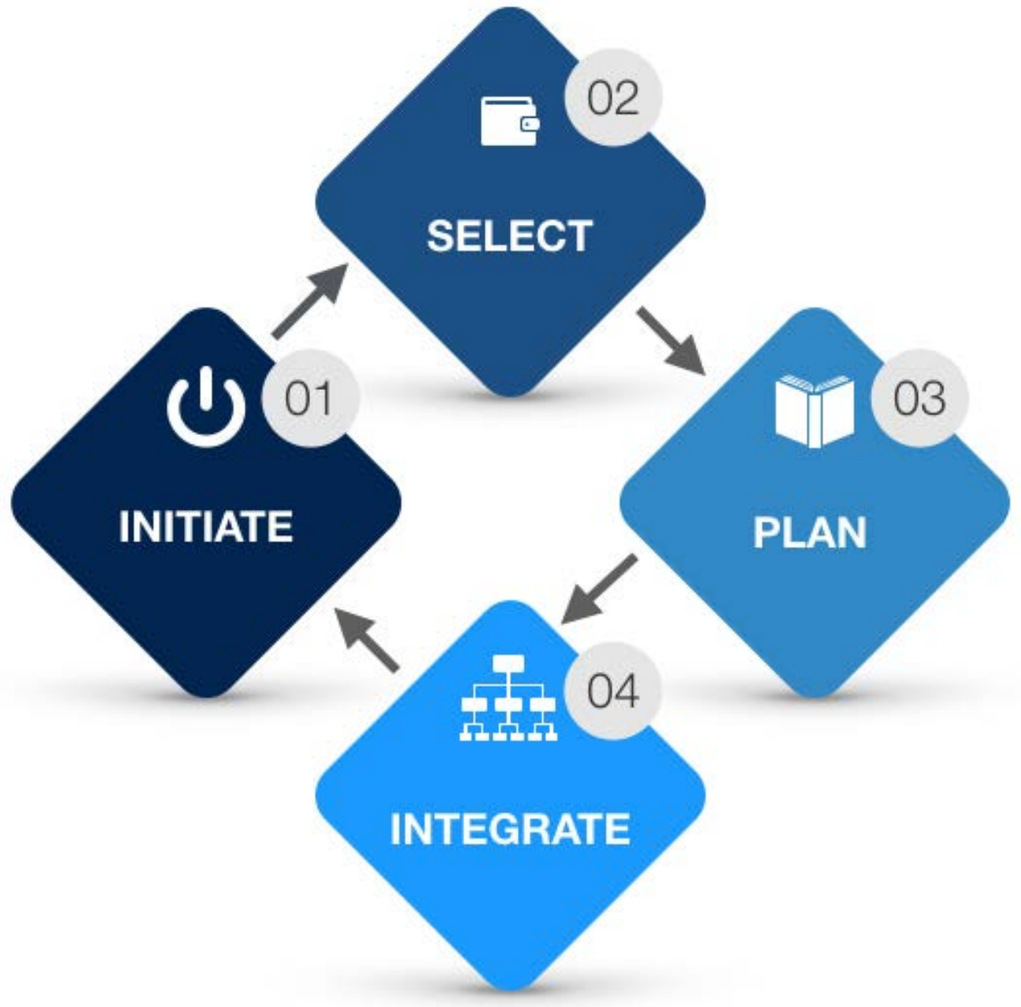
LEAN DEPLOYMENT PLANNING GUIDE

DESIGNING YOUR LEAN JOURNEY FOR A PROJECT



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About the Lean Construction Institute and Lean Project Management

Lean Construction Institute (LCI) is a non-profit organization founded in 1997. The Institute operates as a catalyst to transform the industry through Lean, using an operating system centered on a common language, fundamental principles and basic practices. The Lean operating system provides the foundation for a different, more collaborative and more effective form of project management. Use of Lean techniques produces a transformational way of designing and building capital facilities and generating major improvements in owner satisfaction while dramatically improving schedule and waste reduction, particularly on complex, uncertain and quick projects.

With over 200 corporate members, representing the owner, designer, general contractor and trade partner communities, LCI is a voice for industry as it relates to project work. LCI sponsors programs in education, networking and research to assist members on all stages of their Lean journey.

LCI Vision:
Transformational improvement in: the delivery of value to stakeholders, and the quality of the work environment for all participants, achieved by re-integrating a siloed industry through Lean.

Strategy:
LCI seeks to increase owner and construction supply chain satisfaction with design and construction delivery by creating demand for transformation in the owner community and developing the capacity in the supply chain necessary to meet this demand.

For more information on Lean Construction Institute, visit www.leanconstruction.org.

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Executive Summary

The core principles of lean construction are respect for people and continuous improvement by focusing on process improvements and flow of efficiencies, thus eliminating waste and creating value in facility delivery. Encompassing all lean principles, the overarching goal for implementing lean construction is to focus on continuous improvement of people, process, and product as we deliver construction projects. This can be achieved by implementing lean holistically on a project and focusing on the commercial structure (i.e., the business), the organizational structure (i.e., the culture), and ultimately, the operating system (i.e., the project) as shown in the LCI triangle (see Figure 1) (LCI, 2010).

Figure 1: LCI Triangle: A Framework for Change (LCI, 2010)

The purpose of this guide is to support a project team putting in place their operating system once their commercial and organizational structure has been established for the project. Developing a lean deployment plan for a project can help project teams to plan the lean principles and practices throughout the stages of a project by embedding them into the project management processes, ultimately delivering better value for clients while simultaneously improving overall safety, cost, schedule, and quality. The lean deployment plan is ideally meant to be developed by the project team collaboratively with commitment to the resources and competencies needed for lean implementation, following the formation of the project team and, the development and validation of the project's business plan.

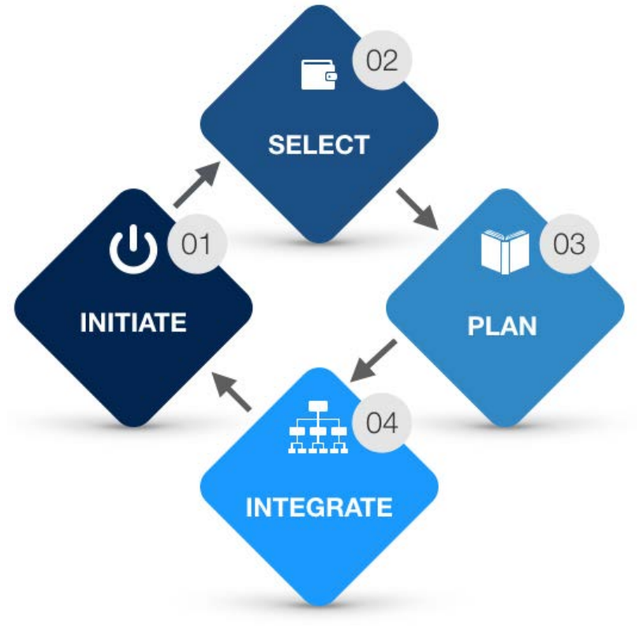


Figure 2: Lean Deployment Planning Procedure

*A **Lean Deployment Plan** is defined as a formal plan that outlines: the project's conditions of satisfaction, the selected methods, the plan for each method, and finally the consolidated project plan, which will be implemented to improve value creation and develop the strategy for communicating and learning from the implementation.*

Research shows that applying lean on projects leads to improved safety, higher quality construction, reduced project schedule, greater productivity, and last but not least, better risk management (McGraw Hill, 2013). However, adoption of lean principles into a capital project is challenging because each project brings together team members with a vast array of experience, abilities, and knowledge, and different levels of awareness and understanding of lean principles and methods. Therefore, this guide is designed to walk the project team through four steps (Figure 2) of the planning procedure systematically as the project specific Lean Deployment Plan is created, while encouraging discussion of lean principles and methods on the project. Each step in the procedure is defined and described in detail in the following chapters of this guide. Template resources are provided to help project teams work through the planning procedure, and document their project specific lean deployment plan.

Executive Summary

Using the plan the project team will be able to develop a common understanding of how lean will be deployed, communicated, measured, and improved supporting the project's conditions of satisfaction. The development of this common understanding can be achieved by collaboratively identifying the strategies and methods that serve the project requirements and then plan for their execution. As the project team works through the planning procedure, the templates provided within the guide are designed to help facilitate and document a complete plan for lean implementation. Therefore, it is beneficial for the team to collaboratively work on this plan, recording all the critical decisions that led to determining the project conditions of satisfaction, selecting methods, tracking implementation, defining the education and training strategy, communicating the plan, and improving continuously.

Audience

The Lean Deployment Planning Guide is designed to help:

Project teams interested, or required by the project client or owner organizations, to implement lean strategies and methods on their projects.

Lean coaches or consultants to promote and manage consistent implementation of lean principles and methods at a project level.

Project client or owners, informing them about what to ask for from projects implementing lean, giving them a place to start.

Overall, the primary audience for this guide is the team recruited for a project, whether a group of individuals interested in adopting lean or a group of firms engaged in a project.

