



May 7, 2013

What can I say?

"The dog ate my homework"? An overdue and overlong note begins after this opening, with a note about LCI winning an unexpected award, then reports on two events.

This prelude expanded as I realized how these reports connected to people and ideas. And I got carried away. This is what old men do. I thought back about research and reflected on the surprise it brings. And that reminded me (here we go again in advance) of the book *Inside Jokes: Using Humor to Reverse Engineer the Mind*. The authors, Matthew Hurley, Daniel Dennett and Reginald Adams, explore the established theories of humor and show how none of them provide a general explanation for why things are funny. Each Chapter begins with a short line or two:

Chapter 1. "The most exciting phrase to hear in science, the one that heralds new discoveries, is not "EUREKA!" (I found it!) but "That's funny...." Isaac Asimov.

On reading the book a second time, I realized Lean Construction is funny because of the sense of surprise with and contradiction to traditional practice. How could it be that people steeped in traditional practice, who surely have experienced unpredictable workflow apparently never explored or measured it? Or took steps to make it more predictable? We weren't stupid, naive or inexperienced when it was measured; 54% of assignments were completed in the week assigned. But there was a sense of surprise and relief: A laugh saying "But of course...", the joke was on us and the industry.

Chapter 2. "He who thinks slowest laughs last."

"Chapter 13. The Punch line" offers a coherent general theory (explanation) connecting and expanding alternative theories explored in the previous chapters. "Humor involves a mental space that contains a false belief and hence indicates that someone is the maker of that mistake. The laughter is always one who has just discovered the mistake, and when the mistake-discoverer is also the mistake-maker one might suppose that the emotional response would be chagrin or dismay or even shame or anger, but nature tips the balance in favor of glorying in the discovery....". Jokes bring together two committed facts that cannot be simultaneously supported. So we laugh, feel a kind of joy and our brains learn and set that connection aside. Jokes don't provoke the same mirth and joy on second hearing because we know the contradiction, have eliminated it and its potential danger. Lean Construction is funny, in its own odd way and so is research.

"The newly added jigsaw puzzle pieces from problem solving may complete part of the puzzle, and at the same time add a new contradiction which helps pinpoint a mistaken belief - a previously misplaced piece of the puzzle - thus causing mirth." (Source: Question 17 in "Chapter 11. The Punch Line.)

Research like humor is about making connections. The authors of *Inside Jokes* explain why we laugh and the evolutionary advantage that comes from sorting out and setting aside potentially dangerous contradictory connections. Research is about finding and making beneficial connections that open new opportunities.



