2019 MONTERREY

1er Congreso Anual

11 - 12 – 13 de Noviembre

What is Lean Construction and What is its Future?

Instituto Mexicano de Lean Construction

Outline

1. What is Lean?
2. What is Lean in Construction?
3. Obstacles and Countermeasures to Construction Industry Transformation
4. The Research Frontier

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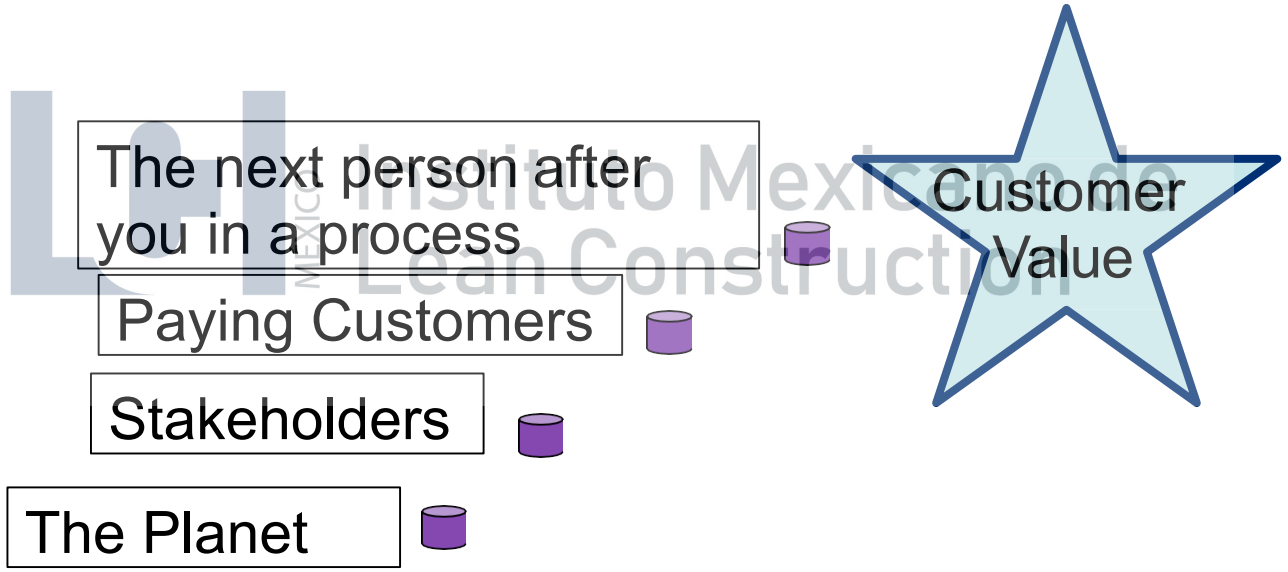
What is Lean?

What is Lean?

A management philosophy defined by the ideal it pursues, the principles followed in pursuit of the ideal, and – at any given moment in time - the methods used to implement the principles.

The Lean Ideal

Give customers, internal and external, exactly what they need to accomplish their purposes, with no waste.



What is “Value” in the Lean Ideal?

That has value for customers which enables them to achieve their objectives—the means to their ends.

What is “waste” in the Lean Ideal?

Anything with a cost of any kind that can be eliminated without reducing value delivered—anything not needed or unnecessary.

Where does Lean apply?

- Anywhere human beings are working together to produce something.
- Producing something together (performing a dance, building a building, organizing fund raising events for your church, trying to get someone elected, …) always involves processes. So we can say that Lean applies whenever there are processes.
- Processes are defined by the steps taken to produce a desired output. But the output is desired by someone (the immediate customer) for some purpose. That purpose is the reason why the process exists. Pedro produces a soils report for Maria so she can decide how to support a foundation. What she decides enables Juan to fabricate concrete piles to the right dimensions for providing that support. If these commitments are not well made, the piles may not be what's needed.
- Reliable promising is the process for making good commitments.

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What is Lean in Construction?