Intended Use

This guide is intended to be used as a reference and tool in the early stages of project planning that can assist project teams to work through the procedure, using the attached template resources to define their project specific lean deployment plan, capturing the baseline for continuous improvement, in current as well as across future projects. At project initiation, when key stakeholders are engaged, this guide and additional resources can be used as tools to perform a lean soft-start or lean deployment planning kick-off. The guide will serve the project team to develop a project specific lean plan by orienting them to the lean construction methods that can support the project's conditions of satisfaction. Throughout the project duration, the project-specific lean deployment plan, developed with the help of this guide, can also be used as an on-boarding tool, to build common understanding between existing and new members of the project team. The planning procedure in this guide can also be used to conduct training workshops for lean project planning or even method planning.

Maintenance

The plan developed with the help of this guide is meant to be a living document and can be revisited to further improve or refine content as needed to maintain the successful implementation of lean principles and methods that fulfill the project's conditions of satisfaction. With sufficient number of implementations using the guide, we envision the ability to benchmark the performance and implementation of projects using lean construction methods and to track project, organization, and industry-level improvements.

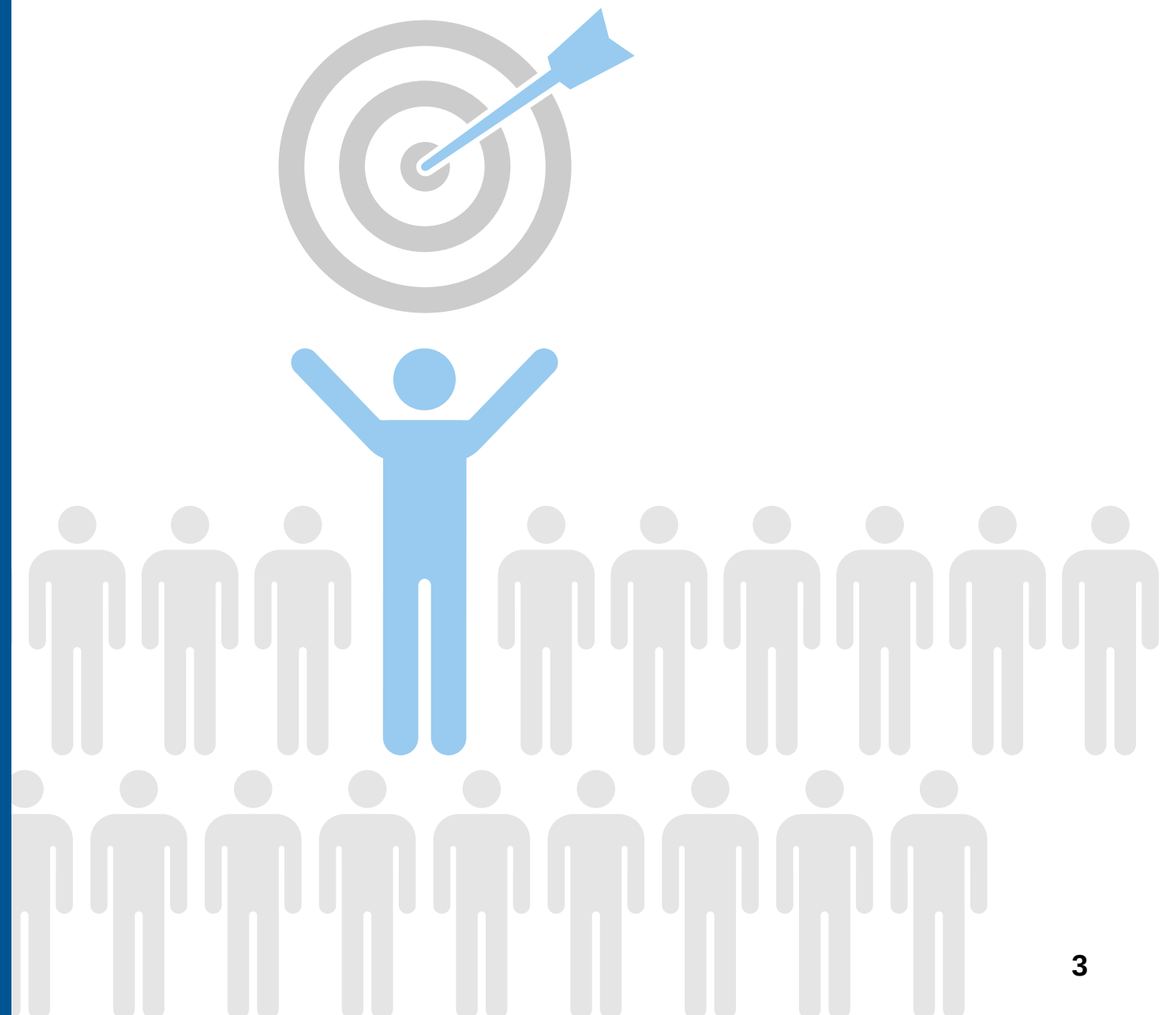
How can we build a culture for Lean within our project teams?

Culture starts with people.

Culture eats strategy for breakfast.

— Peter Drucker

Having the right culture is foundational to lean implementation, and culture starts with people. To truly initiate a lean culture, we need to embed such behaviors that support lean principles among our project teams. While using this lean deployment planning procedure and resource templates is useful as a means, the organization and project leaders must initiate the right culture and mindset through leadership, collaboration, modeled behavior, education, and making continuous improvement part of project routine.



Leadership and Collaboration

The procedure kicks-off with requiring the project team to set the conditions of satisfaction amongst the project stakeholders, selecting methods, and identifying responsible individual or groups for planning each method in detail. Throughout the lean implementation process, there exists opportunities for leaders to emerge by championing one or more methods. In the planning and pursuit of each lean construction method, there are built-in learning opportunities, intended to help project team members to develop essential knowledge, skills, and expertise. The project leadership must model lean behaviors and also integrate supportive routines to embed behaviors conducive to lean principles and practices. For example, using structured agendas is not only effective as a communication tool but also enables efficient use of the meeting times, allowing people to prepare ahead in time and add value during the work sessions. Similarly, introducing the routine for conducting plus-deltas at the end of each meeting or collaborative work session helps gather helpful feedback from participating members as well as gives everyone a chance to express their opinions about how the session was overall.

Performance

Once a plan is established for each method, the subsequent tracking for improvement opportunities promotes performance-based awareness. The target areas for improvement can help set the tone for measurement categories and specific metrics can be tracked by groups or individuals thus engaging them in the philosophy of continuous improvement that is essential to lean culture. The project team needs to consider how performance and improvement can be encouraged.

Education

Similar to continuous improvement, continuous learning is integral to lean culture. The planning procedure begins to draw this to the surface by helping teams define the initial educational plan for each method. It is essential that teams also consider embedding lean approaches throughout the project duration, supportive to education. Consider how will you create a learning culture on your project.

Communication

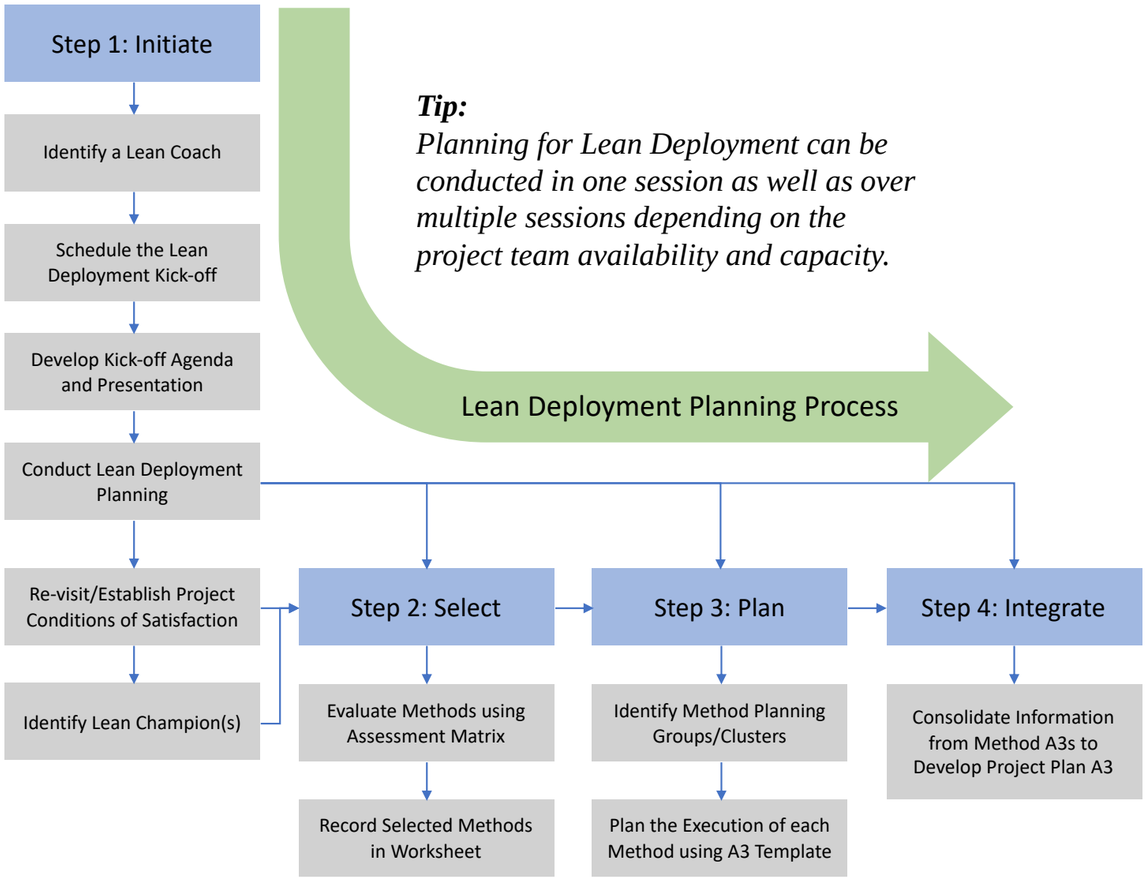
The effectiveness of the project plan is dependent on how well it is communicated to those responsible for implementing it. Therefore, to communicate both the plan or progress, the fastest and most intuitive medium need to be considered. The planning templates are oriented to allow the planned steps to be easily replaced with graphs, charts, or other visuals that will convey progress and performance. However, if these progress charts are not shared and communicated to all, their value and impact are negligible. Thus, consider where and how will you share your plan and progress?

