

## **EURO Summer Institute on Health**

**11-20 June 2014**

**Forte di Bard – Italy**



**FINAL REPORT**

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**1. GENERAL INFORMATION ABOUT ESI XXXI**

The OR Societies of Italy and the UK supported the organization of the EURO Summer Institute (ESI) on the theme “*Operational Research applied to Health in a Modern World*”. ESI XXXI took place at the astonishing Fortress of Bard, Italy, from June 11 to June 20, 2014.

**THEME**

OR modelling for healthcare has developed with the complexities of the modern world. Health Care Systems (HCS) are often awash with data but managers are unable to benefit while concerned only with trouble-shooting. Furthermore, HCS should reflect a patient centered and societal perspective focusing on outcomes rather than only on output. ESI XXXI will bring together those issues proposing new modelling and solution techniques to aid decision makers in the fields of health and disease management, patient flow and all aspects of optimal use of scarce resources.

**BACKGROUND**

EURO is the "Association of European Operational Research Societies" and is a regional grouping within IFORS, the "International Federation of Operational Research Societies". EURO Summer and Winter Institutes (ESWI) provide an excellent forum for PhD students and early career researchers to discuss their research at length with experts in the field, as well as forming links with other early stage researchers that will endure throughout their careers.

Around 25 early stage researchers will be invited to attend the ESWI. They will be very early career academics (PhD students and/or those who have less than two years research experience post PhD). Those invited will meet for about ten days and present the material of an unpublished piece of work, discussing it with others and with a handful of specially invited senior experts in the field. Social activities will complement formal proceedings. Papers will be prepared for consideration for an upcoming issue of an OR publication.

Disregarding the senior experts, no one can participate in an ESWI more than once in his or her lifetime. Participation in an ESWI should be regarded as a considerable honour. In other words, the main objective of an ESWI is to give a limited number of carefully selected representatives of the next generation a unique opportunity for establishing a personal network and for addressing an international audience and thus to create new research groups around the topic chosen. EURO provides a substantial contribution towards all the ESWI

expenses “on location” (room and board, social programme, etc.); sponsorship is being sought for the remainder of these expenses. The travel costs, however, must be covered by the participant's national OR society or, if not possible, by the participants themselves.

**ELIGIBILITY RULES**

Participants should satisfy the following rules:

- (1) should be PhD students or researchers who have less than two years' research experience since completing their PhD at the moment of ESI application, that is at 1st February 2014;
- (2) have a single-authored or co-authored paper in the selected field, which has not yet been published, nor accepted for publication;
- (3) come from a EURO member society country, or study in a EURO member society country, or be appointed by IFORS (in this case the selection process is run entirely by IFORS).

The maximum number of selected EURO participants is 25. One or two candidates can be appointed by IFORS, according to the EURO and IFORS exchange for ESWIs.

**PARTNERSHIP WITH CREATE**

ESI XXXI and the CREATE HOIM Program (<http://www.mcgill.ca/create-hoim/>) from Canada have kindly agreed to allocate up to three seats at this event for CREATE HOIM students. CREATE students will follow the same selection procedure of EURO students. The CREATE program will provide funding for up to 3 students selected by the ESI XXXI scientific committee.

**ORGANISING COMMITTEE**

Dr Roberto Aringhieri, Università degli Studi di Torino, Italy (**EURO contact person**)  
Dr Vincent Knight, Cardiff University, UK  
Dr Honora Smith, University of Southampton, UK

**SCIENTIFIC COMMITTEE**

Dr Roberto Aringhieri, Università degli Studi di Torino, Italy  
Prof Sally Brailsford, University of Southampton, UK  
Prof Mike Carter, University of Toronto, Canada  
Dr Erwin Hans, University of Twente, the Netherlands  
Prof Paul Harper, Cardiff University, UK  
Dr Vincent Knight, Cardiff University, UK  
Prof Dr Stefan Nickel, Karlsruhe Institute of Technology, Germany



