



Michael E. Maddox
Principal Scientist

Work Experience Summary

Consulting Experience

Abbott Laboratories

Conducted front-end user requirements analysis for new generation of blood test instruments. Visited various medical facilities to observe and analyze existing diagnostic systems, including test ordering, sample taking, sample identification, transport, analysis, reporting, and sample disposal. Developed general object model for diagnostic blood testing. Helped develop general design recommendations for new analytical products.

Designed user interface metaphor and object model for an internal product information system. This system is to be used by design engineers, project managers, document control clerks, purchasing agents, etc., to access and maintain all product-related information.

Alabama Power Company

Served as the Human Factors expert on the Control Room Design Review Team evaluating the Farley Nuclear Power Plant. Developed review philosophy, assisted in identifying human factors problems with existing control rooms (2 units), developed techniques used to prioritize problems according to safety significance, and served as the Human Factors expert on the team evaluating problems and proposing solutions. Provided Human Factors consultation on a variety of issues related to control room modifications and new equipment design.

Berchtold Corporation

Perform usability Failure Modes and Effects Analysis (risk analysis) on surgical table product. Recommend HF design changes to mitigate high-risk usability failure modes.

Compaq Computer Corporation

Conducted top-level analysis to determine goals, functions, and objectives for system to support all aspects of product design and manufacturing related to information about product components. This analysis identified all potential users of the system, their background and training, and information requirements from the system. Following the analysis phase of the project, designed the user interface and supplied working interface prototypes to Compaq for eventual incorporation into the system. Extended the above analysis to include all product-related information. Developed conceptual design of system user interface for Windows multimedia environment.

DAT Services, Inc.

Conducted the front-end requirements analysis for a new product concept that extends the companies current products into new and larger markets. Developed the System Objectives Document for this concept, which lists and describes overall goals, functions, and objectives. Conducted interviews with existing and potential customers. Developed overall object model of the business process for the new product.

Developed the Functional Scope Document for a large project aimed at upgrading and integrating all existing back-office functions. Interviewed all relevant internal functional groups within the company, as well as all senior management executives. Developed a general object model of the existing back-office business model. Conducted a web- and telephone-based RFI to narrow down the field of potential RFP recipients for this work.

Electric Power Research Institute

In partnership with Galaxy Scientific Corporation, developing the structure, format, content, user interface, and test plan for the Corrective Action Selection System (CASS). CASS is a decision support system aimed at assisting operators and maintainers in nuclear power plants minimize the role of human error in incidents and accidents. CASS, through a web-based user interface, helps users select the most appropriate human-factors-based interventions to eliminate or minimize the effects of accident root causes that are associated with human performance.

Ericsson

In partnership with Cox & Hall Graphic Design, conducted the user requirements analysis for new 1/4 VGA (QVGA) format mobile phone/PDA products. Developed fundamental philosophy, functionality, and layout for QVGA interface that has become part of the Symbian EPOC operating system. Developed all aspects of the telephony application for new Ericsson integrated, QVGA, phone/PDA. In this project, worked closely with various Ericsson groups in Sweden, England, and the United States.

Conducted a usability test for a prototype mobile phone/PDA with a 1/8th VGA user interface. This test was conducted in North Carolina at the behest of the Ericsson Software Applications Laboratory in Manchester, England.

Federal Express Corporation

Developed the overall operational philosophy and part of the packaging design (keyboard layout) for a small, hand-held barcode scanner and data entry terminal now used by all Federal Express Couriers. Developed and administered the physical testing program for this device. Participated as a member of the design team for the entire development cycle, which spanned 3 years.

Conducted the front-end analysis to identify goals, functions, objectives, and information requirements for a new information terminal designed for customer use. Developed the entire user interface for this new device, including the philosophy of operation, all conventions, standardized display format, and each individual display screen. Developed and conducted the initial user testing program for this device. Eventually extended the test program to large-scale customer testing in multiple cities.

Developed the user interface philosophy, framework, rules, and conventions for a distributed computer system to be used in all Federal Express stations. Conducted extensive interviews with users of prototype system and recommended a complete re-structuring of the existing system. Participated in the re-design as the human factors expert. Evaluated re-designed system and participated in designing the testing process. This system is presently implemented in a Motif environment.

