



INTERNATIONAL COUNCIL ON SYSTEMS ENGINEERING
Systems Engineering Applications Technical Committee

Systems Engineering Applications Technical Committee (SEATC) Organization Report

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NASA has a history of supporting technology transfer to the general public. The Computer Software Management and Information Center (COSMIC) at the University of Georgia facilitates transfer of NASA-developed computer code and documentation. The monthly *NASA Tech Briefs* magazine provides descriptions of new technology and applications developed or sponsored by NASA and sources for additional information appropriate. NASA's National Technical Transfer Center (NTTC) provides information to potential users regarding technology developments made by NASA and its contractors. NTTC information is customized to meet each user's needs and provides information on contractor contracts, licensing, cooperative agreements, and other aspects of the NASA technology transfer program.

NASA has been a key player in creating and maintaining strong technical capabilities in the U.S. economy. In an environment of reduced Federal budgets for science and technology, NASA is developing additional methods for technology transfer, commercializing its technology, and expanding its partnerships and other cooperative efforts with commercial firms, universities, and international partners.

This document benefits all organizations interested in the discipline and practice of systems engineering. It also offers the opportunity for technology transfer across application domains. This document will continually mature and provide a written resource for examining the activities, organization, and issues related to the SEATC.

Acknowledgments

To the Reader

Purpose

This document introduces the technical activities of the International Council on Systems Engineering (INCOSE) on the Systems Engineering Applications Technical Committee (SEATC) and all of its working groups and interest groups. It attempts to document the charters, 1-year goals, membership, and products for all of the SEATC working groups and interest groups. This document also proposes future directions for INCOSE's SEATC.

Organization

This document has eleven chapters and eight appendixes:

- Chapter 1 introduces INCOSE and its technical board, technical committees, and supporting groups.
- Chapter 2 introduces INCOSE's SEATC and its working groups and interest groups.
- Chapter 3 introduces the Commercial and Public Interest Working Group.
- Chapter 4 introduces the Infrastructure Systems Engineering Working Group.
- Chapter 5 introduces the Joint Commercial Aircraft Working Group.
- Chapter 6 introduces the Resource Management Working Group.
- Chapter 7 introduces the Telecommunications Working Group.
- Chapter 8 introduces the Environmental and Waste Management Interest Group.
- Chapter 9 introduces the Health Care Interest Group.
- Chapter 10 introduces the Motor Vehicles Interest Group.
- Chapter 11 introduces the Railway Transportation Interest Group.
- Appendix A lists INCOSE's technical committees, working groups, and interest groups.
- Appendix B contains the INCOSE Strategic Plan (as of February 1997).
- Appendix C contains the historical legacy of the SEATC (from 1995 through 1999).
- Appendix D lists the INCOSE SEATC membership.
- Appendix E contains the SEATC Multilevel Participation Plan.
- Appendix F contains the SEATC product list.
- Appendix G contains the SEATC software engineering applications papers listed by domain and year of publication.
- Appendix H contains the SEATC-sponsored panel sessions.

To the Reader

How To Receive More Information

For further information regarding INCOSE, including membership, location of local chapters, international symposium materials, etc., contact

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Appendix A—INCOSE Technical Committees, Working Groups, and Interest Groups

Appendix B—INCOSE Strategic Plan (Status as of February 1997)

Appendix C—Historical Legacy of the SEATC

Appendix D—INCOSE SEATC Membership

Appendix E—Multilevel Participation Plan

Appendix F—SEATC Products List (As of January 2000)

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1 INCOSE Technical Activities

The International Council on Systems Engineering (INCOSE) is a professional organization in its eighth year that has grown to more than 3,200 members in 18 countries, 38 chartered chapters (with an additional 4 in formation), and 31 corporate sponsors.

INCOSE's mission is to foster the definition, understanding, and practice of world-class systems engineering in industry, academia, and government.

The goals of INCOSE are to

- Provide a focal point for disseminating systems engineering knowledge
- Promote collaboration in systems engineering education and research
- Ensure the establishment of professional standards for integrity in the practice of systems engineering
- Improve the professional status of all persons engaged in the practice of systems engineering
- Encourage governmental and industrial support for research and educational programs that will improve the systems engineering process and its practice

The overall direction of INCOSE is the responsibility of an executive committee consisting of the President, the President Elect, the Secretary, and the Treasurer. The executive committee and directors compose the board, which guides INCOSE activities. Administrative committees include Ways and Means, Symposium, Membership, Communications, and Chapters. All INCOSE technical activities fall under the direction of the INCOSE Technical Board.

1.1 Technical Board

The Technical Board directs the technical activities of INCOSE and is focused outward. It examines the technical requirements of the INCOSE Corporate Advisory Board (CAB), the Board of Directors, other professional organizations (e.g., IEEE, ASME, AIAA, SEI), and the INCOSE membership. The goal of the Technical Board is to produce INCOSE products that meet the needs of these groups—the customers. The board meets its goal through its technical committees.

1.2 Corporate Advisory Board

CAB members are senior representatives from corporate sponsors that have provided financial support to INCOSE. The CAB articulates the voice of the customer and provides guidance on the direction of the organization. The current corporate sponsors are

- Aerojet
- Aerospace Corporation
- AlliedSignal Inc.

INCOSE Technical Activities

- Ascent Logic Corporation
- Boeing Company
- Boeing Company–Military Aircraft & Missile Systems
- Charles Stark Draper Laboratory
- Daimler Chrysler Aerospace/AG Dornier Satellitensysteme GmbH
- Defence Evaluation and Research Agency
- Delphi Automotive Systems
- Department of Energy – Idaho
- GEC Marconi
- General Dynamics Corporation
- Honeywell Inc.
- Hughes Electronics Corporation
- Jet Propulsion Laboratory
- Litton/PRC
- Litton/TASC
- Lockheed Martin Corporation
- Mitre Corporation
- Motorola
- Naval Surface Warfare Center Dahlgren Division
- Northrop-Grumman Corporation
- Raytheon Systems Company/HAC
- Raytheon Systems Company/RES
- Raytheon Systems Company/RTIS
- Rockwell Collins Avionics & Communications
- Science Applications International Corporation (SAIC)
- Software Productivity Consortium
- TRW Systems & Information Technology Group
- United Technologies

One way that the CAB expresses the needs of the corporate customer is with a list of CAB priority needs. These needs are assigned to a specific technical working group and are closed with the acceptance of an INCOSE product that meets the need. New needs are added and previous needs are closed at the two CAB meetings held each year. The CAB has expressed its

needs through the INCOSE Strategic Plan (Appendix B). The primary strategic objectives of that plan are listed in Table 1–1.

Table 1–1. INCOSE Strategic Objectives

Objective		Description
1	INCOSE customers	Identify, describe, and understand the customers and their systems engineering related needs. Seek to ensure that INCOSE’s membership strives to understand both the diversity of the customers and the variations in their needs.
2	Products and services	Identify, develop, provide, and continually improve a diverse and expanding set of products and services that meet or exceed the expectations of INCOSE’s customers. Strive to create new and innovative products and services.
3	Communication	Become so publicly recognized and so reliable a source of information about systems engineering development and use that INCOSE is the primary reference for the industry, academia, government, and the media.
4	Membership	Attract, retain, and engage individual members and corporate sponsors from all organizational levels in the engineering, manufacturing, and service sectors from industry, academia, and government throughout the industrialized world.
5	Outreach and collaboration	Increase INCOSE’s ability to raise awareness of systems engineering principles and increase their application through collaboration, partnership, and support of related efforts by other technical societies and organizations.
6	Theory, research, and education	Identify opportunities for, facilitate sponsorship of, and disseminate rigorous professional research in typical areas that are or could become important to systems engineering and society at large. Seek to expand both the quantity and quality of academic and industrial research that is focused on growing the body of systems engineering theory and knowledge. Promote education and training on the systems engineering discipline.
7	International, national, and regional involvement	Become a known and respected presence and resource in the advocacy and support of international, national, and regional initiatives that would benefit from world-class systems engineering.
8	Structure and operations	Evolve INCOSE’s structure and operations to effectively and efficiently support a growing membership and constituency.

1.3 Technical Committees

Many INCOSE members participate on one or more of the numerous technical working groups organized under the following technical committees:

- Education and Research
- Systems Engineering Applications
- Measurement
- Modeling and Tools
- Systems Engineering Management
- Systems Engineering Processes and Methods

The technical committees are focused inward. They implement the technical needs in their respective areas and review the results and help establish goals and budgets. Their primary tools are chartering and coordinating working groups.

1.4 Working Groups and Interest Groups

Working groups examine topics related to the practice of systems engineering, such as risk management, requirements management, concurrent, engineering, system integration, standards and handbooks, process description, architecture definition, metrics, benchmarking tools, capability assessment, and commercial practices. The working groups focus on a particular need, doing the technical and definition work to solve that need. They produce the results.

Interest groups also exist, sometimes within a local geographic area for rapid progress. Because of the nationwide nature of working groups, they may charter interest groups to create specific products. Interest groups may also form bottom up to address perceived needs and thereby influence the board and committees to charter formal groups. Any technical activity organized at a local chapter level is an interest group activity. Appendix A lists the current working groups and interest groups and a contact person for each.

1.5 Local Chapter Activity

Local chapters are the heart of INCOSE. These chapters exist in different geographic areas to further meet INCOSE's objectives at the local level. Table 1–2 lists the current active chapters.

Table 1–2. Current INCOSE Chapters

Region	Name	Location
I	Heartland Snake River North Star Midwest Gateway Tri-Cities Seattle Metro Vancouver	Cedar Rapids, IA Idaho Falls, ID Twin Cities, MN St. Louis, MO Richland, WA Seattle, WA Vancouver, British Columbia, Canada
II	Central Arizona Southern Arizona Inland Empire Los Angeles Area San Diego San Francisco Bay Area Colorado Front Range Silver State Wasatch	Phoenix, AZ Tucson, AZ San Bernardino, CA Los Angeles, CA San Diego, CA Silicon Valley, CA Denver, CO Las Vegas, NV Salt Lake City, UT
III	France (Emerging) Germany The Netherlands Norwegian SE Council Sweden (Emerging) United Kingdom	Paris, France Munich, Germany Northwest Europe, The Netherlands Oslo, Norway Stockholm, Sweden United Kingdom
IV	Constitution New England Tri-State Liberty Wright-Patterson AFB Delaware Valley Montreal (Emerging)	Hartford, CT Boston, MA Detroit, MI Whippany, NJ Dayton, Ohio Philadelphia, PA Montreal, Quebec, Canada
V	Huntsville Space Coast Central Florida Chesapeake Southern Maryland Central Savannah River North Texas Texas Gulf Coast	Huntsville, AL Melbourne, FL Tampa, FL Columbia, MD Patuxent River, MD Aiken, SC Dallas/Ft. Worth, TX Houston, TX

INCOSE Technical Activities

Region	Name	Location
	Central Virginia Hampton Roads Area Washington Metro	Fredericksburg, VA Hampton Roads, VA McLean, VA
VI	Systems Engineering Society of Australia (affiliate with four chapters) Israel (Emerging)	Australia Israel

1.6 Technical Products

INCOSE has a communications policy on the form and approval requirements for different technical products. The products include proceedings from the annual symposia in the formats of printed volumes and CD-ROM, handbooks and guidebooks, a systems engineering journal, and the INCOSE Internet offerings. The quarterly newsletter, *INCOSE INSIGHT*, has grown to 32 pages per issue and serves as one of the many ways INCOSE communicates with its membership. INCOSE has a presence on the World Wide Web at www.incose.org and conducts online discussions through an Internet listserver.

Publications related to technical products and available from the INCOSE Web site are shown in Table 1-3.

Table 1-3. Publications

Reference No.	Title	Release	Date
INCOSE-TB-001	INCOSE Technical Community Organization	97-1	May 15, 1997
INCOSE-TB-002	INCOSE Technical Community Procedures Handbook	1.1	August 1, 1997
INCOSE-TB-003	INCOSE Technical Products and Services Plan	97-1	May 15, 1997

2 Systems Engineering Applications Technical Committee

The Systems Engineering Applications Technical Committee (SEATC) of INCOSE is concerned with expanding the use of systems engineering in all application domains. Although business with defense is not excluded, the focus of the committee is on commercial and public interest activities. INCOSE's technical activities to date in this area have been concerned with information exchange and planning. This product of the SEATC serves as documentation of the charter, 1-year goals, membership, and products for each SEATC working group and interest group.

2.1 History

The concept of INCOSE technical activities in systems engineering applications started at the 1992 symposium in Seattle with the creation of a Commercial Applications Working Group led by Randy Iliff. A separate Resource Management Working Group was started at the same time by Fred Martin. Early discussions centered on the different industry segments and applications areas where systems engineering (in many cases under a different name) was being successfully practiced. The importance of not simply transferring the defense model of systems engineering to other applications areas was stressed. The various interest groups decided in 1993 to meet as a single body under the Emerging Applications Technical Committee. Bob Coyne became chairperson of the group at the 1993 symposium. Rich Mintz volunteered to facilitate the group's efforts for 1994. The group merged onto the information highway in April 1994 with the first distribution of its monthly activity report by E-mail. At the January 1995 annual business meeting, William Mackey and Cecilia Schuster agreed to create their first draft of the *Emerging Applications White Paper* and to direct the Emerging Applications Working Group (EAWG) efforts in the near term. The EAWG approved its charter, set goals for 1995–96, and released the *Emerging Applications White Paper* at the July 1995 symposium. At that symposium, William Mackey was elected to a 2-year term as chairperson and Carolyn Buford was appointed as cochairperson. In January 1997, William Mackey became the chairperson of the SEATC and has continued in that role to the present time. During this period, the working groups and interest groups have expanded from three in 1995 to nine in 2000.

2.2 Charter

The SEATC promotes the application of systems engineering to the cost-effective development and management of commercial and public interest systems and issues. The SEATC often coordinates with other INCOSE technical committees and working groups to achieve its objectives.

The SEATC achieves its objectives by providing a forum through INCOSE for education and focused exchanges among the international aerospace and defense practitioners of systems engineering; their counterparts in other commercial enterprises; and national and local

Systems Engineering Applications Technical Committee

government planning and policymakers, particularly those who affect the deployment of resources and the quality of the environment.

The SEATC shall understand the unique needs of commercial and public interest users of systems engineering and disseminate these needs to the other parts of INCOSE.

The SEATC shall articulate and disseminate the fundamental principles and benefits of systems engineering to commercial and public interest users and transfer the lessons learned from these systems engineering applications to the other parts of INCOSE.

2.3 Historical Legacy

Refer to Appendix C.

2.4 Future Goals

The SEATC uses a goal-driven basis for carrying out its activities. Each year a new set of goals is established by the working and interest group chairpersons, and the activities are monitored against those goals. The goals for the years 1995 to 1999 are discussed in Appendix C.

