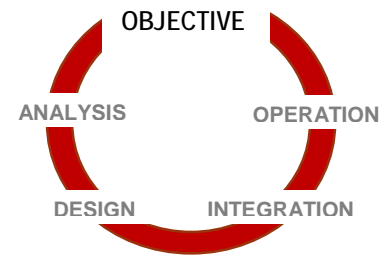


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## **Curriculum Vitae**

**Erik W. Aslaksen PhD**  
Director

**May 2016**

### **Qualifications**

- Primary School: Bygdøy Folkeskole, 1944 -1951
- High School: Oslo Kathedralskole, 1951 -1956, mathematical-physical line.
- Military Service as Communications Technician in the Royal Norwegian Air Force, 1956 -1958.
- MSc in Electrical Engineering. Swiss Federal Institute of Technology, 1958 - 1962.
- Communications Technology Course (corresponding to MA), Bell Telephone Laboratories, 1963 -1964.
- PhD in Physics. Lehigh University, 1964 -1968.
- Certified Professional Logistician (CPL), Society of Logistics Engineers, 1993.
- Certified Systems Engineering Professional (CSEP), INCOSE, 2004.

### **Affiliations**

- Fellow, INCOSE
- Fellow, Royal Society of NSW
- Member, Australian Institute of Physics
- Associate, University of Technology, Sydney

From January 2005 to June 2007, Dr Aslaksen was Associate Technical Director – Technical Review, in the INCOSE Technical Leadership Team. He is a Charter Member and Director of the Omega Alpha Association, the Honor Society for Systems Engineering ([www.omegalpha.org](http://www.omegalpha.org)). He was elected a Fellow of the Institution of Engineers, Australia, in 1990.

### **Gumbooya Pty Ltd (2012 - )**

Engineering management and technical advice to industry and government, and ongoing research projects into the foundations of engineering and the interaction

between engineering and society. Erik was the Technical Lead for Rail Systems on the North Strathfield Rail Underpass project in Sydney (2012-2014), and Lead Engineer, Communications and Control, on the North Eveleigh Switchroom project (2014) and on two traction substation projects in Sydney (2015).

### **Sinclair Knight Merz (1988 – 2012)**

Initially Director of Ewbank Preece Sinclair Knight (1988-1994), the electrical and mechanical division of Sinclair Knight & Partners, then a Senior Principal (1994-2004) and Senior Consultant (2004-2012) of Sinclair Knight Merz Pty Limited, one of Australia's leading consulting engineering firms. Responsible for systems engineering and engineering management aspects of large projects as well as the design of systems in the area of control and automation.

Projects include system design for the Department of Defence, engineering management support to the Departments of Defence and Foreign Affairs and Trade, and evaluation of information technology support systems for the banking industry. Dr. Aslaksen was also manager of the successful bid, jointly by the University of Technology, Sydney and Sydney University, for one of three Advanced Engineering Centres, the Australian Graduate School of Engineering Innovation, where he was a member of the Program Committee. Other assignments include the project management of the full EPCM of one of Australia's most significant new mining developments, the Northparkes E26 Mine; the management, on behalf of the Public Transport Corporation of Victoria, of its new Train Management Facility; project manager for Project Paragon, the replacement train management system for north-west NSW; development of the business case for the Headquarters Australian Theatre, design of control and communications systems for underground mines in Chile, project director for the design of the base stations for the Orange 1800 MHz network, and interim manager of Rail Infrastructure Corporation's design team for the Parramatta Rail Link. More recently he has been involved in a number of Intelligent Transport Systems (ITS), was design manager of a coal upgrade facility in East Kalimantan employing leading edge technology, undertook the restructuring of the engineering function of a major health food producer, and was lead engineer for underground instrumentation and control in the East Cadia Mine project.

### **Previous Appointments**

#### Outside Australia:

1963-1967

Member of Technical Staff, Microwave Ferrite Device Development Department, Bell Telephone Laboratories Inc., Allentown, Pa, USA.

1967-1968

Teaching Assistant, Physics Department, Lehigh University, Bethlehem, Pa, USA.

1968-1970

Member of Technical Staff, Quantum Electronics Research Department, Bell Telephone Laboratories, Inc., Holmdel, NJ, USA.

