

**Ivana  
Ljubic**

**Professor,  
Department  
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## **Education**

Habilitation in Operations Research, University of Vienna  
PhD in Computer Science, Vienna University of Technology

## **Biography**

Ivana Ljubic is Academic Director of [ESSEC EMBA](#) and [ESSEC & Mannheim EMBA](#) programs. She teaches Decision Analysis, Optimal Decision Making, Operations Research (OR) and Business Mathematics in ESSEC MSc, PhD and Advanced Master programs. Prior to joining ESSEC in 2015, she was appointed at the University of Vienna. She also worked as Visiting Scholar/Professor at the Robert H. Smith School of Business at the University of Maryland, TU Dortmund, TU Berlin, Dauphine University.

She has carried out consulting studies and industrial contracts for leading telecommunication providers in France and Austria. After completing her PhD in computer science, she also worked for 2 years as Financial Analyst for a Siemens spin-off (fin4cast), focusing on portfolio optimization.

Research interests of Ivana Ljubic include combinatorial optimization, optimization under uncertainty, bilevel optimization. She uses tools and methods of mixed integer (non-) linear programming, meta-heuristics and their successful combinations for solving optimization problems with applications in network design, telecommunications, transportation, logistics, routing and bioinformatics. She has published more than 40 articles in leading OR journals, including *Operations Research*, *Management Science*, *Mathematical Programming*, *INFORMS JOC*, *European Journal of Operational Research*.

She is member of the Editorial Advisory Board for the journals *European Journal of Operational Research*, *Computers & Operations Research*, *Journal of Global Optimization*, and she is Associate Editor for the journal *Omega*. She also served as guest-editor of journals: *European Journal of Operational Research* and *Annals of Operations Research*.

She currently serves as vice-chair of the *INFORMS Telecommunication and Network Analytics Section*. From 2010-2016 she was member of council of the INFORMS Telecommunication Section and from 2006 to 2008 she was member of the executive board of the Austrian OR Society (OEGOR).

She has received numerous research grants, including those from the French Ministry of Foreign Affairs (PHC program), Austrian Academy of Sciences (OEAW), Austrian Research Fund (FWF) and European Commission (ERA-NET).

See the [full publication list](#) including preprints.

See the [Google Scholar Profile](#).

Complete list of [scientific activities](#).

## **Research Areas**

### **Areas**

Bilevel Optimization  
Biobjective Optimization  
Mixed Integer (Non-linear) Programming  
(Meta-)heuristics

## Sectors

Design of Telecommunication Networks  
Smart Cities  
Facility Location  
Design of Data and Distribution Networks  
Bioinformatics  
Social Networks

## On-going Projects

e4-share (Models for Ecological, Economical, Efficient, Electric Car-Sharing), with Uni Wien, ULB and Uni Bolog. <http://www.univie.ac.at/e4-share>

Network Optimization in Bioinformatics and Systems Biology, with Uni Wien (funded by FWF)

Multi-Criteria Optimization of FTTx Network, with Uni Wien, ZIB Berlin (funded by FWF, DFG)

## Publications

### Academic Publications

#### Articles

"Exact approaches for the directed network design problem with relays" (I. Ljubic, M. Leitner, M. Riedler, M. Ruthmair), *Omega*

"Benders Decomposition for Very Large Scale Partial Set Covering and Maximal Covering Problems" (I. Ljubic, JF. Cordeau, F. Furini), *European Journal of Operational Research*, Dec 2018

"On the use of intersection cuts for bilevel optimization" (I. Ljubic, M. Fischetti, M. Monaci, M. Sinnl), *Mathematical Programming Series A & B*, Nov 2018, Vol. 172, Issue 1-2, p. 77-103

"A Dual Ascent-Based Branch-and-Bound Framework for the Prize-Collecting Steiner Tree and Related Problems" (I. Ljubic, M. Leitner, M. Luipersbeck, M. Sinnl), *Information Systems Research (INFORMS)*, Oct 2018, Vol. 30, Issue 2, p. 402-420

"Tighter MIP models for Barge Container Ship Routing" (I. Ljubic, L. Alfandari, T. Davidovic, F. Furini, V. Maras, S. Martin), *Omega*, May 2018, Vol. 82, p. 38-54