2.5 Membership

Refer to Appendix D.

2.6 Operating Procedures

The operating procedures of the SEATC are to

- Select chairpersons to moderate and direct all other working group and interest group activities
- Meet, at a minimum, at the annual symposium and the Winter Business Meeting
- Maintain a list of SEATC members

2.7 Organization

William Mackey is the current chairperson of the SEATC. The Commercial and Public Interest Working Group (CPIWG), chaired by Jerry Bauknight, is the core working group in the SEATC. The CPIWG maintains the INCOSE *Systems Engineering Applications Profiles (SEAP)* document and acts as the core working group for newly generating interest groups in each application domain. Once an application domain has gained sufficient momentum and a nucleus of members with the same interest, a special interest group is formed. The SEATC coordinates the activities of all working and interest groups and is represented on the Technical Board by William Mackey, Scott Jackson, and Ralph Godau.

The SEATC has divided into sectors of responsibility, as meaningful groups of application domains, and the three cochairpersons of the SEATC each take three working/interest groups to assist and monitor. This responsibility gives the working/interest group chairpersons the attention

that may be required from time to time. The application domain divisions that have been decided upon are as follows:

- Transportation Sector – Scott Jackson
 - Joint Commercial Aircraft Working Group (JCAWG) – Greg Mathers, and Erwin Duurland
 - Motor Vehicles Interest Group (MVIC) – Paul Berry
 - Railway Transportation Interest Group (RWTIG) – John Williams and Jeff Allan
- Resources Sector – Ralph Godau
 - Infrastructure Systems Engineering Working Group (ISEWG) – Pat Sweeney and Ralph Godau
 - Resource Management Working Group (RMWG) – Ted Dolton and Bill Cutler
 - Environmental Restoration and Waste Management Interest Group (ER&WMIG) – Ralph Hill
- Public Services Sector – William Mackey
 - Commercial and Public Interest Working Group (CPIWG) – Jerry Bauknight and William Mackey
 - Telecommunications Working Group (TELWG) – Tom Bagg and Martin Warner
 - Health Care Interest Group (HCIG) – John Zaleski

2.8 CAB Requirements

One active CAB priority need is assigned to the SEATC:

Describe examples of engineering and management process that led to successful complex commercial products.

This priority need is assigned to the SEATC.

2.9 Evolution of SEATC Working Group/Interest Group Development

To understand the status of the SEATC organization, the SEATC established a set of criteria in 1997 for the evolution of working/interest groups. Every year they evaluate each of the SEATC working/interest groups against the criteria. The eight-step criteria shown in the Table 2–1 may be useful to other INCOSE technical committees. The recently formed MVIC and HCIG are just beginning these steps. After completing the first four steps, an interest group is reevaluated as a potential working group.

The present status of each of the nine working/interest groups is shown in Table 2–2. For each criterion, the particular working/interest group has been judged fully compliant, partially compliant, or not-yet compliant based on the evidence available.

Table 2–1. Steps for the Progression of Working/Interest Groups

Interest Group Progression
Step 1: Develop charter for working/interest groups
Step 2: Develop 1-year goals
Step 3: Create nucleus of 3 to 6+ interested members
Step 4: Identify list of potential working group products
Working Group Progression
Step 5: Create profile for SEAP document
Step 6: Develop working group product(s)
Step 7: Communicate working group activities (via INSIGHT, symposia, journal)
Step 8: Create liaisons (with local chapters, universities, companies, societies)

Table 2–2. Status of SEATC Working/Interest Group Evolution

STEP	CPIWG	ISEWG	JCAWG	RMWG	TELWG	ER&WMIG	HCIG	MVIG	RWTIG
Interest Group Progression									
1	!	!	!	!	!	—	—	—	—
2	!	!	!	!	!	#	!	!	#
3	!	!	!	!	!	!	—	#	#
4	!	!	!	!	!	#	—	—	#
Working Group Progression									
5	!	!	!	!	!	#	#	#	—
6	!	#	!	!	#	#	—	—	#
7	!	!	!	!	!	!	—	—	—
8	!	—	!	!	—	!	—	—	#

- ! Fully compliant
- # Partially compliant
- Not-yet compliant

3 Commercial and Public Interest Working Group

3.1 Charter

The charter for the INCOSE Commercial and Public Interest Working Group (CPIWG) was revised and approved for the Application Forum Working Group meeting on January 24, 1996. The AFWG name was changed to CPIWG on July 8, 1998.

3.1.1 Background

At the INCOSE Symposium held in Seattle, Washington, in July 1992, a working group was formed devoted to expanding the frontiers of systems engineering. At that time, it was named the Resource Management and Environmental Planning Working Group.

In 1993, a few local INCOSE chapters, such as the INCOSE Washington Metropolitan Area (WMA) Chapter, created local groups and gave them names such as the Civil Sector Working Group of the INCOSE WMA Chapter.

In 1994, an INCOSE Emerging Applications Technical Committee and an Emerging Applications Working Group (EAWG) were formed. Working groups focusing on special application domains were also formed at the local chapter level.

In 1995, the EAWG met at the Fifth International Symposium of INCOSE in Saint Louis, Missouri. Dr. William Mackey was elected chairperson of the EAWG for a 2-year term and the charter was revised and approved.

During January 1996 at the Annual INCOSE Business Meeting in Melbourne, Florida, the name of the working group was changed to the AFWG and the charter was revised to reflect the name change. The committee was named the Systems Engineering Applications Technical Committee (SEATC). Subsequently, during a SEATC conference call in July 1998, the working group name was changed from the AFWG to the CPIWG. The charter that follows is substantially the same as the one created in January 1996 and is the unanimously approved product of the members in attendance at the January 1996 meetings of the AFWG and the July 1998 conference call of the SEATC.

3.1.2 Purpose

The purpose of the CPIWG is to (1) facilitate the introduction and use of systems engineering principles, techniques, and practices to a wide range of applications in government and private industry, and (2) provide INCOSE a forum to exchange the successful practices that result in high-quality goods and services at affordable and appropriate cost.

3.1.3 Objectives

The chief means by which the CPIWG accomplishes its purpose is through development and sponsoring of activities within the INCOSE and local chapters.

Commercial and Public Interest Working Group

The objectives include, but are not limited to, improving the people, processes, and resources used in the systems engineering mission as follows:

- People
 - Enunciating career opportunities for systems engineering in applications domains
 - Recruiting qualified systems engineers to membership
 - Sponsoring professional programs at INCOSE meetings to exchange systems engineering techniques and practices used in application domains
 - Maintaining a forum within INCOSE to address technology and applications issues
 - Developing informational outreach programs to promote the successful application of the systems engineering approach
 - Representing INCOSE with other professional societies
- Processes
 - Identifying analogies within commercial and public interest applications
 - Improving the systems engineering process within commercial and public interest applications
 - Reviewing and promulgating professional standards for the practice of systems engineering in commercial and public interest applications
 - Maintaining a forum to exchange the successful practices and processes used in commercial and public interest applications
 - Acting as a start-up group for systems engineering application domains of interest
- Resources
 - Maintaining a list of resources useful to systems engineers practicing in systems engineering applications domains
 - Identifying automated tools and their capabilities
 - Facilitating interaction with other groups

3.1.4 Description

The CPIWG is an association of INCOSE members who are engaged in the practice of systems engineering in contexts that include social agencies, Federal and non-Federal government agencies, and small and large businesses in commercial and public interest applications.

Applications domains that have been represented and/or suggested to date include the following:

- Agriculture
- Commercial Aircraft
- Commercial Avionics

- Criminal Justice and Legal Systems
- Drug Abuse Prevention
- Emergency Services
- Energy
- Environmental Restoration
- Facilities
- Food Service
- Geographic Information Systems
- Health Care
- Highway Transportation Systems
- Housing and Building Systems
- Information Systems
- Manufacturing
- Medical Devices
- Motor Vehicles
- Natural Resource Management
- Political and Public Interest Systems
- Service Industries
- Space Exploration
- Telecommunications
- Transportation
- Urban Planning
- Waste Management and Disposal

The application of systems engineering to these topics offers challenging opportunities for discourse between professions and expanding systems engineering. Any one of these topic areas, if developed, could be represented by an interest group or a working group. Placing these topic areas in the CPIWG does not suggest they are unfamiliar to systems engineering; the CPIWG gives these applications the opportunity to be heard and systems engineering the necessary breadth to continue moving into the 21st century.

Commercial and public interest applications have much to offer the traditional practices of systems engineering, and systems engineering can be applied to a wide range of applications with significant benefit.

Commercial and Public Interest Working Group

3.1.5 Structure and Operation

The CPIWG is composed of members of INCOSE who have interest in one or more of the systems engineering application domains cited previously. The policies and activities of the CPIWG are governed by a board elected by the CPIWG members at an annual symposium of INCOSE. Local working groups are elected or appointed from their local chapters.

CPIWG board consists of the following members:

- Chairperson, elected by the membership at the INCOSE annual symposium for a 2-year term
- Cochairperson(s), selected by the elected chairperson
- Secretary, selected by the elected chairperson

The responsibilities of the CPIWG chairperson are as follows:

- Direct CPIWG meetings
- Coordinate logistics for such meetings
- Ensure meeting minutes, agendas, and newsletters are prepared and distributed
- Establish the annual goals for the CPIWG
- Prepare committee reports as required
- Interface with the INCOSE Board and other working groups
- Support coordination of the CPIWG activities

The responsibilities of the CPIWG Cochairpersons and secretary are assigned by the chairperson.

3.1.6 Membership

Persons who might like to participate in developing the foundations of this working group as part of the INCOSE should contact either

Jerry Bauknight (408-756-4265 or jerry.bauknight@lmco.com) or
Dr. William Mackey (301-794-2138 or wmackey@csc.com)

The membership list will be maintained by a CPIWG cochairperson.

3.2 Historical Legacy

Refer to Appendix C.

3.3 Future Goals

The near-term goals of the CPIWG are to

1. Revise the SEAP, Version 3.0, for release in July 2000
2. Conduct one or two panel sessions at the INCOSE Annual Symposium in Minneapolis, MN, in July 2000.

3.4 List of Products

Refer to Appendixes F, G, and H.

Commercial and Public Interest Working Group

4 Infrastructure Systems Engineering Working Group

4.1 Charter

4.1.1 Background

At the INCOSE Annual Symposium held in St. Louis, Missouri, in July 1995, a few INCOSE members discussed the formation of a working group or interest group to exchange information on the application of systems engineering in the facilities environment.

During the Fall of 1995, announcements seeking members interested in “facilities systems engineering” and “facilities configuration management” were sent to those INCOSE members with e-mail addresses and also placed in the *INCOSE INSIGHT*. Seventeen responses were received by the first of January 1996.

At the INCOSE Winter Workshop in Melbourne, Florida, in January 1996, it was decided to proceed with the formation of a Facilities Systems Engineering Interest Group (FSEIG) that would report to the Systems Engineering Applications Technical Committee. It was concluded that facilities configuration management was a relatively narrow focus area and would, therefore, be more appropriate if included in the FSEIG.

At the INCOSE Annual Symposium, held in Boston in July 1996, the FSEIG met, elected officers, and ratified their charter.

During the Winter Workshop in Las Vegas in January 1997, the Interest Group identified a number of possible products, declared themselves a Working Group, and revised their charter.

At the INCOSE Annual Symposium, held in Brighton, England, in June 1999, the working group extended their scope from facilities to infrastructure as these are still made up of physical assets used to support products and services over their entire life and reflect common attributes. To reflect the change in scope, the FSEIG changed its name to the Infrastructure Systems Engineering Working Group (ISEWG).

4.1.2 Purpose

The main purpose of the ISEWG is to provide a forum to address and document the application of systems engineering to the technical management of infrastructure systems. It is also intended to integrate the lessons learned of other bodies of knowledge such as terotechnology, asset management, and facilities management and provide a framework for tailoring systems engineering to meet the technical management needs of “infrastructure” organizations. In particular, the ISEWG intends to follow the emergence of new practices such as Urban Systems Engineering and Life-Cycle Asset Management and assess the benefits of applying systems engineering principles.

4.1.3 Objectives

The objectives of the ISEWG are to promote and facilitate the practice of systems engineering at a broad level in infrastructure systems, specifically by

- Providing products that reflect how systems engineering can be used to improve the technical management of infrastructure systems through the
 - Concept of tailoring systems engineering to match the needs of ‘infrastructure’ organizations
 - Identification of unique aspects of systems engineering that can complement the existing technical management practices used by those infrastructure organizations, e.g., baseline development, configuration management
- Providing a forum for exchange of information
- Serving as a source of information to new practitioners
- Generating and maintaining appropriate good-practice guidance documents

4.1.4 Description and Scope

Infrastructure systems are defined as “systems that are fundamentally made up of a collection of interconnected physical assets and the integral technical and operational functions” that are used to support services or products over their entire life.

Infrastructure systems in this context refer to

- *Economic* infrastructure systems that support the generation of economic activity
- *Social* infrastructure systems that support the social well being
- *Political* infrastructure systems that support the political agenda

The scope of infrastructure systems comprises four domain classes:

- Fixed assets
- Network of assets
- Facilities
- Infrastructure

Included in these classes are the following domain types:

- Utilities—Electricity, water, sewerage, gas, telecommunication
- Economic infrastructure—Transport facilities, ports, airports, utilities, etc.
- Transport facilities—Roads, bridges, rail, trams, etc.
- Social infrastructure—Hospitals, schools, etc.
- Defense infrastructure—Military facilities, research establishments, testing facilities, etc.

- Commercial facilities—Shopping centers, technology parks, office buildings, etc.
- Manufacturing and processing facilities—Production facilities, plants, etc.

The infrastructure system domains have the following attributes:

- Relatively long life (life-cycle issues)
- Latent nature, e.g., impact of the political/business decision-making process
- Failures that have catastrophic social, economic, and political outcomes
- Knowledge dependent
- Requirements under review constantly
- Configuration management issues
- Baseline creation and maintenance through the operation phase
- Disposal issue—emerging environmental problems
- Large number of customers/users
- Changing customer base and technology
- Customer expectations to always improve the level of service
- Customers with intimate knowledge through the use of the system (historical perspective)
- Owners that attempt to match the needs of the customers (balancing short and long term perspectives)
- Issue of capability—How to measure
- Incremental development
- Long-term planning

4.1.5 ISEWG Structure and Operation

The ISEWG is governed by a board elected by the ISEWG members at the INCOSE annual symposium.

- The ISEWG board consists of the following members:
 - Chairperson(s), elected by the membership at the INCOSE annual symposium for a 2-year term.
 - Cochairperson(s), selected by the elected chairperson
 - Secretary, selected by the elected chairperson
- The ISEWG chairperson has the following responsibilities:
 - Direct ISEWG meetings
 - Coordinate logistics for such meetings

Infrastructure Systems Engineering Working Group

- Ensure meeting minutes and agendas are prepared and distributed
- Prepare reports as required
- Interface with the INCOSE Board, the Systems Engineering Applications Technical Committee Board, and other working groups and interest groups
- Delegate tasks and responsibilities to the ISEWG cochairperson(s) and the secretary as appropriate.

