

COMPUTER SYSTEMS LABORATORY COMPUTING AND APPLIED MATHEMATICS LABORATORY

TECHNICAL ACCOMPLISHMENTS October 1994 through March 1996

Elizabeth B. Lennon

**Supporting
the U.S.
Economy**

**With
Measurement
and Standards**

**For
Information
Technology**

**U.S. DEPARTMENT OF COMMERCE
Technology Administration
National Institute of Standards and Technology**

NIST

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**NISTIR 5854
JUNE 1996**



**U.S. DEPARTMENT OF COMMERCE
Michael Kantor, Secretary
Technology Administration
Mary L. Good, Under Secretary for Technology
National Institute of Standards and Technology
Arati Prabhakar, Director**

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OVERVIEW OF
COMPUTER SYSTEMS LABORATORY
COMPUTING AND APPLIED MATHEMATICS LABORATORY

The National Institute of Standards and Technology (NIST) is building a new organization to help developers and users acquire and implement information technology (IT) systems that are secure, interoperable, easily usable, and scalable. In response to the growing need for an advanced infrastructure to support the IT industry, NIST has consolidated the activities of the Computer Systems Laboratory (CSL) and the Computing and Applied Mathematics Laboratory (CAML). While the formal reorganization progresses, CSL/CAML has restructured its organization and redefined its role in delivering products and services to industry and government customers. Dr. Shukri Wakid is Director, CSL, and Acting Director, CAML; Dr. Alvin H. Sher is Acting Deputy Director, CSL, and Deputy Director, CAML.

This publication documents CSL/CAML's technical accomplishments, activities, products, and services to industry and government during FY 1995 and the first half of FY 1996 (October 1994 - March 1996).

Computer Systems Laboratory

CSL's programs and activities benefit both users and producers of information technology. Research programs focus on the development of tests and test methods that advance the interoperability of information systems and ease access to information networks. CSL's test methods and tools, measurement techniques, and related standards help to expand opportunities for U.S. industry in the global marketplace.

In the vital area of information security, CSL continues to assist federal agencies in developing effective computer security programs by increasing awareness of the importance of protecting information resources, providing training opportunities, and contributing technical expertise to government and industry.

CSL's research programs focus on advanced network technologies, human/machine interfaces, software diagnostics, visual image processing, text search and retrieval, spoken language technology, parallel processing performance, and computer security.

CSL Home Page on the World Wide Web

<http://www.nist.gov/itl/lab/csl.htm>

Computing and Applied Mathematics Laboratory

CAML's work supports U.S. industry, research communities, and the NIST staff through the development of mathematical, statistical, and state-of-the-art scientific computing tools. CAML's mathematicians and statisticians use computer-aided modeling of complex manufacturing processes and statistical methods for improving the quality of products and processes. Industrial experimentation and measurement process evaluation are significant components of CAML's statistical engineering program.

Research activities focus on advanced computer graphics programs that produce visualizations of complex problems; innovative techniques for manipulating and communicating large amounts of data; the construction and analysis of mathematical models for selected applications; the development of algorithms for complex mathematical problems; and the implementation and distribution of mathematical software for high performance computers.

CAML Home Page on the World Wide Web

<http://www.nist.gov/itl/lab/caml.htm>

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AWARDS AND RECOGNITION

Department of Commerce 1995 Medal Awards

Cita M. Furlani received a Silver Medal for the leadership of interagency activities that advance applications of information technology on the National Information Infrastructure (NII).

Lisa Carnahan received a Bronze Medal for establishing the FIPS 140-1 validation program whereby accredited laboratories test cryptographic products for conformance to NIST standards.

Christopher Dabrowski received a Bronze Medal for technical enhancement of domain analysis and its application to the development of an architecture for the National Information Infrastructure.

Barbara Guttman and **Edward Roback** jointly received a Bronze Medal for developing an Information systems Security Handbook which promotes comprehensive, cost-effective security programs in the private and public arenas.

Shirley Hurwitz received a Bronze Medal for leadership of NIST/industry programs in database interoperability and the application of distributed database technologies to electronic commerce.

Stefan D. Leigh received a Bronze Medal for extraordinary success and dedication in enhancing the effectiveness of statistical collaborations at NIST.

External Recognition

Roger J. Martin received the 1995 Hans Karlsson Award from the IEEE Computer Society for leadership in the timely completion of test methods which assure quality and dependability for the standards customer, completeness for the portable application builder and consensus of the whole community.

Ronald Boisvert was appointed to the ACM Publications Board.

Michael Garris received the Award for Excellence in Technology Transfer 1996 from the Federal Laboratory Consortium. His software distribution technology is a form-based handprint system for evaluating optical character recognition (OCR). Garris and his associates transferred this state-of-the-art technology in the public domain to numerous industry and government users via a CD-ROM using ISO-9660 format.

William Mitchell developed the MGGHAT package for adaptive solution of partial differential equations which was selected as a finalist for SIAM's 1995 Wilkinson Prize for Numerical Software.

Fernando L. Podio, High Performance Systems and Services Division, received the 1996 Standards Excellence Award from the Association for Information and Image Management International (AIIM) for outstanding and valuable contributions to industry through his efforts in the AIIM standards program, especially in standards development in the area of mass storage systems, particularly optical disk.

Keith Eberhardt was elected Fellow of the American Statistical Association.

Raghu Kacker was elected Ordinary Member of the International Statistics Institute.

Daniel Lozier was appointed to the Editorial Board of Mathematics of Computation.

James H. Burrows, retired CSL Director, received the American National Standards Institute's (ANSI) Howard Coonley Medal for contributions to government and industry in advancing the development and implementation of standards for interoperable, secure and reliable information technology systems.

F. Lynn McNulty, retired Associate Director for Computer Security, received a 1995 Federal 100 Award from *Federal Computer Week* for contributions to information security in federal computer systems.

Thomas C. Bagg posthumously received the Thomas C. Bagg Lifetime Achievement Award established in his honor for his significant contribution to the AIIM Standards Program. A NIST employee since 1941, Mr. Bagg conducted original research in physics, imaging science, computer systems, document management, micrographics, information retrieval, and electrical engineering for 50 years until his death in 1995.

INDUSTRY INTERACTIONS

CSL/CAML participates in many consortia and industry interest groups including the following:

Air Transport Association (ATA) and Aerospace Industries Association (AIA)

The ATA and AIA are international nonprofit organizations for the airline industry and aerospace suppliers. The ATA and AIA consist of the major airline companies, aerospace industries, and software and systems suppliers of the commercial aerospace industry. The ATA, AIA, and CSL/CAML are working together to develop a graphics profile and conformance tests methods for the interchange of graphics data within the commercial aerospace industry. The commercial aircraft industry is moving away from paper-based delivery of maintenance data to digital delivery. Conformance testing is critical in ensuring that graphics tools and implementations conform to the ATA profile and ease the transition to digital delivery of data.

Asynchronous Transfer Mode (ATM) Forum

The ATM Forum is an international nonprofit organization which accelerates the use of ATM products and services through a rapid convergence of interoperability specifications. About 170 U.S. telecommunications corporations comprise the ATM Forum membership. Through the forum, CSL/CAML works with Bellcore, test equipment vendors such as Tekelec and Hewlett-Packard, and ATM switch vendors to develop interoperability test specifications and conformance test suites. CSL/CAML also participates in the Signalling and Traffic Management Working Group to develop ATM service protocols. David Su is the CSL/CAML principal.

Cross Industry Working Team (XIWT)

The Cross Industry Working Team (XIWT) is a multi-industry coalition committed to defining the architecture and key technical requirements for a powerful, sustainable national information infrastructure (NII). Members include firms from the computer, networking, telecommunications, publishing and banking sectors, and others with business interests in the NII. NIST is represented on the executive committee by R.J. (Jerry) Linn; other CSL/CAML representatives participate in working groups related to their research and development activities.

Digital Audio-Video Interoperability Council (DAVIC)

The Digital Audio-Visual Interoperability Council (DAVIC) is an international consortium for the emerging digital audio-visual applications and services. The purpose of DAVIC is to identify, select, augment, and develop internationally agreed specifications of open interfaces and protocols that maximize interoperability across countries and applications/services. CSL/CAML has been working with DAVIC members on the interoperability testing of digital video products conforming to DAVIC specifications. These efforts concentrate on the development of conformance test suites and establishment an interoperability testbed where developers could test their products. The CSL/CAML principal is David Su.

