Center for National Software Studies

PROSPECTUS & STRATEGIC PLAN

JANUARY 2, 2001

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Executive Summary

This Prospectus sets forth the strategic plan for the formation and operation of the Center for National Software Studies (CNSS). The mission of the CNSS is to elevate software to the national agenda, and to provide objective expertise, studies, and recommendations on national software issues.

In a span of less than thirty years, computer software has emerged as a pervasive and critical national resource. Software today is vital to America's global competitiveness and national security, and is a key enabling agent in the nation's infrastructure. The recent year 2000 (Y2K) crisis vividly illustrated the costs and risks of software dependency. Yet for all its importance, the role of software in national prosperity is little studied or understood. Our growing dependency on software raises national issues and challenges that require informed and effective leadership:

? Understanding the value that software adds to the nation's economy.
? Ensuring national competitiveness in the global software marketplace.
? Meeting public needs for trustworthiness in critical software systems.
? Educating and training the current and future software workforce.
? Ensuring qualifications and competency of software professionals.
? Protecting intellectual property and preventing software piracy.
? Defining an effective agenda for software research and investment.

To begin the process of addressing these issues, the CNSS is establishing three major initiatives that deal with national competitiveness, trustworthiness of software systems, and competency of the software workforce. The competitiveness initiative will improve understanding of the value of software in achieving global competitiveness for US industries. The trustworthiness initiative will promote investment in software engineering practices required to develop safe and reliable software systems. The competency initiative will promote education and training required to ensure sufficient capacity and quality in the software workforce.

The CNSS is being established by a group of concerned senior software professionals who have recognized the need for national focus and informed leadership on software issues. The CNSS will study software as a national resource, and help inform the nation and its leadership on the impact of software to the economy. It will serve as a "forward observer" for early identification of issues that affect the software capability of the nation, and will make recommendations to reduce their costs and risks. It will provide a venue for the "best and brightest" to focus on critical software problems through three principal activities:

? Forums: Workshops will be held to bring together industry, academic, and government leaders to develop findings and recommendations on national software issues.

? Studies: Projects will be carried out to clarify and articulate national software issues and develop recommendations to address them.

? Communications: A program of communications, including published reports and Internet sites, will be established to promulgate findings and solicit feedback and participation.

The CNSS has been organized as a private, not-for-profit corporation governed by a Board of Trustees. It is intended that it will ultimately be composed of a permanent staff of managers, technical professionals, and administrators, supplemented by appointed Fellows. A newly constituted National Software Advisory Council (NSAC) of invited senior professionals will provide program oversight and review within the CNSS, and also be available to serve as an independent advisory body to government, industry and academia. The CNSS will pursue studies within its scope and purpose, and establish cooperative and integrating relationships with other organizations as appropriate. It will be funded through grants and contracts with sponsors drawn from industry, government, and academia.

The CNSS Strategic Plan comprises four event-driven phases:

? Phase I ("Startup"): The objectives of phase I are to establish a preliminary CNSS organization and launch the CNSS initially as a web-based "eCenter," with the goal of proving its viability and value as a national resource. During this start-up phase, the CNSS will conduct an initial set of studies through its web site, and provide additional web-based communications facilities and support activities to develop a constituency of contributing participants. During this phase, funding for the CNSS will primarily come from contributions from the participants, initial grants, and potentially from subscription fees paid by supporters and individual CNSS Associate Members. Staffing will be provided by volunteer participants. Phase I began in 4Q 2000 with the launch of the CNSS web site (www.cnsoftware.org) and will conclude when the board of trustees determines that the CNSS has attracted a "critical mass" of supporters and that the concept has been validated. The CNSS will then transition to Phase II.

? Phase II ("Operational"): When the board determines that the CNSS should transition to a continuing "Operational" organization, it will also decide on one of two alternative future directions for the CNSS, based on the success of the startup phase:

a. The CNSS has proven its viability and value as a national resource, and should continue as a permanent web-based eCenter. (This phase may continue indefinitely, or until the board subsequently determines that conditions are appropriate to transition to phase II b. Continuing indefinitely as an eCenter, however will definitely be considered a successful outcome for the CNSS!) Or,

b. The CNSS has proven its viability and value as a national resource, and has attracted a sufficient level of support to not only continue operation as a web-based eCenter, but to embark upon the establishment of a "brick and mortar" center as well. The

objectives of phase II b are to deliver sufficient value to the constituencies of the CNSS through its operations to merit the award of significant contracts and grants, laying the groundwork for launching a CNSS permanent facility.

To the extent that funding will allow, permanent or part-time staff may be hired during phase II (a or b) to supplement the continuing role of volunteer participants. When actual funding or commitments for the CNSS reach the $1 Million dollar level, the board of trustees may approve the transition from phase II b to phase III.

? Phase III ("Buildout"): The objectives of phase III are to transition the CNSS from a purely web-based organization to an organization with a physical home and facilities capable of supporting a vigorous research effort and supporting activities. At the same time, the CNSS must, through its supporters, its staff and collaborative relationships, produce study results of value to the nation. Staffing will continue to be through a combination of volunteer participants and both permanent and part-time staff. Phase III will be completed when the CNSS is established in its first permanent facilities.

? Phase IV ("Sustainment/Growth"): The objective of phase IV is to sustain and improve the capability to deliver value to supporters and the nation. The board of trustees will establish funding and staffing objectives as well as schedule objectives consistent with the ability to ensure quality and the need to accommodate the anticipated workload of the CNSS.

The full Prospectus and Strategic Plan describes the background and motivation for the CNSS, including its origins and rationale; outlines its philosophy and commitment to cooperative collaboration with other organizations; introduces the initial CNSS program addressing global competitiveness, system trustworthiness, and workforce competency; presents the four-phase CNSS Strategic Plan, including objectives, funding, and resource requirements; and introduces key participants in CNSS operations and programs.

1. INTRODUCTION: THE CNSS CONCEPT

1.1 Software Is Critical To National Prosperity And Security

From its modest beginnings some 50 years ago, computer software has become a critical element of modern society, with global reach and impact on virtually every aspect of human endeavor. Software is a key enabling technology in business, industry, government, and defense, and permeates products and services of all kinds. It is no exaggeration to say that the progress of modern society is totally and irrevocably dependent on software, as clearly exemplified by the recent year 2000 ("Y2K) crisis. Economic sectors such as manufacturing, financial services, communications, health care, energy, transportation, and education, as well as national defense and government, depend for the conduct of daily operations on software ranging from personal computer applications to large-scale, networked systems of astonishing complexity. The critical infrastructure of the nation is largely controlled and managed by software. In short, software has become a critical national resource, vital to national well-being and competitiveness.

1.2 Software's Critical Role Raises National Issues

The nation's dependency on software raises national issues and challenges that must be addressed in a coherent manner. Representative issues of major import include:

? Understanding the value that software adds to the nation's economy.
? Ensuring national competitiveness in the global software marketplace.
? Meeting public needs for trustworthiness in critical software systems.
? Ensuring the necessary degree of security and privacy in information systems.
? Educating and training the current and future software workforce.
? Ensuring qualifications and competency of software professionals.
? Protecting intellectual property and preventing software piracy.
? Defining an effective agenda for software research and investment.

