



Contents lists available at ScienceDirect

## European Journal of Operational Research

journal homepage: [www.elsevier.com/locate/ejor](http://www.elsevier.com/locate/ejor)

## Scheduling EURO-k conferences

Thomas Stidsen<sup>a,\*</sup>, David Pisinger<sup>a</sup>, Daniele Vigo<sup>b</sup><sup>a</sup> Technical University of Denmark, Building 426, Produktionstorvet 2800, Kgs. Lyngby, Denmark<sup>b</sup> DEI "Guglielmo Marconi" - University of Bologna, Italy

## ARTICLE INFO

## Article history:

Received 7 November 2016

Accepted 10 October 2017

Available online xxx

## Keywords:

Project scheduling

Conference scheduling

Mixed integer programming

## ABSTRACT

EURO-k conferences are among the largest Operations Research conferences in the world, typically including more than 2000 presentations. As opposed to many other conferences, EURO-k conferences are hierarchically organized, and the conference schedule should reflect this structure to make navigation easier and more logical. In this article we present a scheduling tool that has been developed during the EURO2015 and EURO2016 conferences to schedule the streams, sessions and talks. A schedule is obtained by solving a number of optimization models, each addressing a specific objective. First, areas are assigned to buildings, making sure that related research areas are located close to each other. Next, the goal is to allocate each stream to only one room, and to ensure that the stream consists of a sequence of consecutive time slots. Finally, we optimize the assignment of room sizes. We illustrate the process by showing results from the scheduling of the EURO2016 conference, which took place in Poznan (Poland), July 3–6, 2016.

© 2017 Elsevier B.V. All rights reserved.

## 1. Introduction

The EURO-k conferences are the largest Operations Research (OR) conferences in Europe, and among the largest worldwide. Each conference is hosted by one of the member societies of EURO, the Association of European Operational Research Societies, and typically attracts over 2000 participants from all over the world. The EURO-k conferences are held annually, except when the conference of the International Federation of Operational Research Societies (IFORS) conference is held in the same year.

A significant amount of scheduling activities is necessary behind such a large conference and a number of people in the program and organizing committees work for months ahead of the conference. Luckily, Operations Research offers advanced scheduling tools for some of these tasks. In this article we describe how the use of Mixed Integer Programming (MIP) models supports the scheduling of the time-slots and rooms allocated to the different sessions.

Due to the large number of presentations and diversity of subjects, EURO-k conferences are organized hierarchically. Each EURO-k conference consists of a number of *areas* (i.e., themes) that are defined by the program committee in order to group presentations that are homogeneous with respect to either the methodological

content or the application area. The program committee assigns the overall organization and monitoring of each area to one or more of its members. The area responsible in turn invite a number of key researchers or EURO working group managers to organize *streams* (i.e., groups of sessions) within the area topic. Finally, the stream organizers invite other researchers to organize one or more *sessions*, each consisting of four talks. The session organizers are frequently asked to chair the session they have organized in order to acknowledge their efforts. The abstracts of invited papers are reviewed by stream and area responsible, and those of acceptable standard are included in the conference program. Because of the hierarchical organization, the scheduling process in this paper is about assigning day, timeslot and room to the sessions. The actual ordering of sessions within a stream and of talks within the sessions is left to the stream and session organizers to ensure that they can adjust the stream schedule to the specific need of the stream and the speakers, leaving them some control on the lower level of the program.

In parallel to the hierarchy of invited talks, participants are also allowed to submit a contributed talk to the conference within one of the conference areas. The contributed talks constitute around one third of the submissions, and they go through the same review process as the invited talks. Contributed talks are frequently used to fill holes in invited sessions or they are grouped into new sessions according to a common topic and associated with existing streams. As such, there is no real difference between invited talks and contributed talks and sessions in the final program.

\* Corresponding author.

E-mail addresses: [thst@dtu.dk](mailto:thst@dtu.dk) (T. Stidsen), [dapi@dtu.dk](mailto:dapi@dtu.dk) (D. Pisinger), [daniele.vigo@unibo.it](mailto:daniele.vigo@unibo.it) (D. Vigo).

**Table 1**

Research areas at EURO2016. Each area can be regarded as a mini-conference in the EURO conference, hence its sessions should be located close to each other.

