

NAME: Felix Andres Weintraub Pohorille

DATE AND PLACE OF BIRTH: December 11, 1942, Santiago-Chile

#### ACADEMIC DEGREES

Electrical Engineer, University of Chile, 1967.

M.A. Statistics, University of California, Berkeley, 1970.

Ph. D. Industrial Engineering and Operations Research, University of California, Berkeley, 1971.

#### RESEARCH INTERESTS

- System Analysis and Modeling in Forestry, Mining.
- Problems of Transportation and Logistics.
- Applied Integer Programming. Methods in Decision Making.
- Operations Management.

#### ACADEMIC AND PROFESSIONAL POSITIONS

- Professor, Department of Industrial Engineering, University of Chile, 1974- present.
- Research Lead, Institute Complex Engineering Systems 2007- present. (Annual grant US\$ 3.0 million).
- Research Lead, Millennium Nucleus Complex Engineering Systems 2002-2006. (Annual grant US\$ 350,000).
- Assistant Research Engineer, University of California, Berkeley, 1971-1974 (full time), 1974-1989 (part-time).
- Lecturer, Department of Industrial Engineer and Operations Research, University of California, Berkeley, Jun-Sept. 1977.
- Engineer, National Telecommunications Enterprise, Chile, 1967.

## ACTIVITIES AND DISTINCTIONS

1. Awarded Chilean's National Prize in Applied Science, 2000. This is the highest Chilean award that recognizes career achievement and entails a lifetime endowment.
2. Doctor Honoris Causa, University of Laval, Quebec, Canada 2014.
3. Doctor Honoris Causa, University of SLU, Sweden 2013.
4. Member of the US National Academy of Engineering - NAE 2012.
5. President of the International Federation of Operational Research Societies (IFORS), 1998-2000 (45 countries; about 20.000 members).
6. Member of Chilean's Academy of Sciences (36 lifetime members), since 1994.
7. Member of the Chilean Academy of engineering since 2012.
8. President of the Latin Ibero-American Association of Operations Research (1986-1988). Co-Founder in 1982.
9. Winner of the Edelman Prize Competition 1998 (INFORMS, US Society in Operations Research and Management Sciences) with best applied work in Operations Research in an open worldwide competition. Finalist the years 2011 and 2016.
10. Gold Medal by Institute of engineering of Chile (Most important award of the institution) – Chile 2012.
11. Winner of the 2000 Harold Lander Memorial Prize of the Canadian Operations Research Society, awarded yearly for International Achievement in Operations Research.
12. INFORMS ENRE Best Publication Award in Natural Resources the years 2014 and 2015 with the papers "Optimizing Long-Term Production Plans in Underground and Open Pit Copper Mines" and "Imposing connectivity constraints in forest planning models" respectively.
13. INFORMS President's Award for his work in "analytics in natural resource management 2012.
14. Chilean Forest Engineers Association's Contribution to Forest Engineering Recognition 2007.
15. Chilean Engineers Institute's Distinguished Activities Prize 2004.
16. Member of INFORMS Board (2002-2004). Vice-President for Education and Outreach (2003-2004).
17. Chosen "Best Professor" (Department of Industrial Engineering) by students, six times since process started in 1997 to 2006.
18. Member Council of The Institute of Management Sciences (TIMS, later INFORMS), 1994-1995.
19. Main Researcher in FONDECYT Projects (Chile): 1984-1985, 1986-1988, 1989-1991, 1992-1994, 1994-1996, 1996-1998, 2000-2002, 2002-2004, 2004-2006, 2006-2008, 2008-2010, 2010-2012, 2012-2014, 2014-2016, 2016-2018. Top ranked projects in Engineering in 1986 and 2004.
20. Main Researcher FONDEF Projects (Chile): 1992-1996 and 1998-2000.
21. Co-Founder and Chair of the Forestry Group within ORSA/TIMS, 1984-1997 (USA). This group integrates operational researchers and foresters with OR interests and continues intensive activities within INFORMS.
22. Area editor Operations Research in OR Practice, 2011-present.