Electronic Messaging Association (EMA)

CSL/CAML participated in the activities of this organization in three areas: electronic commerce, electronic mail, and directory services. EMA advances the deployment of these and other technologies throughout government and industry. Industry participants include the Exxon Corporation, MCI Communications Corporation, Hewlett-Packard, GE Information Services, American Express, Lotus Development Corporation, SETA Corporation, AT&T EasyLink Services, Bellcore, Bellsouth Advanced Networks, American Petroleum Institute, The Boeing Company, National Semiconductor, MITRE Corporation, Northern Telecom, Unisys Corporation, Control Data Systems, Inc., Digital Equipment Corporation, and many others. Steve Trus was the contact in FY 1995, at the end of which we concluded our interaction with this group.

Information Infrastructure Standards Panel (IISP)

The Information Infrastructure Standards Panel (IISP) was created by ANSI to identify critical standards requirements for the emerging Global Information Infrastructure (GII). The work of IISP will lead to the creation of standards that will enable the growth of the GII and help bring about interoperability between GII components developed within different industries. As such, the IISP is predominantly made up of representatives from industry. CSL/CAML has contributed to the fulfillment of IISP's mission by devising a conceptual Framework to guide the process of identifying standards requirements and assisting IISP members in the use of this Framework. Christopher Dabrowski is the CSL/CAML contact.

Information Infrastructure Task Force (IITF) Committee on Applications and Technology (CAT)

The CAT, led by NIST Director Arati Prabhakar, is responsible for coordinating the Administration's efforts to develop, demonstrate, and promote applications of information technology in specific application areas. CSL/CAML's Office of Enterprise Integration works with CAT participants in various government agencies and with industry and academia to develop publications, conduct meetings and conferences, distribute both print and electronic information, and respond to queries about the NII and the GII. One resource provided is the NII Virtual Library Home Page found at <http://nii.nist.gov>, co-sponsored with the private sector Council on Competitiveness. Cita Furlani is the CSL/CAML principal.

Information Technology Industry Council (ITI)

CSL/CAML has an informal relationship with the Information Technology Industry Council (ITI). One of ITI's activities is to develop positions on issues in standards, testing, certification and quality assurance. Areas include ergonomics, health, safety and hardware, software and systems functional and performance characteristics. ITI also serves as the secretariat for the American National Standards Institute (ANSI) Accredited Standards Committee X3 (Information Technology) and as U.S. Technical Advisory Group (TAG) administrator for ISO/IEC Joint Technical Committee 1 on Information Technology. The CSL/CAML liaison to ITI is Michael D. Hogan.

Institute of Electrical and Electronics Engineers (IEEE)

The Institute of Electrical and Electronics Engineers, Inc. is the world's largest technical professional society, promoting the development and application of electrotechnology and allied sciences for the benefit of humanity and the advancement of the profession. CSL/CAML maintains close ties with the IEEE to help IEEE identify forward-looking standards efforts and to provide industry input to CSL/CAML's program planning for standards and test activities. IEEE's close ties to industry and to academia help CSL/CAML to understand industry needs and requirements; to know about academic research in areas of interest to NIST; and to communicate about CSL/CAML projects. Daniel R. Benigni currently serves as a member of the IEEE Board of Directors.

International Multimedia Teleconferencing Consortium (IMTC)

The IMTC is a non-profit corporation founded to promote the creation and adoption of international standards for multipoint document and video teleconferencing. The IMTC and its members promote a "Standards First" initiative to guarantee interworking for all aspects of multimedia teleconferencing. The concentration of this group is on promoting and facilitating the broad use of multimedia teleconferencing based on open standards, including the standards adopted by the ITU. Carol Warnar is the principal CSL/CAML contact for these activities especially as they relates to the use of our laboratory facility for interoperability testing. Jean-Philippe Favreau is also a CSL/CAML representative.

Internet Engineering Task Force (IETF)

CSL/CAML contributes to the technical development of the Internet through its participation in the Internet Engineering Task Force (IETF). The IETF develops standards for internetwork technology and for evolving the Internet Protocol Next Generation (IPng). CSL/CAML contributes in the areas of IPv6, IPv4 security, integrated services, systems management, and routing. Additionally, Doug Montgomery co-chairs the IETF interdomain-system-to-interdomain-system (IS-IS) for IP Internet Working Group. Rob Glenn is the contact for non-security related IPv6 work, and John Wack for IPv6 security and key management.

National Industrial Competitiveness Information Technology (NICIT) Working Group

This body, convened by the Office of Enterprise Integration at the request of DoC Under Secretary of Technology Mary L. Good, is composed of industry groups, consortia, trade associations, and government agencies. The broad goal of the group is to identify the best means for U.S. industry to enhance its competitiveness by effectively utilizing information technology within manufacturing. Cita Furlani is the CSL/CAML principal.

National Information Infrastructure Advisory Council (NIIAC)

The NIIAC was formed to provide guidance to the Secretary of Commerce and the interagency Information Infrastructure Task Force (IITF) on the development of the National Information Infrastructure. The NIIAC was a 37-member advisory panel composed of individuals representing private industry, labor, state and local governments, public interest organizations, academia, and leading experts in NII-related fields. The NIIAC was established in January 1994 and completed its work in February 1996. Cita Furlani was the CSL/CAML principal.

National Information Infrastructure (NII) Awards

Sponsored by over 60 groups from industry, government, and community leaders, the NII Awards recognize innovation and excellence in the use of networked information technology. As the representative of the interagency Information Infrastructure Task Force, CSL/CAML's Office of Enterprise Integration provided guidance to NII Awards organizers during the inaugural campaign in 1994-95 and continues to provide advice and support in 1996. Jashojit Roy is the CSL/CAML contact.

National Software Council (NSC)

Incorporated in April 1995, the NSC is a nonprofit membership organization composed of industry, academia, and government members. Its mission is to ensure that the U.S. software industry continues to make a strong and growing contribution to national economic prosperity. CSL/CAML staff participated in NSC planning meetings over the past two years to define the scope and direction of the organization. As a government affiliate member of NSC, CSL/CAML obtains current information about industry and government technology requirements. Tom Rhodes and Dolores Wallace are the principal contacts with NSC.

Network Management Forum (NMF)

CSL/CAML worked with industry consortia to develop OMNI*Point* specifications, as defined by the Open Management Roadmap partnership for addressing the full range of network management requirements. Released in Fall 1992, OMNI*Point* 1 was the first in a series of incremental specifications intended to provide a common approach to the integration and management of diverse technologies. Fran Nielsen serves as Secretary of the User Advisory Council of the OMNI*Point* and is the CSL/CAML participant in the NMF.

NII Testbed Consortium (NIIT)

NIST holds membership in the NIIT consortium, an industry, government, and academia collaboration to develop an advanced, nationwide information testbed that will deliver applications to solve real-world problems. Application Working Groups include Healthcare, Earth and Environmental Sciences, Electronic Commerce, Astrophysics, and Manufacturing. The NIST Concurrent Engineering project is a five-year project that will use currently available high performance computing and communication (HPCC) technologies to develop a platform capable of demonstrating the practical uses of HPCC technologies in concurrent engineering. CSL/CAML's participation in the consortium ensures that the NIST Concurrent Engineering project will be closely linked with industry efforts to focus on actual industry needs and to ensure maximum benefit from the NIST efforts. Shukri Wakid is the principal NIST participant.

Object Management Forum (OMG)

The OMG is a nonprofit international consortium, based in Framingham, Massachusetts, of over 500 organizations whose mission is to research, develop, and promote the use of object oriented technology for distributed systems development. The membership consists of all the major producers of information technology hardware and software (e.g., IBM, DEC, Sun, Microsoft), large user organizations e.g., Boeing, Bellcore, Merrill Lynch, Citibank, GTE, MCI, British Telecom), government agencies (e.g., NASA, NSA, DISA, NIH), and universities (e.g., MIT, Stanford, University of Illinois, University of Michigan). Over the past year, NIST representatives from CSL/CAML and the Manufacturing Engineering Laboratory attended OMG meetings as part of joint project with DISA and Sematech to develop an open, distributed framework for semiconductor manufacturing. John Barkley is CSL/CAML's technical point of contact in the OMG.

