Solicitation Number JSJMD-00-0106

IITRI Proposal Number 210-4-5700-007

Technical Proposal

Independent Technical Review of the Carnivore Electronic Communication Collection System

Prepared For:

U.S. Department of Justice
JMD, Procurement Services Staff
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20 September 2000

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SECTION 1 – EXECUTIVE SUMMARY

The IIT Research Institute (IITRI) and the Chicago-Kent College of Law—both integral parts of the Illinois Institute of Technology—propose an interdisciplinary team approach to evaluating Carnivore. IITRI will deploy its unique independent verification and validation (IV&V) methodology to test the program, working closely with Chicago-Kent academicians—national leaders in understanding information technology's impact on legal issues including privacy. The participation of Chicago-Kent will help IITRI investigators ask the right questions, follow the pertinent leads, and consider the public's concerns in testing the software. Only a unified team approach can ensure both technical proficiency and policy relevance.

IITRI, chartered in 1936 as the first independent research organization founded without endowment, is one of the country's largest not-for-profit contract research and development institutes. With more than 1,500 personnel at 25 locations nationwide, IITRI has a long history of being a trusted advisor to government and industry. For this effort, IITRI will capitalize on its more than 600 employees in the Washington, DC area that are in close proximity to the Department of Justice locations. This close proximity will also enable a cost-effective interchange for the Carnivore project. As an independent contractor, we help our clients solve scientific, engineering, and business problems that often involve the use of sensitive, highly classified, or proprietary information.

IITRI will assume leadership in designing the technical inquiry. IITRI has a long and successful history of helping clients develop and implement business and technology strategies that streamline business processes and deliver world class products and services to their customers. For more than 30 years IITRI has operated the Department of Defense's Information Analysis Centers, or IACs. IACs help ensure United States military technological superiority by providing the defense research and development communities with the right information at the right time. Using web-enabled applications and access methods, the IAC mission is to improve the productivity of researchers, engineers and program managers through collection, analysis, synthesis, and dissemination of global scientific and technical information. The IACs also extend the electronic value chain by delivering mission-critical services to DoD's customers and stakeholders. IITRI's technology center in Lanham, Maryland, offers a convenient, secure facility from which to set up a test ISP environment to study application of Carnivore.

Chicago-Kent will lend its legal acumen and experience in governmental policy analysis to the study. The Chicago-Kent College of Law is one of the leading law schools focusing on the intersection between technology and the law. For instance, Dean Henry H. Perritt, Jr. advised President Clinton's transition team on information policy, and, during the Clinton Administration, responded to government requests to author studies on Electronic Acquisition and Release of Federal Agency Information and on Public Information in the National Information Infrastructure. During the Reagan and Bush administrations, he authored studies on Federal Agency Electronic Records Management and Archives. Associate Dean Harold J. Krent, who worked in the Department of Justice in the 1980s, has since written three independent studies for governmental entities, the most recent of which focused on privacy concerns arising from use of agency ombudsmen. Last year, Professor Krent completed a study at the behest of the World Bank on the best way to revamp Albania's legal information infrastructure. Professor Perritt has written widely on information technology including the influential book, Law and the Information Superhighway, which addresses material on electronic surveillance, national security, and privacy; Professor Krent has written on databanks and litigated both FOIA and Fourth Amendment cases; and both have taught seminars on privacy. Their efforts would shape the ongoing work of IITRI investigators to respond to public concerns about the scope, means, and effectiveness of the Carnivore program.

Response to DoJ Issue #1: Technical Proficiency - Verify that the scope of the lawyer's participation is consistent with the RFP*. An adequate technical review of Carnivore must consider Carnivore as a system for responding to court orders, written by lawyers and judges, that consists of three elements: (1) the understanding of the order's requirements by the field investigator, aided by technical support personnel, (2) the parameters entered by the investigator into the Carnivore interface, and (3) the data acquisition undertaken by the Carnivore software and hardware. The legal members of the team bring special knowledge required to understand the restrictions inherent in court orders and to assist in evaluating the system properly. They will not engage in a policy review, but rather aid in a technical review, which necessarily has legal and managerial aspects as well as purely technological ones.*

In addition, Dean Perritt and Professor Krent can be of special assistance in the public comment phase of the project. They regularly give public lectures explaining how the Internet and other technologies work in the legal context. Such communication is needed to help the DoJ present the facts associated with Carnivore as well as help the public overcome popular myths and understand the limitations associated with Carnivore.

SECTION 2 – TECHNICAL PROFICIENCY

This section provides the background on IITRI as well as how the IITRI IV&V effort started, a brief recounting of the development of the IV&V strategy, and an overview of the implementation and application of the IV&V techniques used for typical tasks.

About IITRI

IITRI has established a global reputation for delivering innovative solutions in fields as diverse as information technology, software science and engineering, electromagnetics, spectrum engineering, life sciences, and oil exploration and development. IITRI is actively searching for cures for killer diseases, helping to revamp the Internal Revenue Service's computer systems and business processes, and advising the Department of Defense on a wide range of knowledge management and mission-critical issues vital to the national defense. IITRI provides design and operational support services for the National Institutes of Health (NIH) electronic business and commerce applications and systems, Patent and Trademark Office acquisitions, Immigration and Naturalization Service acquisitions, Defense Technical Information Center systems, and Defense Information Systems Agency systems.

IITRI's IV&V Methods

IITRI's IV&V methodology is based on evaluating standard approaches to determine their applicability to the customer's system environment. IITRI's research indicates that the Institute of Electrical and Electronics Engineers (IEEE) Standard 1012-9186, an American National Standard and IEEE Standard for Software Verification and Validation Plans, best represents industry consensus on the definition of IV&V and the way in which it should be conducted at different stages of the development life cycle.

For the purposes of this proposal, the following terms are defined:

Independent: The state of being technically, managerially, and financially unrelated to development and performing organizations.
Verification: The process of evaluating a system, component, document, or process to determine whether products of a given development phase are complete, correct, and meet all requirements established during the previous phase. Verification involves evaluation, analysis, and testing at each level of design and development as well as traceability of the requirements to the previous level in the development cycle. Verification provides early exposure of requirement inconsistencies, design errors, and strategic and technical risks, thereby improving the quality of the final product.[1]
Validation: The process of evaluating products at the end of the development process to ensure compliance with requirements, standards, and design. Validation involves software, hardware, and system assessment of the product baseline at the system and subsystem levels.

While applying the results of this research to a client's program, IITRI recognized that it was necessary to go beyond industry standards to identify techniques appropriate for conducting program-level IV&V tasks. IITRI identified additional processes and procedures to supplement current industry standards, including general systems theory, utility and value theory, operations research, and life-cycle development methodologies.

From this research, IITRI selected eight techniques for conducting IV&V. These techniques, identified in Table 1, were specifically chosen to assess the strategic and technical impact of the key system. The techniques were divided into two categories: intrasystem evaluation techniques and intersystem evaluation techniques. Intrasystem techniques focus on evaluating the architecture, process, or plan as it is described in the system being reviewed, without referring to other external systems. Intersystem techniques evaluate the architecture, process, or plan in a broader context, with reference to other systems.

Taken together, these eight techniques provide the range of methods and tools needed to evaluate technical and functional architectures and the diverse set of elements associated with a complex program.

[1] ANSI/IEEE Std. 1012-9186, *Standard for Software Verification and Validation Plans* (New York, NY, The Institute for Electrical and Electronics Engineers, Inc.

Implementation and Application of IITRI's Methods

IITRI's IV&V methodology can be viewed as a set of procedures that are employed to review, analyze, and evaluate system effectiveness throughout the system development life cycle, from system planning through the end of the use of the system. Typically, IITRI validates the documented plans, processes, and products to determine their correctness with respect to the client's stated business vision of government and industry standards and specific system requirements. The techniques that IITRI uses to implement IV&V are tailored to the specific needs and constraints of the applicable program or product in terms of development phase, specific task, schedules, and other considerations. Although no single procedure or technique can guarantee a correct, error-free system, IITRI carefully chooses a set of techniques that can help ensure that the client develops or, in this case, has developed a quality product.

Table 1. Evaluation Technique Objectives

Evaluation Category	Evaluation Technique	Objective
Intrasystem	Process analysis	Ensure that system processes are functionally complete and consistent and that all necessary interfaces are identified
	Data analysis	Ensure that system data is identified, flows correctly through the system, and is consistently defined throughout the system
	Interface analysis	Ensure that all interfaces are identified and consistently defined
	Coherency analysis	Ensure that information is clear and unambiguous and organized in a way to promote clarity
Intersystem	Component analysis	Ensure that all system components have been correctly and completely specified and are traceable to higher-level requirements
	Alternative analysis	Ensure that all trade studies and other alternatives, such as the use of new technology, are properly considered in system design
	Risk analysis	Identify areas of risk that could inhibit achievement of program objectives
	Cross-impact	Ensure that the system is consistent with the analysis of other reference systems, as appropriate

IV&V includes an interactive verification process that determines whether the outputs from each development step fulfills the requirements from the previous step and validation to ensure that the final product is adequate and reliable. The effectiveness of IV&V increases if it is started earlier in the system life cycle and is continued in parallel with system design, development, and testing.

The product or deliverable of an IITRI IV&V task is typically a formal report. In some cases, the client's need for a quick response demands less structured and formalized reports, such as working papers or briefings. Typically, in its technical report or abbreviated derivatives, IITRI presents the results of the IV&V activity, identifies problems documented as individual findings, and provides conclusions and recommendations for corrective actions to resolve the problems identified during its analysis.

In the following paragraphs, the IV&V intrasystem and intersystem techniques are described in greater detail.

Intrasystem Evaluation Techniques

Intrasystem techniques focus on evaluating the system as it is represented in the document being reviewed, without comparison to selected external references. The intrasystem evaluation techniques include

- Process analysis
- Data analysis
- Interconnectivity analysis
- Coherency check
- Issue synthesis

PROCESS ANALYSIS
Strategic and technical process issues are identified for further analysis through architectural validation analysis, which checks the internal consistency of process flows and traces the sequence of events through the system. Process functional

decompositions are analyzed and functional dependencies are evaluated for gaps, overlaps, redundancies, and inconsistencies. Process mapping to system architecture components (e.g., configuration items and subsystems) and organizations are evaluated. Issues that are complex or involve specialized subject area knowledge are assigned to Subject Matter Experts (SMEs), who assist the IV&V analyst as necessary.

DATA ANALYSIS
Data analysis is also required to support architectural validation analysis. Proposed data classes are evaluated to ensure that they are necessary and sufficient to support planned business functions. Data models are checked for anomalies (e.g., redundant or ambiguous data or relationships). Input and output flow issues with potential strategic or technical impacts are identified for further analysis.

INTERCONNECTIVITY ANALYSIS
Both sides (sources and destination) of all interfaces are checked for consistency, accuracy, and adequacy in interconnectivity analysis. Interconnectivity analysis is supported by architectural validation analysis, which also checks for a consistent corresponding description of functionality on both sides. Issues that are complex or involve specialized subject area knowledge are assigned to SMEs, who assist the IV&V analyst as necessary.

COHERENCY CHECK
Analysis by SMEs is the key to the coherency check technique. It is also important that the coherency check takes into consideration the abilities and experiences of the product's target audience. Coherency applies to strategic, technical, and architectural validation, but it is likewise a critical factor in the strategic impact assessment methodology.

ISSUE SYNTHESIS
Issue synthesis is used to provide a comprehensive analysis of issues from a global, top-down perspective. In addition to and in conjunction with the techniques of process analysis, data analysis, interconnectivity analysis, and coherency checking, the use of IV&V guidelines and the synthesis of issues provide additional issue analysis.

Intersystem Evaluation Techniques

The intersystem techniques focus primarily on evaluations done in a broad systems context. For example, IV&V analysts evaluate the consistency among the architecture, business vision, and requirements that may be established in by external factors; i.e., public policy. Intersystem evaluation techniques include

- Component analysis
- Alternative analysis
- Cross-impact analysis
- Risk analysis

COMPONENT ANALYSIS
Component analysis evaluates the parts of the system or architecture for consistency with higher-level directing documents to ensure that the components represent a complete translation.

ALTERNATIVE ANALYSIS
Alternative analysis seeks to ensure that applicable approaches to solving a problem have been considered. Trade studies and technical journals from professional organizations can provide source material for alternative approaches. New technology literature is especially useful for this technique. The IV&V guidelines for risk analysis, which includes technology, economics, and logistics, are frequently employed as well.