## APPLIED PROJECTS AND PROFESSIONAL EXPERIENCE

For the U.S. Forest Service, 1971-1989. Projects carried out include:

- Models in Regional Planning.
- Models for Integrated Forest and Transportation Planning.
- Optimization of a Timber Drying Process in Kilns.
- Generation and Evaluation of Forest Management Alternatives.
- Linear Programming Models in Forestry with Probabilistic Parameter.
- Heuristic Algorithm for Solving Large Scale Mixed-Integer LP's in Forest Management and Road Building Planning Problems.
- Hierarchical Planning Models.
- Forest Planning with Spatial Constraints.

For the California Cedar Products Co. (Stockton, Ca.) Optimization of Kiln Drying Schedules, 1977.

Projects carried out in Chile include:

- "Methodology for Project Selection": For National Nutritional Organization (CONPAN). 1975.
- "Evaluation of a National Center for Telecommunications". National Enterprise of Telecommunications. (ENTEL). 1976.
- "Production Planning in a Dairy Industry". National Development Corporation. 1976.
- "Implementation of a Planning Model for a Private Forest Enterprise". INFORSA. 1978.
- "Use of Models in Forest Planning". Chilean Forestry Corporation/FAO/UNDP. 1980-1981.
- "Implementing a Planning Model for a Private Forest Enterprise" (Forestal Copihue), 1980.
- "Evaluation of Goods and Services in National Parks". Chilean Forestry Corporation/FAO/UNPD. 1981.
- "Implementing an on-Line Truck Dispatching System in a Large Open Pit Copper Mine (Chuquicamata, CODELCO), 1985-1986, 1990.
- "Urban Traffic Models". Joint Project with the Transportation Center, U. of Montreal, financed by IDRC Canada. 1985-1988.
- "A Truck Dispatching System for the Forest Industry Implemented in Forestal Arauco and other Forest Enterprises. 1988-1989.
- Study on Vehicle Scheduling. Electricity Company, CHILECTRA, 1989.
- Vehicle Scheduling for Personnel, Mine El Soldado 1991.
- Short Term Harvesting System, Forestal Arauco, Bio-Bio, Mininco (1991).
- Determination of Forest Cargo Future Equilibrium Flows, Chilean Railways 1991.
- Determination of Future Road Capacity Needs in Southern Chile. Equilibrium Models. Ministry of Public Works 1992.
- A System for Medium Range Forest Planning and Roothing, Forestal Millalemu 1992-1994.

- A System for Daily Harvesting Decisions, Forestal Arauco 1994-95.
- A System for Location of Harvesting Machinery Forestal Arauco, and other firms. 1993-1994.
- A System for Planning Sawmill Production. Aserraderos Arauco. 1995- 96.
- Mathematical Models in Forest Management Joint Project with four Chilean forest firms and FONDEF (joint University-Industry R&D) (1993-1996).
- Evaluation of the Economic Impact of Environmental Policies in Forest Management: Joint Project with four Chilean Forest Firms and FONDEF (1997-2000).
- A System for Forest Tactical Planning. Aracruz-Brasil (1997-1998).
- Work on environmental impact of forest harvesting (FONDEF Project 1998-2000).
- Football Federation. Matches scheduling for the 2005-2008 seasons using mixed integer programming.
- CODELCO (mining firm), developing planning models for underground and open pit-copper mines. 2000-2005.
- SUDAMERICANA DE VAPORES (sea transport company). Containers management planning. 2005-2010.
- Multiexport, salmon industry. Model for net replacement and supply chain, 2007-2008.
- Skretting, model for ship routing to supply food to salmon installations, 2007-2008.
- AquaChile, model for optimizing the company's Process chain, 2014-Present.
- Yadrán, model for optimizing the Processing Plant Production, 2016-Present.