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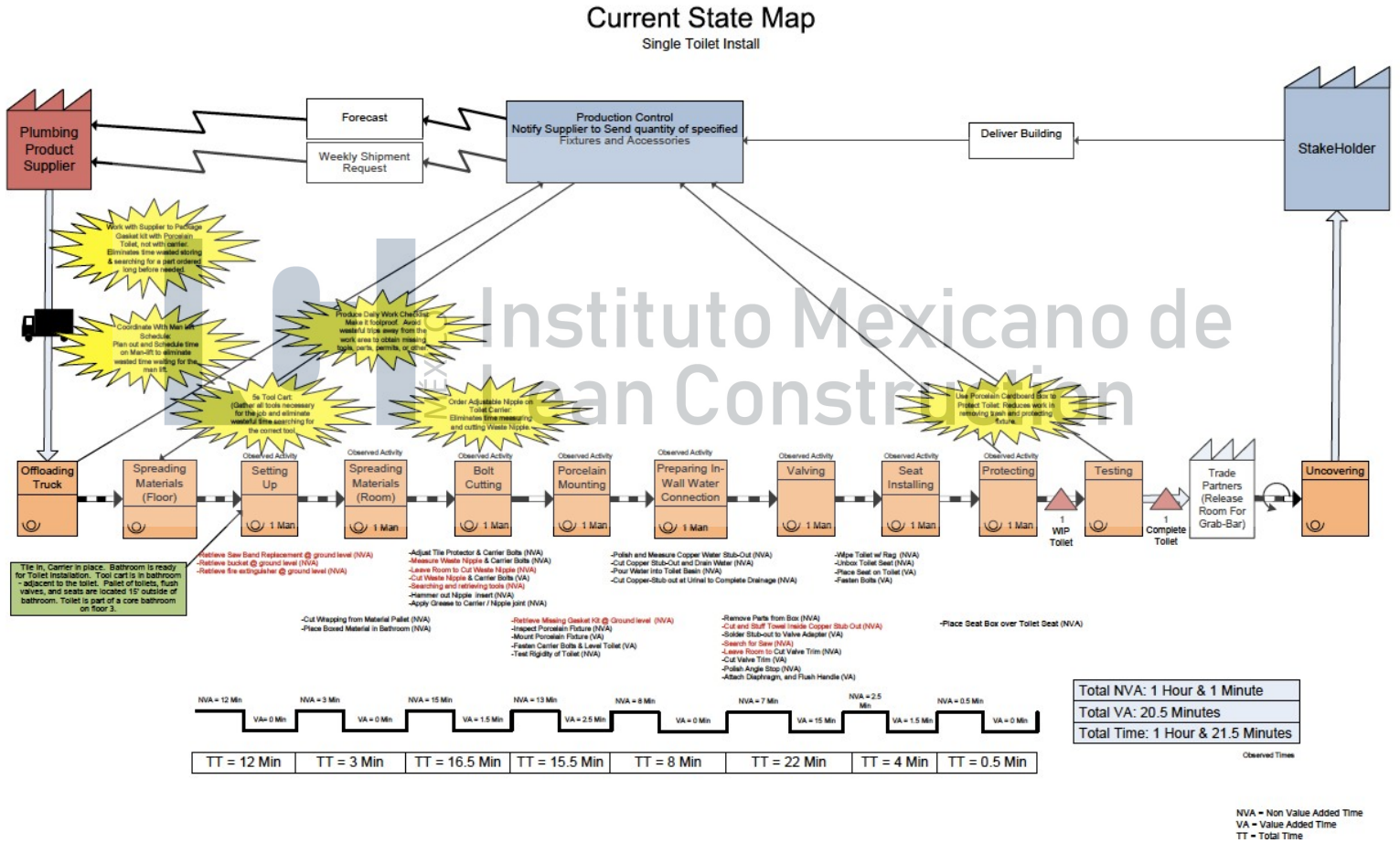
