



CIFE

Center for Integrated Facility Engineering

<http://cife.stanford.edu>

CIFE, Stanford University
The Jerry Yang & Akiko Yamazaki
Environment & Energy Building
473 Via Ortega, MC: 4020
Stanford, CA 94305

Tel 650-725-1546
Fax 650-723-4806
e-mail: kunz@stanford.edu

CALL FOR CIFE SEED RESEARCH PROPOSALS

SUBMISSION DEADLINE: April 9, 2008, 9:00 AM PDT

Brief Summary

This Call for Proposals invites Stanford faculty to propose seed research projects focused on innovative applications of Information and Communications Technologies for the Architecture, Engineering and Construction (AEC) industry. The AEC industry plans, develops, and increasingly manages capital facilities such as buildings, civil works and mechanical, chemical and biotechnical process plants. This call for proposals provides background on the CIFE (Center for Integrated Facility Engineering) mission and research goals and guidelines for how to submit proposals. CIFE normally funds projects for one year, with an option for a competitive second year renewal. The goal is for successful “seed” projects to produce external proposals for substantial further funding.

Timetable for projects for funding during AY 2008-2009:

February 15	Call for proposals
April 2	Deadline for requesting a budget – Engineering Research Admin.
April 9	Proposals due at 9:00 AM PDT [Submit .doc or .pdf document in electronic format to Teddie.Guenzer@stanford.edu]
April 16	Presentation materials due to CIFE for Technical Advisory Committee Meeting handouts [Submit .ppt document in electronic format to Teddie.Guenzer@stanford.edu]
April 23-24	Industry Technical Advisory Committee (TAC) meeting for review of proposals (<i>all PIs will have an opportunity to present their proposals</i>)
May 1	CIFE Award decisions

Areas of CIFE Research Focus

In 2002, CIFE proposed *breakthrough business objectives* for AEC organization performance (<http://cife.stanford.edu/Mission/>):

- **Schedule performance:** by 2015, CIFE member companies will have designed three major AEC projects within a year and constructed them within “six months”. Some CIFE companies have already established dramatic schedule improvement as 2008 goals.
- **Cost conformance:** by 2015, CIFE member companies deliver 98% of their AEC projects within 2% of their budgets. Most CIFE companies see that excellent VDC models are crucial for dramatically improved cost conformance.
- **Sustainability:** by 2015, CIFE member companies develop their new AEC projects with lifecycle costs reduced by 25% from comparable 2002 performance.

Many companies now demonstrate significant commitment and achievement in this area.

- **Globalization:** by 2015, CIFE member companies will acquire 50% of their materials and services from global providers and will make at least 50% of their sales in global markets. These related objectives are important for many companies already, and inevitably global companies will find new opportunities for market growth, cost management and, perhaps most important, sources of innovation.

Last year, CIFE members reported extraordinary success of in reaching the first set of intermediate goals that we first set in 2002. Specifically, most reported that they *operate with a strategic plan to implement VDC incrementally and they use the first (visualization) stage of VDC confidently*. Given that the CIFE membership has largely achieved the CIFE goals for members for 2006, which we first identified in 2002, early this year we proposed:

Measurable 2010 Goals

In 2010, CIFE members will

- Operate with a strategic plan to implement VDC broadly and will manage by public and explicit model-based process metrics including latency, safety, quality, schedule, cost and sustainability;
- Use second (integration) stage of VDC confidently and serve ≥ 5 business purposes on ≥ 10 major projects/year, e.g., architecture, safety, schedule, space use, energy;
- Pilot third (automation) stage of VDC and automate $>30\%$ of routine design and construction activity (wrt 2006 baseline) on > 2 pilot projects/year; and
- Staff each project with four VDC trained engineers

Please review and propose research that directly supports the CIFE breakthrough and intermediate CIFE goals and challenges for members. Proposals that do not address the identified challenges will still be considered for funding if, in the judgment of the reviewing TAC committee members, they are more innovative and promising than others that directly address the CIFE goals. Proposed projects often support more than one VDC goal.

CIFE welcomes research on theory and use of innovative methods at all phases of the facility life cycle. Research of interest includes methods by which companies can measure performance during the design and construction phases; benchmark values for performance and variance; and new methods to improve the variance and the mean performance.

