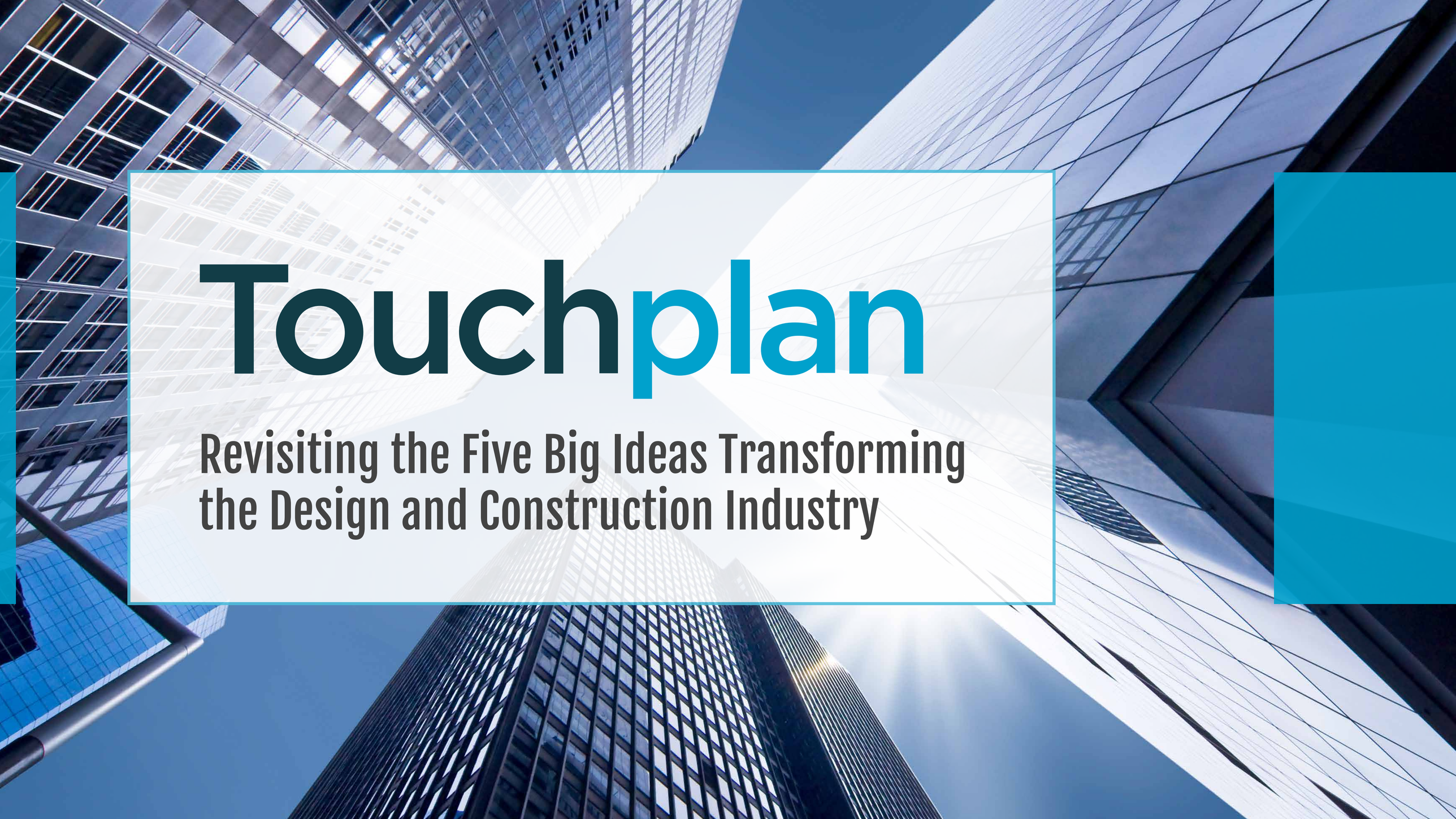

Touchplan

Revisiting the Five Big Ideas Transforming the Design and Construction Industry

Executive Summary

“The COVID-19 pandemic has only served to provide additional urgency to the preexisting productivity and data-visibility issues facing construction companies. While this next phase of platform growth and adoption will better equip construction industry leaders to effectively plan and manage projects, construction technology is still a rapidly growing, highly dynamic space. Further efficiencies will be unlocked with deeper integration of technology solutions directly on the job site and with predictive analytics leveraging data from connected teams and equipment.”

2020 MCKINSEY REPORT

This ebook is based Touchplan’s blog series “Revisiting the Five Big Ideas: Transforming the Design and Construction Industry” which focuses on understanding Lean Construction principles and how the **intersection of humans and technology can create better project outcomes**.

Putting the Five Big Ideas to Work, originally published in 2004, set out to transform how capital projects were designed and delivered. At the time, **capital projects cost too much, took too much time, and often failed to meet objectives**. Sutter Health was the testing ground for adopting a Lean Construction model after hiring Greg Howell and Hal Macomber to introduce these ideas to their building community. With the completion of the Sutter Health project under the LC model, the five big ideas were realized as an innovative project delivery system and approach.

By 2010, the Five Big Ideas became the basis for a **new kind of contract based on the relationships of the teams designing and building a project**. A lot has been learned since then and this ebook will dive into the components that help leaders to effectively navigate the collaboration of teams, identify opportunities to learn, and create action to design milestone conditions that build the best outcomes across the entire project.

This ebook will take a look back at where we’ve been and how we **implement processes that build successful teams** and complete projects efficiently in 2021.

We want to thank Hal Macomber for his insights as well as the others who have generously contributed their expertise and time to this ebook: *Carla Ciepliski, Terri Erickson, Jeff Loeb, Connor Butler, Mark Jussaume, Adam Hoots, Calayde Davey, Layne Hess, and George Hunt*.

The Five Big Ideas Transforming the Design and Construction Industry

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About Touchplan

Touchplan strives to **deliver approachable, progressive technology solutions** that transform construction into a more collaborative, transparent and adaptable process for everyone involved.

If we are successful we will improve the lives of our employees, our customers and their employees, and, most importantly, the lives of people who benefit from the finished projects that were powered by our solutions.

About MOCA

MOCA's niche in Early Project Definition and Alignment helps clients align their building projects for success by becoming engaged at the very beginning of each project, and **bringing together the project's qualitative and quantitative elements** described in quality, scope, cost and time. MOCA is a relationship-focused consulting firm, providing leadership to clients with large, complex, politically challenging projects.

Please visit **www.moca-pm.com** for more information.

1

Transforming the Design and Construction Industry: Where We Started

It was 2004. Sutter Health was faced with upgrading or replacing billions of healthcare facilities to comply with California's seismic requirements. **They were concerned that they wouldn't have access to the architects, engineers, and constructors** they needed because most healthcare organizations were in the same boat. They set out to distinguish themselves by adopting Lean Construction (LC) and hired Greg Howell and Hal Macomber to introduce LC to their building community.

The event, designed for more than 100 people, introduced the principles and practices of LC. But, we knew that wasn't enough. LC was about 12 years old at that time. Very few builders were practicing it. Fewer design firms had the experience. We also knew that the commonsense about the general practices in design and construction ran contrary to what it takes to succeed with LC. So Hal Macomber created a manifesto calling for the adoption of Five Big Ideas among the community of Sutter's design and construction partners.

Those ideas are:

- Collaborate, really collaborate
- Optimize the project as a whole
- Tightly couple learning with action
- Conduct the project as a network of commitments
- Increase the relatedness of the project participants

Sutter and their partners agreed to adhere to the principles of the manifesto and began experimenting based on those ideas and the Lean Construction principles and practices. While it was not all rosy, projects got better and better. By 2010, **the Five Big Ideas became the basis for a new kind of contract based on the relationships of the parties** designing and building the project. That contract was first known as an Integrated Form of Agreement. It's now universally known as Lean Integrated Project Delivery (LIPD).

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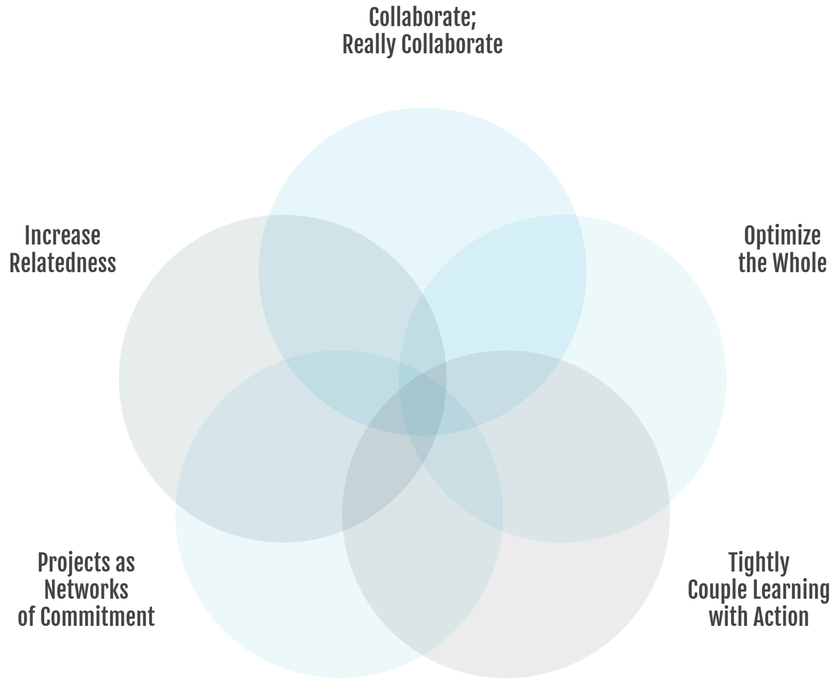
It's been 11 years since Hal Macomber wrote the paper Putting the Five Big Ideas to Work to guide how to succeed with those ideas. Hundreds of LIPD projects have been completed. So much has been learned. And, one big idea has been replaced.