4.1.6 Membership

Persons interested in participating in the INCOSE ISEWG are requested to contact either

Pat Sweeney (931-454-4709 or Pat.sweeney@arnold.af.mil) or
Ralph Godau (61 3 0412 294 541 or rigodau@rmit.edu.au).

The membership list will be maintained by the ISEWG cochairperson.

4.2 Historical Legacy

Refer to Appendix C.

4.3 Future Goals

The near-term goals of the ISEWG are to

1. Edit the themed issue of *INSIGHT*, “Commercial Activities in INCOSE”
2. Redirect facility-focused activities to a broader scope of infrastructure activities

4.4 List of Products

Refer to Appendixes F, G, and H.

5 Joint Commercial Aircraft Working Group

5.1 Charter

A draft version of the Charter for the INCOSE Joint Commercial Aircraft Working Group (JCAWG) was prepared on April 14, 1999. The following subsections contain the contents.

5.1.1 Background

The members of the INCOSE JCAWG, whether they represent major aircraft companies, manufacturers of regional aircraft, regulatory agencies, subsystem suppliers, or other companies in the commercial aircraft domain, have come together because they recognize that aircraft are systems with their own unique functions and drivers. As a part of INCOSE, the only professional society devoted solely to the practice and principles of systems engineering, the JCAWG is dedicated to the principle that it can be both the unifying force to create a framework within which existing practices can reside and also augment these practices with sound systems engineering principles to create quality air transportation systems. As part of the INCOSE Systems Engineering Applications Committee (SEATC), the JCAWG believes that these goals can be accomplished.

5.1.2 Purpose

The JCAWG was established to define the potential benefits of applying system engineering processes, methods, and tools to the commercial aircraft enterprise area; provide system engineering professional guidance, influence, and leadership to define an action strategy for the application of system engineering to this area; and lead the implementation of the strategy so that the potential benefits can be achieved.

5.1.3 Objectives

The primary objectives of the JCAWG are as follows:

1. Establish a forum and focus for commercial aircraft systems engineering
2. Prepare a set of system engineering operational guidelines for the commercial aircraft domain
3. Produce a “Guidelines Document” in concert with established guidelines
4. Sponsor technical papers and information exchange focused on the commercial aircraft domain
5. Develop and maintain a professional set of literature for the commercial aircraft systems engineering domain

Joint Commercial Aircraft Working Group

5.1.4 Description

The JCAWG is an association of INCOSE members who are engaged in the practice of systems engineering in the commercial aircraft domain. The Seattle Metropolitan Chapter of INCOSE is the current chapter sponsor of the JCAWG.

5.1.5 Structure and Operation

The JCAWG is composed of members of INCOSE. The policies and activities of the JCAWG are governed by a board elected by the JCAWG members at an annual INCOSE symposium.

The JCAWG board members are the chairperson, cochairperson, and secretary.

The duties of the JCAWG chairperson are as follows:

- Direct JCAWG meetings
- Communicate meeting times and coordinate logistics
- Establish annual goals of JCAWG
- Prepare committee reports
- Interface with INCOSE board and other working groups
- Support JCAWG activities

The responsibilities of the cochairperson and secretary are assigned by the chairperson.

5.1.6 Membership

Persons who wish to participate in the working group should contact either

Greg Mathers (425-717-1020 or Gregory.Mathers@PSS.Boeing.com) or
Scott Jackson (562-496-5049 or scott.jackson@boeing.com)

5.1.6.1 Current Members As of 4-14-99

Last Name	First Name, Initial	E-mail Address	Affiliation
Anderson	Jim	James.R.Anderson@alliedsignal.com	Allied Signal, INCOSE
Applegate	John	John.Applegate@PSS.Boeing.com	Boeing, INCOSE
Atkinson	Cheryl	CherylA@adse.nl	ADSE, INCOSE
Blanchard	Jim	jwb@db.erau.edu	Embry Riddle Aeronautical University
Brown	Mary	isse@whidbey.com	INCOSE
Burton	Greg	Robert.Burton@MW.Boeing.com	Boeing
Campello	Antonio da Cunha	campello@nv01.netvale.com.br	Embraer

Joint Commercial Aircraft Working Group

Last Name	First Name, Initial	E-mail Address	Affiliation
Crossgrove	Al	William.Crossgrove@F22.Boeing.com	Boeing, SAE
Duurland	Erwin	erwind@adse.nl	ADSE, INCOSE
Gartz	Paul	Paul.Gartz@PSS.Boeing.com	Boeing, IEEE
Hakola	Katri	hakolak@db.erau.edu	Embry Riddle Aeronautical University
Harwell	Rich	rharwell@mindspring.com	AIAA, INCOSE
Jackson	Scott	scott.jackson@boeing.com	Boeing, INCOSE
Jain	Ashok	ashok.jain@alliedsignal.com	Allied Signal, INCOSE
Johansen	Valli	Valli.Johansen@PSS.Boeing.com	Boeing, INCOSE
Mackey	Bill	wmackey@cscmail.csc.com	Computer Sciences Corporation, INCOSE
Mathers*	Greg	Gregory.Mathers@PSS.Boeing.com	Boeing, INCOSE
McCartor**	Morgan	Mary.McCartor@PSS.Boeing.com	Boeing, INCOSE
Occhiuto	Scott	Scott.Occhiuto@PSS.Boeing.com	Boeing, INCOSE
Simpson	Joe	Joseph.Simpson@PSS.Boeing.com	Boeing, INCOSE
Simpson	Mary	Mary.Simpson2@PSS.Boeing.com	Boeing, INCOSE
Vick	Jeffery	Jeffery.Vick@PSS.Boeing.com	Boeing, INCOSE
Weener	Earl, F	Earl.F.Weener@boeing.com	Boeing, INCOSE
Wood	Gary	Gary.Wood@PSS.Boeing.com	Boeing, INCOSE
Wycoff	Gary, L	gary.l.wycoff@boeing.com	Boeing, INCOSE

* Current chairperson

** Current cochairperson

5.2 Historical Legacy

Refer to Appendix C.

5.3 Future Goals

5.3.1 First-Year Goals

1. Produce a review draft of the “Guidelines for the Practice of Systems Engineering in the Commercial Aircraft Domain.”
2. Enlist/maintain a technical membership representing the varied interests within the commercial aircraft domain.
3. Sponsor technical papers at regional and international conferences.

5.4 List of Products

Refer to Appendixes F, G, and H.

6 Resource Management Working Group

6.1 Charter

The charter for the Resource Management Working Group (RMWG) has evolved over several years and is the result of the many views of its members during those years.

6.1.1 Background

The following information represents a brief summary of the growth of the RMWG and the SEATC:

1992

1. INCOSE (then NCOSE) Symposium: Two applications working groups were formed as part of the Technical Board: Resource Management and Commercial Applications.
2. Symposium paper: “Saving the Urban Environment with Systems Engineering,” by Fred Martin, provided the stimulus for the RMWG.

1993

1. The attending membership agreed to combine the two working groups from 1992 into one technical committee—Emerging Applications Technical Committee—and to work under that committee as interest groups.
2. Symposium papers
 - a. “SE Applications in Transportation Planning,” by Dolton, Hoy, and Cutler.
 - b. “Can MIL-STD-499B Be Adapted for Resource Management and Saving the Environment?” by Martin and Daetz, provided further stimulus for the Resource Management Interest Group (RMIG).

1994

1. The Emerging Applications Technical Committee started the Applications White Paper, which documents systems engineering in applications in various industries.
2. The RMIG began working with Emigrant Wilderness Management personnel on introducing systems engineering into Wilderness Areas Management planning.

1995

1. The Emerging Applications Technical Committee was renamed the Systems Engineering Applications Technical Committee (SEATC), with several working groups (Applications Forum, Facilities, Business Domain) and interest groups (RMIG)
2. Specific applications tracks started at the annual symposia under the SEATC.
3. The RMIG contributed to the Emigrant Wilderness Management Direction Environmental Impact Statement (EIS); worked with the local Sierra Club chapter on

Resource Management Working Group

EIS comments, and hosted a public meeting with the Emigrant Wilderness rangers on the EIS.

4. The symposium paper, “Systems Engineering in Wilderness Areas Management,” by Dolton, Hoy, and Martin, continued to emphasize the activities of members of the RMIG.

1996

The RMIG worked with local environmental agencies in watershed management and housing.

1997

1. The RMIG worked with local environmental agencies in watershed management and housing.
2. The symposium paper, “Systems Process for Public Policy Application,” by Cutler, expanded RMIG activities.
3. An RMIG topic of the November San Francisco Bay Area Chapter meeting: Dolton, Cutler, and Kohler, began to involve the local chapter membership.

1998

1. A seminar: “SuperSystem Process: Managing Complex Public Policy Issues,” by Cutler.
2. The RMIG expanded in the San Francisco Bay Area Chapter.
3. Telecons began with the SEATC.

1999

The Resource Management Interest Group (RMIG) became the Resource Management Working Group (RMWG) at the INCOSE Winter Workshop in Phoenix, Arizona.

6.1.2 Purpose

The purpose of the RMWG is to find new application areas for systems engineering in domains that conserve, help understand, and manage resources.

6.1.3 Objectives

The RMWG has the following objectives:

1. Work with jurisdictions, on local, state, and national levels, in understanding their requirements and issues on the management of resources.
2. Determine where the application of systems engineering in these areas can achieve better solutions in meeting their goals.
3. Foster systems engineering in professional societies involved with resources.

4. Work with resource-oriented nongovernmental organizations (NGOs) in helping to address their issues and see how systems engineering can help them organize and manage their projects.
5. Secure speakers to address topics in resource management systems at local chapter meetings and at INCOSE symposia.
6. Foster local chapter interest and participation in performing projects in resource management.

6.1.4 Description

The RMWG is a working group of the INCOSE SEATC. The INCOSE San Francisco Bay Area Chapter is currently the focal point of the RMWG; however, participation is invited from anywhere within INCOSE.

The RMWG works to find new applications areas for systems engineering in public sector domains that conserve, help understand, and manage resources, both natural and human. The RMWG works with jurisdictions and citizen groups on local, state, and national levels in understanding their requirements and issues, and helps them utilize systems engineering processes in meeting their goals.

6.1.5 Structure and Operation

The RMWG has very informal structure and operation. Members are involved in applications individually or, sometimes, in small teams that are mainly in the San Francisco Bay area. For example, one group of three developed a specification for a new school for hearing-impaired children. Another group of three worked with the U.S. Forest Service on a wilderness management environmental impact report. Members meet from time to time to share progress and discuss problems that have arisen.

The scope of RMWG projects include the following:

- Current projects
 - Environmental Protection Agency (EPA) Can-Do housing
 - South Bay Watershed Initiative
 - Use of systems engineering tools in social structures
- Completed projects/studies
 - INCOSE systems process seminar
 - Environmental assessment of solvent
 - Calabasas Creek: Creek Bed Modifications Study
 - San Francisquito Creek CRMP
 - Wilderness planning

Resource Management Working Group

- MTC management plan
- Jean Weingarten School planning

6.1.6 Membership

Presently, the primary members include the following:

1. Jerry Bauknight (jerry.bauknight@lmco.com)
2. Dr. William H. Cutler (billcutler@compuserve.com)
3. Ted Dolton (alanjoanne@aol.com)
4. Andrew Kohler
5. Fred Martin (fmartin@us.net)
6. Ken Nead (kencnead@concentric.net)

6.2 Historical Legacy

Refer to Appendix C.

6.3 Future Goals

The RMWG identified 1-year goals, which include the following for 1999–2000:

1. Participate in the Phoenix INCOSE Winter Workshop. RMWG participation would be to prepare for the Minneapolis, MN, symposium to direct attention to environmental issues.
2. Continue the current volunteer projects in the San Francisco Bay area, and report them to INCOSE membership, as appropriate.

6.4 List of Products

Refer to Appendixes F, G, and H.

7 Telecommunications Working Group

7.1 Charter

7.1.1 Purpose

The purpose of the Telecommunications Working Group (TELWG) is to facilitate the introduction and use of system engineering principles, techniques, and practices to applications in the following areas:

- The telecommunications domain, including equipment manufacture, service provision, procurement, and educational use
- Government and defense telecommunications procurement

In addition, the TELWG provides INCOSE with a forum to exchange successful practices that result in cost-effective goods and services, and promote improved communications.

7.1.2 Objectives

The primary means by which the TELWG accomplishes its purpose is through development and sponsoring of activities with INCOSE and its local chapters.

The objectives include, but are not limited to, improving the people, processes, and resources used in the systems engineering mission as follows:

- People
 - Enunciating career opportunities for systems engineering in telecommunications
 - Recruiting qualified telecommunications systems engineers to membership
 - Maintaining a forum within INCOSE to address telecommunications technology and application issues
 - Promoting the successful application of systems engineering techniques in the development of telecommunication equipment and technology and service provision
- Processes
 - Identifying analogies between telecommunication practices and those of other application domains
 - Improving the system engineering process within the telecommunication domain
 - Promoting an exchange of process techniques and ideas between the telecommunication domain and the defense/aerospace domains
- Resources
 - Maintaining a list of resources useful to systems engineers practicing in the telecommunications domain
 - Identifying automated tools and their capabilities

Telecommunications Working Group

- Developing standards, guidelines, definitions, and vocabularies for the telecommunications domain.

7.1.3 Telecommunication Group Description

The TELWG is an association of INCOSE members who are engaged in the practice of systems engineering in some aspect of the telecommunication domain. The areas concerned include the following:

- Telecommunication equipment supply—Commercial
- Telecommunication equipment supply—Defense related
- Telecommunication service providers.
- Telecommunication management providers
- Educational telecommunications services
- Telecommunication support of information technology services
- Telecommunication installation and deployment
- Telecommunication research

7.1.4 TELWG Structure and Operation

The TELWG is composed of members of INCOSE who have an interest in the telecommunication application domain.

The TELWG Board consists of the following members:

- Chairperson, elected by the membership at the INCOSE annual symposium for a 2-year term.
- Cochairperson, selected by the elected chairperson
- Secretary, selected by the elected chairperson

The TELWG chairperson has the following responsibilities:

- Direct TELWG meetings
- Coordinate logistics for TELWG meetings
- Ensure meeting minutes, agendas, and newsletters are prepared and distributed
- Establish the annual goals for the TELWG
- Prepare committee reports as required
- Interface with the INCOSE Systems Engineering Applications Technical Committee (SEATC) and other working groups
- Support coordination of TELWG activities

The responsibilities of the TELWG cochairpersons and secretary are assigned by the chairperson.