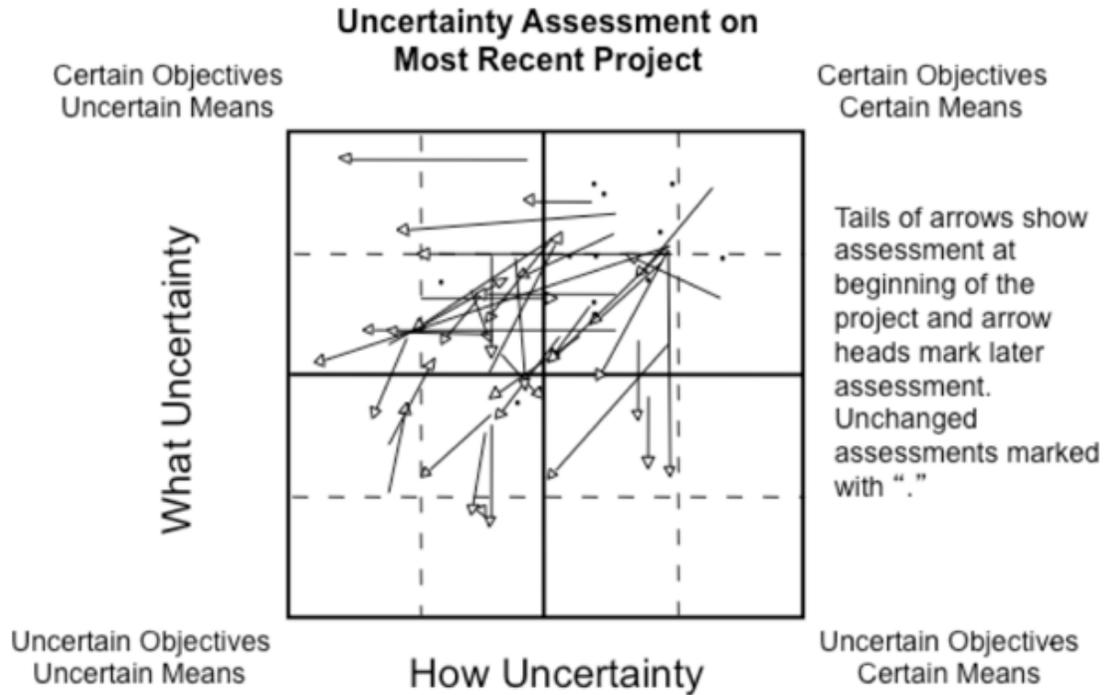
A Fine Surprise

Certainly the most surprising news is from the [National Building Museum](#). LCI has been awarded the 2013 Henry C. Turner Prize for innovation. This is an unexpected and wonderful honor. I understand there will be an event at the Museum and look forward to it. It is one of my favorite places to visit in Washington DC – a little bit off the track but rich in its history. Organize your time to take the guided tour to better understand how and why it was designed and constructed. You will be surprised at the connections with the ideas we espouse. Now from as far back as I can remember.

A Day with the Colorado Community of Practice

I spent a day in a "Conversation with the Colorado Community of Practice." The event, organized by Charles Rountree, was held in the training room Haselden Construction where Katie DePenning was our gracious host. Charles' idea was to do something different, to dig deeper than was possible in an "Introduction to Lean Construction." I agreed straight away as I had been thinking for a while about meeting with a group of more or less experienced people to try different simulations to explore different dimensions. Like joining the Navy, it seemed like a good idea at the time. And I think it was despite a spectacular failure in my administration of the "Oops Game" and a troubling personal relationship with the LCD projector.

The participants were generous and willing to enter serious discussion. I began with the Ultimatum Game used by Sam Bowles to explore equity and fairness. It worked well and to my surprise, all groups gave me the money back. And surprised again by the results of the uncertainty exercise, particularly the extent to which people underestimate the uncertainty as late as the start of construction. As with other groups, about 80% of the participants reported they had underestimated the degree of uncertainty on their most recent project. The dots on the graphic above represent projects where the initial assessment of uncertainty at the start of construction was later understood to be accurate. The arrows connect the point where the respondent thought the project was at beginning of construction and where the reporter later understood it really had been.



I don't doubt their reports - the data collected in Denver looks like that collected in other settings. It seems odd that we persistently underestimate the degree of uncertainty we face - maybe people in construction have some genetic predisposition to optimism. Perhaps this arises because we are blind to some aspects and assume our previous experience is sufficient. Projects may be physically complicated because of known but actionable interactions but they are always complex because people for all their similarity have different histories and experiences. And from those backgrounds may take very different actions.

I expect people on Integrated Project Delivery (IPD) teams will report different levels and relationships in the uncertainty faced. I have some small experience having team members mark the matrix the way they see it at the moment. Then asking people beginning at edges to explain what would be necessary for them to change their assessment of the circumstance. What answers or actions do they need to reduce the uncertainty and risk.



BIM Studio 2013 & PACE Annual Research Meeting at Penn State

The Penn State School of Architecture and Landscaping invited me to join the Jury to select the winning IPD/BIM team and to deliver a keynote to the Partnership for Achieving Construction Excellence (PACE) Research Seminar, an annual event.

[PACE](#) was created by Vic Sanvido, in 1992 when he was the Professor at Penn State to facilitate "interaction by providing a collaborative forum for addressing industry opportunities and challenges." Vic is now Chairman of the LCI Board of Directors and President of Southland Industries. Professor Robert Leicht is now the Director.