In this ebook, **experts offer updated guidance** on bringing the five big ideas to life on your projects.



Source: From the original Five Big Ideas paper:
Putting the Five Big Ideas to Work

2

Collaboration Leverages Team-Based Processes

Collaboration has played a large role in the progress the industry made with Lean design and construction projects. It started in 1994 when the academic community began a collaboration that they called the International Group for Lean Construction (IGLC) to explore revolutionizing this industry. It continues with 27 years of double-blind peer-reviewed conference papers numbering in the thousands, each often written by multiple authors. The Lean Construction Institute followed their example in **creating opportunities at the local and national levels for people to learn, advance, and share** their experiences with competitors and other stakeholders in the construction supply chain. In 2004, as the five big ideas took shape, “Really Collaborating” became the first organizing behavior.

Here are 5 questions to get you started to make collaboration your habit:

1. Who could help me with this?
2. What do I have to offer others?
3. What new ways can we meet regularly?
4. How can we stay in tune with each others’ changing project work?
5. What can you do to be more responsive to each other?

Bring this up to your team at your next meeting. Use the five questions to generate actions you will take as a group and revisit each time you meet.

After 10 more years of experience, we learned that it was **much more than individual behavior**. Collaboration is also about the design of interactions and the system within which people interact.

Collaboration as Action and Mood

Ultimately, ownership lies with each of us as individuals to choose our behaviors in every situation and consider each human interaction we participate in. **These are some key observable behaviors that support collaboration:**

- Demonstrating appreciation for the point of view of others
- Show a personal balance in both supporting the task we are trying to complete together AND managing the relationship between ourselves and others
- Focusing on the common team-oriented goal and being personally committed to achieving it
- Engaging effectively in productive conversations that balance advocacy and inquiry
- Maintaining openness to be changed by what others say
- Demonstrating trust-building behaviors in the small moments (thinking Brene Brown)

We also know that the pre-existing relationship between individuals is a dominant factor in the degree of success in collaboration. The additional effort individuals must apply in collaboration is directly related to the familiarity that individuals have with each other before the collaboration activity.

Processes and Structures Are Essential for Building Collaboration Competence

The greater the complexity and the greater the number of people involved … the greater or more robust the processes and structure will need to be to ensure collaboration effectiveness. While singing kumbaya and holding hands may work for creating a positive environment, it won't help to execute the task we need to complete productively or effectively. After all, collaborating can also be defined as 'Co-Laboring,' or accomplishing a task together. So, a key component to making "Really Collaborate" work is to **leverage the appropriate team-based processes and techniques** to create a structure to effectively navigate the collaboration activities. We know of no better

Source: The Surprising Power of Liberating Structures

micro-processes than Liberating Structures. These are innovative and small methods of improving our interactions with each other. We use them in our work to bring out the best in each other. You should too.

There are other supporting tools or processes you can use depending on the activity your team is working on. For example, if your team is tasked with generating ideas to address a problem or challenge, you would benefit from some structured ideation techniques such as brainstorming, and brain walking. These techniques are intended to expose each participant's mental models visually, to allow for an improved understanding of the participant's individual thoughts while creating a mechanism to build/expand/grow ideas collectively.

Source: Interactions Design Foundation

If your team is tasked with making a decision, you will benefit from a structured decision-making system such as Choosing By Advantages Decisionmaking. These sound methods produce alignment to the important factors associated with the decision and transparency for the basis of the decision. Regardless of what task your team is faced with doing, **consider what additional structure is needed** to help collaborative activity.

Develop the Habit for Collaborating with Others

Collaboration as a skill is always available when we have habituated the action. In other words, we are more successful when it's an automatic action for us. Daniel Kahneman calls this "system 1 thinking or fast thinking." It comes from practicing it purposefully with feedback on how we're doing during the action. The gold standard for developing that level of acting is deliberate practice. Anders Ericsson coined this term, and seriously studied and experimented with people to push their capabilities beyond what everyone thought was possible. (See The Making of an Expert and Peak: Secrets from the New Science of Expertise.) The rule of 10,000 hours of practice to become an "expert" came from his work. The good news is that you can become highly skilled with a small fraction of those hours just by using your everyday work as the setting for deliberately practicing collaboration.

Carla Ciepliski, P.Eng. Owner & Consultant, Ternion Results Inc. contributed to this chapter.

3

Visualization Steers the Essence of Project Control

People acting from local or workgroup concerns rarely take care of the project as a whole. We learned that buildings don't perform as intended when engineers oversize elements of building systems on a discipline-by-discipline basis with concerns to minimize risk. We also learned that work gets out of sequence causing rework and delays when trades act independently of each other. These and other shortcomings detract from what we set out to accomplish for our clients when we design and build. Optimizing a whole takes attention and intentionality.

2010 Guidance for Putting to work 'Optimize the Project as a Whole'

AEC projects are contracted in ways that usually result in optimization at local or subcontract levels. Consulting engineers often manage their work to **maximize engineering utilization**. Plumbers do what is good for the plumbers. Other performers do the same. Some people say that if we do well with each of the parts, the whole will do well too. That is blatantly not true. And, people on the project know it. Sometimes it takes one group to go slow so that the project can proceed more effectively. However, the incentives are not set up to accomplish that.

Optimizing the whole requires ongoing attention. Circumstances change. **What appears to be good for the whole at one point in the project may not be so at other points**. It takes a recurring conversation and assessment among the many project participants to continue to act for the general well-being of the whole project.

Try asking just one question at each of your coordination meetings:

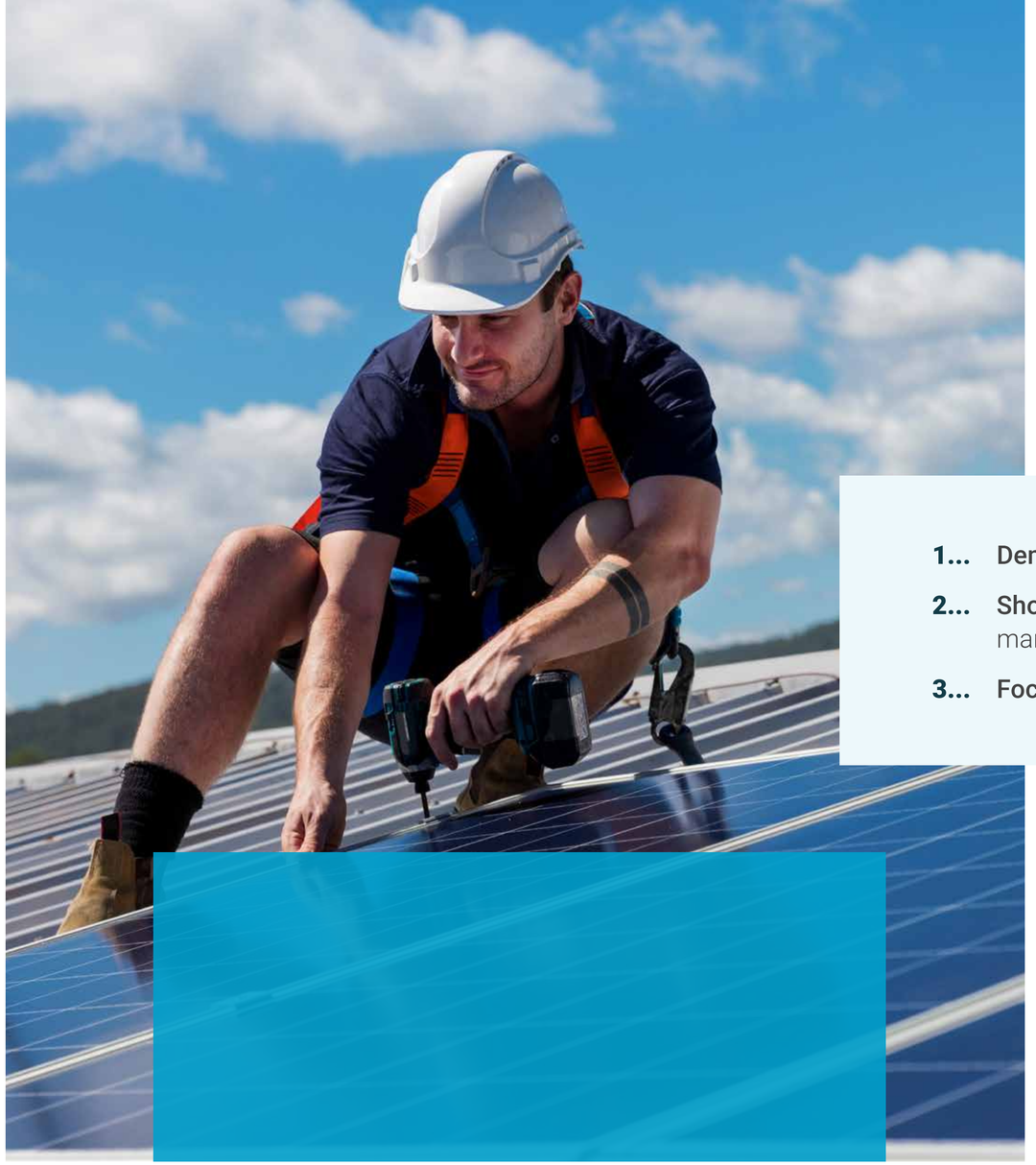
What is the best we can do for the project in the coming week?

