



ELECTRI **INTERNATIONAL**

Research and Education for the Electrical Construction Industry

MEP Contractors and GCs: What is the Cost of Inexperience?

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Motivation

Aging Workforce

Age ¹	2015	2021
16-24	9%	10% ↑
25-54	72%	68% ↓
55+	19%	22% ↑

Future Workforce

41% of construction workers will retire by 2031²

Workforce Needs

93% of construction firms surveyed have job openings³
→ 91% struggle to fill these positions³



¹<https://eyeonhousing.org/2023/06/age-distribution-of-the-construction-labor-force-2/>

²McKinsey & Company. The next normal in construction: how disruption is reshaping the world's largest ecosystem. June 2020

³<https://www.agc.org/news/2022/08/31/construction-workforce-shortages-risk-undermining-infrastructure-projects-most-contractors-struggle-0>



Project Objectives

**Evaluate the impact of
inexperience on MEP
Contractors and GCs during
project delivery**

1. Understand the current impacts the electrical construction industry is facing due to inexperience.

2. Identify strategies to address the industry's challenges due to inexperience.



Multi-Pronged Research Approach

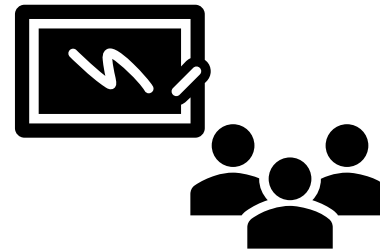
Discovery Interviews



Academic Literature



Design Thinking Workshop



Case Study Interviews



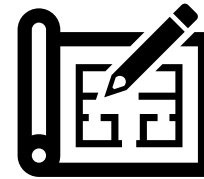
What is Inexperience?

The **lack of experience or knowledge** related to performing or fulfilling specific duties and tasks within a project's lifecycle.

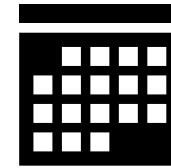


Identifying Current Challenges

Collected case studies
across the project's
lifecycle

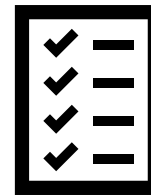


Design



Scheduling

Identified symptoms and
associated root causes



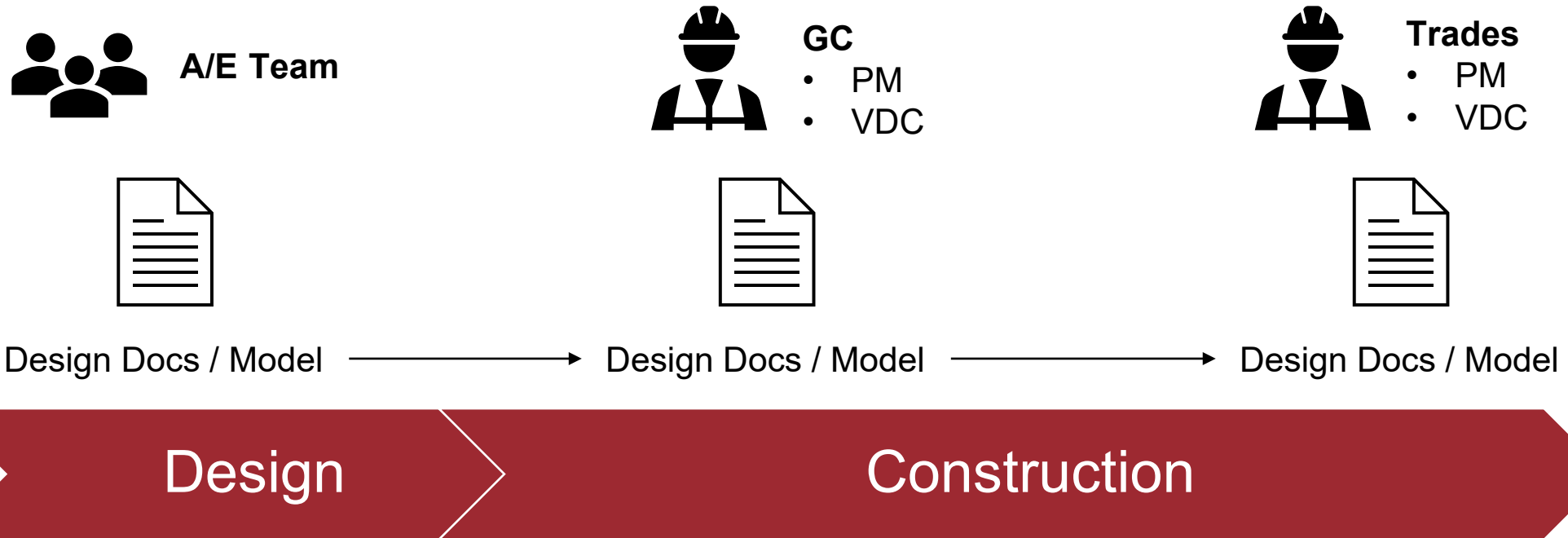
Purchasing



Install



Current State – Project Design



Current

- Linear model
- Lack of constructability
- Lack of knowledge up front
- Snowball effect of constructable design
- Causes stress