"Outer approximation and submodular cuts for maximum capture facility location problems with random utilities" (I. Ljubic, E. Moreno), *European*

*Journal of Operational Research*, Apr 2018, Vol. 266, Issue 1, p. 46-56

"Decomposition methods for the two-stage stochastic Steiner tree problem" (I. Ljubic, M. Leitner, M. Luipersbeck, M. Sinnl), *Computational Optimization and Applications*, Apr 2018, Vol. 69, Issue 3, p. 713-752

"The connected facility location polytope" (M. Leitner, I. Ljubic, J.J. Salazar-Gonzales, M. Sinnl), *Discrete Applied Mathematics*, Feb 2018, Vol. 234, Issue , p. 151-167

"A new general-purpose algorithm for mixed-integer bilevel linear programs" (I. Ljubic, M. Fischetti, M. Monaci, M. Sinnl), *Operations Research*, Dec 2017, Vol. 65, Issue 6, p. 1615-1637

"An Effective Dynamic Programming Algorithm for the Minimum-Cost Maximal Knapsack Packing Problem" (I. Ljubic, F. Furini, M. Sinnl), *European Journal of Operational Research*, Oct 2017, Vol. 262, Issue 2, p. 438-448

"An Algorithmic Framework for the Exact Solution of Tree-Star Problems" (I. Ljubic, M. Leitner, J. Gonzales, M. Sinnl), *European Journal of Operational Research*, Jun 2017, Vol. 261, Issue 1, p. 54-66

"Feature Cluster: Recent Advances in Exact Methods for Multi-Objective Optimisation" (I. Ljubic, M. Ehrgott, S. Parragh), *European Journal of Operational Research*, Jun 2017, Vol. 260, Issue 3, p. 805-806

"Solving Minimum-Cost Shared Arborescence Problems" (I. Ljubic, E. Alvarez-Miranda, M. Luipersbeck, M. Sinnl), *European Journal of Operational Research*, Jun 2017, Vol. 258, Issue 3, p. 887-901

"Stochastic Survivable Network Design Problems: Theory and Practice" (I. Ljubic, P. Mutzel, B. Zey), *European Journal of Operational Research*, Jun 2017, Vol. 256, Issue 2, p. 333-348 ( )

"Redesigning Benders Decomposition for Large Scale Facility Location" (I. Ljubic, M. Fischetti, M. Sinnl), *Management Science*, Issue 7

"A Node-Based ILP Formulation for the Node-Weighted Dominating Steiner Problem" (I. Ljubic, A. Bley, O. Maurer), *Networks*, Jan 2017, Vol. 69, Issue 1, p. 33-51

"Thinning out Steiner trees: a node-based model for uniform edge costs" (M. Fischetti, M. Leitner, I. Ljubic, M. Luipersbeck, M. Monaci, M. Resch, D. Salvagnin, M. Sinnl), *Mathematical Programming Computation*

"Benders decomposition without separability: a computational study for capacitated facility location problems" (I. Ljubic, M. Fischetti, M. Sinnl), *European Journal of Operational Research*, Issue 3

"ILP heuristics and a new exact method for bi-objective 0/1 ILPs: Application to FTTx-network design" (M. Leitner, I. Ljubic, M. Sinnl, A. Werner), *Computers and OR*

"A Node-Based Layered Graph Approach for the Steiner Tree Problem with Revenues, Budget and Hop-Constraints" (I. Ljubic, M. Sinnl), *Mathematical Programming Computation*, Issue -

"The recoverable robust facility location problem" (E. Álvarez-Miranda, E. Fernández, I. Ljubic, ), *Transportation Research*, Sep 2015, Vol. 79, Issue 1, p. 93-120

"The Two-Level Diameter Constrained Spanning Tree Problem" (L. Gouveia,

M. Leitner, I. Ljubic), *Mathematical Programming*, Apr 2015, Vol. 150, Issue 1, p. 49-78

"The Generalized Regenerator Location Problem" (S. Chen, I. Ljubic, S. Raghavan), *INFORMS Journal of Computing*, Mar 2015, Vol. 27, Issue 2, p. 204-220

"The bi-objective prize-collecting Steiner tree problem" (M. Leitner, I. Ljubic, M. Sinnl), *INFORMS Journal on Computing*, Dec 2014, Vol. 27, Issue 1, p. 118-134

