WINTER INSTITUTE
ON
STOCHASTIC OPTIMIZATION

January 7 - 18, 1996, Semmering, Austria

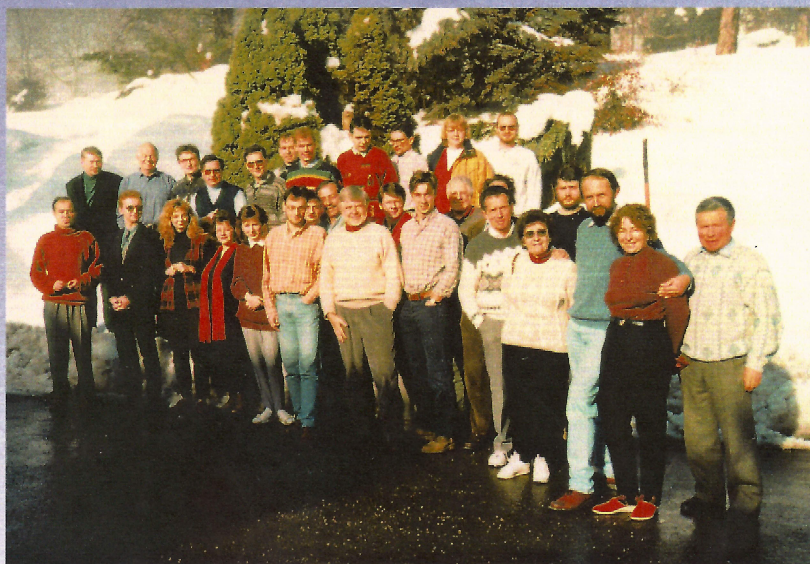## FINAL REPORT

*T*able of contents:

1

Editorial

The idea of European Summer Institutes (ESI) was to create in a relaxed and friendly atmosphere an event for the promotion of an actual area of Operations Research to young European scientists and has been prooved to be very sucessful.

As Austria is famous for all kinds of winter time activities, it was natural to propose a "Summer Institute" in winter time in the Austrian Alps to the EURO council. The topic was chosen as Stochastic Optimization, since this area is very well represented in Austria (at the Universities of Vienna and Graz and at IIASA) and its close neighbours and historical friends Hungary and Czechia.
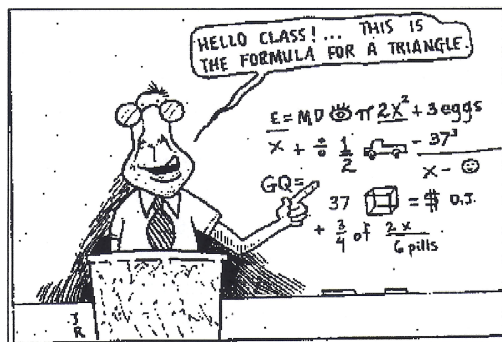
I am indebted to the EURO council and in particular to Costas Pappis for the considerable support. My thanks go also to the International Institute of Applied Systems Analysis (IIASA) in Laxenburg and Vienna and the project leader A. Ruszczynski for co-organisation.

Vienna, April 1996
Georg Pflug

EURO WINTER SCHOOL ON STOCHASTIC OPTIMIZATION

January, 7th - 18th, 1996, Semmering, Austria

Organizer:
G. Ch. Pflug, University of Vienna,
Austria

IIASA-Coorganizer:
A. Ruszczynski,
IIASA Laxenburg, Austria

EURO-Coorganizer:
C. Pappis, University of Piraeus,
Greece

Invited speakers:
M. Dempster (UK),
R. T. Rockafellar (USA)
A. Gaivoronski (Italy)
R. Rubinstein (Israel),
P. Kall (Switzerland),
R. Wets (USA),
W. Römisch (Germany)

SCIENTIFIC SCOPE:

The purpose of this winter school ist to discuss new results on stochastic optimization, like optimality conditions, approximation techniques, statistical properties, algorithmic methods etc. The Winter School will not only treat stochastic decision models, their properties and solution algorithms, but also put some emphasis on software and in particular on integrating simulation and optimization procedures.

THE PROGRAM:

The invited speakers will give expository lectures. Each of the participants is invited to give a shorter presentation. Sufficient time will be provided for informal discussions.