7.1.5 Membership

Persons interested in participating in the TELWG should contact either Tom Bagg or Martin Warner. Their contact information follows:

Tom Bagg
QSS Group, Inc.
7404 Executive Place, Suite 400
Seabrook, MD 20706

Telephone: 301-867-0063
Facsimile: 301-867-0089
E-mail: Tom.Bagg@gsfc.nasa.gov

Martin Warner
Lucent Technologies
Greenway Business Park
Bldg 1, Bellinger Close
Chippenham, Wilts
SN15 1BN, UK

Telephone: +44 1666 833568
Facsimile: +44 1666 832442
E-mail: mw15@lucent.com

The membership list will be maintained by the TELWG chairperson.

7.2 Historical Legacy

Refer to Appendix C.

7.3 Future Goals

Goal	Due	Comments
1. Revitalize TELWG	Fall 1999	Completed
2. Revise Charter	Fall 1999	Completed October 1999 – M. Warner
3. Update TELWG Website	Fall 1999	Charter, Discussion Group and Officers – T. Bagg http://www.incose.org/cmtes/telwg.html (old Web page to be updated and linked)
4. Revise Profile	Spring 2000	Draft to SEATC January 2000; Final later – M. Warner
5. Create Bibliography Draft	Spring 2000	Annual updates – T. Bagg
6. Create Guidebook Draft	Fall 2000	M. Warner (This effort will use Guidelines for the Practice of Systems Engineering in the Commercial Aircraft Domain as a model.)
7. Conduct TELWG Meeting at the INCOSE Symposium	June 2000	Establish goals for next year

7.4 List of Products

Refer to Appendixes F, G, and H.

8 Environmental Restoration and Waste Management Interest Group

8.1 Charter

TBD

8.2 Historical Legacy

Refer to Appendix C.

8.3 Future Goals

TBD

8.4 List of Products

Refer to Appendixes F, G, and H.

Environmental Restoration and Waste Management Interest Group

9 Health Care Interest Group

9.1 Charter

TBD

9.2 Historical Legacy

Refer to Appendix C.

9.3 Future Goals

The primary goals for 1999–2000 are to

1. Stimulate professional papers in the health care industry
2. Conduct one or two panel sessions at the INCOSE Annual Symposium in Minneapolis, MN, during July 2000.

9.4 List of Products

Refer to Appendixes F, G, and H.

10 Motor Vehicles Interest Group

10.1 Charter

TBD

10.2 Historical Legacy

Refer to Appendix C.

10.3 Future Goals

The primary goals for 1999–2000 are to

1. Stimulate professional papers in the transportation industry
2. Conduct a panel session at the INCOSE Annual Symposium in Minneapolis, MN, during July 2000.

10.4 List of Products

Refer to Appendixes F, G, and H.

Motor Vehicles Interest Group

11 Railway Transportation Interest Group

11.1 Charter

TBD

11.2 Historical Legacy

Refer to Appendix C.

11.3 Future Goals

TBD

11.4 List of Products

Refer to Appendixes F, G, and H.

Railway Transportation Interest Group

Appendix A—INCOSE Technical Committees, Working Groups, and Interest Groups

Technical Board

Chairperson:	John Snoderly 703-805-5258 snoderly@home.com
Cochairperson:	Rich Harwell 770-740-0907 insight@sysview.com
Cochairperson:	Heinz Stoewer (49) 2241-345940 heinzstoewer@compuserve.com

Education and Research Technical Committee

Chairperson:	Dennis Buede 703-933-1727 dbuede@gmu.edu
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Working Groups and Interest Groups:

Concepts and Terms Working Group	Sten Dahlberg 206-655-6192 sten.o.dahlberg@boeing.com
Education Development Working Group	Dennis Buede 703-933-1727 dbuede@gmu.edu
Education Measurements Working Group	Peter Sydenham (61) 8-8365-7643 sydenham@senet.com.au
Systems and Supportability Interface Research Working Group	Walter Fabrycky 540-231-6147 fabrycky@vt.edu

Note: The information contained here is under continual change and is enclosed as an initial reference. Please check the INCOSE Website (www.incose.org) for the most recent information.

Appendix A

Systems Engineering Applications Technical Committee

Chairperson: William Mackey
301-794-2138
wmackey@csc.com

Working Groups and Interest Groups:

Commercial and Public Interest Working Group Jerry Bauknight
408-756-4265
jerry.bauknight@lmco.com

Infrastructure Systems Engineering Working Group Pat Sweeney
Group 615-454-4709
sweeney@hap.arnold.af.mil

Joint Commercial Aircraft Working Group Greg Mathers
425-717-1020
Gregory.Mathers@pss.boeing.com

Resource Management Working Group Ted Dolton
650-321-5950
alanjoanne@aol.com

Telecommunications Working Group Tom Bagg
301-809-2216
tom.bagg@gsfc.nasa.gov

Environmental Restoration and Waste Management Interest Group Ralph Hill
301-916-2545
hillrs@inel.gov

Health Care Interest Group John Zaleski
610-354-5379
john.zaleski@lmco.com

Motor Vehicles Interest Group Paul Berry
313-323-0906
pberry1@ford.com

Railway Transportation Interest Group John Williams
011-44-181-392-9776
jsw@netcomuk.co.uk

Measurement Technical Committee

Chairperson:

Sarah Sheard
703-742-7106
sheard@software.orgWorking Groups and Interest Groups:

Capability Assessment Working Group

Bill Schoening
314-234-9651
schoening@inlink.com

Measurement Working Group

Garry Roedler
610-531-7845
garry.j.roedler@lmco.com**Modeling and Tools Technical Committee**

Chairperson:

Mark Sampson
972-669-9937, ext. 215
sampson@tdtech.comWorking Groups and Interest Groups:

Tools Database Working Group

Bill McMullen
972-344-5781
w-mcmullen@raytheon.com

Tools Integration and Interoperability Working Group

John Nallon
972-669-9937 (x220)
nallon@tdtech.com

Information Model and Process Interest Group

Rick Steiner
619-725-1008
fsteiner@west.raytheon.org

Model Driven System Design Interest Group

Bob Cohen
860-610-7436
cohenrm@utrc.utc.com

Appendix A

Systems Engineering Management Technical Committee

Chairperson: Jim Armstrong
703-742-7185
armstrong@software.org

Working Groups and Interest Groups:

Requirements Working Group David Jones
972-344-5780
djones@raytheon.com

Risk Management Working Group Elaine Hall
407-728-7475
drehall@aol.com

Systems Engineering Management Methodology Working Group Jim Armstrong
703-742-7185
armstrong@software.org

Verification and Validation Interest Group Steve Wolf
319-295-1958
sawolf@collins.rockwell.com

Systems Engineering Processes and Methods Technical Committee

Chairperson: Dick Wray
330-796-9931
richard.wray@lmco.com

Working Groups and Interest Groups:

Principles Working Group Sam Alessi
208-526-1326
alessirs@id.doe.gov

System Architecture Working Group Mark Maier
703-633-5350
mark.w.maier@aero.org

Systems Engineering Handbook Working Group Dorothy McKinney
408-742-8790
dorothy.mckinney@lmco.com

Systems Engineering Reengineering Working Group Jack Fisher
818-225-8710
seajnf@aol.com

Design Process Interest Group

Ray Jorgensen
319-295-2615
rwjorgen@collins.rockwell.com

Human Systems Interest Group

Bill Ewald
301-572-0808
ewald@macroint.com

Systems Engineering Internet Processes
Interest Group

Larry Pohlmann
703-442-5374
pohlmann-wma@erols.com

Standards Technical Committee

Chairperson:

James Martin
972-575-0182
j-martin@raytheon.com

Appendix B—INCOSE Strategic Plan (Status as of February 1997)

B.1 Introduction

The International Council on Systems Engineering (INCOSE) is a not-for-profit organization that was established in 1990 (originally as the National Council on Systems Engineering) to serve the needs of systems engineering professionals and the companies that use and benefit from the systems engineering discipline. It has grown from a founding group of 33 individuals into a robust professional technical society with more than 2500 members (as of February 1997). It has chapters in 30 metropolitan areas in North America, Europe, and Australia and a growing participation from the industrialized world.

Our membership comes from a diverse background. INCOSE recognizes that there are different views of what “systems engineering” is and how it can and should be implemented in the large variety of industrial, academic, and government settings in which the discipline is applicable. INCOSE solicits and welcomes as members all professionals (engineers, managers, executives, academicians, and others) who have an interest in more effective and efficient engineering and management methods and techniques to define, develop, manage, and support complex systems. It also solicits corporate sponsorship from companies and organizations that depend on and benefit from high-quality systems engineering.

B.2 INCOSE Charter

INCOSE was created to

Foster the definition, understanding, and practice of world-class systems engineering in industry, academia, and government.

INCOSE’s goals are to

- Provide a focal point for dissemination of systems engineering knowledge.
- Promote collaboration in systems engineering education and research.
- Ensure the establishment of professional standards for integrity in the practice of systems engineering.
- Improve the professional status of all persons engaged in the practice of systems engineering.
- Encourage governmental and industrial support for research and educational programs that will improve the systems engineering process and its practice.

This strategic plan reaffirms the continuing applicability and suitability of this charter statement for the foreseeable future. INCOSE perceives increasing requirements for sound systems engineering in the development of complex systems in a large variety of contexts throughout the

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world. INCOSE recognizes the challenges of serving a membership of diverse nationalities in geographic locations and time zones all over the globe.

INCOSE also recognizes the challenges of promulgating the principles of systems engineering in those diverse sectors of industry, academia, and government that have not historically used the term *systems engineering* in their cultural or environmental settings. In the near term, INCOSE is especially interested in increased involvement with and participation from (1) various commercial sectors involved with the development and reengineering of complex systems for a wide variety of customers and (2) the academic engineering community.

B.3 Structure and Purpose of this Strategic Plan

This strategic plan is structured as a set of objectives and supporting activities that encompass a vision of INCOSE's preferred future. INCOSE's intent is to provide high-level guidance on INCOSE planning and operations for the next 3 to 5 years. The plan suggests priorities and makes recommendations on the evolution of INCOSE's methods of operation. Increased focus on identified priorities and increasingly effective and efficient operations are essential as INCOSE grows and as it anticipates and prepares for the engineering and program management challenges of the 21st century.

B.4 Implementation Expectations

INCOSE anticipates that its objectives and activities (discussed in Sections B.4.1 and B.4.2, respectively) will be prioritized and that specific implementation initiatives will be established. Individual initiatives will be assigned to groups of individuals with an agreed-on leadership. Each initiative will develop and implement (1) more specific objectives, (2) plans to achieve these objectives, and (3) measures for tracking progress against these plans. Progress against these plans will be reported periodically to the membership. Widespread participation by INCOSE members in these initiatives is both anticipated and hereby solicited.

INCOSE VISION

INCOSE is the world's leading authority on and recognized champion of world-class systems engineering.

B.4.1 INCOSE Strategic Objectives

Eight objectives have been chosen. These objectives are ambitious and intentionally general.

Objective 1 – INCOSE Customers

Identify, describe, and understand our customers and their systems engineering related needs. Seek to ensure that our membership strives to both understand the diversity of our customers and the variations in their needs.

Objective 2 – Products and Services

Identify, develop, provide, and continually improve a diverse and expanding set of products and services that meet or exceed the expectations of our INCOSE customers. Strive to create new and innovative products and services.

Objective 3 – Communication

Become so publicly recognized and so reliable a source of information about systems engineering development and use that INCOSE is the primary reference for the industry, academia, and government—and the media.

Objective 4 – Membership

Attract, retain, and engage individual members and corporate sponsors from all organizational levels in the engineering, manufacturing, and service sectors from industry, academia, and government throughout the industrialized world.

Objective 5 – Outreach and Collaboration

Increase INCOSE’s ability to raise awareness of systems engineering principles and increase their application through collaboration, partnership, and support of related efforts by other technical societies and organizations.

Objective 6 – Theory, Research, and Education

Identify opportunities for, facilitate sponsorship of, and disseminate rigorous professional research in topical areas that are or could become important to systems engineering and society at large. Seek to expand both the quantity and quality of academic and industrial research that is focused on growing the body of systems engineering theory and knowledge. Promote education and training on the systems engineering discipline.

Objective 7 – International, National, and Regional Involvement

Become a known and respected presence and resource in the advocacy and support of international, national, and regional initiatives that would benefit from world-class systems engineering.

Objective 8 – Structure and Operations

Evolve INCOSE’s structure and operations to effectively and efficiently support a growing membership and constituency.

B.4.2 INCOSE Supporting Activities

Each objective is supported by several activities as described in the following subsections.

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B.4.2.1 Objective 1 – INCOSE Customers

Identify, describe, and understand our customers and their systems engineering related needs. Seek to ensure that our membership strives to both understand the diversity of our customers and the variations in their needs.

Activity 1.1, Customers – Identify and describe the various categories of INCOSE customers.

Activity 1.2, Needs – Identify and document the product and service needs, priorities, and expectations of the various categories of INCOSE customers.

Activity 1.3, Feedback – Establish easy-to-use mechanisms that enable and solicit, on a continuing basis, feedback and suggestions on all INCOSE products, services, and operations.

B.4.2.2 Objective 2 – Products and Services

Identify, develop, provide, and continually improve a diverse and expanding set of products and services that meet or exceed the expectations of our INCOSE customers. Strive to create new and innovative products and services.

Activity 2.1, Understanding Needs – Seek to ensure that our membership strives to understand both the diversity of our customers and the variations in their needs.

Activity 2.2, Technical Products and Services Plan – As part of INCOSE’s Operating Plan, document and disseminate an annually updated, integrated, 2-year Technical Products and Services Plan. This plan should describe the technical products and services to be produced by our technical committees, working groups, and interest groups, as well as the anticipated relationships with chapter products and services.

Activity 2.3, Technical Product and Services Implementation – Ensure that all committees, working groups, and interest groups aggressively pursue timely execution of the Technical Product and Services Plan. Ensure that the various products and services are sufficiently integrated.

Activity 2.4, Chapter Technical Products and Services – Actively encourage development of a broad range of technical products and services by chapters. Ensure that working group, interest group, and chapter products and services are integrated and complementary.

Activity 2.5, Annual International Symposium – Sponsor a continually enhanced and improved annual International Symposium. Migrate to alternation of hosting between North America and other locations worldwide. Ensure that the processes for planning, preparing for, executing, and following up on our Symposium are well defined, followed, and continually improved.

Activity 2.6, Regional and Chapter Events – Supplement the annual international symposia with an increasing number of regional and chapter events. These should include, but not be limited to, conferences, tutorials, and workshops.

Activity 2.7, Publications – Evolve to a frequent and widely distributed set of professional publications. Ensure that our publications include, but are not limited to, a journal, a newsletter, and substantial presence on the World Wide Web. Actively solicit and encourage the academic community to contribute to, participate in the development of, and use our professional publications.