Planning Procedure Overview

The planning procedure is comprised of four steps; each of these steps have been defined based on research conducted by the Lean Construction Institute to address consistent implementation of lean at a project level. By identifying current practices in method planning and implementation of lean across projects, these steps were developed to capture the best practices and to minimize the existing challenges supporting lean adoption.

Step 1: Initiate

The key outcome from this step is the organization of a lean deployment planning session that will be attended by key members of the project team. Throughout the lean deployment planning, the goal is to finalize the project's conditions of satisfaction (P-COS), select methods for lean implementation, plan the selected methods, and integrate the method plans into a project plan. The lean deployment planning can be organized as a one-time session to perform the entire procedure or as several sessions, whichever best suits the project team capabilities and needs.



Tip:
Planning for Lean Deployment can be conducted in one session as well as over multiple sessions depending on the project team availability and capacity.

Figure 3: Lean Deployment Planning Process

The lean deployment planning can be made more effective by: appointing a lean coach, who has experience conducting lean implementations; developing a facilitation agenda and presentation; and, scheduling sessions for the project team to collaborate. A prerequisite in developing the lean deployment plan is to have a clear understanding of the client's needs from the project. The client needs are usually captured in the project conditions of satisfaction (P-COS) during the validation phase and represent the value proposition for the project, which needs to be captured in the lean deployment plan. If the P-COS has not been developed, then it should be discussed and developed collaboratively at the lean deployment planning kick-off with project leaders, who thoroughly understand the client's needs. Once the P-COS are recorded as part of the plan, the project team leaders need to identify a lean champion, who can be responsible for leading by example during the lean implementation.

Step 2: Select

To deliver the value represented by the project's COS, the goal of the select step is for the project team to review specific methods in terms of their value versus implementation needs in enabling specific lean processes. For example, work clusters support organization of project team respective to the project's core performance areas, scope, deliverables, etc. to maximize efficiency and optimize resources. Due to each project being unique, a different approach and set of strategies may be required to meet project specific requirements. Therefore, with every project, a different set of methods also need to be selected that are complementary to each other in delivering the critical project needs. The method assessment matrix and selection worksheet together assist with brainstorming for each method in terms of their value versus opportunities or challenges.

Step 3: Plan

Once the methods are selected for implementation, the team should collaboratively develop the plan for each of the selected methods during the lean deployment planning kick-off/session(s). The method planning A3 template and the method one page summaries in the guide are intended to help project teams identify and develop the targeted methods. The planning helps to translate the P-COS into an actionable plan that can be measured and continuously improved throughout the project duration.

Step 4: Integrate

Once the implementation plan for each method has been laid out for the project, the project team should work collaboratively to integrate and further develop the metrics, educational plan and communication needed, to track lean implementation at the project level. The goal of the integrate step is to consolidate all the information from the method templates into a project A3. The project A3 is the basis for continuous reflection and improvement of the lean deployment plan. Routine events such as project plan reviews and reflections need to be embedded into the project processes with time and resource commitments to enable the project team to learn and improve. The implementation plan can also be integrated into the project's management processes, such as scope and cost management or design development, to support overall project delivery using lean deployment.

Step1: Initiate

Preparing for Lean Deployment

"Start with the end in mind."

— Stephen R. Covey

The Lean Deployment Plan is intended to be developed following the formation of the project team, and the validation of the client's business plan for the project. Depending on the project team's awareness and understanding of lean, the lean deployment planning can be made more effective by: appointing a lean coach, who has experience with lean implementation; developing a facilitation agenda and presentation; and, scheduling the lean deployment kick-off, a collaborative planning session. During this session, the project team works together to develop the project-specific lean deployment plan.

Lean Coach

The project leadership is responsible for identifying a suitable lean coach for the project, who is knowledgeable about how lean methods are implemented throughout various projects. The lean coach can vary from someone in-house to a third party consultant, depending on the project team's maturity towards lean. By helping to identify and fulfill the project team's need for lean education and training, the lean coach is responsible for enabling the project team's overall alignment to lean principles and practices.

Lean Deployment Kick-off

The lean coach and the project leadership should then conduct the lean deployment kick-off. With the help of an agenda, during the kick-off, the project team needs to collaboratively review the planning procedure and the template resources included in the deployment guide. Additionally, the lean coach can introduce the team to other resources supportive of lean education and implementation. Although the kick-off is a one-time session, the overall lean plan can be developed over multiple sessions depending on the project team's capacity and availability.

Project Conditions of Satisfaction (P-COS)

A prerequisite for developing the lean deployment plan is to have a clear understanding of the client's needs from the project. The client needs are usually captured in the project conditions of satisfaction (P-COS) during the validation phase, which represent the value proposition for the project and need to be captured in the lean deployment plan. If the P-COS has not been developed, then it should be discussed and developed collaboratively at the lean deployment planning kick-off with project leaders, who understand the client's needs.

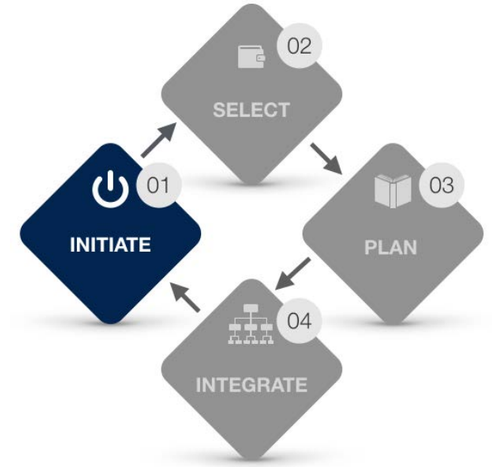
For the purposes of planning the lean deployment in a project, the **Project Conditions of Satisfaction (P-COS)** ***are defined as a set of criteria that are developed based on the client's business needs from the project and, act as a baseline for the project team in making decisions along the project duration.*** These conditions serve as common ground rules for planning and performing work as per the client's satisfaction and all members are jointly responsible. Simply put, they are the goals or critical success factors for the project, which the team should consider throughout the project duration, to make decisions.

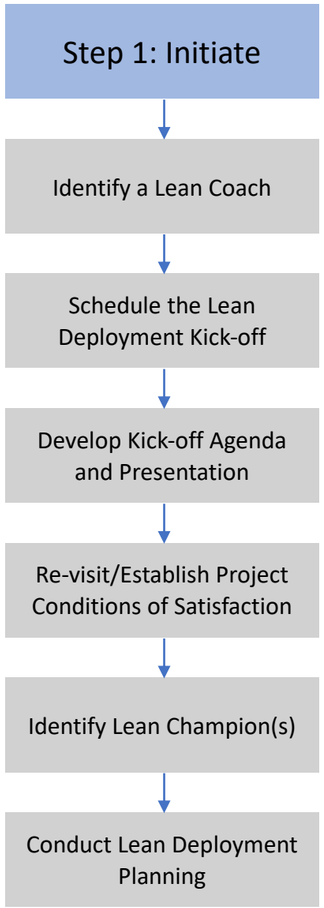
Lean Champion(s)

Following the P-COS being recorded, the project leaders should then identify lean champion(s) for the project. A lean champion is different from a lean coach. ***A lean champion needs to be someone from within the project team, who serves as a role model in aligning with lean thinking and action while spearheading the implementation process.*** The lean champion is responsible for overseeing the overall deployment of lean initiatives on the project. They can be someone with prior lean experience or can be trained by the project's lean coach.

Deployment Planning

Once all the preparations, such as the scheduled kick-off, agenda, presentation, lean coach, P-COS, and lean champion, are in order, the planning for lean deployment can be facilitated in one day long workshop-style session or over multiple follow-up sessions depending on the project team's schedule and capacity. Prior to onboarding members on this path, some members may require foundational lean education and training. Such trainings can be provided by the project's lean coach, specific to the project. Alternately, project team members can participate in webinars conducted by industry organizations such as the Lean Construction Institute, the Associated General Contractors Association, etc.





Step 2: Select

Review and Select the Project Lean Methods

"The hardest thing to learn in life is which bridge to cross and which to burn."

— David Russell

To deliver the value represented by the project conditions of satisfaction (P-COS), the goal of the Select step is to guide the project team through learning about lean construction methods, reviewing specific methods in terms of their value and implementation needs, and accordingly selecting those that are most effective for the project. Due to each project being unique, a different approach and set of strategies is required to meet project-specific requirements. Therefore, with every project, a different set of methods also need to be selected that are complementary to each other in delivering the critical project needs. During the lean deployment planning session(s), once the project team is onboard with the project conditions of satisfaction (P-COS), the lean coach and the project leader(s) should lead the project team through a collaborative method education, review, and selection process. Together all the guide resources are intended to help project teams brainstorm for selecting each method in terms of their value in meeting the P-COS versus their opportunities and challenges due to the project team's awareness and understanding of those methods during lean implementation.

