

PODOFILLINI LUCA

PERSONAL DATA

Date of birth: 13-01-1976
Home address
Switzerland: Bachtalstrasse, 5408, Ennetbaden, Switzerland
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CURRENT POSITION

Since August 2004

Scientist at the Paul Scherrer Institute (PSI), Switzerland, within the Risk and Human Reliability Group, Dept. Nuclear Energy and Safety.

Main activities:

- Support to the Swiss Federal Nuclear Safety Inspectorate (ENSI). The support mainly relates to the review of the Human Reliability Analyses (HRAs) submitted to the Inspectorate by the Swiss utilities as a part of their Probabilistic Safety Assessments (PSAs).
- Research on current and emerging issues in the treatment of the human factor in Probabilistic Safety Assessment. The research program is sponsored by the Swiss Federal Nuclear Safety Inspectorate.
- Application of PSA to large installations for experimental physics (within PSI):
 - Proton therapy facility for tumor treatment (participated in the study)
 - Neutron source facility (as study lead)
- Research on multi-criteria (reliability, safety, cost ...) optimization of complex industrial systems, Monte Carlo simulation for modeling the dynamics of complex industrial systems, and the development of importance measures for multi-state systems.

EDUCATION

May 2004

PhD from the Dept. of Nuclear Engineering of the Polytechnic of Milan, Milan, Italy. The title of the PhD thesis is 'Risk-informed design and operation of hazardous systems'. Supervisor: Prof Enrico Zio, Polytechnic of Milan. The PhD work has concerned the development of advanced simulation models and optimization techniques for risk/reliability applications.

July 2000

Laurea in Ingegneria Nucleare at the Polytechnic of Milan, Italy, with the final degree score of 100/100 cum laude. Thesis title: "Use of genetic algorithms for the estimate of the effective parameters of a reactor model". The work was carried out at the Department of Nuclear Engineering, Polytechnic of Milan, Italy.

1994

Graduation Diploma at the Liceo Scientifico Statale, San Donato Milanese (Milan, Italy), with the score of 60/60.

SCIENTIFIC PROFILE

Co-author of about 30 papers on international scientific journals and about 30 papers on proceedings of international scientific conferences (list of papers at the end of the CV).

Member of the board of the HRA Society (a professional society under development of HRA analysts)

Referee for the following international journals

- *Reliability Engineering and System Safety*
- *IEEE transactions on reliability*
- *IIE transactions, Quality and reliability engineering*

Member of the international technical committees

- *ESRA (European Safety and Reliability Association) Technical Committee on System Reliability (from 2007)*
- *Technical Program Committee of PSAM9 Probabilistic Safety Assessment and Management Conference*
- *Technical Program Committee of ESREL 2006,2007, 2008, European Safety and Reliability Conference*

Co-advisor of one 3-year PhD thesis (2008) and three 1-year Laurea theses at the Department of Nuclear Engineering, Polytechnic of Milan. External referee for 1 European Doctorate mention at the University of Las Palmas de Gran Canaria (2008).

RESEARCH ACTIVITIES ABROAD

**January-April 2003 and
August-October 2003**

Department of Production and Quality Engineering of the Norwegian Institute of Technology (NTNU), Trondheim, Norway. The research objective was to develop a risk-informed approach to the optimization of ultrasonic test intervals in railway applications.

July-September 2001

Industrial Engineering Department of the Rutgers University, Piscataway, NJ, USA. The research objective was the use of genetic algorithms and Monte Carlo method for multi-criteria optimization of network systems reliability.

AWARDS & ACKNOWLEDGEMENTS

- 2004** Winner of a scholarship from the Los Alamos National Laboratory, Los Alamos, NM, USA, for participating to the conference SAMO 2004.
- 2003** Winner of a Marie Curie Fellowship of the European Community for joining the Marie Curie Training Site at the Norwegian Institute for Technology, Trondheim, Norway.
- 2002** Gold medal for best paper at the conference *ESREL'02, LAMBDA-MU 13*, International Conference on Safety and Reliability, 19-21, March, 2002, Lyon, France.
- 1995-96** Fellowships from the Polytechnic of Milan.
- 2001** First-place winner of the Italian Ministry of University and Scientific Research Fellowship for a three-year doctorate in *Science and Technology in Nuclear plants*.
- 2001** Winner of a scholarship of the European community for participating to the conference SAMO 2001.