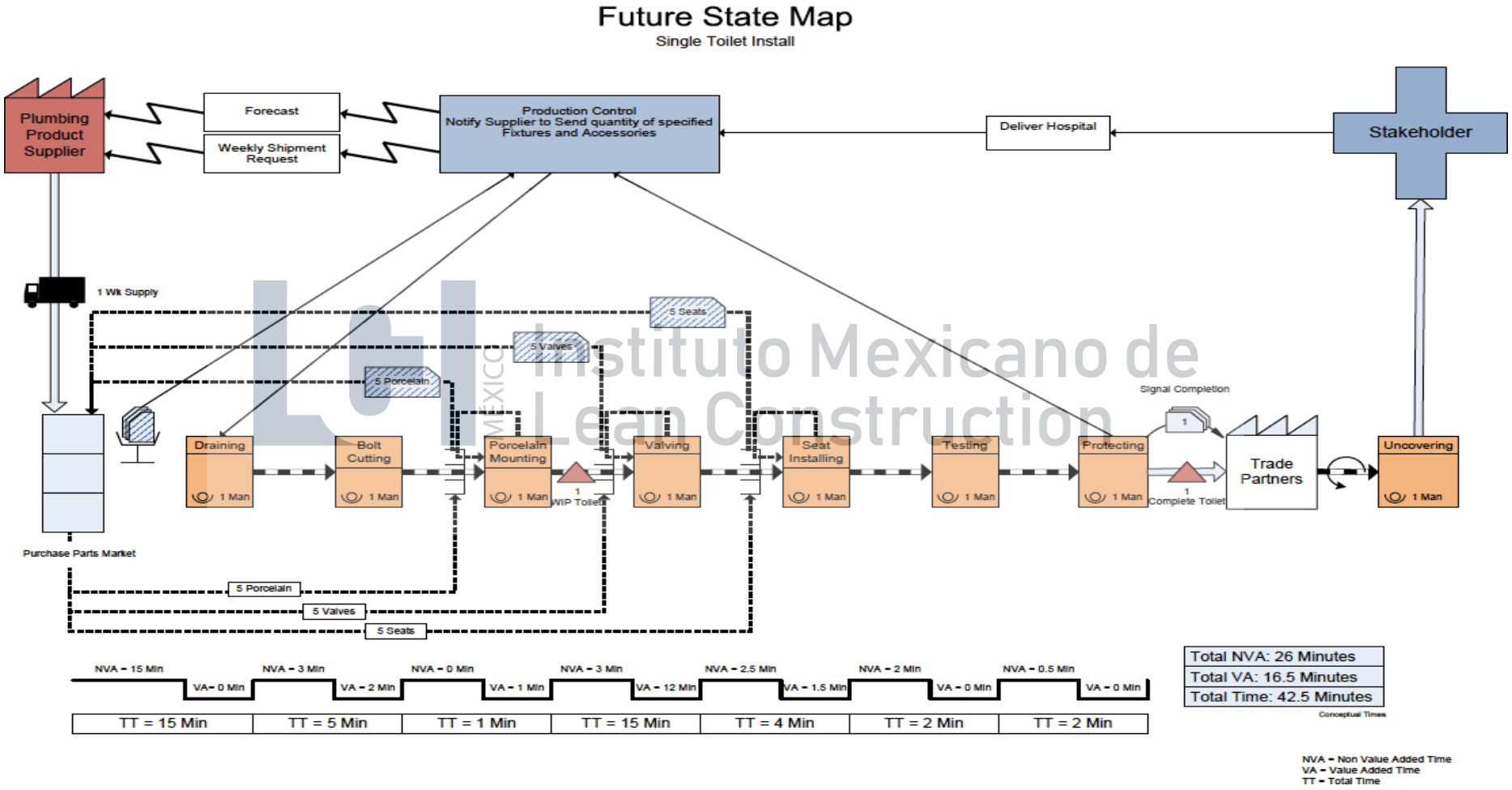
Current State Map: Single Toilet Install