Answer the question in the group setting. Be open to adjusting scope, fees, and plans accordingly. As a result, you'll do better for your client and the team.

New Guidance: Start with the 'Customer Mindset'

Why is it that there is something to be built? What is the purpose or business case for the project? What consequences does the Owner anticipate should the project not go forward? What constraint does the Owner mean to address with the project? The answers to these questions are not only important during design but throughout the whole project. **Failing to keep these concerns present throughout the project life will lead to individuals acting from their own perspectives** and perceptions. The client will suffer.

Operationally, the next person in line (production sequence) is my customer. The plumber is the customer of the framer. The electrician is the customer of the plumber. The framer installing bracing is the customer of the electrician. In design, it's more like a network than it is linear. Disciplines must regularly interact with each other to coordinate the design. Failing to do so results in requests for information, change orders, and rework all of which result in sub-optimization for the client.



Adopt New Standard Practices

Production system design of all stages of design and construction is essential for delivering the most value for the money available. The “design” of the project is the first act for optimizing the whole. The design of systems for material and non-material (professional services) production follows proven production or process theory. One good reference is This Is Lean: Resolving the Efficiency Paradox, by Niklas Modig and Pär Åhlström. Follow these three laws:

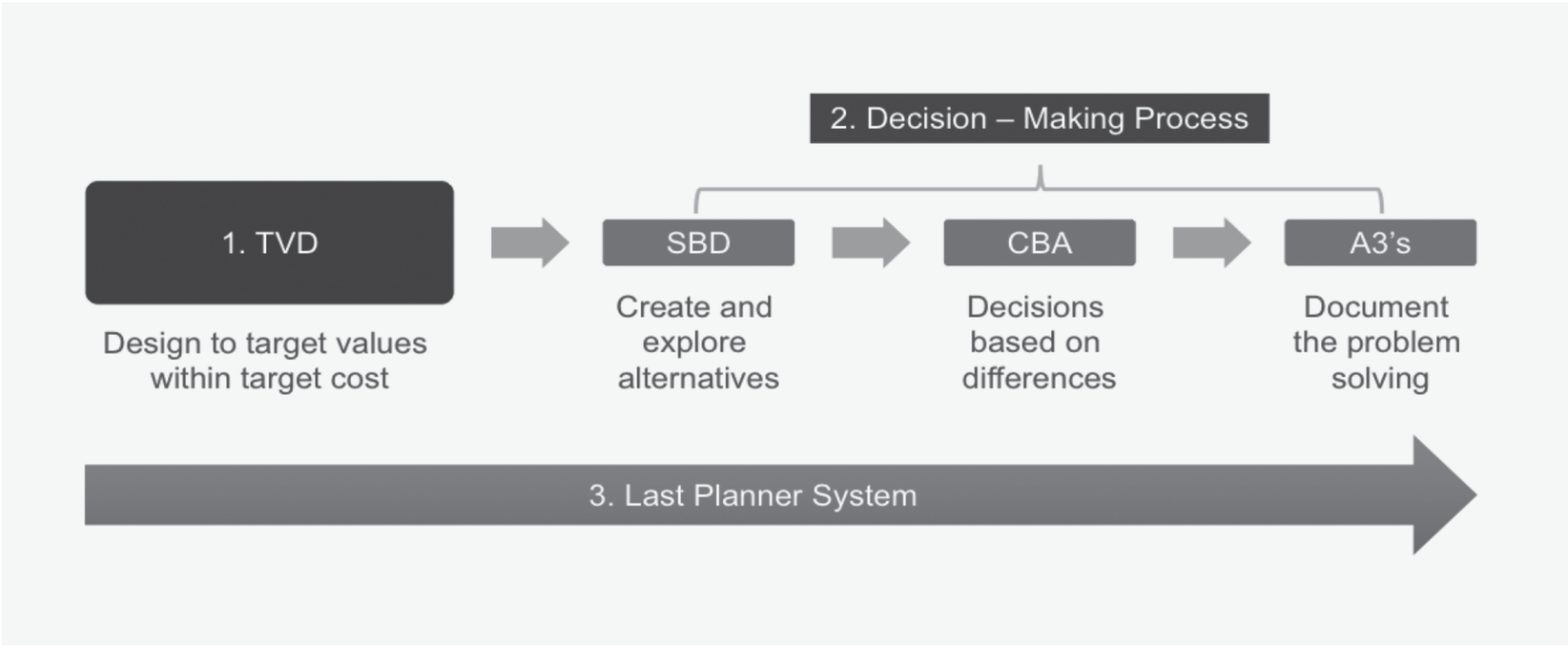
1... **Demonstrating** appreciation for the point of view of others

2... **Show** a personal balance in both supporting the task we are trying to complete together AND managing the relationship between ourselves and others

3... **Focusing** on the common team-oriented goal and being personally committed to achieving it

Good production system design will lead to better outcomes and speedier projects while reducing overall costs.

Concurrent set-based design coupled with Choosing By Advantages Decisionmaking is the current best practice to establish the “basis of design” at the client’s target cost. It alone will get the team far along to maximizing client value. Target Value Design is one example of this. Another is Jacob’s Collaborative Design and Scoping. In lean we place a lot of attention on reducing wasteful variation, and rightly so. However, in design, not all variation is bad. Intentionally producing variety is essential for innovation.



Source: Graphic from paper by Paz Arroyo and David Long

We must always remember that the future is not just uncertain, it is unknowable. Therefore, we want to **visualize the process to engage all project performers** in the ongoing process of adjusting and redirecting action in the always unfolding project situation. The Last Planner System® of Production Control and the Kanban Method are two widely-used collaborative visualization approaches. Visualization creates the conditions for people to act with responsible autonomy to steer the project. Steering is the essence of project control.

One important principle of Lean design and construction is "Make commitments at the last responsible moment." Jeff Loeb says its corollary is, "**Collaborate at the earliest responsible moment**." That goes equally for designing the project, the practices, and the relationships among the project participants.

4

Tightly Couple Learning with Action

The productivity of the design and construction industry has been slowly decreasing for over 40 years while productivity in other industries has soared. This is despite the countless innovations to materials, tooling, and equipment. Consequently, construction in many sectors, particularly infrastructure and housing, is unaffordable. Nearly 30 years ago, many of us thought adopting Lean would bend the curve to a steady incline. We misunderstood our situation.

In 1990 with the publishing of The Machine that Changed the World, the word lean was first used to characterize Toyota's approach to designing and building their cars. It merely meant there was no fat in their system. Unfortunately, it was a misunderstanding of the real nature of Toyota's approach. The misunderstanding continued when The Toyota Way was published in 2003. Jeffrey Liker claimed, "the heart of the Toyota Production System is eliminating waste," although he did go on to write about growing leaders and growing exceptional people.

We now know that Toyota's key principle is to grow people's capabilities through engagement with the work. Toyota's system is designed and evolved for everybody-everyday-always learning. That **learning is responsible for Toyota's unparalleled success** as compared to virtually every other automotive manufacturer. This learning is what has been missing from Lean design and construction efforts.

2010 Guidance on Putting ‘Tightly Couple Learning with Action’ to Work

Toyota’s goal is single-piece flow at the signal of the customer. But why is it so important to do just one at a time? The answer is we want to learn from each action we take. Toyota sees it as the opportunity to test and re-test their hypothesis of how to do work effectively. The approach is generally known as the Deming Cycle: Plan – Do – Study – Act. **Here are six ways you can begin adopting the principle “tightly couple learning with action” on your projects:**

1

Meet at the end of each day for just 5 minutes with the last planners (or frontline workers) on your project to give them the opportunity to report on the work they finished for the day as they had promised to do. Identify at that time any reasons for not finishing promised work. Re-plan as necessary.

2

Do detailed planning for short horizons (6 weeks or less). Review the outcome, then do more detailed planning.

3

Conduct a plus-delta review at the end of each planning meeting. Ask all attendees, (plus) “What produced value for you?” and (delta), “What could we change to produce more value for you?” Start the next meeting by referring back to the last review. Select one item from that list for focus during the meeting.

Put these to work on your project immediately. *Start by discussing this with your team. You might want to create a contest with them to see who can generate the most ways for coupling learning with action.*

4

Conduct a Good 5-Why™ for something that needs to be reworked, repaired, or replaced. Getting to the root causes of why something occurred will lead to actions you can take to avoid recurrence of the variance or problem. (See No-Fault Problem Solving)

5

Have a conversation with the whole team on something that needs improvement. Take action based on an 80% complete solution. Try it out. Review the results. Then create an 80% solution for the balance of the issue.

6

Attack the delays on your project. Explore with your team what keeps them from more closely coupling one person’s work with another person’s work. Experiment. Learn. Re-do the experiment.

Nearly 30 years ago, the learning organization was seen as the way the best organizations would function.

Jeff Liker mentioned it in the first edition of The Toyota Way. In the second edition, he put learning at the center of what distinguishes Toyota from others. Learning – building capability at individual, group, and company levels – principally happens in action. It's as true for learning to play the guitar as it is for doing the calcs to size a beam or for leading organizational change. Yet, too often we understand learning as what happens when taking a course, attending a webinar, or watching a TED talk. These activities take us away from the everyday work where we are in action. Toyota doesn't make this mistake. They use everyday work as the primary setting for building capability.