PUBLICATIONS

Publications on international journals

1. L. Podofillini, V.N. Dang, E. Zio, P. Baraldi, M. Librizzi, "Using Models To Incorporate Expert Knowledge In Human Reliability Analysis – A Dependence Assessment Method". *Risk Analysis*, Vol. 30, 2010, 8, pp. 1277-1297.
2. L. Podofillini, D. Mercurio, V.N. Dang, E. Zio, "Dynamic Safety Assessment: Scenario Identification Via A Fuzzy Clustering Approach", *Reliability Engineering and System Safety*, 95, 2010, pp. 534-549.
3. D. Mercurio, L. Podofillini, E. Zio, V.N. Dang. Identification and classification of dynamic event tree scenarios via possibilistic clustering: Application to a steam generator tube rupture event. *Accident Analysis and Prevention*, Vol. 41, 2009, pp. 1180-1191.
4. P. Baraldi, M. Librizzi, E. Zio, L. Podofillini, V. N. Dang. "Two techniques of sensitivity and uncertainty analysis of fuzzy expert systems", *Expert Systems with Applications*, Vol. 36, 2009, pp. 12461–12471
5. E. Zio, P. Baraldi, M. Librizzi, L. Podofillini, V.N. Dang, "A fuzzy set-based approach for modeling dependence among human errors", *Fuzzy Sets and Systems*, Vol. 60, No.13, 2009, pp. 1947-1964.
6. L. Podofillini, V.N. Dang, K. Thomsen, "Scoping-level Probabilistic Safety Assessment of a complex experimental facility: Challenges and first results from the application to a neutron source facility (MEGAPIE)". *Nuclear Engineering and Design* 238 (2008) 2726–2738.
7. L. Podofillini, E. Zio, "Designing A Risk-Informed Balanced System By Genetic Algorithms: Comparison Of Different Balancing Criteria", *Reliability Engineering and System Safety* 93 (2008) 1842– 1852.
8. L. Podofillini, E. Zio. "Events group risk importance by genetic algorithms", *Journal of Risk and Reliability*, Vol. 222, N.3 (2008).
9. E. Zio and L. Podofillini, "Integrated optimization of system design and spare parts allocation by means of multiobjective genetic algorithms and Monte Carlo simulation". *Proc. Instn Mech. Engrs, Part O: J. Risk and Reliability*, 2008, 221(O1), 67-84.
10. E. Zio, M. Marella, L. Podofillini, "Importance measures-based prioritization for improving the performance of multi-state systems: application to the railway industry" *Reliability Engineering and System Safety*, Volume 92, Issue 10, Pages 1303-1314 (October 2007).
11. E. Zio, L. Podofillini, "Importance measures and genetic algorithms for designing a risk-informed optimally balanced system". *Reliability Engineering and System Safety*, Volume 92, Issue 10, Pages 1435-1447 (October 2007).
12. E. Zio, M. Marella, L. Podofillini, "A Monte Carlo simulation approach to the availability assessment of multi-state systems with operational dependencies". *Reliability Engineering & System Safety*, 92 (7) Pages 871-882 (2007).
13. E. Zio, L. Podofillini and V. Zille "A combination of Monte Carlo simulation and cellular automata for computing the availability of complex network systems" *Reliability Engineering & System Safety* Volume 91, Issue 2, Pages 181-190 (March 2006)
14. E. Zio, L. Podofillini, "The use of Importance Measures in the Optimization of Multi-

State Systems". International Journal of Polish Academy of Sciences "MAINTENANCE AND RELIABILITY", Special Issue on SMRSSL'05, Stochastic Models in Reliability, Safety, Security and Logistics, Volume 2(30) pp 33-36 (2006)

