

# **BRINGING LEAN CONSTRUCTION TO LIFE: DEVELOPING LEADERS, CONSULTANTS, COACHES, FACILITATORS, TRAINERS & INSTRUCTORS.**

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## **ABSTRACT**

There is a global shortage of competent and experienced individuals able to lead, coach, facilitate, train and provide consultancy support both internally and externally to clients, owners, constructors and designers who want to make a successful lean transformation of their enterprise or their projects. Demand exists within public and private sector clients and owners, as well as among design and construction enterprises and their professional advisers.

If the shortage is not addressed there is the potential for the advance of lean thinking in construction to stall and lean construction to get a bad name as constructors and others seek to cut corners and pay lip service to lean as happened in UK (United Kingdom) 15 years ago.

The aim of this paper is to begin a discussion of the skills and knowledge required by those who want to succeed in one or more of these roles.

This essay reviews past lean construction leadership development actions and suggests a curriculum for those who want to develop the skills and knowledge required to excel in these roles.

A delivery framework for a development program is proposed.

The paper concludes with calls for further research and for action sooner rather than later to address the issues, preferably on a regional or global level rather than on a national one.

The value of the paper for practitioners is that it suggests the range of skills and knowledge required to be effective which can help their own development and help assess and recruit internal and external consultants, etc; the benefit for scholars is the discussion of what might be included in undergraduate and higher degree curricula as well as ideas for post-experience, post-graduate course offerings aimed at this need.

## **KEYWORDS**

Lean Construction, leadership, consultancy, coaching, facilitation, training, instructing.

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## INTRODUCTION

The number of design and construction organisations that want to apply lean thinking to their operations and their projects is increasing. The growth in interest in Lean construction is evidenced for example by growth in submissions to this conference, growth in corporate members of LCI (Lean Construction Institute) and P<sup>2</sup>SL (Project and Production Systems Lab, UC Berkeley) and individual members of lean construction groups on LinkedIn. A consequence of this growth is that there is now a shortage of skilled and competent individuals to support the growing demand for help with lean transformation at the enterprise and at the project level. This is as true for the US (based on conversations with a number of American lean leaders) as it is elsewhere in the world.

Failure to address this shortage could stall the advance of lean thinking in construction, as happened in UK 15 years ago (Mossman, 2008), and give lean construction a bad name as constructors and others seek to cut corners and pay lip-service to the ideas.

A critical problem is that much of the knowledge is *tacit* rather than explicit. Tacit knowledge includes ways of knowing, being & doing that often we are unaware that we know. You can probably ride a bike but can you describe how you do it? How you do it is a classic example of tacit knowledge.

Many pioneer companies are clustered intellectually, and often physically, around UC Berkeley in California. Even for them, much of the learning and leadership development has been self-directed. A notable exception was the Shusa program developed by Greg Howell and Hal Macomber in the early 2000s – a course of simulations, directed reading and discussion – attended by many of the US pioneers.

The intention of this paper is to begin a discussion about how to systematically develop a worldwide cadre of individuals with the skills and knowledge to operate effectively in a design, construction or facility management environment.

## WHAT SKILLS AND KNOWLEDGE ARE REQUIRED?

In his presentation to the first Indian Lean Construction Conference (Mumbai, Feb 2015) Glenn Ballard defined lean construction as “a management philosophy defined by the *ideal* it pursues, the *principles* it follows in pursuit of the ideal and the *methods* used to implement them”. In the paper accompanying his presentation he wrote: *The lean ideal: Provide customers, internal and external, with what they need, with no waste.* (Ballard, 2015)

Being a lean construction consultant, facilitator, coach, trainer, instructor requires: some knowledge, appreciation & understanding of: some knowledge, appreciation & understanding of, *and skills in:*

- big room/co-location
- construction & design
- Last Planner<sup>®</sup> & RbPS
- lean project delivery
- lean thinking and flow
- learning & theory of knowledge
- Choosing By Advantages (CBA)
- coaching
- consultancy
- decision making
- facilitation
- leadership, including servant

- pre-fabrication
- production theory
- psychology
- systems
- target value design (TVD)
- Training within Industry (TWI)
- Variation
- leadership
- managing change
- personal and organizational learning
- process mapping
- production planning and management
- reliable promising
- running simulations
- training & instructing

The expression “some knowledge, appreciation and understanding ...” is used in the sense that “one need not be eminent in any nor in all the parts in order to understand and apply it.” (Deming, 1994, 93 referring to the *System of Profound Knowledge*)

### **SOURCES OF CANDIDATES**

Pioneers have come from a variety of backgrounds including construction, design, lean manufacturing, lean consultancy, management consultancy, training. All had some of the skills and knowledge listed above and, to be effective, each needed some of the skills and knowledge of all the others.