Federal Express Corporation (continued)

Developed a pen-based interface for package delivery applications. The purpose of this interface is to test pen-based technology to determine whether it is appropriate in the field environment. Performed the front-end user requirements analysis for this interface and participated on a small design team to translate those requirements into a working interface. The application is implemented on a clipboard-size pen-based device.

Developed an internal survey to determine the state of knowledge, skills, and attitudes of individuals within the Information Technology Division related to new computer systems technology, such as client-server architecture. Survey consists of a number of items with Likert-type rating scales. Chosen as an outside source for this work to enhance the likelihood of truthful and meaningful replies. Preparing to deliver, tabulate, and analyze this survey.

Developed the implementation mechanism for the Total Quality Management (TQM) process within the Information Technology Division. This mechanism consists of a three-stage product development process embedded within a standardized Input-Process-Output (IPO) charting scheme. Presently working with the first department within the division to actually follow the IPO scheme while developing a product for another division.

Acted as Human Factors expert on project team formed to establish business model and data architecture to support movement from mainframe-based, transaction-oriented corporate computer systems to distributed, object-oriented environment. Helped develop both business and object models for Ground Operations activities. Helped establish user interface standards for new application environment.

Developed the General Commercial Transportation Object Model for FedEx as part of their work on the National Defense Transportation Association (NDTA). Responsible for initial design of the object model and all revisions resulting from NDTA working group meetings.

Federal Express Corporation (continued)

Developed Test Specification, managed the production of test materials, managed the actual tests, analyzed results, and made purchase recommendations for remote scanning and dimensioning systems from two vendors. This system has direct revenue impact on FedEx operations.

Acted as the human factors expert on a project team assessing the proper role of automation in the FedEx sales force over the next 10-year period. This team analyzed the sales process, the role of sales force automation (SFA), and the likely evolution of technology over the planning period. The aim of the project was to implement a viable global sales process and to support that process with appropriate technology.

Developed the overall test philosophy and statistical test procedures for a multiple dimension measuring system that is now deployed in all FedEx sortation facilities. Acted as a FedEx representative to the national certification body for such measurement systems.

Devised experimental design, developed test procedure, analyzed and reported data for a test of data entry technicians' ability to extract information from images of airbills scanned with different systems.

Act as on-call consultant in all areas of human factors, especially those related to user interface technology, such as visual displays. Evaluate ideas to exploit new technology.

Galaxy Scientific Corporation

Acting under subcontract to Galaxy, developed a written guide to introduce Human Factors practices into the commercial aviation maintenance environment. Responsible for writing approximately one-half of the overall document and editing input from several other authors, all well-known in the Human Factors field. Retained overall responsibility for the layout, format, structure, and content of the HF Guide, which is the major output of the FAA Office of Aviation Medicine in response to mandates from Congress to provide Human Factors Guidance to the aviation industry. Developed and delivered a workshop to introduce the HF Guide to end users at a commercial airline.

Galaxy Scientific Corporation (continued)

Developed the underlying root cause error taxonomy that forms the basis of an EPRI system aimed at helping nuclear utilities develop meaningful and effective solutions for root causes of incidents and accidents. This system is called the Corrective Action Selection System (CASS).

General Electric Company

Developed 3-part training course to teach members of the corporate research staff how to incorporate user requirements and capabilities into new system designs. Delivered one part of the course to a group of scientists, engineers, and managers at the Corporate Research Headquarters. Designed and delivered all training materials.

GTE

Participated in pilot project to demonstrate "fast path" implementation of re-engineered business processes. Responsible for developing and overseeing prototyping and testing of entire user interface for new, enterprise-wide business process (demand repair). In addition, project required extensive interaction with implementation group to ensure appropriate user requirements, capabilities, and restrictions were embedded in the as-implemented process. Responsible for overseeing the implementation of the UI prototype on a UNIX-based workstation, using the Motif GUI framework.

Developed and delivered a handbook describing the methods and procedures to be used to identify user requirements for new business processes and software applications. Developed and delivered a 2-day course designed to acquaint non-Human-Factors professionals, mainly programmers and systems analysts with requirements gathering techniques.

Gulfstream Aerospace Corporation

Performed a detailed information requirements analysis for certain piloting activities in preparation for certification of the new "glass" cockpit in the Gulfstream IV corporate jet aircraft. Based on this analysis, designed and developed displays to take advantage of the characteristics of the new glass cockpit technology. Provided prototypes of the proposed alternative displays.