CROSS-IMPACT ANALYSIS
Cross-impact analysis compares external architecture, reference, and standards documents with the system being assessed. The comparisons emphasize consistency and compliance checking.

RISK ANALYSIS
Risk analysis is conducted when the IV&V analysis identifies potential risks. For example, subjecting an issue to one or more of the IV&V guidelines may uncover a potential risk. The process of synthesizing analytic results during cross-impact analysis may also identify a potential risk. The issue is submitted to an SME for determination of issue criticality. Mitigating actions are recommended and provided with the risk identified. As appropriate, some findings may result in recommendations for additional tasks to resolve issues.

IITRI's has used this approach to IV&V for many customers. For example:

1. Customer IRS Customer Service Site Executive
   Purpose Evaluate the ability of commercial-off-the-shelf (COTS) software to duplicate exactly the tax computation algorithms of the IRS's Total Integrated Examination System (TIES). These tests were conducted at IITRI's Information Technology Laboratory located in Lanham, MD.
   Output Demonstrated the feasibility of using COTS products to replace selected TIES tax computation algorithms, thereby allowing the IRS to reduce software development and maintenance costs.

2. Customer IRS National Director for System Engineering
   Purpose Evaluated the functionality and interoperability of products and technologies for secure communications and user authentication (e.g., Fortezza Card, Encrypted Asynchronous Transfer Mode (ATM), Public Key Infrastructure (PKI), and Secure Facsimile). These tests were conducted at IITRI's Information Technology Laboratory located in Lanham, MD.
   Output Validated concepts for Tax Systems Modernization resulting in: (1) an increase in voluntary taxpayer filing and payment compliance; (2) more revenue protection, taxpayer privacy, and electronic filing; (3) reduction of taxpayer burden; (4) reduced paper processing; and (5) increased service productivity.

3. Customer National Security Agency (NSA)
   Purpose IITRI has actively participated in the Security Proof of Concept Keystone forum sponsored by NSA. Through this partnership, IITRI has conducted independent tests of commercial security products to assess vendor claims of functionality, performance, and interoperability. These tests have been conducted at IITRI's Information Technology Laboratory located in Lanham, MD.
   Output Through rigorous testing, IITRI identified specific disparities between vendor claims and product behavior in a prototype environment. IITRI constructed a prototype virtual private network to evaluate the functionality, performance, and interoperability of products in establishing secure, encrypted links between parties using the internet for information exchange.

4. Customer IIT Research Institute's IITRINET
   Purpose IITRI's data center currently hosts approximately 44 web sites that are available via the Internet. Because of this large presence, IITRI is routinely probed for weaknesses in our Internet security profile. To date, no attempt to probe/attack our Internet sites have been successful. This is in part due to IITRI's diligence in reviewing audit logs on a daily basis and reporting any attempted intrusions back to the source.

   Results For a period of 6 months, IITRI was the target of massive Denial of Service attacks that combined IP Spoofing with Fraggle and Smurf attacks. IITRI spent extensive time assisting our previous Internet Service Providers security group to set up their network to track spoofed packets back to the original source. The actual tracking for spoofed packets has to be done in real-time because of the IP Spoofing part. IITRI was able to track the perpetrator back to the Cable & Wireless Network in the Atlanta area. These attacks did not impair our operation, other than a hundred thousand or more log entries and staff time assisting our ISP.

   Another incident occurred wherein our audit logs showed a huge amount of entries scanning entire class ranges of addresses. We reported the attempt and it turned out that Bill Cheswick 'Author of: Firewalls and Internet Security' was trying to map a portion of the Internet (Some 50,000 distinct address ranges). Bill told us that this was part of a report he was generating wherein he was trying to map a portion of the Internet and to see who was monitoring audit logs. According to Bill, IITRI was one of five locations that noticed something strange was going on and he sent us a signed edition of his book.

   IITRI routinely receives e-mails from locations wherein we have reported intrusion attempts that thank us for making them aware of the abnormalities and occasionally seeking our help.

SECTION 3 – TECHNICAL APPROACH

Methodology

Typically, IITRI performs a series of detailed, technically-oriented procedures to help the IV&V analyst conduct and implement the IV&V techniques described in Section 2. Each procedure contains detailed, step-by-step activities for conducting the analysis and gives guidance on its function and use. The procedures also delineate the roles and responsibilities of the project team. The procedure statements are provided as individual packages or objects to facilitate their removal and independent use.

Given the time constraints associated with the required deliverable, IITRI in collaboration with Chicago Kent will use the following methodology for performing the Carnivore Technical Review.

1. Determine (or hypothesize) specific limitations provided in the court order for each scenario, in light of case-law interpreting Fourth Amendment and statutory guidance for executing warrants and other court orders.
2. Review the Carnivore source code (in appropriate government facilities) to determine whether it causes acquisition of data beyond that authorized in the court order relevant to the particular scenario.
3. Evaluate the Carnivore user interface to ascertain the circumstances under which an authorized or unauthorized operator could select options that will cause Carnivore to acquire data beyond that authorized in the relevant court order.
4. Evaluate the source code and user interface to determine whether an appropriate audit trail is created disclosing what data was captured in a particular session.
5. Test an operational Carnivore system in simulated conditions of actual use, in which the simulated ISP system components contain IP addresses (both statically and dynamically assigned), user login authentication protocols, complete email messages and headers, and complete FTP and HTTP sessions, including information authorized for access by the relevant court order and information not authorized for access, to determine whether the system acquires all of the information authorized for access and only that information.
6. Identify inherent design limitations in the Carnivore system that preclude or impair its use in certain situations, including certain configurations of ISP network elements.
7. Identify aspects of COTS and hardware elements incorporated into Carnivore that create particular problems or risks of under- or over-inclusive acquisition of data.
8. Attempt to create message, file and session characteristics that will cause Carnivore to fail to acquire authorized data or to acquire unauthorized data.

The result of this approach will provide the information necessary to address the following questions as raised in the solicitation's Executive Summary.

1. "Assuming proper usage, will the Carnivore system provide investigators with all the information, and only the information, that it is designed and set to provide in accordance with a given court order?
2. Assuming proper usage, will use of the Carnivore system introduce new, material risks of operational or security impairment of an ISP's network?
3. Does use of the Carnivore system introduce new, material risks of the unauthorized acquisition, whether intentional or unintentional, of electronic communication information by (i) FBI personnel or (ii) persons other than FBI personnel?
4. Are the protections built into the Carnivore system, including both audit functions and operational procedures or practices, commensurate with the level of the risks, if any, identified in response to (3) above? "

Public Comment Phase

IITRI will actively participate in and provide support during the public comment phase by evaluating and providing a technical assessment of comments and forming replies based on the technical feasibility of the comment and our technical evaluation of Carnivore. Project team members, with technical expertise and experience in communications and public relations will be available to participate in public discussions.

Security Requirements

Response to DoJ issue #2: Technical Approach/Security. As we understand the proposal, IITRI proposes to use its Lanham, MD facility for the review. On page 26 of the business proposal, the Lanham, MD facility is shown as not having secure storage capability. Please explain.

The response regarding secured storage capability was submitted in error. The IITRI Lanham IT Laboratory does comply with DoD National Industry Security Standards for Top Secret Storage in that the facility has GSA-approved security containers and approved vaults secured with a locking mechanism meeting Federal Specification FF-L-2740.

IITRI's Center for Information Technology Laboratory is a self-contained, fully integrated, DoD secure facility staffed by a team of world-class experts in the application of computer science and engineering to IT systems testing and analysis. IITRI's IT Lab provides a range of testing, modeling, and simulation capabilities to validate solutions to your mission-critical business applications. With an unequalled combination of facilities and expertise, IITRI has the capacity and capabilities to perform any IT research or analysis task no matter how large.

The IITRI IT Lab employs a suite of robust and computer-based tools. These capabilities provide a flexible and adaptable simulation and modeling environment that can readily support studies of any information system at the enterprise, system, or component level, without significant or costly modifications.

Environment/Security

Four levels of physical security, and 24-hour, 7-day video monitoring. Other facility features include

- 15,000 square foot facility with 3,500 square feet of raised-floor work space
- Four copper and one multimode fiber independent cable plants
- Plug and play network communication infrastructure
- 150 KVPS UPS with 70-minute backup power
- Multiple protocol communication support (TCP/IP, ATM, FDDI, and Ethernet)

Systems Engineering, Software Engineering, Test Automation, Modeling and Simulation Competence

IITRI's technical proficiency is further illustrated by our use of the following tools to perform IV&V testing and similar work: Doors, RTM, CORE, Object Team, Erwin, Software Through Pictures, Power Builder, Cold Fusion, Front Page, WinRunner, Test Director, LoadRunner.

Modeling and Simulation Tools
Comnet III, Call$im, Autonet/Meshnet, Autonet/Performance 3, Network II.5, Planyst, Work flow Modeler (IDEF0 and IDEF1X), MODSIM III, SES/workbench, ithink, QASE RT, Matlab, @Risk, AMPL, MAPLE V, Knowledge Seeker, S-Plus, Gauss, Microsoft Products, C++, Visual C++ with Visual Basic, DecideRight, Crystal Reports Professional, GraphicC

Reporting Results

Typically, IITRI uses assessment reports as the primary vehicle to document and report the results of IV&V activities. IITRI also prepares briefings and white paper reports, as required, as a means to handle special tasks requiring quick turn-around. IITRI schedules deliverables in accordance with applicable production schedules. The outline for the report is general and may be tailored to particular document types as appropriate to provide additional analysis results or supporting information. The outline for the briefing indicates a preliminary and final briefing that could be used to report findings and recommendations for IV&V tasks.

SECTION 4 – INDEPENDENCE

Response to DoJ Issue # 3. Independence – Given the extent of work IITRI has performed for the government, to include that performed by individuals for previous employers (e.g., J. Allen Crider), how would IITRI respond to criticism that the review was not independent? *IITRI is a not-for-profit research affiliate of the Illinois Institute of Technology. Chartered in 1936 as the first independent research organization founded without endowment, IITRI is one of the country's largest not-for-profit contract research and development institutes with an outstanding, nationally-recognized reputation for objective*

independent research and analysis. The former government employees on IITRI's staff provide a value-added service to the public and to our government clients in that they possess domain expertise. These individuals fully understand that their employment hinges upon their ability to provide clients, both government and commercial, a factual, non-biased opinion thus continuing a time-honored IITRI practice. Moreover, IIT generally has garnered a reputation as an innovator in post-secondary education and technological research. The IIT academics on the research team will further ensure that the technical review is independent in the public eye.

IITRI is a not-for-profit research affiliate of the Illinois Institute of Technology. Chartered in 1936 as the first independent research organization founded without endowment. IITRI is one of the country's largest not-for-profit contract research and development institutes with an outstanding, nationally-recognized reputation for objective, independent research and analysis.

SECTION 5 – RESUMES

To successfully execute this project, IITRI is offering the U.S. Department of Justice a team of professionals that has an excellent understanding of the challenges of conducting this technical review. Our proposed team has proven operations research, server platform, operating systems, network operating systems, C++, database, interface, and ISP expertise. Resumes for these individuals are attached.

Engagement Executive	-	*Melvin Scott*
Project Manager & SME	-	*Steve Smith*
Additional SMEs	-	*Harold Krent*
	-	*Hank Perritt*
Systems/Network Analyst	-	Mengfen Shyong
C++ Application Analyst	-	Allen Crider
Database Analyst	-	Mary Ranade
Security Analyst	-	Steve Mencik
Technical Writer/Editor	-	Larry Reynolds

SUMMARY

IITRI and the Chicago-Kent College of Law are pleased to provide this proposal and look forward to participation in the Carnivore evaluation program. We are hopeful that you will agree that this team provides the U.S. Department of Justice with the proper blend of skills, experience, and understanding of the problem that is essential to meeting the challenges of this project.

