

**Lean Construction Research
University of Colorado
January 25-26, 2001**

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Meeting Announcement

Lean construction is fast emerging as an alternative to the received wisdom regarding the design and management of project-based production systems. The International Group for Lean Construction will hold its 9th annual conference in Singapore in August, 2001. The Lean Construction Institute has developed a conceptual framework for a Lean Project Delivery System and has launched descriptive and action research projects to develop the tools and techniques needed to go beyond concepts. Numerous PhD theses are underway on various aspects of lean construction, including such U.S. institutions as the University of California at Berkeley, the University of Colorado, Penn State University, Stanford University, University of Washington, Virginia Tech, and the University of Florida, to name but a few.

The lean construction research agenda is vast and its development is critical for improving construction industry performance. Coordination of interested researchers is needed. That is why you are being invited to attend a meeting at the University of Colorado on January 25-26, 2001. Please extend this invitation to others you think may be interested.

The meeting is being hosted by Jim Diekmann and sponsored by the University of Colorado and the Lean Construction Institute (LCI). We've attached a white paper from LCI describing its vision of a Lean Project Delivery System. That need not limit our thinking, but will hopefully provide a shared starting point. The meeting will have been successful for us if we generate the following outcomes:

1. All understand the key differences between lean construction and traditional project management.
2. All understand what related research each has underway or planned.
3. Each of us enter into agreements to collaborate with others working in similar areas of lean construction research.

We plan to start at 1 p.m. on Thursday, January 25th and conclude around 2:30 p.m. on Friday, January 26th. Many of you will be able to fly in Thursday morning. Afterwards, those who want to ski can get up to the slopes. Those who want to fly somewhere can get to the airport. We have blocked rooms at the Broker Hotel - 1 800 338 5407.

Please let us know your plans to attend as soon as you can so we can make the necessary arrangements. Also, please let us know your suggestions for how to shape the meeting to our mutual benefit. Send notice of attendance to Jim Diekmann diekmann@spot.colorado.edu.

Please send suggestions regarding the meeting both to Jim and to Glenn Ballard
gballar@pacbell.net.

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Research Areas

- Bill O'Brien – Cost modeling and metrics at the firm level –tying things back to profitability.
- Information systems – how do people use information?
- Jim Diekman – Designing production systems
- Which system behaves better? self-controlling systems
- Howard Bashford – Partnership with housing companies in Phoenix
- How to bring innovation in production home building
 - Working on visioning and reducing cycle time
 - Serial process in houses and multiple houses
 - Even-flow production – how that works
 - Organizational change
 - How to make a serial process parallel
- Leonhard Bernhold – Residential – planning portion of lean production for parts of housing; using superintendent tool.
- Waste/safety reduce accidents, using automated systems, pipe layer system.
 - Operator training – how do you do that – measuring skill with operators.
 - Training over the internet
- Ken Walsh – CII work application of supply chain; management to construction 6-8 months in
- mapping value chains
 - Methods of changing systems serial to parallel
 - Adapting literature from business field to construction
- Les Prudhomme – CII supports multiple academics on projects
- Bill Maloney – Looking at product design, minimize number of parts
- Focus on building 10-20 million \$ projects
 - Preassembly and prefabrication
- Glenn Ballard – Final assembly, testing and turnover, tolerances
- Dan Halpin – Design and how it impacts this issue
- What motivation is there for designers to implement, to design for lean production rather than for function.
- Ballard– Explicitly lean construction includes design as an integral part of the system

Diekman – Differences between space construction and housing. You can't count the parts in residential construction.

Glenn Ballard – Increasing detailing provides incredible returns in the production process. Return on investment is so high it is not necessary.

Dan Halpin – Motivate project designers to use lean ideas. How do we do this?

Greg Howell – Architecture profession under grade. In Europe they design for function and for production.
Patent ideas for ongoing revenue in design.

CII – Design for construction automation.
Designs have been the same for 50 years.

Tauriq Abdelhamid –Liability in the US is an issue. Liability is the product for designer, process liability goes to the contractor.

Les Prudhomme – (CII Research) A number of projects were described.
Research in safety.