Historically CIFE Virtual Design and Construction methods include the following:

- **3D/4D modeling:** methods to represent designs and 4D design-construction animations both visually and, as possible and appropriate, symbolically, at many different levels of detail ranging from coarse LOD for conceptual design to high LOD for field instructions;
- **Integrated Concurrent Engineering (ICE):** methods to support multi-stakeholder, multi-discipline design extremely rapidly;

- **Product, organization, Process (POP) modeling:** methods to represent the major factors that projects can and must design and manage during a facility development project, especially as they enable a project team to relate the vast and diverse range of project data over its lifetime from design through construction, commissioning and operations;
- **Integration** of multiple specialized models developed from individual perspectives. The current Building Integration Modeling (BIM) and Industry Foundation Class (IFC) industry efforts are examples of this work. CIFE has done work that shows the limits of existing methods and simple automated methods to integrate and relate models from different modeling tools. The intermediate 2010 *integration* goal requires increasing CIFE automated model integration capabilities dramatically.
- **Automation:** methods to automate aspects of project design, fabrication in support of field assembly, and potentially of actual field assembly. The intermediate 2010 *pilot automation* goal requires increasing CIFE automated model integration capabilities dramatically.
- **Implementation:** methods that allow senior managers to implement significant process or organization change, and methods to measure, benchmark or predict the financial value and costs of innovation in AEC;
- **Decision support:** methods to represent the detailed engineering rationale of design decisions, represent the multiple design analyses and criteria of design decisions, and support project designers and managers whose decision focus ranges from detailed engineering to corporate management;
- **Internet collaboration:** methods to use modern communication methods for collaboration;
- **Laser scanning technology:** methods to develop CAD and symbolic models of project status during construction, operation, and prior to retrofit or demolition, including both capturing the current status and relating it to existing product models.

For each method, CIFE welcomes research on theory and use of innovative methods at all phases of the facility life cycle.

Selection Criteria

The CIFE Technical Advisory Committee will evaluate seed proposals according to the criteria shown on the [proposal review form](#).

Funding Levels

There are no fixed funding limits for project proposals. Last year, the TAC funded five projects with a total budget of \$250,000. The normal funding for a proposal with one PI (Principal Investigator) has been about \$40,000 to \$50,000. For two PIs, the normal funding has been about \$60,000 to \$80,000. This year, we again specially encourage multi-PI proposals (from any departments) and proposals that include specific plans for mutually engaging collaboration with CIFE member companies. We also encourage innovative arrangements among PIs, for example three or more PIs collaborating to focus on the same test case(s) in complementary ways. An ideal would be for multiple investigators to propose a large enough integrated proposal that it became a “flagship” project to advance the CIFE mission.

The total amount of funds available for seed projects this year will be around \$250,000. Because of budgetary constraints, successful proposals may not be awarded all of the funds requested.

CIFE Background

CIFE is an interdisciplinary Center of the School of Engineering <http://cife.stanford.edu>. In partnership with its industrial members, the CIFE mission is to be the world's premier academic research center for Virtual Design and Construction of Architecture - Engineering - Construction (AEC) industry projects.

Virtual Design and Construction (VDC) is the use of multi-disciplinary performance models of design-construction projects, including the Product (i.e., facilities), Work Processes and Organization of the design - construction - operation team in order to support explicit business objectives.

Intellectual Property Rights

Any inventions that may be developed with CIFE Seed Research funding are in the public domain. Stanford University will not assert any intellectual property rights for inventions developed with CIFE Seed Research funding.

Policies and Guidelines for CIFE Seed Research Projects

Proposal Details

- The Maximum proposal length is 4,000 words (about eight pages, excluding cover and budget detail pages). Be concise; this is not a NSF proposal. Please include a short bibliography of relevant publications.
- Please use the cover page and see the proposal content guidelines: <http://cife.stanford.edu/proposals2008/CIFEProposalTemplate.doc>.
- Please get a proposal number from Teddie Guenzer (Teddie.Guenzer@stanford.edu).
- For budget preparation, please contact your department's research administrator in Engineering Research Admin. no later than **April 2nd**.
- Submit proposal with cover page (using template) and budget by **9:00 AM, PDT, April 9th**.
- The principal investigator will present the proposal at the Technical Advisory Committee Meeting (selection committee) on **April 23-24th**.

Requirements for Awarded Seed Projects

Project website: The PIs of awarded projects must create a website about their CIFE research project *by the end of the first quarter* and maintain it throughout the remainder of the life of the project. Initial release of the first half of awarded funds will be contingent on creation of the project web site that describes the proposed project. Release of the second half of awarded funds will be contingent on updating the project web site to describe the then-current project status. The website should provide access to at least the following information:

- A practical scenario illustrating the engineering/business problem addressed by the research and highlighting the potential impact of the research on practice,
- The original proposal (except the budget),

- Explanations of test cases used for the project, and
- PowerPoint presentations developed for this project

RA participation in CIFE Seminar: The research assistant(s) supported by the CIFE award will participate in the CEE320 “Seminar on Integrated Facility Engineering” or CIFE Ph.D. student seminar starting in the fall of each academic year.

Final project report: Submit a final project report (.pdf format) to Teddie.Guenzer@stanford.edu) by the last day of the final project quarter (September 30). CIFE will put this report on its web site. Find details at “Instructions to Authors” on the CIFE [Publications](#) web page.

If you have questions, please address them to the following individuals:

- Administrative questions: Teddie Guenzer, 3-4945, Teddie.Guenzer@stanford.edu
- Content questions: John Kunz, 5-1546, kunz@stanford.edu