International Air Transport Association

Co-developed a 3-day course addressing Human Factors in Aviation Maintenance (IATA Course M-38). Deliver this course at least twice per year to an audience of IATA members concerned with delivering, managing, and providing training for commercial aircraft maintenance. As of the latest update to this summary, this course has been delivered twice and is scheduled to be delivered at least twice more.

Lufthansa Technical Training

Developed and delivered a 3-day human factors course to training developers for Lufthansa Technical Training, Lufthansa Technik, Airbus Industrie, Hapag Lloyd, and Turkish Airlines. Course was aimed at allowing further development of human factors training modules to comply with Joint Aviation Regulation (JAR) 65, which requires certifying staff to have in-depth knowledge of certain human factors principles and methods. Course was delivered at the Lufthansa Technical Training Center at Frankfurt/Main Airport.

Conduct human factors evaluation of maintenance program for Kuwait Airways. Provide recommendations to address potential HF problems with maintenance operation.

May & Speh

Evaluated the development prototype for a graphical user interface designed to facilitate selection from direct marketing databases. Reviewed and critiqued original prototype, recommended methods for collecting relevant user input to the design process, suggested various test techniques that could be used to validate the robustness and completeness of the design.

Motorola

Evaluated various methods of entering letters and numbers with different keypad layouts for a full-function, two-way pager product. This work was done in conjunction with Cox&Hall Design of Dallas, Texas. The basic issue involved the use of dedicated number buttons versus using some form of “shifted” alphabetic buttons. Conducted an extensive review of the research and design literature related to data entry using limited keypads. Provided rank-ordered recommendations for the content and layout of buttons on the product.

National Research Council (NRC)

Served as a member of the Panel on Workload Transition. This panel studied the general area of operator workload and specifically the issue of what happens when people abruptly transition between very low workload and very high workload. The panel was convened at the request of the US Army to look at this issue as it relates to tank crew members. Over a period of two years, the panel looked at various aspects of the working environment of tank crew members, including the design of the tank workstations, the use of protective clothing in a chemical-biological threat environment, fatigue, etc. The report issued by the Panel addressed the general issue of workload transition.

NCR Corporation

Served as the Human Factors expert on the design team defining the next generation of pen-based devices to be produced by the company. Reviewed literature and conducted studies to define the fundamental handling characteristics of such devices for various form factors and weights. Consulted with corporate and contractor Industrial Designers regarding the appropriate ergonomic design limits for such products. Participated with various engineering groups within the Pen-Based Design Group to determine appropriate display sizes and viewing angles. Consulted with marketing groups to establish the most critical usability features for pen-based devices. Performed various usability and safety analyses related to the use of pen-based devices by certain targeted customer groups.

NEC America

Conducted heuristic usability evaluations of two new mobile phone user interfaces. Provided user-centered design input on the re-design of each mobile phone UI. These user interfaces are embedded in mobile phone products that will introduce the NTT DoCoMo “I-mode” Internet access protocol into markets in the U.S. and Europe.

Designed, conducted, and analyzed results of usability tests conducted in the United States and the U.K. Provided re-design recommendations based on the results of the the usability tests.

Pfizer Pharmaceuticals Group

Defined initial user requirements and interface design features of Web-based information distribution application. This system is aimed at distributing all types of product-related information among development groups and individuals in each local market throughout the world.

Pizza Hut Corporation

Conducted an analysis of restaurant operation, including both front- and back-end tasks, to determine the loci of human errors affecting customer service, training, food preparation, and restaurant management. Worked with Senior Management and other levels within the organization to develop a framework for eliminating human errors, enhancing customer service, and simplifying management tasks. The aim was to work on each major contributor to human error with the goal of minimizing such errors.

Public Service Company of Colorado

Served as the Human Factors expert on the Control Room Design Review Team evaluating the Fort St. Vrain Nuclear Power Plant. Developed review philosophy, assisted in identifying human factors problems with existing control room, developed techniques to prioritize problems according to safety significance, and served as the Human Factors expert on the team evaluating identified problems and proposing solutions. Participated in the NRC in-progress audit of the CRDR and in several meetings held at NRC Headquarters to discuss the CRDR philosophy and techniques.

Developed and delivered a 4-day course on integrating Human Factors considerations into the design and modification process within Public Service of Colorado's Engineering Division. The course was delivered at the Ft. St. Vrain Plant. Assisted in the development of a procedure that was incorporated into the set of PSC Policies and Procedures related to engineering changes to power plants.

