OFFICE OF THE DIRECTOR OF
DEFENSE RESEARCH AND ENGINEERING
3040 DEFENSE PENTAGON
WASHINGTON, D.C. 20301-3040

October 3, 2002

MEMORANDUM FOR: SEE DISTRIBUTION

SUBJECT: Selection of FY 2003 Common High Performance Computing Software Support Initiative (CHSSI) Project Proposals

On May 23, 2002, the Director, High Performance Computing Modernization Program (HPCMP) solicited Service and Agency Executives' recommendations for CHSSI projects. In response to the call, Department of Defense (DoD) science and technology (S&T) and test and evaluation (T&E) organizations submitted twenty-nine proposals. These proposals were evaluated by subject matter experts and prioritized based on DoD needs.

The result of this process is a set of high performance computing software development projects that will provide the S&T and T&E communities with important tools needed to solve some of DoD's highest priority challenges. One new portfolio will begin to further our chemical and biological defense posture, and several projects will augment our efforts in materials development and battlefield simulation. The following are approved as FY 2003 CHSSI projects.

Portfolio	**Chemical and Biological Defense (CBD)**
Project Title	**CB-LADITAS - Chem/Bio Ladar Detection, Identification, and Transport Analysis Simulator**
Synopsis:	The project will develop an innovative, first-of-class coherent and direct detection laser radar (ladar) simulator to aid in technology assessment and development for chemical and biological agent (CBA) detection, identification, and transport. CB-LADITAS will be an end-to-end simulator, starting with the release of CBAs and ending with the measurement by the ladar system. The end product will be a new chemical/biological LIght Detection And Ranging (lidar) scalable simulation tool with excellent core capabilities and interfaces to high fidelity plume evolution models that can be validated by real-world ladar data.
Principal Investigator:	Mr. Jason S. Coker
Organization:	Air Force Research Laboratory

Portfolio	**CBD**
Project Title	**Scalable Software for Chemical Agent Detection and Identification**
Synopsis:	The project will establish a scalable, portable, DoD software capability for detection, tracking, species identification, and relative concentrations of chemical effluents from long-wavelength infrared (LWIR) hyperspectral data. State-of-the-art algorithms have been developed over the last three years to detect, identify, and relatively quantify chemical effluents from airborne long-wave hyperspectral imagery. The current implementations of the detection and identification processing exist as single thread software implementations within the Gas Tool Kit (GTK) developed at Lawrence Livermore National Laboratory. The project will take the computationally intensive detection and identification modules from this toolkit and produce a scalable, portable computation engine.
Principal Investigator:	Mr. Eric J. Coolbaugh
Organization:	Space and Naval Warfare Systems Center

Portfolio	**CBD**
Project Title	**Development of Scalable Software for the Prediction of the Atmospheric Transport and Fate of Hazardous Materials**
Synopsis:	The project will develop scalable software that can quickly and accurately predict the atmospheric transport and fate of CB agents. Quantum chemical (QC) computation of rate constants imposes severe computational demands on execution times, data storage, and disk Input/Output. To mitigate these demands and to provide results in a timely manner requires the development of scalable tools that are applicable to the high-level coupled-cluster implementation in ACES II to provide fundamental chemical information for ChemCODE.
Principal Investigator:	Dr. Donald Ferris
Organization:	Air Force Technical Applications Center

Portfolio	**Modeling and Simulation of the Electronic Battlefield Environment (EBE)**
Project Title	**High Performance RF Propagation Server**
Synopsis:	As part of the EBE portfolio, this project will demonstrate scalable high performance computing (HPC) near real-time radio frequency (RF) propagation/visualization capabilities as an accessible server. A client application in support of the battlefield planning and visualization will be developed to validate the server's utility. This mission planning software leverages existing high fidelity RF propagation software model and equipment/environmental databases associated with mature radio/radar/antenna models along with the advanced visualization methods. The resulting applications software will be scalable, portable and an efficient tool for the distribution of simultaneous computational tasks across a large number of computer nodes.
Principal Investigator:	Mr. Alan Hansen
Organization:	US Army Communications and Electronics Command, Research, Development and Engineering Center

Portfolio	**EBE**
Project Title:	**Integrated PArallel Framework for Network-Centric Warfare Simulations (PAWarS)**
Synopsis:	This project will develop an integrated framework that allows mission planners to perform efficient, high fidelity performance assessments of deployed communication assets to achieve "dominant battle space awareness". Such an integrated framework will combine high-fidelity RF and antenna models developed under ongoing EBE projects into NETS, a parallel, high fidelity protocol level simulator developed under a previous CHSSI award.
Principal Investigator:	Dr. Albert Legaspi
Organization:	Space and Naval Warfare Systems Center

Portfolio	**Materials By Design (MBD)**
Project Title:	**Molecular Packing Software for *ab initio* Crystal Structure and Density Predictions**
Synopsis:	The project will parallelize existing serial molecular packing codes for the *ab initio* prediction of the crystal structures and densities of new energetic materials. The effort will incorporate DoD Planewave with the molecular packing codes within the modular XML based molecular simulations framework of DoD VXMD to allow for *ab initio* crystal prediction with quantum mechanical descriptions of forces. The integration of these methodologies will enable DoD researchers to use quantum mechanical methods to optimize approximate crystal structures obtained by current generation packing codes to obtain reliable densities and structures.
Principal Investigator:	Dr. Betsy M. Rice
Organization:	US Army Research Laboratory