Evaluating Methods

Prior to selecting methods for implementation, the team needs to evaluate them in order to understand two aspects about the method. One, which methods have the potential to really help with achieving the P-COS and two, how experienced is the project team to implement it. The method's potential in meeting the P-COS is based on expert judgement of the lean coach and the project leadership. The project team's comfort level in implementing a method is based on the project team's awareness and understanding of each method. If a method helps with meeting the P-COS, and the project team also understands the foundational process supporting that method, then they will be more willing to implement that method.

An assessment matrix (Figure 4) is provided to assist the project team perform a quick visual assessment of how the lean method's value-level in meeting the project conditions of satisfaction (P-COS) relate to the project's team's experience-level with that method.

For example, methods that the project team has high-level of awareness and understanding of and therefore, require little or no training, are those that should definitely be considered based on order of value to P-COS. The dark to light shade of green represent the high to low in order of importance with which the method should be considered by the team on the project for implementation.

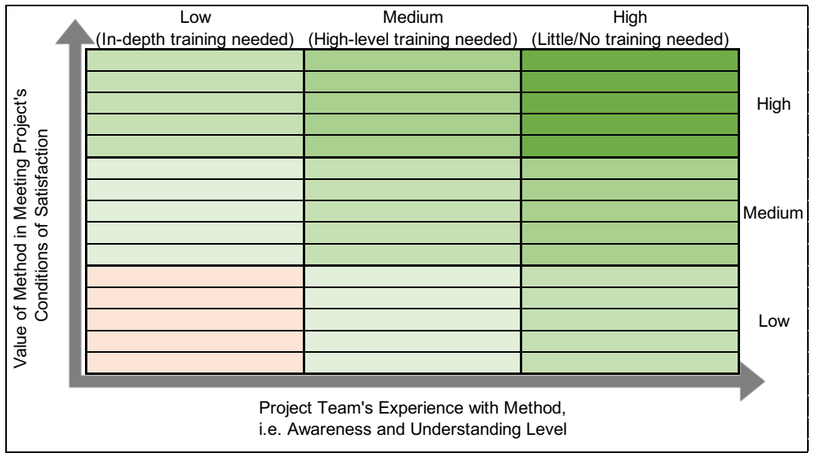


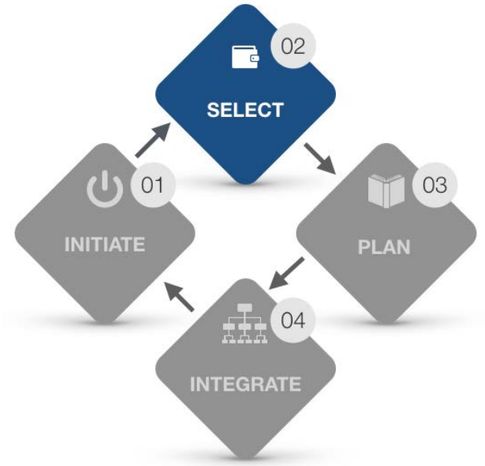
Figure 4: Methods Assessment Matrix

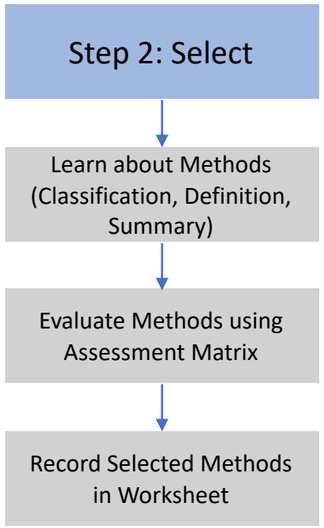
Selecting Methods

The selection worksheet is designed to record the P-COS, methods of potential value in meeting the P-COS, the role or group that would be responsible for implementing it, the corresponding education and training needs, and if the project team is in consensus to proceed with planning for such methods. The team does not need to wait to make all final selections to proceed with the planning. New methods may be selected in future depending on the value they bring to the project.

Project Goals/ Conditions of Satisfaction (P-COS)	Potential Methods	Value in Pursuing Method	Primary Responsible Role/Group	Education/ Training Needs	Notes	Implement Method?

Figure 5: Methods Selection Worksheet





Methods Classification by Function, Process, and Phase

The methods included in this guide are organized into two functional categories to help align the them with the project processes being targeted: organization and operating system. Figures 6 and 7 show frequently used methods in lean implementation classified by their function, their role in supporting various project management processes, and their timing relative to project phase, e.g. when they can be implemented. Other methods that are less common or that do not require the same level of planning by the team but still are considered in lean implementation are also included in the definitions on pages 9-10 to make project teams aware of further options. These less common methods are listed at the bottom half of the pages and are indicated using a lighter color.

Operating System Methods

Operating system methods (Figure 6) are related to the core project work and can be planned in advance for implementation when the project is about to start. For example, Target Value Design can be used to define the project targets based on customer value and then the project scope and cost can be managed to meet those targets along the project duration. This is implemented by allowing the design to be developed and the production system to be designed per the project targets offering maximum value.

Organization Methods

Organization methods (Figure 7) help align the supportive project processes that enable the project's operating system, such as team organization, problem solving, decision-making, etc. and help the project team set-up the groundwork before starting the project execution. For example, "Onboarding is a way for new employees to quickly acquire the necessary knowledge, skills, and behaviors to become effective organizational members." (LCI). Thus having a pre-planned onboarding process for new project team members will increase engagement and commitment, resulting in higher performance.

Methods by Project Phase

As project teams develop, or re-visit, lean deployment at different stages of the project lifecycle, Figure 6 serves to orient project teams to the application of certain methods based upon the project development. Some methods, such as Agile planning, are quite valuable in iterative planning of design amongst inter-disciplinary project teams. Others, like Takt planning are targeted at the detailed production planning of construction tasks. Some methods can span across both design and construction, such as the Last Planner System. And a few methods, such as Choosing-by-Advantages need to be planned early, but are used on an as-needed basis, such as in critical design decision-making.

Once the methods classification is reviewed, specific methods can then be considered using the method evaluation matrix (Figure 4, Appendix A5 and selection worksheet (Figure 5, Appendix A6). Together, the matrix and the worksheet help the project team evaluate each method in terms of the value they bring to the customer and what is required to implement them.

Following the method selection, the team should break into working groups and develop the plans for implementing each of the identified lea methods. An A3 planning template is included to help define the key components for each method, allowing them to be customized to each project and teams' needs.

