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1. Message from the Directors

CIFE recently completed a successful [Industry Advisory Board meeting](#). The upcoming [Summer Program](#) meets in Helsinki, Finland, for the first time, and at Stanford. As you know, Helsinki has a high concentration of VDC practitioners, software providers, and researchers. We plan two and a half day sessions to learn about the integration and automation potential of VDC and outline a strategy towards implementing VDC-enabled, integrated and automated work processes, and to enable your coming with minimal disruption to busy schedules.

The [CIFE – GSA – CURT VDC/BIM](#) use survey results show dramatic growth in VDC use in 2007. A dramatic result of this survey is that many user companies report that they are shifting toward broad VDC implementation and overall organizational transformation based on its use.

We plan the Technical Advisory Board (TAC) meeting on April 23 – 24. For several years, members have asked to hear more about ongoing CIFE research activities, whether sponsored by seed research funding, individual members or other agencies. We will review these activities on April 23 and have the normal proposal review and selection meeting on April 24.

CIFE will celebrate its [20th anniversary](#) on Friday, April 25, 2008. Please sign our guest book and plan to attend the celebration. We will have a little nostalgia, discussions of the future, and people who have made CIFE what it is and who have had their lives impacted by CIFE.

2. CIFE Welcomes New Members

We are delighted to welcome three new member companies:

[Adolfson & Peterson Construction](#) is a sixty year old general contractor based in Minneapolis that emphasizes effective use of the newest technologies and long-lasting customer relationships. A&P operates in most of the country and has started to place strategic importance on VDC methods.

[Skanska USA](#) is a large global provider of comprehensive construction services and a developer of public-private partnerships. Skanska USA operates across the US. Sustainability has been a formal part of the company reporting and management process, and the company wants to increase the breadth and depth of its VDC capabilities.

[Slavenburg BV](#), a mid-sized construction company based in Holland, has used IT to help migrate the company practice to Design/Build and thereby create new business opportunities. As we at CIFE find, they have found that they need to change the company culture and move from being an element in a production process toward offering a total product.

3. Industrial Advisory Board (IAB) meeting

The principal topic of the IAB was to discuss activities that we can do together to enable 2010 and 2015 CIFE Breakthrough Goals that are more valuable than what any of us can do individually. We reviewed CIFE goals for 2015, which we first discussed in 2002. The **2015 goals** call for specific measurable schedule, cost, sustainability and globalization performance, each of which is dramatically beyond the normal practice of 2002 and today.

Since members have shown commitment to the 2015 goals, at the 2006 IAB meeting we developed the following measurable 2010 goals: CIFE members will

- **Operate with a strategic plan to implement VDC broadly and 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., use VDC models to support 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**

The Advisory Board discussed specific measures we could initiate to support these 2010 goals, recognizing that 2010 comes very soon. The IAB recommended that CIFE lead the development of examples of best VDC practice including performance metrics and establish the education and training requirements for VDC-trained engineers. Based upon discussions at the advisory board, we outline below a specific proposal for all CIFE members for a collaborative project to Apply VDC “best practices” to study the value of VDC in practice and educated your engineering and management staff in VDC-based methods.

The first objective of the VDC Best Practices effort is to assess the value and limits of current VDC best practice. We will work with members to measure and report quantitative results of different VDC methods in practice. Second, we want to advance the science of VDC. In collaboration with members’ project teams, we propose to develop, apply and test methods of Integrated Concurrent Engineering and VDC visualization, integration and automation in practice. In addition, we plan to develop, apply and test methods to collect data about the impact of controllable factors on weekly process performance and final project outcome.

We hope to develop a consortium to work with ten to twenty projects being done in 2008 by CIFE member organizations. We hope to recruit some “veteran” teams from organizations that have previously done multiple VDC projects, but we hope also for some teams who are new to VDC use. We will work with collaboration participants to define controllable factors and methods to apply VDC. We hope that participating projects will focus explicitly on 2010 CIFE VDC goals, i.e., projects will plan to serve at least five business purposes with VDC models, automate more than 30% of routine design and construction activities and staff the project with four VDC trained engineers. We also hope to recruit different project types, e.g., commercial, government office, multi-family residential, process-heavy, data center, factory.