1970-1973

Senior Research Scientist, Theoretical Physics Group, Corporate Research Center, Brown Boveri & Company, Baden, Switzerland.

1974-1977

Technical Director, GUTOR-Group, Wettingen, Switzerland.

Manufacturers of sheet metal products, transformers and industrial electronics; with 300 employees. Responsible for all product development, costing and production, and, as a member of a three-man management team, responsible for running the company. Advised the Board on several acquisitions, and was involved in the group-wide introduction of the IBM COSTING Management Information System.

1977-1981

Own consulting firm, ASLAKSEN AG. Engineering expertise in the field of industrial electronics, in particular reliability and systems aspects of power supplies, as well as engineering management support. Development of a computer-supported design, costing and tender preparation system for a leading firm of consulting engineers. Re-organisation of a small electronics firm.

In Australia:

Feb-June 1982

Senior Consultant, Ewbank Belford Pty Ltd. Control system for a four-drum winder in Kalgoorlie, and the design and economic analysis of a gas pipeline from Palm Valley to Alice Springs.

1982-1984

Deputy Manager - Electrical Division, Brown Boveri (Australia) Pty Ltd. Responsible for technical support and sales of the product groups protection, static excitation, large variable-speed drives, frequency changers, and computer-based control systems.

1984-1985

Manager - Systems Division, Brown Boveri (Australia) Pty Ltd. Responsible for a division of 22 persons, mostly computer engineers, concerned with the engineering and sales of computer-based systems. In particular, a leading position was developed in the SCADA market.

1985-1988

Technical Manager at Racal Electronics Pty Ltd, with particular responsibility for the technical and trials management of Project PARAKEET, a new tactical communications system for the Australian Army (projected cost about \$300M). It is a mobile, digital system, based on distributed computer-controlled switching with delta-modulation and time-division multiplexing, and employing such diverse technologies as satellite, HF, UHF, and troposcatter transmission, voice, telegraph, and data services and various levels of encryption.

The technical and trials management included final and overall responsibility for the following aspects of the project:

- Systems engineering, ensuring full compliance with the Army Staff Requirement.
- Design of various types of mobile assemblages.
- Development of detailed engineering plans for the areas of Reliability, Maintainability, Human Engineering, Integrated Logistic Support and all aspects of Testing.
- Estimating and scheduling of all activities, and supervising their day-to-day execution.
- Personnel management for a team of twelve engineers.
- Liaison with the Commonwealth.

## Teaching Experience

1967-1968

Teaching Assistant, Physics Department, Lehigh University. Tutorials and laboratory supervision in undergraduate physics.

1971-1972

Course on Quantum Electronics at the Swiss Federal Institute of Technology.

1983-2000

Adjunct Professor in the Faculty of Engineering at the University of Technology, Sydney. Lecturing in systems engineering and engineering management, as well as participation in curriculum development.

## Research Experience

Microwaves

Research on low-temperature (4K) ferrite devices leading to the development of commercial devices. First introduction of ferrite devices into integrated microwave networks.

Quantum Field Theory

Basic research into optical interactions in matter and the theory of such optical devices as lasers and parametric amplifiers.

Mathematical Methods

Extensive work on digital modelling and numerical analysis of physical processes and devices (theoretical support for experimental physicists).

Power System Control

Reliability aspects of power systems, in particular the influence of the control subsystem on reconfigurable systems.

## Published Works

### Development

I. Tatsaguchi and E.W. Aslaksen, "Integrated 4-GHz Balanced Mixer Assembly", IEEE Journal of Solid-State Circuits, SC-3, 21 (1968).

E.W. Aslaksen, "Integrated Microwave Power Distribution Network", IEEE Transactions on Electron Devices, ED-15, 679 (1968).

-, "Reliability of Static Secure Power Supplies", Bull. Swiss Electrotechn. Soc. 66, No. 8, 421 (1975) (in German).

-, "Selective Protection in DC Supplies", Bull. Swiss Electrotechn. Soc. 68, No. 4, 204 (1977) (in German).

-, "Reliability as a Profitability Factor", Bull. Swiss Electrotechn. Soc. 69, No. 4, 157 (1978) (in German).

