Lean Synergy with BIM and how Lean Construction Ireland (LCi) can help your business

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Lean Synergy with BIM and how Lean Construction Ireland (LCi) can help your business

Agenda

• Lean overview and where to start
• Synergies between BIM and Lean
• Lean Construction Ireland (LCi)
• What could the future hold?
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What’s the Problem?

Productivity in manufacturing has nearly doubled, whereas in construction it has remained flat.

Overview of productivity improvement over time
Productivity (value added per worker), reel, $ 2005

Key Factors Impacting Poor Cost & Schedule [McKinsey]

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<th>Poor Organization</th>
<th>Missed Connections</th>
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<td>Inadequate</td>
<td>Poor Short Term</td>
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<td>Communication</td>
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<td>Flawed Performance</td>
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<td>Contractual</td>
<td>Limited Talent</td>
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<td>Misunderstandings</td>
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Source: Expert interviews; IHS Global Insight (Belgium, France, Germany, Italy, Spain, United Kingdom, United States); World Input-Output Database

McKinsey&Company

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What is Lean Construction?

‘Lean construction refers to the application and adaptation of the underlying concepts and principles of the Toyota Production System (TPS) to construction. As in the TPS, the focus in lean construction is on reduction in waste, increase in value to the customer, and continuous improvement.’

(Sacks, Koskela et al, 2010)
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8 types of Process Waste

- **Defects**: Efforts caused by rework, scrap, and incorrect information.
- **Overproduction**: Production that is more than needed or before it is needed.
- **Waiting**: Wasted time waiting for the next step in a process.
- **Non-Utilized Talent**: Underutilizing people's talents, skills, & knowledge.
- **Transportation**: Unnecessary movements of products & materials.
- **Inventory**: Excess products and materials being processed.
- **Motion**: Unnecessary movements by people (e.g., walking).
- **Extra-Processing**: More work or higher quality than is required by the customer.
Toyota Production System (TPS)

- **4Ps**
- **14 Principles** (Likert 2004)
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TPM House of Quality
(Liker 2004)
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BIM and Lean Synergy

‘Two initiatives have a considerable mutual synergy and that it is highly advantageous to implement them jointly. In view of this, there are increasing needs to make BIM champions and users aware of Lean principles, methods and tools, as well as Lean champions and implementers aware of the functionalities of BIM.’
(Koskela, L, Kiviniemi, A, Owen, 2013)

(Sourced from: http://muum.global/bim/)

5 Principles of Lean (Womak and Jones 2003)
Lean Principles vs BIM Functionality

‘Using a matrix that juxtaposes/compares BIM functionalities with prescriptive lean construction principles, 56 interactions have been identified.....documented evidence of 48.’

(Sacks, Koskela et al 2010)
BIM Functionality (Sacks, Koskela et al 2010) & Waste Reduction?

- Visualisation of form (Client/Designer/Constructor)
  - Clear Client input early, better design intent
- Rapid Generation of Design Alternatives (Client value)
- Reuse of model data for predictive analysis
- Maintenance of information and design model integrity
- Automated generation of drawings and documents
  - Streamlined process, facilitates changes quickly.
- Collaboration in design and construction
  - Better design and construction coordination
  - Less clashes, RFIs, Drawing revision and approval
- Rapid generation and evaluation of multiple construction plan alternatives
- Online/electronic object based communication
  - Centralised, widely accessible, live drawings/docs. Less chance of using old Rev drawing

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Synergies Between BIM and Lean *(Sacks, Koskela et al 2010)*

- Lean principles that have the highest concentration of unique interactions are:
  - Get quality right the first time (A)
  - Focus on improving upstream flow variability (B)
  - Reduce production cycle durations (C)

- BIM functionalities that have the highest concentrations of unique interactions:
  - Aesthetic and functional evaluation (1)
  - Multiuser viewing of merged or separate multidiscipline models (10)
  - 4D visualization of construction schedules (13)
  - Online communication of product and process information (15)
Conceptual Connections Between BIM and Lean
(Koskela, L, Kiviniemi, A, Owen, 2013)
Summary of Synergies between BIM and Lean:

- **BIM becoming an ISO Standard**: (EN ISO 19650–1/2; Superseding Pas 1192-2). Standardisation of best practices is a key lean tool for waste reduction.

- **ISO 9001 creates standardisation of the supply chain, enabling easier BIM implementation.**

- **Efficient data management/ BIM** (sharing, collaborating, remote access, convenient approvals and revision controls) all result in **low waste processes** for design, data, construction management.

- Consider **implementation of both BIM and Lean on a continuous improvement basis** to maximise company competitiveness.

- Increasing **utilisation of digital technologies** promote BIM and Lean effectiveness- 3D CAD, Costing, Scheduling, Clash Detection, Enterprise Resource Planning (ERP), CRM etc.

- **Strong evidence of synergy between BIM and Lean, but still at early stages of research.**
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Lean Construction Ireland (LCi)

• **WHO WE ARE...** Lean Construction Ireland is an all-island, independent, and voluntary not-for-profit association whose members passionately believe that Lean Thinking & Practices can enable and sustain enhanced effectiveness, efficiency, productivity, and profitability for the Irish Construction Sector, Clients, and Supply Chain.

