

**CALL FOR SEED RESEARCH PROPOSALS BY
THE CENTER FOR INTEGRATED FACILITY ENGINEERING (CIFE)
SUBMISSION DEADLINE: April 21, 2015, 9:00 AM PDT**

Research Focus

The Center for Integrated Facility Engineering (CIFE) seeks research proposals that quantify and improve the life cycle performance of the built environment in its socio-economic and environmental contexts. Proposals should focus on one or several of the typical project phases from project conception to design, construction, operation, and reuse or focus on critical connections between phases in terms of information and knowledge transfer and feedback loops.

Background

In the last decade, the CIFE community has made large strides towards delivering buildings, infrastructure, and industrial plants more quickly, safely, and cost-effectively and with higher quality. These improvements have been enabled by higher productivity and reliability through the deployment of VDC (Virtual Design and Construction). VDC methods are enabling owners, designers, and builders of capital assets to deliver these assets better. CIFE still looks for innovative research projects that further improve the design and construction phases of the built environment. For example, there are still significant opportunities to develop methods that streamline the flow of information across project phases and between the different disciplines engaged in a project, such as the seamless transfer of information from a BIM (Building Information Model) to construction crews or into facility management.

Given the availability of sensing, data analytics, and data processing methods such as parallel computing, CIFE is also seeking research proposals that enhance our ability to understand the performance of facilities in all their life cycle phases and for criteria beyond the typical scope, schedule, budget, and safety criteria pursued by project management teams today. For example, how well a facility serves the needs of its users is still poorly understood as are the connections of design and construction decisions to the performance of a facility for its users. Furthermore, the deployment of sensing, data analytics, and data processing methods provides more reliable data, which enable comparison of many facilities and support novel feedback loops between project phases and disciplines. For example, how effective have energy efficiency measures been across a portfolio of facilities? Or, how effective was the strategy for integrating the design and construction teams in enabling faster and safer construction? The appendix lists further example research areas of interest to the CIFE community.

CIFE characterizes the performance of the built environment into four broad categories of performance: usable, buildable, operable, and sustainable. A good design and a good life cycle management approach improve the performance of the built environment for these four types of criteria. In essence, these four criteria address the concerns of the four major stakeholders in any building project: the users of the completed building, the builders, the team operating and maintaining the building, and the community around the building. Usable refers to what the users of a facility want to do in or with the facility. Buildable refers to objectives during the construction phase, such as the safety of the construction workers, the environmental impact of construction work, or the conformance to the project budget. Operable includes maintenance and operational aspects during the use phase. Sustainability objectives focus on how well a facility is embedded in its economic, social, and environmental context. Research proposals should indicate which of these categories of performance criteria are addressed by the proposed research.

CIFE seeks research proposals that focus on near-term opportunities and proposals that are highly explorative to establish far out opportunities. Proposals should indicate whether the researchers see the proposed work as a near, medium, or long-term opportunity. Finally, CIFE is happy to consider research that incrementally improves current methods and research that leads to breakthrough or disruptive innovations.

Timetable and requirements for projects for funding during AY 2015-16

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| March 23 | Call for proposals available to the Stanford and CIFE communities. |
| April 14 | Request the budget for your proposal from Engineering Research Administration for departments in the School of Engineering or your local research administration staff for other Stanford departments. Note that the majority of the requested funding should normally be allocated to research students. Request a proposal number from Teddie Guenzer at CIFE (guenzer@stanford.edu). |
| April 21 9:00 AM PDT | Submit your proposal in .doc, .docx, or .pdf format including the budget to cife-email@stanford.edu. Use the proposal template ; also available at: http://cife.stanford.edu/SeedProposals2015 . |
| April 24 9:00 AM PDT | Submit the slides you plan to use for the presentation at the Technical Advisory Committee (TAC) meeting in .ppt or .pptx format to cife-email@stanford.edu. Use the template ; also available at: http://cife.stanford.edu/SeedProposals2015 . |
| April 28 | Present your proposal to CIFE's industrial members at the TAC meeting. The proposals will be evaluated with this review form ; also available at: http://cife.stanford.edu/SeedProposals2015 . |
| May 5 | CIFE award decisions announced. |
| July 1 | Earliest start date for the proposed research. |
| Oct. 1 | Typical start date. |
| Jan. 1, 2016 | Latest start date to start research. |
| Note: | At the requested funding time, CIFE will establish a skeleton project website which should then be completed by the research team ¹ . Continued funding for the second half of the project is contingent on updates to the website in accordance with the milestones listed in the proposal. |
| Note: | Throughout AY 2015/16, PI(s) and RA(s) on funded seed projects are expected to be available occasionally to present the research at CIFE seminars and workshops or to visiting academics or industry professionals. |
| Sept. 30 | Latest date for research completion unless a no-cost extension was requested. |
| Oct. 31 | Submit final project report to CIFE for publication as a Technical Report, Working Paper, video, or website. Follow the guidelines for authors available on the CIFE website. |

Funding Levels

There are no fixed funding limits for proposals. Since these are seed projects, typical project budgets range from \$30,000 to \$90,000. We encourage multi-PI proposals and are looking for proposals that leverage CIFE's industrial members. We also encourage innovative arrangements among PIs, such as multiple PIs proposing a number of research projects that focus on the same test case(s) in complementary ways. The total amount of funds available for seed projects this year is at least \$300,000. Because of budgetary constraints, successful proposals may not be awarded all of the funds requested. If the Technical Advisory Committee suggests a reduced budget for a project, an adjusted scope will be discussed with the PI(s).

Intellectual Property Rights

The research carried out through the CIFE Seed Research program is, of course, governed by the research and intellectual property guidelines and rules in effect at Stanford University.

¹ The website should provide access to at least the following information: (1) A practical scenario illustrating the engineering or business problem addressed by the research and highlighting the potential impact of the research on practice, (2) the original proposal (except the budget), (3) explanations of test cases used for the project, and (4) presentations developed for this project.

Appendix: Examples of research areas mentioned by members of the CIFE community

Research on understanding and improving life-cycle performance could focus on:

- Analyzing past facility operations data to assess the range of performance achieved and the factors influencing performance;
- Formalizing and testing improved theoretical models for performance prediction and expanding the scope of criteria to include socio-economic objectives and other factors;
- Creating methods to normalize and benchmark historical facility data that enable meaningful comparisons of facilities;
- Developing methods to help decision makers understand project performance trade-offs and make decisions given multiple competing criteria;
- Developing closed-loop methods for continuous analysis and learning as new performance data become available;
- Understanding performance across physical building scales, such as building systems, whole buildings, portfolio of buildings (e.g., a campus), neighborhoods, cities, or classes of buildings in a region;
- Developing methods to optimize the design of facilities, including their technical systems.

Research on enabling owners, designers, and builders to deliver high-performance facilities could focus on:

- Analyzing factors that support or hinder project teams from creating high-performance facilities;
- Developing methods for rapid learning about the effectiveness and efficiency of the design, construction, and operations teams;
- Streamlining information flows across disciplines and lifecycle phases;
- Simulating and visualizing the multi-disciplinary performance of facilities across physical and temporal scales.

Researchers are also welcome to submit research proposals in other areas of research that fit within the broad scope outlined at the beginning of this call for proposals.