

**NSF Invitational Workshop on
Distributed Information, Computation, and
Process Management for Scientific and
Engineering Environments**

May 15-16, 1998, Herndon, Virginia, USA
(<http://deslab.mit.edu/DesignLab/dicpm/>)

Organizer:

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Sponsored by NSF

- Information and Data Management Program
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- International Coordination Program
- Operating Systems and Compilers Program
- Experimental Software Systems Program
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- Integrative Systems Program
- Climate Dynamics Program
- Office of Multidisciplinary Activities
- Arctic Research and Policy Program

51 participants, drawn from academia (35),
industry (4), and government (12).

DICPM: Objective

The workshop brought together domain specialists from engineering and the ocean, atmospheric, and space sciences involved in the development and use of simulations of complex systems, and computer scientists working on distributed repositories, visualization, and resource management.

The objective was to formulate directions for future research efforts to facilitate effective collaboration and to help increase access to information and sharing of results and tools useful in large-scale, distributed multidisciplinary scientific and engineering environments.

DICPM: Multidisciplinary Collaboration

The simulation of complex systems encompasses many domains, including physical systems with a large variety of interacting processes and dynamic phenomena at disparate spatial and temporal scales, as well as sophisticated man-made systems encountered in the design and manufacturing of land, air, space, and ocean vehicles. Research advances in these areas generate new requirements for computational environments and infrastructure.

Future efforts for enabling multidisciplinary collaboration need to focus on the application of current computer science research (e.g., integration and heterogeneity; distributed resource discovery; performance and management issues for large distributed datasets and processes) to scientific and engineering problems; while at the same time strengthening these fundamental research topics.

DICPM: Barriers to Collaboration

A consensus also emerged that the problems inhibiting the widespread exploitation of multidisciplinary scientific and engineering collaboration are threefold:

1. **Structural:** Institutional barriers to multidisciplinary cooperation (e.g., educational focus, funding, publication policy, promotion criteria, etc.);
2. **Computational:** Insufficient support for computational infrastructure to make information accessible for interpretation and for sharing results and tools; and
3. **Social:** Communication barriers stemming from the narrow specialization of technical expertise.

DICPM: Recommendations

Towards alleviating these barriers to effective multidisciplinary activities, the workshop participants made the following proposals:

1. The establishment of a global distributed information registry and repository (a “virtual scientific marketplace”) for expert knowledge, simulation and analysis tools, and procedures, which will facilitate multidisciplinary collaboration;
2. The establishment of a national (and possibly, international) digital library for the physical sciences and engineering, which will disseminate research knowledge and resources beyond conventional domain boundaries; and
3. The allocation of support and incentives for multidisciplinary projects by the appropriate facilitators in the research community, industry, and government, which will foster cooperation between computer and domain scientists, and encourage team-based approaches to multidisciplinary problems.