• **WHAT WE DO...** Lean Construction Ireland leads a community of learning and practice that promotes the application of Lean Thinking & Practices throughout the Irish Architecture, Engineering, Construction (AEC) sector so as to realise value-add for all stakeholders in the value chain.
  
  • It supports the free and open exchange of knowledge, information, and experiences around good practices and case studies.
  • It also supports ongoing research into Lean practices nationally and globally, their application to AEC, and their sharing with the wider Lean Construction Ireland Community. It is aligned to LCI USA.
Lean Construction Ireland (LCi)


STAKEHOLDERS...
• Capital Project Clients/Owners – public and private., EC Supply Chain, AEC Representative Bodies & Agencies. AEC Professional Bodies, Academics, Lean Consultants/Trainers.

VISION...
• Deliver Projects Better, Faster, Together

OBJECTIVES...
To achieve this Vision Lean Construction Ireland will:
• Promote the application of Lean Thinking & Practices in the Irish AEC sector.
• Develop a national network of members committed to the application of Lean Thinking & Practices.
• Challenge the status quo of current project thinking and delivery methods.
• Advance amongst all stakeholders the business case for Lean Construction knowledge and skills.
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Lean Construction Ireland (LCi)

(www.leanconstructionireland.ie)

LCI Conference 2018
Lean Innovation- Inspiring our Future in Construction
On the 20th November Ireland Will Play Host To The Inaugural Lean Construction Ireland National Conference 2018

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Getting Started

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Tools

Lean Construction Starter Pack
This document is a very useful guide to the basics of Lean and Lean Construction, and pulls together some of the information in the Concepts section. You can click on the PDF Flipbook opposite to read online, or you can download the file. Click here to read more

Lean Health Check
This Lean Health Check is a survey for staff to complete to highlight opportunities on projects where the 7 wastes could be reduced. To capture the most accurate data a broad range of roles in the company should be surveyed and it should be completed anonymously. By rating each waste driver a chart is automatically produced on the first tab which can be used to compare the Lean status across different projects and also to track progress in waste reduction. Click on the file on the right to download. Click here to read more

Lean Assessment Tool
This tool is based on a tool developed by Intel in the USA, and now shared freely with the Lean Construction Ireland Community. It is designed to help those in the supply chain self-evaluate where they are on their Lean journeys – as opposed to being used to compare against others in the supply chain. Click on the file opposite to open in another tab or download directly. Click here to read more

Concepts

Lean is
Lean has been described in various ways, and there is no universally accepted definition. This PowerPoint provides an overview of what Lean is, and then describes what Lean Construction is. Click here to read more

5 Principles
Lean is generally viewed as being a principles-based process improvement methodology. The 5 Principles were developed by global thought leaders in Lean, James Womack and Daniel Jones (Womack & Jones, 1996), arising from their research of the Toyota Motor Corporation. This PowerPoint describes these 5 Principles of Lean which are now applied by organisations in all sectors around the world. Click here to read more

Value
The issue of “value” is at the heart of what Lean is all about – delivering value to the customer based on what the customer defines as value. This PowerPoint examines Value and the Customer. Click here to read more

8 Wastes
The “godfather” of the Toyota Production System (TPS) is Taiichi Ohno, and one of Ohno’s great contributions was the identification of what are termed the “7 Wastes of Lean”. Separately others later added an 8th waste which referred to wasted peopleskillsetalent. This PowerPoint details the 8 Wastes of Lean. Click here to read more

DMAIC
DMAIC is a quality tool and the acronym refers to Define, Measure, Analyse, Improve, Control. This PowerPoint details the DMAIC approach and its role in Six Sigma improvement projects. Click here to read more

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Construction Company Lean Audit sample findings

• Identify top sources of waste and address
• Repeat audit to reduce waste and improve supply chain efficiency
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LCi National Conference
• 20th Nov 2018
• All Welcome!
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What Could the Future Hold?

- **Collaboration between CitA and LCi** envisaged to promote synergy, deployment of digital construction technology and lean thinking - Regional events, research, resources, conferences etc.

- **Growth of LCi membership** and lean thinking adoption across Ireland and increase of construction sector efficiency.

- **Lean Capability Development** - HEIs, Professional Bodies, Trainers

- **LCi Book of Cases** - Practical examples of how BIM and Lean work in harmony in projects, including use of Last Planner

- **Cultural change in the construction sector** to adapt continuous improvement and long term planning strategies in line with best practice.

- **Integration of best practices** in BIM, Lean, Project Management and Sustainability.
Conclusion

• Construction Sector learning from manufacturing and is embracing lean thinking to improve productivity (and profit margin!)

• BIM and Lean should be implemented to maximise efficiency of projects.

• Lean Construction Ireland (LCi) is a great resource to help you on your lean journey.

• Lean Construction Ireland Conference 20th November.

• Joining up with LCi will enable your company connect with like minded companies and learn from best practices.
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