Those who tell me they are interested in learning to lead, coach, facilitate, train and provide lean construction consultancy come from an equally diverse range of backgrounds including construction, design, lean consultancy, management consultancy, training.

### **HAS THE ISSUE BEEN ADDRESSED BEFORE?**

So far as I know there has been one formal attempt to do this before – The *Lean Project Leadership (Shusa<sup>2</sup>) Program* offered in 2003 by Lean Project Consulting, Inc. and The Center for Innovation in Project and Production Management (LCI US).

The Shusa program “*develops leaders able to implement lean projects and teach the essential practices and habits of mind to others*” (Howell, 2006) and consisted of:

- 6 face to face sessions (1800 Monday - 1415 Wednesday) over 5 months
- weekly Study-Action Team meetings (Slivon and Macomber, 2010)
- 2 x coaching relationships with other participants
- Action learning based around a project at work (e.g. Revans, 1980)
- preparing a 3-5 page white paper on a related topic
- developing a personal learning plan for continuing development.

The face-to-face sessions session began ...“with a simulation or game chosen to explore some aspect of lean delivery. Participants conduct these exercises to gain experience with the game and managing discussions. We place an emphasis on learning with others while in action -- Study Action Teams. The remainder of each

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<sup>2</sup> Shusa is the Japanese term for respected leader and is particularly applied to leaders of large projects

session includes a combination of large and small group discussions on the books, book summaries, and articles assigned as homework. Ten books have been chosen for the program based on their historical, technical, and leadership content. A similar number of book summaries and articles are also assigned drawn from a variety of sources. Study-Action Teams work together by phone in the periods between meetings as well.

*Part of each session is devoted to specific aspects of lean project delivery and the Last Planner System™ (LPS). Short lectures introduce some topics but the emphasis is on being in action. Most participants will be managing a project using LPS and these will be the subject of reflection and discussion.*

*Each participant will be involved in two coaching relationships with other participants as a coach and a “coachee” .... Coaching is a continuing subject. Participants will engage with experts, other practitioners, and as experts for developing their skills and a personal body of knowledge.*

*Each participant will draft and present a white paper (3-5 pages) on a related topic and participate as appropriate in a continuing web-based discussion. The program closes with the development of an individual learning plan for each participant. (Howell, 2006)*

Participants in the second Shusa program included individuals from DPR, LeanTrak, Boldt (2), Messer Construction (3) & Linbeck. At least one is now retired.

There is one other important source of leaders in our community, the UC Berkeley Doctoral & Masters program led by Profs Glenn Ballard and Iris Tommellein. Some graduates have remained in the academic world and provide leadership there while others have gone on to lead in commercial settings.

## **CORPORATE PROGRAMS**

Some larger companies have set up their own internal programs – e.g. Granya y Montero, JE Dunn, Shepherd, Alstom, CH2M. Some are more formal than others.

## **THE QUALIFIED PROJECT STEWARD (QPS) TRAINING PROGRAM**

In 2011 CH2M advertised for Project Stewards (PS) to support design teams detailing the background and experience of candidates they sought as:

- Design and construction industry background
- Registered engineer/architect, minimum 5 years experience
- Technical design discipline leadership and project leadership experience
- Knowledge and experience in managing multidiscipline design integration, interdependencies, and system level relationships
- Demonstrated leadership skill with emphasis on cross-discipline coordination (e.g. project engineer, project architect, design manager, or similar role)
- Leadership and facilitation of large group meetings and working sessions
- General Management with lean practice backgrounds and demonstrated skills will be considered
- Experience with lean design and construction practices is beneficial (e.g. LPS)

The advert described successful *Project Stewards* (PSs) as:

- **Responsible:** .... A PS assumes responsibility for the team’s adoption of RbPD [Macomber and Bettler 2011] and practice of it. A good PS thrives on ... responsibility that comes without power.
- **Humble:** A humble PS is willing to do what is necessary to help the team achieve its goal recognizing that his or her success is found in the team’s success. He or she recognizes the value in each team member, and by example leads others to the same appreciation.
- **Collaborative:** A good PS will work to ensure a collaborative culture exists within the team. The PS ensures team members feel able and supported in raising issues for open discussion. A good PS will establish collaboration as the team norm and will coach for appropriate behavior.
- **Committed:** The PS role requires someone in the role who is fully committed to it. The PS must feel the same high level of commitment to the project and its goals as do team members. Further, we seek candidates who are willing to commit to 1 or 2 or more years in the role to develop deep expertise and the capacity to teach the role to others.
- **Influential:** To be successful a PS will need to influence the team and the organization. Initially, team members may need to be influenced to begin to practice RbPD or to improve collaboration. A PS should know how to exert influence without resorting to a command and control style.
- **Knowledgeable:** The best PSs have the technical, industry, market, or specific knowledge to help the team in pursuit of its goal. (CH2M, 2011)

CH2M listed the skills of successful *Project Stewards* as including:

- Facilitation
- Listening
- Make assessments
- Quick thinking
- Making & securing reliable promises
- Excellent communication – written & verbal
- Organization & planning
- Coaching
- Adapting and responding to dynamic situations
- Ability and desire to master new skills
- Open learner – enjoys learning-while-doing in front of others.
- Highly coachable (CH2M, 2011)

How were the successful applicants going to learn all this *stuff*? They became part of a Community of Practice (CoP) of CH2M *Project Stewards* and Project Coaches “working and learning together to lead projects for learning and improvement.” In addition they were promised training and development:

- “Coaching from a CH2M Hill Project Coach who will provide training and real time coaching as you learn your new role
- Intensive hands-on Qualified Project Steward (QPS) training workshop together with other Project Stewards

- Coaching & practice learning the skills of ‘Leader as teacher’, Socratic method
- Develop improvisation skills; adapting to situations
- Develop deep insight into cross discipline interdependencies and dynamics
- Receive training and coaching in the skills of making and securing reliable promises
- Build relationships with the whole project team
- Build relationships with project and organization management
- Build skill in leading change and dealing with resistance
- Other training and developmental benefits
- Facilitation skills
- Leading groups
- Negotiation
- Root cause analysis –5Why
- Group problem solving
- Sound decisionmaking, Choosing by Advantages (CBA)
- Managing constraints on projects
- Being in service to the team - servant leadership” (CH2M, 2011)

Jeff Loeb, one of the internal lean coaches, reported the following results realised in the first two years of this program (personal communication):

- 16 Project Stewards (PS) were recruited (all of them internally) and completed the QPS training program. Each PS stewarded between 2 & 8 projects.
- 16 Project Managers and Operations Leaders also completed the QPS training enabling them to effectively partner with PSs.
- 3 CH2M internal lean coaches led the CoP, broadened lean capability within the organization, and supported the development of the Project Stewards.
- 36 design projects were delivered on a lean basis, each with a PS facilitating lean practices (with RbPD as a focus).
- Bi-weekly Lean CoP meetings enabled shared learning, peer coaching, and methods development. CoP participants included a mix of Project Managers, PSs, department leaders, and individuals desiring to practice lean.
- 50% more projects met or exceeded profitability targets.
- Performance against schedule improved incrementally, though with a marked decrease in ‘sprinting to the finish line’.
- Teams consistently reported higher engagement, less stress, and better whole-project understanding than on traditionally delivered projects.

Grana y Montero, a Peruvian constructor, has a unit called *The Academy* dedicated to managing the existing knowledge of group and also generating means for incorporating new knowledge through research and innovation. It is divided into three main schools – leadership and people management; project management and

continuous operations; the technical school. For the last 15 years GyM has had a groupwide strategy to create each jobsite as a *place of learning*. GyM have 300 “internal teachers”, construction professionals who additionally share their roles and knowledge in the group (private communication with the author).

There has been no formal evaluation of any of these programs.

## WHAT DO LEARNERS NEED?

Learners are likely to have degrees in a range of subjects and some will have higher degrees. All will have some years of work experience gathered in a range of settings.