1.3 Addressing the National Software Issues

Beginning in 1993, a group of senior software professionals drawn from industry, government, and academia has been addressing several of these issues These professionals shared a common concern over the growing societal dependency on software, the competitiveness and security implications of that dependency, and the absence of coherent national strategies to deal with software issues and challenges. Working through an organization then called the National Software Council, the group organized a number of workshops, forums and software summit meetings throughout the mid and late 90's in an effort to bring to bear appropriate resources and focus on the most critical issues. The results of these efforts are described in Appendix B.

While the original National Software Council achieved some significant accomplishments, it became clear that the critical importance of the issues demanded a commensurate dedication of resources, and an organization that could have a national level impact. It was also clear that no existing organization had the requisite combination of industry knowledge, objectivity and national policy focus to meet the need. As the new millennium dawned in January of 2000, the list of critical issues was expanding. After considerable deliberation and analysis of several alternatives, the concept of establishing a new funded center with a resident research and support staff augmented by a body of distinguished Fellows emerged as the best structure to accomplish the original goals.

Accordingly, the group undertook the task of creating the Center for National Software Studies (CNSS), whose goals and objectives are described in this Prospectus. The CNSS has adopted a 'think tank' model, and will operate as a non-profit organization with 501(c)(3) status.

1.4 The CNSS Role

The mission of the CNSS is to provide objective expertise, studies, and recommendations on national software issues.

As a public policy research institution, the CNSS will promote the arts and sciences of software, to support the health of the software industry and the welfare of all users of software. In particular, the CNSS will focus on software as a critical national resource, and will help inform the nation and its leadership on the impact of software on the economy. It will recommend policies, processes, and methods to its constituencies designed to maintain and improve the trustworthiness of software systems, the competitiveness of software-dependent organizations, the competency of the software workforce, and the national software education and research infrastructure.

The CNSS will operate as a non-profit "think-tank," staffed by recognized thought leaders in software and governed by a Board of Trustees. It will initiate operations as an "eCenter", and evolve through phased growth to a robust organization maintaining a permanent staff of researchers, augmented by visiting Fellows.

The founders of the CNSS believe it is vital to pursue this work now. As a nation, we must understand the pervasive impacts and opportunities of software to better capitalize on this remarkable technology in the future. The CNSS is being placed at the service of the nation for this purpose.

1.5 Relationships with Existing Organizations

The CNSS does not intend to duplicate the work of other organizations, but rather to pursue studies within its scope and purpose that are not addressed by others. Where overlap exists with the efforts of other institutions and the CNSS can contribute objectivity and breadth to an issue, it will seek collaboration before proceeding. The CNSS relates to and will collaborate with other organizations as follows:

1.5.1 Professional Societies

Societies such as the IEEE Computer Society and the Association for Computing Machinery are membership organizations that represent the needs of computing professionals. For example, the IEEE Computer Society deals principally with technical issues in software engineering. The CNSS will deal with broader issues than those addressed by professional societies. Where there is an overlap, such as the issue of licensing software professionals, the CNSS will work in cooperation with professional societies.

1.5.2 Trade Associations

Trade associations such as the Business Software Alliance, Software and Information Industry Association, and numerous others are supported by member companies for the specific purpose of dealing with mutual business interests. Trade associations must be responsive to the business needs and objectives of their members. The CNSS will maintain contact with these associations to understand their interests, and collaborate with them when appropriate.

1.5.3 Government Agencies

Many government agencies perform studies and have an interest in software. These agencies generally act to further specific government objectives. For example, the Information Technology Laboratory (ITL) of the National Institute for Standards and Technology (NIST) is responsible for supporting commerce in computing and software. The ITL works with industry to develop standards, and plays a key role in improving software quality through technologies and tools for testing and measurement. The CNSS will interact with government agencies such as NIST to understand their objectives and to work with them when appropriate.

1.5.4 Existing Software Organizations

Several organizations that have been formed to deal with issues of software technology and management, for example:

? Software Productivity Consortium (SPC): The SPC is a member organization founded to address technical software engineering issues on behalf of its industrial membership. It does not address the broader scope and wider constituency of the CNSS.

? Software Engineering Institute (SEI): The SEI is a Federally Funded Research and Development Center (FFRDC) whose objective is to improve the practice of software development in the DoD and DoD-related industries. While mutual interests exist, the SEI is directed by the DoD and is not chartered with the broad CNSS mission to address national software issues.

1.5.5 Council on Competitiveness (CoC)

The CoC is concerned with the competitiveness of major US industries, including the software industry. Given its broad mission, the CoC is not in a position to apply the resources required for in-depth study of national software issues. The NSC assisted the CoC in the past by providing expertise for analysis of software competitiveness, and the CNSS will continue the collaboration as appropriate.

1.5.6 National Research Council (NRC) and National Academy of Engineering (NAE)

The NRC and NAE conduct studies of interest to the government in many areas, including software. Given their broad charter, the NRC and NAE are not focused on in-depth analysis of national software issues, and their membership is not well suited to this role. The CNSS will bring significant resources and expertise to software issues, and will collaborate with these organizations as appropriate.

1.5.7 Academia

Academic institutions generally pursue limited and specific software studies within fields of interest of particular researchers. Many of these studies are purely technical in nature. In some cases, such as the Stanford study of software competitiveness, mutual interests can be pursued. The CNSS is aware of relevant activities and will work with appropriate institutions to avoid duplication and provide assistance to specific efforts.

2. CNSS ORGANIZATION AND OPERATION

2.1 The CNSS Organization

The CNSS will operate as a private, not-for-profit corporation composed of a permanent staff of managers, technical professionals, and administrators, governed by a Board of Trustees. Within the CNSS, the National Software Advisory Council (NSAC) will provide oversight and review of the CNSS program, and be available to government, industry and academia as an advisory body. Sponsoring and collaborating organizations and individuals may be invited to join the CNSS as associates. The work of the CNSS will be performed by a professional staff (Phase II), supplemented by appointed Fellows drawn from industry and academia. Fellows will be recognized thought leaders in their fields, with demonstrated achievements and professional contributions.

The CNSS will conduct research and disseminate results in order to provide understanding, insight, and education on issues relating to software, the software industry, and the application of software throughout the national economy. It will operate in such a manner as to qualify as a tax-exempt educational and scientific institution under Section 501(c)(3) of the Internal Revenue Code. The CNSS will be specifically prohibited from engaging in lobbying activities.