Schedule for Performance

Task	Description Week Ending	9/29	10/6	10/13	10/20	10/27	11/3	11/10	11/17	11/24	12/1	12/8
1	*Project Initialization* *Provide a clear understanding of project scope.* *Approach - Meeting with DoJ sponsor and key team members to determine* *- DoJ project team members and functional area participants.* *- Determine participant roles and responsibilities.* *- Confirm scope, approach and objectives of engagement.* *- Finalize project schedule and prepare detailed project plan.* *- Conduct kick-off meeting.*											
2	*Conduct a business context and operational review with functional area participants.* *- Review business documentation* *- Conduct interviews with functional area participants* *- Analyze business processes and management control system* *- Hypothesis operational scenarios* *- Evaluate legal restrictions* *- Identify potential restrictions*											
3	*Source Code Review - Determine (or hypothesize) specific limitations provided in the court order for each scenario. Assess potential for misuse.*											
4	*User Interface Review - Review the Carnivore source code (in approved government facilities) to determine whether it causes acquisition of data beyond that authorized in the court order relevant to the particular scenario. Determine functions performed and assess potential for error.*											
5	*Assess Audit Trail Capability - Evaluate the Carnivore user interface to ascertain the circumstances under which an authorized or unauthorized operator could select options that will cause Carnivore to acquire data beyond that authorized in the relevant court order*											
6	*Laboratory Evaluation – Develop testing scenarios, develop test bed and install. Conduct test. Evaluate the source code and user interface to determine whether an appropriate audit trail is created disclosing what data was captured in a particular session*											
7	Test an operational Carnivore system in simulated conditions of actual use, in which the simulated ISP system components contain IP addresses (both statically and dynamically assigned), user login authentication protocols, complete email messages and headers, and complete ftp and http sessions, including information authorized for access by the relevant court order and information not authorized for access, to determine whether the system acquires all of the information authorized for access and only that information.											
8	Identify inherent design limitations in the Carnivore system that preclude or impair its use in certain situations, including certain configurations of ISP network elements.											

Schedule for Performance (Cont)

Task	Description Week Ending	9/29	10/6	10/13	10/20	10/27	11/3	11/10	11/17	11/24	12/1	12/8
9	*COTS Review and Evaluation - Identify aspects of commercial off-the-shelf software and hardware elements incorporated into Carnivore that create particular problems or risks of under- or over-inclusive acquisition of data. Determine functions performed, evaluate current selections, and assess risk for misuse.*											
10	*Evaluate post-intercept controls - Attempt to create message, file and session characteristics that with cause Carnivore to fail to acquire authorized data or to acquire unauthorized data.*											
11	Evaluate post-intercept controls on data acquired in a Carnivore session, comparing chain-of-custody and access controls to those found to be appropriate historically for wire intercepts and trap-and-trace records, to determine whether these controls for Carnivore provide equivalent protections to those found to be acceptable for traditional surveillance.											
12	*Complete Interim Draft of Technical Report* *- Conduct in-progress review briefings* *- Complete in-progress interim draft report*											
13	*Complete Final Reports* *- Conduct briefings* *- Complete final technical report* *- Complete final financial report* *- Conduct project close out*											
14	Determine Next Steps											

Resumes

IIT Research Institute

RELEVANT EXPERIENCE

Program Management	CMM	Data Mining	Information Assurance
Systems Engineering	ISO	Telecom	Methodology

NAME: HE P. HE

SKILL CLASSIFICATIONS: PROGRAM MANAGEMENT; SYSTEMS/SOFTWARE ENGINEERING; QUALITY ASSURANCE

SUMMARY OF EXPERIENCE:

Mr. He, with over 28 years experience in information systems development, managers the Technology Assessment Division within IITRI's Center for Information Technology. He has complete profit and loss responsibility a $5M line of business. For the previous 6 years, he was IITRI's advisor to the Internal Revenue Service in areas such as standards, methodology, and evaluation of software development capabilities. In previous industry positions, he lead the development, integration, testing and deployment of large software systems using both object oriented and structured methodologies. He supervised internal research and development projects that resulted in marketable products and in new applications of cutting-edge software capabilities. Mr. He's experience has tracked industry migration from mainframes, to minicomputers, to distributed systems, and back. He has worked in FORTRAN, COBOL, Pascal, C, LISP and assembler programming languages and with hardware including IBM, DEC, and Sun. As a consultant, Mr. He's expertise in software development, planning, and methodology is sought by leading IS-industry companies to ensure that they apply established "best practices".

CHRONOLOGICAL EXPERIENCE:

IIT Research Institute, Technology Assessment Division
Division Manager, September 1999 to present

As manager of the Technology Assessment Division within IITRI's Center for Information Technology, Mr. He has profit and loss responsibility for a $5M line of business that includes MIS program support, data mining, information assurance, and telecommunications planning. Mr. He supervises a staff of approximately 20 information systems professionals. He is responsible for both day to day operations of projects within his division and the growth of his high technology line of business. Current clients include the U.S. Departments of Treasury and Agriculture, the Central Intelligence Agency (CIA), the Defense Information Systems Agency (DISA) and the Internal Revenue Service.

IIT Research Institute, Tax Systems Modernization Division
Science Advisor; **May 1993– September 1999**

Mr. He lead key, high-profile tasks and provided quality assurance, independent review, and risk management to all IITRI tasks in support of the IRS. He analyzed project plans to ensure a sound approach; he assessed products to ensure that findings, conclusions and recommendations were consistent across projects; and he ensured conformance with IITRI and IRS standards.

As leader of the IRS Acquisition Management and Support (AMS) task, Mr. He assessed IRS contractors for conformance with the software and software acquisition Capability Maturity Models (CMM), and supported AMS and the GMPO in analyzing and improving their business processes. His recent support

facilitated successful quick-turn-around evaluations of CMM-related qualification materials submitted by contractors competing to become the IRS PRIME.

In past assignments at IITRI's Tax Systems Modernization Institute, Mr. He directed

- (1995-1997) Evaluation the IRS standards program and recommending changes to the current program and organization to bring the IRS into compliance with business goals.
- (1995) Review the draft IRS Development Methodology (IRS/DM).
- (1996) Assessment of Internet-based technology to support IRS acquisitions business goals.
- (1997) Support for IRS task force investigating unsolicited proposals related to modernization
- (1997) Quick turn around review of positive features of IRS conformance with the SW-CMM.

Self Employed
Engineering Consultant; March 1992 - April 1993

Mr. He supported defense industry clients on high value engineering and program management tasks. He drew upon his technical experience to address complex or state of the art requirements in software and systems engineering. He drew upon his management and business development experience to help clients create coherent, responsive documents. His significant accomplishments on proposals, system engineering and software development tasks include the following:

- Prepared a system integration plan and labor estimate for ESC Inc., an 8a sub-contractor to General Dynamics on the Forestry Service ADPE Modernization effort.
- Directed a 12 person team of software engineers from two companies (CSI, Inc. and Essex) and a Government Agency who were designing a distributed message handling system using C, Motif, and Sybase on a network of SUN SPARC workstations. In a six month assignment, successfully transitioned development from structured to object oriented methodology, and from C to C++ coding. Also assisted Government Project Manager in demonstrating that object oriented development can be managed with existing techniques.
- Researched, prepared and presented a qualification package for a team of 5 companies (QuesTech, PSC, Watkins-Johnson, Geodynamics, and ITT) seeking to bid on a major system integration for a defense agency
- Wrote the software and RDBMS technical volume of a proposal to transition a system from a FORTRAN coded minicomputer environment to a C coded distributed client/server environment. This volume described specific methodologies for requirement development and tracking, for software and database design, and for integration, test and support. It also explained the advantages to be gained via CASE tools, and an approach to meet requirements for computer security.
- Advised PRC and GTE on staffing for their PLUS II OIR Support proposal. This job supports ADPE modernization (distributed PC environment Vs mainframe) for a Government Agency.

Lockheed Missile & Space Co., Inc.
Program Manager; March 1991 - March 1992

The Maryland office of LMSC provides high technology support for the maintenance and development of computer based systems for the Department of Defense.

Mr. He was the Software Development Manager for EQUALIZER, a distributed resource management system. EQUALIZER included real-time status and control of special purpose hardware, interfaces to multiple TCP/IP EtherNet LANs, and a windowed Man-Machine Interface (MMI) based on Open Look. Mr. He led a team of 22 engineers. He established task plans, conducted design and code walk-throughs, and was the software point of contact for customers and company management. He supervised development of almost 90K lines of C code including the MMI created with a tool called GUIDE (Graphic User Interface Development Environment). He also applied McCabe, Inc's CASE tools to control complexity and prepare comprehensive tests. His team provided end-user and maintenance training, and prepared a complete documentation package to Government Customer standards. This software is now installed and running at an overseas site.

Defense Security Systems
Deputy Director of Engineering; January 1987 - March 1991

DSS provided software and systems engineering support to the Department of Defense, and produced state of the art systems for digital processing and analysis of imagery, electronic signals, and telecommunications. Prior to November 1989, DSS was a subsidiary of the Northrop Corporation. It was subsequently sold to General Dynamics and is now part of GDE, Inc.

Mr. He coordinated the efforts of software, systems, programs management, and business development organizations. He dealt directly with customers, presenting company capabilities, understanding customer requirements, and preparing winning technical and management responses. He was also an active technical contributor, e.g.,

- (1987) developed a detailed system support model using PSL/PSA. This 3 month effort was done on local PC's and a remote HP UNIX based computer system. It provided a methodology and program plan for engineering and management support of a massive ADP upgrade.
- (1987-88) developed signal and information processing algorithms and implemented them in FORTRAN, assembly language, C, and later C++. Also established customer requirements; researched, evaluated and compared candidate algorithms; verified end-user satisfaction. This on-going effort enhanced systems already developed and delivered to DSS Government customers.
- (1988) implemented a C language interface to connect DOS based PCs to a DEC-20 mainframe via a PC gateway running XENIX. This 6 month effort included substantial systems programming and integration of commercial software for task management and DBMS.
- (1988-89) product manager for a modular processor based on commercial off-the-shelf components built by Analog Devices Inc., SUN, and Zoran; performed an extensive evaluation of competing products primarily from avionics and EW applications; designed applications for signal and image processing based on customer requirements; created a digital signal processing support database using SYBASE, and developed user interface software for a SUN host using C and X-Windows (X-LIB level).

When DSS was sold to General Dynamics, Mr. He continued to support the processor product. He also directed efforts to interface it with GD's image processing systems, and to apply it for fusion of telecommunications and imagery data. Simultaneously (1989-91), he was responsible for the organization's highest priority acquisition, a multi-year pursuit of a program that included state-of-the-art subsystems for RDBMS, massive data repository (50+ terabyte), FDDI LAN, and computer security (NCSC B2). He managed a team of up to 25 engineers from three companies who performed independent research, and a funded study that led to a $20 million development. The team established requirements for functionality and performance, conducted trade studies to identify available commercial products, and prepared a comprehensive design and implementation plan using CASE tools such as Software through Pictures. Mr. He provided overall technical guidance and specific expertise in large

data systems and computer security.

VERAC, Inc.
Manager of Systems Engineering; January 1985 - January 1987

VERAC was a small business that applied artificial intelligence (AI) and advanced MMI technology to signal and image processing, and telecommunications programs. It is now part of Ball Aerospace Corp. Mr. He directed applications of VERAC's proprietary technology to new customers. Specific Accomplishments included:

- Subcontract support to General Electric to assist them with the specification of command and control software for a specialized communication system and to consult on the development methodology mandated by their customer. This 12 month effort involved reverse engineering a large body of FORTRAN code to identify and document requirements.
- Developed an AI-based mission planning tool for the DoD. Mr. He led a team of 5 analysts who combined LISP programs with a commercial database engine (dBASE III+) on a PC. This 12 month effort eventually replaced a minicomputer-based system and saved several times its development cost in systems maintenance.

HRB Singer, Inc.
Principal Engineer/ Program Manager; September 1978 - January 1985

In six years at HRB, Mr. He succeeded in progressively more responsible software, systems engineering, and program management positions. Significant accomplishments include:

- (1978-80) designer and later software integration manager for a 100K LOC FORTRAN/assembly language control, store, and forward system. This system included a single remote computer and a central computer cluster connected by a high speed packet based communication link. Mr. He performed key analysis to demonstrate and model the performance of the intersite communications and designed the data transfer software.
- (1980-83) promoted from lead software engineer to lead system engineer to program manager for development of a high frequency (HF) communications monitoring system. Total budget for this program was over $20M. Mr. He supervised up to 20 people who developed 20,000 lines of code, prepared and coordinated component and system tests, and deployed the system at seven US and overseas sites. Systems had to be integrated in a 24 hour per day operational environment without impacting ongoing operations. Software for these systems was written in FORTRAN and assembly language for DEC PDP-11 minicomputers.
- (1983) directed transition of large application on SEL minicomputers from RSX to RTM operating system. Emulated old operating system calls to upgrade FORTRAN applications; did extensive recoding of assembly language segments to enhance performance. Managed staff of 12 engineers at two sites.
- (1984) led a 12 person senior staff IV&V team on a sensitive, interagency program. Reviewed system and software development documents produced by the prime contractor, advised the Government on development methodology, formulated system quality assurance plans. Also supported a field exercise involving selection, integration, and rapid deployment of a 30 node network of DEC workstations to provide electronic mail, rudimentary database, and telecommunications support.