The needs of each learner will be different and so it is difficult to specify a single curriculum that is appropriate to all possible learners.

Learners will want a program that is flexible enough to address their personal learning and skill development needs, rigorous in its approach and provides them with opportunities for continuing learning and development once the formal part of the program is complete. Some will want a qualification.

## WHAT DOES A GROWING LEAN COMMUNITY NEED?

Owners, clients, designers, constructors and consultancies (+ universities and colleges) wishing to employ lean leaders, coaches, facilitators, instructors, trainers and/or consultants are likely to hire people who show evidence of the practical application of the broad range of skills, understandings and experience and of their continuing learning and development.

Many larger owners/clients, designers and constructors are multi-national in their operations. Specialists based in UK may work with Dutch architects and Australian builders on a project in the Middle-East while serving a variety of other projects in the UK and elsewhere in the world. The very inter-connected nature of contemporary design and construction suggests that developing a common set of ideas around the world will make it easier to form lean teams sharing a common language.

## TOWARDS THE DESIGN OF A NEW PROGRAM

Criteria for the design:

- Flexible, learner-centred
- Multi-disciplinary
- Part-time, post-experience
- Develops people and process skills
- Built around live project(s)
- Involves the learner's employer

These are very similar criteria to those that guided the design of the PG Diploma in Management by Self-Managed Learning (PGDip SML) at NE London Polytechnic<sup>3</sup> in the late 1970s. PGDip SML was the model for the Roffey Park MBA a decade later. It was also the basis for in-company programs (Mossman and Stewart 1987).

The PGDip SML was a two-year program run in the days before email and the web. *Self Managed Learning (SML) is an approach to management development which enables managers to be more aware of:*

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<sup>3</sup> now the University of East London.

- how they achieve key results using live work issues...
- while controlling the content, processes and pace of their own learning...
- with a group of other managers who are collectively responsible for assessing their own progress ...
- within a structured programme facilitated by an Adviser.

*The approach is based on a number of principles. These are expressed as an agreement between Learner and Set Adviser:*

*Learners:*

- are responsible for their own learning
- have the right to and are responsible for identifying their own learning needs, and for changing them over time.
- have the right to and are responsible for negotiating how they meet their learning needs within the available learning resources.
- are responsible for evaluating and assessing their own learning.

*Set Advisers:*

- are responsible for helping the Learners realise their individual responsibility for their own learning.
- are responsible for providing access to the available learning resources
- have the right to and are responsible for determining their own personal involvement in the provision of learning resources (referral is acceptable).
- have the right to and are responsible for evaluating the whole programme and their own effectiveness.

*These principles give rise to the process of Self Managed Learning through which the Learner personally works out what is to be learnt and how it is to be learnt, in conjunction with others.” (Mossman and Stewart, 1987).*

Throughout the program learners (who all came from around the London area) met every 2-3 weeks in groups of six with a *set adviser*. In the first three months learners developed *learning contracts* in which they outlined their personal curriculum for the remainder of the program. Learning contracts were negotiated with the learner’s line manager, set and set advisor as well as the external examiner for the program.

During the middle section of the program (15 months) learners acted on their learning contract – frequently revising it (evidence of learning) in the light of their own learning and development. Learners used a wide variety of learning methods to support their own learning including Action Learning, action research, role play

In the final three months each learner presented evidence of their learning to their set in a powerful self-and-peer assessment process. Following the conclusion of the course many sets carried on working together on their continuing development.

## **DISCUSSION – TOWARDS A DELIVERY FRAMEWORK**

The web, not available for the PGDip SML, and improved telephone services enable:



- sets to meet virtually on a more frequent basis
- peer coaching and consulting
- Study-Action Teams
- the program to draw learners from a much wider area.

The web will not replace face-to-face meetings:

- It is good to break bread together (as a number of IPD projects have discovered)
- Hanging out together in the bar or the coffee shop is vital for subsequent building of relationships online
- Simulations, a vital part of lean trainings, need to be experienced first so that facilitators have a sense of what their audience are experiencing.

The program differs from existing professionally-oriented built environment programs in a number of ways – it is, for example:

- **multi-disciplinary**—for integrated project teams and integrated project delivery requires built environment professionals who understand the languages of their fellow professionals and have the skills and knowledge to work effectively with them;
- **learner centred**—most program designers assume they know what students need to know; this program has a very different starting point that allows learners and their employers considerable freedom to define what they need;
- **develops people and process skills**—most existing programs are very good at developing technical skills. Technology most often fails because people and process issues are given insufficient consideration.