The above six recommendations from Putting the Five Big Ideas to Work mostly focuses on after-action steps you can take to learn. The key is what you can do to learn while in action. For instance, a few years ago, Calayde Davey of The Pocket Sensei – Mastering Lean Leadership took gigs to play Christmas music. The music was very familiar to her. She might have been bored. Instead, Calayde made playing that music the opportunity to practice very specific violin skills. In the other situation, Hal Macomber challenged a summer engineering intern to get the most from the experience. He said, "When you get an assignment ask 'what do you want me to learn while I do this?'" This is the central question each of us can ask as we begin to do whatever it is we are doing. The shift is to turn the work into purposeful practice. Use tasks to add or refine a skill.

The organization or project team can create circumstances where each assignment is the opportunity to practice what each person or a small group needs for growing skill or capability. It can be as simple as asking, "What is it I will practice while performing the task?" and "How will I know that I got better, or not?" Sometimes we need an observer to distinguish between doing something effectively and not effectively. Other times, self-reflection will suffice. Couple this practice with the widely used G.R.O.W. coaching approach adopted by Google and the workgroup or company will build the capability that the business or project needs.

Source: Performance consultants

Toyota Kata (TK) is a significant opportunity to develop critical and creative thinking skills for individuals and groups while pursuing workgroup and company goals. It was developed by Mike Rother while studying Toyota. The approach starts with a challenge – something beyond the reach of the team. People perform experiments (for the sake of learning) in the course of doing their work to advance their way toward the challenge. Learning is consolidated as improvements to the process or product. Customers, the company, and the team members all benefit as challenges are achieved and capabilities accumulate. There is a growing community of people practicing TK at KataCon7.

The key theme throughout our guidance for putting this big idea to work is to change your system and practices to use your everyday work to grow people on projects and throughout the organization.

Terri Erickson, Principal, Kata Consulting contributed to this chapter.

60% **increase in total users**

5

Projects are a Network of Commitments

An uninterrupted flow of value-adding work products is within the reach of every superintendent or project manager operating on the Last Planner System of Production Control®. However, three new practices are necessary: First, there must be a **practice for project performers to continuously update their promises** and declare complete. The second practice is **a system that calls attention to the action required** to keep the promises that are outstanding. The third practice is the **development of the project organization** so people are in a position to declare breakdowns and initiate compensating action.

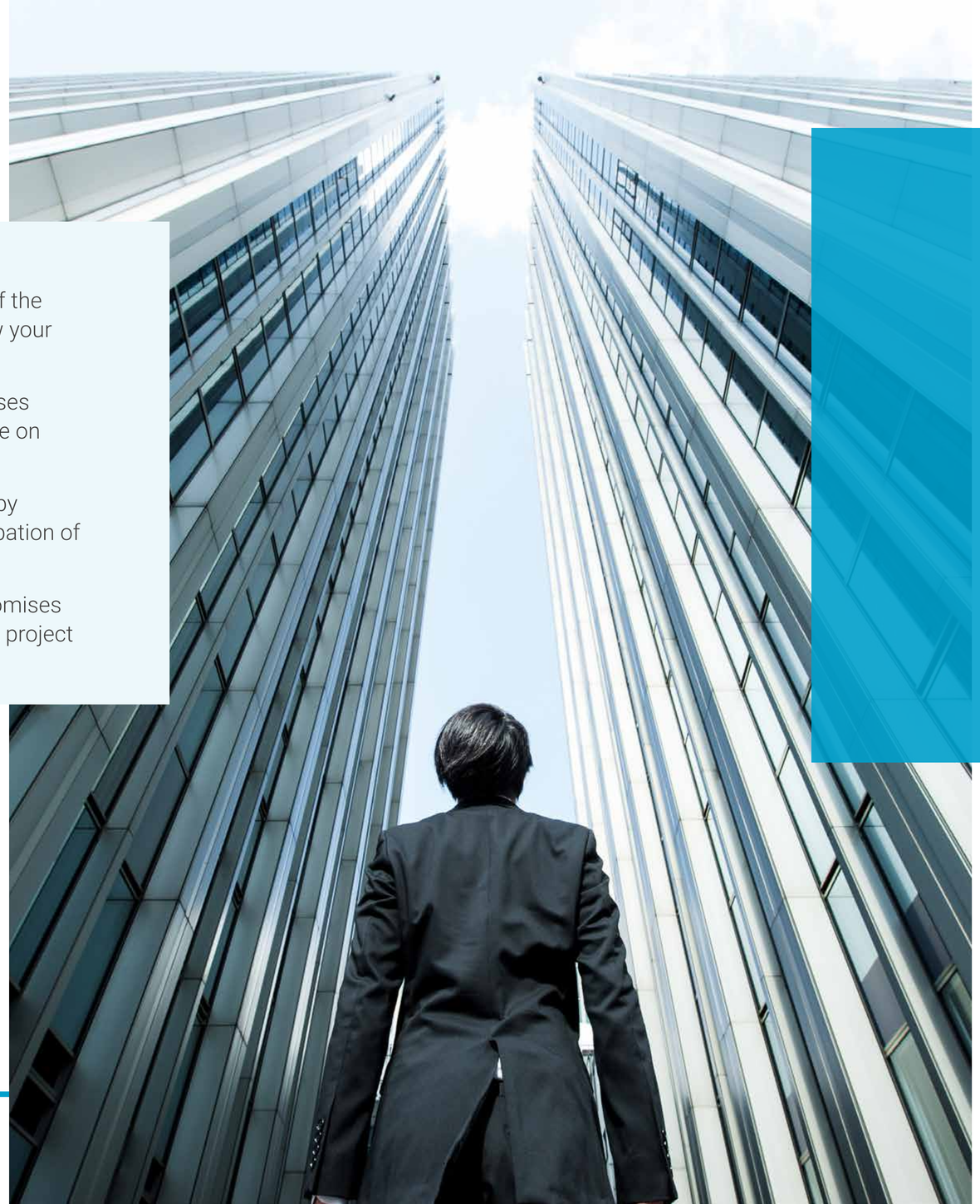
2010 Guidance on ‘Conducting the Project as Networks of Commitments’

A project is a single-purpose network of commitments performed by a temporary social system. Unlike recurring business processes, the networks of commitments on a project are designed and then evolve. Networks are refined as performers have experience. Performers in a project get one shot through the network. To complicate this project performers come together as strangers. They often lack experience with each others’ reliability to perform within the network. Without the experience with each other, project performers will hold out on making their best commitments.

Your role as project leader is to activate the network of commitments on your project. **Here are four actions you can take:**

- Set an example of making offers (promises) that take care of the concerns and needs of project performers. People will follow your example.
- Encourage project performers to negotiate offers and promises that they can reliably deliver. Help them as needed to improve on reliability.
- Be a good customer for the promises made on your project by offering your help to performers and announcing your anticipation of completion.
- Be quick to show your appreciation for the completion of promises including being notified at completion rather than at the next project

These actions begin to bring project performers together as team members who are taking care of each other while they take care of the project. Doing this publicly provides the basis for people to develop trust in each others' competence and reliability to perform. And it is just the beginning. Your role as project leader requires continued attention to the functioning of the network of commitments.



New Guidance to “Conduct Projects as Networks of Commitments”

Project leaders must **continue activating the networks of commitments**. Collectively, the above four practices support performers to make reliable promises. The text “network of commitments emerges rather than designed” was removed because design occurs in a process the Lean construction community calls **phase pull planning**. Evolution occurs by teams managing the promises in the network with a “practice” of making commitments with the intent to improve as the project progresses.

Source: Icicongress.org

Design and Negotiate the Conditions of Satisfaction for the Phase

Pull planning starts by **defining the milestone** that completes the phase. This is a collaborative conversation among the project performers for the phase. They engage with each other in the customer mindset — the next performer in the sequence is my customer. The conversation establishes a clear statement of the conditions of satisfaction (COS) that are to be achieved at the milestone.

COS are nouns and adjectives, not verbs and adverbs. We often give names to COS. For instance, two all-beef patties, special sauce, lettuce, cheese, pickles, onions on a sesame seed bun is a list of ingredients (nouns) that when assembled is a Big Mac.

For the construction phase that we call "overhead rough-in," the COS may include:

- Ready for third-party inspection
- Material installed in accordance with the building information model
- No pipe insulation where heat trace is installed
- Fire sprinkler capped without heads
- Ductwork openings covered with plastic
- Etc.

Often in Lean, we call establishing COS reaching "strong agreement on the what and how."

> "Timely production data that is tracked and analyzed will aid the team to make improvements to their system and practices"

Make it Easy to Update Promises and Report Completions

Managing promises starts with making it easy for project performers to **continuously update their promises** and report completions. This is typically done at an end-of-shift stand-up meeting with the last planners (trade partner foremen). It's best done in the location where the phase plan work is performed. It's done at the end of shift to minimize the delay or lag in sharing and responding to the day's performance. This gives the team the time overnight to make compensating adjustments before the start of work the following morning. Other project stakeholders can know and respond to the outcomes when you electronically capture the completions and adjustments to promises along with reasons for any variation.

Develop Your System to Call Attention to Opportunities for Improvements

We also want to engage in practices that call attention to the action required to keep the promises that are outstanding. While we set out to make promises that can be kept, we can encounter unforeseen circumstances. Material deliveries can be delayed; field conditions may be different than specified; production staff may be unavailable; equipment can break down; the workspace may be unavailable. And there can be a pattern to these emergent conditions. Standard practice is to **measure the performers' commitments via percent plan** (promises) complete (PPC). The best practice for high-functioning networks of commitments is to measure the reliability of enabling work such as materials, RFI's, and submittals along with investigating the promises that are missed.