The consortium participants will use a kickoff workshop, held here at CIFE, to collaboratively define controllable factors, such as VDC model and analysis objectives, model scope, goals, level of detail, responsible model developers, intended stakeholders, tools and methods to apply VDC. In addition, we will collaboratively define project process metrics, such as latency; schedule, cost, quality conformance; stakeholder engagement, which the teams will track at least weekly and report to CIFE for analysis. Finally, we will identify outcome performance metrics and methods to collect and interpret them, such as schedule, cost, quality and safety. During the kickoff meeting, we will also apply Integrated Concurrent Engineering (ICE) methods using the iRoom for each project, giving consortium participants the opportunity to learn to use the method as well as some powerful contemporary VDC modeling and analysis tools. Each project will then collect controllable, process and outcome data and report the data to CIFE for analysis and sharing after they are appropriately “sanitized” to preserve privacy. Participants will use Internet methods and periodic (net) meetings to share methods and data. Ideally, each project team will provide four VDC engineers per project at the kickoff. To support CIFE staffing of the kickoff sessions, data collection and analysis and reporting, each project will pay \$5,000 plus local per diem meeting expenses while at the kickoff meetings. This fee is independent of whether the team sends one or up to four participants. Please contact [CIFE](#) to discuss your interest in the program.

4. CIFE Summer Program

Our Virtual Design and Construction maturity model has three major phases:

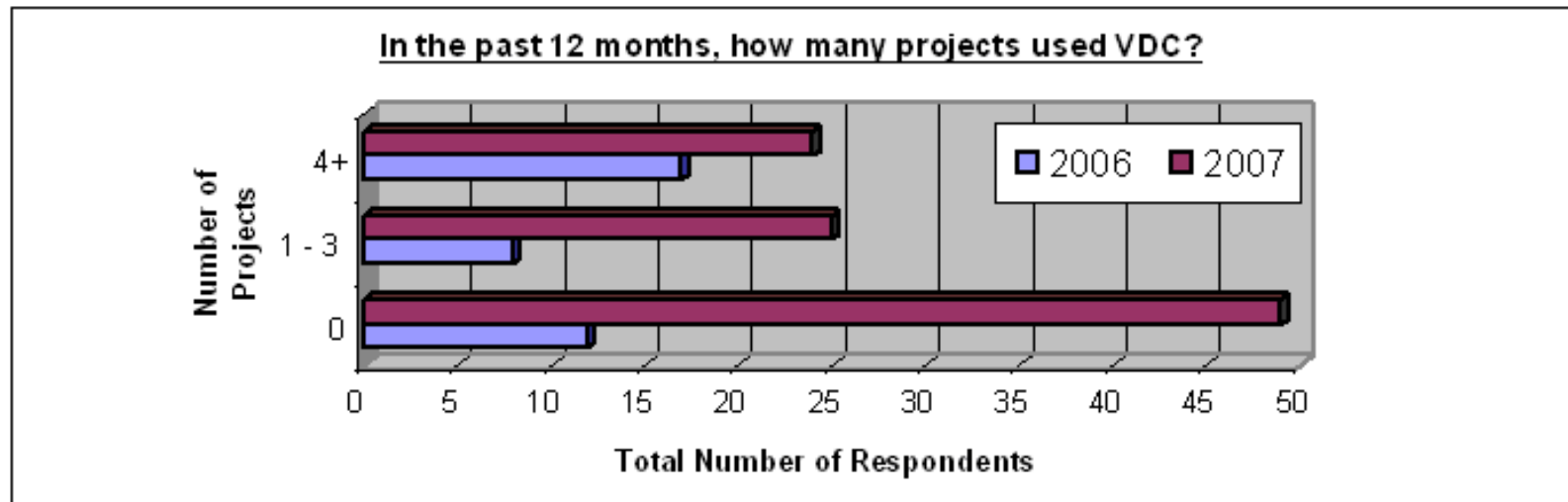
- Visualization of project designs.
- Integration of the data from multiple models and analyses.
- Automation of aspects of both design and fabrication.

Within each phase, organizations need to first develop initial understanding of the value proposition for their organizations; then do pilots; and finally implement broad scale capabilities. CIFE members have reported that, as a group, you are well into this maturity process. Thus, this year, the Summer Program will again focus on strategies and methods for members to implement and obtain value from VDC, assuming now that most participants want to hear more about the “how” and “why” of VDC, already knowing enough “what.” Therefore, the first day of the Summer Program will focus on Integration and Automation and the second day on Strategy and Training.