Symptoms and Root Causes

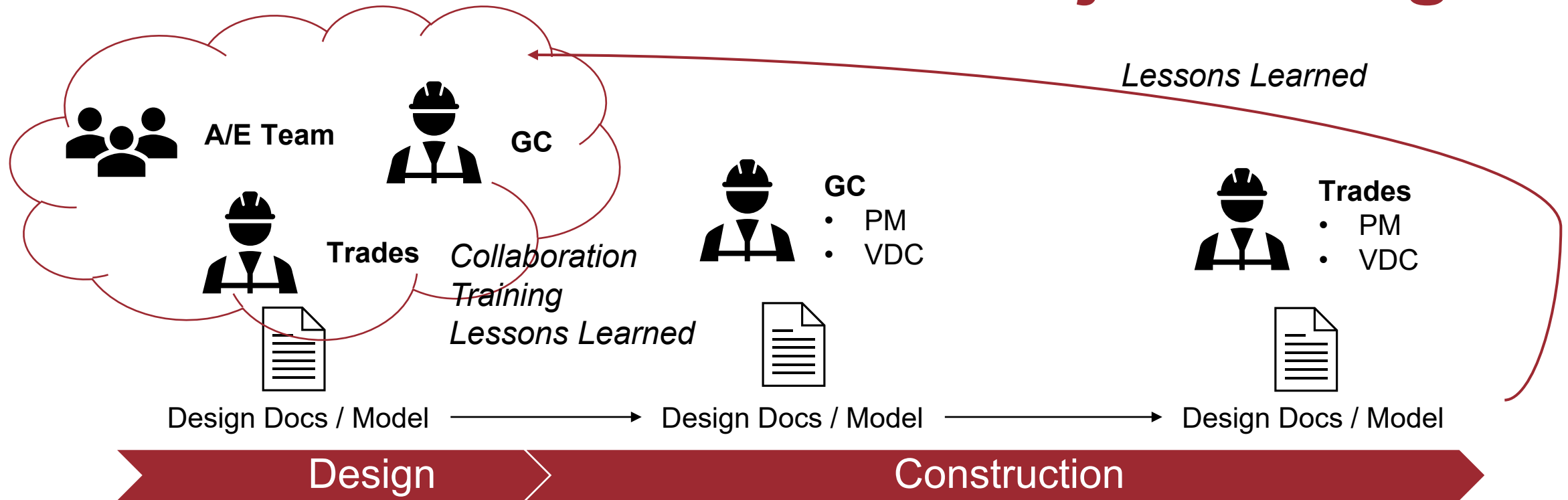
Symptoms	Root Causes
Cost Overrun	Silos
Schedule Impact	Process
RFIs	Time
Rework	Early Engagement
Delays	Retirement / Turnover
Change Orders	Technology versus Construction knowledge
	Construction knowledge
	Trust



Where do we want to go?



Desired Future State – Project Design



Future

- Project team engagement during design documents phase
- Model handoff to construction team only after they review it



Paths Forward

Lean Project
Delivery

Early
Contractor
Involvement

Metrics and
Transparency

Collaboration

Learning and
Training



Lean Project Delivery

Characteristics¹

Value
generating
process

Early
involvement of
stakeholders

Pull techniques
to manage
information and
material

Buffers to
absorb
variabilities

Strategies

Target Value
Design

Early
Contractor
Involvement

Visual
Management

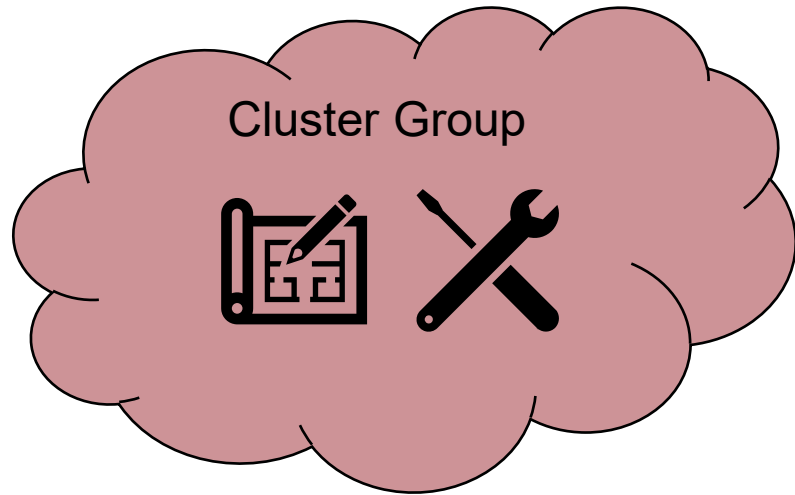
Takt
Planning



Source: ¹<https://leanconstructionblog.com/What-is-the-lean-project-delivery-system.html>