Activity 2.8, Journal – Emphasize development and regular delivery of a high-quality journal.

Activity 2.9, Standards – Establish and maintain an active role and, as appropriate, a leadership role in the development of systems engineering and systems engineering related international standards. Assist with the tailoring of these standards for national communities. Work with other professional organizations to establish a single, inclusive set of systems engineering standards that are recognized by industry, academia, and government.

Activity 2.10, Systems Engineering Skills Development – Incrementally identify, assemble, and integrate sets of materials that can be used to facilitate the education, training, and development of systems engineering skills in industry, academia, and government. Where appropriate, tailor these sets of materials to the various business or systems engineering application sectors.

Activity 2.11, Product Evolution – Ensure that all products and services become and remain responsive to customer needs. Seek to identify and develop innovative products and services that recognize and address the emerging needs of our customers

B.4.2.3 Objective 3 – Communication

Become so publicly recognized and so reliable a source of information about systems engineering development and use that INCOSE is the primary reference for the industry, academia, and government—and the media.

Activity 3.1, Facilitate Networking – Establish diverse mechanisms to facilitate networking among systems engineering professionals. Encourage interaction among professional organizations whose memberships are involved in the development of complex systems.

Activity 3.2, Electronic Access – Systematically and rapidly grow the extent and variety of World Wide Web access to systems engineering related information. Encourage contributions from industry, academia, and government toward this goal.

Activity 3.3, Integrated Information Sets on Systems Engineering Benefits – Identify, develop, and use processes for providing and integrating reliable and readily accessible information worldwide about the development, use, and results of effective and efficient systems engineering.

Activity 3.3, Spokespersons – Establish a mechanism whereby individuals and organizations can identify individuals who are both able and willing to serve as spokespersons, experts, consultants, speakers, or educators on the various aspects of the discipline of systems engineering.

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Activity 3.5, Advertising – Advertise INCOSE and its products and services in appropriate public and professional media. Facilitate the effective and efficient advertising of high-quality systems engineering products and services.

B.4.2.4 Objective 4 – Membership

Attract, retain, and engage individual members and corporate sponsors from all organizational levels in the engineering, manufacturing, and service sectors from industry, academia, and government throughout the industrialized world.

Activity 4.1, Membership Benefits – Publicize widely the benefits of INCOSE membership. Find and implement ways to continually grow those benefits.

Activity 4.2, Sources and Diversity – Identify, characterize, and target specific sources of potential individual members and corporate sponsors. Strive to ensure that we are viewed positively and that we encourage participation by a culturally diverse society.

Activity 4.3, Demographics – Solicit and analyze sufficient demographic information about our membership and sponsors to facilitate the development of targeted products and services.

Activity 4.4, Publicize Methods – Identify, document, and disseminate to all of our chapters and members a diverse and innovative variety of methods for attracting and retaining individual members.

Activity 4.5, Chapter Support – Empower and support existing chapters in ways that help to keep them active, vibrant, and growing.

Activity 4.6, New and Emerging Chapters – Establish and use processes to identify and target those geographical or metropolitan areas capable of establishing and sustaining a viable INCOSE chapter. Assist emerging chapters with start-up and with establishing and maintaining effective and efficient operations.

Activity 4.7, Corporate Sponsorship – Establish and maintain an active and continuing initiative to attract and retain corporate members and sponsors. Coordinate international, national, regional, and local efforts toward this end.

Activity 4.8, International Growth – Campaign aggressively to increase our membership throughout the industrialized world, including individual members, chapters, and corporate sponsors.

B.4.2.5 Objective 5 – Outreach and Collaboration

Increase INCOSE’s ability to raise awareness of systems engineering principles and increase their application through collaboration, partnership, and support of related efforts by other technical societies and organizations.

Activity 5.1, Opportunities – Determine the areas where INCOSE objectives would be advanced more rapidly and effectively through collaborative efforts (international, regional, or local) with other organizations. Establish criteria for partner selection, and identify potential partners.

Activity 5.2, Methods – Develop the capability to manage partnerships so that mutual success and satisfaction are ensured. Develop and use processes and products that are flexible enough to fit a wide variety of partner organizations.

Activity 5.3, Enhancement – Manage ongoing partnerships with key organizations by (1) continually exploring new opportunities for collaboration, (2) striving to enhance jointly sponsored and administered products and services, and (3) constantly improving the processes of interaction and cooperation.

Activity 5.4, Regional and Chapter Level Collaboration – Encourage outreach and collaboration at the regional and chapter levels by identifying and disseminating to all regions and chapters candidate models of collaboration that have been found to be effective. Draw these models not only from other INCOSE regions or chapters, but also from other technical societies.

Activity 5.5, Partnering with Suppliers and Customers – Within the bounds of maintaining objectivity, identify viable mechanisms for collaboration with and among systems engineering tool or service vendors and companies that employ INCOSE members.

Activity 5.6, Commercial Sector Initiatives – Over an extended period of time, select and target specific commercial sectors (or industry groups) within which to increase the awareness of the applicability and the potential benefits of world-class systems engineering.

Activity 5.7, Mutual Support – Identify and use World Wide Web sites and other mechanisms for increasing mutual awareness of other technical and professional societies whose members interact or interface frequently with the systems engineering community.

B.4.2.6 Objective 6 – Theory, Research, and Education

Identify opportunities for, facilitate sponsorship of, and disseminate rigorous professional research in topical areas that are or could become important to systems engineering and society at large. Seek to expand both the quantity and quality of academic and industrial research that is focused on growing the body of systems engineering theory and knowledge. Promote education and training on the systems engineering discipline.

Activity 6.1, Engineering Initiatives – Establish specific initiatives to increase interaction with the academic engineering community in ways that are mutually beneficial.

Activity 6.2, Research Opportunities – On the basis of feedback from members and other key stakeholders, identify and describe a set of candidate research opportunities and priorities based on projected needs in the systems engineering arena.

Activity 6.3, Dissemination Mechanisms – Establish mechanisms to facilitate the publication and dissemination of research needs, ongoing research, and useful research results. Find and

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implement ways to become the preferred organization for rapidly disseminating systems engineering-related research results.

Activity 6.4, Sponsorship – Become a strong and vocal advocate of systems engineering related research and research funding in industry, academia, and government.

Activity 6.5, Collaboration – Identify and establish ways to facilitate systems engineering related research collaboration among industry, academia, and government.

Activity 6.6, Participate in Academic Affairs – Encourage and facilitate the involvement of INCOSE members in academic affairs in ways that are mutually beneficial to both academia and INCOSE.

Activity 6.7, Curricula Development and Certification – Seek to facilitate and participate in the development of systems engineering related curricula.

Activity 6.8, Certificate and Certification Programs – Explore the feasibility and viability of supporting and participating in systems engineering certificate and certification programs, wherever they occur.

Activity 6.9, Graduate Programs – Encourage and support the development of Masters and Doctorate programs in the field of systems engineering.

Activity 6.10, Training and Education – Assist with establishing training and education mechanisms that can help practitioners to effectively and efficiently apply the body of systems engineering knowledge in the development of complex systems throughout industry, academia, and government.

B.4.2.7 Objective 7– International, National, and Regional Involvement

Become a known and respected presence and resource in the advocacy and support of international, national, and regional initiatives that would benefit from world-class systems engineering.

Activity 7.1, Opportunities – Identify areas where INCOSE involvement in international, national, and regional issues and initiatives would be both feasible and beneficial to the initiative.

Activity 7.2, Methods – Develop the capability to plan and orchestrate the involvement of INCOSE representatives in international, national, and regional initiatives.

Activity 7.3, Collaboration – Encourage and facilitate collaboration among systems engineering practitioners in industry, academia, and government to contribute to addressing international, national, and regional issues and initiatives. Help to increase awareness and utilization of best practices that may be applicable to these initiatives.

Activity 7.4, Implementation – Encourage and facilitate collaboration among systems engineering practitioners in industry, academia, and government to contribute to addressing international, national, and regional issues and initiatives. Help to increase awareness and utilization of best practices that may be applicable to these initiatives.

Activity 7.5, Documentation – Help to document and disseminate successes, shortcomings, and lessons learned during the process.

B.4.2.8 Objective 8 – Structure and Operations

Evolve INCOSE’s structure and operations to effectively and efficiently support a growing membership and constituency.

Activity 8.1, Employ Our Discipline – As champions of world-class systems engineering, apply suitable systems engineering discipline and rigor to our own operations.

Activity 8.2, Leadership Development – As an almost exclusively volunteer organization that looks forward to an extended period of rapid growth, actively identify and develop the leadership that is and will be needed at all levels of the INCOSE organization.

Activity 8.3, Continuing Involvement – Find appropriate ways to keep senior members and those who have served as leaders interested and productively involved with INCOSE.

Activity 8.4, Roles and Responsibilities – Ensure that the roles and responsibilities and expectations for all positions of INCOSE leadership are established, documented, and accessible to the membership.

Activity 8.5, Recognition – Constantly work at all levels to ensure that our volunteer leaders and participants, and their sponsoring companies, are appropriately recognized for their efforts and contributions.

Activity 8.6, Strategic Plan – Update the Strategic Plan as a whole at least every 3 years. Annually review and report publicly on our progress against these strategic objectives and activities. In conjunction with the annual Winter Business Meeting, assess whether specific objectives and activities need to be modified, added, or reprioritized.

Activity 8.7, Operating Plan – Establish and annually update a 2-year operating plan that articulates our (1) primary technical objectives, (2) Technical Product and Service Plans, and (3) business and administrative objectives and plans. The plan should include metrics by which progress against specific objectives and supporting activities may be assessed and reported.

Activity 8.8, Operating Procedures – Ensure that policies and operating procedures for all major INCOSE activities are defined, documented, and easily accessible to INCOSE members.

Activity 8.9, Central Office Staff – Develop and implement a plan to evolve to a full-time Executive Director and central office staff.

Activity 8.10, Organizational Structure and Responsibilities – To posture for continued international growth and provide flexibility for the future, reexamine the organizational structure and responsibilities of INCOSE at all levels.

Activity 8.11, Plans and Procedures Availability – Within 6 weeks after the Annual Symposium and the Winter Business Meeting, ensure that any updates that were made to our plans and procedures are accessible to INCOSE members.

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Activity 8.12, Feedback and Continual Improvement – Establish easy to use mechanisms that enable and solicit, on a continuing basis, feedback and suggestions on all INCOSE products, services, and operations. Use the resulting data as the basis continual improvement. Set a goal that all of our processes and procedures migrate as rapidly as possible to a high level of maturity and effectiveness.

Appendix C—Historical Legacy of the SEATC

From 1995 to 1996, the goals of the Systems Engineering Applications Technical Committee (SEATC) were articulated primarily through the Applications Forum Working Group (AFWG). Four sets of goals are included in this appendix:

- AFWG goals for 1995–1996
- SEATC goals for 1996–1997
- SEATC goals for 1997–1998
- SEATC goals for 1998–1999

C.1 AFWG Goals for 1995–1996 (Established by AFWG Members at the July 1995 INCOSE Symposium)

At the July 1995 INCOSE Symposium in St. Louis, Missouri, the AFWG membership agreed to the following goals for 1995–1996. The goals and status as of August 1, 1996, are as follows:

Goal 1. Establish a charter for the working group

Status: The charter was established and approved by the AFWG membership on July 25, 1995; the charter was revised to reflect the working group name change by the AFWG members in attendance at the INCOSE Winter Business Meeting on January 24, 1996.

Goal 2. Complete and releasing the second draft of the AFWG White Paper

Status: The second draft of the *Emerging Applications White Paper* (July 24, 1995) was approved for release by the AFWG on July 26, 1995.

Goal 3. Identify other tangible AFWG work products

Status: The following products have been completed or are planned:

- Systems Engineering Applications Profiles Authors Writing Guide, April 1, 1996 (included as Appendix E in Version 1.0 of SEAP)
- Systems Engineering Applications Profiles, May 1, 1996 (Version 1.0 included in Volume 2 of the 1996 INCOSE Symposium Proceedings)
- List of systems engineering applications papers from previous INCOSE Symposiums (planned)
- Systems engineering applications papers summaries (planned)
- Case studies of systems engineering applications (planned)
- List of systems engineering activities and events of other related societies (planned)

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Goal 4. Conduct two to four Systems Engineering Applications Sessions at the 6th Annual International Symposium in Boston, Massachusetts, on July 7–10, 1996, on diverse systems engineering applications

Status: The AFWG coordinated with Marty Ross, Symposium Technical Chairperson, throughout the year; four Systems Engineering Applications sessions were part of the Boston Symposium.

Goal 5. Conduct two additional directed Systems Engineering Applications Sessions at the same symposium in topic areas that are growth areas such as

- **Highway Transportation Systems**
- **Environmental Restoration or Natural Resource Management Systems**
- **Telecommunications Systems**

Status: The AFWG members seeded high-quality professional papers in these areas; as a result, three additional sessions were offered for the first time in INCOSE's history as an experiment. These sessions were as follows:

- Session 1.1, Environmental Applications
- Session 2.1, Transportation Applications
- Session 3.1, Transportation and Environmental Applications

This accomplishment was precedent setting and could not have been accomplished without the cooperation and agreement of both the AFWG members who submitted papers and the Symposium Technical Chairperson, Marty Ross.

Goal 6. Obtain a Keynote Speaker in one of the above applications areas to promote the changing focus of systems engineering.

Status: Although the AFWG claims no credit for this accomplishment, the planned speakers represented a well-balanced program. The speakers were

- Dr. Robert D. Ballard, who has led or participated in nearly 100 deep-sea expeditions, is a renowned author of more than 50 scientific articles and has directed prestigious explorations organizations
- Dr. Robert J. Hermann, Senior Vice President, Science and Technology, United Technologies Corporation
- Lester Thurow, economist, author, and educator
- Planned speaker Vice President Al Gore, renowned author in environmental issues and advocate for a systems approach to telecommunications development, environmental planning, and other societal endeavors, could not attend.

Goal 7. Stimulating INCOSE Interest Groups in local chapters such as

- **Detroit/Tri-State: Motor Vehicle Systems**
- **Texas Gulf Coast: Energy Systems**
- **Chesapeake: Telecommunications Systems**
- **Washington Metro: Highway Transportation Systems and/or Criminal Justice and Legal Systems**
- **New England: Health Care Systems**
- **San Francisco Bay Area: Natural Resource Management Systems**

Status: Four chapters have accepted the challenge and are conducting or proposing programs in their local chapters

Goal 8. Initiate contact with universities that offer a Systems Engineering curriculum to gain their participation in the AFWG.

Status: Contacts are underway across the nation with systems engineering students and faculty at universities such as Virginia Tech, George Mason University, and the first student chapter at the University of Arizona. Several AFWG members are involved in these activities.