LOCATION AND ACCOMODATION:

The venue ("Haus Semmering" der GPA, A-8685 Steinhaus am Semmering Tel: (+43) 3853-8104) is a recreation center of the Austrian trade unions. It contains an indoor swimming pool, finnish bath, TV-rooms, table tennis rooms and a cafeteria. The small skiing area of Steinhaus (3 lifts) is in walking distance. The larger ski areas of Semmering/Hirschenkogel and Spittal/Stuhleck are at a distance of not more than 3 km. Sport equipment can be rented.

PUBLICATION:

It is planned to prepare a special issue of the European Journal of Operations Research from the contributions of the participants.

PARTICIPATION:

Participation including accomodation is free. There is an age limit of 35 years. Applicants should submit their CV, a list of publications and an unpublished paper which is

related to the topic of the Winter School to their national OR society by November 1, 1995.

The societies will select and rank the candidates and submit their applications to the organizers not later than December 1, 1995.
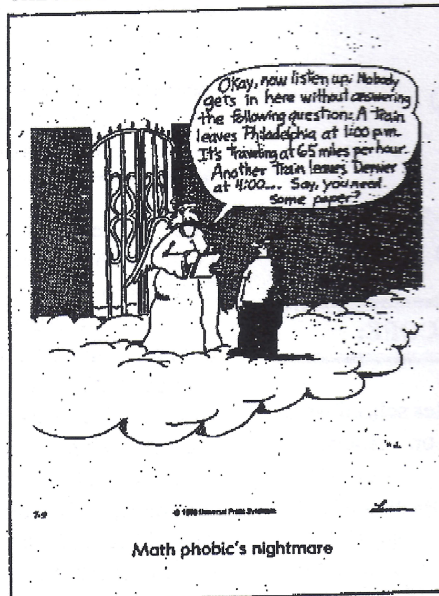
INFORMATION:

e-mail:euro@smc.univie.ac.at
www:
http://www.smc.univie.ac.at/~euro

THE FAR SIDE By Gary Larson

Math phobic's nightmare

The Program

The Winter School was organized in the following way: each morning was devoted to a two hour invited lecture according to the following schedule:

Monday, 8 th:	**Wets**
Tuesday, 9th:	**Rockafellar**
Wednesday, 10 th:	**Rusczcynski**
Thursday, 11 th:	**Kall**
Friday, 12 th:	**Römisch**
Saturday, 13 th:	
Morning :	**Gaivoronskii**
Afternoon:	**Dempster**
Monday, 15 th:	**Rubinstein**
Tuesday, 16 th:	**Pflug**
Wednesday, 17 th:	**Ermoliev**

The afternoon session was devoted to the presentations of the young participants. Each participant gave a 30 minutes lecture. Generally, the presentations were of excellent quality. The covered spectrum was very wide-ranging from algorithms implementation aspects, scenario generation and simulation methods to various fields of applications (Finance, energy systems, manufacturing). No time pressure was put onto the presentations. In case, the program could not be finished before dinner, we continued after. This not time constraining atmosphere allowed everybody to pose questions and to interrupt. There was always enough time for discussion.
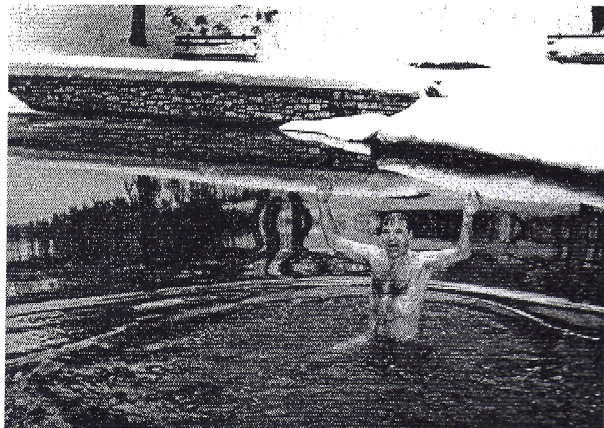
The Social program

The main social program was of course all kinds of winter sports including down hill skiing, cross country skiing, snowboarding, sledging and hiking. Every day in the long lunch break mini-vans took the group to the nearby skiing areas. Many participants stood for the first time on skis and managed at

the end of the Winter Institute to ski down from the topmost points of the mountain. Besides that, the indoor swimming pool was the major attraction in the evenings. One participant from

Lithuania did not even need this: he jumped every day into an outside pont with a water temperature of 4° C (!).