Improvements (sunbursts)

- Work with supplier to package gasket kit with porcelain toilet, not with carrier. Eliminates time wasted storing and searching for a part delivered long before needed.
- Coordinate use of man-lift to reduce waiting.
- Set up tool cart with all needed tools and parts to reduce motion.
- Produce a Daily Work Checklist to reduce avoidable trips.
- Order adjustable nipple on toilet carrier to eliminate measuring and cutting to fit.
- Use cardboard box to prevent toilet use before plumbed. Ask supplier to stamp DO NOT USE on box.

Future State Map



Comparisons

	Before	After	
NVA time:	61.0	26.0	
VA time:	20.5	16.5	
			% better
Cycle Time:	81.5	42.5	48%
VA/Cycle Time:	25%	39%	76%

“Necessary Waste”?

- Sometimes what you would eliminate if you could, cannot be eliminated because it is ‘necessary’ at this moment for delivering value. Several of the types of waste can be ‘necessary’ in this temporary sense; e.g., inspections, approvals, moving, earlier delivery than desirable to avoid the risk of late delivery—always something about the way the process is designed.
- Waste necessary at this moment is to be attacked and rendered unnecessary going forward.
- The term “necessary waste” is sometimes used in this context, but is a contradiction in terms. Remember: Waste is anything with a cost of any kind that is not needed (unnecessary) for delivering value to a customer.

Principles that may apply universally

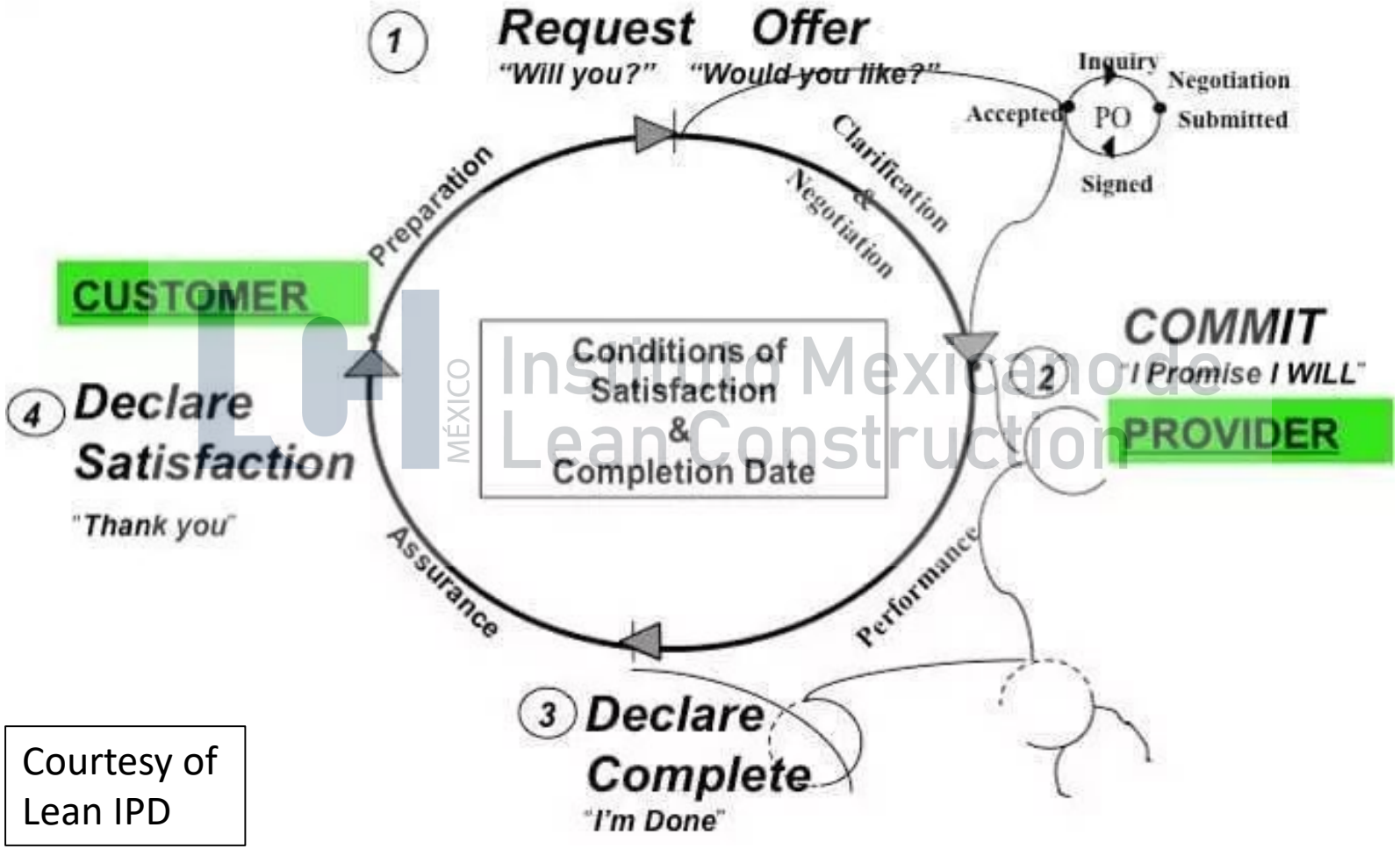
1. Base management decisions on long-term philosophy even at the expense of short-term financial goals
2. Grow leaders who thoroughly understand the work, live the philosophy, and teach it to others
3. Become a learning organization through relentless reflection and continuous improvement
4. Create continuous process flow to bring problems to the surface
5. Build a culture of stopping to fix problems to get quality right the first time
6. Respect your employees and suppliers by challenging and helping them to develop their capabilities