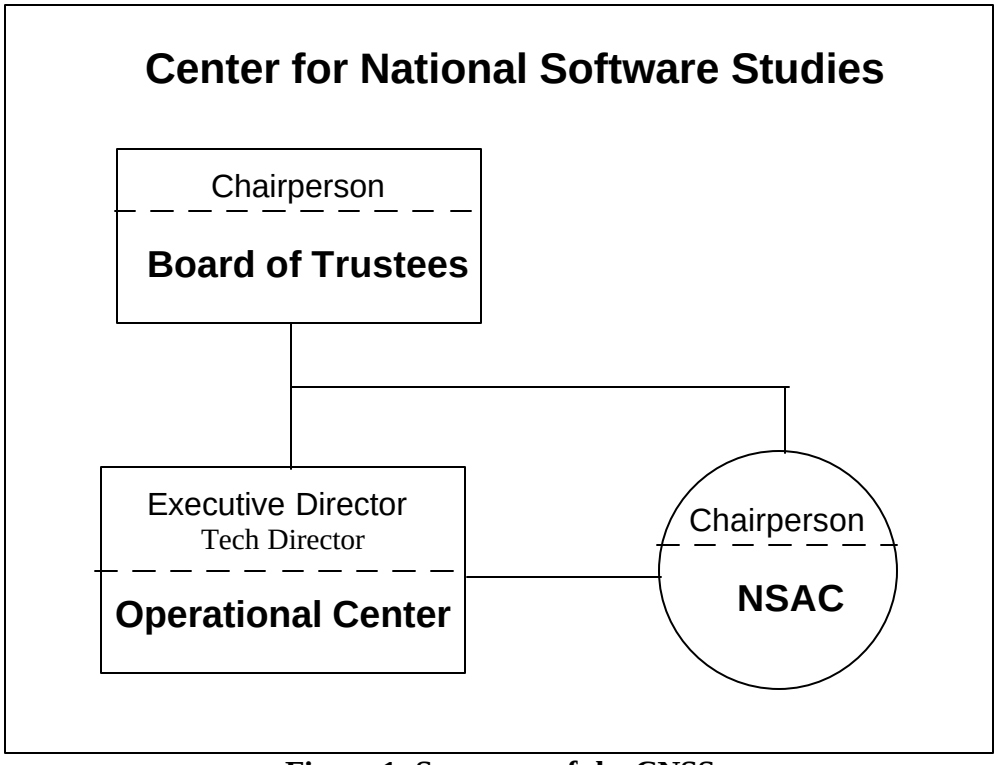

Figure 1: Structure of the CNSS

Figure 1 depicts the structure of the CNSS. The Operational Center will carry out the CNSS programs and administer the CNSS web-site. The NSAC will provide program guidance and review. The Board of Trustees will provide overall CNSS governance, and will appoint the Executive Director of the Operational Center and the initial Chairperson of the NSAC. The Tech Director will be appointed by the Board of Trustees, with the concurrence of the NSAC. The initial Board of Trustees has been drawn from members of the predecessor NSC board, and will subsequently govern itself in accordance with processes it will establish. Appointments to the NSAC will likewise be made in accordance with processes initially established by the Board of Trustees. When the NSAC becomes fully operational, it will determine its own processes and membership criteria, subject to the concurrence of the Board of Trustees.

2.2 CNSS Operations

The CNSS will address software issues through a three-part program composed of forums, studies, and communications, all under the direction of a Program Director. CNSS forums will bring together industry, academic, and government leaders to address national software issues and develop findings and recommendations. These forums will increase communication and understanding, and bring focus to issues that require in-depth study and analysis. Studies will be initiated by the CNSS or commissioned by supporters, to clarify and articulate software issues and develop recommendations to address them. Studies will be carried out by under the direction of a Study Director by CNSS staff and Fellows, monitored by the Board of Trustees, and reviewed by the new National Software Advisory Council (NSAC). The CNSS will establish an extensive program of communications through published reports, Internet sites, and conference participation to promulgate its findings and solicit feedback and participation in its work.

2.2.1 Program Directors

A Program Director, appointed with the concurrence of the NSAC, will plan and direct the activities of the CNSS in each major issue area selected by the CNSS board (see Section 3, CNSS Program). Responsibilities of the Program Director include:

? Plan and direct an active program to address the selected issue;
? Prepare (or adopt) an appropriate taxonomy of the issue and post it on the CNSS website;
? Prepare a catalog of relevant past or ongoing activities and post it on the CNSS website;
? Identify critical gaps in effort that merit CNSS focus;
? Coordinate CNSS efforts with other organizations, as appropriate;
? Propose appropriate studies, conferences, workshops to address the topic;
? Recruit Study Directors, activity chairmen etc. as required.

2.2.2 Study Directors

A Study Director, appointed by the Program Director, will plan and direct the execution of each CNSS study (see Section 3, CNSS Program). (Note: The Program Director can also serve as a Study Director.) Responsibilities of the Study Director include:

? Recruit a *balanced* team of study participants, representing all appropriate constituencies. (Typically no fewer than three nor more than 12 members.);
? Prepare a detailed study plan for approval, including a proposed budget and schedule;
? Manage the study to completion in accordance with the study plan.

2.2.3 Review Process

Each CNSS study will undergo a formal review and approval process prior to publication and release of the findings and recommendations. This review will be under the direction of the CNSS Technical Director.

2.3 CNSS Principles of Engagement

The programs conducted by the CNSS on behalf of its supporters will be governed by the following Principles of Engagement:

? All work accomplished by the CNSS shall be in the public interest.

? All CNSS final reports and recommendations shall be available to the public.

? The CNSS shall provide necessary and appropriate protection of information made available to it in the course of its operations.

? The CNSS shall retain ownership of the intellectual property that it creates, while respecting and appropriately crediting the rights pertaining to material that may be referenced or included as a part of a CNSS product.

3. THE CNSS PROGRAM

3.1 Program Objectives and Study Criteria

The CNSS program will identify and articulate national software issues, provide a forum for their analysis and discussion, and develop findings and recommendations to address them. The program will elevate software challenges to a national level, where their full impact and contribution to the national interest in areas of economics, education, technology, and international relations can be effectively evaluated as a basis for action.

Studies undertaken as part of the CNSS program require a clear and concise statement of the problem to be addressed and the question(s) to be answered. Studies will typically be highly focused short-term efforts, with deliverable products completed within six months or less. Each study will be led by a Study Director/Principal Investigator who will prepare a detailed study plan, including planned deliverables, a breakout of activities to be undertaken as part of the study (e.g., workshops), a detailed time schedule with milestones, a list of coordinating and/or collaborating organizations, a proposed study team, and a proposed budget.

3.2 Representative Issue Areas

The following descriptions provide more detail on three representative issue areas planned for study.

3.2.1 Software Value to US Economic Competitiveness

A need exists to increase awareness among policy makers of the pervasive role of software and its value in maintaining prosperity and competitiveness. The Software Value Add Study will improve understanding of the value that software adds to the national economy and the contribution that software makes to global competitiveness. This study was initiated by the NSC and will be continued by the CNSS. It will provide timely, accurate, complete, and understandable information on software and its essential uses across the economy. These findings will be packaged for use with diverse audiences ranging from the general public to the nation's policy makers.

The study is based on use of an instrument called the Global Software Competitiveness Assessment Program. This program is designed to assist corporations in pinpointing strengths and weaknesses in the software competitiveness of their product and service lines. It accomplishes this through the application of carefully designed instruments, a global software competitiveness database, and site visits. Leading software indicators are defined, and industry-specific Value Points are identified where software is strategically essential in the competitiveness of an enterprise.

3.2.2 Software System Trustworthiness

Software system development is often driven by technical requirements alone, and does not adequately address trustworthiness requirements based on societal impact and the

consequences of failures. Trustworthiness encompasses issues of software reliability, safety, security, privacy, and survivability. Because of the increasing complexity and scope of software, trustworthiness will likely become a dominant issue in the future.