On Sunday, a group visit to Graz was organized.

A nice banquet was organized on the third evening. The participants themselves took responsibility for organizing a table tennis competition, where Römisch was the unbeatable overall winner, and a dancing party.

List of talks

Invited speakers:

A. Gaivoronski (*Italy*)   Stochastic programming on network structure

Y. Ermoliev (*Ukraine*),   On nonsmooth problems of
                                 stochastic systems optimization

P. Kall (*Switzerland*):   Stochastic Programming: Models,
                                Properties and Computational Methods

T. Rockafellar (*USA*):   Optimality Conditions
                               in Multistage Stochastic Programming

W. Römisch (*Germany*):   Stability Analysis of Stochastic Programs

R. Rubinstein (*Israel*):   Optimization of Computer
                                 Simulation Models with Rare Events

A. Ruszczynski (*Poland*):   Decomposition Methods in Stochastic Programming

Georg Pflug (*Austria*):   Approximation of
                                Stochastic Programs by Empirical Programs

Roger Wets (*USA*):   Approximation schemes for stochastic optimization
                           problems based on sampling the random elements

Participants:

J. Bogensperger (*Austria*):   Stochastic power system optimization
Claus Caroe (*Denmark*):   Cutting plane algorithms for
                                mixed 0 -1 stochastic integer programs
N. Detlefsen (*Norway*):   Preprocessing in stochastic programming
D. Frysova (*Czechia*):   Bank assets and liability management
A. Futschik (*Austria*):   Discrete stochastic optimization

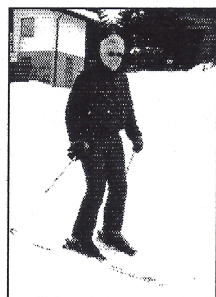|	
A. Goldenshluger (*Israel*)	Spatial adaptive nonparametric estimation
N. Gröwe (*Germany*):	Estimated Stochastic Programs with Probability Constraints
W. Gutjahr (*Austria*):	Reliability models
P. Klaasen (*Netherlands*):	Financial Asset Pricing Theory and Stochastic Programming
V. Lauer (*Czechia*):	Optimization models for bond portfolio management
M. Mandjes (*Netherlands*):	Simulation of blocking probabilities in loss networks
E. Messina (*Italy*):	Modelling and Analysis of Multistage Stochastic Programming Problems
C. Meszaros (*Hungary*):	Interior point methods for 2-stage stochastic linear programming
M. Nowak (*Germany*):	Multistage stochastic linear transportation problems
A. Orman (*Great Britain*):	*Combined models for manufacturing systems*
L. Sakalauskas (*Lithuania*):	Practical stochastic optimization
F. Stella (Italy):	Bayesian nets for reliability optimization
M. Strapec (Czechia):	Alternative methods of scenario generation
A. Swietanowski (Poland):	On the regularized decomposition method for 2 stage stoch. programming
V. Tadic (Serbia):	Stochastic Approximation with random truncations
J. Teixera (Portugal):	Recursive estimation and neural networks

List of participants

Name: Josef Bogensperger
Institute: Institut f. Elektrische Anlagen TU Graz
Adress: Inffeldgasse 18 8010Graz, Austria
e-mail: Bogensperger@ifea.tu-graz.ac.at
fax: (+43) 316 873 7553 **tel:** (+43) 316 873 7559
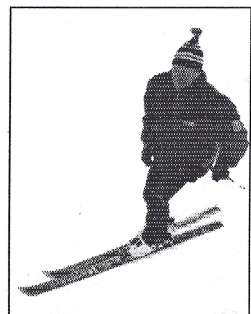
Name: Claus Caroe
Institute: Matematisk Institute,University of Copenhagen
Adress: Universitaetsparken 5 2100 Copenhagen, Danmark
e-mail: caroe@math.ku.dk
fax: (+45) 35 32 07 54 **tel:** (+45) 35 32 07 04

