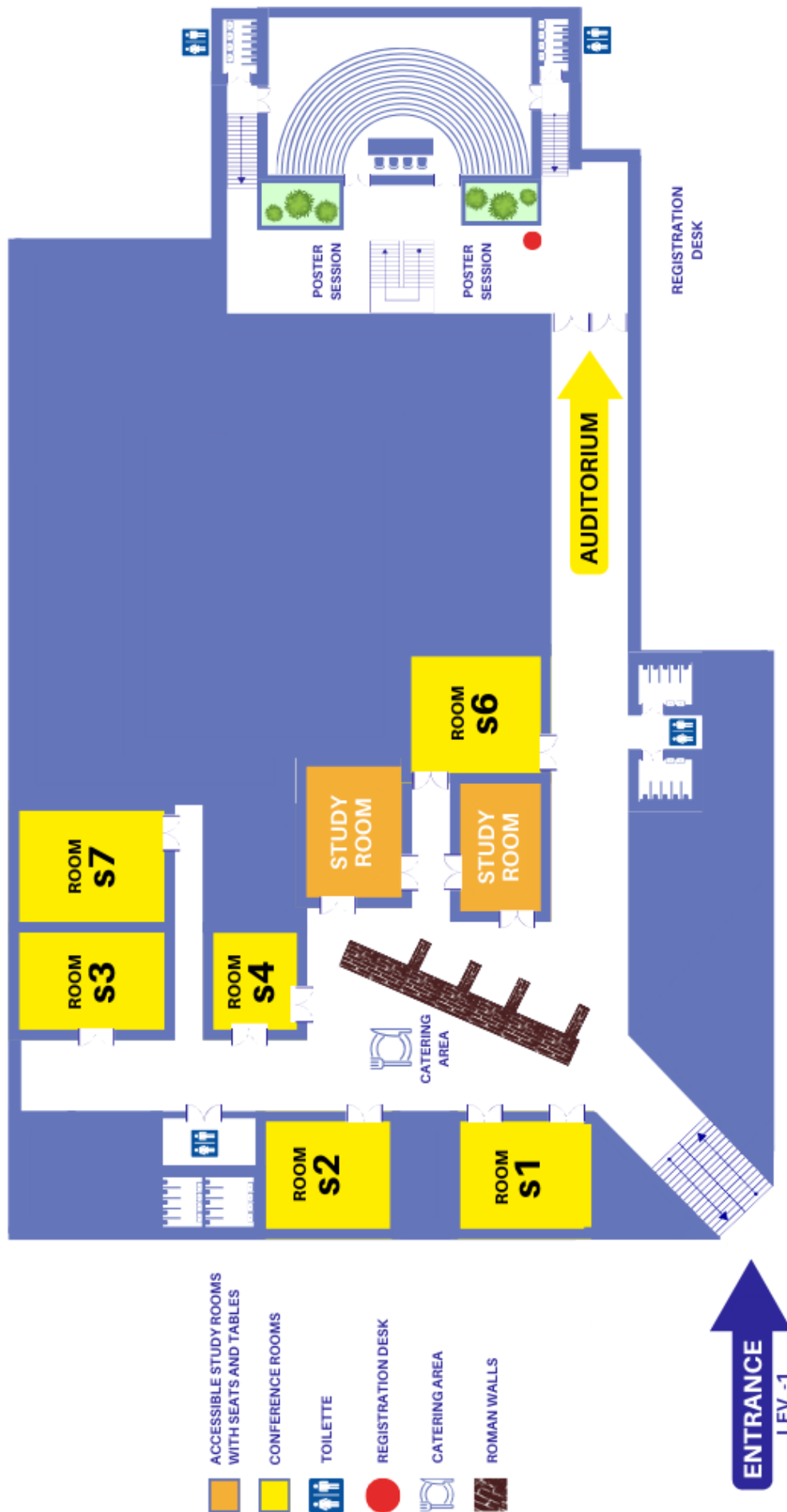


Figure 1: Map of the area surrounding the venue:
<https://orahs2024.di.unito.it/map-of-the-city-centre/>.

Five rooms are available for the ORAHs conference: **Auditorium**, for opening and closing sessions, plenary lectures and the business meeting, and **rooms S1, S2, S3, and S6** for parallel sessions. When the room **S1** is not used for parallel session, the room is available for small meetings and/or for reading emails.