Open Software Foundation (OSF)

CSL/CAML had an informal relationship with the OSF, an international organization dedicated to the development and delivery of an open, portable software environment to which vendors and users have equal input and access. OSF efforts address the need for portability, interoperability, and scalability. The organization made their Distributed Computing Environment (DCE) technology available for use in CSL/CAML's Distributed Systems Engineering laboratory. Fritz Schulz was the principal CSL/CAML participant in interactions with the Open Software Foundation.

Society for Enterprise Engineering (formerly the IDEF Users Group)

In developing the Integration Definition for Function Modeling (IDEFO, FIPS 183) and the Integration Definition for Information Modeling (IDEF1X, FIPS 184) standards, CSL/CAML worked closely with the Society for Enterprise Engineering, a non-profit association established to support users' requirements and provide capabilities of enterprise systems integration methods. The group provides a forum for the interchange of ideas and experiences in the use of integration modeling methods, related software tools and techniques, and the identification of potential solutions that add value and efficiency to business modernization initiatives. CSL/CAML worked closely with industry to expand the coverage of the IDEF modeling technologies over a larger portion of the system development life cycle. Bruce Rosen is the CSL/CAML principal.

Society for Information Display (SID)

This worldwide professional society and forum is committed exclusively to the advancement of information display technologies. Membership in SID entitles CSL/CAML to participate in SID-sponsored symposia, seminars, and access to SID publications. Mark Williamson is the principal contact.

Software Engineering Institute (SEI)

Established by Congress in 1984, the SEI is a research and development center with a broad charter to address the transition of software engineering technology. CSL/CAML established a memorandum of understanding (MOU) with SEI to work collaboratively on software engineering issues of mutual interest. Under this agreement, the Software Engineering Group of the Systems and Software Engineering Division and SEI worked together to address issues and develop standards for integrated software engineering environments. SEI also participated with CSL/CAML in the formation of the Center for High Integrity Software Systems Assurance. Roger Martin serves on SEI's Educational Products Advisory Board with representatives from Texas Instruments, AT&T, Carnegie Mellon University, Rochester Institute of Technology, and the Department of the Army.

Software Productivity Consortium (SPC)

An industry-based consortium founded in 1985, the SPC focuses on advancing the fundamental processes and methods of software and systems engineering technologies for developing high-quality software intensive systems. The SPC provides a forum for CSL/CAML to collaborate with industry, government, and academia on development, application, and exchange of advanced software processes and methods for developing high-quality software systems. The forum allows CSL/CAML to contribute its technical views, program results, and capabilities to various industry sectors and provides a mechanism for technology exchange and further collaboration with industry. Roger Martin and Tom Rhodes represent CSL/CAML in this consortium.

Telecommunications Industry Association (TIA)

The TIA is a major developer of voluntary standards for telecommunications products and the principal U.S. developer for fiber optic standards, building wiring standards, and cellular telephony standards. Over the past 18 months, Bill Burr, who serves as Chairman of the Federal Wireless Policy Committee subcommittee on Privacy and Authentication, has occasionally attended meetings of the TIA TR 46 (committee on Personal Communications Systems) ad hoc on Privacy and Authentication and the TIA TR 45 (committee on cellular telephony) Ad Hoc Authentication Group (AHAG) to reflect federal security concerns about wireless and cellular communications.

Video Electronics Standards Association (VESA) Special Interest Group (SIG) on Flat Panel Displays

CSL/CAML's Workshop on the Computer Interface to Flat Panel Displays, held in San Jose, California, in January 1994, resulted in a consensus to form a VESA SIG to undertake the development of a standard or series of standards for the interface between a flat panel display and its controller. This interface standard will address both active and passive flat panel displays in integrated devices, and will cover both the electrical and the mechanical specifications. As a full member of VESA, CSL/CAML will participate in the technical development of standards and will also develop laboratory implementations of proposed interface architectures and by developing laboratory metrics. The CSL/CAML contact is John Roberts.

Virtual Library Consortium

CSL/CAML created a Virtual Library Consortium of industry and academic participants to pursue joint research and development activities related to virtual libraries. Institutions or agencies that have done or continue to do research and development efforts related to virtual libraries participate in the consortium. In 1995, CSL/CAML met with interested parties who responded to the initial call for participation and determined the applicability of ongoing work in academia and industry to the NIST virtual library project. Lawrence Welsch is the principal contact.

X/OPEN

X/Open provides a forum for vendors to discuss and establish consensus on open system specifications. CSL/CAML has been a member of the X/OPEN User Council for several years. We have also worked closely with them in the development of conformance testing technology for information systems. Roger Martin is the principal most closely involved in this interaction. X/Open is merging with the Open Software Foundation to become the Open Group.

COLLABORATION WITH INDUSTRY, GOVERNMENT, AND ACADEMIA

CSL/CAML collaborates with many organizations and consortia from industry, academia, government, and foreign countries, including the following:

Agility Forum
American Apparel Manufacturers Association
American National Standards Institute (ANSI)
American Petroleum Institute
American Society of Manufacturing Engineers
American Society for Quality Control
American Statistical Association
Amoco Corporation
Apple
Argonne National Laboratory
Army Corps of Engineers
Army Research Office
Association for Computing Machinery
AT&T
Automotive Industry Action Group
Baltic-American Enterprise Fund
BBN Systems and Technologies
BellCore
Bell Laboratories
Black & Decker
Boeing Computer Services
Booz-Allen Hamilton
Bureau of the Census
CALS Industry Steering Committee
Cambridge University
Chrysler Corporation
Citibank
CMU
Columbia University
Comcom
CommerceNet
Computer Aided Manufacturing - International Computer and Automated Systems
Association of the Society of Manufacturing Engineers
COMSAT
Consortium for School Networking
Construction Industry Institute
Cornell University

A

Council on Competitiveness
Cray Research
Cryenco
Cubic Defense Systems
DataBeam
DataKey
Defense Advanced Research Projects Agency
Defense Information Systems Agency
Department of Agriculture
Department of the Air Force
Department of Commerce International Trade Administration
Department of Commerce National Telecommunications and Information Administration
Department of Defense
Department of Education
Department of Energy (HQ)
Department of Health and Human Services
Department of the Navy
Department of State
Department of Transportation
Disney Imagineering
Dow Chemical
Dragon Systems
Dupont
Electronics Industries Association
Enterprise Integration Technologies
Environmental Protection Agency
European Commission
Federal Aviation Administration
Ford Automotive Operations
Galway and Associates
GE Information Services
GEMPLUS Card International
General Motors Corporation
George Mason University
Global Growth Strategies
Government of Australia
Government of Canada
Government of France
Government of Germany
Government of Japan
Government of Italy
Government of the Netherlands
Government of New Zealand

Government of Singapore
Government of the United Kingdom
Grummond
Harvard Information Infrastructure Project
Hewlett-Packard Company
Highway 1
Howard University
Hughes
I-4
IBM
IBM T.J. Watson Research Laboratories
Industrial Technology Institute
Institute of Defense Analysis, Center for Computing Sciences
Institute of Electrical and Electronic Engineers
Intel Corporation
Internal Revenue Service
International Micro Industries
International Society of Optical Engineering
ITS
Japanese Ministry of International Trade and Industry
Japanese Ministry of Posts and Telecommunications
JILA
Kennedy Space Center
Kodak
Lawrence Berkeley Laboratory
Lehigh University
Loral
Los Alamos National Laboratory
Manufacturers' Alliance for Productivity and Innovation
Massachusetts Institute of Technology
Massachusetts Software Council
McCabe & Associates
MCI
Micro Networks
Mitek
Morino Institute
Motorola
National Academy of Sciences
National Aeronautics and Space Administration
National Archives and Records Administration
National Association of Manufacturers
National Center for Advanced Technologies
National Center for Manufacturing Sciences