Computer Sciences Crop, Applied Technology Division;
Member Technical Staff; September 1973 - September 1978

Mr. He led a team of 30 engineers, programmers, and technicians supporting earth and space science

programs at NASA Wallops Island. He prepared and evaluated simulations for orbital missions and analyzed radar and telemetry data to evaluate performance of launch vehicles. Wrote simulation and analysis software in FORTRAN and assembler for execution on GE mainframe and DEC minicomputers.

Columbia Research Crop
Fluid Mechanics Engineer; March 1971 - September 1973

Mr. He conducted analysis and experiments in fluid mechanics. He wrote simulations in FORTRAN for execution on a remote DEC-10

PROFESSIONAL REGISTRATION:

HARDWARE:

IBM, DEC, Sun: dated experience

SOFTWARE:

Microsoft Office; skilled desktop applications user

C, C++, FORTRAN, PASCAL, LISP, SQL, COBOL, assembler; dated programming experience

JAVA, HTML; recent but limited programming experience

ACTIVE SECURITY CLEARANCES:

INACTIVE SECURITY CLEARANCES:

TS/SI/TK

EDUCATION:

Pennsylvania State University, M.S., Computer Science
Virginia Polytechnic Institute, B.S., 1971, Aerospace Engineering

OTHER COURSES:

Software Engineering Institute, Software Capability Evaluation, 1998

PUBLICATIONS/PRESENTATIONS:

AWARDS/AFFILIATIONS:

Commitment to Excellence, IITRI, 1996

Commitment to Excellence, IITRI, 1997

Commitment to Excellence, IITRI, 1999

Henry H. He, Jr.

Biographical Information

Dean and Professor of Law, Chicago-Kent College of Law, and Vice President - Downtown Campus, Illinois Institute of Technology (1997-)

Formerly:

Professor of Law, Villanova University (1981-1997)

Fellow, Center for Business and Government, John F. Kennedy School of Government, Harvard University (sabbatical semester, Fall, 1990)

General Counsel - Labor and Environmental Affairs
Consolidated Rail Corporation, 1976-81

Deputy Under Secretary of Labor, 1975-76

White House Staff, 1975

Executive Secretary, Cost of Living Council
Executive Office of the President, 1972-74

S.B., 1966 — Massachusetts Institute of Technology

S.M., 1970 — Massachusetts Institute of Technology
Sloan School of Management

J.D., 1975 — Georgetown University Law Center

Member of the bar:

Virginia
Pennsylvania
District of Columbia
Maryland
Illinois
United States Supreme Court

Bar and professional activities:

Member, Council on Foreign Relations

Chairman, Section on Law and Computers, Association of American Law Schools (1991)

Commissions & Consultancies:

Member, Computer Science and Telecommunications Board, National Research Council/National Academy of Sciences (2000-2003)

Member, Advisory Commission on Internet Privacy, State of Illinois (1999)

Member, Committee on Global Networks and Local Values, National Research Council (1998-2000)

Consultant, Office of Information and Regulatory Affairs, Office of Management and Budget (1993-94)

Member, Advisory Committee on Internet Dissemination of SEC EDGAR data under NSF Grant to NYU and IMS (1994-present)

Member, Transition Team for the President-Elect, December, 1992 - Science, Space & Technology Cluster, focusing on the FCC

Consultant, Administrative Conference of the United States (1985-present)

Consultant, Office of the Secretary, United States Department of Labor (1986-88)

Consultant, European Commission, Directorate General 13 (1995-)

Member, Illinois Advisory Commission on Internet Privacy (appointed by Governor)

Books:

ELECTRONIC CONTRACTING, PUBLISHING AND EDI LAW (1991 John Wiley & Sons; co-author: Michael Baum)

HOW TO PRACTICE LAW WITH COMPUTERS (2d ed Practising Law Institute November, 1992) (1268 pages)

TRADE SECRETS: A PRACTITIONER'S GUIDE (Practising Law Institute 1994 with annual supplements)

LAW AND THE INFORMATION SUPERHIGHWAY (740 pages, John Wiley & Sons 1996)

HOW TO PRACTICE LAW WITH COMPUTERS (3D ED. 1998)

Articles:

And the Whole Earth Was of One Language: A Broad View of Dispute Resolution, 29 Vill.L.Rev. 1049 (1984)

Electronic Acquisition and Release of Federal Agency Information: Analysis of Recommendations Adopted by the Administrative Conference of the United States, 41 ADMIN.L.REV. 253 (1989).

Federal Electronic Information Policy, 63 TEMPLE L.REV. 201 (1990).

Determining the Content and Identifying Suppliers of Public Information in Electronic Form, 17 GOV'T PUB. REV. 325 (1990).

The Electronic Agency and the Traditional Paradigms of Administrative Law 44 ADMIN.L.REV. 79 (1992)

Market Structures for Electronic Publishing and Electronic Contracting in BUILDING INFORMATION INFRASTRUCTURE: ISSUES IN THE DEVELOPMENT OF THE NATIONAL RESEARCH AND EDUCATION NETWORK (Harvard University and McGraw-Hill 1992)

Electronic Records Management and Archives, 53 U.PITT.L.REV. 963 (1992).

Tort Liability, the First Amendment, Equal Access, and Commercialization of Electronic Networks, 2 ELECTRONIC NETWORKING (Meckler) 29 (Fall, 1992)

Format and Content Standards for the Electronic Exchange of Legal Information, 33 JURIMETRICS J. 265 (1993)

Introduction, The Congress, the Courts and Computer Based Communications Networks: Answering Questions about Access and Content Control, Symposium, 38 VILL.L.REV. 319 (1993)

Dispute Resolution in Electronic Network Communities, 38 VILL.L.REV. 349 (1993)

Commercialization of Government Information: Comparisons between the European Community and the United States, 4 INTERNET RESEARCH 7 (Meckler Summer 1994)

Unbundling Value in Electronic Information Products: Intellectual Property Protection for Machine Readable Interfaces, 20 RUTGERS COMP. & TECH. L.J. 415 (1994)

President Clinton's National Information Infrastructure Initiative: Community Regained?, 69 CHI.-KENT L.REV. 991 (1994) (Charles Green Lecture)

Video Depositions, Transcripts and Trials, 43 EMORY L.J. 1071 (1994)

Access to the National Information Infrastructure, 30 WAKE FOREST L.REV. 51 (1995)

Sources of Rights to Access Public Information, 4 WILLIAM & MARY BILL OF RIGHTS J. 179 (1995)

Should Local Governments Sell Local Spatial Databases Through State Monopolies?, 35 JURIMETRICS J. 449 (1995).

Payment Infrastructures for Open Systems, 3 DATA LAW REPORT 1 (No. 1, July, 1995)

The Information Highway: On Ramps, Checkpoints, and Tollbooths, 13 GOV'T INFO. Q. 143 (1996).

Mapping the Information Superhighway, 3 INT'L J. LAW & INFO. TECH. 201 (1996)

Jurisdiction in Cyberspace: the Role of Intermediaries, in Brian Kahin & Charles Nesson, BORDERS IN CYBERSPACE: INFORMATION POLICY AND THE GLOBAL INFORMATION INFRASTRUCTURE 164 (1997)

Legal and Technological Infrastructures for Electronic Payment Systems, 22 RUTGERS COMP. & TECH. L. J. 1 (1996)

Jurisdiction in Cyberspace, 41 VILL. L. REV.1 (1996)

Property and Innovation in the Global Information Infrastructure, 1996 U. Chi. Legal F. 261 (1996)

Information Access Rights Based on International Human Rights Law, 45 BUFF. L. REV. 899 (1997) (with Christopher J. Lhulier)

Cyberspace Self-Government: Town-Hall Democracy or Rediscovered Royalism?, 12 BERKELEY TECH. L. J. 413 (1997)

Electronic Freedom of Information, 50 ADMIN. L. REV. 391 (1998)

Cyberspace and State Sovereignty, 3 J. INT'L LEGAL STUD. 155 (1997)

The Internet as a Threat to Sovereignty? Thoughts on the Internet's Role in Strengthening National and Global Governance, 5 IND. J. GLOB. LEG. STUD. 423 (1998)

Chinese Economic Development, Rule Of Law, And The Internet (with Randolph R. Clarke), 15 GOV'T INFO. Q. *393 (1998)*

Will the Judgment-proof Own Cyberspace? 32 INT'L LAWYER *1121 (1998)*

False Alarm: European Privacy Law and International Jurisdiction, 51 FED. COMM. L. J. 811 (1999) (with Margaret G. Stewart)

The Internet is Changing International Law 73 CHI-KENT L. REV. *997 (1998)*

International administrative law for the Internet: mechanisms of accountability 51 ADMIN. L. REV. 871 (1999)

Dispute Resolution in Cyberspace: Demand for New Forms of ADR, 15 OH. ST. J. DIS. RES. 675 (2000)

Lawrence Lessig, Code and Other Laws of Cyberspace , 32 CONN. L. REV. 1061 (2000) (Book Review)

The Internet is Changing the Public International Legal System, 88 KY L. REV. 885 (2000).

Reports:

ELECTRONIC ACQUISITION AND RELEASE OF FEDERAL AGENCY INFORMATION, Report Prepared for the Administrative Conference of the United States, October 1, 1988.

ELECTRONIC PUBLIC INFORMATION AND THE PUBLIC'S RIGHT TO KNOW, proceedings of conference in October, 1989, sponsored by Benton Foundation and Bauman Family Foundation.

MARKET STRUCTURES FOR ELECTRONIC PUBLISHING AND ELECTRONIC CONTRACTING ON A NATIONAL RESEARCH AND EDUCATION NETWORK, prepared for Conference on Information Infrastructure for the 1990s, November 29 - December 1, 1990, Kennedy School of Government, Harvard University

FEDERAL AGENCY ELECTRONIC RECORDS MANAGEMENT AND ARCHIVES, prepared for the Administrative Conference of the United States, December 1, 1990.

THE ROLE OF FORMAT AND CONTENT STANDARDS AND OTHER CONVENTIONS IN FACILITATING ELECTRONIC EXCHANGE OF ACCOUNTING AND LEGAL

INFORMATION, Report to the National Center for Automated Information Retrieval ("NCAIR") (February 1, 1991)

PUBLIC INFORMATION IN THE NATIONAL INFORMATION INFRASTRUCTURE, Report to the Regulatory Information Service Center, General Services Administration, and to the Administrator of the Office of Information and Regulatory Affairs, Office of Management and Budget, May 20, 1994

ELECTRONIC DOCKETS: USE OF INFORMATION TECHNOLOGY IN RULEMAKING AND ADJUDICATION, prepared for the Administrative Conference of the United States, September 8, 1995

Born: December 30, 1944

Contact:

Henry H. He, Jr.
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Chicago Kent College of Law,
Illinois Institute of Technology
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hHe@kentlaw.edu

September, 2000

IIT Research Institute

RELEVANT EXPERIENCE

Systems Engineering	Telecom	Datacom	Systems Software
Systems Analysis	Computer Science	Operation Research/ Analysis	Data Analysis

List keywords that summarize your areas of expertise or skills. These keywords will be used for quick reference.

NAME: SHE BETH SHE

SKILL CLASSIFICATIONS:

PRIMARY SKILL CLASSIFICATION: SYSTEMS ENGINEERING

RELEVANT SECONDARY SKILL CLASSIFICATIONS: SYSTEMS ANALYSIS, DATA ANALYSIS

SUMMARY OF EXPERIENCE:

Over 11 years in Systems Engineering with AT&T, with expertise in Operations Planning, Computer Telephony Integration, Systems Analysis, Network Management. Strength includes designing large systems, negotiating customer requirements, defining systems requirements, solving hard problems, and defining test plans. Have worked on several large and complicated projects in support of both Government Contracts and Commercial Markets.