The welcome party on Sunday 14th and the coffee breaks will be held around the ancient Roman wall. The poster session will take place in the area in front of the Auditorium, close to the registration desk.

Lunches will be served in the 4 restaurants located above the room floor, and chosen to taste different kinds of cuisine and, at the same time, to minimise the impact of catering waste. Each participant will receive a coupon to dine in a different restaurant each day. Participants can exchange coupons of the same day with each other.



SCIENTIFIC PROGRAM

The program is available online here:

<https://orahs2024.di.unito.it/scientific-program/>.

The program is also available online here:

<https://www.euro-online.org/conf/orahs2024/program>.

We **strongly** advise participants not to print out the program but to consult it online via website, PDF or using the app provided by the ORAHS 2024 Abstract Submission system itself. Such an app could be installed in your mobile as follows: **(1)** visit the page

<https://www.euro-online.org/conferences/program/#conference/orahs2024>

from a browser of your mobile phone, **(2)** above the login box, click on “Add to home screen”, **(3)** login with your EURO user and password to manage your personal program selecting the favourite sessions.

A **printed copy** of the program will be available in each conference room, and a few copies at the registration desk.

LAST MINUTE UPDATE

The conference website has a **news section** at the link:

<https://orahs2024.di.unito.it/category/orahs-news/>.

The news section will be used for updates on the scientific program.

INFORMATION FOR SESSION CHAIRS

The scientific program is based on sessions made of 3 or 4 talks. Each talk lasts approximately 20 minutes plus 2+ minutes for questions. We invite the chairs to follow the order of the talks as scheduled, and not to anticipate talks in the event of the speaker’s absence.

Session chairs will find a computer in the room, computer already connected to the projector. Presentations can be uploaded via usb key or by using the browser of the computer to download it. We invite speakers not to use their computer, which could not be recognized by the system.

In each room there will be a member of the staff on hand to ensure that the session runs as smoothly as possible.

WI-FI CONNECTION

The EDUROAM connection is available in all University spaces.

A wi-fi connection through the **unito-guest** network is available in all University spaces for the registered participants. Please ask your credentials (username and password to the registration desk. Instructions are available here:

<https://en.unito.it/services/online-services/university-wifi>.

NOTES FOR BUS TRANSFERS

We decided to organise a walking-distance conference. Except for some social activities included in the accompanying program, all the activities are really close to the conference venue.

On Wednesday 17th and on Saturday 20th, the buses will leave from Piazza Castello.

Please check the map for the meeting point:

<https://orahs2024.di.unito.it/map-of-the-city-centre/>.

RECEIPT AND CERTIFICATE

Each registered participant will receive from Promoest (organising secretariat) the receipt of payment of the registration fee to the email address indicated during registration.

Moreover, participants who wish it will receive the certificate of attendance by requesting it to the organising committee by sending an email to program-orahs2024@di.unito.it.

STEVE GALLIVAN AWARD

Since ORAHS 2017, the Gallivan Award is given to the best poster presented by Ph.D. students. In particular, 3 students are awarded at each ORAHS edition thanks to the EURO General Support Funding. The winner of the previous editions are published on the ORAHS website: <http://orahs.di.unito.it/awards.html>.

Even if some participants will present also their work as a regular talks, only the poster will be evaluated by the Jury.

The list of candidates is composed of 8 PhD students: Chao Pan (KU Leuven), Arianna Freda (Roma Tre University), Jedidja Lok-Visser (University of Twente), Sonja Weiland (University of Technology Nuremberg), Thomas Xenos (Technical University of Crete), Thamer Almohaya (University of Southampton), Sara Cambiaghi (Università di Pavia), Aleyna Gürsoy (University of Bergamo).

This year, the jury is composed by Melanie Reuter-Oppermann (president), Ettore Lanzarone and Alexander Rutherford. The winners of the Steve Gallivan Award will be announced during the social dinner.

WATER AND WEATHER

Historically, Turin has developed a drinking water network as a common good. Such a network is based on the iconic fountain called “Toret”. So we invite you to bring your water-bottle and to fill it using both the drinking water from the Toret or from the tap.

Toret Map: <https://ilovetoret.it/en/mappa/>.