5. CIFE – GSA – CURT VDC/BIM Use Survey Results

Sponsored by the US General Services Administration and the Construction Users Roundtable, the CIFE survey of VDC/BIM use finds a remarkable and rapidly growing use of VDC. Please see the latest [results online](#) and published in technical report [TR171](#).

Below is just one set of data that we find dramatic. In 2006, sixteen survey respondents reported that their organizations used VDC on four or more projects during the past year. In 2007, that number increased to thirty-four. The number of organizations reporting some use rose from twenty-two to seventy-three, which we consider a dramatic increase in the number of organizations doing one or more VDC pilots. Since most organizations take several years to go from initial pilots to VDC use on multiple projects, these data suggest to us that a large and growing user community now shows genuine commitment to VDC use. The data also show many organizations do not yet use the methods. By either strategy or happenstance, these non-using organizations will follow the leaders as they implement VDC methods. Thus, unless they are unusually quick and effective in their VDC implementations, they will fall into catch-up places in their market positions after their competition has claimed the initial growth opportunities and easiest cost savings of VDC use.



6. CIFE 20th Anniversary

CIFE celebrates its 20th anniversary in 2008. We will hold a formal event on campus on Friday, April 25, 2008. Please add an entry to our [guest book](#) and comment on your CIFE experiences and your wishes for CIFE.

The event itself will be a one-day celebration on the Stanford campus. We will have a little nostalgia, some panels that include participants from visitors, students and university staff of several eras of CIFE history. We will discuss the future of AEC and CIFE, and of course we will have a birthday celebration.

7. CIFE Moves to New Building

CIFE will be moving soon to new digs on the second floor of the Jerry Yang & Akiko Yamazaki Environment & Energy Building. We expect to move in February, pending completion of the new IRoom. It will be great to celebrate the 20th anniversary in the new space with the generous donation of SmartBoards and technology from CIFE member SMART Technologies!

8. News about CIFE People

After several years with the GSA, first serving as a CIFE Visiting Fellow to help pilot the GSA's VDC efforts and then as the first National 3D-4D-BIM Program Manager in the Office of the Chief Architect, Calvin Kam has decided to embrace new opportunities and challenges as the Vice President of Strategic Innovation with CIFE member Optima. Please join us in congratulating Calvin and his collaborators in the GSA 3D-4D-BIM Program on establishing a highly successful and highly visible 3D-4D-BIM Program and in wishing him well in his new position. We look forward to seeing Calvin at CIFE wearing his Optima hat.

9. New CIFE Publications

TR171: "VDC Use in 2007: Significant Value, Dramatic Growth, and Apparent Business Opportunity"

Brian Gilligan, John Kunz

(December 2007; 40 pages; download size:5,200 kb) [Download](#)

This study analyzes and compares data from surveys conducted in 2006 and 2007 on the use of Virtual Design and Construction (VDC) and Building Information Modeling (BIM) technologies in the AEC industry. The 171 respondents thus far to the 2007 survey represent a broad mix of geographic locations, business sizes, technical disciplines, and project types. The data suggest that VDC use is significant, expanding quickly and has entered mainstream use. Survey respondents report more and increasingly sophisticated use of the methods in their operations and many are reporting specific benefits in the areas of improved participant engagement, reduced risk and project contingency, improved latency, and cost and schedule conformance. While value of their work in practice is rarely measured quantitatively, the majority of users report qualitative value across all phases of the design and construction process as well as for all parties to it, which is growing in comparison with survey results of a year ago. A growing proportion of early adopters report plans to transform their organizational strategy, and, in addition, more early adopters are now shifting from individual pilot projects to broad scale use of the methods than in the previous year of the survey. The majority of veteran users now plan such organizational transformations, and, indeed, are attempting integration and automation phase implementation of VDC in a sign of ever-increasing sophistication of use.