Starting from February 1999, have worked with IITRI on the Federal Funded Research and Development Center (FFRDC) contract, responsible for the Internal Revenue Service (IRS) voice systems Y2K end-to-end testing. This test was conducted at the Department of Treasury Interoperability Test Lab, and Ms. She was the test planning coordinator between the Department of Treasury and the IRS. This project involved the following disciplines: voice systems architecture, network model and simulation, and equipment inventory data analysis. In addition, Ms. She conducted researches on voice over packet technology.

CHRONOLOGICAL EXPERIENCE:

IITRI, Security and Telecommunication;
Science Advisor, February 1999 – Present

Successfully defined the PBX/VMS/ACD/VRU topology, and verified software and hardware telecommunication components to ensure the network will be Y2K functional for the Internal Revenue Service (IRS).

- Developed the IRS Y2K end-to-end test requirements for voice systems test call paths, and the IRS voice systems configurations.
- Point of Contact (POC) for IITRI Y2K end-to-end testing team.

- Coordinated with the Treasury Communication Enterprise – Interoperability Testing Lab (TCE-ITL) to identify problems and resolve issues associated with test planning.
- Provided the IRS voice systems architecture and helped the TCE-ITL to simulate the IRS voice environment in their test lab.

AT&T Bell Laboratories, Systems Development and Networks Planning;
Senior Technical Staff Member; May, 1990 – September, 1998

Job Function: Operations Planning

Successfully defined the new tasks that work centers need to do and the new capabilities that the systems need in order for AT&T to deliver a new Video Teleconferencing Service in support of a Government Defense Contract.

- Developed a Maintenance and Network Management operations technical plan.
- Wrote the systems requirements for a trouble ticket system using Remedy-ARS.
- Designed the systems requirements for Network Performance Management Data Reports.
- Defined a Video Equipment Maintenance Interface Agreement with a subcontractor.
- Developed an Operations Readiness Test Plan for the Maintenance of the Video Network.
- Led the process development of the Video Services.

Job Function: Systems Analysis

Defined systems requirements for a systems organization in the Government Markets which support the FTS2000 contract. System features included:

- Graphical User Interface for GMIS Customer Profile
- FTS2000 800 Service on the 4ESS Network
- Systems Interface between FMIS Trouble Reporting and Commercial Trouble Reporting
- Service Order Reports and Billing Reports
- Security and Permissions and Systems Architecture

Job Function: Systems Administration

Provided networked computing capability for a development organization that supports the provisioning, planning and development. The network contained over 70 workstations and PCs.

- Designed and administered client/server and email capabilities.
- Implemented a Local Area Network (LAN).
- Provided Graphical User Interfaces by using Object Oriented Design.
- Determined and satisfied user requirements for system availability and response time.

Job Function: Software Engineering

Performed software development for AT&T Software Defined Network (SDN) provisioning systems.

- Led the development of a customer profile database.

- Led the movement of the customer profile database to a new platform.
- Designed and improved access performance for databases.

H&L Technique Inc., Systems Engineering

Computer Consultant to **AT&T,** July, 1989 – May, 1990

Designed and developed software for the AT&T Private Line Service Provisioning Product Development Department.

- Designed and developed a process to aggregate information from multiple databases.
- Designed and developed processes to synchronize and establish the integrity of information across multiple databases.

Cap Gemini America Inc., Software Engineering

Computer Consultant to **AT&T,** July, 1987 – June, 1989

Developed call management capabilities for the AT&T System 85 PBX. Designed and implemented administrative capabilities for System 85 features and databases.

Louis Berger International Inc., Civil Engineering Tools

Systems Analyst, December, 1986 – July, 1987

Led the development of a three-dimensional CAD/CAM package.

HARDWARE:

SUN Sparc workstation/SunOS 4.1.3 and Solaris 2.3, System Administration

NEXT workstation/Mac 3.0 and NEXT step, System Administration and Object C Programming

PYRAMID, AT&T 3B2, VAX-11/780, UNIVAC 1000, System Administration

SOFTWARE:

Object Oriented Analysis/Design, C++, C, OBJECTIVE C, HTML, Java Script, PowerJ Java Tool, PASCAL, MODULA-2, ADA, PL/I, FORTRAN, COBOL, LISP, PROLOG, OPS5, VAX/MACRO-11 Assembly, INTELL 8080/8085 Assembly, CYBER Assembly (COMPASS), UNIVAC Assembly (ASSEMBLER).

TERADATA, INFORMIX, ORACLE - SQL, Design, Administration and Performance tuning.

NETWORK SERVICES:

Voice over Data Network**,** Video Teleconferencing Service, Switched Voice and Data services (SVS/SDS), Dedicated Transmission Service (DTS), Packet Switched Service (PSS), Enhanced Packet Switched Service (EPSS – Frame Relay), ATM and SONET. TCP/IP, AT&T Datakit and StarLan 10.

EDUCATION:

MS, Computer Science, State University of New York at Buffalo, NY, 1986.

Graduation project: An applied artificial intelligence research on threat analysis.

OTHER COURSES:

Over 40 AT&T sponsored course work, 1990-1998, including:

Understanding SONET/SDH. ATM & Data Networking ATM & Broadband

Object-Oriented System Design Object-Oriented Analysis Client/Server Technology

IITRI sponsored course work, 1999, Voice over IP Technology, provided by Global Knowledge

AWARDS/AFFILIATIONS:

Member, International Council on Systems Engineering (INCOSE), the Washington Metropolitan Area Chapter.

IIT Research Institute

RELEVANT EXPERIENCE

Unix	C	C++	Oracle
Microsoft Windows	Visual Basic	FORTRAN	Assembly Language

NAME: J. HE HE

SKILL CLASSIFICATIONS: PRIMARY: SOFTWARE DEVELOPMENT; SECONDARY: MATHEMATICS, STATISTICS

SUMMARY OF EXPERIENCE:

13 years experience in developing software and leading development teams. Involved in all phases of software development, from analysis and design to final testing on projects in several application areas, including digital signal processing, image processing, statistical analysis, and business processes. Led teams of three to six developers on several medium sized projects.

CHRONOLOGICAL EXPERIENCE:

IITRI, Information Technologies;
Senior Programmer Analyst, March, 2000 – Present

Provide software development support for the Huntsville, Alabama office.

- Developing radar and weapon systems simulation driver for the 3D Visualization tool.

SAIC, McLean, VA;
Software Developer; January 2000 – March 2000

Continued development and maintenance of the FBI's National Instant Check System (NICS) that provides the instant check capabilities required for firearms purchases under the Brady Bill.

- Resolved numerous outstanding bug reports and enhancement requests against NICS, particularly the modules that add data to the database about prohibited individuals as submitted to the FBI by state and federal law enforcement agencies.

SAIC, Information Services Sector, Columbus, OH;
Systems Architecture Analyst; June 1999 – December 1999

Developed and maintained Windows 95/Windows NT based client/server software using Visual Basic and Oracle to support the business processes of the Boeing Guidance Repair Center, Heath, Ohio.

- Automated weekly processing of timecard data for submission to the Boeing North American corporate payroll system. This required developing several programs in Visual Basic to replace Microsoft Access forms that had been run manually to verify data and pro-rate charges from support organizations and developing PL/SQL processes to run on an Oracle server.

Boeing Information Services, Professional Services, Columbus, OH;
Systems Architecture Analyst; June 1996 – June 1999

Developed and maintained Windows 95/Windows NT based client/server software using Visual Basic and Oracle to support the business processes of the Boeing Guidance Repair Center (BGRC), Heath,

Ohio from March 1998 to December 1999. Developed Microsoft Windows based client/server software for pre-award procurement tracking for the Defense Logistics Agency (DLA) from June 1996 to January 1998.

- Upgraded electronic timecard program from Visual Basic 3 to Visual Basic 6 and incorporated changes to reflect differences in timekeeping procedures between BGRC and the Boeing North American corporate offices.
- Developed scheduling tools and programs to automate several routine procedures previously performed by computer operators, allowing BGRC to reduce the operator staff by one and reducing the workload on other operators.
- Developed procedures for upgrading BGRC software from Visual Basic 4 to Visual Basic 6 to take advantage of new capabilities provided by Win32 and other system upgrades.
- Member of development team that converted the Microsoft DOS based application used by DLA for pre-award procurement tracking to Microsoft Windows, adding a graphical user interface and other features to improve usability. Technical lead for the development team for the final four months of this project.

Computer Sciences Corporation, Huntsville, AL;
Computer Scientist; June 1994 – June 1996

Provided software development support and performed Unix system administration duties for the Vehicle Propulsion Laboratory at NASA's Marshall Space Flight Center.

- Developed new modules of the Post-Test Diagnostic System (PTDS), a Sun workstation based system written in C using X and Motif for analyzing data from tests of the space shuttle main engine. Assisted other developers with debugging, testing, integration, and documentation of all PTDS modules.
- Developed additional software for the analysis of data from tests of the space shuttle main engine and from flights of the space shuttle.
- System administrator for a network of nine Sun SPARC workstations with over one hundred users. Accomplishments included upgrading all workstations to SunOS 4.1.3 or later, automating network backup procedures, implementing improved security measures on the network, and developing a plan for upgrading the entire network to Solaris 2.5.
- Technical lead for a team of four software developers providing all Unix support for the Vehicle Propulsion Laboratory.

Boeing Information Services, Huntsville, AL;
Computer Scientist; July 1993 – June 1994

Provided software development support for the Vehicle Propulsion Laboratory at NASA's Marshall Space Flight Center.

- Developed one module of the Post-Test Diagnostic System (PTDS) and assisted other developers with debugging, testing, integration, and documentation of other modules.
- Maintained and enhanced existing software used for analyzing trajectory data for space shuttle flights by NASA engineers.

Boeing Computer Services, Huntsville, AL;
Systems Analyst–Computing; March 1991 – July 1993

Led a programming team in the development of DESK (Desktop Exploitation Software Kit), a workstation-based image processing and exploitation system for the Department of Defense and led the design effort on a large mensuration package for photogrammetric analysis for inclusion in multiple image processing systems.

Dynetics, Inc., Huntsville, AL;
Research Analyst; September 1989 – March 1991

Led initial development of DESK. Developed a data acquisition and analysis package for the Department of Defense. Modified large simulation codes to enhance portability and improve performance.

National Security Agency, Fort George G. Meade, MD;
Mathematician; March 1987 – September 1989

Developed and implemented computer algorithms in the areas of digital signals processing, Fourier analysis, and statistical analysis for testing of research ideas and for production purposes.

HARDWARE:

Intel x86, Sun SPARC, Cray, Convex, and other computer platforms

SOFTWARE:

Multiple Unix flavors, including Solaris, AIX, and HP-UX

Microsoft Windows, including Windows 95 and Windows NT

Oracle, versions 7 and 8

C, C++, Visual Basic, FORTRAN, Assembly Languages

ACTIVE SECURITY CLEARANCES:

Interim Secret, DOD, May 2000

INACTIVE SECURITY CLEARANCES:

Top Secret/Special Intelligence, DOD, 1987 – 1992

EDUCATION:

University of Tennessee, M.S., 1985, Mathematics

University of Missouri–Rolla, B.S., 1980, Applied Mathematics

University of Missouri–Rolla, B.S., 1980, Computer Science

HAROLD J. HE

230 Moraine Road
Highland Park, Ill. 60035
(847) 266-1712 (H)
(312) 906-5397 (W)

Work Experience

1994 - Professor, Chicago-Kent College of Law (Associate Dean since 1997)

1987 - 1993: Assistant Professor of Law, University of Virginia Law School

1983 - 1987: Attorney, Department of Justice Civil Division, Appellate Staff

1982 - 1983: Law clerk for the Honorable William H. Timbers (2d Cir.)

Education

New York University School of Law (J.D. 1982)

Law Review: Note and Comment Editor
Order of the Coif; Kapelsohn Prize (legal writing in labor law); Rubin Prize (best law review note in commercial or international law area - 56 N.Y.U. L. Rev. 694); Cahn Award (superior achievement as Law review editor)

Princeton University (A.B. 1977)

Recent Publications

Federal Agency Ombuds: The Costs, Benefits and Countenance of Confidentiality, 52 Admin. L. Rev. 17 (2000).

Monitoring Governmental Disposition of Assets: Regulatory Substitutes for Market Controls, 52 Vand. L. Rev. 1705 (1999) (with Nicholas Zeppos).