Some Lean Methods

- 5S
- Built-in-Quality
- Delivery of information, materials & tools to the point of use
- Five Whys
- Flow/Pull/Push
- Kanban
- JIT (Just-in-Time)
- Last Planner System

- Leader Standard Work
- Plan-Do-Check-Act
- Standardized work
- Set Based Design
- Setup time reduction
- Target Value Design/Delivery
- Value Stream Mapping
- Visual controls
- Waste Walks

Reliable Promising Cycle



Courtesy of Lean IPD

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Obstacles & Countermeasures to Construction Industry Transformation

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Obstacles to the take-up of Lean

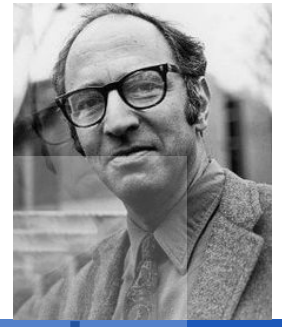
- Failure to educate the youth in new concepts and principles before they become habituated to the old
- Not understanding how industries, organizations and individuals change
- Resistance by those who live off the waste
- Paradigms

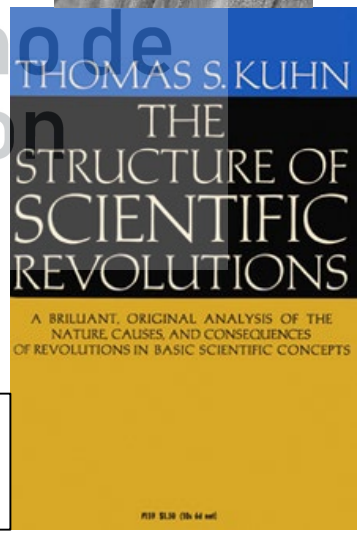
Leonova, et al. “Strategies That Can Help Transform the Construction Industry”. IGLC 2017
Gehbauer et al. “How Research Can Help Transform the Construction Industry”. IGLC 2017

International Group for Lean Construction Conference 2018

What are Paradigms?

- Assumptions about reality; the filter through which one sees the world—facts only have meaning through the lens of paradigms.
- In traditional paradigms, Lean's claims are impossible.





Samuel Korb (Technion) and Glenn Ballard (UC Berkeley). *Believing is Seeing.* International Group for Lean Construction Conference 2018

Traditional Construction Management Paradigms

- Trust is for suckers
- Win-win is an illusion. What counts is that I win.
- You can manage projects by managing contracts.
- Risk is managed when transferred to someone else.
- If you pay the least price for project materials and labor, you pay least price for the project.

