A Project Summary

We want to know how to effectively build and evolve software *for* distributed inter-organizational systems and *by* distributed multi-organization teams — and we want this knowledge to have widespread impact.

Methodologies and technologies for effectively supporting application development have not kept pace with the changing character of applications and development groups. We now see applications that span multiple companies, regulatory agencies, and consumers, involving thousands of interacting and heterogeneous computers. The creation and evolution of these inter-organizational systems typically involves many separate development organizations, who, knowingly or unknowingly, contribute to a collective set of software systems that must seamlessly interact to support many inter-organizational activities in ways that often cannot be predicted. As a nation, we need to be able to effectively and reliably create such systems. Otherwise, we continue facing a dismal record of under-used, unnecessarily costly, faulty or failed systems.

As the problem is intrinsically interdisciplinary, so must be the approach. Our project proposes to create a new generation of development methods and technologies for the above circumstances based upon obtaining a deep understanding of the new situations from *an integrated social and technological* perspective.

Insights into solving the problem come from many quarters. From a technical standpoint, the emergence of new, highly adaptive software architectures and event-based technologies suggest novel approaches to inter-organizational applications. On the social side, previous successes in enhanced coordination and awareness technologies must be brought to inter-organizational settings in which migratory work is commonplace, applications and work context change on a regular basis, and tradeoffs between information sharing and privacy concerns are continuously made. An overarching concern is that inter-organizational settings provide no central authority --- rather, social arrangements and interactions play dominant roles in shaping technology development and deployment. As such, our research takes the only possible path to potential success in integrally addressing social and technological concerns.

Our research objectives, therefore, are to:

- understand the needs for and consequences of integrated social and technological approaches to inter-organizational system development, deployment, and use that result from new and complex social relationships (e.g., between and within organizations, policy makers, and the marketplace);
- create new technical approaches, development models, and testable theories that build on successful practices for inter-organizational system development based upon these understandings;
- transition the results into practice through education, publication, technology transition, and community building, as well as through our partners.

The project will be empirically grounded through cooperative research partnerships with four external organizations. These partnerships will enable the researchers at UC Irvine to develop their understandings based upon field observation of a variety of representative inter-organizational projects. Building from these findings, the UC Irvine researchers will develop new systems, models, and scientific principles that will be the basis for participatory field trials, further observation, and analysis with our partners. Four partners have committed to collaborate with us, representing a cross-section of industries and technical attributes. One partnership involves next-generation electric power generation and distribution (the Advanced Power and Energy Program Consortia); a second is NASA's Jet Propulsion Laboratory; a third is the Boeing Company; the fourth is SRI International in its projects developing K-12 educational software.

The project is large since it requires multiple research perspectives, grounding in real inter-organizational development projects, field studies and trials, technology development, and enough time to cycle from observation to development and back to observation. Administrative support and management is provided by the UC Irvine Institute for Software Research (www.isr.uci.edu), a campus-level administrative unit.