The challenge set to five teams was to design a Headquarters Building for the [Energy Efficient Buildings](#) (EEB) Hub in the Philadelphia Navy Yard. The Navy Yard, an historic area on the edge of Philadelphia, is a \$3B [urban development initiative](#). The jury included: **Phil Bernstein FAIA** Autodesk, Vice President for Industry Strategy and Relations AEC / Lecturer in Professional Practice, Yale University, **Tim Carr, CFM, LEED**, Vice President Southern Region Project Management, Heery International, **Pierce Reynoldson, MArch**, Virtual Design and Construction Manager, Tocci Building Corporation / Lecturer in Architecture, Yale University, **Gil Snyder, MArch, R.A.**, Associate Dean and Associate Professor, School of Architecture and Urban Planning, University of Wisconsin-Milwaukee, **Johann Mordhorst, AIA, LEED AP**, Associate, Kieran Timberlake, **Aage Langedrag, MArch**, BIM Manager, Mulitconsult, Oslo, Norway and myself.

Each student team included an architect, structural, mechanical and electrical engineers and a construction manager. They developed their solutions with BIM and were given an hour to present and be questioned on their solution. I was impressed by how the disciplines in each team worked through complicated problems created by the project objectives: the situation faced, and their interaction looked and sounded like real life.

Personalities mattered, as did the ability to test alternatives and find innovations that moved beyond compromise. The technology used by the teams during their work together and in presentation was stunning. Penn State has a wonderful balance between the building by hand classic physical models and leading edge electronic technology. Jury members occasionally interrupted the presentations to clarify or challenge, and on completion engaged the team in searching and sophisticated discussions. Every team told a story about the power of cross-discipline conversation. One team hit on a really interesting idea late and had to decide if and how they should use it. I was impressed with the idea; it might well have one if they had explored the alternative sooner.

The Jury gathered after the presentations to select a winner. I suggested a form of Choosing-by-Advantages (CBA) and Phil Bernstein proposed we each select the top team in four categories. 1. Best Solution, 2. Want to Build, 3. Best Team Each member of the Jury identified their top choice in each category, we discussed the results and chose "BIMmaculate Conception". The Jury liked the way their solution connected to history of the Navy Yard and its dry dock and suggested the team might change their name to "DryDock." The actual building designed by [KieranTimberlake](#) is now in construction. After the award, the Jury, Faculty and Students discussed the experience, what was learned and how they might use the experience. Then we adjourned to a fine dinner and presentation by Phil Bernstein "Market Trends, Structure and Future of the AEC."



The Annual PACE Research Spring Seminar followed on Tuesday morning. I was asked to speak on Lean Construction (LC) and given the BIM focus decided to connect Lean/IPD and BIM.

An intermediate diversion of several pages: While I am impressed with the ability of designers and teams to use BIM from design through facility operation, I don't believe there is an implicit BIM process, that technology requires or produces a process. BIM can be used by integrated teams or by a traditional silo-organization. Integrated teams are almost always more likely to be more successful but BIM itself is neutral and BIM is here to stay, it will continue to evolve and the industry will change in response. BIM is a powerful tool for solving problems but my sense was and is that BIM alone will not change the paradigm of traditional project management. I was troubled and wanted to follow the advice of Professor Clark Oglesby at Stanford who said, "It never works to call another person's god ugly."

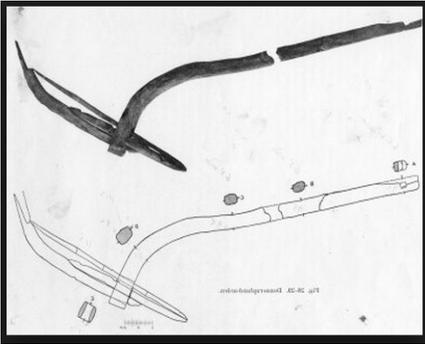
It took a while to visit my mental library. I found one filed under "Paradigm" and another under "Technology". In 1962, I read [Thomas Kuhn's](#) book, *[The Structure of Scientific Revolutions](#)* in the required course, "History of Western Civilization". While Kuhn's subject was scientific and not social revolutions, the development of, and resistance to Lean Construction (LC) suggests LC is such a shift. "During revolutions in science the discovery of anomalies leads to a whole new paradigm that changes the rules of the game and the "map" directing new research, asks new questions of old data, and moves beyond the puzzle-solving of normal science." ([Structure Link](#)) In the case of Lean Construction, the triggering anomaly was that 54% of assignments at the foremen level were completed in the week assigned. This finding proves the strength of the existing activity centered thinking to blind us to the obvious. Everyone who had ever worked on a project has experienced the causes and consequences of unpredictable workflow but its causes and consequences were invisible in current practice.