## PUBLICATIONS

1. A Alonso-Ayuso, LF Escudero, M Guignard, A Weintraub. Risk management for forestry planning under uncertainty in demand and prices. *European Journal of Operational Research*. Volume 267, Issue 3, 16 June 2018, Pages 1051-1074.
2. Eduardo Álvarez-Miranda, Jordi Garcia-Gonzalo, Felipe Ulloa-Fierro, Andrés Weintraub, Susana Barreiro. A multicriteria optimization model for sustainable forest management under climate change uncertainty: An application in Portugal. *European Journal of Operational Research*. 2017.
3. Fernando Alarcón, Guillermo Durán, Mario Guajardo, Jaime Miranda, Hugo Muñoz, Luis Ramírez, Mario Ramírez, Denis Sauré, Matías Siebert, Sebastián Souyris, Andrés Weintraub, Rodrigo Wolf-Yadlin, Gonzalo Zamorano. Operations research transforms the scheduling of chilean soccer leagues and south american world cup qualifiers. *Interfaces* 47 (1), 52-69. 2017.
4. JJ Troncoso, JJ., Weintraub, A., Martell, DL. Development of a threat index to manage timber production on flammable forest landscapes subject to spatial harvest constraints. *INFOR: Information Systems and Operational Research* 54 (3), 262-281. 2016.
5. Rios, I., Weintraub, A., Wets, RJB. Building a stochastic programming model from scratch: a harvesting management example. *Quantitative Finance* 16 (2), 189-199. 2016.
6. Garcia-Gonzalo, J., Pais, C., Bachmatiuk, J. and Weintraub, A. Accounting for climate change in a forest planning stochastic optimization model. *Canadian Journal of Forest Research* 46 (9), 1111-1121. 2016.
7. Garcia-Gonzalo, J., Pais, C., Bachmatiuk, J. and Weintraub, A. Accounting climate change in a stochastic optimization model in forest planning. *NRC Research Press (a division of Canadian Science Publishing)*, 2016.
8. Caro R., Epstein R., Santibañez P., Weintraub A. An integrated approach to the long-term planning process in the copper mining industry. *Handbook of Operations Research in Natural Resources*. 2016.

9. Bare, B. B., Weintraub, A. "Brief history of systems analysis in forest resources". *Annals of Operations Research*, 1-10, 2015.
10. Mikael Rönnqvist, Sophie D'Amours, Andres Weintraub, Alejandro Jofre, Eldon Gunn, Robert, G. Haight, David Martell, Alan T. Murray and Carlos Romero. Operations Research challenges in forestry: 33 open problems. *Annals of Operations Research* 232 (1), 11-40.
11. Troncoso, J., D'Amours, S., Flisberg, P., Roennqvist, M., Weintraub, A., "A mixed integer programming model to evaluate integrating strategies in the forest value chain - a case study in the Chilean forest industry", *Canadian Journal of Forest Research*, 45(7): 937-949, 2015.
12. Badilla, F., Watson, J. P., Weintraub, A., Wets, R. J. B., Woodruff, D. L. "Stochastic optimization models in forest planning: a progressive hedging solution approach". *Annals of Operations Research*, 1-16, 2014.
13. Alonso-Ayuso, A., Carvallo, F., Escudero, L. F., Guignard, M., Pi, J., Puranmalka, R., Weintraub, A. "Medium range optimization of copper extraction planning under uncertainty in future copper prices". *European Journal of Operational Research*, 233(3), 711-726, 2014.
14. Cortés, C. E., Gendreau, M., Rousseau, L. M., Souyris, S., Weintraub, A. "Branch-and-price and constraint programming for solving a real-life technician dispatching problem". *European Journal of Operational Research* ,238(1), 300-312, 2014.
15. Diaz-Balteiro, L., Martell, D. L., Romero, C., & Weintraub, A. "The optimal rotation of a flammable forest stand when both carbon sequestration and timber are valued: a multi-criteria approach". *Natural hazards*, 72(2), 375-387, 2014.
16. Bravo, F., Durán, G., Lucena, A., Marengo, J., Morán, D., & Weintraub, A. "Mathematical models for optimizing production chain planning in salmon farming". *International Transactions in Operational Research*, 20(5), 731-766, 2013.