An ironic finding of our study is that those organizations that respondents themselves and others consider most likely to find value from using VDC, namely architects and facility owners, are the least likely to use or require it on their projects. This result may now be changing for Architects, however, as the biggest annual reported increases in VDC use, implementation efforts, and perceived value occurred in the design phases of the construction process. As VDC use increases, reported impediments to its further adoption by new and existing users are shifting from technical issues such as contractual language and hardware and software to people issues such as training and availability of qualified staff. The survey data and information gathered during one-on-one phone interviews suggest that VDC programs are growing in extent and that once they start organizations grow their use of VDC. Since VDC staff training and availability have become bottlenecks in 2007, we infer that early adopting organizations obtain value at a lower cost than competitors that need to recruit, invest and compete in an established VDC marketplace. Later adopters may find themselves operating at a strategic disadvantage for significant periods of time while they need to offer low prices to overcome lack of perceived marketplace competence and simultaneously pay for their attempts to develop scarce people resources and institutionalize new processes.

TR170: "Fulton Street Transit Center Project: 3D/4D Model Application Report"

Timo Hartmann, William E. Goodrich, Martin Fischer, Doug Eberhard
(May 2007; 56 pages; download size: 1996 kb) [Download](#)

Within this report we describe the 3D/4D model implementation and application on the Fulton Street Transit Center (FSTC) project during July 2004 to July 2005. The Fulton Street Transit Center is one of the major subway reconstruction projects in New York City. With a budgeted project value of \$750 Million the New York City Transit Authority (TA) plans to refurbish the seven subway lines around Fulton Street [Figure 1]. Furthermore, the TA plans to build a new above ground Transit Terminal. On this project a joint venture between Parsons Brinckerhoff and Bovis Lendlease formed the consultant construction management team to support the TA with the tasks of constructability review, bid packaging and site supervision.

WP106: "Observations of Two MEP iRoom Coordination Meetings: An Investigation of Artifact Use in AEC Project Meetings"

Kathleen Liston, Martin Fischer, John Kunz, Ning "Tony" Dong
(November 2007; 59 pages; download size: 1800kb) [Download](#)

Construction planners face many scheduling challenges during the course of a project. Limitations in time and resources frequently require planners to re-sequence existing activity sequences to expedite milestone or bottleneck activities. Re-sequencing activities within a CPM network, however, is time-consuming and error-prone because planners find it difficult to know which activities may be delayed and what the implications are to other activities once an activity is delayed. This paper presents a formal identification and re-sequencing process that supports the rapid development of sequencing alternatives in construction schedules. The identification process identifies activities in a CPM schedule that when delayed will expedite a project-critical activity. The re-sequencing process ensures that any sequencing conflicts that occur while re-sequencing activities are correctly resolved. The process builds on a constraint ontology that provides domain-specific representation of sequencing rationale for construction activities. The process also utilizes a classification mechanism that provides the heuristics to infer the role and "status" (i.e., whether an activity may or may not be delayed) between activities. The entire process ensures that all possible re-sequencing solutions are explored and developed consecutively. Validations performed using a prototype system, "Constraint-loaded CPM" (CLCPM), demonstrate improvement in planners' ability to understand the schedule logic and quickly devise alternative sequencing scenarios for execution.

WP107: "Building Energy Performance Simulation Tools - a Life-Cycle and Interoperable Perspective"

Tobias Maile, Martin Fischer, Vladimir Bazjanac
(December 2007; 49 pages; download size: 1,502KB) [Download](#)

Energy simulation tools are increasingly used for analysis of energy performance of buildings and the thermal comfort of their occupants. This paper describes a selection of energy simulation engines and user interfaces that are capable of these analyses today. Specifically, it

discusses the usage of these tools over different life-cycle stages. Besides a brief overview about energy simulation concepts, the paper illustrates each tool's strengths and weaknesses as well as its data exchange capabilities. Given the significant variety of such energy simulation tools, it is crucial to understand limitations of the tools and the complexity of such simulations. The reliability of data exchange and straightforward, user-friendly interfaces are major aspects of the practical usage of these tools. Due to the huge amount of input data and the availability of rich 3D geometry models, effective data exchange and software interfaces are crucial to enable faster and more reliable energy performance simulation analysis.

10. CIFE Calendar 2008

April 23-24	CIFE Technical Advisory Committee Meeting
April 25	CIFE 20th Birthday
June 11-12	CIFE Summer Program Session I, Finland (with company/site visits on June 9-10 and a VDC research workshop on June 13)
September 10-12	CIFE Summer Program Session II, Stanford
October 16	CIFE Industry Advisory Board Meeting

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