"The Recoverable Robust Two-Level Network Design Problem" (E. Alvarez-Miranda, I. Ljubic, S. Raghavan), *INFORMS Journal on Computing*, Sep 2014, Vol. 27, Issue 1, p. 1-19

"A MIP-based Heuristic Approach to solve a Prize-Collecting Local Access Network Design Problem" (I. Ljubic, P. Putz, JJ. Salazar6gonzalez), *European Journal of Operational Research*, Jun 2014, Vol. 235, Issue 3, p. 727-739

"Hop constrained Steiner trees with multiple root nodes" (L. Gouveia, M. Leitner, I. Ljubic), *European Journal of Operational Research*, Jun 2014, Vol. 236, Issue 1

"A note on the Bertsimas & Sim algorithm for robust combinatorial optimization problems" (E. Alvarez-Miranda, I. Ljubic, P. Toth), *4OR*, Dec 2013, Vol. 11, Issue 4, p. 349-360

"Lagrangian decompositions for the two-level FTTx network design problem" (A. Bley, I. Ljubic, O. Maurer), *EURO Journal on Computational Optimization*, Nov 2013, Vol. 1, Issue 3, p. 221-252

"Exact Approaches for Solving Robust Prize-Collecting Steiner Tree Problems, *European Journal of Operational Research*" (E. Alvarez-Miranda, I. Ljubic, P. Toth), *European Journal of Operational Research*, Sep 2013, Vol. 229, Issue 3, p. 599-612

"A cutting plane algorithm for the Capacitated Connected Facility Location Problem" (S. Gollowitzer, B. Gendron, I. Ljubic), *Computational Optimization and Applications*, Jul 2013, Vol. 55, Issue 3, p. 647-674

"Enhanced Formulations and Branch-and-Cut for the Two Level Network Design Problem with Transition Facilities" (S. Gollowitzer, L. Gouveia, I. Ljubic), *European Journal of Operational Research*, Mar 2013, Vol. 225, Issue 2, p. 211-222

"QTL Mapping Using a Memetic Algorithm with Modifications of BIC as Fitness Function" (F. Frommlet, I. Ljubic, H. Björk Arnardóttir, M. Bogdan), *Statistical applications in Genetics and Molecular Biology*, May 2012, Vol. 11, Issue 4, p. Art. 2

"Layered Graph Approaches to the Hop Constrained Connected Facility Location Problem, 25(2): 256-270, 2013 Technical Report Nr. [2010-08]," (I. Ljubic, S. Gollowitzer), *INFORMS Journal on Computing*, Apr 2012, Vol. 25, Issue 2, p. 256-270

"Exact approaches to the single-source network loading problem" (I. Ljubic, P. Putz, JJ. Salazar-Gonzalez), *Networks*, Jan 2012, Vol. 59, Issue 1, p. 89-106

"MIP models for connected facility location: A theoretical and computational study" (S. Gollowitzer, I. Ljubic), *Computers and OR*, Feb 2011, Vol. 38, Issue 2, p. 435-449

"A branch-and-cut-and-price algorithm for vertex-biconnectivity augmentation" (I. Ljubic), *Networks*, Oct 2010, Vol. 56, Issue 3, p. 169-182

"Orientation-based models for {0,1,2}-survivable network design: theory and practice" (M. Chimani, M. Kandyba, I. Ljubic, P. Mutzel), *Mathematical Programming Series A & B*, Jul 2010, Vol. 124, Issue 1, p. 413-440

"The regenerator location problem" (I. Ljubic, S. Chen), *Networks*, May 2010, Vol. 55, Issue 3, p. 205-220

"Obtaining optimal k-cardinality trees fast" (I. Ljubic, M. Chimani, M. Kandyba, P. Mutzel), *ACM Journal of Experimental Algorithmics*, Jan 2009, Vol. 14, Issue 5, p. 5.1-5.23

"An Algorithmic Framework for the Exact Solution of the Prize-Collecting Steiner Tree Problem" (I. Ljubic, R. Weiskircher, U. Pferschy, G. Klau, P. Mutzel, M. Fischetti), *Mathematical Programming*, Feb 2006, Vol. 105, Issue 2, p. 427-449