17. Carvajal, R., Constantino, M., Goycoolea, M., Vielma, J. P., & Weintraub, A. "Imposing connectivity constraints in forest planning models". *Operations Research*, 61(4), 824-836, 2013.
18. Romero, G., Durán, G., Marenco, J., Weintraub, A. "An approach for efficient ship routing". *International Transactions in Operational Research*, 20(6), 767-794, 2013.
19. Epstein, R., Neely, A., Weintraub, A., Valenzuela, F., Hurtado, S., Gonzalez, G., ... and Angulo, G. "A strategic empty container logistics optimization in a major shipping company". *Interfaces*, 2012.
20. Hernández, P., Alonso-Ayuso, A., Bravo, F., Escudero, L. F., Guignard, M., Marianov, V., Weintraub, A. "A branch-and-cluster coordination scheme for selecting prison facility sites under uncertainty". *Computers & Operations Research*, 39(9), 2232-2241, 2012.
21. Epstein, R., Goic, M., Weintraub, A., Catalán, J., Santibáñez, P., Urrutia, R., Caro, F. "Optimizing long-term production plans in underground and open-pit copper mines". *Operations Research*, 60(1), 4-17, 2012.
22. Araya, F., Dell, R., Donoso, P., Marianov, V., Martínez, F., Weintraub, A. "Optimizing location and size of rural schools in Chile". *International Transactions in Operational Research*, 19(5), 695-710, 2012.
23. Mosquera, J., Henig, M. I., Weintraub, A. "Design of insurance contracts using stochastic programming in forestry planning". *Annals of Operations Research*, 190(1), 117-130, 2011.
24. Newman, A. M., Rubio, E., Caro, R., Weintraub, A., Eurek, K. "A review of operations research in mine planning". *Interfaces*, 40(3), 222-245, 2010.

25. Rey, P., Muñoz J. A., Weintraub, A. "A Column Generation Model for Truck Routing in the Chilean Forest Industry". INFOR, special issue on Supply Chain Management in the Forest Industry.
26. I Gac, I., Martínez, F., and Weintraub, A. (2009). "A deterministic linear optimization model for allocating schools to zones". Journal of the Operational Research Society, 60(7), 895-905, 2009.
27. Goycoolea M, Murray A, Vielma J.P., et al, (2009). "Evaluating Approaches for Solving the Area Restriction Model in Harvest Scheduling". Forest Science 55(2): 149-165, 2009.
28. Basnet C. and Weintraub, A., "A genetic algorithm for a bicriteria supplier selection problem". International Transactions in Operational Research 16: 173-187, 2009.
29. D'Amours, S., Rönnqvist, M., & Weintraub, A. "Using operational research for supply chain planning in the forest products industry". INFOR: Information Systems and Operational Research, 46(4), 265-281, 2008.
30. Weintraub, A., Pereira, M., & Schultz, X. "A priori and a posteriori aggregation procedure to reduce model size in MIP mine planning models". Electronic Notes in Discrete Mathematics, 30, 297-302, 2008.
31. Weintraub A. "Integer Programming in Forestry". Annals of Operations Research 149(1): 209-216, 2007.
32. Duran G., Guajardo M., Miranda J. Sauré D., Souyris S., Weintraub, A., "Scheduling the Chilean Soccer League by Integer Programming". Interfaces 37(6): 539-552, 2007. (see also Erratum Interfaces 38(3): 221-221, 2008.)
33. Palma C., Cui W., Martell D., Robak D., Weintraub, A., "Assessing the impact of stand-level harvests on the flammability of forest landscapes", International Journal of Wildland Fire 16(5): 584-592, 2007.