Trustworthiness is already an issue in many vital systems, including those found in transportation, telecommunications, utilities, health care, and financial services. Any lack of trustworthiness in such systems can adversely impact large segments of society, as exemplified by recent software-caused outages of telephone and Internet systems. It is difficult to estimate the considerable extent of loses experienced by individuals and companies that depend on these systems. The issue of system trustworthiness is not well known or understood by the public or the nation's leadership. The CNSS will initiate the Trustworthy Software Systems Study to understand the societal impact of failures in critical systems, and to define, from a public perspective, what trustworthiness is and how it can be evaluated and achieved in system development and operation. The CNSS will organize forums to explore the issue, drawing upon leading experts and public officials concerned with providing safe and effective software systems. The intent is to fully articulate the issue so that the public can be informed and industry can respond to an informed public. In addition, the CNSS will initiate efforts aimed at eliminating specific technical barriers to trustworthiness.

3.2.3 Software Industry/Academic Collaboration

This initiative will address the need for improved mechanisms for the software industry to communicate educational requirements to academic and training organizations, and for academic and training organizations to communicate technology developments to industry. The software industry has educational needs, which can be difficult to assess, and academia has often produced technology that has stagnated for lack of effective technology transfer.

The CNSS will initiate the Software Industry/Academic Collaboration Study to address means for improved collaboration and cooperation between these groups. The objective is to improve the state of technology transition between industry and academia by a variety of methods, including innovative approaches to identify, articulate, and match academic research to the needs of industry, and through joint projects and conferences. Several workshops have been held by the NSC which have brought academic and industrial personnel together to explore these issues.

4. CNSS BUSINESS PLAN

4.1 Implementation Phases

The CNSS Strategic Plan comprises four event-driven phases:

? Phase I ("Startup"): The objectives of phase I are to establish a preliminary CNSS organization and launch the CNSS initially as a web-based "eCenter," with the goal of proving its viability and value as a national resource. During this start-up phase, the CNSS will conduct an initial set of studies through its web site, and provide additional web-based communications facilities and support activities to develop a constituency of contributing participants. During this phase, funding for the CNSS will primarily come from contributions from the participants, initial grants, and potentially from subscription fees paid by supporters and individual CNSS Associate Members. Staffing will be provided by volunteer participants. Phase I began in 4Q 2000 with the launch of the CNSS web site (www.cnsoftware.org) and will conclude when the board of trustees determines that the CNSS has attracted a "critical mass" of supporters and that the concept has been validated. The CNSS will then transition to Phase II.

? Phase II ("Operational"): When the board determines that the CNSS should transition to a continuing "Operational" organization, it will also decide on one of two alternative future directions for the CNSS, based on the success of the startup phase:

c. The CNSS has proven its viability and value as a national resource, and should continue as a permanent web-based eCenter. (This phase may continue indefinitely, or until the board subsequently determines that conditions are appropriate to transition to phase II b. Continuing indefinitely as an eCenter, however will definitely be considered a successful outcome for the CNSS!) Or,

d. The CNSS has proven its viability and value as a national resource, and has attracted a sufficient level of support to not only continue operation as a web-based eCenter, but to embark upon the establishment of a "brick and mortar" center as well. The objectives of phase II b are to deliver sufficient value to the constituencies of the CNSS through its operations to merit the award of significant contracts and grants, laying the groundwork for launching a CNSS permanent facility.

To the extent that funding will allow, permanent or part-time staff may be hired during phase II (a or b) to supplement the continuing role of volunteer participants. When actual funding or commitments for the CNSS reach the $1 Million dollar level, the board of trustees may approve the transition from phase II b to phase III.

? Phase III ("Buildout"): The objectives of phase III are to transition the CNSS from a purely web-based organization to an organization with a physical home and facilities capable of supporting a vigorous research effort and supporting activities. At the same time, the CNSS must, through its supporters, its staff and collaborative relationships, produce study results of value to the nation. Staffing will continue to be through a combination of volunteer

participants and both permanent and part-time staff. Phase III will be completed when the CNSS is established in its first permanent facilities.

? Phase IV ("Sustainment/Growth"): The objective of phase IV is to sustain and improve the capability to deliver value to supporters and the nation. The board of trustees will establish funding and staffing objectives as well as schedule objectives consistent with the ability to ensure quality and the need to accommodate the anticipated workload of the CNSS.

4.2 Support Base and Funding Sources

The potential base of supporters for the CNSS, including sources of grants and donations, is composed of industrial, governmental, and academic organizations, as well as associations and foundations, with an interest in software issues on a national scale.

The following is a partial list of representative large-scale infrastructure and application areas that have critical dependencies on software. Organizations that develop and commercially offer these types of systems, those that use them, and those that are concerned with public policy regarding their implementation and use, can all be expected to have an interest in the types of issues described in this prospectus:

Telecommunications:
- Network control and switching systems
- Satellite control and management systems
- Mobile communications systems and protocols

Transportation:
- Route management and collision avoidance systems
- Avionics systems
- Air traffic control systems
- Navigation and position location systems
- Embedded automobile control systems

Finance:
- Electronic commerce and electronic funds transfer systems
- Transaction processing systems
- Security and privacy management systems
- Legacy systems and year 2000 problems
- Network management systems

Manufacturing:
- Computer integrated manufacturing systems
- Inventory and logistics management systems
- Integrated supplier networks and EDI systems

Health Care:

- Medical device control systems
- Patient record systems
- Insurance and payment systems

Utilities and Energy:

- Power generation and distribution systems
- Nuclear power control systems
- Energy resource allocation systems

5. CNSS MANAGEMENT

The initial Officers and Board of Trustees of the CNSS are listed below, with full biographical information provided in Appendix C of this prospectus.

5.1 CNSS Officers		
President	Dr. Alan Salisbury	Chairman, Avilar Technologies Inc., and former Commanding General, US Army Information Systems Engineering Command
Executive Vice-President	Don O'Neill	Independent Consultant
Vice-President	Richard Linger	Senior Member of the Technical Staff at the Software Engineering Institute (SEI), Carnegie Mellon University
Vice-President Executive Director (pro tem) and Secretary/Treasurer	John Marciniak	Independent Consultant and Visiting Scientist, Software Engineering Institute, Carnegie Mellon University

5.2 CNSS Board of Trustees	
Dr. Laszlo Belady	Director and advisor, Austin Software Council and Former Chairman and CEO, Mitsubishi Electric Information Technology Center America
Larry Bernstein	Independent software consultant and former Operations Systems Vice President of AT&T Network Systems
Dr. Barry Boehm	TRW Professor of Software Engineering, Computer Science Department, University of Southern California, and Director, USC Center for Software Engineering

Dr. Peter Denning	Professor and Chairman of the Computer Science Department at the Naval Postgraduate School in Monterey, California
Dr. Howard Eisner	Distinguished Research Professor and Professor, Engineering Management and Systems Engineering, School of Engineering and Applied Science (SEAS), The George Washington University, Washington, DC.
Dr. Alan Hevner	Eminent Scholar and Professor in the Information Systems and Decision Sciences Department in the College of Business Administration at the University of South Florida
Richard Linger	Senior Member of the Technical Staff at the Software Engineering Institute (SEI), Carnegie Mellon University
John Marciniak	Independent Consultant and Visiting Scientist, Software Engineering Institute, Carnegie Mellon University
Dr. Edward Miller	Founder and President, Software Research, Inc.
Don O'Neill	Independent Consultant
Dr. Alan Salisbury Chair	Chairman, Avilar Technologies, and former Commanding General, US Army Information Systems Engineering Command
Paul Szulewski	Senior Project Consultant, Draper Laboratory
Dr. Jeffrey Voas	Co-founder and Chief Scientist of Cigital
Dolores Wallace	Consultant to the Software Assurance Technology Center (SATC) at Goddard Space Flight Center, NASA

APPENDIX A: STUDY DESCRIPTIONS

This Appendix provides additional details on the Software Value Add Study and the Trustworthy Software Systems Study.