How to Move Beyond the Exclusionary Rule: Structuring Judicial Response to Legislative Reform Efforts, 26 Pepperdine L. Rev. 855 (1999) (symposium).

The Supreme Court as an Enforcement Agency, 55 Wash. & Lee L. Rev. 1149 (1998).

Should Bouie Be Buoyed?: Judicial Retroactive Lawmaking and the Ex Post Facto Clause, 3 Roger Wms. U. L. Rev. 35 (1998) (symposium).

Reviewing Agency Action for Inconsistency with Prior Rules and Regulations, 72 Chi-Kent L. Rev. 1187 (1997) (symposium).

The Puzzling Boundary Between Criminal and Civil Retroactive Lawmaking, 84 Geo. L. J. 2143 (1996).

Turning Congress Into An Agency: The Propriety of Requiring Legislative Findings, 46 C.W.R.U. L. Rev. 731 (1996) (symposium).

Of Diaries and Data Banks: Use Restrictions Under the Fourth Amendment, 74 Texas Law Review 49 (1995).

Delegation and its Discontents, 94 Columbia Law Review 201

(1994) (book review essay).

Fee Shifting Under the Equal Access to Justice Act - A Qualified Success, 11 Yale Law & Policy Review 458 (1993) (based on 1992 Consultant Report to Administrative Conference of the United States).

Explaining One-Way Fee Shifting, 79 Virginia Law Review 2039 (1993).

Of Citizen Suits and Citizen Sunstein, 91 Michigan Law Review 1793 (1993) (with Ethan Shenkman).

Reconceptualizing Sovereign Immunity, 45 Vanderbilt Law Review 1529 (1992).

Preserving Discretion Without Sacrificing Deterrence: Federal Governmental Liability in Tort, 38 UCLA Law Review 871 (1991).

Fragmenting the Unitary Executive: Congressional Delegations of Administrative Authority Outside the Federal Government, 85 Northwestern University Law Review 62 (1990).

Executive Control Over Criminal Law Enforcement: Some Lessons From History, 38 American University Law Review 275 (1989) (symposium).

Separating the Strands in Separation of Powers Controversies, 74 Virginia Law Review 1253 (1988).

Commentary

Foreword, The Legacy of Chancellor Kent, 74 Chi-Kent L. Rev.3 (1998).

"Unitary Executive" in Encyclopedia of the American Constitution, Supplement II.

The Fee Shifting Remedy: Panacea or Placebo?, 71 Chi-Kent L. Rev. 415 (1996).

Some Skeptical Thoughts About the Growing Convergence of Public and Private Institutions, 95 APA Newsletter on Philosophy and Law 54 (Fall 1995).

The Failed Promise of Regulatory Variables, 73 Washington Univ. Law Quarterly 1117 (1995).

Avoiding a Mistake with Corrections Day, 17 Legal Times 22 (1995) (with James Rossi).

Anthologizing the Administrative State, 44 Journal of Legal Education 609 (1994).

Works in Progress

Presidential Powers (book).

Conditioning the President's Conditional Pardon Power

Consultant Projects

Administrative Conference of the United States
- Attorney Fee Shifting
- Government Auctions, Leases, and Sales

Coalition of Federal Ombuds
- Ombuds and Confidentiality

World Bank
- Albania Legal Information Project

IIT Research Institute

RELEVANT EXPERIENCE

Database	System Performance	Software Development	Database design
Relational Database	Data Mining	DBA	System testing

NAME: SHE S. SHE

SKILL CLASSIFICATIONS: PRISHE: COMPUTER SCIENCE; SECONDARY:DATA BASE MANAGEMENT; SYSTEMS DESIGN AND IMPLEMENTATION; PERFORMANCE EVALUATION AND TESTING; EDUCATION

SUMMARY OF EXPERIENCE: Over 25 years of experience in progressively responsible positions in the computer industry, including system and performance evaluation of large computer telephony systems, logical and physical design of large data base systems, design and development of applications and software tools for relational database administrators, design and development of relational database engines, technical support of relational database users and presentations to user groups, data needs assessment and software evaluation, microchip design in support of computer graphics research, software simulation, design and development of quality assurance software and procedures, proposal preparation, design and implementation of accounting and manufacturing systems, software support of statistical analysis of experimental data, and teaching information science (including file management).

CHRONOLOGICAL EXPERIENCE:

IITRI/TSMI;

Senior Computer Scientist; March 1994–Present

Ms. She participated in projects in support of the Internal Revenue Service (IRS) and Defense Technology Information Center (DTIC) in the areas of Strategic Planning, Technology Assessment, and the Information Technology Research Lab.

Achievements: Significant contributions include:

- Analysis of Y2K readiness of Oracle Developer application generation software for IRS.
- IV&V of DTIC Swept Frequency Acoustic Interferometer (SFAI) documents, code and functional testing of system.
- Developed prototype software for tracking and providing trend analysis of IRS Telecommunications (FTS2000) costs.
- Oracle database reorganization and documentation for DTIC STINT.
- Technical assessment of data analysis techniques, particularly data mining, for DTIC IATAC.
- System design evaluations and performance tests and evaluations of the IRS TeleFile computer telephony system.
- Datamining and MIS database efforts and preparation of Internet-based training in support of IRS Inspections.

- IRS database design and operations evaluations as part of the SCRIPS proposal evaluation team, and in support of the IRS TRDB investment decision.
- Support of projects in the Information Technology Research Laboratory (ITRL) in the design and implementation of databases.
- Research and reports on new and emerging technologies pertinent to IRS data management needs including data mining, parallel database technologies for very large databases (VLDBs), and techniques for Internet database access.
- Chief contributor to the design and development of the Electronic Encyclopedia, an object-oriented database tool used by Strategic Planning analysts for independent verification and validation (IV&V) of IRS architectural and requirements documentation.
- Project manager of the Data Storage Technology Assessment project, which investigated the current and emerging technologies for storage of large amounts of ASCII and image data, and assessed the applicability of these technologies to the IRS three tier storage architecture planned for Tax Systems Modernization.

Relay Technology, Inc. (VM Systems Group / Systems Center, Inc. / VM Software, Inc)

Senior Product Developer, May 1987–March 1994

Design and development of relational database tools for database administrators (DBAs) on both mainframe and client-server databases.

Achievements: Significant contributions include:

- Chief developer of DB/RESTORE, a tool for disaster-recovery of SQL/DS databases by allowing table-level restoration of data from database and log archives
- Chief developer of DB/SECURE, a tool for the efficient management of database privileges for SQL/DS.
- Design and implementation of DB/CENTER, a common platform for a suite of DBA tools for SQL/DS, and
- Design and implementation of RELAY/DATAPORT, an object-migration tool for the client-server environment.
- Chief developer of DB/REORGANIZER, a reorganization and object alteration tool for SQL/DS,
- Chief developer of DB/REPORTER, a report-writing tool for SQL/DS.
- Presentations to user groups (including IBM Share) on methods and techniques of maintaining well tuned databases, and table level restoration of data.
- Top level technical support and consultation for use of the products and the logical and physical design of large databases.

Data General Corporation;

Senior Systems Engineer, May 1984–May 1987

Design and implementation of DG/SQL, a fully relational database for Data General's AOS/VS operating system.

Achievements: Significant contributions include:

- Chief developer of the query optimization component (access path selection) of the DG/SQL, including optimization of multi-field indexes, multi-table joins, and quantified and non-quantified subqueries

- High level technical support and consultation for DG/SQL users within the corporation, including those with large volatile MIS databases and graphics databases for CAD/CAM applications.

Department of Computer Science, Univ. of North Carolina

Graduate Research Assistant, May 1983–May 1984

Achievements: Significant products of research:

- Participation in the pixel planes project, a VLSI-based system supporting real-time color graphics. Contributions to the design of a pipelined serial multiplier, development of a prototype controller chip, and general software simulation support.

School of Business, North Carolina Central University

Assistant Professor, January 1981–May 1983

Achievements: Significant contributions include:

- Taught courses in database and file management, computer organization, COBOL, and introductory programming.

- Active in curriculum development and library enhancement.

Research Triangle Institute

Information Systems Analyst, September 1977–January 1981

Contributed to a variety of projects in support of contracts to the federal government.

Achievements: Significant contributions include:

- Data needs assessment and software evaluation of the Model State Information System(MSIS), a database application used to monitor state drinking water quality for the EPA.

- Design of software and procedures for a quality assurance study of the Pesticide Database for EPA.

- Design and implementation of a computer simulation model for the power lawnmower thrown-objects test for the Consumer Products Safety Commission.

- Design and implementation of computational software for error evaluation in log-normal estimation of sample mass of inhaleable particles.

IIT Research Institute

Associate Mathematician, June 1976–August 1977

Provided software support and statistical analysis of experimental data.

Achievements: Significant contributions include:

- Provided software support and the statistical analysis of experimental data relating to selection of corrosion-resistant materials for coal gasification.

- Determination of optimum procedures for the electron-microscope measurement of asbestos fiber concentration

- Provided software support for the establishment of the normal profile of gas-chromatogram peaks in lung effluents.

U.S. Steel Corporation;

Programmer, June 1974–June 1976

Participated in the design and implementation of accounting and manufacturing computer systems.

Achievements: Significant contributions include:

- Design and implementation of software providing for optimal steel rolling mill scheduling
- Design and implementation of accounting

Department of Mathematics, Illinois Institute of Technology;

Graduate Teaching Assistant, June 1972–June 1974

Achievements: Significant contributions include:

- Taught classes in advanced engineering mathematics, finite math, and trigonometry.

Lewis University;

Instructor of Mathematics; September 1970–June 1972

Achievements: Significant contributions include:

- Taught courses in Euclidean and non-Euclidean geometry, linear algebra, single and multi-variable calculus, pre-calculus, and finite math.
- Participated in curriculum design and supervised independent-study courses.

HARDWARE:

Sun, Pyramid, IBM, Data General, DEC PDP11, UNIVAC, Burroughs, Inforex

SOFTWARE:

Operating systems include: Unix, WinNT, Windows95, Apple MacIntosh, IBM MVS, IBM VM/CMS, DG AOS/VS.

Database experience includes: Microsoft Access, Informix, Oracle, Sybase, Teradata, DB2, SQL/DS, DG/SQL, Itasca.

Programming languages include: Visual Basic, C, Javascript, HTML, COBOL, FORTRAN, SQL, REXX.

EDUCATION:

Illinois Institute of Technology, Ph.D., 1974, Mathematics

Illinois Institute of Technology, M.S., 1967, Mathematics

St. Xavier College, Chicago, B.A., 1964, Major Mathematics, Minor English

OTHER COURSES:

University of North Carolina, Chapel Hill, Graduate course work in Computer Science, 21 hours

completed, including Systems Analysis and Design, Data Structures, Computer Organization, Operating Systems, Computer Graphics, VLSI design (1982–1984)

PUBLICATIONS:

Ergodic Properties of Polynomials, Ph.D. Thesis, Mathematics Department, Illinois Institute of Technology, June 1974

AWARDS/AFFILIATIONS:

Member, Association of Computing Machinery

Member and tutor of English as a Second Language (ESL), Literacy Council of Montgomery County, (Linkages to Learning Program), Literacy Council of Northern Virginia.

IIT Research Institute

RELEVANT EXPERIENCE

Publishing	Marketing communications & brochures & flyers	Configuration management	Data interchange standards, HTML, SGML, XML, MPEG, JPEG, PNG, GIF
Document management and production	Tradeshow management	Meeting and conference management	Slide show & multimedia applications development

Key Summary Experience Words inserted in boxes for Quick Reference

NAME: HE L. HE

SKILL CLASSIFICATIONS: DOCUMENT MANAGEMENT, DATA INTERCHANGE, GRAPHICS, AND MULTIMEDIA APPLICATIONS SPECIALIST; MARKETING COMMUNICATIONS

SUMMARY OF EXPERIENCE:

Mr. He has extensive experience organizing and managing large electronic documentation and multimedia projects. He also has researched, analyzed, and specified standards and applications packages for numerous document management systems, including World Wide Web (WWW) and platform training applications. He has also developed configuration management policies and specifications and served as configuration manager on numerous large document production projects.

Mr. He has developed marketing communications programs for information technology capabilities. These activities include researching and selecting tradeshows for exhibit participation; researching, designing, and purchasing tradeshow booths and equipment; writing and editing capability brochures; developing high-level overview brochures, developing and designing capability briefings and slide shows; researching government solicitations for potential bid proposals; and written and edited proposals.