34. Vielma J.P., Murray A., Ryan D., and Weintraub, A., "Improving computational capabilities for addressing volume constraints in forest harvest scheduling problems", *European Journal of Operational Research* 176(2): 1246-1264, 2007.
35. Díaz Legües A., Jacques A. Ferland, Celso C. Ribeiro, Jorge R. Vera and Andrés Weintraub, "A tabu search approach for solving a difficult forest harvesting machine location problem". *European Journal of Operational Research* 179(3): 788-805, 2007.
36. Henig, M. I., & Weintraub, A. "A dynamic objective-subjective structure for forest management focusing on environmental issues". *Journal of Multi-Criteria Decision Analysis*, 14(1-3), 55-65, 2006.
37. Epstein R, Weintraub, A, Sapunar P, et al. "A combinatorial heuristic approach for solving real- size machinery location and road design problems in forestry planning". *Operations Research* 54(6): 1017-1027, 2006.
38. Weintraub, A., Romero C. "Operations research models and the management of agricultural and forestry resources: A review and comparison". *Interfaces* 36(5): 446-457, 2006.
39. Weintraub, A. and Murray A., "Review of combinatorial problems induced by spatial forest harvesting planning". *Discrete Applied Mathematics* 154(5): 867-879, 2006.
40. Goycoolea M., Epstein R., Weintraub, A., Murray A., Barahona F., "Harvest Sheduling Subject to Maximum Area Restrictions: Exploring Exact Approaches", *Operations Research* 53(3): 490-500, 2005.
41. Bjorndal T., Lane D., and Weintraub, A. "Operational Research Models and the Management of Fisherties and Aquaculture: A Review". *European Journal of Operational Research* 156(3): 533-540, 2005.33. Caro F., Shirabe T., Guignard M. and Weintraub, A., "School redistricting embedding GIS tools with integer programming". *Journal of Operational Research Society* 55:.836-849, 2004.

42. Murray, A.T., Goycoolea M. and Weintraub, A. "Incorporating average and maximum area restrictions in harvest scheduling models." *Canadian Journal of Forest Research*, 34: 456-464, 2004.
43. Caro F., Andalaft R., Weintraub, A., Sapunar P., Cabello M., "Evaluating the Economic Cost of Environmental Measures in Plantation Harvesting through the Use of Mathematical Models", *Production and Operations Management* 12(3): 290-306, 2003.
44. Andalaft N., Andalaft P., Guignard M., Adrian Magendzo, Alexis Wainer, Andres Weintraub. "A Problem of Forest Harvesting and Road Building Solved Through Model Strengthening and Lagrangean Relaxation", *Operations Research* 51(4): 613-628, 2003.
45. Caro F., Constantino M., Martins I. and Weintraub, A. A 2 Opt Tabu Search Procedure for the Multi-Period Forest Harvesting Problem with Adjacency, Green-up, Old Growth and Even Flow Constraints", *Forest Science* 49(5): 738-751, 2003.
46. Vera, J., Weintraub, A., Koenig, M. Bravo G., Guignard M., Barahona F., 2003. "A Lagrangian Relaxation Approach for a Machinery Location Problem in Forest Harvesting". *Pesquisa Operacional* 23(1): 11-128 , 2003.
47. Murray A., Weintraub, A. "Scale and Unit Specification Influences in Harvest Scheduling with Maximum Area Restrictions". *Forest Science* 48(4): 779-789, 2002.
48. Weintraub A, Guignard M, Church, R and A Murray "Forest Management Models and combinatorial Algorithms: Analysis of State of the Art", *Annals of Operation Research* 96: 41-66, 2000.
49. Weintraub A., Epstein, R., Murphy G., Manley B. "The Impact of Environmental Constraints on Short Term Harvesting: Use Planning Tools and Mathematical Models". *Annals of Operations Research* 96: 271-285, 2000.
50. Epstein, R., Nieto, E., Weintraub, A., Chevalier, P., & Gabarró, J. "A System for Short Term Harvesting Strategy", *European Journal of Operations Research* 119: 427-439, 1999.