The Regional Agency for Environmental Protection provides really accurate weather forecasts via the [website](#). Although only in Italian, the displays are intuitive and a lot of information is provided in real time. There is also an app for your mobile phone that uses georeferencing.

Doctoral Colloquium

Room S7 – Saturday 13th – 10:30-17:45

Room S7 – Sunday 14th – 9:00-17:00

Doctoral students working on their thesis in the field of Operations Research applied to Health Services can discuss their research work with senior experts.

In addition to PhD presentations, the program includes *Ask the experts*, *Speed dating* and *Wrap-up* sessions. Check the program: <https://orahs2024.di.unito.it/dc-info/>.

Participants: Alice Daldossi, University of Turin (guest); Andres Felipe Torres Ramos, Universidad de los Andes (guest); Arina Soboleva, TU Delft; Chao Pan, KU Leuven; Florentina Hager, University of Twente; Ismael Aguilera, University of Chile; Luca Murazzano, Université Laval; Marc Chouraqui, Université de Technologie de Troyes (guest); Märt Vesinurm, Aalto University; Paul Fleurance, IMT Atlantique; Ricardo Otero, KU Leuven; Sara Cambiaghi, University of Pavia; Thomas Xenos, Technical University of Crete (guest).

Experts: Angel Ruiz, Université Laval; Davide Duma, University of Pavia; Joe Viana, BI Norwegian Business School; Melanie Reuter-Oppermann, Maastricht University; Paolo Landa, Université Laval; Roberto Aringhieri, University of Turin; Sandy Rutherford, Simon Fraser University; Sean Manzi, Dartington Service Design Lab.

On Saturday 13, the DC social dinner will take place in the *RistoTram* as it moves through the centre of Turin.



Conference opening

Auditorium – Monday 15th – 9:00-9:30

Institutional greetings:

- Umberto Ricardi
*Delegate of Stefano Geuna,
Rector of the University of Turin
and
Vice Rector for the Medical Area and
Head of the School of Medicine
of the University of Turin*
- Susanna Donatelli
*Director of the Department of Computer Science
of the University of Turin*
- Melanie Reuter-Oppermann
*co-chair of the EWG ORAHS
Maastricht University, NL*
- Roberto Aringhieri
*chair of the ORAHS 2024
and
co-chair of the EWG ORAHS,
Computer Science Department, University of Turin, Italy*

Plenary talks

Auditorium – Monday 15th – 9:30-10:30

Strategies for a lasting impact in healthcare: from day-to-day operations to policy

Stefan Nickel

KIT, Karlsruhe, Germany
Institute of Operations Research
Discrete Optimization and Logistics (dol.ior.kit.edu)
Executive Director FZI (www.fzi.de/LSO)
Director KSRI (ksri.kit.edu)
VP EURO-IFORS, stefan.nickel@kit.edu



Healthcare involves both medical and logistical activities. While medical professionals are responsible for designing medical aspects, Operations Research (OR) can offer quantitative decision support for designing logistical processes. This enables OR to influence individual decisions and contribute to policy development.

Achieving this impact requires integrating several key elements. Communication with stakeholders is essential for gaining insights into healthcare systems and establishing trust in OR models. Real-world data is necessary to build accurate models, which, in turn, can guide the collection of relevant data. The models must be adapted to comply with differing, local legislation while aligning with the overarching goals of healthcare systems. This adaption can also lead to the development of novel OR models.

Decisions and their impact on care quality and economic factors are the driving force and structuring element for developing models and prioritising research and implementation efforts. Bringing these elements together can be achieved through virtual planning environments such as discrete event simulation. Built on real-world data, they can be used to communicate with stakeholders, validate OR models, and understand the interdependence of decisions. Drawing on an ongoing project focused on emergency medical services, this talk will showcase concepts, models, and insights illustrating how OR can make a tangible impact and influence legislative changes.

Auditorium – Thursday 18th – 9:30-10:30

Implementation Science: more than translating evidence into practice

Carl May

London School of Hygiene and Tropical Medicine, UK, Carl.May@lshtm.ac.uk



The field of implementation science seems to be growing, almost exponentially, with new journals, research centres, and funding schemes, appearing around the world. But can there truly be such a thing as a science of implementation? And, if there can be such a science, how can we find our way into it and share in its achievements? In this plenary talk, I will (a) set out some of the key features of implementation science as an empirical field of research and development; (b) consider some of its conceptual underpinnings – theoretical models that identify, characterize and explain the mechanisms that motivate and shape implementation processes; and (c), explore the ways that these may open doors for collaboration between Operational Researchers and Implementation Scientists.