15. E. Zio, L. Podofillini, "Accounting for components interactions in the differential importance measure" Reliability Engineering & System Safety, Volume 91, Issues 10-11, October-November 2006, Pages 1163-1174.
16. L. Podofillini, E. Zio and J. Vatn "Risk-informed optimisation of railway tracks inspection and maintenance procedures" Reliability Engineering & System Safety, Volume 91, Issue 1, Pages 3495-3510 (January 2006).
17. M. Marseguerra, E. Zio and L. Podofillini "Multiobjective spare part allocation by means of genetic algorithms and Monte Carlo simulation" Reliability Engineering & System Safety, 87 (2005), 325-335
18. M. Marseguerra E. Zio L. Podofillini "Optimal Reliability/availability Performance of Uncertain Systems Via Multiobjective Genetic Algorithms: A Nuclear Application", IEEE transactions on Reliability, 53 (2005), 424-434.
19. M. Marseguerra, E. Zio and L. Podofillini "First-order differential sensitivity analysis of a nuclear safety system by Monte Carlo simulation" Reliability Engineering & System Safety, 90 (2005) Selected papers from ESREL 2003 Pages 162-16
20. M. Marseguerra, E. Zio, L. Podofillini, D. W. Coit, "Optimal design of reliable network systems in presence of uncertainty". IEEE Transactions on Reliability 54(2): 243-253 (2005)
21. G. Levitin, L. Podofillini, E. Zio "Generalized importance measures for multi-state systems based on performance level restrictions". Reliability Engineering and System Safety 82 (2003); 235-349
22. M. Marseguerra E. Zio L. Podofillini, "A multiobjective genetic algorithm approach to the optimization of the technical specifications of a nuclear safety system". Reliability Engineering and System Safety 84 (2004); 87-99
23. E. Zio, L. Podofillini, G. Levitin, "Estimation of the importance measures of multi-state elements by Monte Carlo simulation". Reliability Engineering and System Safety 86 (2004) 191-204
24. M. Marseguerra E. Zio L. Podofillini "Model parameters estimation and sensitivity by genetic algorithms" Annals of Nuclear Energy, Vol 30 Issue 14 (2003) pp. 1437-1456
25. E. Zio L. Podofillini, "Importance measures of multi-state components in multi-state systems". International Journal of Reliability, Quality and Safety Engineering Vol 10, No 3 (2003) 289-310
26. E. Zio L. Podofillini, "Monte Carlo simulation analysis of the effects of different system performance levels on the importance of multi-state components". Reliability Engineering and System Safety 82 (2003); 63-73
27. M. Marseguerra E. Zio L. Podofillini "Condition-based maintenance optimization by means of genetic algorithms and Monte Carlo simulation", Reliability Engineering and System Safety 77 (2002) p. 151-165.

Book Chapters

1. M. Marseguerra, E. Zio, L. Podofillini, "Genetic Algorithms and Monte Carlo simulation for the optimization of system design and operation" Chapter of book: Computational Intelligence in Reliability Engineering, Levitin, Gregory (Ed.), ISBN: 978-3-540-37367-4 p 101-150 (2007)

Technical Reports

1. L. Podofillini, V.N. Dang, “Comparative analysis of the HRAs in the Gösigen Full Power PSAs”. (LEA 09-306) Prepared for the Swiss Federal Nuclear Safety Inspectorate, December 2009.
2. J. Kim, L. Podofillini, V.N. Dang, “Characterization of Emergency Operation Systems of Nuclear Power Plants” (LEA 09-305). Prepared for EDF R&D, Clamart, France, November, 2009.
3. L. Podofillini, V. N. Dang, “Independent technical peer review 2 of the NARA tool” (LEA 09-301). Prepared for the Health and Safety Executive (HSE) Nuclear Installation Inspectorate, Merseyside L20 3JZ, UK, May, 2009.
4. L. Podofillini, B. Reer, V.N. Dang, “Review of the Human Reliability Analysis in the Leibstadt PSA (KKL PSA 2006)” (LEA 08-301) Prepared for the Swiss Federal Nuclear Safety Inspectorate, May 2008.
5. B. Reer, L. Podofillini, “Review of the Procedural Guidance of Selected Actions of the PSA Model of the Leibstadt Plant” (LEA 07-303) Prepared for the Swiss Federal Nuclear Safety Inspectorate, November 2007.
6. B. Reer, L. Podofillini, V. N. Dang, “Review of the Procedural Guidance of Selected Actions of the MUSA-2005 PSA Model” (LEA 06-302) Prepared for the Swiss Federal Nuclear Safety Inspectorate, November 2006.
7. L. Podofillini, V.N. Dang, “Comparative analysis of the HRAs in the Mühleberg Full Power PSAs” (LEA 06-304), Prepared for the Swiss Federal Nuclear Safety Inspectorate, October 2006.
8. L. Podofillini, B. Reer, V.N. Dang, “Review of the Human Reliability Analysis in the Mühleberg PSA - MUSA 2005” (LEA 06-301) Prepared for the Swiss Federal Nuclear Safety Inspectorate, October 2006.
9. L. Podofillini, V.N. Dang, “Evaluation of Selected Human Reliability Analysis Methods” (HSK-AN-5642), Prepared for the Swiss Federal Nuclear Safety Inspectorate, August 2005.
10. V.N. Dang, L. Podofillini, “Review of the Human Reliability Analysis in the Gösigen Low Power and Shutdown PSA – SGPSA” (HSK-17-807), Prepared for the Swiss Federal Nuclear Safety Inspectorate, Federal Office of Energy, December 2005.