"A Memetic Algorithm for Minimum-Cost Vertex-Biconnectivity Augmentation of Graphs" (I. Ljubic, G. Raidl), *Journal of Heuristics*, Jan 2003, Vol. 9, Issue 5, p. 401-428

"Evolutionary Local Search for the Edge-Biconnectivity Augmentation Problem" (G. Raidl, I. Ljubic), *Information Processing Letters*, Jan 2002, Vol. 82, Issue 1, p. 39-45

"Solving the simple plant location problem by genetic algorithms" (J. Kratica, D. Tosic, V. Filipovic, I. Ljubic), *RAIRO Operations Research*, Jan 2001, Vol. 35, Issue 1, p. 127-142

## Book Chapters

*Intersection Cuts for Bilevel Optimization*. In: *Integer Programming and Combinatorial Optimization* (with M. Fischetti, M. Monaci, M. Sinnl). Berlin (Germany) : Springer Lecture Notes in Computer Science, Quentin Louveaux, Martin Skutella . 2016, p. 77-88

*The Maximum Weight Connected Subgraph Problem*. In: *Facets of Combinatorial Optimization* (with E. Alvarez-Miranda, P. Mutzel). : Springer, Michael Jünger, Gerhard Reinelt. 2013, p. 245-270

## Teaching

### Teaching at ESSEC

Decision Analysis, Grand Ecole Program and Master in Data Science & Business Analytics

Optimization for Decision Making, Grand Ecole Program

Introduction to Optimization Methods, PhD Program

Business Mathematics & Statistics, Grand Ecole Program

### Other Teaching Activities

Networks: Design and Analysis (Vienna University of Technology)

Graph Algorithms and Network Flows (Uni Vienna)  
Operations Research (Uni Vienna)  
Business Mathematics (Uni Vienna)

## Other Activities

### Awards and Distinctions

2016: Best paper award of the INFORMS Telecommunication Section for the paper [The Generalized Regenerator Location Problem](#), INFORMS Journal on Computing 27(2): 204 - 220, 2015 (with S. Chen, S. Raghavan).

**2014: Winner of the [DIMACS implementation challenge on Steiner trees](#)** (with M. Fischetti et al.)

2014: Finalist for the best paper award of the INFORMS Telecommunication Section (with L. Gouveia, M. Leitner)

APART Fellowship of the Austrian Academy of Sciences (2011-2013)

Hertha-Firnberg Post-Doc Fellowship of the Austrian Science Fund (2007-2010)

PhD award of Austrian Society for Operations Research (2005)

PhD Fellowship of Austrian Academy of Sciences (DOC Fellowship, 2003-2004)

### Scientific Activities

#### Editorial Board Membership

*Journal of Global Optimization*, Springer

*Computers and Operations Research*, Elsevier

#### Conference Presentations

See the full list of [Invited Talks and Conference Presentations](#)

#### Recent invited talks:

From Game Theory to Graph Theory: A Bilevel Journey,  
[OR 2018: International Conference on Operations Research](#), **EURO Plenary**, Brussels, Belgium, Sept 12-14, 2018.

Branch-and-Cut Algorithms for Mixed-Integer Bilevel Linear Programs,  
**Plenary Speaker**,  
[IWOBIP'18, 2nd International Workshop on Bilevel Programming](#), Inria Lille-Nord Europe, Lille, France, June 18-22 2018.

#### Book Editors

*Operations Research Proceedings 2015*. (avec K. Doerner, G. Tragler, G. Pflug, ). : Springer Verlag, 2016

#### Consulting and Other Activities

OptTelNets, project with Telecom Austria A1 (2007 - 2010)

FSC Siemens, portfolio optimization (2005-2007)

### **Professional Experience**

Recent activities as the **program committee** member:

[European Conference on Operational Research](#), EURO 2016, Poznan, Poland

[International Network Optimization Conference](#), INOC 2015, Warsaw, Poland

[International Symposium on Combinatorial Optimization](#), ISCO 2014, Lisbon, Portugal

[INFORMS Telecommunication Conference 2014](#), Lisbon, Portugal

Recent **co-organization of conferences & workshops**:

[OR2015](#), Vienna, Austria, Sept 1-4, 2015

Workshop "[Recent Advances in Multi-Objective Optimization](#)", 2014  
University of Vienna, Austria

Workshop "[Routing and Networks](#)", University of Vienna, 2014, Austria