51. Weintraub A, Murray A, Church R, "Operational Forest Planning and Steiner Tree Extension", *Geographical Systems* 5: 221-237, 1999.
52. Epstein, R, Morales, R, Serón, J, Weintraub, A. "Use of OR Systems in the Chilean Forest Industries", *Interfaces* 29: 7-29. 1999.
53. Weintraub, A, Aboud J, Fernandez C, Laporte G, Ramirez E, "An Emergency Vehicle Dispatching System for An Electric Utility in Chile". *Journal of the Operational Research Society* 50: 690-696, 1999.
54. Church R., Murray, A., Weintraub, A., "Locational Issues in Forest Management", *Locational Science* 6: 137-153, 1998.
55. Martell, D., Gunn E., Weintraub, A., "Forest Management Challenges for Operational Researchers". *European Journal of Operations Research* 104(1): 1-17,1998.
56. Equi, L., Gallo, G. Marziale S., Weintraub, A., "A Combined Transportation and Scheduling Problem." *European Journal of Operations Research* 97(1): 94-104, 1997.
57. Weintraub, A., Saez G., Yadlin M., "Aggregation Procedures in Forest Management Planning Using Cluster Analysis". *Forest Science* 43(2): 274-284, 1997.
58. Weintraub A. and Bare Bruce. "New Issues in Forest Management from an Operations Research Perspectives", *Interfaces* 26(5): 9-25, 1996.
59. Weintraub A., Epstein R., Morales R., Serón J. and Traverso P. "A Truck Scheduling System Improves Efficiency in the Forest Industries" *Interfaces* 26(4): 1-12, 1996.
60. Weintraub, A., Jones, G., Meacham, M. Magendzo M., Magendzo, A., Malchuk, D. "Heuristic Procedures for Solving Mixed-Integer Harvest Scheduling

Transportation Planning Models". Canadian Journal of Forest Research 25:1618-1626, 1995.

61. Weintraub, A. and Abramovich, A. "Analysis of Uncertainty of Future Timber Yields in Forest Management", Forest Science 41(2): 217-234, 1995.
62. Weintraub, A., Jones, G., Magendzo, A. Meacham, M. Kirby M. "Heuristic System to Solve Mixed Integer Forest Planning Models", Operations Research 42(6): 1010-1024, 1994.
63. Weintraub, A., Barahona, F. and Epstein, R. "A Column Generation Algorithm for Solving General Forest Planning Problems with Adjacency Constraints", Forest Science 40: 142-161, 1994.
64. Weintraub, A., Barahona, F., J.C. Rozas, Muñoz, E. "Solving Multicommodity Flow Problems", Investigación Operativa 3: 201-213, 1993.
65. Fernandez E., Marcotte P., Mondschein S., Vera J and Weintraub, A. "Solution Approaches to the Bus Operator Problem". Transportation Research Part B: Methodological 27(1): 1-11, 1993.
66. Barahona F., Weintraub, A. and Epstein R., "Habitat Dispersion in Forest Planning and Stable Set Problem". Operations Research 40(1): S14-S21, 1992.
67. Weintraub A. and Cholacky A. "A Hierarchical Approach to Forest Planning". Forest Science 39(5): 439-460, 1991.
68. Weintraub A. and J. Vera "A Cutting Plane Approach for Chance Constrained Linear Programs". Operations Research 39(5): 776-785, 1991.
69. Rensi G. and Weintraub, A. "Using Dynamic Programming to Determine Efficient Kiln-Drying Schedules". Wood and Fiber Science 20: 215-225, 1988.

70. Barros O. and Weintraub, A. "Spatial Market Equilibrium Problems as Network Models". *Discrete Applied Mathematics* 13: 109-130, 1986.
71. Weintraub A., Kohn V. and Guitart S. "Strategic Planning in Forest Industries". *European Journal of Operations Research* 24(1): 152-168, 1986.
72. Weintraub A., Ortiz C. and González J. "Accelerating Convergence of the Frank-Wolfe Algorithm", *Transportation Research* 19(2): 113-122, 1985.
73. Barros O. and Weintraub, A. "Planning for Vertically Integrated Forest Industries" *Operations Research* 30(5): 1168-1182, 1982.
74. Weintraub A. and Ingram W. "An Efficient Approach to Some Cases of Coefficient Variations in Linear Programs". *Operations Research* 29(3): 609-611, 1981.
75. Weintraub, A. and González J. "An Algorithm for the Traffic Assignment Problem". *Networks* 10: 197-209, 1980.
76. Weintraub A. and Navon D. "A Forest Management Planning Model Integrating Silvicultural and Transportation Activities", *Management Science* 22(12): 1299-1309, 1976.
77. Weintraub, A. "A Primal Algorithm to Solve Network Flow Problems with Convex Costs", *Management Sciences* 21(1): 87-97, 1974.
78. Weintraub, A. "The Shortest and K-Shortest Routes as Assignment Problems", *Networks* 3: 61-73, 1973.