Prof Yasar Ozcan, Virginia Commonwealth University, USA

Prof Marion Rauner, University of Vienna; Austria

Prof Giovanni Righini, Università degli Studi di Milano, Italy

Dr Honora Smith, University of Southampton, UK

Prof Martin Utley, CORU, University College London, UK

Prof Jan Vissers, Erasmus University Rotterdam, the Netherlands

## **WEBSITE**

A website for the ESI was built and more information on this EURO Summer Institute can be found there: <http://di.unito.it/eswihealth2014>



## 2. VENUE

### **FORTRESS OF BARD**

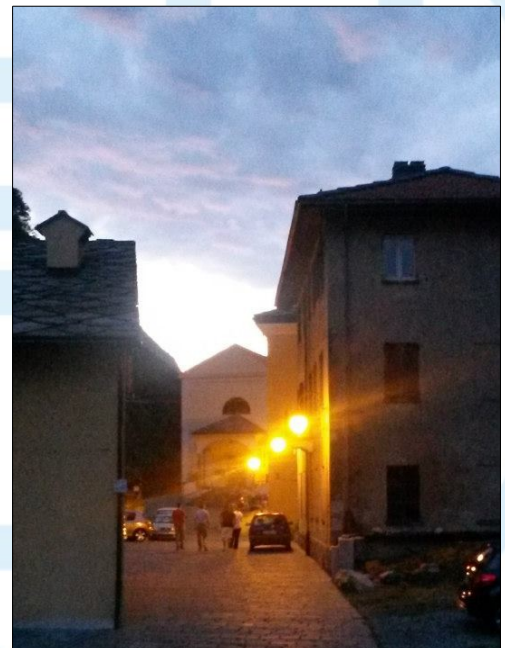
Almost intact from the moment of its construction, the Fortress of Bard represents one of the best examples of early 1800 military strongholds. The Fortress of Bard is formed of 3 main defence stations positioned at different levels upon a high imposing rock spur, the lowest at 400m above ground and the highest at 467m. The Ferdinando Opera is the defence structure at the bottom, the Vittorio Opera in the middle, and the Carlo Alberto Opera at the top. There are a total of 283 rooms in the entire fortress.



Thanks to the restoration of this magnificent fortress and the various territories connected to it, the entire fortress compound together with the village of Bard has now become the leading cultural centre of the Western Alps, offering innovative exhibition spaces and services dedicated to the spread of culture combined with high quality accommodation and hospitality facilities.

### **BORGHO OF BARD**

There is a harmonious bond between the birth of this medieval village and the defence system erected along the immense rocky spur at the top of which there once stood a castle. It is highly likely that the village was originally enclosed by a defence wall and accessed by two gateways, one in the east and the other in the west.





## CONFERENCE ROOM

Scientific sessions was held at “Sala degli Archi Candidi” within the Forte di Bard in the Carlo Alberto Opera, at the very top of the rock. The “Sala degli Archi Candidi” can seat a maximum of 100 people and 6 speakers. Further, it can be arranged as a sort of mixed round table and standard audience using tables available in the room.



Lunches was served at “La Polveriera”, the old gunpowder magazine. The restaurant has a wide-ranging menu including the traditional cuisine of Valle d'Aosta.

## ACCOMMODATIONS

Accommodations was provided at Hotel Stendhal located at the base of the fortress in the Borgo of Bard. An elegant three stars hotel in the centre of the village of Bard. It provides rooms for all participants including breakfasts and dinners.



**3. LIST OF PARTICIPANTS**

The organizing committee agreed to collect **expressions of interest** in order to assess the likely number of participants. The deadline was 31<sup>st</sup> July 2013. According to the list of countries published on the EURO website, the 15 EURO countries represented by the 46 expressions of interest were Portugal (4), Germany (8), UK (5), Turkey (3), Italy (3), The Netherlands(4), Sweden (1), Iceland (1), Switzerland (1), Ireland (1), South Africa (1), Serbia (1), Greece (1), Austria (1), France (1) (not accounting for eligibility regarding date of PhD). Possible IFORS countries: Iran, China, Nigeria, India, Singapore, USA (3).