"We need a no-blame, learning-first, one for all and all for one environment for high-functioning networks of commitments. Creating this starts with project leaders and trade partner supervisors and entails everyone on the project."

Develop the Project Organization to Take Care of Each Other and the Project

Last, we won't hear about the problems people see and encounter if they don't speak about them. We must develop the project organization so people are in a position to and will **declare breakdowns and initiate compensating action**. We use the word "breakdown" to mean any condition that would interrupt or keep us from completing a commitment. We often see trades, acting in a spirit of "minding their own business," fail to speak about something they see about another trade's work. We also see trades not report problems they have with their work. Instead, they see a problem — fix the problem — move on to the next problem. The networks of commitments are fragile when those patterns prevail.

Closing in on Uninterrupted Flow

The combination of promising reliably, designing the milestone conditions of satisfaction, and managing promises create a basis for designing production systems that follow sound production laws and that are robust to the remaining breakdowns in the project setting. This brings us closer to the lean thinking ideal of uninterrupted flow. It's there for your taking.

Connor Butler, Managing Principal, Relevate contributed to this chapter

6

Bring an Outward Mindset to all Interactions

Some of the most important decisions are taken at the early stages of projects. This is true when we bring architects and engineers together for conceptual and schematic design. It's true when a general contractor assembles trade partner foremen for the first of phase pull planning. To get the most out of these sessions care must be taken to tap the available perspectives, expertise, and judgments. Otherwise, we fall short of what we could be doing for our clients. The challenge is larger as we pursue industry-wide change. **In 2004 when the Five Big Ideas Transforming the Design and Construction Industry was published, it claimed:**

> **The chief impediment to transforming the design and delivery of capital projects is an insufficient relatedness of project participants. Participants need to develop relationships founded on trust if they are to share their mistakes as learning opportunities for their project, and all the other projects.**

While the industry made great strides, the challenge remains. Change the people to change the projects and the industry.

Prior Guidance for ‘Intentionally Build Relationships on Projects’

Whether you are a leader or team member, see to it that you take the time upfront to build your team. What does that take? Try these five steps:

1

Explore each others’ personal intentions and ambitions. Projects offer sufficient opportunities to take care of individual needs and desires. We just need to find out what they are. Then align those intentions with the promise of the project.

2

Cultivate practices of commitment-making. At the very first opportunity, begin practices of making promises in front of each other. This practice provides a factual basis for making assessments of trustworthiness and care for the team.

3

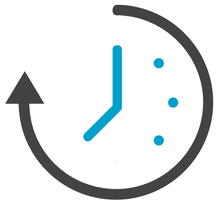
Make it your habit to acknowledge and appreciate team members. Become a mutual admiration society. High-performing teams are characterized as environments where people are acknowledged at least once every seven days for the talents, efforts, and contributions each team member brings.

4

Foster an environment for healthy conflict. Encourage team members to express alternate views. Even in the face of the agreement have someone create a different perspective.

5

Make the project setting a place where people can be their authentic selves without fear of judgment or mockery. Granting each other their legitimacy is the basis for the healthiest of relationships.



20M+

hours of construction work planned

New Guidance for Bringing an Outward Mindset to our Projects

Perhaps you've made the statement, "change behavior and you'll change results." My prior guidance only focused on the actions we want from people. That was good as far as it went, but it was not far enough. When we change our minds we change our actions. Mark Jussaume leads the Boston office for SmithGroup. The people in that office stand out in their community, markets, and on their projects for bringing an outward mindset to their interactions with each other and those on their projects. In this mindset, we see people as people, with their own wants and needs, expertise and perspectives, purposes and ambitions, and cares and concerns. This contrasts with an inward mindset where we have our attention only on those issues for ourselves. When we're inward others appear as objects or obstacles in our way. Mark says,

"**Bringing an outward mindset to projects is a force multiplier for changing behaviors."**

It starts with caring enough about others to be helpful. That entails:

- See people as people, as a human, with goals and aspirations like me.
- Be considerate, helpful, attentive, and thoughtful.
- Be curious around others. Suspend advocacy in favor of inquiry.
- Take accountability for your impact on others.
- Take care of others while you take care of yourself.

We move from outward to inward when we become self-focused.

- "When we turn inward," Mark says, "we tend to behave in ways that are less helpful such as subtly holding back information or we don't bring up issues that might make us look bad."
- "Other people become vehicles to get what we want, obstacles in our way or even irrelevant to us. We start to think in terms of "my work" as opposed to "our work".

35,0000+
users and growing

Some people might confuse an outward mindset with simply being kind or pleasant to work with. Having **an outward mindset means that other people matter** like I matter and by conceiving our work in this way we can achieve amazing results for ourselves and others.

Now, look back at the above five recommendations. Notice that each one of them is easier in an outward mindset — we are taking care of ourselves and the client — than the inward mindset — I need to have a productive work session. It's also true that bringing about the conditions for conducting projects as high-functioning networks of commitments — a no-blame, learning-first, one for all, and all for one environment — is possible when we turn our mind outward.

Bringing an outward mindset requires practice for it to be always available. It takes work. For us, it's the work of choosing, again and again, to be outward. The behaviors just follow.

Mark Jussaume, VP, Office Director, SmithGroup contributed to this chapter

7

Understanding Flow Efficiency

The Five Big Ideas Transforming Design and Construction were proposed in 2004 to a group of people in Northern California who were already embracing project-based production thinking. In 1999, the Lean Construction Institute published a few white papers on production theory as it applied to projects as did numerous researchers and academics in the International Group for Lean Construction (IGLC). Still, as people adopted phase pull planning from 2004 to 2007, production laws faded from the planning conversations. This is in spite of the near-ubiquitous use of the Parade of Trades® and the Lego® airplane production simulations in all Lean construction training. It wasn't until **This Is Lean, Resolving the Efficiency Paradox** was introduced at the 2015 Lean Design and Construction Congress in Boston that production theory was back in the conversation.

That simple theory consisted of three parts:

1) Flow over resource efficiency

2) Visualization

3) Continuous improvement

Three of the five big ideas are directly affected by the **appropriate use of production thinking**. They are “optimize the project as a whole”, “tightly couple learning with action”, and “conduct the project as networks of commitments”. The production theory issues are the same for all three. **It has to do with Taiichi Ohno’s lesson**.

> Flow when you can; pull when you can’t.

Adam says, “Pursuing flow is paramount on projects! Projects must project purpose!” Whenever flow is broken all three of the above big ideas are impacted. Flow and pull break when production laws are not followed. Let’s start with the biggest villain, the blind practice of launching work on the master (critical path method) schedule per the planned start date. (In CPM-speak, pulling work to the data date.) This violates Little’s Law. In short, **the more work we launch the further behind we get**. When work-in-process rises without an appropriate increase in the workforce, then the overall duration increases.

The second large mistake we make is taking our eyes off the bottlenecks. A change anywhere in the process other than at the bottleneck will not improve the production rate. Letting the bottleneck move around only makes it worse! **Find the bottleneck** and then use them to pace the flow through that phase of work.

Third, uncontrolled variation makes the project a crapshoot. There are three important measures we use in the Last Planner System of Production Control® that directly relate to minimizing variation.

1. **Percent plan complete (PPC)**
   an improvement measure of the reliability of completing work items as promised (planned). Due to the compounding of variation with dependence, PPC must be greater than 70% to get timely milestone completion.

2. **Milestone completion**
   a key performance indicator for overall timely completion of the project.