Samuel Korb (Technion) and Glenn Ballard (UC Berkeley). *Believing is Seeing.* International Group for Lean Construction Conference 2018

More Paradigms

- Management by results yields the best results
- Variation in work flow is from external causes
- Resource utilization trumps project flow
- Control starts with identifying a negative variance between SHOULD and DID
- Social factors are interesting, but don't really matter

Samuel Korb (Technion) and Glenn Ballard (UC Berkeley). *Believing is Seeing.* International Group for Lean Construction Conference 2018

Why are paradigms a problem for Lean Construction?

- How widespread are the paradigms in the previous slides?
  - Very. Construction professionals in the traditional paradigm default to behaving in accordance with them when under pressure, believing them to be true.
- To what extent are they true?
  - On every point, counter examples or at least counter arguments can be brought to disprove them.

Paradigms

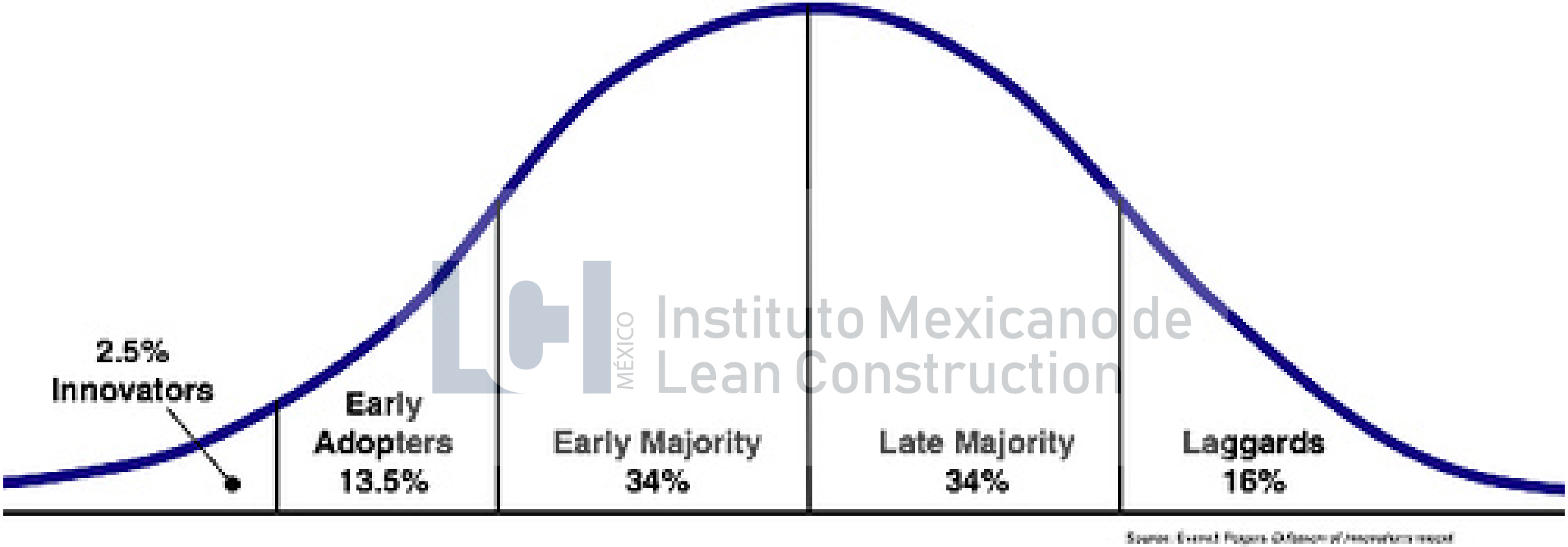
- Trust is for suckers
- Win-Win is an illusion
- Project management is managing contracts
- Risk shifting is risk management
- Minimizing the cost of a project is done by paying the least for each part of the project
- Resource utilization trumps project flow
- Control is acting on negative variances between DID and SHOULD

Counter Evidence

- Collaboration improves outcomes for all
- Managing production (not only contracts) improves outcomes
- Risk sharing improves outcomes
- Local optimization yields global suboptimization
- When work is not made ready in the right sequence and rate (flow), 100% resource utilization will not deliver the project on time
- Reactive control is like driving while looking in the rear view mirror

What Can Be Done?