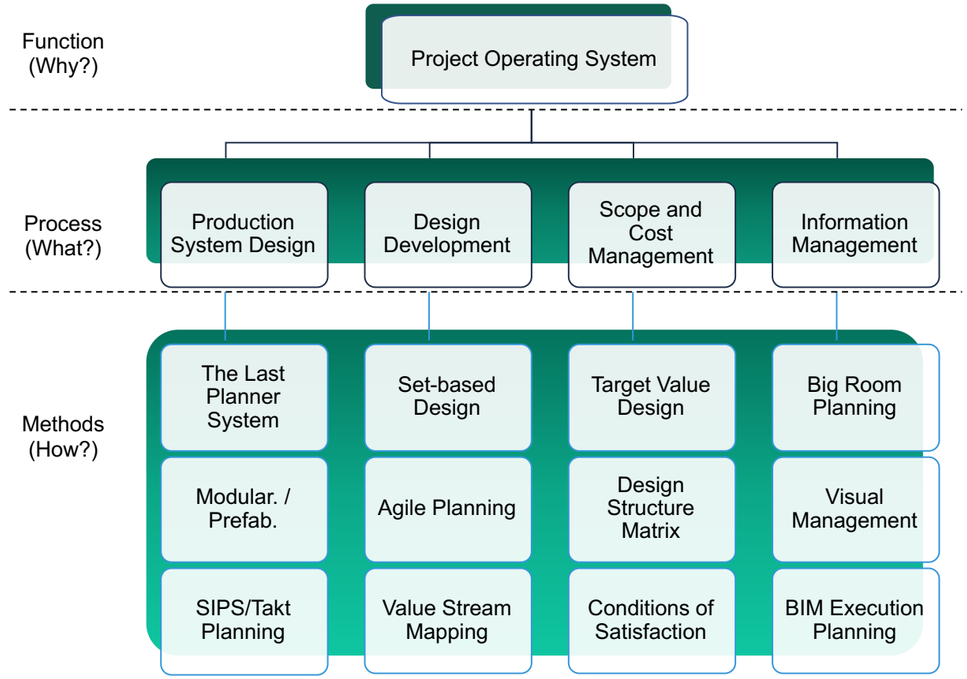


Figure 6: Operating System Methods

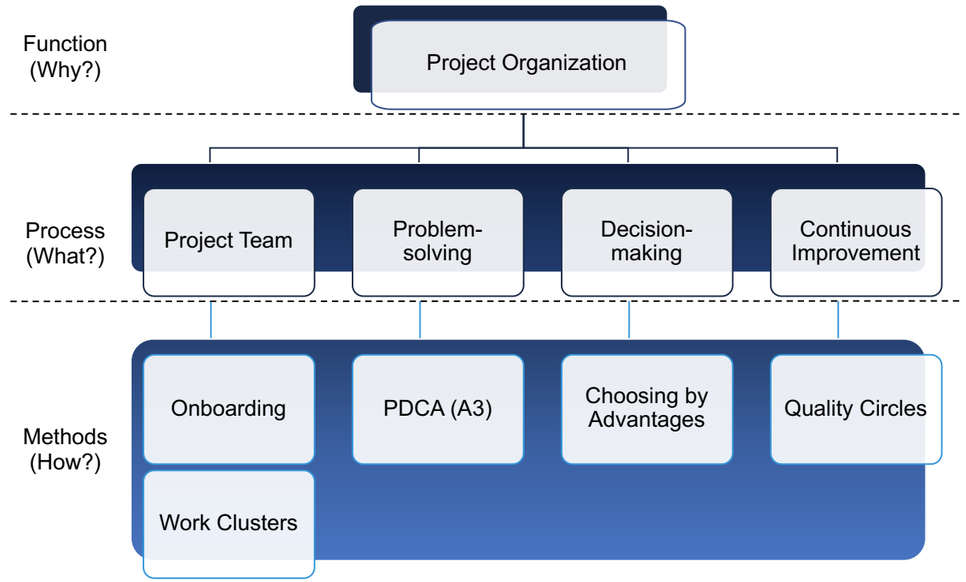


Figure 7: Organization Methods

Methods Classification by Project Phase

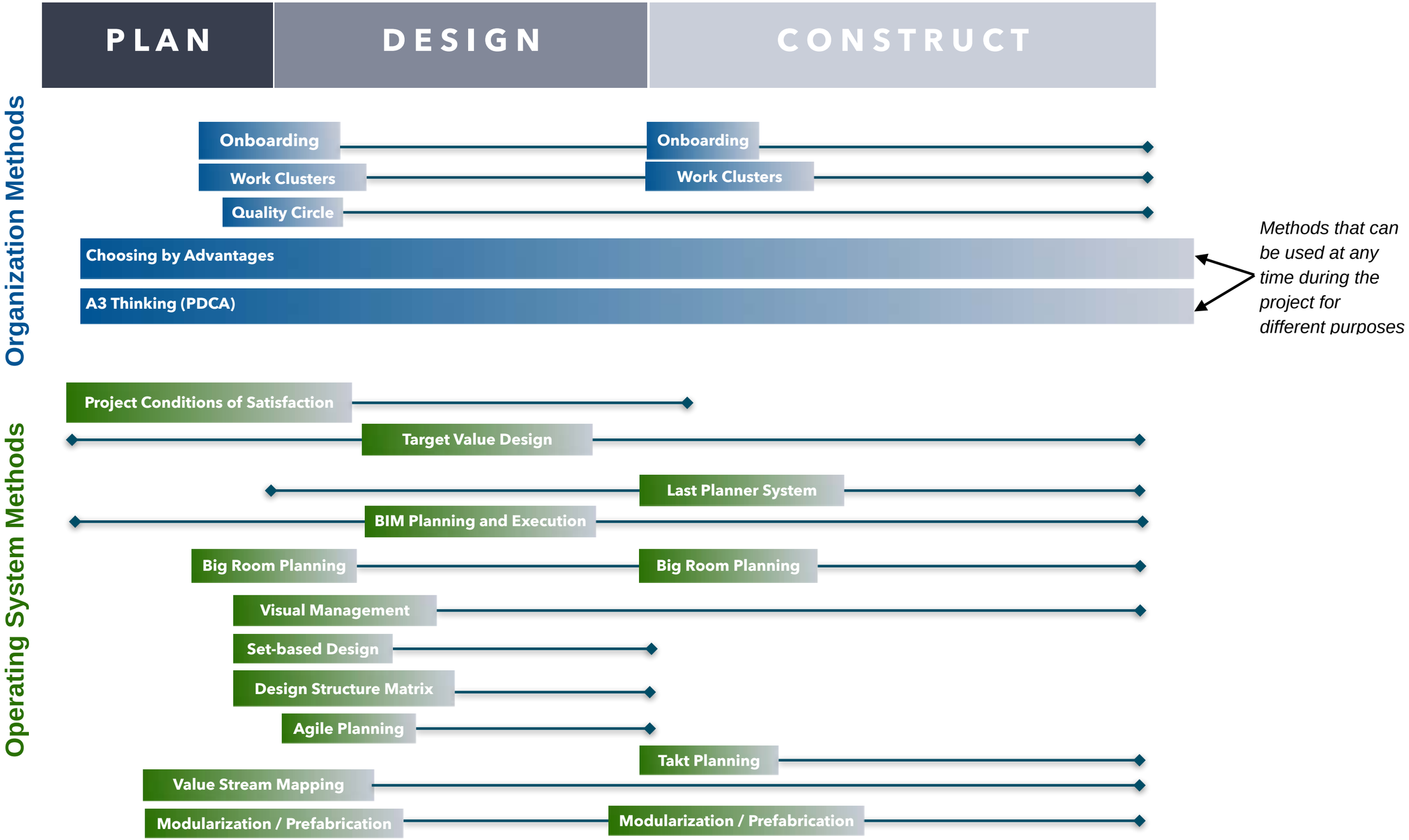


Figure 8: Methods Classification by Project Phase

Operating System Methods - Definitions

Production

Last Planner System

Collaborative and commitment-based system of planning and control that helps develop a reliable workflow through pull planning make-ready look-ahead planning, and weekly work planning.

SIPS/Takt Planning

Short Interval Production Scheduling (SIPS) focuses on detailed planning of worker and crew level tasks at short (15 or 20 minute) intervals for highly repetitive work.

Modularization

Strategies employed in production to develop assemblies off-site to streamline work flow and add efficiencies to work on-site.

Design development

Set-based Design

A method to explore and optimize design alternatives in small sets, based on a set of design criteria, for the project, to find the best solution.

Agile Planning

An approach to planning the development of design by prioritizing a portion of the work scope and making realistic commitments to finish them based on analysis of previous performance.

Value Stream Mapping

Mapping the process by including value and non-value add work activities to identify areas of improvement in the delivery process.

Scope & Cost

Target Value Design

A design approach that meets target cost and client's needs by focusing on creation of value, innovation, and elimination of waste in all forms of resource consumption.

Design Structure Matrix

A method to determine project related interdependencies and accordingly develop the design sequence for the project systems and/or elements.

Conditions of Satisfaction

An explicit description by a Customer of all the actual requirements that must be satisfied by the Performer in order for the Customer to feel that he or she received exactly what was wanted.

Information Management

Big Room Planning

A practice that focus on planning and organizing a space to facilitate collaborative and interactive engagement of project teams.

Visual Management

A way to manage information visually such that it enables collaboration, open communication, helps track progress and notice disruptions quickly.

BIM Execution Plan

Planning for implementation of building information modeling (BIM) using a structured process to define uses, information hand-offs, and deliverables.

Additional Techniques used in Lean Implementation:

First Run Studies

Trial execution of a process ahead in time in order to determine the best means, methods, sequencing, etc. to perform it.

Poke-Yoke

A Japanese term for mistake-proofing method or device used to prevent an error or defect from happening or being passed on to the next operation.

5-S

An approach for workplace organization and maintaining visual control. The "S" stands for: Sort, Set, Shine, Standardize, Sustain.

3P

3P stands for Production Preparation Process, which is laid out to physically organize the area where new work is about to begin.

Organization Methods - Definitions

Team Organization

Onboarding

Activities conducted strategically to quickly get everyone on the same page regardless of when they join the project team. Example: orientations, trainings, team building exercises, etc.

Work Clusters

Multifunctional work groups created within the project team to pursue complex decision-making and problem-solving by putting in use the different experience and skills of every member.

Problem-solving

A3 thinking (PDCA)

Documentation approach for problem-solving and reporting on project-related critical decisions using the Plan - Do - Check - Adjust. (PDCA) method for continuous improvement.

Decision-making

Choosing by Advantages

A multi-criteria decision-making method developed by for determining the best decision by quantifying the advantages of each option.

Continuous Improvement

Quality Circles

A participatory management technique that engages workers directly in identifying and solving problems that span different steps in the design or production process.

Additional Techniques used in Lean Implementation:

5 WHY Analysis

Problem solving technique to determine root cause by diving deeper into the “why” five times.

Ohno Circles

Figuratively refers to a portion of the workplace identified to be observed and analyzed for an uninterrupted period of time to look for inefficiencies.

PICK Chart

An ease/impact chart that segregates ideas into possible, implement, challenge, and kill categories.

Spaghetti Diagramming

A map that shows current layout of operations and path taken by people, product, or the service as it moves through the process.

Gemba Walk

Means “Going to the work” or walking the job site where the actual work is done to identify waste elimination opportunities.

Step 3: Plan

Defining the ‘How’, ‘When’, and ‘Who’

“Planning is bringing the future into the present so that you can do something about it now”

— Alan Lakein

Once the methods are selected for implementation, the project team should collaboratively develop the plan for each of the selected methods. It is strongly encouraged to develop these during the lean deployment planning kick-off and follow-up session(s). One page summaries of frequently used methods are included in Appendix B to help project teams learn about them and get started with planning. A method planning A3 template is also provided to guide the team in developing the plan for targeted methods and record critical decisions regarding implementation. The planning step helps to translate the P-COS into an actionable plan that can be measured and improved throughout the project duration.