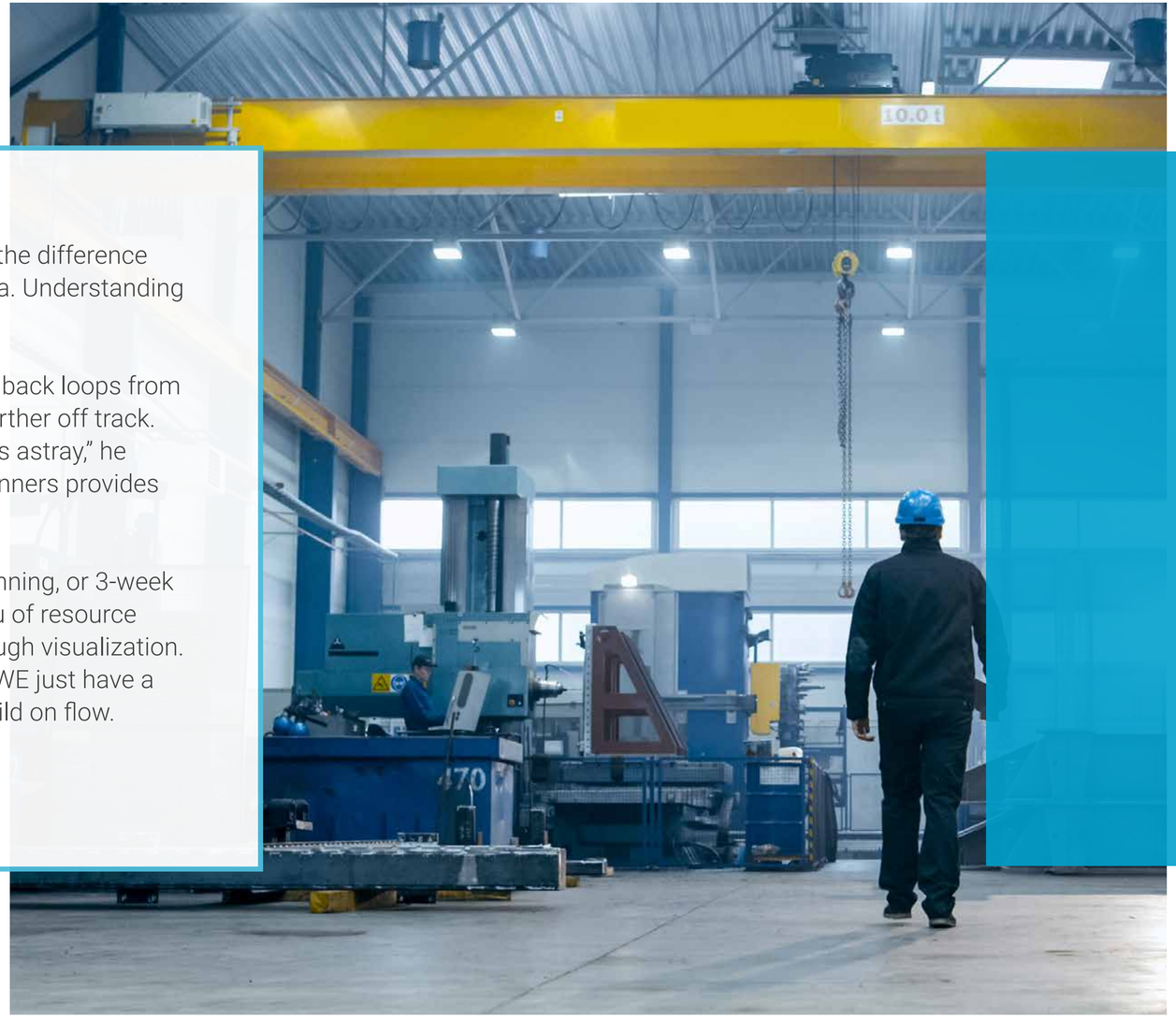
3. **Making work ready**
   reliably addressing all of the roadblocks and constraints to starting and finishing work items as promised.

For all three metrics, the percent isn't the interesting thing about the measures. It's the difference between the metric and 100% that is interesting. In other words, learn from the delta. Understanding what is driving the variation allows us to focus on continuous improvement.

Adam notes, "CPM would work if we focused on flow." That requires very quick feedback loops from what we set out to do and what happened. Without data-informed action, we get further off track. "It's the smallest details or misunderstandings in commitment keeping that takes us astray," he explains. End of shift/day commitment management stand-ups among the last planners provides the "steering" to keep production flowing.

Whether we practice CPM Scheduling, Takt Planning, Last Planner System, Pull Planning, or 3-week lookaheads, the point is that our teams must learn to focus on flow efficiency in lieu of resource efficiency. Once teams understand the flow, the team will then be able to learn through visualization. Improvement of flow efficiency is what we all seek within our projects, sometimes WE just have a tough time verbalizing that. You'll get the best outcomes when the five big ideas build on flow.

Adam Hoots, Operation Innovation, Langston contributed to this chapter.



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Project Outcomes Matter

So, maybe the five big ideas are not so big anymore. It was 17 years ago when the bold claim was made that the five big ideas would transform the industry. Since then, it has been adopted as one basis for the relational contract and delivery method that we now call Integrated Project Delivery. There is also evidence throughout the industry of giving high importance for collaboration and early trade contractor involvement for design assistance to optimize the project as a whole. Teams who use the Last Planner System® of Production Control use the name trade partners respectfully rather than subcontractors and they help the trades make reliable promises to other trades seeing each other as their customers.

While for many years the emphasis was on bringing about the behaviors or practices of the five big ideas, it was believed there was always something else. Client-owners wanted solutions, not just practices. Specifically, they wanted more competitive projects, high-trust environments, reliability in outcomes, continuous improvement, and innovation. Each of these outcomes sit at the intersection of two of the five big ideas.

- **Competitive solutions** — really collaborate + optimize the project as a whole
- **Continuous improvement** — optimize the whole + couple learning with action
- **Reliability of outcomes** — couple learning with action + conduct projects as networks of commitments
- **Building trust** — conduct projects as networks of commitments + bring an outward mindset
- **Innovation** — bring an outward mindset + really collaborate

Outcomes don't just happen. And, if you're not looking for them, then you may miss that they are available. While the claim that the outcomes could be found at the intersection of the big ideas, those intersecting practices are necessary conditions but not sufficient conditions. For instance, if you are looking for competitive solutions you need more than the intersecting actions of real collaboration and optimization of the whole project. We reasonably can expect that the timing of collaboration matters — neither too early nor too late — along with clear conditions of satisfaction and aspirational goals as targets for optimization. Miss any of those and you won't have competitive solutions. Similarly, for the other four desired outcomes there are insufficient conditions that could prevent the outcomes from being realized.

Calayde Davey points to the Eiffel Tower as an example of a client-owner who was only interested in a temporary gateway for an international exposition. Instead, the designers brought forth inspiration, ambition, with collaboration to design the tallest of all structures in the world (at that time) and an icon of possibility to this day. Our owner-clients deserve no less.

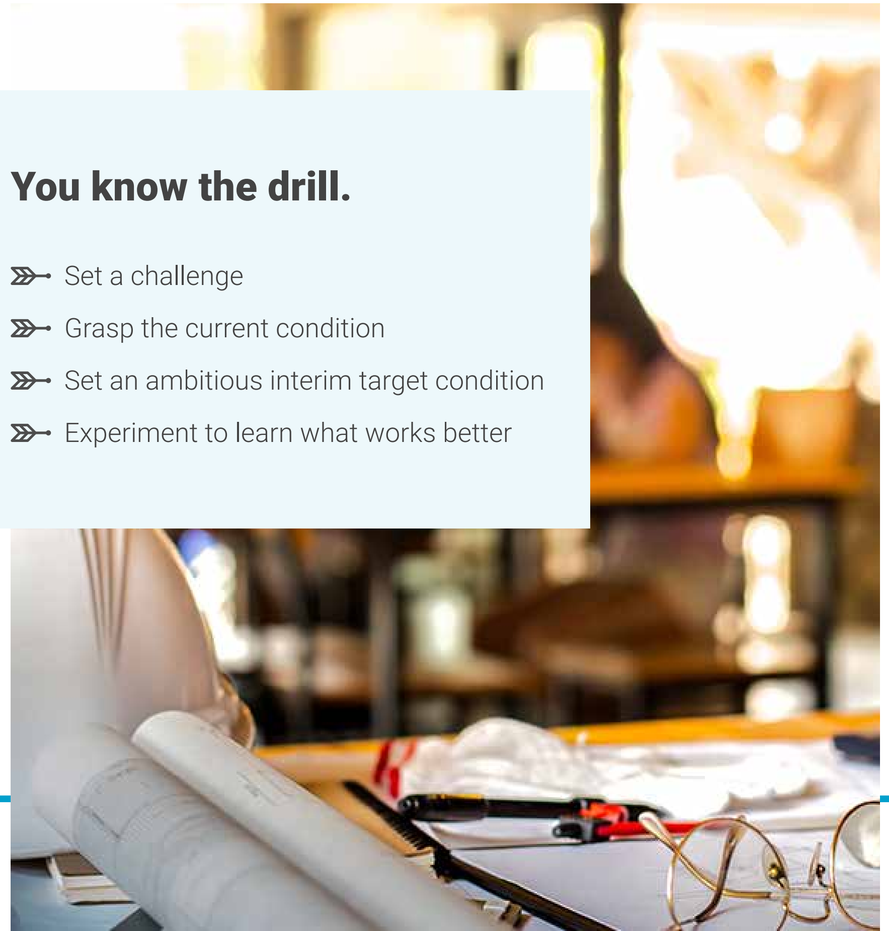
The building blocks to create the outcomes you want

While our client-owners may be more focused on their business cases for their projects, the desired outcomes are central to the realization of their goals. The five big ideas and practices are the building blocks for creating the conditions for realizing those desired outcomes.

We'd be remiss not to characterize our adoption of the five big ideas and the pursuit of the desired outcomes as ambitious. More appropriately, we're speaking about profound change at a system level. But don't be scared of that.

You know the drill.

- Set a challenge
- Grasp the current condition
- Set an ambitious interim target condition
- Experiment to learn what works better



As you adopt change, look out for unintended consequences. Our best intentions invariably can lead to poor outcomes. Also, remember that we're after improvement at the project level. Beware of improving locally at the expense of project-level improvements. If system (project) performance didn't improve, then the change wasn't effective.

Yes, the five big ideas are still transforming the design and construction industry. Adopt them to bring more value to your clients, your teams, and your company.

Calayde Davey, Ph.D., Research Associate, University of Pretoria, South Africa contributed to this chapter

How Jacobsen Construction Adopted the Five Big Ideas

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The five big ideas did not start as the basis for a special delivery model – Lean Integrated Project Delivery (IPD). The ideas proposed practices that could apply to all project delivery approaches. But, it didn't happen that way. For the most part, the five big ideas have not been embraced in the design, bid, build world. That is now changing.

When taking a closer look at Jacobsen Construction's success in adopting the Last Planner System of Production Control® (LPS) Layne Hess describes Jacobsen as a "medium growth" company with a focus on diversifying its markets. Three years ago, the management team decided to use the LPS on all their projects. They went from three projects using LPS to all projects — 70 of them — in just over a year. Jacobsen used Touchplan on all of them.