IHTC-2024

Auditorium – Tuesday 16th – 14:00-15:00

The Integrated Healthcare Timetabling Competition (IHTC-2024)

Andrea Schaerf

DPIA, University of Udine, Italy, schaerf@uniud.it



In this talk, we present the International Integrated Healthcare Competition: a new competition for optimization methods that intends to stimulate research focusing on the specifics of integrated scheduling problems in healthcare. We will provide an overview of all aspects of the competition, which will begin in September 2024 and will finish in March 2025.

First, we will introduce the considered problem, which integrates three critical problems in healthcare: surgical case planning, patient admission scheduling and nurse-to-room assignment. Second, we will describe all the necessary infrastructure provided to support the competition's participants: datasets, file formats, and solution validator. Finally, we state the rules of the competition.

All up-to-date information about the competition will be available in a dedicated repository on GitHub.

ORAHS business meeting

Auditorium – Thursday 18th – 16:00-17:30

During the business meeting, the following topics will be discussed:

- Announcements and news from the family
- ORAHS 2023: evaluation
- ORAHS 2024: announcement
- Next ORAHs: presentations
- ORAHS board update
- ESWI
- Miscellaneous

All conference participants are kindly invited to attend the business meeting to bring their ideas and suggestions.

Social program

The ORAHS conference is well-known for its valuable social program for delegates and their accompanying.

Traditionally, on **Sunday** afternoon there will be a welcome reception at the venue of the conference (<https://orahs2024.di.unito.it/map-of-the-city-centre/>) and on **Monday** a guided city tour.

On **Wednesday** a boat trip will be held on the Lago Maggiore, where we will visit (hopefully) all three islands (Isola Bella, Isola Madre and Isola Superiore). The three islands are completely different from each other: Isola Bella is known for its famous Palazzo Borromeo and the Italian-style baroque garden, while Isola Madre is known for its amazing botanical garden. Finally, Isola Superiore (also called “Fishermen’s island”) is the only one which has a small village where people even nowadays live!

Bring your Swimming Gear! Also bring a beach towel and sunscreen.

On **Thursday**, we will have the conference social dinner along the quay of the Po River at the Porto Urbano.

Finally, on **Saturday** the conference survivors will be able to enjoy the grandeur and splendour of Mont Blanc from Punta Helbronner by attending this optional social activity.

All the social programs are available online:

<https://orahs2024.di.unito.it/social-program/>.

A rich program for accompanying participants has been prepared including the visit of the Museum of Cinema, Palazzo Madama, Park “La Mandria” and its Castle, the “Reggia di Venaria”, Palazzo Reale and the Egyptian Museum.

Every day, the group of accompanying will be lead by the same tour leader.

The complete program is available online:

<https://orahs2024.di.unito.it/social-program/>.

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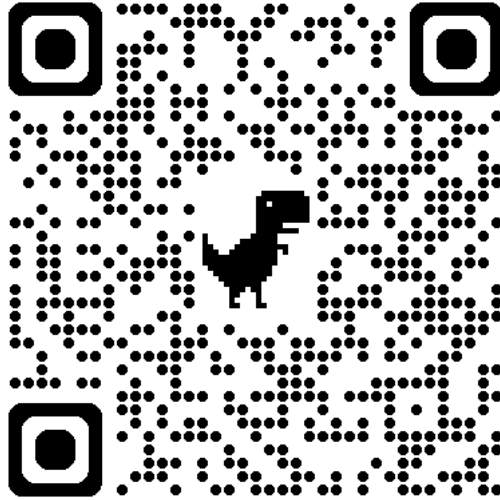


Figure 1: ORAHS 2024 website QR code.

CONTACTS

Conference chairs and committee
program-orahs2024@di.unito.it

Roberto
roberto.arinhieri@unito.it
Text me via SMS or WA to +39 331 1239026

Organisational Secretariat
orahs2024@promoest.com
Text me via SMS or WA to +39 338 9965674