Method Planning Groups/Clusters

One of the best ways to plan for how to implement the methods is to use the project team members as a key resource. Considering that every individual has unique experience and set of skills, in a cross-functional group, such experiences and skills are enhanced and can be used objectively to develop a plan for each of the selected methods. Therefore, during the planning session(s), the project team can be divided into smaller cross-functional groups/clusters of three to five members from different organizations, varying based on the number of attendees. Each group can then learn about a method using the one page summaries and develop a method-specific plan using the A3 template. Depending on the number of clusters versus the number of methods selected, each group can be responsible for planning one or more methods.

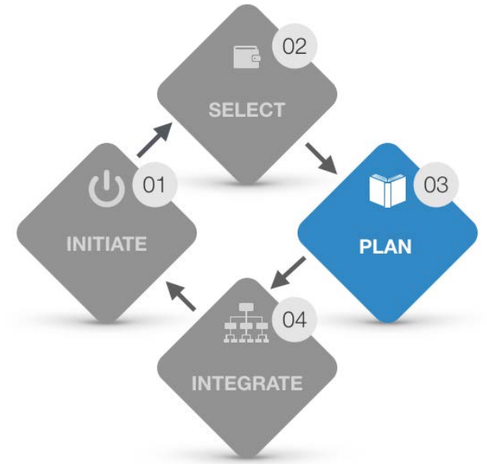
Planning the Methods

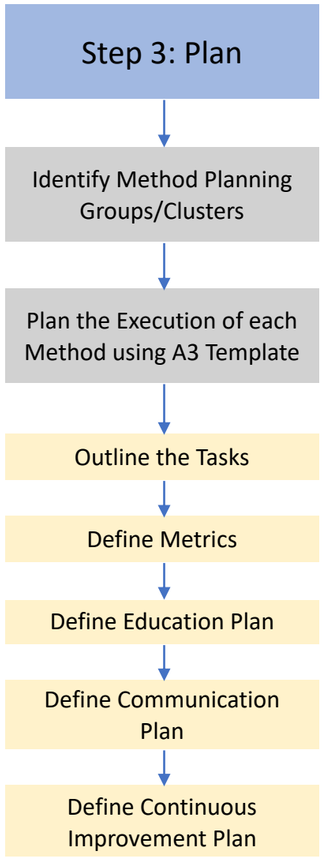
The lean coach, along with the project leaders should facilitate each of the planning sessions. When the project team or the method clusters review the method one page summaries, the lean coach should be able guide them and answer fundamental questions that expand on the team or cluster’s understanding of that method. Even as clusters work on the method plan, each should appoint a leader or champion, who will be responsible to follow through with the development and execution of the plan, along with tracking alignment.

As the project team goes through the planning process, the first step is to identify the project condition(s) of satisfaction (P-COS) that the method helps achieve or the specific purpose of implementing that method. Identifying the P-COS, will support with developing metrics that are truly indicative of progress and help the team stay focused on continuously improving during implementation. The method cluster needs to identify all the potential touch points of each specialty so that it can be planned accordingly factoring into the task-breakdown all such roles and responsibilities.

For each method being planned, the groups need to acknowledge other methods that are complementary in achieving similar P-COS. For example, using Set-based Design encourages use of Choosing by Advantage to make a final design selection and both are included in the use of Target Value Design to manage scope and cost throughout project duration. Therefore, all three methods can be developed in combination with each other and their task breakdowns will need to consider the points of intersection of roles and responsibilities. Having considered that, if a plan is being developed for all methods, it needs to be considered in the ‘Integrate’ step while developing a project level implementation plan.

Going through the A3 Method Planning template, the project team needs to consider all of the above as they develop measures for tracking successful implementation, identify the education and training needed to avoid breakdowns during the implementation, and determine the communication formats and, the continuous improvement initiatives. The page titled - Method Planning Process and A3 Template Instructions, further elaborates on which aspects to consider during the planning phase and how the template needs to be filled out to capture all critical planning information and decisions.





Methods Planning Process and A3 Template Instructions

Once the Lean methods are evaluated and selected, the project team can begin planning for each method. Depending on the project team size and the number of methods selected, the planning of methods can be assigned to cross-functional cluster groups or the entire team can do it together. To support this process, a generic A3 Method Planning Template (Figure 9) is provided in Appendix A, that can help the project team to systematically develop a method plan. Specific to each method, one-page summaries are also provided to indicate the unique considerations, metrics, training, and communication needed to support the team's discussion and decision-making process for individual methods. The A3 template design is focused on capturing the method-level information and rolling it up to create a project-level plan. The template is illustrated in Figure 9 with corresponding working instructions by sections, in the following paragraphs.

Project Details: The project should be identified to clarify the targeted process. Also, once each project is complete, firms can compile methods references from multiple projects to support future teams - knowing the source project can be helpful to collect insights and advice from the project team during and also after implementation.

Method Name: At least one method template should be developed per method. In some instances, such as the use of a method across phases, it may be helpful to refine or update the planning template to address the new contexts and team members when moving from design to construction.

Date: When conducting a collaborative planning session, it is critical to capture the date to enable version control for when the plan needs to be revised or duplicated.

Project Conditions of Satisfaction (P-COS) / Method Goals: The P-COS/Method Goals is defined as a set of criteria that are developed based on the client's business needs from the project and, act as a baseline for the project team in making decisions along the project duration. Therefore, with each method, there needs to be a record of why that method was selected and which P-COS/purpose it contributes to.

Participant(s) / Session Attendees: In this section, the team needs to capture which members were present for which method planning sessions such that follow-up discussions can be initiated. If the methods are being planned in clusters then the names of all such cluster members should be included who participated in the session.

Tasks Associated with Method Implementation: The core of the A3 planning is defining the particular tasks that need to be performed for a given method. In the method summaries, found in Appendix C, there are method-specific questions and suggestions to help a team define the necessary tasks and steps. Along with listing the tasks, it is essential to assign responsibility for them and set due dates, without which tracking their implementation would not be possible.

Related Methods and Strategies: In an ideal lean environment, many methods can and should be used in combination with each other, to derive the maximum benefit from their implementation. The method one-page summaries in Appendix C, provide indications of such methods that are complementary or interdependent. This allows the project team to help map the relationships among the method-specific tasks during implementation.

Method Champion(s): The method champion(s) are the individuals responsible for the planning and implementation of a specific method and should be someone engaged in the daily project operations.

Measures: To be able to track implementation status with minimal effort, the data collection should be aligned with the project delivery process. Measures for tracking successful implementation, should be defined first and then accordingly data sources need to be identified. Examples include: project management systems, team feedback mechanisms such as interviews, focus groups, plus delta reviews, customer satisfaction surveys, and peer reviews.

Education/Trainings: One of the key challenges to successful implementation of any lean process or method is ensuring those responsible for it have the necessary knowledge and skills. Therefore, defining the education and training needs is critical to avoiding breakdowns during the implementation process. For example, who needs the training, by when, and what resources are needed. The timing is critical to supporting the identified tasks.

Communication: In this section, the team needs to capture the critical implementation aspects that need to be communicated to the larger team, in time, to maximize on utilization of available resources and maintain alignment. This includes addressing the various topics and formats for sharing information, identifying target audience, assigning responsibility, and determining frequency/timing of every communication topic.

Continuous Improvement: The key to continuous improvement is to learn from what has already been done. Therefore, it is important that the project team decide the monitoring, reassessing, and learning approaches that can be beneficial on the project. To formulate a thorough continuous improvement plan, the team then needs to define specific continuous improvement initiatives, assign responsibility, determine frequency, and outline future steps.

Follow-up Items: Resulting from each method planning session, this section helps to capture the follow-up action items and individuals/groups responsible for them. This ensures that the tasks outlined for each method is actually getting implemented.

Methods Planning Process and A3 Template Instructions

PROJECT DETAILS

Method Name:	Date:	Method Champion(s):

Project Conditions of Satisfactions / Method Goals:

Measures for Tracking Succcessful Implementation	Responsible Party

Participants/Session Attendees		

What education/training is required for individuals/groups to avoid breakdowns?

Which Individual/Group?	Training Needs	By When?	Resource (How)?

Tasks Associated with Method Implmentation	Responsible Person/Group	Completion Due by

How do you want to communicate the information from this plan to your team?

Topic	Format	Audience	Responsibility	Frequency

How will you ensure that your method implementation is continuously improving?

Strategy	Responsibility	Frequency	Future Steps

Related Methods and Strategies:	

What are follow-up/action items from this planning session to support implementation?

Items:	Responsible Person/Group

Figure 9: Structured A3 Template for Method Planning

Step 4: Integrate

Integrate, Deploy, and Measure

"What gets measured gets done. What gets measured well and fed back gets done well. What gets rewarded gets repeated."

— John Jones, 360° Feedback

Once the individual method plans have been completed, the project team should collaboratively integrate the information from them to track lean implementation at the project level. For this purpose, an A3 template (Figure 10) is provided in the Appendix. The project A3 is divided into six different sections to capture the project level summary, as basis for continuous improvement during lean implementation. The project team should customize each section based on how they want to visually manage the information to facilitate project reviews and to encourage collaborative problem-solving and decision-making.