Publications
on
proceedings
of
international
conferences

1. L. Podofillini, V.N. Dang, P. Baraldi, M. Conti, E. Zio, “A review of Decision Tree models for assessing Human Reliability Analysis dependence”. Proceedings of ESREL 2009 Safety, Reliability and Risk Analysis, Prague, Czech Republic, 7-10 September 2009, p. 253-259.
2. P. Baraldi, M. Conti, E. Zio, V.N. Dang, L. Podofillini, “A Bayesian Network model for dependence assessment in Human Reliability Analysis”. Proceedings of ESREL 2009 Safety, Reliability and Risk Analysis, Prague, Czech Republic, 7-10 September 2009, p. 223-230.
3. L. Podofillini, V.N. Dang, E. Zio, P. Baraldi, M. Librizzi. “Techniques for verification of expert models for dependence assessment in human reliability analysis” Proc.. 9th Int. Conf. on Probabilistic Safety Assessment and Management (PSAM9), Hong Kong, China, 18-23.05.2008
4. L. Podofillini, B. Reer, “Comparing CESA-Q human reliability analysis with evidence from simulator: a first attempt”. Proceedings of ESREL 2008 Safety, Reliability and Risk Analysis, Valencia, Spain, 22-25 September 2008, p. 233-241. ISBN: 978-0-415-48513-5.
5. L. Podofillini, V.N. Dang, “Safety Evaluation of the MEGAPIE Experimental

Facility: Results and Insights from the Application of Probabilistic Safety Assessment". HPPA5 Fifth International Workshop on the Utilisation and Reliability of High Power Proton Accelerators, Mol, Belgium. 6-9 May 2007.