National Coalition for Advanced Manufacturing
National Communications System
National Computer Graphics Association
National Computer Security Association
National Economic Council
National Fluid Power Association
National Initiative for Product Data Exchange
National Institute of Justice
National Oceanic and Atmospheric Administration
National Research Council
National Retail Federation
National Science Foundation
National Security Agency
National Security Industrial Association
Naval Research Laboratory
Nestor
Newport News Shipbuilding
NIU Forum
Novel, Inc.
Oak Ridge National Laboratory
Office of Management and Budget
Office of Science and Technology Policy
Old Dominion University
Oracle Corporation
PDES, Inc.
Pharmaceutical Research and Manufacturers of America
PlantStep
Price Waterhouse
Purdue University
Robotic Industries Association
RST
Russian Academy of Sciences
Rutherford Appleton Laboratory
Sandia National Laboratory
Scicomp, Inc.
Scientific Atlanta
SEMATECH
Shell Oil
Society for Industrial and Applied Mathematics (SIAM)
Social Security Administration
Society of Manufacturing Engineers
Sun
Synergy Group

Telephone Security Group
Trusted Information Systems
UK CALS Industry Council
United Airlines
University of Maryland
University of Minnesota
University of New Hampshire
University of Pittsburgh
University of Tennessee at Knoxville
University of Texas at Austin
U.S. Naval Academy
U.S. Product Data Association
Verity
VLSI Standards, Inc.
Washington Statistical Society
West Publishing Company
Westinghouse Science and Technology Center
Wright Patterson Air Force Base
Xerox
Yale University

COOPERATIVE RESEARCH & DEVELOPMENT AGREEMENTS (CRADAs)

In FY 1995 and FY 1996 (through February), CSL/CAML had formal CRADAs with **39** industry, academia, and government organizations to establish partnerships to pursue mutual areas of research. Three additional CRADAs are pending.

Research Partner	Project
ADB, Inc.	Test & Evaluation of "Middleware Implemented According to CORBA Specifications Using an Object DBMS"
Adobe Systems Incorporated	PostScript Language, PDF Format and Acrobat Software Review
COMSAT Corporation	Test and Demonstrate ISDN Protocols and Services
Enterprise Integration Technologies	Develop Software and Services for Electronic Commerce on the Internet
Linguistic Data Consortium	Corpora to Support Human Language Technology Research
MicroFab Technologies	Solder Jet Science and Technology
Washington Software Technologies	Basic Test Suite

The North American ISDN Users' Forum (NIUF) is an industry/government forum established in 1988 to create a strong user voice in the implementation of ISDN applications. CRADA partners are:

AHK & Associates
Ameritech Services
AT&T Bell Laboratories
Bell Atlantic
Bell Communications Research
BellSouth
Defense Communication Agency
Electronic Data Systems Corporation
Fujitsu Networks Industry, Inc.

General DataComm, Inc.
GTE Southwest Incorporated
Hayes Microcomputer Products, Inc.
Intecom, Inc.
International Business Machines Corporation
Network Communications Corporation
North Carolina State University
Northern Telecom Inc.
NYNEX
Open Communications Networks, Inc.
Presearch, Inc.
RLR Resources
Siemens Stromberg-Carlson
Southwestern Bell Telephone Company
Symbolic Systems, Inc.
TASC (The Analytic Sciences Corporation)
Telamon, Inc.
Teltone Corporation
U.S. Air Force (Technology Integration Center)
U.S. Coast Guard
U.S. West
Unisys Corporation
West Virginia University

GUEST RESEARCHERS AND FACULTY APPOINTMENTS

In FY 1995 and FY 1996 (through March), CSL/CAML collaborated with **117 guest researchers** from industry, government, academia, and foreign research laboratories including the following:

American National Standards Institute
Armament Development Authority, Rafael, Israel
BellSouth Communications Systems
Bhabha Atomic Research Center, India
Bundesamt fur Sicherheit in Der Informations Technik
Centro National de Metrologia, Mexico
CM Communications
Convex Computer Corporation
Cornell University
Cray Research Incorporated
Digicon Corporation
East China University
Electronics and Telecommunications Research Institute, Korea
Environmental Protection Agency
Florida State University
George Mason University
George Washington University, Washington, D.C.
Institute for Defense Analysis
Institute of Geology, Beijing, People's Republic of China
Institut National des Telecommunications, France
Korea Telecom Research Laboratories
Los Alamos National Laboratories
Michigan Technological University
Ministry of Communications, Taiwan
Ministry of Defense, Israel
National Aeronautics and Space Administration
National Computerization Agency
National Science Foundation, Washington, D.C.
National Security Agency
National Research Laboratory (Navy)
Purdue University
Quality One Softworks Corporation, Annandale, Virginia
Rolm Corporation
Sandia National Laboratories
Space Science and Technology Center, People's Republic of China
Syracuse University, Syracuse, New York
Telecom, Paris, France

Trusted Information Systems, Glenwood, Maryland
University of Kent at Canterbury
University of Manchester, United Kingdom
University of Maryland, College Park, Maryland
University of Maryland, Baltimore, Maryland
University of Nancy, France
University of South Florida
University of Southern California
University of Southampton, UK
University of Texas, Austin
University of Twente, The Netherlands
VDG, Inc.

Faculty Appointments totaled **33** during FY 1995 and FY 1996 from:

Arizona State University
Colorado State University
George Mason University
Howard University
Loyola College, Baltimore, Maryland
Old Dominion University
Temple University
University of Colorado
University of the District of Columbia
University of Maryland Baltimore County
University of Maryland College Park
University of North Carolina
University of Pittsburgh
University of Tennessee
West Virginia University

Post Doctoral Appointment - 1

INTERNATIONAL ACTIVITIES

CSL/CAML's international interactions during FY 1995 and FY 1996 included the following:

Collaboration with Electrotechnical Laboratory (ETL), Japan

As part of an ongoing NIST-ETL study on computer performance, Roldan Pozo spent two weeks as Visiting Scientist at the Electrotechnical Laboratory (ETL) in Tsukuba, Japan in February at the invitation of the Japanese Ministry of International Trade and Industry. Pozo presented four lectures on iterative methods for solving large sparse linear algebraic systems, object-oriented software design for scientific computing, and performance modeling of multifrontal methods for distributed memory architectures. The lectures took place at ETL, Fujitsu Laboratories, the KEK High-Energy Physics Colloquium, and the Performance Measurement Consortium in Tokyo. At Fujitsu, Pozo was given a demonstration of the company's next-generation parallel computers.

Collaboration with Russian Academy of Sciences

As part of an international agreement between CSL/CAML and the Russian Academy which fosters scientific exchanges, Daniel Lozier hosted a six-week visit to NIST in October-November 1995 by Dr. J.M. Rappoport of the Russian Academy. Rappoport has published algorithms and software for special function evaluation, mostly in the Russian literature. During his visit, Dr. Rappoport began a collaboration with CSL/CAML scientists on algorithms for the MacDonald (modified Bessel) functions. These arise as the Kernel of the Kontorovich-Lebedev integral transform, for which little software exists in Western computer libraries.

World Summit on Trade Efficiency

In November 1994, four computer scientists participated in the World Summit on Trade Efficiency as part of the Official U.S. Delegation. CSL/CAML demonstrated a pilot electronic commerce SmartProcurement system jointly developed with the Enterprise Integration Technologies Corporation. The SmartProcurement system is an innovative application of two evolving computer technologies, the WWW and Intelligent Agents, and reduces bid time from vendors to hours instead of days or weeks.

Cryptographic Applications Program Interfaces

In December 1994, CSL/CAML sponsored a workshop to address the growing interest in developing a generic Cryptographic Applications Program Interface (CAPI) and the need for convergence in the development of standards. This work is a collaborative effort with the United Kingdom (UK) Ministry of Defence (MoD), the National Security Agency, several standards organizations, and some commercial vendors. Officials from the UK and Canada shared their experiences with CAPI initiatives in their countries, and all participants agreed to coordinate future activities in this effort. A second meeting was held in March 1996, and periodic information exchanges will continue.

International Statistics Institute (ISI)

Raghu N. Kacker, Statistical Engineering Division, was elected an Ordinary Member of the ISI in 1995. With fewer than 2000 members representing 96 countries, the ISI elects fewer than 100 new members annually.

Broadband ISDN

Through a Memorandum of Understanding, CSL/CAML, the Korean Telcom Research Laboratories (KTRL), and the Electronics and Telecommunications Research Institute (ETRI) are jointly developing abstract conformance test and interoperability test suites for Broadband Integrated Services Digital Network (B-ISDN) protocols. KTRL and ETRI assigned guest scientists to work at NIST in developing the test suites and on research on the B-ISDN call control signalling procedures.