Project Details: The project details allow for firms to identify the source when compiling references from multiple projects to support future teams as well as collect insights and advice from the project team during and also after implementation.

Project Conditions of Satisfaction (P-COS): This section requires listing all the project's conditions of satisfactions that are being met using lean methods and tracking their performance status.

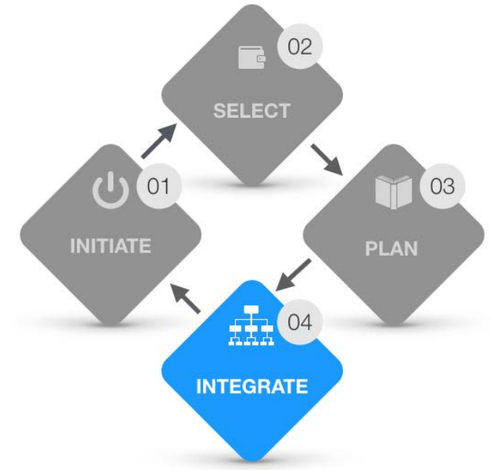
Methods Implemented: This section requires listing all the selected methods on the project and tracking their status along the implementation planning phase.

Implementation Measures: In this section, the project team should record such measures that indicate how well the lean implementation planning is going in the project.

Education/Training Measures: In this section, the project team should record such measures that indicate how well the education and training for the various project team members were managed to enable successful lean implementation planning on the project, and their status.

Communication Effectiveness Measures: In this section, the project team should record such measures that indicate how effectively the communication was managed along the lean implementation planning process, and their status.

Continuous Improvement Measures: In this section, the project team should record such measures that indicate how well the continuous improvement initiatives were planned by tracking their status.



PROJECT DETAILS			
Project Conditions of Satisfaction	Status	Implementation Measures	Status
		Education/Training Measures	Status
Methods Implemented	Status	Communication Effectiveness Measures	Status
		Continuous Improvement Measures	Status

Figure 10: Project A3 Template

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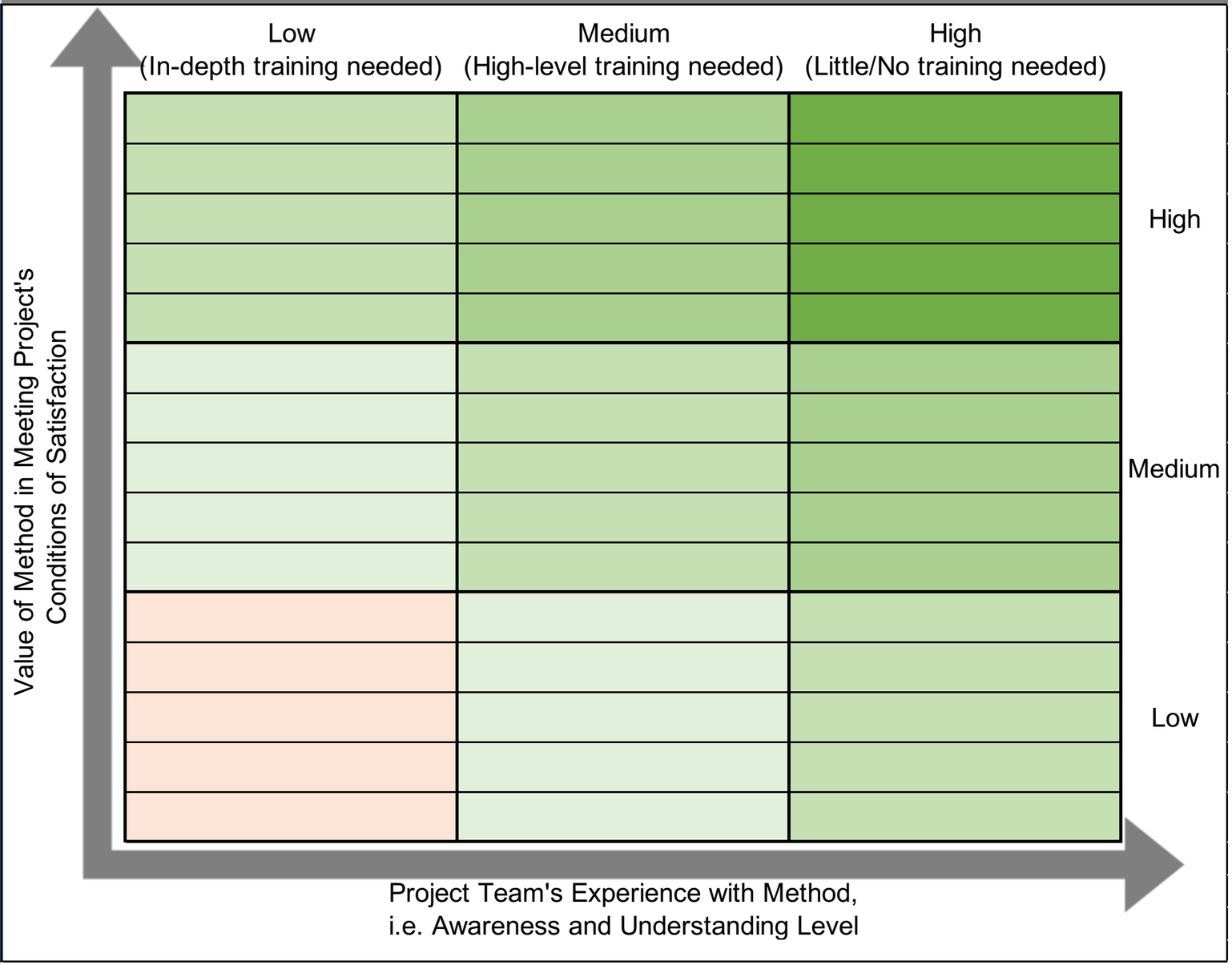
Appendix A - Templates

A1 - Project Conditions of Satisfaction

INITIATE	PROJECT DETAILS		
Please use this table to list your: - the project-specific conditions of satisfaction (P-COS), - the risks/challenges associated with each P-COS, and - the potential lean methods that help meet those P-COS. P-COS is defined in the lean deployment guide as a set of criteria that are developed based on the client's business needs from the project and, act as a baseline for the project team in making decisions along the project duration.	**Project Conditions of Satisfaction**	**Risks/Challenges**	**Potential Lean Methods**

A2 - Method Evaluation Matrix

SELECT	PROJECT DETAILS
The purpose of the method assessment matrix is to assist the project team perform a quick visual assessment of how the lean method's value-level to the project conditions of satisfaction (P-COS), relate to the project's team's experience-level with that method. For example: Methods that the project team has high-level of awareness and understanding of and therefore, require little or no training, are those that should definitely be considered based on order of value to P-COS. The dark to light shade of green represent the high to low in order of importance with which the method should be considered for implementation by the team on the project.	

A3 - Method Selection Worksheet

SELECT

Please use this table to record your decision process for selecting methods for lean implementation on your project.

Start with listing your project conditions of satisfaction (P-COS) from the pull down menu. This pull down menu is based on the P-COS listed in the first tab (Project COS-KPIs). For each P-COS, list the potential methods identified in the first tab as well and assess the value of that method versus the various education/training needs to implement it. Finally, record your team's discussion related to each method in the *Notes* column and the final decision for whether to implement that method in the *Implement Method* column.

Project Goals/ Conditions of Satisfaction (P-COS)	Potential Methods	Value in Pursuing Method	Primary Responsible Role/Group	Education/ Training Needs	Notes	Implement Method?

A4 - Method Planning Instructions - A3 Structured Template

PROJECT DETAILS:

Method Name:	Date:	Method Champion(s):

Project Conditions of Satisfactions / Method Goals:

Measures for Tracking Successful Implementation	Responsible Party

Participants/Session Attendees		

What education/training is required for individuals/groups to avoid breakdowns?			
Which Individual/Group?	Training Needs	By When?	Resource (How)?

Tasks Associated with Method Implmentation	Responsible Person/Group	Completion Due by

How do you want to communicate the information from this plan to your team?				
Topic	Format	Audience	Responsibility	Frequency

How will you ensure that your method implementation is continuously improving?			
Strategy	Responsible	Frequency	Future Steps

Related Methods and Strategies:	

What are follow-up/action items from this planning session to support implementation?	
Items:	Responsible Person/Group

A5 - Project Plan for Lean Deployment

PROJECT DETAILS:

Project Conditions of Satisfaction	Status

Implementation Measures	Status

Education/Training Measures	Status

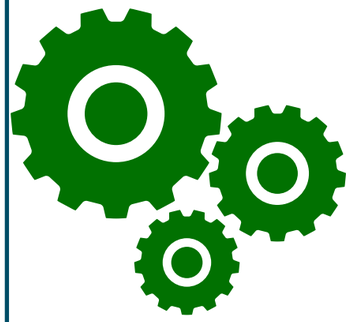
Methods Implemented	Status

Communication Effectiveness Measures	Status

Continuous Improvement Measures	Status

Appendix B - Method Summaries

Operating System Method



Conditions of Satisfaction

Critical success factors or criteria determined based on the client's business needs from the project and, act as a baseline for the project team in making decisions along the project duration.

These conditions serve as common ground rules for planning and performing work as per the client's satisfaction for which all members are jointly responsible, and should be considered throughout the project timeline.