6. L. Podofillini, E. Zio, "Identification of important groups of events by a genetic algorithm search" Proceedings of the 2007 European Safety and Reliability Conference ESREL 2007, Stavanger, Norway, 25-27 June 2007. p 133-140.
7. E. Zio, P. Baraldi, M. Librizzi, L. Podofillini & V.N. Dang, "A Fuzzy Logic Model for Taking into Account Tasks Dependencies in Human Reliability Analysis" Proceedings of the 2007 European Safety and Reliability Conference ESREL 2007, Stavanger, Norway, 25-27 June 2007. p 773-780.
8. L. Podofillini & V.N. Dang "Probabilistic Safety Assessment of complex experimental facilities: lessons learned from the application to a neutron source facility (MEGAPIE)" Proceedings of the 2007 European Safety and Reliability Conference ESREL 2007, Stavanger, Norway, 25-27 June 2007. p 1511-1519.
9. E. Zio, P. Baraldi, M. Librizzi, L. Podofillini, V.N. Dang, "Sensitivity analysis of a Fuzzy Expert System for modeling dependencies in human operators emergency tasks", Proceedings of SSARS 2007, Summer Safety and Reliability Seminars, 22-29 July 2007, Sopot, Poland.
10. B. Reer, V.N. Dang, L. Podofillini, D. Corey, "First results from a probabilistic risk assessment for PSI's spot-scanning proton therapy facility". PSAM 8, 14-18 May 2006, New Orleans, Louisiana, USA.
11. E. Zio, D. Mercurio, L. Podofillini, V.N. Dang, "A fuzzy clustering approach for accident scenarios identification", Proceedings of the 2006 European Safety and Reliability Conference ESREL 2006, Estoril, Portugal, 18-22.09.2006. p. 181-188.
12. E. Zio, L. Podofillini, "Exploiting Importance Measures Information For Optimizing System Design By Genetic Algorithms", Proceedings of the 2006 European Safety and Reliability Conference ESREL 2006, Estoril, Portugal, 18-22.09.2006. p 661-669
13. E. Zio, L. Podofillini, "The use of Importance Measures in the Optimization of Multi-State Systems". Proceedings of SMRSSL'05, Stochastic Models in Reliability, Safety, Security and Logistics, February 15-17, Beer Sheva, Israel, pp 400-405.
14. L. Podofillini, E. Zio, M. Marella, "A multi-state Monte Carlo simulation model of a railway network system". ESREL 2005, 27-30 June 2005, Tri City Poland, pp 1567-1575.
15. J. Vatn, L. Podofillini, E. Zio 'A non-homogeneous Markov model of the degrading failure of a rail section under periodic inspection' PSAM 07 - ESREL 2004, June 14-18, Berlin, Germany pp. 2570-2575.
16. E. Zio, M. Marella, L. Podofillini 'A Monte Carlo simulation method for the dependability assessment of multi-state systems with operational dependence'. ESREL 2004, June 14-18, Berlin, Germany pp 914-919.
17. E. Zio and L. Podofillini, "A Monte Carlo Approach to the Estimation of Importance Measures of Multi-State Components". RAMS 2004, the annual Reliability and Maintainability symposium, January 26-29, Los Angeles, CA, USA, pp. 129-134.
18. E. Zio and L. Podofillini, "A Second-order Differential Importance Measure for Reliability and Risk Applications" SAMO 2004, Sensitivity Analysis of Model Output, March 8-11, 2004, Santa Fe, New Mexico, USA Conference proceedings available on CD-rom.
19. E. Zio, M. Marella, L. Podofillini "A comparison of different importance measures for multistate systems". MMR 2004, Mathematical Methods in Reliability, June 21-

25, Santa Fe, New Mexico, USA.

20. Zio E., Podofillini L. "Measuring the reliability importance of components in multi-state systems", ESREL 2003, European Safety and Reliability, Maastricht, The Netherlands, June 15-18, 2003, pp. 1753-1760.
21. J. Vatn, L. Podofillini, E. Zio, "A risk based approach to determine the type of ultrasonic inspection and frequency in railway applications". WCRR, World Congress on Railway Research, Edinburgh, Scotland, September 28-October 1, 2003. Conference proceedings available on CD-rom pp. 698-698.
22. E. Zio and L. Podofillini, "A comparison of two Monte Carlo simulation approaches for the estimation of importance measures in multi-state systems". Book of abstract of MCM2003, seminar on Monte Carlo Methods, September 15-19, 2003, Berlin, Germany, pp 30.
23. M. Marseguerra, L. Podofillini, E. Zio, "Using Multiobjective Genetic Algorithms For The Optimization Of System Performance In Presence Of Parameters Uncertainty" ESREL 2002, European Safety and Reliability, Lyon (France), March 18-21, 2002, pp 433-438 (winner of the gold medal for best work).
24. M. Marseguerra, L. Podofillini, E. Zio, "Modeling Spare Parts Dynamics by Multi-State Monte Carlo Simulation", MMR2002, Mathematical Methods in Reliability, Trondheim (Norway), June 17-20 2002, pp 433-436.
25. M. Marseguerra, L. Podofillini, E. Zio, "Spin-off sensitivity information gained in search procedures by genetic algorithms", SAMO 2001, Sensitivity Analysis of Model Output, Madrid, June 18-20, 2001, pp. 183-187.
26. M. Marseguerra, L. Podofillini, E. Zio, "Use of genetic algorithms for the optimization of spare parts inventory", ESREL 2001, European Safety and Reliability, Torino (Italy), Sept 16-20, 2001, pp. 1523-1530.
27. M. Marseguerra, L. Podofillini, E. Zio, "Use of genetic algorithms for on line reactivity forecasting", proceedings of IMORN 28, International Meeting on Reactor Noise, Athens, Greece, October, 11-13, 2000. pp. 129-135.