Cryptographic Module Validation

CSL/CAML and the Communications Security Establishment of the Government of Canada collaborated on the development of the Cryptographic Module Validation Program, announced jointly on July 17, 1995. Products validated by this program as conforming to FIPS 140-1, *Security Requirements for Cryptographic Modules*, are accepted for use in both the U.S. and Canada for the protection of sensitive, unclassified information.

G-7 Global Information Society Inventory Pilot Project

Under the coordination of the European Community and Japan, the Global Inventory Project (GIP), one of eleven pilot projects designed to stimulate global applications of information technologies, aims to produce a multimedia inventory of national and international projects, studies, and calls relevant to the promotion and further development of knowledge and understanding of the information society. As the U.S.A.'s point of reference, the Office of Enterprise Integration (OEI) established an entry point for a sampling of current and proposed U.S. information infrastructure projects under ten application areas defined by the G-7 nations. Electronic project submission, as well as access to the resources is available via the U.S. National Information Infrastructure Virtual Library Home Page at URL <http://nii.nist.gov/>.

G-7 Pilot Project on Global Electronic Commerce

Along with Japan and the European Community (EC), the Department of Commerce was designated the lead agency in a G-7 Information Society Pilot Project "Global Marketplace for Small and Medium Enterprises (SMEs)." The SME project seeks to identify the information needs of SMEs, promote SME use of the information infrastructure, and encourage the development and demonstration of electronic marketing, cooperation, and trade. The Department of Commerce and CommerceNet Consortium hosted a G-7 Working Group meeting in San Jose, California, in September 1995, at which CSL/CAML participated in the demonstration of the G-7 "Global Marketplace" server.

Worldwide Electronic Commerce: Law, Policy, Security and Controls Conference

In October 1995, CSL/CAML participated as an affiliated cosponsor of an international conference on issues of electronic commerce and the law. About 300 industry, government, and foreign participants attended. Other cosponsors included the American Bar Association; the Centre for Commercial Law Studies, Queen Mary & Westfield College, UK; EDI Association of the UK; Harvard Law School, International Union of Latin Notaries; International Chamber of Commerce, Paris; Software Publishers Association; United Nations Commission on International Trade Law; and the U.S. Council of International Business.

Technical Assistance to Jordan

As part of the Peace Net effort, three CSL/CAML scientists traveled to Jordan in October 1995 to establish a telecommunications link on the Internet in that country. Oscar Farah, Ken Tice, and Sean Sell set up a demonstration project by assembling a microwave dish with "loose parts" electronics to Internet routers and servers provided by NIST, SUN, and Sprint. The success of the project can be measured by the large amount of e-mail which NIST has received from Jordan since the inception of the Internet capability. Our technical assistance to this effort continues.

CONFERENCES, WORKSHOPS, AND LECTURES

CSL/CAML sponsored, cosponsored, and conducted more than 100 conference, workshops, lectures, and training seminars:

Annual conferences and ongoing workshops

COMPASS, Conference on Computer Assurance
Data Administration Management (DAMA) Symposium
Federal Information Systems Security Educators Association (FISSEA) Conference
Federal Wireless User's Forum (FWUF)
International Conference on Information and Knowledge Management
Open System Environment (OSE) Implementors' Workshop (OIW)
OSE Users' Forum
National Information Systems Security Conference
North American ISDN Users' Forum
Text Retrieval Conference (TREC)

Specialized workshops

Healthcare Forum
Invitational Workshop on Information Technology (IT) Security Techniques and Tools for
Government Information Technology Services
Technologies to Improve Your Software
Training for the Future
Workshop on Cryptographic Applications Program Interfaces
Workshop on Experimental Design for Scientists and Engineers
Workshop on Mugshot and Facial Image Standards
Workshop on Role-Based Access Control
Usability Engineering
Virtual Library Consortium

Lectures

Applied Information Technology Lecture Series
CAML Laboratory Seminars
Applied & Computational Mathematics Division Colloquium Series
Churchill Eisenhart Memorial Lecture
Digital Video Lecture
High Integrity Systems Lecture Series
High Performance Computing Lecture Series
Statistical Engineering Division Seminars

Training courses

Connecting to the Internet Securely

Eudora Training
How to Establish an Incident Handling Capability
Information Systems Security...And You
Macintosh Users Group
Programming in Fortran 90
Introduction to Data Compression
Introduction to C and C++ for Scientists and Engineers

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PATENTS

CSL/CAML acquired five new patents in FY 1995, bringing the total to eight:

Cryptographic Key Notarization Methods and Apparatus
Miles Smid and Dennis Branstad
Issued May 31, 1983

Satellite Controlled Digital Clock System
Joseph Cateora, Dick Davis, and D. Hanson
Issued March 29, 1977

Object/Anti-Object Neural Network Segmentation
Charles Wilson, Michael Garriss, and R. Wilkinson
Issued September 14, 1993

Automated Recognition of Characters Using Optical Filtering With Positive and Negative Functions Encoding Pattern and Relevance Information
Charles Wilson
Issued November 1, 1994

Automated Recognition of Characters Using Optical Filtering With Maximum Uncertainty Minimum Variance (MUMV) Functions
Charles Wilson and James Blue
Issued December 6, 1994

Apparatus For Identifying Unknown Words By Comparison to Known Words
Jon Geist
Issued February 21, 1995

Procedure for Digital Image Restoration
Alfred S. Carasso
Issued May 9, 1995

Aerosol Mass Spectrometer
Kensei Ehara
Issued June 27, 1995

TECHNICAL PUBLICATIONS

In FY 1995 and the first half of FY 1996, CSL/CAML published 100 technical publications which present a broad range of test measurements, metrics, reference data, and research results in information technology.

CSL Publications (by type of publication, in order of publication date)

NIST Computer Systems Technology Series

- | | |
|---------|---|
| 500-220 | Guide on Open System Environment (OSE) Procurements
By Gary Fisher, October 1994 |
| 500-221 | A User Study: Informational Needs of Remote National Archives and Records
Administration Customers
By Judi Moline and Steve Otto, November 1994 |
| 500-222 | Glossary of Software Reuse Terms
By Susan Katz, Christopher Dabrowski, Kathryn Miles, and Margaret Law,
December 1994 |
| 500-223 | A Framework for the Development and Assurance of High Integrity Software
By Dolores R. Wallace and Laura M. Ippolito, Dec 1994 |
| 500-224 | Stable Implementation Agreements for Open System Environment, Version 8,
Edition 1
December 1994 (supersedes NIST SP 500-214)
Albert Landberg, Workshop Chairman; Joseph Hungate, Workshop Vice
Chairman; and Brenda Gray, Workshop Editor, December 1994 |
| 500-225 | Overview of Third Text Retrieval Conference (TREC-3)
D. K. Harman, Editor, April 1995 |
| 500-226 | Self Monitoring Accounting Systems
By Roger F. Sies, March 1995 |
| 500-227 | ELECTRONIC ACCESS: BLUEPRINT for the National Archives and Records
Administration
By Judi Moline and Steve Otto, April 1995 |
| 500-228 | Guidelines for the Evaluation of X.500 Directory Products
By John Tebbutt, May 1995 |

- 500-229 Z39.50 Implementation Experiences
Paul Over, William E. Moen, Ray Denenberg, and Lennie Stovel, Editors,
September 1995
- 500-230 Application Portability Profile (APP) The U.S. Government's Open System
Environment Profile Version 3.0
By Gary E. Fisher, February 1996
- 500-231 Guidelines for the Evaluation of Electronic Data Interchange Products
By John J. Garguilo and Paul Markovitz, February 1996
- 500-232 Open System Environment (OSE): Architectural Framework for Information
Infrastructure
By Frederick (Fritz) Schulz, December 1995
- 500-233 A Manager's Guide for Monitoring Data Integrity in Financial Systems
By Roger Sies, February 1996
- 500-234 Reference Information for the Software Verification and Validation Process
By Dolores R. Wallace, Laura Ippolito, and Barbara Cuthill, April 1996