- Use Research to:
  - capture and develop knowledge about how industries, organizations and individuals change
  - Accumulate evidence against the assumed truth of paradigms
- Educate the Next Generation before they become habituated to to traditional thinking and practice
- Work with those who are ready to work with you
- Put market pressure on those who cannot be persuaded by evidence



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What is Lean's Future?

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Some Research Questions for the Future

A. How to learn from breakdowns (any time the result of an action is different from what was intended)?
B. How to make the design of operations a process in which quality, safety, time and cost are considered systematically throughout a project, as opposed to piecemeal for each performance dimension separately.
C. How to create and manage demand and supply chains?
D. How to specify leader standard work that puts coaching at the heart of supervision.

Key Points

A. Lean is a philosophy for managing human organizations that produce goods and services—from a group planning a party to Proctor & Gamble.

B. The Lean philosophy is specified by the ideal pursued and the principles followed in that pursuit.

C. Methods are 'lean' if they are fit for purpose and applied consistently with principles.

D. The Lean Ideal: Give customers, internal and external, exactly what they need to accomplish their purposes, with no waste.

E. Waste is not a thing, but rather a potential for reducing 'cost' through innovation.

F. Construction is a type of fixed position manufacturing, which requires coordination through shared understanding.

More Key Points

G. Value stream mapping takes as given that what is produced by the process being mapped is needed by its customer. Only then are the people in the process engaged in making it more efficient by reducing cost and cycle time.

H. The social glue in work processes is reliable promises.

I. Paradigms are among the major obstacles to a Lean transformation of the construction industry.

J. Evidence persuades only those willing to be persuaded. Others require compulsion: demands by buyers of their products and competition from providers of their products.

K. Every organization (project, business, or supply network) must learn how to 'do Lean' in its own context.

L. You learn how to 'do Lean' like you learned how to ride a bike.

Thank you

Making a Project Lean-#1

A. select partners or suppliers who are willing and able to adopt lean project delivery
B. structure the project organization to engage downstream players in upstream processes and vice-versa, and to allow resources (money, personnel, schedule float, etc.) to move across organizational boundaries in pursuit of the best project-level returns
C. do target costing: define and align project scope, budget and schedule to deliver customer and stakeholder value, while challenging previous best practice
D. encourage thoughtful experimentation; explore adaptation and development of methods for pursuing the lean ideal
E. celebrate breakdowns as opportunities for learning rather than occasions for punishing the guilty

Implementing Lean at the Project Level—Construction Industry Institute 2006

Making a Project Lean-#2

F. do set based design: make design decisions at the last responsible moment, with explicit generation of alternatives, and documented evaluation of those alternatives against stated criteria

G. practice production control in accordance with lean principles such as making work flow predictable and using pull systems to avoid overproduction

H. implement JIT and other multi-organizational processes after site demand for materials and information is sufficiently reliable

Implementing Lean at the Project Level—Construction Industry Institute 2006

Making a Project Lean-#3

I. build quality and safety into your projects by placing primary reliance on those doing the work of designing and making, by acting to prevent breakdowns, including use of pokayoke techniques, by detecting breakdowns at the point of occurrence, by taking immediate corrective action to minimize propagation, and by acting on root causes in order to prevent reoccurrence

J. use First Run Studies: on processes that transform materials, use to design and test process capability to meet safety, quality, time and cost criteria

K. use computer modeling to integrate product and process design, to design construction operations in detail, and for use by the customer in facilities management

Implementing Lean at the Project Level—Construction Industry Institute 2006