Name: Prof. Michael Dempster
Institute: Dept. of Mathematics, University. of Essex
Adress: Wivenhoe Park C04 3SQ Colchester, England
e-mail: mahd@mathibm1.essex.ac.uk
fax: (+44) 206 873598 **tel:** (+44) 206 873032

Name: Nina Detlefsen
Institute: University of Trondheim
Adress: Dept of OR N-7034 Trondheim, Norway
e-mail: nd@iok.unit.no
fax: (+47) 73 59 36 03 tel: (+47) 73 59 36 00

Name: Prof. Yuri Ermoliev
Institute: IIASA
Adress: Schloßplatz 1 2361 Laxenburg, Austria
fax: (+43) 2236 71313 **tel:** (+43) 2236 807

Name: **Darina Frysova**
Adress: Bezrucova 392, Frydek-Mistek, Czech Republic

Name: **Andreas Futschik**
Institute: Inst. f. Statistik u. OR, University Vienna
Adress: Universitätsstraße 5, 1010 Wien, Austria
e-mail: futschik@smc.univie.ac.at
fax: (+43) 1 407 63 55 88   tel: (+43) 1 407 63 55 221

Name: **Alexej Gaivoronski**
Institute: ITALTEL
Adress: Castelletto di Settimo Milanese (MI) 20019 Milano, Italy
e-mail: gaivoron@settimo.italtel.it
fax: (+39) 2 43 88 79 89   tel: (+39) 2 43 88 87 54

Name: **Alex Goldenshluger**
Adress: Gilboa str. 102 32716 Haifa, Israel
e-mail: goldensh@ie.technion.ac.il
fax: (+972) 4 29 29 23   tel: (+972) 4 29 29 23

ame   **Nicole Gröwe**
Institute: Inst. f. Ang. Math. HU-Berlin
Adress: Unter den Linden 6 10099 Berlin, Germany
e-mail: groewe@zib-berlin.de
fax: (+49) 30 89 60 41 25   tel: (+49) 30 89 60 42 47

Name: **Walter Gutjahr**
Institute: Institut für Statistik u. Operations Research,University of Vienna
Adress: Universitätsstraße 5, 1010 Wien, Austria
e-mail: gutjahr@smc.univie.ac.at
fax: (+43) 1 407 63 55 88   tel: (+43) 1 407 63 55 190

Name: **Prof. Peter Kall**
Institute: Inst. f. OR University Zürich
Adress: Moussonstr.15, 8044 Zürich, Switzerland
e-mail: kall@ior.unizh.ch
 tel: (+41) 1 2573770

Name: **Pieter Klaassen**
Institute: Rabobank Nederland
Adress: Postbus 17100 3500 Utrecht, Netherlands
e-mail: P. Klaassen@rn.rabobank.nl
fax: (+31) 30216 1863 tel: (+31) 30216 3315

Name: **Vit Lauer**
Adress: Raisova 1775 397 01 Pisek, Czech Republic
tel: (+42 2) 855 61 52

Name: **Michel R. H. Mandjes**
Institute: Department of Econometrics, Vrije Universiteit Amsterdam
Adress: De Boelelaan 1105, 1081 HV Amsterdam
e-mail: mmandjes@econ.vu.nl

Name: **Enza Messina**
Institute: Dip.di Mathematica University di Milano
Adress: Via L. Cicognara 7 20129 Milano, Italy
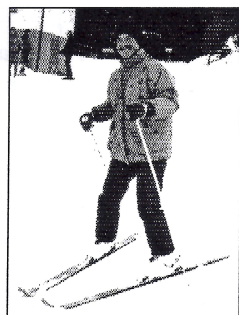**e-mail:** Vincenzina.Messina@brunel.ac.uk
fax: (+39) 2 73 73 85 567

Name: **Csaba Meszaros**
Adress: Lagymanyosi u. 11 H-1518 Budapest, Hungary
e-mail: meszaros@lutra.sztaki.hu
fax: (+36) 1 269-8268 tel: (+36) 1 269-8267

Name: **Matthias Nowak**
Institute: Inst. f. Angew. Math. HU- Berlin
Adress: Unter den Linden 6 10099 Berlin, Germany
e-mail: nowak@mathematik.hu-berlin
fax: (+49) 30 209 32 232 tel: (+49) 30 209 321 73