-, "Failure Probability of Battery-Buffered DC Supplies", etz-b, 30, No. 6, 209 (1978) (in German).

-, "Some Basic Considerations in the Design of Battery-Powered Locomotives", Bull. Swiss Electrotechn. Soc. 71, No. 1, 22 (1980) (in German).

-, "Standardisation of the Format in the Data Transmission between Front-End Processors and Signal Transducers", Bull. Swiss Electrotechn. Soc. 72, No. 17, 957 (1981) (in German).

### Research

E.W. Aslaksen and J.R. Klauder, "Unitary Representations of the Affine Group", J. Math. Phys. 9, 206 (1968).

E.W. Aslaksen, "Correlation Length of Density Fluctuations in Liquids", Phys. Rev. 182, 316 (1969).

E.W. Aslaksen and J.R. Klauder, "Continuous Representation Theory Using the Affine Group", J. Math. Phys. 10, 2267 (1969). Reprinted in "Fundamental Papers in Wavelet Theory", C. Heil and D.F. Walnut, eds. Princeton University Press, 2006.

E.W. Aslaksen, "Optical Dispersion and the Structure of Solids", Phys. Rev. Lett. 24, 767 (1970).

J.P. Gordon and E.W. Aslaksen, "Intensity Distribution Function for a Q-Switched Laser", IEEE J. of Quantum Electronics, QE-6 428 (1970).

E.W. Aslaksen, "The Optical Backward Wave Parametric Oscillator Above Threshold", Optics Communications 2, 69 (1970).

J. R. Klauder and E.W. Aslaksen, "Elementary Model for Quantum Gravity", Phys. Rev. 2, 272 (1970).

E.W. Aslaksen, "Threshold of the Optical Backward-Wave Parametric Oscillator", IEEE J. of Quantum Electronics, QE-6, 612 (1970).

-, "Theory of Parametric Interaction between Three Diffracting Beams of Light", J. Opt. Soc. Am. 61, 320 (1971).

- and B. Ineichen, "Two-Dimensional Order in a Nematic Liquid Crystal near Threshold for Dynamic Scattering", J. Appl. Phys. 42, 882 (1971).

E.W. Aslaksen, "Parametric Coupling of Lightwaves in a Plasma", SAMP 22, 442 (1971).

B. Adam and E.W. Aslaksen, "Voltage-Current Characteristics of Fast Discharges in a He-CO<sub>2</sub> Gas Mixture", Phys. Lett. 36A, 147 (1971).

E.W. Aslaksen, "Continuum Mechanics of Nematic Liquids", Phys. kondens. Materie 14, 80 (1971).

-, "Steady State of a Nematic Liquid above the Threshold for Dynamic Scattering", Molecular Crystals and Liquid Crystals 15, 121 (1971).

-, "Comment on the Electrohydrodynamic Instability in Nematic Liquids", J. Appl. Phys. 43, 776 (1972).

- , "A Simple Model for the Fast Transverse Discharges Used in Pumping High-Pressure Gas Lasers", ZAMP 22, 1135 (1971).
- , "Rotational Transitions in the Solid State", Phys. Lett. 40A, 47 (1972).
- , "Theory of the Spontaneous Polarisation and the Pyroelectric Coefficient of Linear Chain Polymers", J. Chem. Phys. 57, 2358 (1972).
- , "Dielectric Model of Diatomic Molecules", Phys. Rev. A6, 1367 (1972).

### Technical Management

E.W. Aslaksen, "The Individual in Models and in Reality", Research Management 16, No. 5, 7 (1973).

-, "Technical Management of Medium-Sized Firms", Techn. Rundschau 66, No. 16, 1 (1974) (in German).

-, "Improving the Efficiency of Product Development in Small and Medium-Sized Firms", Techn. Rundschau 71, No. 43, 24 (1980) (in German).

-, "Symptoms, Causes, ... and Systems Engineering", Techn. Rundschau 73, No 28, 1 (1981) (in German).

-, "Packaging, a Neglected Area of Specialisation for the Swiss Electrotechnical Industry?", Elektroniker 20, No. 9, EL41 (1981) (in German).