CHRONOLOGICAL EXPERIENCE:

IITRI, Tax Systems Modernization Institute;
Communications Manager; August 1993–Present

Responsible for IRS report production for computer and telecommunications systems and document process automation research projects. Also responsible for research and analysis of electronic document and multimedia production, management, and distribution technologies, standards, and systems related to the IRS Modernization Program. Related accomplishments:

- Provided advice to the IRS on data interchange, multimedia systems, and Internet and WWW standards and wrote the related sections of the IRS Standards Profile document, a part of the IRS Modernization Blueprint.

- Created and managed a new department for editing and production of technical reports, multimedia briefings, and Web pages for computer technology projects.
- Wrote writing and publishing guidelines style guides to improve TSMI technical staff writing skills and document and multimedia briefing content, format, and quality.
- Developed and formalized format, quality control, configuration management, and process standards to ensure consistent quality and content.
- Developed a project document scheduling and tracking system to ensure project milestones were met and documents were delivered on schedule.
- Prepared a writing guidelines style guide for the IRS Internal Revenue Manual reorganization and rewrite project to ensure a consistent level of coverage and writing style.
- Wrote a Standard Generalized Markup Language (SGML) overview and trade study report for the IRS. This report described the SGML ISO standard in layperson's terms, described methodologies for establishing and organizing electronic document management projects and implementing electronic document technologies, and provided a comprehensive survey of electronic document vendors and software, systems integrators, consultants, and trade associations.

In addition to these assigned responsibilities, Mr. He was also responsible for developing a marketing communications program for the new Center for Information Technology (CIT) Operation. Related accomplishments:

- Established the name for the operation.
- Surveyed and compiled a list of CIT capabilities and used this list to develop a two-page brochure describing each capability.
- Researched information technology tradeshows and developed a tradeshow program for CIT participation. Researched tradeshow booth vendors and designed and purchased the component parts for a booth that was compatible with other Advanced Technology Group booths and could be used in a 10-, 20-, or 30-foot in-line configuration. Developed the graphic and signage concept for the tradeshow booth.
- Managed CIT tradeshow participation ordering booth space and all show services, developing CIT capability themes for each tradeshow, ordering giveaways, establishing booth staffing schedules, providing on-site management and booth setup, and staffing the booth.
- Developed a business briefing and slide show format and prepared briefings and slide shows.
- Served as configuration manager for numerous proposals, including oral briefings.

Independent Consultant;
Technical Publishing, Marketing Communications, and Training; August 1992–August 1993

Provided clients with research studies and advice on implementing the latest technologies for on-line technical publishing and training systems including multimedia applications. Provided clients with advice on implementing web-based marketing communications and outreach programs and using list serve applications to communicate with prospective clients.

COMSAT, Systems Division;
Documentation and Training Manager; October 1990–August 1992

Responsible for customer publications and multimedia training on INTELSAT and Inmarsat satellite earth stations for international customers using fixed and mobile terrestrial, air mobile, and sea mobile

satellite telecommunications systems and UNIX-based network control systems. Related accomplishments:

- Developed and implemented a strategy and plan for marketing and promoting standard and custom multimedia training programs for satellite earth station systems to an international market, including writing proposals and making sales presentations.
- Created and managed a new department for development, research, writing, and production of technical publications and multimedia training programs for satellite earth station systems.
- Increased production efficiency by implementing on-line word processing, graphics, and desk-top publishing systems hardware and software standards. Researched and analyzed functional requirements and equipment specifications, calculated cost savings, and directed installation and training.
- Developed and formalized publications and training format, quality control, and process standards to ensure consistent quality and content.
- Created a vendor training specification that defined the methodology and content of formal classroom, self-study, and on-the-job training for purchased subsystems to ensure that vendor-supplied training was consistent with COMSAT-prepared training and met COMSAT and customer requirements.

Data General, Telecommunications Systems Division;
Marketing Services, Publications and Training Manager; January 1989–October 1990

Responsible for systems publications, multimedia training, promotional literature, market and product research, multimedia presentations, multimedia exhibitions and product demonstrations, and public relations to create and develop international joint-venture-development-partner relationships to design and produce software and hardware for tandem hybrid X.25 packet switch/circuit switch digital network telecommunications products and UNIX-based network management systems to meet ISDN and SS7 standards for international markets. Related accomplishments:

- Created and managed a new department for developing, researching, writing, and designing marketing and technical publications; conducting international market and product research; and developing multimedia applications for training personnel and customers in product operation.
- Created a series of product support and training publications pertaining to installation, operation, maintenance and network planning that successfully addressed the unique requirements of Far Eastern and European countries where English is a second language.
- Increased production efficiency by implementing PC/LAN on-line authoring and desk-top publishing systems. Researched and analyzed functional requirements and equipment specifications, performed benchmark tests, calculated cost savings, and directed installation and training.
- Developed strategic marketing promotional programs supporting a successful international campaign to develop joint-development partnerships.

CASE Communications, Inc.;
Publications and Marketing Services Manager; March 1970–December 1988

Responsible for technical publications, marketing literature, multimedia customer promotions, multimedia training, and sales catalogs on X.25 packet switch, statistical multiplexer, network management system, modem, and VF signaling telecommunications products to increase market share and revenue. Managed multiple departments for creating, writing, designing, publishing, and distributing product, sales, and marketing publications. Related accomplishments:

- Created four departments (writing, graphics, printing, and administration) to produce technical publications, develop sales and marketing literature, develop multimedia product demonstrations, develop multimedia training courses, and manage corporate administration functions.
- Developed new publication formats for several new product lines meeting unique customer requirements within each market.
- Increased production efficiency by implementing a distributed on-line authoring system based on client/server technology. Researched and analyzed equipment specifications and functional requirements, performed benchmark tests, calculated cost savings, and directed installation and training.
- Contributed to increased revenues of $10 million annually by developing promotional literature and publications that supported a marketing campaign to enter a new market.
- Contributed to $3 million increased revenues during the first year of operation by designing a series of new sales catalogs.
- Directed a campaign for new markets, including a strategic new design to consolidate and reposition the company's image, which substantially increased revenues.
- Developed a consolidated/automated mailing list database eliminating duplicates and reducing advertising and mailing costs by matching customers interests with specific products.
- Reduced advertising response time by developing standardized response packages. Response time was reduced from six weeks to two days.

PROFESSIONAL REGISTRATION:

None.

HARDWARE:

Gateway PC.

Dell Inspiron Laptop PC.

SOFTWARE:

Microsoft Word 97 and 98. Extensive experience in style templates, forms, tables, and general formatting, including headers and footers. Experience in multicolumn formats.

Microsoft Excel 97 and 98. Extensive experience in multispreadsheet workbooks, formulas, and linking.

Microsoft PowerPoint 97 and 98. Extensive experience in slide master templates, importing and enhancing graphics, text box development, flowcharting, and formatting. Extensive experience in setting up and sequencing slide shows.

Event Planner Plus. Meeting and conference planning application.

Fortran IV. Some experience in basic programming.

ACTIVE SECURITY CLEARANCES:

Treasury Department, Internal Revenue Service, Official Use Only clearance, active; 1993–Present.

INACTIVE SECURITY CLEARANCES:

DISCO, Secret clearance, active 1964–1977.

EDUCATION:

University of Maryland, B.S., 1987, Summa Cum Laude, Business Management, Minors: Marketing and Electrical Engineering

OTHER COURSES:

University of Wisconsin, electrical engineering courses.

Marquette University, electrical engineering courses.

University of Texas, electrical engineering courses.

SGML Syntax and Programming, Basic and Intermediate.

Newsletter Writing and Publishing.

American Management Association Management Series, 6 courses.

Numerous management and human relations theory courses.

PUBLICATIONS/PRESENTATIONS:

Internal Revenue Manual Writing Guidelines, IIT Research Institute, Lanham, Maryland 1994

Standard Generalized Markup Language Overview and Trade Study, IIT Research Institute, Lanham, Maryland, 1994

IITRI Style Guide, Volume I, Writing Guidelines, IIT Research Institute, 1995, 1998

Summary of Graphics Standards for Data Interchange Services, IIT Research Institute, Lanham, Maryland, 1996

Hierarchy of Data Interchange Document File Applications, IIT Research Institute, Lanham, Maryland, 1996

An Overview of the HyperText Markup Language (HTML), IIT Research Institute, Lanham, Maryland, 1996

Bibliography of Resources on Standards for Data Interchange And Graphics Services—With Abstracts and Commentary, IIT Research Institute, Lanham, Maryland, 1996, on-line version located at http://www.uampfa.berkeley.edu/onlineres/standardsbib.htm

AWARDS/AFFILIATIONS:

Commitment To Excellence Award for IRS Standards Project, IIT Research Institute, 1996.

Member, Alpha Sigma Lambda Honor Society, Tau Chapter; Vice-President, 1989; President, 1990–1992; Executive Committee Member, 1993–Present; Scholarship Committee, 1997–Present; Chairperson, Scholarship Committee, 1999–Present.

Member, Phi Kappa Phi Honor Society.

Member, Amateur Radio Relay League.

IIT Research Institute

NAME: HE R. HE

SKILL CLASSIFICATIONS: PROGRAM MANAGEMENT, P&L MANAGEMENT, BUSINESS DEVELOPMENT

SUMMARY OF EXPERIENCE:

Over the course of my extensive and successful career, I have had the opportunity to work both on the scientific and business sides of information technology. I have built several organizations from the ground floor and, in another case, turned a program around from losing money to be very profitable. I have always been instrumental in the choice and use of the latest technologies. I have been a leader in developing strategic plans for business development and technical marketing. All of these positions have enabled me to become an excellent manager of people and gain a thorough understanding of many different technologies. For examples, I have led major software development projects, led major research projects, led major procurements of computing and telecommunications equipment, managed high performance computing centers, led major proposal developments, participated in strategic planning, led business development, and technical marketing activities.

CHRONOLOGICAL EXPERIENCE:

IITRI, Center for Information Technology (CIT);
Operations Manager for Center for Information Technology, 10/1999 – Present

The CIT has the following seven divisions; Systems Engineering Division, Medical Information and Telemedicine Division, Information Management Division, Technology Assessment Division, Engineering Application Division, Information Technology Lab Division, Information System Division. The Operations Manager is responsible for the execution of ongoing contracts, development of new business initiatives and management of resources, both human and materials, of the CIT.

AGISS Software Corporation, USA, 1998 -1999;
President - USA, Reston, VA; 9/1998 – 9/1999

In September 1998, He was selected by AGISS to initiate and develop the U.S. operations for the AGISS Software Corporation, which is headquartered in Ottawa, Canada. The primary areas of emphasis are (1) Solutions for Year 2000, Euro-commerce, and Electronic commerce, (2) Enterprise system integration, including legacy system migrations, and (3) software development. The e-business activities were primarily in electronic procurement for small and medium sized businesses.

He set up several strategic alliances with leading software vendors such as, McCabe and Associates, Piercom, Inc., IST Development, Peregrine, Vitria, and Ariba Technologies. He also set up strategic alliances with large systems integrators such as Litton/PRC and Boeing. Played a prominent role that resulted in a contract with a major banking institution that will be over $5M over the lifetime of contract. He was very instrumental in the development of the AGISS Y2K methodology, Remedy2000™, and marketing materials. He also led the proposal efforts for several major commercial and government agencies. These have included Year 2000, IV&V, BPR, e-business, infrastructure support, and logistics.

The Boeing Company, 1987 - 1998;
Chief Scientist, Information Services, Vienna, VA; 4/1997 - 10/1998

He provided technical strategy; assessment; guidance in hardware, software, and network architecture; software engineering techniques; automated support tools for data warehousing; e-business; and Year 2000 resolution, as well as ensuring the technical integrity of all work contracts performed. He developed information technology architecture strategy and plans for Professional Services and information technology product lines for Boeing. He was also responsible for management of the business development, planning, analysis, design, and construction of information systems for Enterprise Resource Planning (ERP) and data warehousing for federal, state and local, and commercial customers including proposals for several banks, insurance and steel companies, and for logistics modernization projects.