Software Value Add Study

BACKGROUND:

1. The value of software to the national economy is not well understood.

2. The nation's leaders generally view software as a shrink wrapped commodity for personal computers.

3. Critical industries are increasingly dependent on custom software applications embedded within product lines and their processes.

ISSUE:

What is the value add of software to the nation's critical industries, to what extent are the nation's critical industries dependent on software, and to what extent are the leading enterprises in each industry achieving global software competitiveness?

IMPLICATIONS:

1. Global competitiveness, industrial security, and professional infrastructure of the software industry are becoming leading indicators of national prosperity.

2. While the competitiveness of the US industrial base is strongly and increasingly linked to software, the global competitiveness of US software-dependent enterprises is threatened.

APPROACH AND STRATEGY:

1. Identify software usage within the product lines of each critical industry.

2. Pinpoint the software value points that are strategically essential to the competitiveness of each industry.

3. Assess the leading indicators of global software competitiveness for the top enterprises, product lines, and value points in each critical industry.

4. Package the findings for use with diverse audiences ranging from the general public to the nation's policy makers and industry leaders.

DELIVERABLES:

1. Report on software usage in critical industries including telecommunications, transportation, manufacturing, transportation, medical systems, and utilities and energy industry sectors by analyzing and pinpointing the value points that are strategically essential to the competitiveness of the enterprise and the nation.

2. For each enterprise and product line, report on the leading indicators of global software competitiveness using the mechanisms of the Global Software Competitiveness Assessment Program.

3. Accumulate the findings in the Global Database of Software Competitiveness to serve as a national resource to promote a strategic advantage for the nation and its critical industries.

IMPACT:

1. Focus the software issues that impact national policy for our nation's leaders.

2. Pinpoint shortfall in global software competitiveness for each enterprise assessed and promote improvement.

3. Improve the understanding among the nation's leaders and the general public on the importance and risk of software.

TARGET AUDIENCE:

The target audience includes leadership in industry, government, and academia, as well as the general public.

PLAN:

1. Initially the identification of the enterprises participating in each industry sector and the pinpointing of strategic Value Points within targeted product lines provide the candidates for competitiveness assessments.

2. As competitiveness assessments are conducted, the measured results are calibrated based on the clustering of upper and lower ranges that serve to set expectations.

3. The models and findings of the competitiveness assessments are then validated based on the business performance of the product lines assessed.

Study Milestones:

1.	Kickoff Software Value Add Study	February 1996
2.	Identify software usage study participants	Continuing
3.	NSC Board Review and Sponsorship	June 1996
4.	Conduct initial competitiveness assessment	November 1996
5.	NSC Board Review	November 1996
6.	NSC Board Review	February 1997
7.	Software Value Add Study Article in ACM SEN	July 1997
8.	NSC Board Review	July 1997
9.	Software Maintenance and Global Competitiveness article in Journal of Software Maintenance	December 1997
10.	The Competitor Newsletter	1997-1999
11.	Extended Software Value Report	1998
12.	Initial Software Usage Reports	1998-2000
13.	Initial Software Competitiveness Assessments	1998-2000
14.	Complete Software Usage Reports	Continuing
15.	Complete Software Competitiveness Assessments	Continuing

CNSS ROLE:

The CNSS will function as a facilitating organization and provide supporting research.

Trustworthy Software Systems Study

BACKGROUND:

Modern society is increasingly dependent on large-scale software systems of astonishing complexity. Because the consequences of failure in such systems is so high, it is vital that they exhibit trustworthy behavior. Much effort has been expended in methods for reliability, safety, and security analysis, as well as in methods to design,

implement, test, and evaluate these systems. Yet the "best practice" results of this work are often not used in system development. A program is required to integrate these methods within a trustworthiness framework, and to understand how best to ensure that they are applied in critical system development. In addition, it is important to focus attention on critical systems and to understand the societal and economic implications of potential failures.

ISSUE:

1. Agreement is required on what "trustworthy" means in various contexts of usage, risks, and consequences, and how it can be systematically evaluated.

2. The questions of who should declare a system trustworthy, how it should be done, and under what circumstances it makes sense to do it must be understood.

3. The question of why best software engineering practices are often not used in critical system development must be understood. Currently, the state-of-practice lags the state-of-art by a wide margin.

4. The software industry needs to agree on business practices for software product certification, system recalls and stop ship orders, and conformance to standards.

5. The question of whether and how to define a set of ethics for internal and external software suppliers of trustworthy system must be addressed.

6. The work of the IEEE, ACM and other professional society efforts to establish a set of ethics must be integrated and focused.

IMPLICATIONS:

1. Critical software systems in major industries and key government services will be identified.

2. Improved methods of system development and trustworthiness evaluation will be proposed.

3. An increase in public safety is possible over time.

4. Suppliers might be held accountable for negligence.

5. Software professionals will be able to evaluate their actions against industry ethics standards.

6. The need to impose government regulation might be reduced.

7. A better understanding of the implications of government standards and regulations for software could be achieved. This is especially important for the FDA, FAA, and DoD.

APPROACH AND STRATEGY:

1. Investigate the contextual requirements for producing trustworthy software, in terms of trustworthy people working in trustworthy organizations following best practice software engineering standards and processes.

2. Investigate the extent to which required system trust can be achieved by applying appropriate technologies and practices in development and testing.

3. Sponsor a Trustworthy Systems Symposium to identify ideas from people working in such areas as best practices, ethics, and product certification.

4. Investigate the concept of a registry of trustworthy systems, suppliers, architects and project managers, and establish such a registry.

5. Investigate and develop findings on a set of ethics for trustworthy system development, including concepts such as:

? A software architect and project manager are named and sign off on a software product as fit for use.
? Software professionals receive training in ethical behavior and respect property, copyright, patent, and privacy rights
? Software fitness for use is defined in terms such as:
Software trustworthiness is measured in scientific terms.
A trustworthy system is certified as a correct implementation of its defined specification when used in a specified usage environment.
The software development follows a formal and documented process, and applies best engineering practices.
Safety and risks of the software are analyzed and documented.
Tasks that require human interaction are humanized.
Development professionals seek a deep understanding of the customer's problem and do not simply accept the customer's solution.

DELIVERABLES:

1. A standard definition for trustworthy software.

2. Recommendations on best practices for developing and evaluating trustworthy software.

3. Endorsements of key groups including ACM, IEEE, and ITAA.

4. A simple, workable code of ethics for trustworthy software development.

IMPACT:

1. Key collaborating groups can strongly influence customers and suppliers to address the issues of trustworthy software.

2. Overall, this could have great impact in moving the issue of software trustworthiness from the professional forum to the public forum. The profession would act to improve software because cost and schedule would not be the sole means to evaluate software systems.