### In Australia

E.W. Aslaksen, "Substation Automation", Proceedings of the IE Aust. Conference on Computers and Engineering, Sydney, 1983.

-, "Substation Automation", Annual Conference of the Electricity Supply Engineers' Association in NSW, Sydney, 1983.

W.R. Belcher and E.W. Aslaksen, "A Systems Approach to Engineering Design", Conference on Design in Engineering, Univ. NSW, 1985.

W.R. Belcher and E.W. Aslaksen, "Systems Engineering, an Australian High Technology Industry", 2nd Australian Computer Engineering Conference, Sydney, 1986.

E.W. Aslaksen, "Systems Engineering and System Specification", J. Electrical and Electronics Eng., Aust., Vol. 7, No. 3, 1987, pp. 159-165.

-, "Performance Modelling for a Tactical Trunk Network", Proc. 22nd IREECON, Melbourne (1989), pp. 439-442.

E.W. Aslaksen, "Clear Project Definition is Crucial", Engineers Australia, November 1989, pp. 18,19.

-, "Coming Up? Going Down!", Engineering World, August 1991, pp. 18-22.

-, "CALs in the Wider Context of Systems Engineering", Proc. CALS Australasia '91, Sydney, 1991.

E.W. Aslaksen, W.R. Belcher, N. Law, P.G. Lewis, and K.W. Yates, "A professional strand in undergraduate engineering education: Its relevance to professional practice and context", Proc. Australasian Assoc. Eng. Education, University of Queensland, December 1992.

E.W. Aslaksen, W.R. Belcher, T.W. Cole, J.R. Glastonbury, and P.J. Parr, "The Australian Graduate School of Engineering Innovation", Proc. Australasian Assoc. Eng. Education, University of Queensland, December 1992.

E.W. Aslaksen, "Formulation of the Optimal Repair Policy Problem Within the Framework of Systems Engineering", Proc. 3rd Int'l Symposium, National Council of Systems Engineering, Arlington, July 1993.

R. Harwell, E.W. Aslaksen, R. Mengot, I. Hooks, and K. Ptack, "What Is a Requirement?", Proc. 3rd Int'l Symposium, National Council of Systems Engineering, Arlington, July 1993.

E.W. Aslaksen, "A Leadership Role for NCOSE", Proc. 4th Int'l Symposium, National Council of Systems Engineering, San Jose, August 1994.

E.W. Tota and E.W. Aslaksen, "Implementing a high-technology mining strategy at Northparkes Mines", Conference on Robotics & Automation in Mining, Sydney 4-5 September 1995 (AIC Conferences)

E.W. Aslaksen, "Systems Engineering as a Design Process", Proc. SESA '95, 6 October 1995 (IE Aust technical society).

-, "Contract Mining in the Context of Mine Development Under an EPCM Regime at Northparkes Mines", Second Annual Australian Contract Mining Conference, Perth, 17/18 June 1996 (AIC Conferences).

-, "Engineering Management - Ergonomics of the Mind", Portland Int'l Conf. on Management of Engineering and Technology, Portland, WA, 27-31 July 1997.

-, "Award Winning Northparkes Mine", What's New in Process Engineering, February 1999.

-, "High-Level Dynamics of Maintained Systems", Trans. of Multi-disciplinary Engineering, Australia, Vol. GE22, 1999, pp. 23-36.

-, "Focusing on The Bottom Line", Proc. Twelfth Int'l Symposium of INCOSE, Las Vegas, 2002.

-, "Total Cost Optimisation", Proc. Twelfth Int'l Symposium of INCOSE, Las Vegas, 2002.

-, "A Model of System Coherence", Systems Engineering, Vol.6, No.1, 2003, pp.19-27.

-, "Requirements Definition - A Plea for a Return to English", Proc. Thirteenth Int'l Symposium of INCOSE, Arlington, VA, 1-3 July 2003.

R.S. Carson *et al*, "Requirements Completeness", Proc. Fourteenth Int'l Symposium of INCOSE, Toulouse, France, 20-24 June 2004.

E.W. Aslaksen, "A Critical Examination of the Foundations of Systems Engineering", half-day tutorial, Proc. Fourteenth Int'l Symposium of INCOSE, Toulouse, France, 20-24 June 2004.