Kuhn proposed the shift moved through 3 phases: In the **Pre-paradigm** phase, there is no coherent theory. Research is underway and likely produces a variety of contradictory explanations that may conflict. These begin to resolve and eventually produce a coherent body of knowledge useful for solving problems. In the second phase, **Normal Science** puzzles are solved within the paradigm until anomalies difficult to explain accumulate challenging the paradigm and producing a crisis. In the third phase, **Revolutionary Science**, the underlying assumptions of the existing paradigm are challenged and a new paradigm emerges. I like this quote from the Wikipedia entry on the Kuhn's book: "Kuhn's insistence that a paradigm shift was a *mélange* of sociology, enthusiasm and scientific promise, but not a logically determinate procedure, caused an uproar in reaction to his work." It reminds me of the early reaction both in the LC community and response from those comfortable in traditional practice. This is not to say that the world has shifted but we know, indeed can prove, our approach to solving problems both works better than traditional practice and rests on explicit conceptual foundations. Remembering "Structure" reminded me of another book about technology and how it changed society.

Lynn White's book, *[Medieval Technology and Social Change](#)*, was given to me in 1965 by fluid mechanics [Professor John Vennard](#) (I decided to look him up and was stunned by his life's work including writing a text book on fluid mechanics that sold a 250,000+ copies. And he was a great teacher and mentor.) White's book traces the impact on society of new technologies. He tells a story about the arrival in Europe of the moldboard plow, probably from Africa. Prior to this, people plowed fields with an inexpensive plow that dug a single groove in the soil.



**LEAN
CONSTRUCTION
INSTITUTE**
TRANSFORMING DESIGN AND CONSTRUCTION



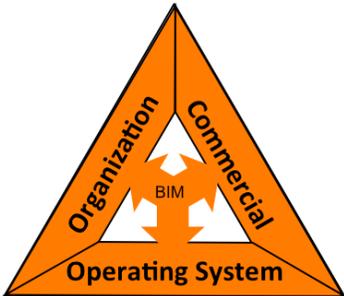
Plots of land were small, rather square and farmed independently. The moldboard plow was expensive and hard to turn. Few could afford them so many were purchased communally. And these new plows being hard to turn, called for larger longer fields. So people began to aggregate holdings and share the result. These are the sorts of things that happen, and I can see how BIM is having a similar impact in our industry.

Like the moldboard, BIM is certainly an improvement in traditional practice. And the new plow had another impact; it opened new lands for cultivation, lands previously too wet or dry to produce reliable crops.

Moldboards turn the soil usually to the right, clockwise strips and the profile begins to the center low in the outer furrows. Farmers crops now in wet and dry years. In dry of the furrows held enough moisture to the wet, tops were dry enough to produce. advantage opened new lands and increased food produced. The same sort of thing is BIM: it improves existing practices and is opportunities.



Plow the field in change, high in could count on years, the bottoms produce and in This unexpected the amount of happening with opening new



I had been thinking to use an image of BIM as an umbrella over the triangle image of Commercial Terms, Organization and Operating System I use to describe Lean Construction. That didn't seem right because BIM raises issues/is connected with all three sides of the triangle particularly when used in reference to design. The ability of BIM to organize, represent, remember, connect and make accessible the design and its components and their characteristics opens new possibilities. BIM creates the possibilities for new conversations and calls for new relationships between project participants that

otherwise would have little interaction. And there is more to say about what can happen when BIM is connected with logistics management and high precision GPS but this has run on too long already.

We can be sure that big things happen when new technology connects with a new paradigm.

Cory Hill