3. Software professionals will have a code of ethics to follow in developing safety-critical software.

APPENDIX B: PRIOR INITIATIVES

The CNSS is an evolution of the former National Software Council (NSC). The NSC was founded by a group of senior software professionals drawn from industry, government, and academia. These professionals shared a common concern over the growing societal dependency on software, the competitiveness and security implications of that dependency, and the absence of coherent national strategies to deal with software issues and challenges.

The Cooperstown Workshop

The NSC concept originated in August 1993 at a workshop held at Cooperstown, NY, attended by a broad spectrum of software leadership. The principal finding of the workshop was that software had become a true national resource, and that the challenges facing the US software sector had become national in scope. A national-level council was proposed to help inform and shape public policy on software goals and issues. A strong need was identified to obtain commitment from senior US leadership to understand the software sector's impact on national prosperity, and to help ensure its continued competitiveness in the global marketplace. To achieve such commitment, the mission of the NSC was seen as elevating software goals and issues to a national level of strategy and policy discussion.

The NSC University of Maryland Workshop

A workshop attended by 80 software thought leaders was convened at the University of Maryland in October 1994, to gather views and recommendations on how to organize the NSC. Two principal findings emerged from that meeting. First, the NSC should be a membership organization, to provide a forum for the views and opinions of all organizations and individuals in the software sector. Second, the NSC should be organized around a Policy Council composed of senior executives of software-centric corporations, academic institutions, and key government organizations.

This work resulted in incorporation of the NSC in April 1995 as an industrial (501(c)(6)) association, to serve as a non-commercial, impartial research organization for software-related issues and their implications for the US economy and the public interest.

The NSC Software Summit Conference

The NSC sponsored the National Software Summit Conference in Washington, DC, in November, 1995. The summit was attended by 150 senior information technology and software policy experts, and was keynoted by the Director of the National Institutes of Standards and Technology and the President of America Online. The NSC synthesized the Summit discussions and findings into a program focused on five issues:

? Issue: The impact of software on the US economy and society is not adequately understood. The NSC proposed to increase awareness within society and understanding among policy makers on the value of software in maintaining US prosperity.

? Issue: The impact of reductions in software research and development funding by government is not adequately understood. The NSC proposed to sponsor a study to more fully understand the impact of software research and development on software-dependent industries.

? Issue: Industry lacks a systematic mechanism for communicating software requirements to academia. The NSC proposed to explore new means for cooperation between academia and industry to improve the two-way flow of software education and technology.

? Issue: The value added by software to the national economy is not well understood. The NSC proposed to investigate and model the role and impact that software has on the economy.

? Issue: The impact of software engineering education on the US industry is not well understood. The NSC proposed to study this impact and communicate results to industry and academia in order to improve software engineering education.

The NSC Workshop on Licensing Software Engineers

The NSC conducted a workshop in St. Louis in June, 1996 to provide a forum for discussing the issue of licensing of software engineers.

The workshop provided a venue for researchers to discuss the merits of licensing, definition of requisite bodies of knowledge, program accreditation, testing and certification mechanisms, legal responsibilities, codes of conduct, and professional registration.

Decision to Establish the CNSS

While the NSC achieved significant accomplishments as summarized above, the Board of Directors concluded that the critical importance of the issues demanded a commensurate dedication of resources, and that a membership-based NSC was inherently limited in its potential impact. After considerable deliberation and analysis of several alternatives, the concept of establishing a funded center with a resident research and support staff augmented by a body of distinguished Fellows emerged as the best structure to accomplish the original NSC goals.

The NSC Board of Directors developed a plan to replace the former NSC structure with the Center for National Software Studies, whose goals and objectives are described in this Prospectus. The CNSS will adopt a 'think tank' model, and will operate as a non-profit organization with 501(c)(3) status.

APPENDIX C: BIOGRAPHIES OF CNSS OFFICERS AND BOARD

LASZLO A. BELADY (CNSS Board Member) is Director and advisor, Austin Software Council. Until his retirement in 1997 he was Chairman and CEO of Mitsubishi Electric Information Technology Center America, Inc., with laboratories in Massachusetts, New Jersey, and California. He was also the Chairman of Mitsubishi Electric Research Laboratories, Inc. (MERL), in Cambridge, Massachusetts since its founding in 1991 until 1995. Between 1984 and 1991 he was with the Microelectronics and Computer Technology Corporation (MCC) in Austin, Texas as Vice President responsible for the Software Technology and Advanced Computing Technology Programs. During his 23 years with IBM he established software research in the Tokyo Research Lab (1983-84), and was responsible for software technology at Corporate Headquarters (1981-82). Earlier he was in the T.J. Watson Research Center (1961-1981), where he did groundbreaking research in virtual systems and later led the software engineering effort. His professional career also includes: Visiting Professor, University of CA, Berkeley 1971-72; Visiting Fellow, Imperial College, London, UK, 1974; Adjunct Professor, New York Polytechnic University, 1981-84. He is extern member, Hungarian Academy of Sciences; IEEE Fellow; Sr. Fellow of ICC Institute, University of Texas; Adjunct Professor, ECE, University of Texas; Advisory Board member, Computer Sciences, University of Colorado. Other board memberships include Board Director, Mitsubishi Electric America, 1996-1999; Board Director, Computer Research Associates, 1988-94; member, USAF Science Advisory Board, 1987-88; Editor-in-Chief, IEEE Transactions on Software Engineering, 1979-83. Belady's honors include: Citation Index Classic for most referenced paper in the field of software in two decades (1983); J. D. Warnier Prize for excellence in information; IBM Outstanding Contribution Awards. He has a BS in Mechanical Engineering (1949) and a MS in Aeronautics (1950) from the Technical University, Budapest.

LARRY BERNSTEIN (CNSS Board Member and past president of the National Software Council) is Senior Industry Professor, Stevens Institute of Technology in Hoboken, NJ. He had a 35-year distinguished career at Bell Laboratories in managing large software projects and since retirement heads his own consulting firm. At Bell Labs he became a Chief Technical Officer of the Operations Systems Business Unit and an Executive Director. In parallel with these Bell Labs positions he was the Operations Systems Vice President of AT&T Network Systems from 1992-1996. Lawrence Bernstein is a recognized expert in network architecture, network management, software technology, project management, and technology conversion. Currently, He is teaching graduate courses on Computer Networks and Software Engineering at the Stevens Institute of Technology. He is a Fellow of the Institute of Electrical and Electronics Engineers, Inc. (IEEE) and a Fellow of the Association for Computing Machinery. He is a member of the Russian Information Academy; a visiting Associate of University of Southern California's Center for Software Engineering and an Industrial Fellow of Ball State Center for Information and Communication Sciences. He is a member of the honor societies Tau Beta Pi and Eta Kappa Nu and is listed in Who's Who in America. He was awarded the coveted Bell South "Eagle" for seminal contributions to their automatic service provisioning systems.

