

## Activities and Challenges for the Newly Forming IEEE Systems Council

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### **Need for Systems Focus**

Most of the focus within the worldwide industry today is in the integrated systems environment, although this may not be readily recognized as such since our global definition of “systems” and “system-of-systems” has gradually evolved without the umbrella overview that typically provides the systems-level focus. The term “systems engineering” actually was brought to popular use by Western Electric in the late 40’s as Western Electric designed the telephone communications system and found that a top-level engineering view was needed to analyze requirements and allocate the technical solution to various design groups, and then assure that the required solution had indeed been achieved via exhaustive systems integration & test. The manufacturers of commercial aircraft today employ such systems-level thinking, and the aircraft itself, while indeed is a true “system-of systems” with heavy commercial, off-the-shelf content including flight control, entertainment, navigation, communications, seating, environmental, propulsion and similar, in fact the true system-of-systems also includes the ground support environment and similar off-aircraft systems. And in fact, that aircraft and its related systems are part of an overall system-of-systems called a transportation system, which unlike the commercial aircraft which did have umbrella systems thinking at the outset, gradually evolved as technology evolved and provided additional components of the overall transportation system that we enjoy today. The true “systems-level” thinking of our current transportation systems has in fact occurred very late in the game and has only been able to influence a small portion of the overall.

Systems focus includes the discipline of systems engineering and its attendant components. To underscore the need for the engineering as well as application focus, the United States Air Force, after exhaustive study in 2004, has found that fully 1/3 of all their programs are at least 2 years behind schedule and 50% over budget, and the single common contributor to this sad situation is a lack of appropriate systems engineering. Subsequent plans are being put in place to address the issue by strengthening systems engineering discipline and content, and introduce “systems thinking” in their programs. Systems thinking is essential in the world today, not only for technical systems but also for society at large. It applies not only to the engineering design from the ground up for individual systems, and systems-of-systems, but also to the implementation of such things as transportation infrastructure and operation, banking and finance systems, manufacturing and production systems, help-desk operation, and many more.

### **The IEEE Systems Council**

The purpose of the IEEE Systems Council is to advance and coordinate work in the field of system design, development and management carried throughout the IEEE. The Council sponsors the Systems Conference, publishes the Systems Journal and maintains the Systems Council website. The Council is also establishing a Distinguished Lecture Program and developing a series of workshops focused on healthcare. The Systems Council exists for the benefit of the member societies and the primary goal of the Council is to expand the IEEE's role within multiple disciplines related to systems and system-of-systems. The Council integrates IEEE activities regarding aspects of multiple disciplines and specialty areas associated with the engineering of systems such as:

- Systems engineering, education, standards, processes and methodologies
- Modeling, simulation and integration related to design, testing, production and support

- Design aspects for robust design, human factors, safety, security and usability
- Transition of products from design to production, deployment and use
- Quality control and system management
- Program/product/project management interactions
- Risk management
- Systems architecture

The Systems Council conducted a series of meetings with a subset of the IEEE Society Presidents. The primary outcome of these meetings was a consensus of the presidents that the Council needed to focus on a particular topic and identify specific activities in which their societies and members could participate. The Systems Council has decided to focus on healthcare as the first topic. The Council is establishing a committee to design and conduct a series of workshops to help identify specific topics and areas that will lead to an interdisciplinary conference and publication.

The Systems Council is currently looking for volunteers that would be interested in participating in the design and implementation of the workshops and potentially taking a leadership role in the conference and the publication. Contact the author for further information.

One additional activity that the Council is initiating with the help of IEEE Educational Activities is an accreditation and comprehensive certification program for systems engineering, as there is a perceived need for this within industry. This effort is just beginning and a need survey is the first step, the results of which will establish the path forward in this important activity.