

# Integrated Concurrent Engineering Technologies

<p><b>What if?</b></p> <p>What if we could more effectively teach designers to see and understand the relationships among different disciplinary perspectives?</p> <p>What if we had a method to design the organization, design process, and information technologies that reliably improved the schedule, cost, and quality of a large class of collaborative design projects?</p>	<p><b>Applications</b></p> <ul style="list-style-type: none"> <li>• Engineering design education</li> <li>• Conceptual design projects</li> <li>• Collaboration efficiency of engineering processes</li> </ul>
<p><b>Research</b></p> <p>For the past eight years the NASA/Caltech Jet Propulsion Laboratory (JPL) has used Integrated Concurrent Engineering (ICE) methods as a distinctive technology, organization, and design process to improve performance of design teams dramatically in comparison with traditional methods. However, some organizations have found that establishing effective ICE is extremely difficult. In collaboration with NASA, we propose to extend an earlier study by validating, operationalizing, and testing ICE in Stanford classes and research projects.</p> <p>--&gt; More below</p>	<p><b>People and Partners</b></p> <p>Raymond Levitt, CEE      David Bergner, NASA</p> <p>John Kunz, CEE</p> <p>John Chachere, MS&amp;E      Rebecca Wheeler, NASA</p> <p>Marc Ramsey, CEE</p> <p>Pamela Hinds, MS&amp;E</p> <p>Martin Fischer, CEE</p> <p>John Nash, SCIL</p> <p>Cliff Nass, Communications</p> <p>Terry Winograd, CS</p>

**Research** We have observed and documented Integrated Collaborative Engineering (ICE) at the NASA/Caltech Jet Propulsion Laboratory (JPL), which produces high quality designs of space missions in a few weeks, in comparison with the usual time of about a year. As the JPL method is based on its version of multi-screen iRoom technology now found throughout the Stanford campus, we have started to use the method in our own teaching, research and professional education. We also developed a theoretical framework that explains the functions, structure, behavior and implementation principles of ICE, which we relate to both industrial and academic application.

Our principal research goal is to replicate, demonstrate and test at Stanford the multi-faceted ICE method for team-based, multidisciplinary, model-driven design, and to operationalize, validate and document the use of our theoretical framework for teaching design.

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