At the end of the selection process, **16 EURO, 2 IFORS and 3 CREATE students** were selected. Unfortunately, two students, that is Brian Reddy from Ireland and Saied Samiedaluie from Canada had to give up. On very short notice, one accepted student, Zehra Onen, did not attend the ESI due to health problems.

The organizing committee decided also to allow the attendance of three guest students.

**EURO DELEGATES**

1. Omar El-Rifai, École Nationale Supérieure des Mines de Saint-Étienne, France
2. Melanie Reuter, Karlsruhe Institute of Technology, Germany
3. Ines Raschendorfer, University of Kaiserslautern, Germany
4. Jacqueline Wirnitzer, Karlsruhe Institute of Technology, Germany
5. Manolitzas Panagiotis, Technical University of Crete, Greece
6. Paolo Landa, Università degli Studi di Genova, Italy
7. Paolo Tubertini, Università degli Studi di Bologna, Italy
8. Aleida Braaksma, Academic Medical Center, University of Twente, the Netherlands
9. Maartje van de Vrugt, University of Twente, the Netherlands
10. Pieter van den Berg, Delft University of Technology, the Netherlands
11. Nardo Borgman, University of Twente, the Netherlands
12. Mário Amorim Lopes, Universidade do Porto, Portugal
13. Zehra Onen, Koç University, Istanbul, Turkey
14. Julie Vile, Cardiff University, United Kingdom
15. Jennifer Morgan, Cardiff University, United Kingdom

**IFORS DELEGATES**

16. Papiya Bhattacharjee, IIT Kharagpur, India
17. Sheetal Prakash Silal, University of Cape Town, South Africa

**CREATE DELEGATES**

18. Houra Mahmoudzadeh, University of Toronto, Canada
19. Anna Graber-Naidich, University of Toronto, Canada



**GUESTS**

- 20. Anne Zander, Karlsruhe Institute of Technology, Germany
- 21. Davide Duma, Università degli Studi di Torino, Italy
- 22. Saber Mashaal, Medical Institute, Pulmonology, Al Ain Hospital, UAE

**SENIOR EXPERTS**

- 23. Roberto Aringhieri, Università degli Studi di Torino, Italy
- 24. Vincent Knight, Cardiff University, UK
- 25. Honora Smith, University of Southampton, UK
- 26. Sally Brailsford, University of Southampton, UK
- 27. Paul Harper, Cardiff University, UK
- 28. Stefan Nickel, Karlsruhe Institute of Technology, Germany
- 29. Marion Rauner, University of Vienna; Austria
- 30. Giovanni Righini, Università degli Studi di Milano, Italy
- 31. Vito Fragnelli, Università degli Studi del Piemonte Orientale, Italy



## 4. SCIENTIFIC PROGRAM

### FORMAT OF THE INSTITUTE

ESI XXXI was organized around tutorials, paper presentations and discussions, and parallel discussion panels.

All the tutorials had an expositive part while, some of them, had also a second part including exercises and hands- on practice. For the paper presentation and discussion each paper has been assigned to an ESI senior expert for an in depth analysis and study. All students had a 60 minutes slot assigned, in which they have made a presentation, followed by a discussion. Each day, the final session was a parallel discussion panel – lasting 2 hours – in which groups of participants discussed the paper presented in the previous sessions. Each group was composed of the paper's author, a senior expert and all the students interested in the topic of the paper. Usually, students and senior experts moved between groups.

### SCHEDULE

The complete schedule is reported in the [program of ESIXXX](#) available on the website.

#### Thursday, June 12th Expert: Prof Dr Stefan Nickel

1. Pieter van den Berg: *Ambulance Location Modeling with Stochastic Response Times.*
2. Omar El-Rifai: *ED Staff Allocation during Seasonal Epidemics.*
3. Anna Graber: *Multicriteria Optimization Modeling for Primary Care Facility Network Design – The Regulator's Perspective.*

#### Saturday, June 14th Expert: Prof Marion Rauner

4. Nardo Borgman: *Appointment scheduling at a radiology department with unscheduled arrivals and reprioritization.*
5. Mário Amorim Lopes: *Data mining the European Health for All database.*
6. Aleida Braaksma: *Online appointment scheduling with different urgencies and appointment lengths.*
7. Zehra Onen: *Optimal Screening Policies for Alzheimer's Disease.*