Summary of Accomplishments for 1995–1996

- AFWG had a major impact on the 1996 INCOSE Symposium in Boston.
- AFWG released and distributed a significant product in Volume 2 of the *1996 INCOSE Symposium Proceedings*—Version 1.0 of *Systems Engineering Applications Profiles*, May 1, 1996
- Local chapters began to initiate activities in selected systems engineering application domains.

C.2 SEATC Goals for 1996–1997 (Established by SEATC Members at the January 1997 INCOSE Winter Workshop)

The SEATC met in Las Vegas, Nevada, January 27–31, 1997, to work on unfinished business and prepare for the summer symposium in Los Angeles, California. The goals established in January 1997 and the status as of August 1, 1997, are as follows:

Goal 1. Improve and modify the Systems Engineering Applications Profiles (SEAP) document during the summer symposium in 1997.

Status: *Systems Engineering Applications Profiles*, Version 1.0, was completed May 1, 1996, and included in Volume 2 of the *1996 INCOSE Symposium Proceedings*. A Facilities Systems Engineering section was ready to be added; six additional sections were planned for the next release. (The release subsequently did not happen in 1997.)

Goal 2. Initiate additional SEATC work products.

Status: The following products have been completed or are planned:

- *Systems Engineering Applications Profiles Authors Writing Guide*, April 1, 1996 (included as Appendix E in Version 1.0 of SEAP)
- *Systems Engineering Applications Profiles*, May 1, 1996 (Version 1.0 included in Volume 2 of the *1996 INCOSE Symposium Proceedings*)
- *Systems Engineering Applications Profiles*, Version 2.0 (Version 2.0 was planned for inclusion in Volume 2 of the *1997 INCOSE Symposium Proceedings*, but was not completed in time)
- List of systems engineering applications papers from previous INCOSE symposiums (planned for 1998)
- Summaries of systems engineering applications papers
- Case studies of systems engineering applications
- List of systems engineering activities and events of other related societies

Goal 3. Conduct two to four Systems Engineering Applications Sessions at the 7th Annual International Symposium in Los Angeles, California, August 3–7, 1997, on diverse systems engineering applications.

Status: The SEATC chairperson maintained contact with Lisa Hritz, Symposium Technical Chairperson, throughout the year; five systems engineering applications paper sessions plus one panel session were conducted at the Los Angeles Symposium.

Goal 4. Conduct directed Systems Engineering Applications Sessions at the same symposium in topic areas that are growth areas such as Transportation Systems, Environmental Restoration Systems, Telecommunications Systems, and Transportation Systems.

Status: Twenty high-quality professional papers were placed into five sessions. As a result of the symposium committee permitting our technical committee to propose the session structure, all of the Systems Engineering Applications Sessions were systems engineering domain-specific for the first time in INCOSE's history. These sessions were as follows:

- Session 1 – Environmental Restoration Systems Engineering Applications
- Session 2 – Commercial Aviation/Space Systems Engineering Applications
- Session 3 – Automotive/Railway Transport Systems Engineering Applications
- Session 4 – Urban/Public Policy Systems Engineering Applications
- Session 5 – Commercial Systems Engineering Applications
- Session 6 – Systems Engineering in Commercial Industries Panel Session

This accomplishment was initiated in Boston and was precedent setting in Los Angeles. It could not have been accomplished without the cooperation and agreement of the SEATC members who submitted the papers and the Symposium Technical Chairperson, Lisa Hritz. The experiment was a success in Boston and Los Angeles.

Goal 5. Continue contact with universities that offer a systems engineering curriculum to gain their participation in the SEATC.

Status: Contacts are underway across the nation with systems engineering students and faculty at universities such as Virginia Tech, George Mason University, and the first student chapter at the University of Arizona. Several SEATC members are involved in these activities.

Additionally, a major program has been initiated with the University of Maryland under an INCOSE member, Professor Mark Austin, to place the SEAP document on the Web and to develop JAVA instructional systems engineering modules for specific application domains. Letters of support were signed by INCOSE officers and submitted to the University of Maryland.

Goal 6. Obtain a complete complement of INCOSE interest groups in local chapters such as

- **Chesapeake: Telecommunications Systems**
- **Washington Metro: Highway Transportation Systems and/or Criminal Justice and Legal Systems**
- **San Francisco Bay Area: Natural Resource Management Systems**
- **Nevada Silver State: Waste Management and Disposal Systems**
- **Detroit/Tri-State: Motor Vehicle Systems**
- **Texas Gulf Coast: Energy Systems**
- **New England: Health Care Systems**

Status: The first four chapters have accepted the challenge and are conducting or proposing programs in their local chapters. The San Francisco Bay Area Chapter has as many as eight volunteer projects underway in Natural Resource Management.

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Summary of Accomplishments for 1996–1997

- The SEATC had a major impact on the 1997 INCOSE Symposium in Los Angeles in that all Systems Engineering Applications Sessions were systems engineering domain specific
- The SEATC conducted a panel session in Los Angeles entitled “Systems Engineering in Commercial Industries”
- A major initiative is underway to use the SEAP document as an instructional module on the Web
- The San Francisco Bay Area Chapter has as many as eight volunteer projects underway in Natural Resource Management

C.3 SEATC Goals for 1997–1998 (Established by SEATC Members at the January 1998 INCOSE Winter Workshop)

The SEATC met in Dallas, Texas, January 26–29, 1998, to revitalize its work and prepare for the summer symposium in Vancouver, British Columbia, Canada. The SEATC has specific goals for each year, and its members work very hard to accomplish them. As of July 1998, here is how they are doing:

Goal 1: Improve and modify the SEAP document for the summer symposium in 1998 and place it on the Web.

Status: Version 1.0 of the SEAP document was completed May 1, 1996, and was included in Volume 2 of the *1996 INCOSE Symposium Proceedings*. The Facilities Systems Engineering section was added in 1997; additional sections were planned for release in July 1998. Version 2.0 was ready for distribution at the 1998 INCOSE Symposium. Also check out the University of Maryland Website that has been built as a prototype for the SEAP by Professor Mark Austin, who led the Commercial and Public Interest Working Group during this period. Go to EE623 at the following URL:

<http://www.isr.umd.edu/~austin>

SEATC activities in this goal have been exciting for the past 3 years.

Goal 2: Initiate additional SEATC work products.

Status: The following products have been completed by the working and interest groups:

- *Systems Engineering Applications Profiles Authors Writing Guide*, April 1, 1996 [completed by Ted Dolton of the Resource Management Interest Group (RMIG) and included as Appendix E in Version 1.0 of SEAP]
- *Systems Engineering Applications Profiles*, May 1, 1996 (Version 1.0 included in Volume 2 of the *1996 INCOSE Symposium Proceedings*)
- List of systems engineering applications papers from previous INCOSE symposiums (Two lists by year and by application domain were handed out by William Mackey in Dallas, demonstrating that systems engineering is alive and well in many commercial application domains. Refer to Appendixes H and I of Version 2.0 of SEAP.)
- The SEATC conducted a panel session at the Los Angeles symposium entitled “Systems Engineering in Commercial Industries.”
- The SEATC had application-focused symposia sessions for 1996 in Boston, 1997 in Los Angeles, and 1998 in Vancouver. Although hard to accomplish in the beginning, it has almost become the accepted format.
- The RMIG has conducted seminars, hosted volunteer projects, and become known for its systems engineering services to many government and civic organizations in the San Francisco Bay area.

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- The Facilities Systems Engineering Working Group has distributed a brochure about its activities.
- Scott Jackson, SEATC Cochairperson, completed the Multilevel Participation Plan (see Appendix E).
- The SEATC developed the first themed issue of *INSIGHT* (Summer 1998, Volume 1, Issue 2, “Systems Engineering Applications Domains in the Commercial and Public Interest”).

The SEATC has done a lot of good work and has no intention of stopping. It can use help on such items as

- New systems engineering applications profiles
- Summaries of systems engineering applications papers
- Case studies of systems engineering applications
- List of systems engineering activities and events of other related societies
- Department of Energy application-generic systems engineering management plan
- Telecommunications business model

Goal 3: Conduct Systems Engineering Applications Sessions at the 8th Annual International Symposium in Vancouver, British Columbia, Canada, July 26–30, 1998, on diverse systems engineering applications.

Status: The SEATC chairperson has maintained contact with Kal Toth, Symposium Technical Chairperson, throughout the year; five Systems Engineering Applications Sessions were planned for the Vancouver symposium.

Twenty high-quality professional papers were placed into five sessions; as a result of the symposium committee permitting our technical committee to propose the session structure, all of the Systems Engineering Applications Sessions were systems engineering domain specific for the third time in INCOSE’s history. These sessions are

- Session 1 – Aviation Applications
- Session 2 – Defense and Aerospace Applications
- Session 3 – Telecommunications and Information Systems Applications (New)
- Session 4 – Health Care Applications (New)
- Session 5 – International Commercial Applications (New)

The best paper in these sessions was an international paper.

Goal 4: Conduct a Systems Engineering Panel Session at the Vancouver symposium.

Status: The SEATC proposed two panel sessions for consideration in Vancouver: “Using Internet for Expanding the Services of Systems Engineering Applications” and “Issues Related to

Deploying Systems Engineering in the Commercial and Public Interest Domains.” Unfortunately, the number of panel sessions had been reduced in Vancouver, and it was necessary to wait until the 1999 symposium in Brighton, England, to conduct these panel sessions.

Goal 5: Continue contact with universities that offer a systems engineering curriculum to gain their participation in the SEATC.

Status: Contacts are underway across the nation with systems engineering students and faculty at universities such as Virginia Tech, George Mason University, and the first student chapter at the University of Arizona. Several SEATC members are involved in these activities.

Additionally, a major program was initiated in 1997 with the University of Maryland under an INCOSE member, Professor Mark Austin, to place the SEAP document on the Web and to develop JAVA instructional systems engineering modules for specific application domains. Professor Austin and his students have taken the SEAP document and created a prototype Web site at URL <http://www.isr.umd.edu/~austin>. The site exhibits dynamic JAVA systems engineering case studies and allows visitors to perform a modifiable systems engineering tradeoff analysis online.

Goal 6: Obtain a complete complement of INCOSE interest groups in local chapters such as the following:

- **San Francisco Bay Area: Natural Resource Management Systems**
- **Washington Metro: Highway Transportation Systems and/or Criminal Justice and Legal Systems**
- **Chesapeake: Telecommunications Systems**
- **Nevada Silver State: Waste Management and Disposal Systems**
- **Detroit/Tri-State: Motor Vehicle Systems**
- **Texas Gulf Coast: Energy Systems**
- **New England: Health Care Systems**

Status: The first four chapters have accepted the challenge and are conducting or proposing programs in their local chapters. The San Francisco Bay Area Chapter has had as many as eight volunteer projects underway in Natural Resource Management. In November 1997, they conducted an evening program on the topic of “New Arenas for Applying Systems Engineering.” In January 1998, this chapter, along with the RMIG under Ted Dolton and Bill Cutler, also conducted a seminar entitled “Managing Complex Public Policy Issues.”

Congratulations to the San Francisco Bay Area Chapter!

Summary of Accomplishments for 1997–1998

- The SEATC had a major impact on the 1998 INCOSE Symposium in Vancouver, BC, Canada, with five application-specific sessions. New sessions were offered in Telecommunications and Information Systems, Health Care, and International Commercial Applications.
- The SEATC developed the first themed issue of *INSIGHT* (Summer 1998, Volume 1, Issue 2, “Systems Engineering Applications Domains in the Commercial and Public Interest”)
- The *Systems Engineering Applications Profiles, Version 2.0*, was released in July 1998, and placed on the INCOSE Webpage in August 1998.
- The SEATC released the Multilevel Participation Plan as part of the SEAP, Version 2.0.
- The RMWG conducted two regional seminars on public interest topics, and the DOEIG conducted a regional seminar on waste management.

C.4 SEATC Goals for 1998–1999 (Established by the Members at the July 1998 INCOSE Symposium and the January 1999 INCOSE Winter Workshop)

The SEATC met in Vancouver, British Columbia, Canada, during the week of July 26–30, 1998, and also in Phoenix, Arizona, during the week of January 25–28, 1999, to review the work of the SEATC and to prepare for the 1999 International Symposium in Brighton, England. All participants worked very well together and accomplished a great amount of work during those weeks. In Phoenix, all committees were asked to reexamine their goals with respect to commercial and public interest organizations. The SEATC was requested to lead the development of this issue of *INSIGHT*—an opportunity readily accepted because SEATC members believe the future growth of the discipline depends on commercial and public interest activity.

The SEATC has specific goals for each year, and the members work very hard to accomplish them. The following goals were identified in Vancouver in July 1998 and updated in Phoenix in January 1999 and Brighton, England, in June 1999. The status as of August 1999 is provided for each goal.

Goal 1: Improve and modify the Systems Engineering Applications Profiles (SEAP) document for the Summer Symposium in 1999 and place it on the Web.

Status: The SEAP, Version 1.0, was completed on May 1, 1996, and included in Volume 2 of the 1996 Symposium Proceedings. The SEAP, Version 2.0, was completed on July 1, 1998, and released at the 1998 Symposium in Vancouver, BC. The SEAP, Version 2.0a, was completed on January 20, 1999, and released at the 1999 Winter Workshop in Phoenix, AZ. The SEAP, Version 2.0a, is now on the INCOSE Web page under SEATC Products. Also, Professor Mark Austin has built a University of Maryland Web site as a prototype for the INCOSE SEAP. This site is accessible by selecting EE623 at the following URL:

<http://www.isr.umd.edu/~austin>

The SEATC activities in this goal have been exciting for the past four years.

Goal 2: Initiate new SEATC work products in all working groups and interest groups.

Status: The following products have been completed by the working groups and interest groups:

- *Systems Engineering Applications Profiles Writing Guide*, April 1, 1996 (completed by Ted Dolton and enclosed as Appendix E of Version 1.0 of the SEAP)
- *Systems Engineering Applications Profiles (SEAP)*, May 1, 1996 (Version 1.0 was included in Volume 2 of the 1996 Symposium Proceedings by the CPIWG).
- *Systems Engineering Applications Profiles (SEAP)*, July 1, 1998 (Version 2.0 was released at the 1998 Symposium in Vancouver, BC).