Area name	Number of streams	Number of sessions
Analytics, Data Science and Data Mining	4	21
Artificial Intelligence, Fuzzy Systems and Computing	3	7
Continuous Optimization	7	28
Control Theory and System Dynamics	6	17
Decision Analysis, Decision Support Systems, DEA and Performance Measurement	4	12
Discrete Optimization, Mixed Integer Linear and Nonlinear Programming	5	30
Emerging Applications of OR	10	18
Energy, Environment, Natural Resources and Climate	6	18
Financial Modeling, Risk Management and Managerial Accounting	9	24
Game Theory and Mathematical Economics	5	11
Graphs and Networks	4	17
Metaheuristics	1	6
Multiple Criteria Decision Making and Optimization	8	47
OR Education	2	5
OR for Developing Countries and Humanitarian Applications	4	10
OR History and OR Ethics	3	7
OR in Health, Life Sciences and Sports	8	31
OR in Industry and Software for OR	6	13
Practice of OR (Making an Impact)	3	8
Production Management and Supply Chain Management	6	26
Revenue Management	1	2
Routing, Location, Logistics and Transportation	9	53
Scheduling, Timetabling and Project Management	6	29
Simulation, Stochastic and Robust Optimization	2	10
Soft OR, Problem Structuring Methods and Behavioural OR	2	13
Total	124	463

A typical EURO-k conference with 1800–2000 talks includes about 5–600 sessions: due to last-minute cancellations and other program requirements, not all sessions have the standard number of four talks. The sessions are arranged in 100–150 streams belonging to about 25 areas. In the conference program, the sessions are scheduled in *time slots* of 90 minutes that allow about 20 minutes for each presentation and some minutes devoted to questions and discussion. Depending on the specific conference calendar there are 10 or 11 time slots available across three days. As a consequence, between 40 and 60 sessions should be assigned to each time slot in parallel.

In order to enable a clear and easy to understand conference program, it is generally desirable that the program of a EURO-k conference follows the hierarchical structure of the invited talks. This means that main areas which are related to each other (such as, “Routing, Location, Logistics and Transportation” and “Production Management and Supply Chain Management”) should be scheduled in the same building (or in nearby ones) such that participants interested in the research field easily can move quickly between the talks. Also, each stream should ideally consist of a sequence of consecutive sessions in the conference time slots, all assigned to the same room throughout the conference. However, if a stream consists of more sessions than the available number of time slots, then it may be necessary to split the stream into two or more parts.

As a rule of thumb, a speaker is only allowed to give one presentation during a EURO-k conference. A few exceptions exist to this rule. This may include talks in “OR and teaching”, workshops or other similar activities. The main speaker of each talk needs to register to the conference, otherwise the talk is cancelled and deleted. A delegate can be co-author of as many talks as needed, but due to the imposed complexity it cannot be guaranteed that there will be no overlap in the schedule between the co-authored talks.

Table 1 shows a list of the 25 different areas for EURO2016. Each area consists of a number of different streams, resulting in a total of 124 streams in 2016. For the sake of brevity we refrain

from listing all the streams. Each stream consists of a number of sessions, in each of which up to four presentations are given. Each stream has a designated organizer who is in charge of the detailed scheduling of which talk is given in which session. The stream organizers are responsible for defining a proper ordering of the sessions, and session organizers should order the talks in their sessions.

### 1.1. Previous work

Conference scheduling has been quite well studied as an optimization problem and in Vangerven et al. (2016) we find a detailed survey of the problem. The survey distinguishes between a presenter-based perspective, which strives to avoid clashes between presenter duties, and a attendee-based perspective, which strives to make the conference easily accessible for the attendees. Besides the articles surveyed in Vangerven et al. (2016), we would like to also mention the following results on conference scheduling (Bhardwaj et al., 2014; Kim et al., 2013; Sampson, 2004; Zhang, Bhardwaj, & Karger, 2016).

In Sampson (2004) a MIP model is presented for preference-based conference scheduling. The model maximizes a general participant utility function while ensuring solution feasibility. The model is solved using a simulated annealing algorithm. The scheduling tool has been applied to a conference with 213 sessions over 10 time-blocks involving 1086 attendees.

The papers (Bhardwaj et al., 2014; Kim et al., 2013) present a community-informed conference scheduling tool called *Cobi*. *Cobi* comprises community sourcing applications for collecting preferences and constraints from community members, and a visual scheduling interface that enables the organizers to make informed improvements to the schedule. The scheduling is done in two steps: First, committee members are invited to group papers in their areas of expertise, and next authors of the accepted papers are invited to identify papers that would complement their own within the same session. The tool has been used for a number of

Download English Version:

<https://daneshyari.com/en/article/6894560>

Download Persian Version:

<https://daneshyari.com/article/6894560>

[Daneshyari.com](https://daneshyari.com)