NIST Computer Security Series

- 800-10 Keeping Your Site Comfortably Secure: An Introduction to Internet Firewalls
By John P. Wack and Lisa Carnahan, December 1994
- 800-11 The Impact of the FCC's Open Network Architecture on NS/NP
Telecommunications Security
By Karen Olsen and John Tebbutt, February 1995
- 800-12 An Introduction to Computer Security: The NIST Handbook
By Barbara Guttman and Edward Roback, October 1995
- 800-13 Telecommunications Security Guidelines for Telecommunications Management
Network
By J. Kimmins, C.R. Dinkel, and D.L. Walters, October 1995

NIST Special Publication

- 868 The Information Infrastructure: Reaching Society's Goal
NIST Office of the Director
Kathleen Roberts, Editor
September 1994

I Federal Implementation Conventions for Electronic Data Interchange Series

- 1 Federal Implementation Guideline for Electronic Data Interchange, ASC X12 003040
Transaction Set 838 Trading Partner Profile (Vendor Registration), Implementation
Convention
Jean-Philippe Favreau, Editor, August 1995
- 2 Federal Implementation Guideline for Electronic Data Interchange, ASC X12 003040
Transaction Set 838 Trading Partner Profile (Confirmation of Vendor Registration),
Implementation Convention
Jean-Philippe Favreau, Editor, August 1995
- 3 Federal Implementation Guideline for Electronic Data Interchange, ASC X12 003050
Transaction Set 850, Award Instrument, Implementation Convention
Jean-Philippe Favreau, Editor, August 1995
- 4 Federal Implementation Guideline for Electronic Data Interchange, ASC X12 003050
Transaction Set 860, Modifications to Award Instrument, Implementation Convention
Jean-Philippe Favreau, Editor, August 1995
- 5 Federal Implementation Guideline for Electronic Data Interchange, ASC X12 003050
Transaction Set 865 Purchase Order Change Acknowledgment/Request - Seller Initiated,
Implementation Convention
Jean-Philippe Favreau, Editor, February 1996
- 1-6 Federal Implementation Guideline for Electronic Data Interchange, ASC X12 003050
Transaction Set 855 Purchase Order Acknowledgment, Implementation Convention
Jean-Philippe Favreau, Editor, February 1996
- 1-7 Federal Implementation Guideline for Electronic Data Interchange, ASC X12 003050
Transaction Set 843 Response to Request for Quotation, Implementation Convention
Jean-Philippe Favreau, Editor, February 1996
- 1-8 Federal Implementation Guideline for Electronic Data Interchange, ASC X12 003050
Transaction Set 840, Request for Quotation, Implementation Convention
Jean-Philippe Favreau, Editor, February 1996
- 1-9 Federal Implementation Guideline for Electronic Data Interchange, ASC X12 003050
Transaction Set 836, Procurement Notices, Implementation Convention
Jean-Philippe Favreau, Editor, February 1996

Other NIST Publications

- NISTIR 5510 Validated Products List 1994 No. 4
Judy B. Kailey and Peggy N. Himes, Editors, October 1994
- NISTIR 5522 Information Technology Engineering and Measurement Model: Adding
lane markings to the information superhighway
By Marvin Zelkowitz and Barbara Cuthill, November 1994
- NISTIR 5530 Mapping Integration Definition for Information Modeling (IDEF1X)
Model into CASE Data Interchange Format (CDIF) Transfer File
By Igor Simakhodskiy, November 1994
- NISTIR 5532 ISDN LAN Bridging
By Tim Boland, November 1994
- NISTIR 5538 SGML Parser Validation Procedures
By R.B. Wilson, January 1995
- NISTIR 5540 Multi-Agency Certification and Accreditation (C&A) Process: A Worked
Example
By Ellen Flahavin, Annabelle Lee, and Dawn Wolcott, December 1994
- NISTIR 5541 Initial Graphics Exchange Specification (IGES): Procedures for the NIST
IGES Validation Test Service
By Jacki A. Schneider and Lynne S. Rosenthal, December 1994
- NISTIR 5542 Binary Decision Clustering for Neural Network Based Optical Character
Recognition
By C.L. Wilson, P.J. Grother, and C.S. Barnes, December 1994
- NISTIR 5546 A Perspective on Software Engineering Standards
By Dolores R. Wallace and Roger J. Martin, December 1994
- NISTIR 5561 ATM Procurement and Usage Guide
By Tim Boland, December 1994
- NISTIR 5570 An Assessment of the DOD Goal Security Architecture (DGSA) for Non-
Military Use
By Arthur E. Oldehoeft, November 1994

- NISTIR 5571 Operating Principles of MultiKron II Performance Instrumentation for MIMD Computers
By Alan Mink, December 1994
- NISTIR 5576 Computer Systems Laboratory Annual Report 1994
By Elizabeth Lennon, Shirley Radack, and Ramona Roach,
February 1995
- NISTIR 5585 Validated Products List 1995 No. 1 (2 volumes)
Judy Kailey, Editor, January 1995
- NISTIR 5589 A Study on Hazard Analysis in High Integrity Software Standards and Guidelines
By Dolores Wallace, January 1995
- NISTIR 5590 Proceedings Report of the International Invitation Workshop on Development Assurance
By Patricia Toth, January 1995
- NISTIR 5595 Application Software Interface: ISDN Services for an Open Systems Environment
By Daniel P. Stokesberry, February 1995
- NISTIR 5600 Object-Oriented Technology Research Areas
By Dolores R. Wallace, January 1995
- NISTIR 5623 An Electronic Implementors' Workshop
By Ted Landberg, Robert Bagwill, and Brenda Gray, March 1995
- NISTIR 5629 Validated Products List 1995 No. 2 (2 volumes)
Judy Kailey, Editor, April 1995
- NISTIR 5631 An Analysis of ANSI ASC X12 and UN/EDIFACT Electronic Data Interchange Standards
By Robert Aronoff and Karen Hsing, April 1995
- NISTIR 5636 Persistent Object Base System Testing and Evaluation
By Elizabeth N. Fong, April 1995
- NISTIR 5647 PCASYS -- A Pattern-Level Classification Automation System for Fingerprints
By G.T. Candela, P.J. Grother, C.I. Watson, R.A. Wilkinson, and C.L. Wilson, August 1995

- NISTIR 5652 Operating Principles of the SBus MultiKron Interface Board
By Alan Mink, George G. Nacht, and John K. Antonishek, May 1995
- NISTIR 5654 Defining Environment Integration Requirements
By Barbara Cuthill and Marvin Zelkowitz, May 1995
- NIST GCR
95-670 Standards Policy and Information Infrastructure
NIST, Science, Technology and Public Policy Program, Harvard
University, and Technology Policy Working Group, Information
Infrastructure Task Force, May 1995
- NISTIR 5657 An Introduction to the P1003.1g and CPI-C Network Application
Programming Interfaces
By Karen Olsen, May 1995
- NISTIR 5677 Center for High Integrity Software System Assurance-Initial Goals and
Activities
By Dolores Wallace and Marvin Zelkowitz, June 1995
- NIST GCR
95-675 Testability of Object-Oriented Systems
June 1995
- NISTIR 5687 Method and Evaluation of Character Stroke Preservation on Handprint
Recognition
By Michael D. Garris, July 1995
- NISTIR 5691 Unravel: A CASE Tool to Assist Evaluation of High Integrity Software,
Volume 1 and Volume 2
By James R. Lyle, Dolores R. Wallace, James R. Graham, Keith B.
Gallagher, Joseph P. Poole, and David W. Binkley, August 1995
- NISTIR 5693 Validated Products List 1995 No. 3, Vols. 1 and 2
Judy Kailey, Editor, July 1995
- NISTIR 5695 Improving Neural Network Performance for Character and Fingerprint
Classification by Altering Network Dynamics
By Charles L. Wilson, James L. Blue, and Omid M. Omidvar,
August 1995
- NISTIR 5696 The Effect of Training Dynamics on Neural Network Performance
By Charles L. Wilson, James L. Blue, and Omid M. Omidvar,
August 1995