- , "System Thermodynamics: Complexity Emerging from Simplicity", Systems Engineering, Vol.7, No.3, 2004, pp. 271-284.

- , "Systems Engineering and the Construction Industry", position paper in the panel "Requirements Definition in Commercial Industry", Proc. Fifteenth Int'l Symposium of INCOSE, Rochester, NY, 10-14 July 2005.

- , "The Boundaries of Systems Engineering", Opening Keynote Address at SETE 2006, Melbourne, in Proc. SETE 2006.

- , "System Thermodynamics and the Concept of a System Temperature", Proc. SETE 2007, Sydney, September 24-27, 2007.

- , P. Brouwer, and P.J.P. Schreinemakers, "Designing the Construction Process", Proc. Eighteenth Int'l Symposium of INCOSE, Utrecht, The Netherlands, 15-19 June 2008.

Farnham, R. and E.W. Aslaksen, "The Application of Systems Engineering to Infrastructure Projects", Proc. Spring Conference 2009, INCOSE UK Chapter, <http://www.incoseonline.org.uk>.

E.W. Aslaksen, "Why Software is Different", SESA Newsletter No.48, July 2009.

- , "The System Concept and Its Application to Engineering", keynote address at COGIS 2009, Paris, 16-18 November 2009, <http://www.cogis2009.org>.

- , "Languages and Models in Systems Engineering", 4<sup>th</sup> Asia-Pacific Conf. on Systems Engineering, Keelung, Taiwan, 4-6 October 2010.

- , "A System Approach to Flash Dryer Design", 4<sup>th</sup> Asia-Pacific Conf. on Systems Engineering, Keelung, Taiwan, 4-6 October 2010.

- , "The Concept of Emergence, and a Simple Example", SESA Newsletter No. 52, November 2010.

- , "Elements of a Systems Engineering Ontology", Proc. SETE 2011, Canberra, 2-4 May, 2011.

Farnham, R. and E.W. Aslaksen, "Systems Engineering in modern power plant projects: 'Stakeholder Engineer' roles", CSDM, Paris 7-9 November 2011.

Aslaksen, E.W, "Infrastructure Control Modelling Language (ICML)", Proc. 22nd Int'l Symposium of INCOSE, Rome, 9-12 July 2012.

- , "An Engineer's Approach to the Philosophy of Engineering." Abstracts of 2012 Forum on Philosophy, Engineering, and Technology. Beijing, China.

- , "The Engineering Paradigm", Int'l J. of Engineering Studies, vol. 5, No. 2, 2013, pp. 129-154.



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- , "Systems Engineering and the Engineering Paradigm", Proc. SETE 2014, Adelaide, 28-30 April 2014.
- , "The Value of Engineering to Society", Abstracts of 2014 Forum on Philosophy, Engineering and Technology, Blacksburg, VA, 27-29 May 2014.
- , "Systems and Projects", Proc. 24<sup>th</sup> Int'l Symposium of INCOSE, Las Vegas, NV, 30 June-3 July 2014.
- , "The Relationship Between Engineers and Society: is it currently fulfilling its potential?", Journal and Proceedings of the Royal Society of New South Wales, vol. 148, nos. 455 & 456, 2015, pp. 28-43.
- , "The Future of Engineering", Journal and Proceedings of the Royal Society of New South Wales, vol. 148, nos. 457 & 458, 2015, pp. 159-165.
- , "Technology, Ethics, and Survival", Abstracts of 2016 Forum on Philosophy, Engineering and Technology, Nürnberg, 18-20 May 2016.

In addition, a number of papers and monographs are published on the company website, [www.gumbooya.com](http://www.gumbooya.com).

### Books

- E.W. Aslaksen, "Quantum Electronics", Vogel-Verlag, Wurzburg, Germany, 1976 (in German; Hungarian edition 1978).
- E.W. Aslaksen and W.R. Belcher, "Systems Engineering", Prentice-Hall, 1992.
- E.W. Aslaksen, "The Changing Nature of Engineering", McGraw-Hill, 1996.
- , "Designing Complex Systems: Foundations of design in the functional domain", CRC Press, 2008.
- , "The System Concept and Its Application to Engineering", Springer, 2013.