### **INITIAL IDEAS FOR THE PROGRAM:**

This proposal envisages a number of universities collaborating to deliver a common program. Student enrolment will happen once a year or maybe once every other year.

When the course commences students will be allocated to a self-managed learning set and to a set advisor. Each student will also have a personal tutor in the university where they enrolled.

The program structure will have a number of elements:

- **Learning sets** – sets of five or six learners and a set-advisor (in a facilitative/consultative role) meet every 2-3 weeks on the web and occasionally face to face – this is where the learner reviews their project, their learning from their project and learns how to be a consultant to other learners; learners will learn vicariously from the experience of colleagues in their set. In the first weeks of the program each set will meet 2-3 times a week for an hour as a Study-Action Team™ (SAT) with two purposes:
  - To get to know each other
  - To build a shared picture of three key topics: lean, consultancy & facilitation
- **Residentials** – 2 per year of at least four days in each zone (Americas, Europe/Africa/Mid-East, Asia/Oceania) – six per year in total.

- **Learning contract** — each learner develops a learning contract with their set, their organisation and their mentor. A learning contract sets out a learner's unique learning program and is flexible enough to recognise that learning needs change and awareness of what you know and don't know changes too.
- **Learning Log** – learners keep a learning log as part of their reflective process
- **Communities of practice** – learners are expected to join at least one community of practice depending on their area(s) of interest and weakness
- **Webinars** – recorded and subsequently available to faculty and learners on the web – webinars will generally be presented twice to allow participation by learners in all time zones.
- **Libraries** — in and via the learner's university of registration
- **Workshops and courses** — in the learner's university of registration and in other cooperating institutions
- **Reports** – written and verbal, produced by the learner on their learning and on project progress, papers for IGLC, etc.
- **Self and peer assessment** of the learner's progress in the set.

Learners will graduate from their university of enrolment. Learners wanting to proceed to a masters will be expected to meet the dissertation regulations of their university of enrolment.

All the elements are tried and tested and have yet to be used together in this way.

The author has personal experience of most of them. He saw the power of the multi-disciplinary approach working with Shell Exploration and Production's P100 program that led a group of recent recruits from a wide range of disciplines through a team-based **action-learning** program; he served as a *set adviser* for 9 years on the pioneering PGDip SML and saw the impact of **learner-centred education** on the managers who participated—and the rigour of **self and peer assessment**; he has led **Study-Action Teams**<sup>TM4</sup> and seen the ability of that process to build aspirations and excitement—one team he worked with was half a world away and connected via the web; recent and emerging technologies are making it ever easier to create distance learning experiences that make a difference *and allow people to have fun doing it*.

## CONCLUSIONS

In order to support the growing interest in the application of lean thinking to design, construction and facility management in organisations and projects many more individuals each with a broad range of skills, knowledge and experience are required. The challenge is to find a way to develop those individuals.

The paper has presented an initial checklist of skills & knowledge required to lead a lean transformation, described a couple of previous attempts to do this and introduced an approach with the flexibility to meet the needs of both learners from diverse backgrounds and potential employers of those who complete the program.

A delivery framework has been briefly sketched.

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<sup>4</sup> Study Action Team is a trademark of Lean Project Consulting. [Leanproject.com](http://Leanproject.com)

Action is now required to create a program or programs that will serve the needs of learners and organisations around the world and to clarify what will be required from providers.

### **FURTHER RESEARCH**

A more systematic study of the skills, knowledge etc used by competent lean leaders, coaches, facilitators, instructors, trainers and/or consultants.

It would be useful to have an evaluation of:

- The Lean Project Leadership (Shusa) Program
- The Qualified Project Steward (QPS) training program
- other formal or informal corporate programs whose purpose is similar (developing individuals able to lead, coach, facilitate, train and provide consultancy support both internally and externally to clients, owners, constructors and designers who want to make a successful lean transformation of their enterprise or their projects.) e.g. Granya y Montero, JE Dunn, ...

None of these studies are essential to making a start on the program but they will help to develop and refine it.

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