#### Monday, June 16th Experts: Prof G. Righini (R) and Prof P. Harper (H)

8. Ines Raschendorfer: *Hierarchical Edge Colorings and Rehabilitation Therapy Planning in Germany.* (R)
9. Houra Mahmoudzadeh: *A constraint generation solution approach to robust optimization models in radiation therapy treatment planning.* (R)

10. Melanie Reuter: *Ambulance Location under Stochastic Demand: A Sampling Approach.* (R) (H)
11. Paolo Landa: *Robust solution for Stochastic operating rooms with patient sequencing: a bi-objective approach.* (R) (H)

Tuesday, June 17th Experts: Prof G. Righini (R) and Prof P. Harper (H)

12. Jacqueline Wirnitzer: *Patient-based nurse rostering in Home Health Care.* (R) (H)
13. Sheetal Silal: *Sensitivity to model structure: A comparison of compartment models in epidemiology.* (H)

Wednesday, June 18th Expert: Prof Sally Brailsford

14. Jennifer Morgan: *Mixing in practice: reflections on using DES ad SD to explore a radiotherapy treatment planning process.*
15. Paolo Tubertini: *Forecast and fund allocation of medical specialty positions: Emilia-Romagna Region case study.*
16. Manolitzas Panagiotis: *MED-UTA: Integrating Simulation and Aggregation-Disaggregation Approach of MCDA in an Emergency Department.*
17. Papiya Bhattacharjee: *Simulation Modelling and Analysis of Appointment System Performance for Multiple Classes of Patients in a Hospital: A Case Study.*

Thursday, June 19th Expert: Prof Sally Brailsford

18. Julie Vile: *Managing time-varying and prioritised requests when forecasting demand and setting staffing requirements for Emergency Medical Services.*
19. Maartje van de Vrugt: *Assigning treatment rooms at the Emergency Department: Queueing in a random environment.*

## TUTORIALS

The scientific program of ESI XXXI provides to the participants a list of 5 tutorials by

1. Prof Dr Stefan Nickel, Karlsruhe Institute of Technology, Germany: *Healthcare Logistics.*
2. Prof Marion Rauner, University of Vienna, Austria: *Health Technology Assessment – Main concepts & Software TreeAge.*
3. Prof Vito Fragnelli, Università del Piemonte Orientale, Italy: *Game Theoretical Scenarios in Health Management.*
4. Prof Paul Harper, Cardiff University, UK: *Queueing Systems in Healthcare.*
5. Prof Sally Brailsford, University of Southampton, UK: *System Dynamics 101.*

The extended abstract of the tutorials are available in the [program of ESIXXX](#) on the website.

## SPECIAL ISSUES

Two special issues will appear after ESI XXXI. The first one on **Operations Research for Health Care** while the second on **Health Systems**. The deadline is set to the 31st October 2014.





## 5. SOCIAL PROGRAM

ESI XXXI had a rich social program including art and history, tasting, social issues and team building.