NISTIR 5703	The NIST ATM Network Simulator -- Operation and Programming, Version 1.0 By N. Golmie, A. Koenig, and D. Su, August 1995
NISTIR 5708	Electronic Access to Standards on the Information Highway By Sharon J. Laskowski and Venkata V. Ramayya, August 1995
NISTIR 5719	Mapping Integration Definition for Function Modeling (IDEFO) Model into CASE Data Interchange Format (CDIF) Transfer File By Igor Simakhodskiy, September 1995
NISTIR 5731	Validated Products List 1995 No. 4 L. Arnold Johnson and Peggy N. Himes, Editors, October 1995
NISTIR 5735	Distributed Systems: Survey of Open Management Approaches By Joseph Hungate and Geraldina Fernandes, September 1995
NISTIR 5736	Comparison of POSIX Open System Environment (OSE) and Open Distributed Processing (ODP) Reference Models By Geraldina Fernandes and Joseph Hungate, November 1995
NISTIR 5737	A Method to Determine a Basis Set of Paths to Perform Program Testing By Joseph Poole, November 1995
NISTIR 5740	Virtual Environments for Health Care By Judi Moline, November 1995
NISTIR 5743	Operating Principles of MultiKron Virtual Counter Performance Instrumentation for MIMD Computers By Alan Mink, November 1995
NISTIR 5757	Sharing Information Via the Internet - An Infoserver Case Study By Robert H. Bagwill, November 1995
NISTIR 5762	Standard Generalized Markup Language Test Suite Evaluation Report By Craig S. Russell, November 1995
NISTIR 5771	STandard for the Exchange of Product model data (STEP): Procedures for NIST STEP Validation By Lynne S. Rosenthal, November 1995
NISTIR 5788	Public Key Infrastructure Invitational Workshop September 28, 1995, MITRE Corporation, McLean, Virginia

William E. Burr, Editor, November 1995

NISTIR 5789

Using S-Check Alpha Release 1.0
By Robert Snelick, Nathalie Drouin, and John Antonishek
February 1996

NISTIR 5793

Data Communications Strategy
By Jerry Mulvenna and Tim Boland, January 1996

NISTIR 5799

Application of the Pointer State Subgraph to Static Program Slicing
By David W. Binkley and James R. Lyle, March 1996

CSL Bulletins

Available via the WWW, email, and paper form to about 4,000 subscribers, CSL Bulletins address topics of significant interest to the information systems community. Twenty-nine bulletins are currently available, including the following published in FY 1995 and FY 1996:

Digital Signature Standard, Donna Dodson, Edward Roback, and Elizabeth Lennon, November 1994

The Data Encryption Standard: An Update, Shirley Radack (editor), February 1995

Acquiring and Using Asynchronous Transfer Mode in the Workplace, Frederick Boland, March 1995

Standards for Open Systems: More Flexibility for Federal Users, Shirley Radack, May 1995

FIPS 140-1: A Framework for Cryptographic Standards, Lisa Carnahan, August 1995

Preparing for Contingencies and Disasters, Barbara Guttman and Elizabeth Lennon, September 1995

An Introduction to Role-Based Access Control, David Ferraiolo, John Barkley, and Shirley Radack, December 1995

Human/Computer Interface Security Issues, Robert Bagwill, February 1996

Millennium Rollover: The Year 2000 Problem, Gary Fisher and Elizabeth Lennon (editor), March 1996

Guidance on the Selection of Low Level Assurance Evaluated Products, Eugene Troy, April 1996

CAML Publications (by type of publication, in order of publication date)

NIST Standard Reference Materials Series

260 Statistical Aspects of the Certification of Chemical Batch SRMs
 By S.B. Schiller

NIST HB DATAPLOT Reference Manual, Volume I: Commands; Volume II: LET
 Subcommands and Library Functions

Other NIST Publications

NISTIR 85-3273-10 Energy Prices and Discount Factors for Life-Cycle Cost Analysis 1996:
 Annual Supplement to NIST Handbook 135 and Special Publication 709
 By S.R. Petersen, October 1995

NISTIR 4942-3 Present Worth Factors for Life-Cycle Cost Studies in the Department of
 Defense [1996]
 By S.R. Petersen, October 1995

NISTIR 5185-2 BLCC The NIST Building Life-Cycle Cost Program, Version 4.21, User's
 Guide and Reference Manual
 By S.R. Petersen, January 1995

NISTIR 5185-3 BLCC The NIST Building Life-Cycle Cost Program, Version 4.3, User's
 Guide and Reference Manual
 By S.R. Petersen, October 1995

NISTIR 5505 A $\{\xi\}$ -Vector Formulation of Anisotropic Phase-Field Models: 3-D
 Asymptotics
 By A.A. Wheeler and G.B. McFadden, October 1994

NISTIR 5506 The Maximal Accuracy Rate Algorithm for Sequence Alignment and
 Comparison
 By S.A. Janet, December 1994

NISTIR 5508 Air Pollutant Emission Factors for Federal Energy Conservation Projects
 By S.R. Petersen

NISTIR 5528 Finite Element Analysis of Advanced Technology Laboratories [ATL]
 Isolation Slab Conditioning System
 By J.T. Fong and S.J. Treado, November 1994

NISTIR 5534	An Integral Model of Gravity Currents By R.G. Rehm, H.R. Baum, and K.B. McGrattan
NISTIR 5537	Sequential Quadratic Programming By P.T. Boggs and J.W. Tolle
NISTIR 5554	ALARM 1.0 --Decision Support Software for Cost-Effective Compliance with Fire Safety Codes By S.F. Weber, B.C. Lippiatt, and B.E. Harper
NISTIR 5557	Lubrication Theory for Reactive Spreading of a Thin Drop By R.J. Braun, B.T. Murray, W.J. Boettinger, and G. B. McFadden, December 1994
NISTIR 5569	The MasPar MP-1 as a Computer Arithmetic Laboratory By M.A. Anuta, D.W. Lozier, and P.R. Turner, January 1995
NISTIR 5573	Agile Manufacturing from a Statistical Perspective By R.G. Easterling, October 1995
NISTIR 5596	Inserting Line Segments into Triangulations and Tetrahedralizations By J. Bernal, March 1995
NISTIR 5618	An Expression Formatter for MACSYMA By B.R. Miller, July 1995
NISTIR 5624	The National Institute of Standards and Technology Parallel Applications Development Environment User's Manual By J. Devaney, R. Lipman, M. Lo, W.F. Mitchell, M.A. Edwards, J. Turner, and C.W. Clark
NISTIR 5641	Anisotropy of Interfaces in an Ordered Alloy: A Multiple-Order Parameter Model By R.J. Braun, J.W. Cahn, G.B. McFadden, and A.A. Wheeler, April 1995
NISTIR 5646	The Parallel Applications Development Environment [PADE] By J. Devaney, R. Lipman, M. Lo, and W.F. Mitchell
NISTIR 5660	Parallel and Serial Implementations of SLI Arithmetic By D.W. Lozier, and P.R. Turner, June 1995
NISTIR 5724	Error-Bounding in Level-Index Computer Arithmetic By D.W. Lozier and P.R. Turner, October 1995

NISTIR 5811

Basic Linear Algebra Operations in SLI Arithmetic

By M.M. Anuta, D.W. Lozier, N. Schabanel, and P.R. Turner, March 1996

TECHNICAL PAPERS

In FY 1995 and FY 1996 (through March), CSL/CAML published more than 135 technical papers in journals, proceedings, book chapters, and other media including the World Wide Web (WWW):

CSL Papers

1994

Gilbert, D.; **16th National Computer Security Conference**. NIST Journal of Research, September/October 1994.

Flater, David; Yesha, Yelena; **Coping with Different Retrieval Standards in Next Generation Networks**. Proceedings of the 7th International Conference on Parallel and Distributed Computer Systems, Las Vegas, October 6-8, 1994.

Jansen, Wayne A.; **A Taxonomy for Security Standards**. National Computer Security Conference Proceedings, October 1994.

Ressler, Sandy; **Approaches Using Virtual Environments with Mosaic**. Proceedings of the Second International WWW'94 Conference on Mosaic and the WEB, October 1994.

Wallace, D.R.; Lyle, J.R.; Graham, J.R.; Gallagher, K.B.; Binkley, D.W.; Poole, J.P.; **A CASE Tool to Evaluate Functional Diversity in Safety System Software**. Letter Report to U.S. Nuclear Regulatory Commission, October 1994.

Harman, D.K.; **Analysis of Data from the Second Text Retrieval Conference (TREC-2)**. Intelligent Multimedia Information Retrieval Systems and Management Conference, Rockefeller University, New York, October 1994.