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- *Systems Engineering Applications Profiles (SEAP)*, January 20, 1999 (Version 2.0a was released at the 1999 Workshop in Phoenix, AZ, and is presently on the INCOSE Web page under SEATC Products).
- List of systems engineering (SE) applications papers from previous INCOSE Symposia (Two lists by year and by application domain were handed out by W. Mackey in Phoenix demonstrating that SE is alive and well in many commercial application domains. This information has been included as Appendixes H and I of the SEAP, Version 2.0a).
- The SEATC conducted a panel session at the 1997 Los Angeles symposium on the topic “Systems Engineering in Commercial Industries”
- The SEATC has had application-focused symposia sessions for 1996 in Boston, 1997 in Los Angeles, and 1998 in Vancouver and to a lesser extent in Brighton, England, during 1999. It was hard to accomplish in the beginning, but has almost become the accepted format.
- The FSEWG has distributed a Facilities SE brochure on its activities.
- The first themed issue of *INSIGHT* was completed entitled “Systems Engineering Application Domains in the Commercial and Public Interest” and distributed as Volume 1, Issue 2, dated Summer 1998.
- A second themed issue of *INSIGHT* devoted to commercial applications domains was completed entitled “Commercial Activities in INCOSE” and led by Pat Sweeney of the SEATC and distributed as Volume 2, Issue 2, dated Summer 1999.
- A Multilevel Participation Plan was completed in 1998 by Scott Jackson and included as Appendix G of the SEAP, Version 2.0a.
- An Application Domain Template was also developed in 1998 by Scott Jackson and approved by the SEATC for trial use by the JCAWG to create a Commercial Aviation Guideline Document.
- The CPIWG has created a SEAP Prototype Webpage at the University of Maryland during 1997.
- The RMWG has conducted seminars, volunteer projects and become known for its systems engineering services to many government and civic organizations in the San Francisco Bay area.
- The RMWG conducted a seminar on November 11, 1997 on the topic “New Arenas for Applying Systems Engineering: A Systems Engineering Applications Panel,” at the San Francisco Bay Local Chapter.
- The RMWG conducted an instructional seminar on January 31, 1998 on the topic “Supersystem Process: Managing Complex Public Issues”.
- The DOEIG conducted a seminar during October 1998 on the topic “Systems Engineering in the DOE Environment” in Las Vegas, NV; another regional seminar was completed during March 1999 in Jackson Hole, Wyoming.

SEATC members have accomplished much good work and are continuing to do so. Help with the following items is encouraged:

- New systems engineering applications profiles
- Summaries of systems engineering applications papers
- Case studies of systems engineering applications
- List of systems engineering activities and events of other related societies

Allocation to working groups and interest groups

SEATC and working groups and interest groups: A charter, 1-year goals, nucleus membership, and list of working/interest group products report needs to be created. W. Mackey has agreed to lead this effort.

CPIWG future work products:

1. Add 1998/99 symposium papers to the SEAP Appendices H and I. W. Mackey has already accomplished this effort.
2. Migrate the UMD Webpage closer to the INCOSE Webpage. Mark Austin has this action, but he did not have time to accomplish it.
3. Create the housing and building systems profile for the SEAP. Mark Austin has this action, but he did not have time to accomplish it.

ISEWG future work products:

1. Update the facilities brochure.
2. Create a charter for the ISEWG based on the CPIWG format. This has been accomplished and included as Section 4.
3. Develop a list of potential members based on 1998/99 symposium attendance.
4. Develop 1-year goals.
5. Develop a list of future products and assign priorities.

JCAWG future work products:

1. Create a charter for the CAIG based on the CPIWG format. This has been accomplished and included in Section 5.
2. Develop a list of potential members based on 1998/99 symposium attendance. This has been accomplished and included in Section 5.
3. Develop 1-year goals. This has been accomplished and included in Section 5.
4. Develop a list of future products and assign priorities. The primary future product is cited in item 5.

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5. Develop a guidebook for commercial aircraft based on the application domain guideline template. This effort is well underway and is set for formal release during 2000.

RMWG future work products:

1. Continue volunteer projects in the San Francisco Bay area.
2. Update the charter for the RMWG based on the CPIWG format. This has been accomplished and included in Section 6.
3. Develop a list of potential members based on 1998/99 symposium attendance. This has been accomplished and included in Section 6.
4. Develop 1-year goals. This has been accomplished and included in Section 6.
5. Develop a list of future products and assign priorities.

TELWG future work products:

1. Develop the telecommunications business model.
2. Create a prototype for conducting symposia using teleconferencing techniques.
3. Create a charter for the TELWG based on the CPIWG format. This has been accomplished and included in Section 7.
4. Develop a list of potential members based on 1998/99 symposium attendance.
5. Develop 1-year goals. This has been accomplished and included in Section 7.
6. Develop a list of future products and assign priorities.
7. Update the telecommunications profile.

ER&WMIG future work products:

1. Develop the waste management profile.
2. Complete the DOE applications generic Systems Engineering Management Plan (SEMP).
3. Create a charter for the ER&WMIG based on the CPIWG format.
4. Develop a list of potential members based on 1998/99 symposium attendance.
5. Develop 1-year goals.
6. Develop a list of future products and assign priorities.

HCIG future product goals

1. Create a charter for the HCIG based on the CPIWG format.
2. Develop a list of potential members based on the 1998/99 symposium attendance.
3. Develop 1-year goals.

4. Develop a list of future products and assign priorities.
5. Develop the health care applications profile.

MVIG future work products:

1. Create a charter for the MVIG based on the CPIWG format.
2. Develop a list of potential members based on 1998/99 symposium attendance.
3. Develop 1-year goals.
4. Develop a list of future products and assign priorities.
5. Develop the motor vehicle application profile.

RWTIG future work products:

1. Create a charter for the RWTIG based on the CPIWG format.
2. Develop a list of potential members based on 1998/99 symposium attendance.
3. Develop 1-year goals.
4. Develop a list of future products and assign priorities.
5. Develop the railway transportation application profile.
6. Lead the Railway panel in Brighton, England. This was accomplished during June 1999.

Goal 3: Conduct Systems Engineering Applications Sessions at the 9th Annual International Symposium in Brighton, England, on June 6-10, 1999, on diverse systems engineering applications.

Status: The SEATC chairperson has maintained contact with Allen Fairbairn, Symposium Technical Chairperson, since the Vancouver symposium; SE applications domain-specific paper sessions were planned for the Brighton symposium.

Allocation: Thirty-five papers were presented at the Brighton symposium. Unfortunately, the following sessions proposed for Brighton were for the most part lost because of the format chosen for that symposium:

- a. Session 1: Aviation/Avionics Applications
- b. Session 2: Space Exploration Applications
- c. Session 3: Y2K Applications (new)
- d. Session 4: Information Systems Applications
- e. Session 5: Internet/Telecommunications Applications (new)
- f. Session 6: Telecommunications Applications

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- g. Session 7: Commercial Applications
- h. Session 8: Transportation Applications
- i. Session 9: Defense Applications
- j. Session 10: Facilities Systems Engineering Applications (new)
- k. Session 11: Waste Management Applications

Goal 4: Conduct one or more SE Panel Sessions at the Brighton Symposium

Status: The SEATC presented three panel sessions at the Brighton, England, International Symposium in 1999. The sessions were as follows:

1. “Using Internet for Expanding the Services of Systems Engineering”
2. “Systems Engineering Aspects of Environmental Restoration and Waste Management”
3. “A Panel for Railway Case Studies in Europe and the United States”

Another panel proposed for Brighton and now planned for Minneapolis in 2000 is “Issues Related to the Deployment of Systems Engineering in the Commercial and Public Interest Applications.”

Goal 5. Continue contact with universities that offer a Systems Engineering curriculum to gain their participation in the SEATC.

Status: Contacts are underway across the nation with systems engineering students and faculty at universities such as Virginia Tech, George Mason University, the University of Maryland, the University of Arizona, and UNLV. Several SEATC members are involved in these activities.

UNLV has been involved in at least two regional seminars supported by the Silver State Chapter in Las Vegas, NV, and the Snake River Chapter in Idaho Falls, ID, and involving the ER&WMIG membership.

In addition, the systems engineering students of W. Mackey at the University of Maryland have written 17 profiles, several of which are of sufficiently high quality to be included in the next SEAP release.

Goal 6. Obtain a complete complement of INCOSE Interest Groups in local chapters such as

- **San Francisco Bay Area: Natural Resource Management Systems**
- **Washington Metro: Highway Transportation Systems and/or Criminal Justice and Legal Systems**
- **Chesapeake: Telecommunications Systems**
- **Nevada Silver State: Waste Management and Disposal Systems**

- **Detroit/Tri-State: Motor Vehicle Systems**
- **Seattle Metro: Commercial Aircraft Systems**

Two others are proposed:

- **Texas Gulf Coast: Energy Systems**
- **New England: Health Care Systems**

Status: The first six chapters have accepted the challenge and are conducting or proposing programs in their local chapters. The San Francisco Bay Area Chapter has had as many as eight volunteer projects underway in Natural Resource Management.

On October 27-28, 1998, the Nevada Silver State Chapter conducted a workshop entitled “Systems Engineering Within the DOE Complex.”

The Seattle Metropolitan Chapter members are leading the development of the Guidelines for the Practice of Systems Engineering in the Commercial Aircraft Domain.

Congratulations to these chapters!!

Goal 7: Improve team building and communications in the all SEATC Working Groups and Interest Groups

Status: It is apparent that the lack of resources, limited commitment in a volunteer organization and downsizing in many industries have caused a few people to carry the burden on virtually all INCOSE committees. The SEATC is fortunate in that its members for several years have demonstrated a willingness to work together and produce materials useful to the SEATC and INCOSE. Nevertheless, the SEATC members believe more must be done to encourage active participation in all working and interest group activities.

SEATC: Scott Jackson created a Multilevel Participation Plan that was completed on March 17, 1998. The plan is included as Appendix G of the SEAP, Version 2.0a and also Appendix E of this document.

The plan proposes a system of participant networks using a “multilevel participation” concept. The key features of this concept include the following:

- Members would be able to participate at different levels including from their workstations
- Communications would focus on E-mail and teleconferences (bimonthly) rather than meetings
- These media would conduct symposia and workshop business, and points of contact rather than chairs would head networks. Members from anywhere in the world will be able to help. Everyone is asked to consider this possibility.

SEATC: Telecons have initiated with all working group and interest group chairs. Using a structured agenda, these calls last 1 hour and to date all business has been conducted. The time of the calls is 4:00 p.m. EST and, therefore, allows inclusion of Australian and European participants, as well as West Coast personnel. To date, 2 years of bimonthly telecons have been

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conducted by the SEATC. In addition, the JCAWG conducts telecons almost weekly to develop the new commercial aircraft guidebook.

Anyone who likes this exciting activity and is interested in systems engineering applications is invited to join one of the SEATC's working or interest groups. To "roll up your sleeves" and support the goals and interests of the SEATC, please contact

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Summary of Accomplishments for 1998–1999

- The SEATC had a major impact on the 1999 INCOSE symposium in Brighton, England, with three application panel sessions: Telecommunications/Internet, Environmental Restoration and Waste Management, and Railway Transportation.
- The SEATC led all INCOSE technical committees in creating the themed issue, "Commercial Activities in INCOSE," of *INSIGHT* (Summer 1999, Volume 2, Issue 2).
- The Systems Engineering Applications Profiles, Version 2.0a, was released in January 1999, and placed on the INCOSE Webpage in February 1999.
- The SEATC created two drafts of the SEATC Organization Report, which delineates the charters, legacy, goals, products, and membership of the SEATC.
- The JCAWG initiated the first INCOSE application-specific Guidelines for the Practice of Systems Engineering in the Commercial Aircraft Domain.

Appendix D—INCOSE SEATC Membership

This membership list was initially established at the INCOSE Annual Symposium in July 1995. Information may be dated; the most recent information must be obtained from INCOSE records.

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Kessinger, Bill		Resonance Associates	Info. Sys. Mfgr.	wkessing@iamerica.net	256-776-0026 503-460-5678	256-776-0417	105 Peyton Circle, Gurley AL 35748
Lybarger, Tom	P	Lucent Technologies	TC	tlybarger@lucent.com	614-860-4942	-868-4021	MS 2B-247 6200 E. Broad St. Columbus, OH 43213
Mackey, Bill	P	CSC	TC	wmackey@cscmail.cos.com	301-794-1966	-2280	10110 Aerospace Rd. Greentech II, Room 30V Lanham-Seabrook, MD 20706

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<u>Name</u>	<u>V</u>	<u>Organization</u>	<u>Domain</u>	<u>E-mail</u>	<u>Phone</u>	<u>Fax</u>	<u>Mailing Address</u>
McKillican, Boyd	P	Alcatel	RT	bmckilli@torsel.alcatel.com	416-742-6550	-744-6284	4000 Weston Rd. Weston, Ontario M9L 2W8 Canada
Mell, Leonard	C	Pathfinder Solutions	OTH (Commercial)	lemjd@aol.com	303-814-8733	-688-7558	11578 Heidemann Rd. Franktown, CO 80116
Paul, Arthur	P	Howard University		asp@scs.howard.edu	202-806-4861	-4531	2300 Sixth St. N.W., Rm 2040 Washington, DC 20059
Perry, Hugh S.	P	General Dynamics IS	All	hugh.s.perry@gd-is.com	612-921-6597	-6552	8800 Queen Ave. South, M/S BLC WIS Bloomington, MN 55431
Piedras, Graciela	P	OAS	SE/TC	gpiedras@oas.org	202-458-3481	-6854	1889 F St. NW Washington, DC 20006
Riggs, Drew	P	CSC	CPI	cjriggs@ercls.com	202-647-5641 (L) 301-445-1299 (P)	301-985-8909 (L)	10008 Branch View Ct. Silver Spring, MD 20903
Rindskopf, Sam	P	TRW	DOE	m.sam_rindskopf@notes.ymp.gov	702-295-3965	-0709	1180 Town Center Dr. Las Vegas, NV 89143
Shain, Dave	P	Lucent Technologies	TC	dshain.lucent.com	614-860-4922	-5818	6200 E. Broad St. Rm 2B-232 Columbus, OH 43213
Shanks, Wesley	P	Lucent Technologies	TC	wshanks@lucent.com	973-386-7892	-884-5668	67 Whippany Rd, MS 3D-204A Whippany, NJ 07981
Simpson, Joe	P	Boeing	CA	joseph.j.simpson@boeing.com	425-717-1010 (L) 206-781-7089 (P)		6400 32nd NW #9, Seattle, WA 98107
Srivatsan, R.	P	Raytheon	?	raghavachari_srivatsan@re5.raytheon.com	978-858-1389	-4757	50 Apple Hill Dr., MS T2TF2 Tewksbury MA 01876
Tsang, Kam	P	Alcatel	RT Control	ktsang@torsel.alcatel.com	416-742-6550	744-6284	4000 Weston Rd. Weston, Ontario M9L 2W8