BARRY BOEHM (CNSS Board Member) is TRW Professor of Software Engineering, Computer Science Department Director, USC Center for Software Engineering. He received his B.A. degree from Harvard in 1957, and his M.S. and Ph.D. degrees from UCLA in 1961 and 1964, all in Mathematics. Between 1989 and 1992, he served within the U. S. Department of Defense (DoD) as Director of the DARPA Information Science and Technology Office, and as Director of the DDR&E Software and Computer Technology Office. He worked at TRW from 1973 to 1989, culminating as Chief Scientist of the Defense Systems Group, and at the Rand Corporation from 1959 to 1973, culminating as Head of the Information Sciences Department. He was a Programmer-Analyst at General Dynamics between 1955 and 1959. His current research interests include software process modeling, software requirements engineering, software architectures, software metrics and cost models, software engineering environments, and knowledge based software engineering. His contributions to the field include the Constructive Cost Model (COCOMO), the Spiral Model of the software process, the Theory W (win-win) approach to software management and requirements determination and two advanced software engineering environments: the TRW Software Productivity System and Quantum Leap Environment. He has served on the board of several scientific journals including the IEEE Transactions on Software Engineering, IEEE Computer, IEEE Software, ACM Computing Reviews, Automated Software Engineering, Software Process, and Information and Software Technology. He has served as Chair of the AIAA Technical Committee on Computer Systems, Chair of the IEEE Technical Committee on Software Engineering, and as a member of Advisory Board's Information Technology Panel, and Chair of the Board of Visitors for the CMU Software

Engineering Institute. His honors and awards include Guest Lecturer of the USSR Academy of Sciences (1970), the AIAA Information Systems Award (1979), the J.D. Warnier Prize for Excellence in Information Sciences (1984), the ISPA Freiman Award for Parametric Analysis (1988), the NSIA Grace Murray Hopper Award (1989), the Office of the Secretary of Defense Award for Excellence (1992), the ASQC Lifetime Achievement Award (1994), and the ACM Distinguished Research Award in Software Engineering (1997). He is an AIAA Fellow, an ACM Fellow, an IEEE Fellow, and a member of the National Academy of Engineering.

PETER J. DENNING (CNSS Board Member) PETER J. DENNING is Professor and Chairman of the Computer Science Department at the Naval Postgraduate School in Monterey, California, where he came from George Mason University. At Mason, he served as vice provost for continuing professional education, associate dean for computing, and chair of the Computer Science Department in the School of Information Technology and engineering. He founded the Center for the New Engineer in 1993. He was the founding director of the Research Institute for Advanced Computer Science at the NASA Ames Research Center, was co-founder of CSNET, and was head of the computer science department at Purdue. He received a Ph.D. from MIT and BEE from Manhattan College. He invented the working set model for program behavior and helped establish virtual memory as a permanent part of operating systems. He was president of the Association for Computing Machinery 1980-82. He chaired the ACM publications board 1992-98 where he led the development of the ACM digital library, and now chairs the ACM Education Board. He has published 7 books and 290 articles on computers, networks, and their operating systems, and is working on 3 more books. He was named one of the 10 best teachers at George Mason University in 2001 and, in 2002, one of Mason's 5 Best Teachers, the best teacher in the School of Information Technology and Engineering, and one of Virginia's 10 Best Teachers. He holds three honorary degrees, three professional society fellowships, two best-paper awards, three distinguished service awards, the ACM Outstanding Contribution Award, the ACM SIGCSE Outstanding CS Educator Award, and the prestigious ACM Karl Karlstrom Outstanding Educator Award.

Howard Eisner (CNSS Board Member) is Distinguished Research Professor and Professor, Engineering Management and Systems Engineering, School of Engineering and Applied Science (SEAS), The George Washington University, Washington, DC. Dr. Eisner joined The George Washington University (GWU) in 1989 after thirty years as an executive and research engineer with ORI, Inc. and the Atlantic Research Corporation (ARC), holding positions as President, C3I Division, & Executive Vice President, ARC Professional Services Group; President, Intercon Systems Corporation; and President, Atlantic Research Services Corporation. He was on the Boards of Directors of ORI, Inc., Calculon Corporation, Intercon Systems Corporation, and Planning Systems, Inc. (PSI). Dr. Eisner has been active in developing computer-aided systems and software engineering. His book "Computer-Aided Systems Engineering" (Prentice-Hall, 1988) was the first in this field. He has given lectures and keynote addresses in this and related areas and served on the Editorial Board for John Wiley's "Encyclopedia of Software Engineering" (1994, 2002). His more recent book (Essentials of Project and Systems Engineering Management - John Wiley, 1997, 2nd Edition 2002) specifically integrates the topics of project management and systems engineering. His other book (Reengineering Yourself and Your Company - Artech House, 2000) explores migration paths from engineer to manager to leader as well as strategic planning issues and related measures of progress in strategic matters. He is a Life Fellow of the Institute of Electrical and Electronics Engineers (IEEE) and a Fellow of The New York Academy of Sciences. He is also a member of Tau Beta Pi, Eta Kappa Nu, Sigma Xi and Omega Rho. In 1994, he was given the Outstanding Achievement Award from the GWU Engineering Alumni. He holds the following degrees: B.E.E., The City College of New York, 1957; M.S., Columbia University, 1958; Doctor of Science, The George Washington University, 1966.

ALAN R. HEVNER (CNSS Board Member) is an Eminent Scholar and Professor in the Information Systems and Decision Sciences Department in the College of Business Administration at the University of South Florida. He holds the Salomon Brothers/Hidden River Corporate Park Chair of Distributed Technology. Dr. Hevner's areas of research interest include information systems development, software engineering, distributed database systems, healthcare information systems, and telecommunications. He has published over 80 research papers on these topics and has consulted for a number of Fortune 500 companies. Dr. Hevner received a Ph.D. in Computer Science from Purdue University.

RICHARD LINGER (CNSS Vice-President and Board Member) is a Senior Member of the Technical Staff at the Software Engineering Institute (SEI), Carnegie Mellon University. At the SEI, he defined the Cleanroom software engineering implementation of the Capability Maturity Model (CMM) for Software, and is developing

technology for architectural analysis and design of survivable systems and networks. Mr. Linger completed a 30-year career at IBM as a Development Manager and Senior Technical Staff Member. At IBM, he co-developed the Cleanroom software engineering process for creating high-reliability software, including the technologies of box structure specification and design, function-theoretic correctness verification, and statistical usage testing for scientific certification of software reliability. Mr. Linger founded and managed the IBM Cleanroom Software Technology Center, with responsibility for Cleanroom research, development, and technology transfer. He was the architect and development manager of IBM's first Cleanroom-developed product, the COBOL Structuring Facility, where he pioneered large-scale correctness verification and statistical testing, and introduced technology for automatic reengineering of legacy programs. Mr. Linger has published extensively in software engineering topics, including three textbooks, 10 book chapters, and numerous conference and journal papers. He is a founding member of the National Software Council, a member of the ACM and IEEE, and serves on the FAA Air Traffic System Research and Development Advisory Committee. Mr. Linger holds a Bachelor of Science degree in Electrical Engineering from Duke University.