Portfolio	**MBD**
Project Title:	**Computational Tools for Nanoscale Materials Design**
Synopsis:	The overall goal of this project is to develop a scalable and portable suite of programs based on current scalar codes developed at the Naval Research Laboratory for calculating the first-principles local-density-functional based electronic structure, total energy, and energy derivatives of nanoscale structures whose dimensions exceed the capabilities of current DoD and academic computational approaches. A set of first-principles codes using Gaussian-based density-functional theory will be parallelized coherently as an interoperable suite. These codes will provide a capability not currently available to DoD researchers and are complementary to current software in the CHSSI portfolio.
Principal Investigator:	Dr. Brett I. Dunlap
Organization:	Naval Research Laboratory

Portfolio	**MBD**
Project Title:	**Discrete Element Method for Analysis of Designed Pavement Components**
Synopsis:	The principal technical goal is to develop a maintainable computational platform for very large scale discrete element analyses of granular media. This effort builds on existing computing software by incorporating into a parallel-computing paradigm based on improved micro-mechanical models derived from research on serial versions of the code. This effort will give the discrete element code that is currently used for high-level analysis of vehicle-terrain interaction, a broader application base for MBD applications. Specifically, the code will make available a parallel-computing platform for analysis of micro-mechanical behavior of asphalt concrete, material interfaces and soil additives to improve the development process of innovative polymer binders.
Principal Investigator:	Dr. John F. Peters
Organization:	U.S. Army Engineer Research and Development Center

I thank all who participated in this endeavor and look forward to the development of these innovative products.

/*Signed*/
Charles J. Holland
Deputy Under Secretary of Defense
(Science and Technology)

cc:
High Performance Computing Advisory Panel
Computational Technology Area Leaders

DISTRIBUTION:
Director, Operational Test and Evaluation
Director, Defense Advanced Research Projects Agency
Commander, Defense Information Systems Agency - Joint Interoperability Test Command
Commander, Defense Logistics Agency
Director, Defense Threat Reduction Agency
Director, Missile Defense Agency
Director, Armed Forces Radiobiology Research Institute
Director, Joint National Integration Center
Commander, U.S. Army Engineer Research and Development Center
Director, U.S. Army Cold Regions Research and Engineering Laboratory
Director, Coastal and Hydraulics Laboratory
Director, Construction Engineering Research Laboratory
Director, Environmental Laboratory
Director, Geotechnical and Structures Laboratory
Director, Information Technology Laboratory
Director, Topographic Engineering Center
Director, U.S. Army Aviation and Missile Command
Commander, U.S. Army Medical Research and Materiel Command
Commander, U.S. Army Soldier and Biological Chemical Command
Commander, U.S. Army Soldiers System Center
Commander, Director, U.S. Army Redstone Technical Test Center
Commander, Space and Missile Defense Command
Commander, U.S. Army White Sands Missile Range
Commander, U.S. Army White Sands Test Center
Commander, U.S. Army Dugway Proving Ground
Commander, U.S. Army Tank-Automotive & Armaments Command
Commander, Naval Air Warfare Center, Weapons Division
Commander, Naval Air Warfare Center, Aircraft Division
Director, Space and Naval Warfare Systems Center, San Diego
Commander, Naval Research Laboratory
Chief of Naval Research, Naval Research Laboratory
Commander, Naval Surface Warfare Center
Commander, Naval Surface Warfare Center, Dahlgren Division
Commander, Naval Surface Warfare Center, Indian Head Division
Commander, Naval Surface Warfare Center, Panama City Division
Commander, Naval Undersea Warfare Center
Chief of Naval Research, Office of Naval Research
Commander, Arnold Engineering Development Center
Commander, Air Force Air Armament Center
Commander, Air Force Flight Test Center
Commander, Electronic Systems Center
Commander, Space and Missile Systems Center
Director, Developmental Planning Directorate
Commandant, Air Force Institute of Technology
Commander, Air Force Weather Agency Center

Commander, Air Force Aeronautical Systems Center
Director, Air Force Research Laboratory/Air Force Office of Scientific Research
Director, Air Force Research Laboratory/Directed Energy Directorate
Director, Air Force Research Laboratory/Human Effectiveness Directorate
Director, Air Force Research Laboratory/Information Directorate
Corporate Information Officer, Air Force Research Laboratory/Corporate Information Office
Director, Air Force Research Laboratory/Materials and Manufacturing Directorate
Director, Air Force Research Laboratory/Munitions Directorate
Director, Air Force Research Laboratory/Propulsion Directorate
Director, Air Force Research Laboratory/Sensors Directorate
Director, Air Force Research Laboratory/Air Vehicles Directorate
Director, Air Force Research Laboratory/Space Vehicles Directorate