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Previous Members

<u>Name</u>	<u>Y</u>	<u>Organization</u>	<u>Domain</u>	<u>E-mail</u>	<u>Phone</u>	<u>Fax</u>	<u>Mailing Address</u>
Allan, Jeff	P	University of Birmingham (this may be obsolete)	RT	jallan@ee-alta.bham.ac.uk	011-44-121-414-4286	-4291	Edgbaston, Birmingham B15 2TT UK
Austin, Mark	P	University of Maryland	CPI	austin@isr.umd.edu	301-405-6627	-6707	A.V.Williams Bldg, Rm 2209 College Park, MD 20742
Bagg, Tom	P	TCB III	TC	tom.bagg@gsfc.nasa.gov	301-809-2218	-262-2642	6307 Frederick Rd. Cantonsville, MD 21228
Cole, Norm	M	Lockheed Martin Idaho Technologies	DOE	ncole@inel.gov	208-526-5004	-0664	3169 S. Nina Drive Idaho Falls, ID 83404
Cutler, Bill	M	Consultant System Services	RM	billcutler@compuserve.com	650-493-8715	-8715 (call first)	4114 Park Blvd. Palo Alto, CA 94306
Dolton, Ted	M		RM	alanjoanne@aol.com	650-321-5950		1570 Dana Ave. Palo Alto, CA 94303
Henderson, Bill	M	Sverdrup Corporation	FA	hendersonwf@hap.arnold.af.mil	615-454-5295	-3618	1934 Little Hurricane Rd Winchester, TN 37398
Hill, Ralph	M	LMITCO	DOE	hillrs@inel.gov	301-916-2545	-4098	12850 Middlebrook Road Germantown, MD 20874
Mathers, Greg	M	Boeing	CA	Gregory.Mathers@pss.boeing.com	425-717-1020		

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<u>Name</u>	<u>V</u>	<u>Organization</u>	<u>Domain</u>	<u>E-mail</u>	<u>Phone</u>	<u>Fax</u>	<u>Mailing Address</u>
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Williams, John	M	University of Birmingham	RT	jsw@netcomuk.co.uk	44-181 392-9776	-121-414-4291	63 Palewell Park, East Sheen London, SW14 8JQ, UK
Wittig, Bill	M	Delphi Saginaw Steering Systems Advanced Product Center	MV	bwittig@usa.net	517-757-3057	-3039	3900 Holland Rd, MS APC-1 Saginaw, MI 48601-9494
Zaleski, John	M	Lockheed Martin	HC	john.zaleski@lmco.com	610-354-5379		

P - Participants List
M - INCOSE member list
L - Signup list at Vancouver

Appendix E—Multilevel Participation Plan

MULTILEVEL PARTICIPATION PLAN

Prepared by Scott Jackson, INCOSE Los Angeles Area Chapter

E.1 Introduction

At the International Workshop in Dallas, Texas, January 26–29, 1998, the SEATC identified the strengths and weaknesses of the committee. This discussion resulted in a list of injections (i.e., solutions) that might correct many of the weaknesses. The primary need addressed was how to increase participation in committee activities. This need is particularly acute in view of the fact that both the then past (Eric Honour) and present (Bill Shoening) INCOSE presidents listed emphasis on non-defense applications as one of the top priorities of the organization. This plan will spell out the features of a plan to address this need.

E.2 Background

The committee listed both the strengths and weaknesses of the committee. Present were William Mackey (SEATC Chairperson), Scott Jackson (SEATC Cochairperson), Patrick Sweeney (Facilities Systems Engineering Working Group), and Terry Robar (Business Domain Analysis Working Group).

E.2.1 Strengths

The following strengths were listed:

- Strong expertise of members in a number of applications domains
- Ability to structure symposia to the advantage of systems engineering applications
- A Systems Engineering Applications Profile document with ability to expand in multiple application domains
- Ability to create liaisons with academic institutions

E.2.2 Weaknesses

The following weaknesses were identified:

- Lack of travel money
- Limited volunteer time
- Limited number of committed people
- Limited number of invitations to winter workshop
- Conflicts with other committees
- Not enough public relations

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- No time during summer workshop to attract and sign up new people
- The commercial industries (and public interest organizations) that we study seem to provide minimal representation

This plan addresses primarily the first five weaknesses.

E.3 Plan Features

The features of the plan are as follows:

- Networks
- Participation
- Leadership
- Communication
- Teleconferences
- Meetings
- Workshop invitations

E.3.1 Networks

The plan envisions that the system of working groups and interest groups would function as networks with the members participating at multiple levels of participation (Section E.3.2) with leaders functioning as points of contact and communicating by E-mail (Section E.3.4) and teleconferences (Section E.3.5). The current emphasis on meetings (Section E.3.6) would be de-emphasized. This system is seen as the primary method for involving people whose time commitments and organizations do not permit them to travel.

E.3.2 Participation

The concept of multilevel participation is envisioned as the primary mechanism for allowing anyone, even members of other committees and working groups, to participate at their own level without committing to travel to meetings or conferences.

E.3.2.1 Level 1, Comment

The comment level is the lowest level of participation. It addresses those members whose commitments to other priorities are most restrictive. For example, a person may be a member of another committee, but have a special interest in a particular application domain. This level allows those persons to comment on products being produced. If any person at this level wishes to contribute from time to time at a higher level, that participation would not be discouraged. Persons at this level can also participate in the teleconferences if they wish. No travel commitments are associated with this level.

E.3.2.2 Level 2, Contributory

The contributory level is directed at those persons who may wish to write a paragraph, a section, or even the entire text of any SEATC product. These contributions can be accomplished entirely by E-mail. No travel is expected, but it is welcome.

E.3.2.3 Level 3, Coordination

The coordination level is directed at those persons who may be willing to coordinate a particular SEATC product. This coordination would involve exchanging E-mail with the various contributors and ensuring the continuity and integrity of the product. This level does not necessarily imply any writing; however, the development of an outline would be a logical task, along with editing to ensure continuity of the sections. Like other levels, this task can also be conducted entirely by E-mail; hence, no travel is required.

E.3.3 Leadership

As discussed in Section E.3.1, the leadership concept would allow working group and interest group leaders to function as points of contact and reduce their need to attend meetings. Hence, working group or interest group leaders may function entirely without attending symposia or international workshops (formerly called winter workshops). The primary function of a leader is to determine what the products of the group are and to coordinate their production. The leader may function as a coordinator and also may contribute material. The SEATC chairperson and cochairperson would normally be expected to attend symposia and international workshops. Working and interest groups would also be encouraged to attend, but attendance would not be required.

E.3.4 Communication

It has been noted that other technical committees have begun to function almost entirely through E-mail, which is also the SEATC's goal. Coordination, contributions, and comments can all be accomplished by E-mail. Teleconferences are another communication method.

E.3.5 Teleconferences

An increased emphasis on teleconferences is envisioned for members at all levels of participation. We propose bimonthly teleconferences, with the first one taking place the first week of March 1998. The conferences should be early (e.g., 8:00 a.m. Pacific time) so that European members (4:00 p.m. Greenwich mean time) can participate. The teleconferences should be structured with an agenda and last no more than 1 hour. Typical topics would be the status of deliverables, and upcoming conferences and meetings. The teleconference chairperson will publish a meet-me number that all members can call at the appointed hour. As each member calls in, he or she should briefly introduce himself or herself (e.g., "This is Joe Smith from the XYZ corporation in ABC, Texas."). The chairperson will periodically summarize who is on the line.

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E.3.6 Meetings

Although the chairperson and cochairperson are the only SEATC members expected to be at annual symposia and international workshops, others are strongly encouraged to attend. Lack of attendance will not affect their performance in any level of participation.

E.3.7 Workshop Invitations

One weakness cited is that the invitation-only policy for international workshops may discourage many SEATC members from attending. This plan calls for the SEATC chairperson to arrange for invitations for any SEATC members who wish to attend. In the unlikely event that there are too many requests, a limit may have to be set. The current plan is to arrange invitations for any SEATC member who requests one.

E.4 Schedule

E.4.1 Prepare Plan Draft

The deadline for the preparation of this plan is February 15, 1995. The responsibility is Scott Jackson's. The plan was complete by the above date.

E.4.2 Approve Plan

The date for the approval of this plan is the teleconference during the first week of March 1998. The approval is required by the chairperson, cochairperson, and current working/interest group chairpersons. NOTE: This plan was unanimously approved during the teleconference on March 4, 1998.

E.4.3 Teleconference

Scott Jackson will poll members for the most convenient day for a teleconference during the first week of March. He also will chair the teleconference and notify the members of the meet-me number. William Mackey will prepare the agenda.

E.4.4 Publicity

Following the approval of this plan, the appeal for members will be made in various forms:

- Insight – Pat Sweeney, theme editor for the *INSIGHT* issue, will ensure that a notice of the multilevel participation concept is included in that issue. Suspense date is March 17, 1998. This action was completed.
- Reflector – Scott Jackson will prepare and send a reflector message. Suspense date is also March 17, 1998. This action was completed.
- Other – The SEATC, under direction of the chairperson, will determine other methods of publicity.

E.4.5 Task Assignments

Prior to plan approval, we envision that appeals for help will focus on current tasks, such as completing sections of the SEAP document.

Following plan approval, members will be assigned to the various levels of participation they request. The chairperson will be responsible for level, working group, and interest group assignments.

Appendix F—SEATC Primary Products List (As of January 2000)

Product Name	WG/IG	Type	Publication Date	Distribution Date
1. Systems Engineering Applications Profiles (SEAP) Document Version 1.0 Version 2.0 Version 2.0a Version 3.0	CPIWG	Report	May 1, 1996 July 1, 1998 January 20, 1999 Planned for July 2000	July 1996, Vol. 2 INCOSE Proceedings August 1998 INCOSE Webpage February 1999 INCOSE Webpage
2. SEAP Writing Guide	CPIWG	Report	April 1, 1996	July 1996, Volume 2. INCOSE Proceedings Appendix E of SEAP
3. Multilevel Participation Plan	SEATC	Report	July 1, 1998	August 1998 INCOSE Webpage Appendix G of SEAP, Version 2.0
4. SE Applications Organization Report Draft Version 1.0	SEATC	Report	June 1999 January 2000	June 7, 1999 Selected Distribution Planned for Website
5. INSIGHT Themed Issue “Systems Engineering Applications Domains in the Commercial and Public Interest”	SEATC	INSIGHT Volume 1 Issue 2	Summer 1998	Summer 1998
6. INSIGHT Themed Issue “Commercial Activities in INCOSE”	SEATC Lead	INSIGHT Volume 2 Issue 2	Summer 1999	Summer 1999

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Product Name	WG/IG	Type	Publication Date	Distribution Date
7. Guidelines for the Practice of Systems Engineering in the Commercial Aircraft Domain Version 1.0	JCAWG	Guidebook	Planned for July 2000	
8. Telecommunications Industry Applications Guidebook, Version 1.0	TELWG	Guidebook	Planned for TBD	

Appendix G—INCOSE Systems Engineering Applications References by Application Domain and Year Published

The references in this appendix are from INCOSE symposia proceedings, journals, etc. They have been clustered by systems engineering application domain within each year from 1992–1999. The following table demonstrates that a large number of publications has been completed in many domains since INCOSE’s first symposium in 1991. A complete list of these papers can be found in Appendix H of the *Systems Engineering Applications Profiles* document, Version 2.0a, located under SEATC Products at the INCOSE Website (www.incose.org)

Summary of Systems Engineering Applications by Year

Systems Engineering Application Domain	Year								Total
	1992	1993	1994	1995	1996	1997	1998	1999	
Agriculture	0	3	2	0	0	0	0	0	5
Aviation/Avionics	1	4	0	2	1	7	8	7	30
Commercial	1	3	3	1	4	4	2	6	24
Criminal Justice and Legal Systems	1	0	1	0	0	0	0	0	2
Defense	0	0	0	0	0	0	1	8	9
Emergency Services	0	0	0	0	0	0	0	1	1
Energy	0	1	1	1	0	0	0	1	4
Environmental Restoration	0	0	1	1	3	1	0	0	6
Facilities	0	0	0	0	0	0	0	2	2
Health Care	0	0	0	0	0	0	2	0	2
Information Systems	0	0	0	0	3	1	1	5	10
International Commercial	0	0	0	1	0	0	4	0	5
Medical Devices	0	0	0	1	0	0	0	1	2
Natural Resource Management	0	0	0	1	0	0	0	0	1
Political and Public Interest Systems	1	0	0	0	2	0	1	0	4
Space Exploration	0	4	3	8	7	1	4	8	35
Telecommunications	0	1	0	0	3	0	3	5	12
Transportation	1	1	1	1	3	7	1	2	17
Urban Planning	0	1	2	1	0	3	0	0	7
Waste Management and Disposal	1	0	3	2	3	3	3	5	20
Totals	6	18	17	20	29	27	30	51	198

Appendix H—SEATC-Sponsored Panel Sessions

Panels and Regional Seminars	WG/IG	Publication Date	Application Domains Represented
1. "Horizons of Systems Engineering in the Civil Sector," INCOSE WMA Chapter	Civil Sector Working Group	April 20, 1993	Environmental Restoration Legal Profession Agriculture
2. "Systems Engineering in Commercial Industries" Los Angeles Symposium	SEATC Panel CPIWG FSEWG JCAWG TELWG RMWG DOEIG	August 7, 1997	Environmental Restoration Commercial Aircraft Facilities Systems Engineering Telecommunications National Resource Management Highway Transportation
3. "New Arenas for Applying Systems Engineering" San Francisco Bay	RMWG Panel	November 11, 1997	Resource Management
4. "Supersystem Process: Managing Complex Public Issues" San Francisco Bay Seminar	RMWG Seminar	January 31, 1998	Public Interest Resource Management
5. "Systems Engineering in the DOE Environment" Silver State Chapter Seminar	ER&WMIG Seminar	October 1999	Environmental Restoration Waste Management
6. (Title Unknown) Snake River Regional Seminar Jackson Hole, Wyoming	ER&WMIG	March 1999	Environmental Restoration Waste Management
7. "Systems Engineering Aspects of Environmental Restoration and Waste Management"	ER&WMIG Panel Brighton Symposium	June 9, 1999	Environmental Restoration Waste Management
8. "Using the Internet for Expanding the Services of Systems Engineering"	TELWG Panel Brighton Symposium	June 10, 1999	Telecommunications Long-Distance Education Internet
9. "Railway Case Studies in Europe and the United States"	RWTIG Panel Brighton Symposium	June 10, 1999	Railway Transportation
10. "Issues Related to the Deployment of Systems Engineering in the Commercial and Public Interest Application Domains"	SEATC Panel Minneapolis Symposium	July 2000 (Planned)	TBD

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Panels and Regional Seminars	WG/IG	Publication Date	Application Domains Represented
11. "Commercial Aircraft Industry Systems Engineering Applications"	JCAWG Panel Minneapolis Symposium	July 2000 (Planned)	Commercial Aircraft
12. "Caring for the Health of the Patient as and Entire System"	HCIG Panel Minneapolis Symposium	July 2000 (Planned)	Health Care
13. "Developing Systems for the Healthcare Industry"	HCIG Panel Minneapolis Symposium	July 2000 (Planned)	Health Care
14. Information Systems Panel	CPIWG Panel Minneapolis Symposium	July 2000 (Planned)	Information Systems
15. Motor Vehicles Panel	MVIG Panel Minneapolis Symposium	July 2000 (Planned)	Motor Vehicles