Evaluated the emergency procedures for the Ft. St. Vrain Nuclear Power Plant and provided recommendations for completely revising these procedures so they were symptom-oriented rather than event-oriented. Used revised procedures to conduct an information needs analysis for the existing control room.

Ryder Dedicated Logistics

Performed a heuristic human factors evaluation of the user interface for a new enterprise-wide site management support system. Made recommendations for changes in function, terminology, character size, and graphics. Developed scenarios for performing formal usability testing on the interface.

Samsung Electronics, Ltd.

Performed market analysis for new Internet appliance device. Developed functional requirements for this new product, including goals, functions, and objectives. Identified and characterized target user populations and usage scenarios. Identify and prioritize feature set. Developed prototype of user interface for Internet appliance, including graphic look and feel, user interaction, navigation, and all functionality. Developed conceptual design document describing all elements of the prototypical UI. Conducted formal usability test of the UI prototype and report on all usability (and other) issues identified during the test. Revised UI prototype based on test results and deliver both the prototype and a management presentation describing the project, as a whole, and the final UI. Work performed in partnership with Cox&Hall Design.

Search Technology, Inc.

Director of Consulting Services for three years of five-year tenure with the company. As a member of senior management, participated in the growth of the company from 5 members of the staff to over 30 members. Functioned as principal or co-principal researcher on a variety of projects sponsored by both government and private sources. Consulted on a number of small projects not listed in this summary, including display design projects for local (Atlanta) corporate clients, artificial-intelligence-based systems for NASA, and forensic (expert testimony) activities.

Sensormatic, Inc.

Evaluated the design of an applicator to be used to apply anti-theft tags to a variety of merchandise. Performed a detailed analysis of potential ergonomic problems related to this device, such as cumulative trauma disorders (CTD's). Provided design recommendations aimed at making the device more usable and reducing the risk of repetitive motion type injuries. Designed and conducted an empirical study of the usability of the applicator. Contributed various ideas to the redesign of the prototype device.

Provided consulting and researched issues related to integrating theft tag deactivation into retail checkout stands.

Evaluated the design of a bulk tagging device used to apply anti-theft tags to large numbers of individual items.

Evaluated the ergonomic features of a camera control unit used to select and control surveillance cameras.

Sperry Corporation (now Unisys)

Conducted a detailed, top-down analysis of system goals, functions, objectives, and information requirements for a new-generation air-to-ground communication link. Previous generation equipment was considered unusable by military personnel. Developed philosophy of operation, interface structure, conventions, and, eventually, functional hardware requirements. Developed and prototyped all displays to be used in the field system. Developed and delivered complete design documentation related to system goals, functions, objectives, information requirements, and functional hardware requirements.

State Farm Insurance Company

Conducted the front-end analysis for an internal bibliographic database application. Designed the web-based application UI. Used an interaction graphics designer subcontractor to develop a prototype of the web-based UI using Dreamweaver. Tested UI for usability and revised according to test results. Fully documented the front-end analysis, design, tests, and final web-based UI specification.

Taco Bell / KFC

Provided human factors expertise in the design and testing of a new point-of-sale (POS) system to be used throughout various PepsiCo food operations. Participated in a multi-company team to determine critical user requirements, including information needs, workspace layout considerations, and training objectives. Participated as the Human Factors practitioner on the user interface design team. Conducted a series of physical measurements and analyses to determine the potential usability of new POS hardware and software. Developed and conducted an extensive testing plan for new POS user interfaces.

Developed and delivered a 1-day workshop designed to introduce non-Human-Factors professionals, mainly systems analysts and programmers, to the concepts of user-centered design. The purpose of the workshop was to sensitize the participants to the necessity of embedding user capabilities and limitations into new software systems and applications.

Tennessee Valley Authority

Served as the human factors expert on the Control Room Design Review (CRDR) Team evaluating the Browns Ferry Nuclear Power Plant. Developed review philosophy, assisted in identifying human factors problems with existing control rooms (3 units), developed techniques to prioritize problems according to safety significance, and served as the human factors expert on the team that evaluated problems and proposed solutions. In addition, provided human factors training to other members of the review team. Participated in Nuclear Regulatory Commission (NRC) audit of Browns Ferry as the Human Factors Representative on the TVA CRDR team.