Program Manager, Defense Enterprise Integration Service Contract, Vienna, VA; 7/1995 – 4/1997

Reporting to the President of Boeing Information Services, He managed business development, technical marketing, and service delivery for the Professional Services program that accounted for almost $100 million in task orders (work contracts). Customers included Defense Accounting and Finance Service, Defense Procurement and Contract Administration, Defense Logistics Agency, the U.S. Air Force, and others. He managed over 390 personnel and was a member of the Executive Management Staff of Boeing Information Services. Most of the customer interactions were with Senior Executive Service, Generals, and Admirals. The project had fixed priced rates and included a number of large and small subcontractors

He took over the entire PS program with 100 people and red ink of $1.5 million. He assessed the situation and took a multi-pronged approach to profitability: structuring and automating the cost model to track work assignments and resources; ensuring a higher Boeing content of work in each task order; and expanding and broadening the customer base with network and relationship marketing to generate repeat business. He also extended business development to reach new customers and doubled number of task orders, revenue, and profit each year. He built the staff to 390 including marketing, task order leaders, and staff for running 80 projects with an annual budget of $50 million. When the program ended, He had turned a profit of $2.2 million with excellent customer satisfaction. Projects were in data warehousing, electronic procurement, web-based applications, migration of legacy systems to client/server, etc.

Chief Scientist, Defense Enterprise Integration Service Contract, Vienna, VA; 1/1994 – 7/1995

He provided business development, direct technical sales (over $25 M), technical strategy, assessment, and guidance in hardware and software, software engineering techniques, and support tools as well as technical integrity of projects. Responsible for customer interactions.

Program Manager, Alabama Supercomputer Network, Huntsville, AL; 3/1987 – 12/1993

He managed Boeing team responsible for the design, implementation, deployment, infrastructure consulting services, and management of the supercomputer 24x7 data center and a statewide telecommunication network for the State of Alabama, serving government, universities, and industry. He completed construction from a vacant lot within five months, installed all equipment within the next three months and was operational to all users in the state of Alabama within another three months. The $50 million, fixed priced contract was on schedule and under budget and was used by over 1,200 users.

Equipment included CRAY X-MP, IBM, DEC, Sun, nCUBE, and Cisco. The project introduced new technology, such as FDDI network, mass storage, and massively parallel computing with nCUBE.

He developed many new business opportunities for supercomputing service delivery and matrixed with other parts of Boeing Information Services for project delivery. He ran several projects himself, managing another 20 to 25 people. For example, he led projects in LAN-WAN networking and image processing for the Army Intelligence Agency. He increased the profit returned to Boeing by almost 70 percent, achieving excellent user satisfaction.

Sandia National Laboratories, 1996-1987

Albuquerque, New Mexico

Supervisor of Supercomputer Systems (1985 to 1987)

He ran a division responsible for technology forecasting and assessment for scientific computing and the development and maintenance of the scientific operating systems for CRAY and CDC computers. He was responsible for the procurement of over $100 Million in computing and networking equipment.

Supervisor of Applied Mathematics Division (1975 to 1985)

He founded and managed the Applied Math Division with responsibilities for the development of mathematical models, mathematical software, research in vector and parallel processing, and consulting on numerical analysis for engineers and physicists throughout the Laboratory. He initiated parallel processing research. Sandia is now one of the recognized leaders in research for parallel processing. He chaired long-range planning of scientific computing. He developed large software systems for optimization of solar energy, enhanced oil recovery, extraction of oil from oil shale, and weapons release from aircraft. The group consisted of eight Ph.D. and two M.S. personnel.

Member of technical Staff (1966 to 1975)

He was responsible for the design of fast-burst reactors. Research into techniques for numerical solution of neutron and electron transport. He co-founded and chaired the SLATEC Common Mathematical Subroutine Library Committee, which is used extensively throughout the Department of Energy.

Pratt and Whitney Aircraft, 1964-1966
Research Scientist, East Hartford, CT, 6/1964 - 8/1966

He had responsibility for mathematical support of studies of fuel cells for the Apollo Moon Program, automobile engines for General Motors, and home use. Developed new techniques for the numerical solution of very sensitive linear and nonlinear two-point boundary-value problems.

HARDWARE:

Experienced with Cray, IBM, Sun, and DEC systems; UNIX, VM, and NT OS

Experienced with massively parallel systems, such as nCUBE

SOFTWARE:

Microsoft Project, Word, Access, PowerPoint, and Excel

McCabe, Reasoning Systems, Piercom, CCD Online, and Veronex

Ariba Technologies

FORTRAN, C

ACTIVE SECURITY CLEARANCES:

Top Secret, Department of Defense

INACTIVE SECURITY CLEARANCES:

Top Secret, SCI, Army

EDUCATION:

University of Vermont, Burlington, Vermont, Ph.D., Applied Mathematics, 1972

Rennselaer Polytechnic Institute, Troy, New York, MS, Applied Mathematics, 1967

New Mexico Institute of Mining and Technology, Socorro, New Mexico, BS, Mathematics, 1964

OTHER COURSES:

University of Houston, Executive Development Program (four weeks), 1991

University of California at Los Angeles, Engineering and Management Program (three weeks), 1984

University of California at Los Angeles, Computer Science (two weeks), 1982

Over 1,000 specialized hours in Information Technology, Management, and Marketing

PUBLICATIONS/PRESENTATIONS:

Over 60 article published in journals. Only last four listed plus book

“System Integration and Development in an Enterprise Environment” Future Focus Systems, Issue 1, Volume 1, 1998.

"Requirements for Advanced Year 2000 Maintenance Tools," with P.H. Newcomb, *IEEE Computer*, March 1997, pp. 52-57

"Year 2000 Inspection, Assessment, Correction, and Testing: Part 1: Year 2000 Problem Awareness," Crosstalk, October 1996, Volume 9, Number 10, pp. 9-14.

"Year 2000 Inspection, Assessment, Correction, and Testing: Part 2: Y2K Problem Adaptive Maintenance," Crosstalk, November 1996, Volume 9, Number 11, pp. 10-14.

Invariant Imbedding, Addison-Wesley, 1973

AWARDS/AFFILIATIONS:

Co-Editor-in-Chief, Applied Mathematics and Computation, Elsevier Science

Associate Editor, Nonlinear Analysis, Elsevier Science

Advisory Board for Network Telemetrics, Inc., Westlake Village, California.

Advisory Board for High Performance Computing at IBM, 1990-1993

Advisory Board for Computing at the National Institute of Standards and Tech., 1976-1985

IIT Research Institute

RELEVANT EXPERIENCE

INFOSEC	Network Security	Website Design	Information Security
Computer Security			

NAME: HE M. HE

SKILL CLASSIFICATIONS: PRIMARY: INFORMATION SECURITY; SECONDARY: WEB-SITE DESIGN, PROGRAMMING

SUMMARY OF EXPERIENCE:

With more than 18 years experience in the Information Security field, Mr. He has demonstrated expertise in system vulnerability analysis, penetration testing, system security design and implementation, as well as security policy development. Mr. He is a computer scientist that has been active in vulnerability assessment for many years. He also has participated in the development of many U.S. and International standards for computer and network security, including the International Common Criteria and Presidential Decision Directive-63.

CHRONOLOGICAL EXPERIENCE:

IITRI, TSMI;
Science Advisor, March 1999 – Present

Provides computer and network security consulting to a diverse customer base, which includes both the U.S. Government (NSA and IRS), and private industry. This consulting work includes system architecture definition, systems engineering, security evaluation, risk management, and the development of security plans, policies and procedures. He also provides assistance in obtaining security certification and accreditation.

Achievements:

- Completed the security testing of the Skyline Virtual Private Network (VPN) device for the NSA sponsored Security Proof Of Concept Keystone (SPOCK) program.
- Designed the Multiple-Single level security architecture for the Raytheon Airborne Communications Node program.
- Redesigned the IITRI Center for Information Technology (CIT) webpages to improve their search engine placement.

National Security Agency;
Senior Computer Scientist; Sept. 1998 – March 1999

Served as the NSA INFOSEC Program Integration Manager (PIM) for the Defense Message System (DMS) (a $500 million DoD program managed by the Defense Information Systems Agency (DISA).

This program was established to provide a secure, accountable, and releasable messaging service for up to two million users, and replace AUTODIN).

Achievements:

- Facilitated and coordinated the entire spectrum of NSA INFOSEC support to the DMS Program Management Office.
- Managed, through $4 million/year contracts, all of the commercial vendors, along with DISA and other NSA offices, building DMS security products, to ensure that communications between the vendors and other developers resulted in interoperable and secure products.

Senior Computer Scientist; Sept. 1996 – Sept. 1998

Served as the NSA INFOSEC representative to the Office of the Manager for the National Communications System.

Achievements:

- Provided technical consulting to the President's National Security Telecommunications Advisory Committee on a variety of issues.
- Led working group, which assessed the state of computer and network Intrusion Detection systems, and in conjunction with the President's Commission on Critical Infrastructure Protection (PCCIP), led a Risk Assessment of the Transportation Information Infrastructure.
- Worked with the PCCIP in developing PDD-63 (the Presidential Decision Directive on Critical Infrastructure Protection).

Senior Computer Scientist; April 1992 – Sept. 1996

Senior Information Security Evaluator for the Developmental Systems Division.

Achievements:

- Lead evaluator for the Electronic Key Management System (EKMS). Discovered vulnerabilities and designed fixes for this system, which is used to distribute encryption, key material to United States forces worldwide. Documented all findings with technical reports.
- Trained junior analysts.
- Senior INFOSEC evaluator for the RADIANT MERCURY system. Performed a system design analysis, code analysis, and hands on security testing for this U.S. Navy fixed format message sanitizer and classification downgrader. Discovered several vulnerabilities, which would allow "root" access, and developed fixes for them.
- Technical Director for Security for the Multi-Level System Security Initiative. Analyzed system for vulnerabilities and worked to develop secure solutions for multi-level systems.
- Worked with NATO and other countries on the development of the Common Criteria for security evaluations.

Branch Chief; April 1988 – April 1992

Supervisor for a group of 6 junior analysts responsible for security evaluations and research.

Achievements:

- Provided technical direction to branch analysts, managed travel and award budgets, wrote performance appraisals, developed training plans, and other managerial functions.
- Technical tasks included computer virus research, computer network attacks, NATO messaging systems, and key management.
- Served as the U.S. representative to the NATO subgroup, which developed the NATO network security architecture guidelines.

Computer Science Corporation, Hanover, MD;
Senior Computer Scientist; July 1983 – April 1988

Designed and developed custom information security software for NSA.

Achievements:

- Designed and developed parts of the prototype EKMS for NSA. Specifically, designed the software for a custom circuit board, which performed translation of key material from bulk encrypted form to singly super-encrypted form. Programming was done in both C and 68020 assembler, and tested and debugged using an HP-64000 emulation system. Code which was developed included interrupt handlers, classified encryption algorithms, and interprocess communications protocols. All programming was done in accordance with DS-80 (NSA standard for Communications Security software development).
- Performed software quality assurance for other classified NSA applications.
- Also served as System Administrator for five UNIX systems that were part of the CSC development laboratory. Provided account management, security services, and network communications setup (UUCP, remote host access, etc.), and audit log analysis.

National Security Agency;
Computer Systems Analyst; July 1981 – June 1983

Provided computer and network security evaluations for various DoD and other Government Agencies.

Achievements:

- Evaluated the Defense Data Network, and the U.S. Treasury Automated Communications System. As part of these evaluations, he modified some software path-flow analysis tools to work with the computer languages used.
- Helped develop the Trusted Computer Systems Evaluation Criteria, better known as the “Orange Book.”
- Charter member of the DoD (later National) Computer Security Center.

PROFESSIONAL REGISTRATION:

N/A

HARDWARE:

- Various Intel-base PC’s
- Sun Microsystems SPARC series

- HP-64000 Emulation station

SOFTWARE:

- 68000 Assembler language, developer (see experience)
- C programming language, developer
- HTML and Perl, developer

ACTIVE SECURITY CLEARANCES:

Top Secret / SCI, National Security Agency, June 1999

INACTIVE SECURITY CLEARANCES:

N/A

EDUCATION:

Johns Hopkins University, MS, 1984, Computer Science

Georgia Institute of Technology, BSICS, 1981, Information and Computer Sciences

OTHER COURSES:

N/A

PUBLICATIONS/presentations:

N/A

AWARDS/AFFILIATIONS:

Granted Senior Member title in NSA Computer Science Technical Track Program, 1995

Granted Senior Member title in NSA Information Security Technical Track Program, 1996