Name: Alexander Jason Orman
Institute: Fac.of Math. Studies University Southampton
Adress: Highfield SO17 1BJ Southhampton, United Kingdom
e-mail: ajo@maths.soton.ac.uk
fax: (+44) 1703 595147 ,tel: (+44) 1703 593644

Name: Prof. Georg Pflug
Institute: Inst. f. Statistik u. OR, University of Vienna
Adress: Universitätsstr. 5 1010 Wien, Austria
e-mail: pflug@smc.univie.ac.at
fax: (+43) 1 407 55 63 88 ,tel: (+43) 1 407 63 55 210
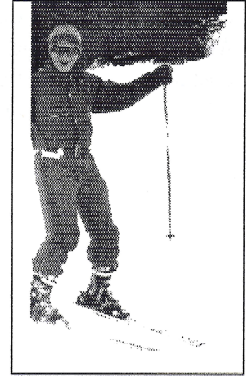
Name: Prof. Costas Pappis
Institute: Dept. of Ind. Manag. University Piraeus
Adress: 80 Karaoli & Dimitriou str.
GR-18534 Piraeus, Greece
e-mail: pappis@unipi.gr

Name: Prof. Terry Rockafellar
Institute: Dept of Mathematics
Adress: University of Washington GN 50 WA 98195 Seattle, USA
e-mail: rtr@math.washington.edu
Tel: (+1 206) 543 1150

Name: Prof. Werner Römisch
Institute: FB Mathematik HU Berlin
Adress: Unter den Linden 6 10099 Berlin, Germany
e-mail: romisch@mathematik.hu-berlin.de
fax: (+49) 30 209 32 232 ,tel: (+49) 30 209 32 561

Name: Prof. Reuven Rubinstein
Institute: Dept. of Ind. Eng. Technion
Adress: Technion City 32000 Haifa, Israel
e-mail: ierrr01@ie.technion.ac.il
fax: (+972) 4 235194 tel: (+972) 4 29 44 58

14

Name: **Prof. Andrzej Ruszczynski**
Institute: ΠASA
Adress: Schloßplatz 1 2361 Laxenburg, Austria
e-mail: usz@iiasa.ac.at
fax: (+43) 2236 71313 tel: (+43) 2236 807

Name: **Leonidas L. Sakalauskas**
Institute: Inst. of Mathematics and Informatics
Adress: Akademios st 4 ,Vilnius, Lithuania
e-mail: mathematica@mii.lt
tel: (+370) 2 729 209

Name: **Fabio Stella**
Institute: Dipartimento Scienze dell'Informazione
Adress: Via Comelico, 39 20135 Milano, Italy
e-mail: stella@hermes.mc.dsi.unimi.it
tel: (+39) 2 55 006 275

Name: **Mario Strapec**
Adress: Patkova 3, B-1818 182 00 Praha 8, Czech Republic
e-mail: mario.strapec@cerge.cuni.cz
fax: (+42 2) 242 27 143 tel: (+42 2)240 05 185

Name: **Artur Swietanowski**
Institute: Inst. of Contr.and Comp. Engineering ,
University of Technology,Warsaw
Adress: Nowowiejska 15/19, 00665 Warsaw
e-mail: swietanowski@ia.pw.edu.pl
fax: (+48) 22 253 719 tel: (+48) 266 071 22

Name: **Vladislav Tadic**
Institute: Automatic Control Laboratory Mihailo Pupin Institute
Adress: Volgina 15 11000 Beograd, Serbia
e-mail: etadicv@ubbg.etf.bg.ac.yu
fax: (+381) 11 638 215

Name: **Joao Claudio Teixeira**
Adress: R. Cidada da Beira 48 5 A, 1800 Lisboa, Portugal
e-mail: sjcpat@skull.cc.fc.ul.pt
tel: (+351) 1 8515667

Name: **Prof. Roger Wets**
Adress: 2121 Pinehurst Ct CA 94530 El Ceritto, USA
e-mail: rjbwets@ucdavis.edu
fax: (+1 916) 752 6635 tel: (+1 916) 752 3629