### WELCOME PARTY AND OPENING SESSION, WEDNESDAY, JUNE 11



### FORTE DI BARD GUIDED TOUR, THURSDAY, JUNE 12





## SPORT TOURNAMENT, FRIDAY, JUNE 13



## TASTING OF LOCAL PRODUCTS, SATURDAY, JUNE 14





**SOCIAL TOUR, SUNDAY, JUNE 15**

**FENIS CASTLE**



**ROMAN AQUEDUCT, PONT D'AEI**

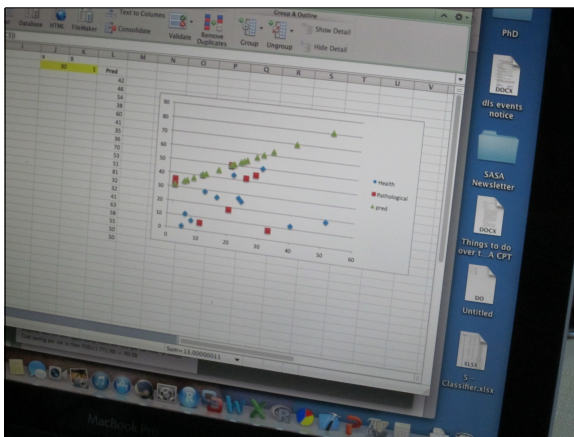
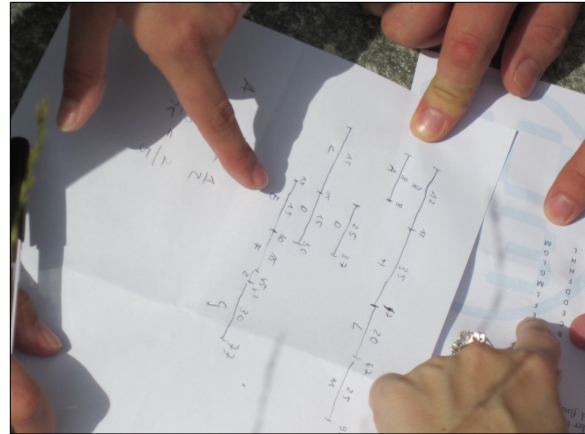


**LILLAZ WATERFALL AND COGNE**





## OR IN HEALTHCARE TREASURE HUNT, TUESDAY, JUNE 17



The complete report is available here ([links](#)).



## VISIT TO FONDAZIONE ADRIANO OLIVETTI IN IVREA, THURSDAY, JUNE 19



The program of the visit is available here ([link](#)).

## PABLO PICASSO AND SOCIAL NIGHTS



## 6. FINANCIAL REPORT

The ESI XXXI budget was built considering EURO support of 1000 € per eligible participant. We were supported also from Dipartimento di Informatica, University of Turin, and from CREATE. Further, the University of Southampton and Cardiff University supported Honora Smith and Vincent Knight. Finally, some experts used their personal funds to pay their stay and their travel expenses.

Income		Expenditure	
EURO	17,000	Conference Rooms	2,989.00
Dip. Informatica	2,000	Lunches and Coffee breaks for all participants	4,370.00
CREATE	300	Half Board Accommodation (students)	7,113.60
		Half Board Accommodation (experts)	1,210,20
		Social Activities	3,246.00
		Invited Speakers Travel Expenses	218,06
		Organization (conference materials)	151,28
<b>Total</b>	<b>19,300</b>	<b>Total</b>	<b>19,298.14</b>

## 7. SPONSORS AND ACKNOWLEDGMENTS

The organizing committee would like to acknowledge the following sponsorships.



The Association of European  
Operational Research Societies



[di.unito.it](http://di.unito.it)



**CREATE**  
HEALTHCARE OPERATIONS & INFORMATION MANAGEMENT

UNIVERSITY OF  
**Southampton**



The organizing committee would like to thank all the reviewers involved during the selection phase.

Finally, the organizing committee would like to acknowledge the support of:

- **Sara Scalco**, for preparing the conference material graphics and the handmade agendas;
- **Paola Finetto** and **Carmela Langellotti**, for their kind support during the organization;
- the **administration staff** of the Computer Science Department of the University of Turin, for their endless patience.

**Torino, Cardiff, Southampton, Thursday, July 8, 2014**

*Roberto Aringhieri,  
Università degli Studi di  
Torino, Italy*

*Vincent Knight,  
Cardiff University, UK*

*Honora Smith,  
University of Southampton,  
UK*



GIUGNO 2014

MAR.	MER.	GIO.	VEN.	SAB.		
3	EXPO VERRE Spa.	4	EXPO VERRES Spa.	5	EXPO VERRES Spa.	6
10	CONF. STAMPA PICASSO / LARRAIN EURO SUMMER INSTIT.	11	EURO SUMMER INSTIT.	12	EURO SUMMER INSTIT.	13
	EURO SUMMER INSTIT.	18	EURO SUM. INSTIT. INAUGURAZIONE PICASSO	19	EURO SUMMER INSTIT.	20
	25		26	WORKSHOP		