JOHN J. MARCINIAK (CNSS Vice-President and Board Member) is a visiting scientist with the Software Engineering Institute (SEI). He has over thirty years of experience in software engineering management and has been instrumental in forming policy for software engineering practice within the Department of Defense. Specific accomplishments include organizing the U.S. Air Force Higher Order (Programming) Language standardization program based on the "JOVIAL-73" language, developing the first Air Force management plan for the implementation of the Ada language, organizing the Joint Industry/Government Language User Group, known as the AdaJUG, and innovating and organizing the Computer Technology Forecast and Weapon Systems Impact study, which provided the basis for Air Force technology programs in distributed systems and artificial intelligence. He currently consults in software process improvement programs and delivers seminars on software and systems engineering. Mr. Marciniak is a co-author of the Software Acquisition Capability Maturity Model® and the Federal Aviation Administration Integrated Capability Maturity Model℠ (FAA-iCMM®). Mr. Marciniak served as the first President of the National Software Council. He holds a B.E.E. from the College of the City Of New York and a M.E.E from the University of Oklahoma. Mr. Marciniak is a member of the IEEE Computer Society and co-author of "Software Quality Assurance and Management," 1987, and "Software Acquisition Management," 1989, and Editor in Chief of the "Software Engineering Encyclopedia," 2nd Ed., 1999, all published by John Wiley & Sons.

EDWARD MILLER (CNSS Board Member) is Founder and President of Software Research, Inc. Through the IEEE Computer Society and the Association for Computing Machinery (ACM), Dr. Miller has authored several revisions of software testing and automated tools books, and has chaired many technical conferences, including the Quality Week conference series begun in 1988. He has been a Distinguished ACM Lecturer, a regular IEEE Tutorial Leader and a frequent contributor to technical conferences. Dr. Miller has held a number of professional positions, has served on a variety of conference technical program committees, is a frequent conference keynote speaker, and recently has been involved in the U.S. software technology arena as an elected member of the Board of Directors of the National Software Council.

DON O'NEILL (CNSS Executive Vice-President and Board Member) is a seasoned software engineering manager and technologist currently serving as an independent consultant. Following his twenty-seven year career with IBM's Federal Systems Division where he completed challenging assignments in management and technical performance and was awarded IBM's Outstanding Contribution three times, Mr. O'Neill completed a three year residency at Carnegie Mellon University's Software Engineering Institute (SEI) under IBM's Technical Academic Career Program. There he developed a blueprint for charting software engineering evolution in the organization including the training architecture and change management strategy needed to transition skills into practice. As an independent consultant, Mr. O'Neill conducts defined programs for managing strategic software improvement including rolling out organizational Software Inspections Processes, directing the National Software Quality Experiment, and conducting Global Software Competitiveness Assessments. Mr. O'Neill served on the Executive Board of the IEEE Software Engineering Technical Committee and as a Distinguished Visitor of the IEEE. He is a founding member of the National Software Council (NSC) and the Washington DC Software Process Improvement Network (SPIN). Mr. O'Neill has a Bachelor of Science degree in mathematics from Dickinson College in Carlisle, Pennsylvania.

ALAN SALISBURY (CNSS President and Chair of the Board of Trustees) is an independent consultant in the information technology industry. He currently serves as Chairman of Avilar Technologies, an eLearning Infrastructure and services company, and from 1993-1999 was president of US operations of Learning Tree International, the leading independent, world-wide provider of advanced information technology and technical management training. From 1991 until 1993, Dr. Salisbury was Executive Vice President and Chief Operating Officer of the Microelectronics and Computer Technology Corporation (MCC), the nation's premier research and development consortium. Prior to joining MCC, he served as President of Contel Technology Center, the advanced technology research and development organization serving Contel Corporation, then the nation's third largest independent telephone company. In 1987, he retired from the US Army where he was a Major General commanding the US Army Information Systems Engineering Command (USAISEC). Dr. Salisbury holds MS and Ph.D. degrees from Stanford University in electrical engineering and computer science, and is a graduate of the US Military Academy. He is the author of numerous technical and management papers, as well as *Microprogrammable Computer Architectures*, a computer architecture reference book, and was founding editor of the Journal of Systems and Software. He currently serves on the Board of Directors of Sybase, Inc. as well as the Board of Trustees of Mitretek Systems, a not-for-profit corporation serving primarily federal, state and local government customers. He completed 14 years of service on the Board of Visitors of the Software Engineering Institute at Carnegie Mellon University as well as 10 years on the Board of Visitors of the College of Engineering at the University of Maryland. Dr. Salisbury is a Senior Member of the IEEE and a member of the Association for Computing Machinery (ACM), the Society of the Sigma Xi, and the Phi Kappa Phi honor society.

PAUL A. SZULEWSKI (CNSS Board Member) has held a variety of engineering-related technical and management positions. He specializes in project planning, measurement, assessment, and process definition. He has pioneered research in software metrics, and evaluation methods for products, processes, and organizations. He is currently Senior Project Consultant for Engineering at Mercury Computer Systems, Inc., of Chelmsford Massachusetts. Prior to his current position he was at the Draper Laboratory for nearly 20 years, and with Sanders Associates for 5 years. He is a founding member of the National Software Council (NSC).

JEFFREY VOAS (CNSS Board Member) is a Co-founder and Chief Scientist of Cigital. Cigital was listed in the Inc. 500 in 1999 and has offices in Boston, Dallas, New York, Atlanta, and Dulles Virginia (HQ). Voas has co-authored two Wiley books: Software Assessment: Reliability, Safety, Testability (1995), and Software Fault Injection: Inoculating Programs Against Errors (1998). Voas was the General Chair for COMPASS'97, the Program Chair for ISSRE'99, the Program Co-Chair for ICSM 2000, and will be the Program Chair for ECBS 2001. Voas is a Senior Member of the IEEE, received a Ph.D. in computer science from the College of William & Mary in 1990, and was named the 1999 Young Engineer of the Year by the District of Columbia Council of Engineering and Architectural Societies. Voas was recipient of the IEEE's Reliability Engineer of the Year award in 2000, and received a Third Millennium Medal from the IEEE in 2000. In 2000, Voas also received a Meritorious Service award from the IEEE Computer Society. Voas is also on the editorial boards of 4 scientific magazines/journals and is Vice-President of the IEEE Reliability Society.

DOLORES R. WALLACE (CNSS Board Member) serves a consultant to the Software Assurance Technology Center (SATC) at Goddard Space Flight Center, NASA where she is working on standards and guidance in software assurance. Prior to joining SATC, Ms Wallace spent almost 18 years at the National Institute of Standards and Technology (NIST) where she led the High Integrity Software System Project and the Software Reference Fault and Failure Data Project, and developed guidance on software verification and validation and other software quality topics. Her publications on software verification and validation include NIST SP 500-234, Reference Information for the Software Verification and Validation Process, V&V articles in *IEEE Software*, the *Encyclopedia of Software Engineering* (Wiley) and IEEE Tutorials on Software Requirements Engineering and Software Engineering. She is co-author, *Software Quality Control, Error Analysis, and Testing*, Noyes Data Corporation, 1995, and co-chair of the IEEE STD 1012-1998, Software Verification and Validation. She has published papers on software experimentation, metrics, and other software engineering topics. She received the 1994 Department of Commerce Bronze Medal Award. While at NIST she served on the Industrial Advisory Board for the IEEE Computer Society's Software Engineering Body of Knowledge Project. She serves on the editorial board of the American Society for Quality's *Software Quality Professional* and recently on the editorial board for the John Wiley *Software Engineering Encyclopedia.* She is a member of the ACM and the IEEE Computer Society. She has a master's degree in mathematics from Case Western University.