Freimer, R.; Khuller, S.; Mitchell, J.S.B.; Piatko, Christine D.; Romanik, K.; Sovaine, D.; **Localizing an Object with Finger Probes**. Proceedings of the Vision Geometry III Conference, October 1994.

Hou, Luoming; Favreau, Jean-Philippe; Tang, Debra; **Implementation of TTCN Operation Semantics in Estelle**. Proceedings of the 7th International Workshop on Protocol Test Systems, Tokyo, Japan, November 8-10, 1994.

Williamson, M.P.; **Flat Panel Display Interface Standards**. Electronic Design, November 21, 1994.

Flater, David; Yesha, Yelena; **The Role of the Database Community in the National Information Infrastructure.** Proceedings of the International Conference on Information and Knowledge Management, November 29-December 2, 1994.

Wilson, C.L.; Omidvar, O.M.; **Information Content in Neural Network Optimization.** Journal of Connection Science, Vol. 6, No. 1, 1994.

Newton, J.; **Data Administration Management Association Symposium.** NIST Journal of Research, November/December 1994.

Ippolito, L.M.; Wallace, D.R.; Lennon, E.B.; **COMPASS '94.** NIST Journal of Research, November/December 1994.

Lennon, Elizabeth B.; **North American Integrated Services Digital Network (ISDN) User's Forum (NIUF).** NIST Journal of Research, November/December 1994.

Favreau, Jean-Philippe; **EDI Federal Implementation Convention Registry.** CALS Exposition International '94. Long Beach, California, December 5-8, 1994.

Watson, C.I.; **NIST Special Database 18 Mugshot Identification Data Fronts and Profiles.** NIST NSRDS Special Database 18, December 1994.

Kemmerer, Sharon J.; **Commercial CALS...and its Application.** Proceedings of the CALS Europe '94 Conference, Fall 1994.

Romanik, K; Freimer, R.; Khuller, S.; Mitchell, J.S.B.; Piatko, C.; Souvaine, D.; **Localizing an Object with Finger Probes.** Proceedings of SPIE Vision Geometry III Conference, 1994.

Clapp, J.A.; Stanten, S.F.; Peng, W.W.; Wallace, D.R.; Cerino, D.A.; Dziegiel, R.J.; **Software Quality Control, Error Analysis, and Testing.** Advanced Computing and Telecommunications Series, Noyes Data Corporation, 1994. Reprint of NIST SP 500-209, **Software Error Analysis**, by Wendy Peng and Dolores Wallace.

Radack, Shirley M.; **The National Information Infrastructure: Requirements for Frameworks, Standards and Research.** The Council of Federal Data Center Directors. Council of Federal Data Center Directors Annual Conference, December 1994.

Dabrowski, C.; Majurski, W.; McCoy, W.; Wakid, S.; **Modeling NII Services to Identify Future Needs for Standards and Interoperability.** ACM StandardView, December 1994.

Radack, Shirley M.; **Digital Signature Standard: An Update of Implementation, Technical, and Patent Issues.** Federation Facts, Federation of Government Information Processing Councils, Winter 1994.

1995

Fong, E.; Hurwitz, S.; Yesha, Y.; **Third International Conference on Information and Knowledge Management (CIKM-94).** NIST Journal of Research, January/February 1995.

Ruhl, M.K.; Antonishek, T.; **Federal Wireless Users' Forum Workshop.** NIST Journal of Research, January/February 1995.

Hungate, J.; **Application Portability Profile and Open System Environment Users' Forum.** NIST Journal of Research, January/February 1995.

Pallett, D.S.; Fiscus, J.G.; Fisher, W.M.; Garofolo, J.S.; Lund, B.A.; Martin, A.; Przybocki, M.A.; **1994 Benchmark Tests for the ARPA Spoken Language Program.** Proceedings of the ARPA Spoken Language Systems Technology Workshop, January 1995.

Fisher, W.M.; Fiscus, J.G.; Martin, A.; Pallett, D.S.; Przybocki, M.A.; **Further Studies in Phonological Scoring.** Proceedings of the ARPA Spoken Language Systems Technology Workshop, January 1995.

Wilson, C.L.; Wilkinson, R.A.; Garriss, M.D.; **Self-Organizing Neural Network Character Recognition Using Adaptive Filtering and Feature Extraction.** Progress in Neural Networks, Vol. 3, pp. 295-313, 1995.

Lund, B.A.; Fisher, W.M.; Garofolo, J.S.; Pallett, D.S.; Przybocki, M.A.; Wilkinson, R.A.; **A Spoken Natural Language Interface to Libraries.** Proceedings of the ARPA Spoken Language Systems Technology Workshop, January 1995.

Ressler, S.P.; **Network-Based Documents.** OII Management Handbook, January 1995.

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Since it was made available on the World Wide Web (<http://math.nist.gov/gams/>) in April 1994, GAMS has received more than 2,000,000 inquiries. It has been awarded the highest 4-star rating by the McKinley Internet Directory, a commercial enterprise that rates Web pages for coverage, organization, ease of use, and currency.

Standard Reference Databases

NIST Special Databases

Special Database 1

NIST Binary Images of Printed Digits, Alphas, and Text

Special Database 2

NIST Structured Forms Reference Set of Binary Images (SFRS)

Special Database 4

NIST 8-Bit Gray Scale Images of Fingerprint Image Groups

Special Database 6

NIST Structured Forms Reference Set of Binary Images II

Special Database 8

NIST Machine-Print Database of Gray Scale and Binary Images

Special Database 9

NIST 8-Bit Gray Scale Images of Mated Fingerprint Card Pairs (Volumes 1-5)

Special Database 10

NIST Supplemental Fingerprint Card Data

Special Database 11

NIST Census Miniform Training Database I: Binary Images from Microfilm

Special Database 12

NIST Census Miniform Training Database 2: Binary Images from Paper and Microfilm

Special Database 13

NIST Census Miniform Test Database: Binary Images from Paper and Microfilm

Special Database 14

NIST Mated Fingerprint Card Pairs 2

Special Database 18

NIST Mugshot Identification Database (MID)

Special Database 19

NIST Handprinted Forms and Characters Database

Special Database 20

NIST Scientific and Technical Document Database

Special Software 1

NIST Scoring Package Release 1.0

Standard Reference Materials

SRM Number Description

3200 Magnetic Tape Cartridge

3201 Magnetic Tape Cartridge

3202 Magnetic Tape Cartridge

3203 Magnetic Tape Cartridge

3204 Magnetic Tape Cartridge

3217 Magnetic Tape Cartridge

9529 Flexible Disk 90

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DARPA Switchboard Corpus, Recorded Telephone Conversations, October 1992, NIST Speech Discs 9-1.1, 9-3.1 - 9-29.1 (28 discs).

Switchboard Corpus Excerpts, Credit Card Conversations, May 1992, NIST Speech Disc 8-1.2 (1 disc).

ARPA SPIDRE Speaker Identification Research (SPIDRE0) Corpus, April 1994, NIST Speech Discs 18-1.1 - 18-2.1 (2 discs).

VALIDATED PRODUCTS

In FY 1995 and the first half of FY 1996, CSL/CAML conducted 276 programming and database language validations (includes Ada, C, COBOL, Fortran, Pascal, and SQL), as well as CGM validations, at the following companies:

AT&T Global Information Systems
Canon U.S.A.
Computer Associates International, Inc.
Concurrent Computer Corporation
Convex Computer Corporation
Cray Research, Inc.
DDC-International
Digital Equipment Corporation
Electronic Data Systems Corp.
Henderson Software
Hewlett-Packard Company
IBM Corporation
IBM Canada Ltd.
Informix Software, Inc.
Intergraph Corporation
Larson Technology Software
Liant Software Corporation
Micro Focus Corporation
Microsoft Corporation
Modular Computer Systems, Inc.
Oracle Corporation
Pyramid Technology Corporation
Rational Software
SCO Canada, Inc.
Sequent Computer Systems, Inc.
Silicon Graphics Computer Systems,
Software AG
Sun Microsystems, Inc.
Sybase, Inc.
Tandem Computers, Inc.
Tisoft, Inc.
UNISYS Corporation
Zeh Graphic Systems

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