Lean Project Delivery

Target value design (Target value delivery)



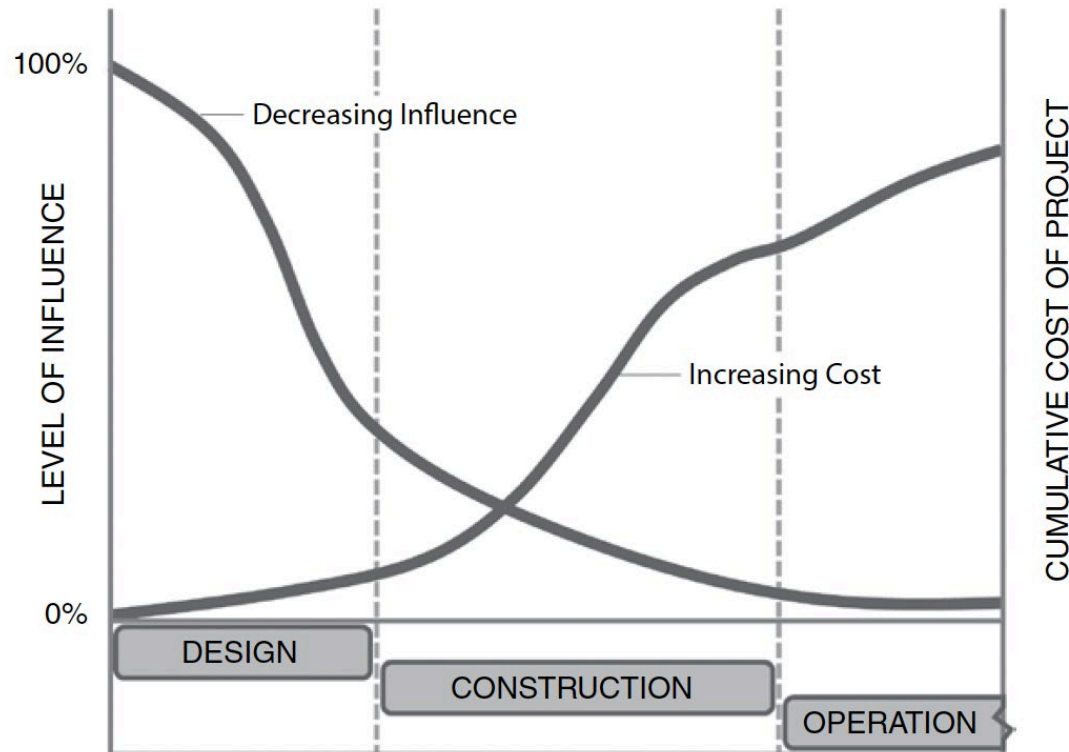
“Set a target cost (what you are willing to spend to design, produce and sell a product) based on expected revenues and desired profit margin.”¹



Source: ¹Ballard, G. 2009. An Update to Target Value Design.

Early Contractor Involvement

Level of Influence of Design on Project Cost¹



“Get the builder’s knowledge early, while your options are greater and your cost of making changes is lower and your opportunity to influence the outcome is higher.”



Source: ¹Leite, F. 2019. BIM for Design Coordination.

Metrics and Transparency

Visual Management

“...how we capture the value of this integration, and the trade influence is giving the trades visual communication dashboards [...] **That simple discipline creates a lot of potential for improvement.**”



Visual Workplace in the Big Room at the construction site, Girona, Spain.
Implementation and picture by Juan Felipe Pons Achell¹

Source: ¹<https://leanconstructionblog.com/The-power-of-Lean-Visual-Management-in-Construction.html>





Collaboration

Shared
Goals

Big Room

Culture

Risk &
Reward

“If you have a problem and you don’t tell anyone, then it’s your problem. But, if you have a problem and tell everybody [on your team], then it’s everybody’s problem; it’s everybody’s responsibility to fix it.”

“Not all of your ideas are good and not all of their ideas are good, but all of the ideas that are shared together in a collaborative environment makes for the best product.”



Learning and Training

Formal
Training

Mentorship

Experience

*“You have to go through **scars of experience**, like submittals: if you don’t turn in your submittals on time [...] they get approved late. [It’s] a long lead time item and then it doesn’t show up [on] schedule.”*



Paths Forward

Lean Project
Delivery

Early
Contractor
Involvement

Metrics and
Transparency

Collaboration

Learning and
Training

Others



What's Next?

*“It's not a single thing, but
it's a system of things”*

Additional research
and development

Continued
discussions and
research in the
Electrical
Construction Industry

Collaborations with
other industry groups





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