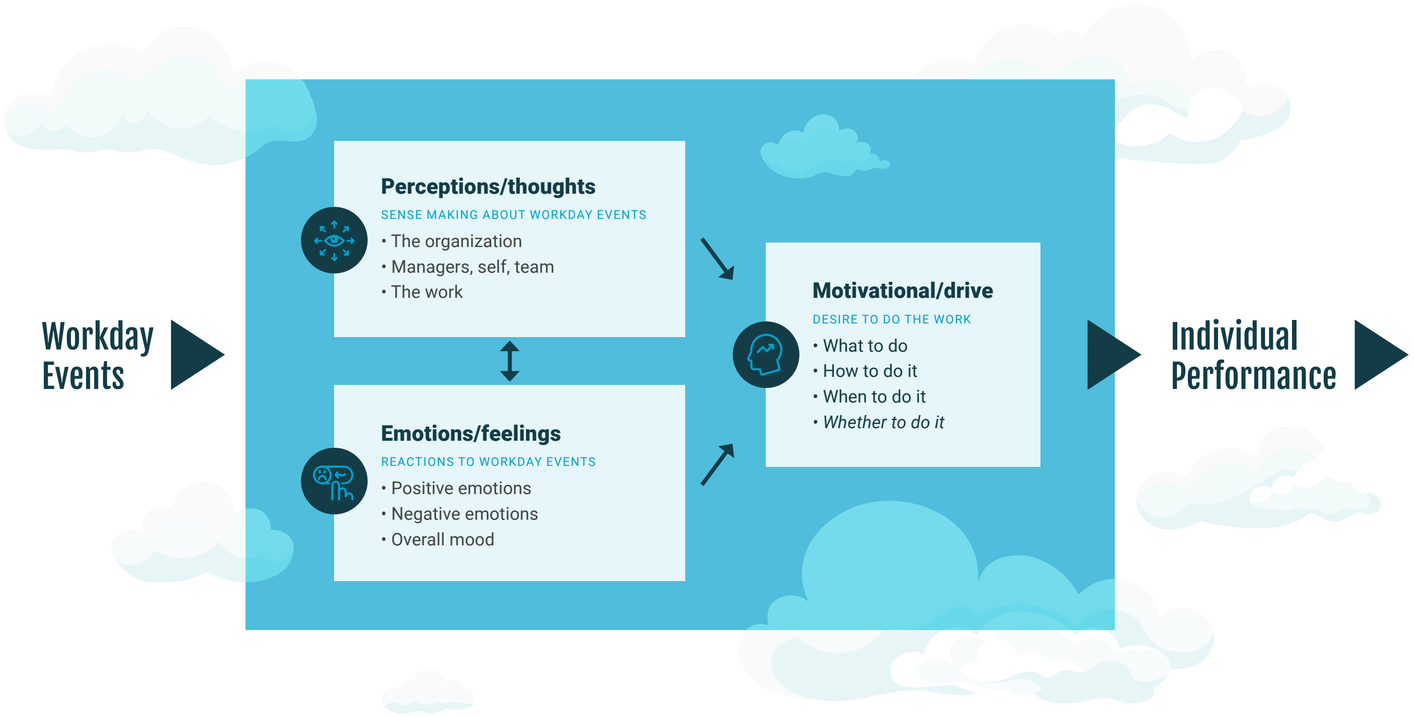
For background about Jacobsen Construction – Jacobsen was named the top contractor in Utah for seven of the last eight years. Why? They don't just take care of their clients, they take care of their people and their trade partners. Not in a paternalistic way, it is with an outward mindset to treat people as people. **They show respect; expect respect, and take care of each other** while they take care of the company and their clients.

Layne explains, "Start with why (the purpose) and keep it present throughout the project." **People know the purpose and keep the purpose present** in their conversations and their thinking. "We have the crucial conversations in an elegant way to protect the process and communicate how you're doing that." This is just the beginning of the story.

Why reliable promises matter

Operating the project as a network of commitments starts with “why.” In the LPS, trade partner foremen — last planners — make promises to each other as customers to put work in place. While the promises are tied to the phase plan milestones, it’s the purpose of the project that gives importance to the reliability of those commitments. Making reliable promises is essential for achieving flow. Due to the compounding of variation with dependence — one missed commitment cascades to missed commitments for others — the percent promises complete (PPC) metric needs to stay above 80% to achieve the milestone date for the construction phase. Layne has helped the company raise the average PPC across 70 projects by 14 points in just six weeks. He did this with the analytics from Touchplan Insights coupled with the teams’ efforts at promising reliably — learning from action + project as a network of commitments + outward mindset.

Inner Work Life System



Source: “The Progress Principle” by Steven Kramer and Teresa Amabile

Making reliable promises is essential for achieving flow.

Visualizing progress for the team is key

Layne also knows the power of the **progress principle** — the single most important factor for achieving any challenging goal is the participants must see their efforts result in progress. Layne has teams use interim milestones — at least once every four weeks in every phase plan — as mile-markers along the way to see that they're making progress. This works equally well for putting work in place as it does for increasing the participation of the last planners — learning from action + optimizing the project as a whole + outward mindset.

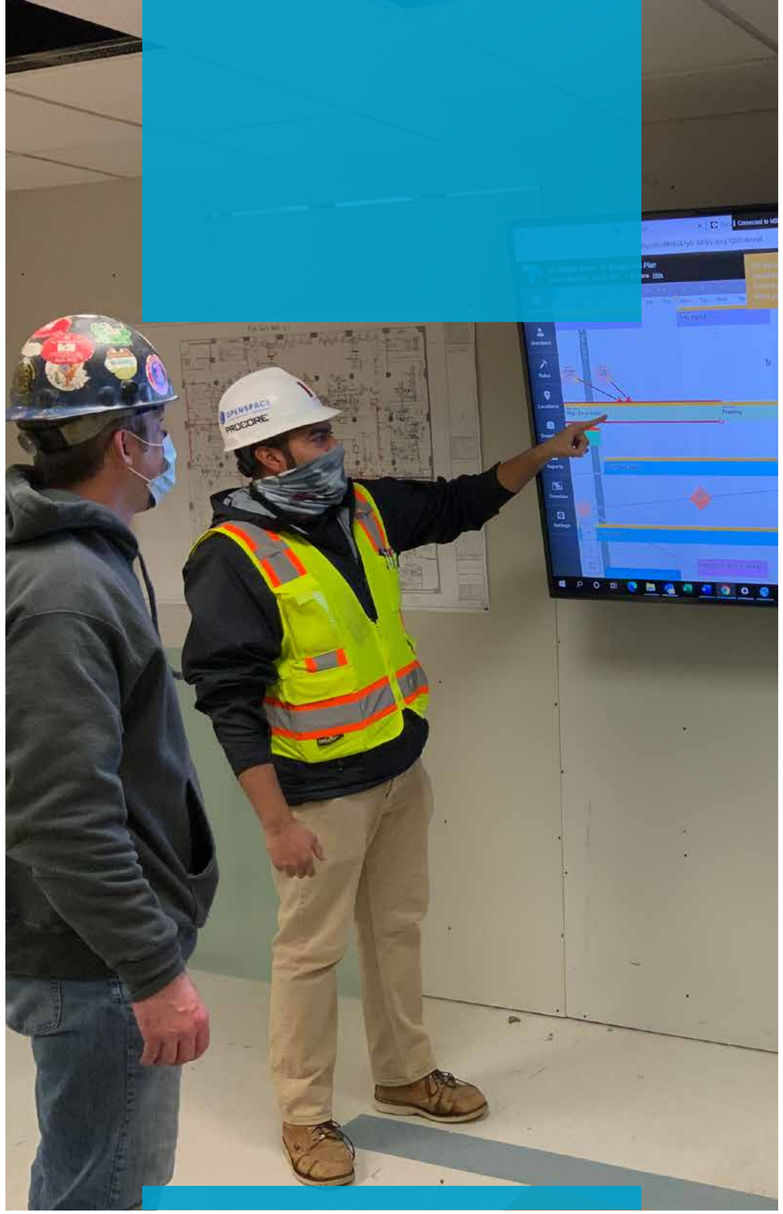
> Plan your adoption of the five big ideas just like you plan your projects.

Jacobsen is serious about bringing people along with them. Layne said, "We did the **Villego Last Planner** simulation with all the trades. We take on the responsibility to bring others along, helping the trades improve, too." We called that the outward mindset. He calls it doing the right thing.

Using the pull planning approach

Do you want better project outcomes? Plan your adoption of the five big ideas just like you plan your projects. Use a phase pull planning approach. Add interim milestones to engage the progress principle. Do it in Touchplan and you'll keep it visible, make it collaborative, and have the data analytics from Touchplan Insights to **focus the teams' efforts on data-informed improvements**. In no time you'll be as successful as Layne has been at adopting the Last Planner System.

Layne Hess, Corporate Director of Planning, Scheduling & Lean at Jacobsen Construction



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Designing our future

In 2004 when the Five Big Ideas Transforming the Design and Construction Industry was released, it was a time when extraordinary requirements for seismic upgrades were required in California. There was general agreement that then-current practices wouldn't suffice. Four years later, Lean Integrated Project Delivery (LIPD) was created. Many California healthcare projects were completed under this model along with countless projects across the country including theme parks, higher education, and life sciences projects.