Halpin – Construction safety alliance.
Lean construction for safety
Rules for process – how lean processes could deliver a safer environment

Howell – Safety as an individual responsibility
Safety should be a planning system and individual responsibility
Operations design measuring performance of planning system in relation to safety.

Prudhomme – Virtual teams work
Modularization, pre-assembly/off-site construction
~ US construction don't utilize this – why ??
Improve construction supply chain performance
E-commerce applications in construction
Risk analysis for construction projects

Presentation: “Operation Analysis”

Mike Costen – Production Superintendent's Institute
– Production Analysis
How to break an operation apart?
Set of common descriptors of construction operations
Genetics
Process

Work Zone Movement
System Relationship
Batch Size
Work Area Elevation
Work Area Congestion
Bi-products

Russell Kenley – Lean construction
Lean manufacturing
Small industry
Supply chain mapping procurement in the supply chain
Top down research
Reducing cost through innovation

Tauriq Abdelhamid – Construction Innovation Forum

John Draper – Cross-functional teams, multi-skilled, ownership pride in what they are doing –
move away from specialization
How do we measure productivity in the multi functional teams
New business models for construction

Bolivar Senor – A company? in Fort Collins
They have their own “Last planner” system
Schedule and look ahead did not match
Through more field work reliability you are improving productivity
Uses “suretrack” with subactivities allows you to use different schedules
For 8 weeks – look ahead
Excel bold system

Keith Molennar – Project delivery
Changing contract delivery system for Wash. State Transportation Dept.
DBIA Water Wastewater Education about different methods to deliver projects
Innovative contract administration in Europe

Julio Martinez – Modelling of processes
Visualization of the model for perspectives
Virtual models

Tauriq Abdelhamid – Process based reliability assessment
Reducing cycle times in manufactured housing plants, introducing lean construction principles
Occupation accidents prevention
Ergonomics of construction operations
Construction Production Process Design
A system run
Introduce constraints and variables into the process design

Ron Wakefield - Micro modeling of construction operations
excavator simulator

housing tasks – process design tool

- Housing Research – industrializing the construction site
integration, understanding
information integration
supply chain

- Application of new techniques in optimization to construction design

LCI/CU Lean research meeting actions

- Get NSF to sponsor an international workshop to develop the lean construction research agenda.
- Leonard Bernold will coordinate a group to draft a proposal for the workshop
- Greg Howell to discuss the idea with Priscilla Nelson
- Looking for research partners (LCI will provide a place on its website where lean construction researchers can post requests for research partners. Russell's is the first.)
- Russell Kenley: time unit vs activity-driven scheduling as applied to repetitive construction, but also linking to nonrepetitive operations.
- Russell Kenley will explore the possibility of using New Zealand's construction community as a test bed for lean construction.
- Leonard Bernold's suggested that we assemble CII big wigs & talk about lean construction. This led to the following:
 - Les Prudhomme says researchers should put in needs assessments to CII. He will see that they are given a hearing.
 - Ask the CII Research Committee, et al, for help getting to NSF/other big wigs. CII itself doesn't have that much money.
 - Have Greg or Glenn speak to CII on behalf of this group.
 - Help create the crisis by writing a book. Bill O'Brien will take the lead. Everyone should send cases to Bill. Bill will develop and circulate an outline for comment, then sort out who is to do what.
 - Develop a guide for description/case studies: Ken Walsh, Iris, Jim (CII Supply Chain Task Force)
 - Have Grad students describe how work is actually done. Give a prize for the best.
 - LCI will establish a discussion form on its website to share teaching materials and case studies
 - Have a meeting on teaching lean construction (Ken Walsh and Howard Bashford volunteered to host the meeting at Arizona State)
 - Align meeting with research meeting
 - Identify groups of research on ends/means charts, then break outs.
 - LCI will form an academic forum
 - Net meetings
 - Research meetings
 - Publish minutes of this meeting on LCI website.
 - Greg Howell will issue a news release regarding this meeting and the formation of a lean construction academic forum.
 - Schedule the teaching and next meeting.

