

# Modern Systems Engineering: A driving force for industrial competitiveness!

Heinz Stoewer

*President Space Associates GmbH, Germany*

*President elect, International Council on Systems Engineering, INCOSE*

*heinzstoewer@compuserve.com*

What effects on our engineering practices can we expect from the rapid changes in industry? Global industrial networks with distributed operations and worldwide competence centres require different engineering practices when compared to the past. Their requirements call for virtual presence, real-time communication means, and extensive database and tools compatibilities. Global markets and competitive postures will continue to dominate the engineering environments.

What are the needs, requirements, constraints and opportunities for future systems – and software engineers?

International environments foster teamwork, multicultural communication and flexible means of R&D, production and distribution of goods. Future engineers need to possess an ever growing set of capabilities beyond traditional engineering skills. Soft skills are in strong demand and determine industrial hiring priorities and training agendas. System engineers, but also software engineers, need to possess more and more of such soft skills to succeed in their job environments.

This lecture, using examples from aerospace technology, will highlight developments in the application of modern systems engineering practices as drivers for industrial competitiveness.

Systems engineering, once a domain of senior technical generalists, with an ability to bridge several specialist fields to create good “technical” solutions, is developing into a node within the industrial “skills web”. Modern systems engineering has to assimilate market, business and after sales servicing aspects into successful technical concepts. This process requires the integration of soft parameters and hard engineering facts, a demand for which engineers generally are not trained for. Competitive concepts are however not measured on the basis of their technical merits, however genial, but on how they fare in the market, whether they yield a good return on investment and profitability, and whether they stand up to operational, maintenance and after sales servicing realities. The environment for systems engineering has thus drastically changed. Competitiveness advancements are the force behind and the challenge for modern systems engineering practices. Some examples,

notably from the aerospace and automobile industries, as well as from some trends from recent INCOSE studies aimed at identifying future “Technical Perspectives and Visions” for systems engineering, should exemplify these points throughout this keynote presentation.

Professor Stoewer holds degrees in technical physics, economics and systems management. From 1962 he worked at Bölkow GmbH (today Daimler-Chrysler Aerospace/Astrium) and from 1967 at McDonnell Douglas Astronautics Company/Boeing in the fields of launchers and manned space systems. As from 1973 he worked at the Technical Centre of the European Space Agency, ESTEC, as Programme Manager Spacelab; in 1978 he founded ESA’s Systems Engineering and Programmatic Department. In 1990 he became Managing Director in the newly created German Space Agency DARA GmbH for the utilization programmes and later for all German national and international space projects. Additional functions included Chairman of ESA’s Programme Board for Earth Observation and Meteorology, Executive Chairman of the International Committee on Earth Observation (CEOS) and other national and international assignments, such as member of the German delegation to the ESA Council and the EU’s Space Advisory Group.

In 1995, after retirement from DARA, he became president of the newly founded Space Associates GmbH, a company consulting internationally on space matters.

Between 1987 and 2001 he was parttime professor for space systems engineering at Delft University of Technology. 1995 he became Founding Director of the international postgraduate Space Systems Engineering Master Programme SpaceTech.

He is a member of a number of international scientific and industrial boards, such as the Board of Trustees of the International Academy of Astronautics (IAA), chair of its Engineering Section, member of the Senate of the German Aerospace Society (DGLR), chair of the Dutch Space Advisory Committee, and President elect of the International Council for Systems Engineering (INCOSE). He has authored numerous scientific/technical publications and holds various national and international awards.