Today's challenges

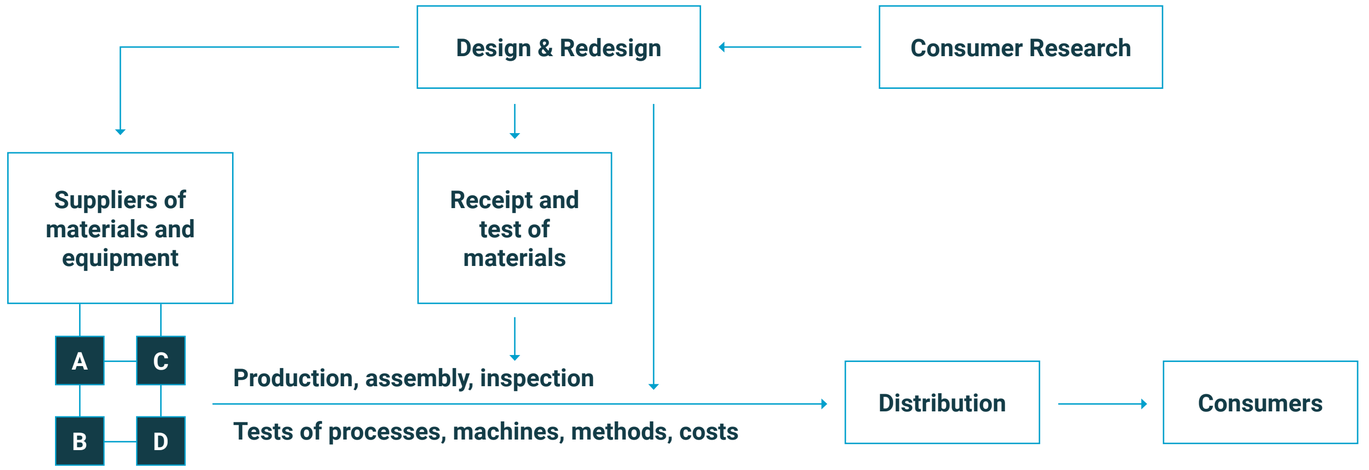
Today the industry is faced with equally daunting challenges, including:

- Unaffordable housing and infrastructure
- Decarbonization of the built environment and the industry that puts it in place
- A vanishing workforce, not just that the industry is unattractive, but we're not replacing the population (birth rate is < 2)
- Underperforming on equity, diversity, and inclusion
- Cultures to sustain changes
- A built environment that is resilient to rising sea levels and storms

To that let's acknowledge that significant change is underway, including:

- Off-site/Industrialized Construction
- Digitalization/datafication of everything
- Power to the edge — we're enabling the workforce using their phones — and force multiplier — the tools allow the trades to have more capability at their fingertips
- Consolidation of the industry
- Influx of technologies aimed at doing more with fewer people (i.e. 3D printing, drones, robotics)

Our current engineering-like approaches to challenges and change are insufficient for guiding and designing the future in the face of these challenges and change. We need another approach. That **approach is systems thinking.**

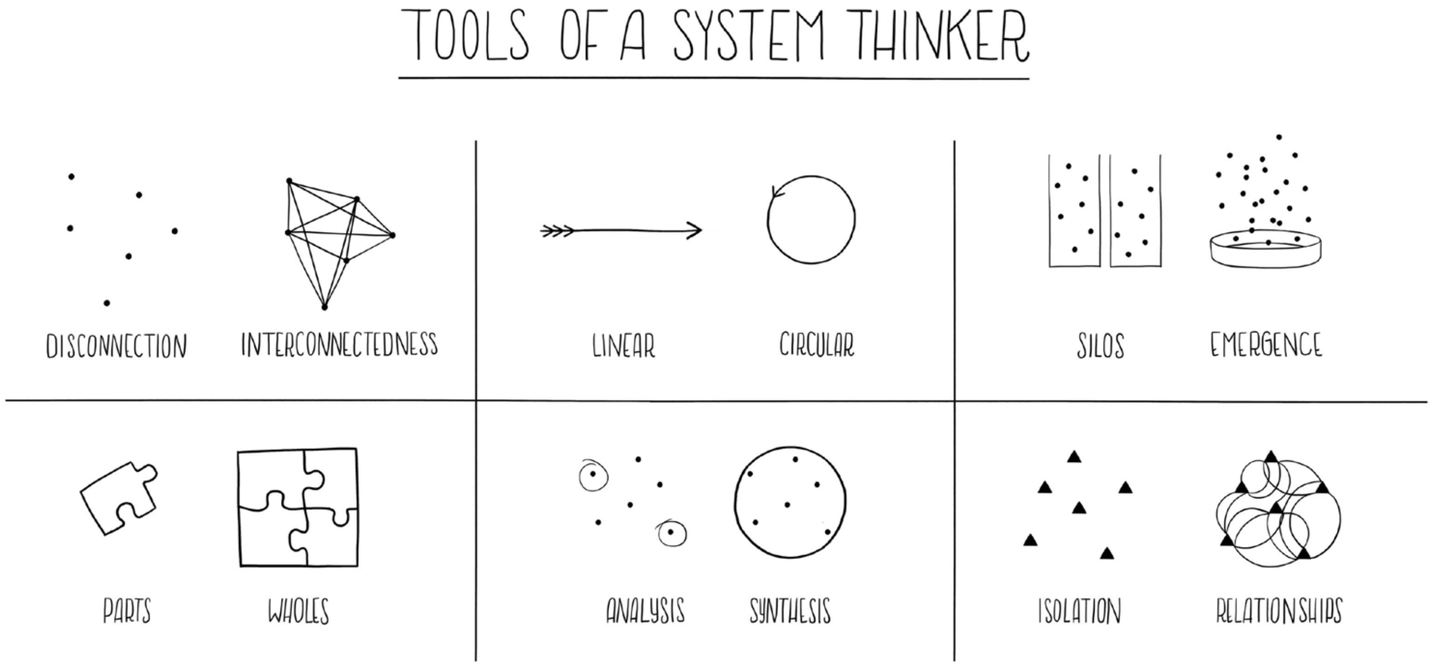


Source: The view of an organization as a system by W. Edwards Deming from Japan lectures in 1950's and also found in Out of the Crisis.

Systems thinking was birthed at the Sloan School of Management at MIT in the early '50s by Jay Forrester. He wasn't alone speaking about the systems nature of manufacturing, the economy, ecology, management of organizations, and other complex phenomena. At about the same time, W. Edwards Deming was speaking about **thinking in systems**. So too was Russel Ackoff who was teaching Operations Research at Wharton. But it was Peter Senge who made systems thinking popular with The Fifth Discipline, The Art and Practice of the Learning Organization (1990). (**See Tools of a System Thinker**) 14 years later, Jeffrey Liker writing in The Toyota Way made a fleeting reference to the importance of systems thinking. 17 years later Liker acknowledged he missed the significance of systems thinking in Toyota's success. He restated Principle 1 as "Base your management decisions on long-term systems thinking, even at the expense of short-term financial goals."

An optimistic future

While systems thinking is multi-faceted, one defining characteristic is that socio-technical systems, those that involve people and technology, have circular causality rather than simple linear causality. In other words, we typically think linearly that A causes B and B causes C. But how about A causes B and B causes A — circular causality? Examples include the rich get richer; the smart get smarter; the complicated gets more complicated. Deming and others describe the challenges of profound change, like moving from command and control to participative management, or from mass construction to lean construction, as governed by the systems nature of both the current condition and the future condition. When organizations are adopting Lean practices, it's at least as important to decide what you will stop doing as what you will start doing. Otherwise, the current system will prevail.



Source: "Tools for Systems Thinkers: The 6 Fundamental Concepts of Systems Thinking" by Leyla Acaroglu

George Hunt reminds us that many people looked at using Touchplan as additional work on top of what they were already doing. In systems terminology that is the balancing loop "not enough time." We changed the way that we introduced teams to using it. We looked at our current lookahead and planning process and made changes so that Touchplan would fit into what they already were doing, not adding additional work on top of them.

We can be optimistic about Putting the Five Big to Work if we approach it from a systems perspective. Otherwise, we are merely layering new practices on top of existing practices. This inevitably leads to a breakdown of the current system. Organizations won't let that happen, therefore they abandon the change. Embracing circular causality is the path for making profound change. Thinking in systems takes the focus off of the people and puts it instead on the system. It respects the fact that "humans are humans", which follows along with the "respect for people" principle and the outward mindset.

George Hunt, Head of Presales / Sales Engineering at Touchplan contributed to this chapter.

Resources

Case studies

Lee Kennedy
Sparrow Hospital

More resources

Putting the Five Big Ideas to Work (2004)
Data-Driven Decisions Drive Better Project Management By Michael Carr
4 Tips for a Zero-Punch-List-Project
Last Planner System® of Production Control
Liberating Structures By liberatingstructures.com
Building a Learning Organization By David A. Garvin
Choosing By Advantages Decisionmaking webinar series
4 Ways to Improve Projects Using Digital Tools
No-Fault Problem Solving By Leanproject.com
The Pocket Sensei – Mastering Lean Leadership By Calayde Davey
This Is Lean: Resolving the Efficiency Paradox, by Niklas Modig and Pär Åhlström
Toyota Kata
Choosing By Advantages Decisionmaking
Target Value Design
Collaborative Design and Scoping
Kanban Method
The Progress Principle
Tools of a System Thinker
Why I [Wish I Could] Hate Arbinger
The Outward Mindset: Seeing Beyond Ourselves
Leadership and Self-Deception: Getting Out of the Box
The Anatomy of Peace: Resolving the Heart of Conflict