Texas Instruments

Conducted the front-end analysis for a system to provide centralized security for TI facilities. This analysis included identifying overall goals, functions, objectives, and information requirements for a system to replace an existing, outdated facility. Developed overall system philosophy of operation, all conventions, standardized display format, and prototype display screens. Specified number of required personnel, number of individual workstations, and workstation functional hardware requirements.

Conducted the front-end analysis for a futuristic system for manufacturing semiconductors. This analysis included the top-down identification of system goals, functions, objectives, and, eventually, information requirements and functional hardware specifications. Defined fundamental user-interface philosophy, framework, and conventions. Interface is implemented in SmallTalk environment mimicking Motif. Developed fundamental object model of user interaction with the new system. Participated in the development of a demonstration system for joint TI-government research project.

VF Corporation

Developed overall user interface (UI) philosophy and detailed screen elements for enterprise software designed to manage retail floor space for major accounts across all product lines. Developed formal design guidelines that describe all elements of the UI, including assumptions about categories of users, navigational metaphor and technique, philosophy and widgets to be used to design individual displays, etc. Developed end-user testing philosophy and list of tasks for each user category. Provided general human factors guidance for integrating various software applications into a unified interface.

V2R, LLC

Conduct front-end analysis for web-based application related to organizational alignment, goal setting, and evaluation. Document functional and user requirements. Develop general object model for the product. Perform conceptual design for the user interface (UI). Develop the detailed UI using Dreamweaver web development software. Test usability of web-based UI with Dreamweaver prototype. Refine and complete detailed UI and deliver working Dreamweaver prototype including HTML code (in progress).

Non-Consulting Activities

Electric Power Research Institute

Served as co-principal investigator on a 3-year project to compare the effectiveness of simulation-oriented, computer-based instruction (SOCBI) to classroom methods of teaching diagnostic skills to maintainers. This general research question was focused on emergency diesel generator maintainers in nuclear power plants. Visited many nuclear plants and gathered user information and control requirements for diesel generator maintenance technicians. Extensively studied and photographed various diesel generator facilities.

My responsibility included designing the computer-based user interface for the SOCBI courseware. I was responsible for all aspects of the user interface, including its general structure and the specific visual elements of each part of the interface.

The third year of the project consisted of a formal evaluation of maintainers' performance after being exposed to either classroom instruction or SOCBI. We performed three such evaluations: one immediately after training, one 30 days after training, and one 6 months after training. In addition, we performed a number of pilot usability studies to test the ability of computer novices to use the SOCBI interface.

In a second EPRI project, I served as the co-principal investigator of a one-year evaluation of a new computer-based Safety Parameter Display System (SPDS). At that time, the Nuclear Regulatory Commission had issued a requirement that every U.S. Nuclear plant install an easy-to-interpret, *i.e.*, "user friendly", display with which plant operators could quickly assess the safety status of their plant. I performed a number of analytical assessments of various ideas for SPDS displays and also developed and conducted usability tests of these systems using actual nuclear plant operators.

Institute of Nuclear Power Operations (INPO)

During my 2-year tenure at INPO, I served as the principal human factors liaison between the domestic nuclear industry and the NRC regulators concerned with human factors issues in nuclear power plants. I participated in a number of industry groups that produced various human factors evaluation and design documents, which were subsequently used by nuclear utilities to evaluate their control rooms and emergency procedures. These documents introduced the U.S. nuclear industry to various human factors concepts, such as task analysis, usability

testing, etc. During this period, I also participated in an IEEE standards subcommittee developing a human factors standard for nuclear power facilities (IEEE Standard 845-1988). I was eventually assigned the responsibility for writing this standard.

HumanCentric Technologies

Developed integrated patient risk reduction method for healthcare market.

Conducted usability Failure Modes and Effects Analysis (UFMEA) as part of FDA-mandated risk analysis for new medical products. Provided recommendations for addressing high-risk design features.

Expanded and refined human error risk analysis methodology and applied it to Federal Aviation Administration Air Traffic Control facilities maintenance tasks.

Provide senior technical guidance for all human-error-related projects and proposals.

Managed various projects related to medical device design and evaluation, website design and implementation, and product design and testing.

Co-wrote two chapters for an upcoming Food and Drug Administration human factors guide for medical device design, packaging, and use.

Currently editing and revising the Human Factors Guide for Aviation Maintenance and Inspection for the Federal Aviation Administration.