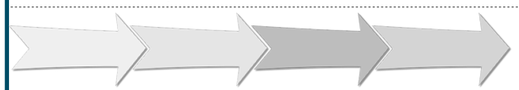
A construction project team comprises of member organizations that serve different roles and therefore, performance can be driven by what is profitable to each organization from the project, thus creating a lack of common motivation. Setting common project conditions of satisfaction (P-COS) upfront based on the client's needs from the project instead sets the ground for common alignment of interest and motivation for project success.

Benefits:
- Helps create common understanding and motivation for project success
- Avoids self-centered thinking when there is lack of consensus in decisions

Success / Progress Metrics:
- How will you gather information regarding alignment with P-COS?
- How will you measure success with meeting the P-COS?

Suggested Resources:
- Location to post visual representation of P-COS and related news
- Project Lean Deployment Plan
- Book: Don't Conform, Transform - chapter on Conditions of Satisfaction

Potential Education needs:
- Who will help facilitating the development of the P-COS?
- Who will design the visual communication of the P-COS and tracking mechanisms?

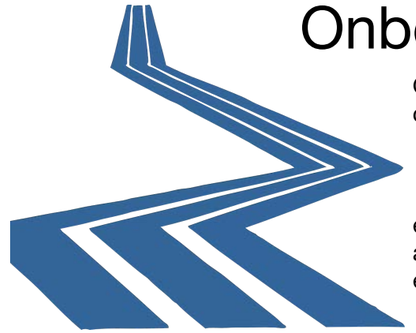


Task Breakdown Planning Questions:
- What is of most value to the project client?
- What will be supportive in delivering that value?
- How will you define your P-COS? For example, call a meeting, conduct a collaborative session for brainstorming, etc.?
- How will you handle misalignment? Do want to consider risk/reward approach?

Communication Planning:
- How will you understand/learn about what the client needs?
- How will you communicate the P-COS to your larger project team?
- How will you enforce alignment?

Continuous Improvement:
- How will the relevance and quality of the P-COS be evaluated in terms of actual project success?
- How will the project team maintain continuous alignment of the P-COS with what is of value to the client?

Organization Method



Onboarding

Onboarding provides a way for team members to reach common levels of learning as new team members are added to a project. Onboarding allows for the new team members to be immersed in the project organization, understand the unique processes and expectations of this project, to be trained, and to gain access to project specific resources. Onboarding ensures that the team's cultural, behavioral, and procedural environments are not disrupted.

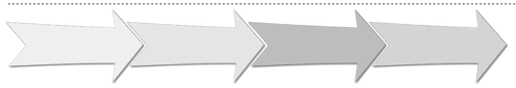
Construction is a project-based industry where adoption of lean can be challenging because each project brings together team members with a vast array of experience, abilities, and knowledge, each with a different level of awareness or experience with lean principles. Onboarding presents an opportunity to align these experiences and knowledge at the beginning of each person's experience with this project.

Benefits:
- Helps create high-performing teams
- Reduces potential process breakdowns
- Helps develop leadership skills

Success / Progress Metrics:
- All project leaders have led a session
- % of team members that attended
- Plus/Deltas from onboarding sessions
- Post-session 'quiz' results

Suggested Resources:
- Lean Simulations
- Project Lean Deployment Plan
- Training space
- Book: Don't Conform, Transform - chapter on Onboarding

Potential Education needs:
- Who will lead onboarding sessions?
- What project's onboarding do they need further training to teach?
- Who needs training to facilitate lean simulations?



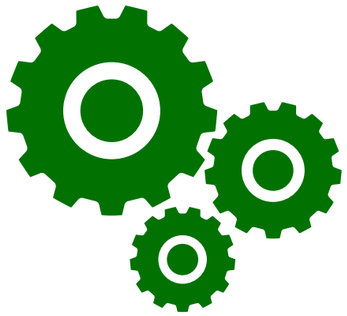
Task Breakdown Planning Questions:
- Which specific methods do you want to share with all new project team members?
- Which lean simulations should be used?
- Which project leaders will be conducting the onboarding session?
- How frequently, or at which events, will onboarding sessions be offered?
- How will onboarding sessions be evaluated and by who?
- What documents and training materials will be used and who will assemble them?
- What lean principles should be taught at onboarding?

Communication Planning:
- How will team members be informed of onboarding timelines?
- How will project culture and training from onboarding be reinforced visually throughout the project?

Continuous Improvement:
- How will the onboarding process be updated throughout the project?
- How will the effectiveness of sessions be evaluated?
- Who will review the content or audit the sessions for quality and effectiveness?

Operating System Method

Set-based Design



Set-based Design (SBD) is a method to explore design alternatives for the project in small sets, to find the best solution. Each set of design alternatives is distinguished by a set design criteria. As the design evolves, the best features from each set are consolidated to generate the option that delivers maximum value to the project. Eventually design options are evaluated based on client preference, target value, feasibility, advantages, and constraints.

Construction projects tend to be complex and require multiple experts to provide input along the design process. It helps to break down the overall project scope into smaller components.

Set-based design helps with the development of such smaller components to streamline the overall design development process.

Benefits:
- Concurrent development of multiple design components and options
- Maintains design options longer, then advances quickly as decisions are made
- Enabler for integrated design

Success / Progress Metrics:
- Effectiveness of design criteria sets
- Support of Conditions of Satisfaction
- Innovativeness of ideas
- Design development deadlines

Suggested Resources:
- Design visualization and review space
- Design experts
- Project Lean Deployment Plan
- Book: Transforming Design and Construction: Set-based Design

Potential Education needs:
- Who will facilitate the SBD process?
- Who is experienced in SBD?
- How will you plan the design handoffs and collaborative development?

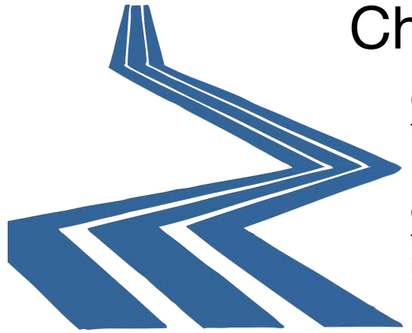
Task Breakdown Planning Questions:
- How will you define the design set criteria?
- When will you assemble the design team?
- How will you make decisions when reaching design milestones?
- How will you incorporate the required design expertise?
- When will key charrettes/workshops occur?
- How will you track design development?
- How will you engage the client in the process of design review and selection?
- How will you evaluate options and make final selections? (For example: Visualization, CBA)

Communication Planning:
- How will you communicate the design schedule and progress with project team, including the client?
- How will you communicate design alternatives for final selection?

Continuous Improvement:
- How will you improve the efficiency of the design development process?
- How will you improve the efficiency of design development tools?
- What routines can you use to continue maximizing value for client through design development?

Organization Method

Choosing by Advantages



Choosing by Advantages (CBA) is a decision-making system that considers multiple criteria. It helps determine the best decision by quantifying the advantages of each option based on reliable information. CBA can be used to make complex, as well as simple decisions, but should be facilitated by someone who has experience with implementation of the process using a structured approach.

The most common tendency in decision-making is to compare the pros and cons of every alternative when considering multiple options. However, by spending time on focusing the cons, we are already wasting our resources, and potentially double-double-counting some features. CBA compares the positive differences among alternatives in a value-oriented manner that eliminates waste of our resources.

Benefits:
- Helps create well-informed decisions
- Helps eliminate wasting of resources by focusing on the positive differences
- Structured and transparent process

Success / Progress Metrics:
- Number of decisions using CBA
- Re-use(s) of template
- Number of clusters using CBA
- Utilization frequency

Suggested Resources:
- Collaboration space
- Facilitator/trained person
- Book: Transforming Design and Construction, Chapter on CBA.

Potential Education needs:
- Who will create the CBA template?
- Who will facilitate the CBA?
- Who will be populating the information for decisions?

Task Breakdown Planning Questions:
- How will you identify the decisions to apply CBA?
- What will 'trigger' its use?
- How will you facilitate the CBA?
- Who will generate the template and instructions for the team to use?
- What are the key decision criteria, based upon your conditions of satisfaction?
- How will you define factors that differentiate between alternatives?
- How will you weight the importance for advantages?
- How will you compare the advantages to cost based on their order of importance?

Communication Planning:
- How will you gather information about each alternative?
- How will you capture decisions?
- Where will you post / share decisions?

Continuous Improvement:
- How will you evaluate the effectiveness of CBA as a decision-making method?
- Does CBA satisfy your needs?
- What can you do to improve the value from conducting the CBA process to justify the use of resources?

Organization Method

Work Clusters

Work clusters is a method for organizing the project team into smaller cross-functional groups to distribute the design tasks and responsibilities using targeted inter-disciplinary teams.
Work clusters are responsible for breaking down the overall burden of high-value/high-risk project decisions with the help of cross-functional knowledge and distributed leadership among the group members.

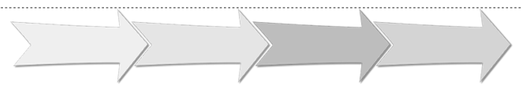
Work clusters can be used in the project (for example: TVD process) to explore and develop design options or solutions to problems with the help of rapid learning from each other and rapid prototyping to determine what provides maximum value to the project. Having project leaders be a part of each cluster, decisions can be made more effectively and expeditiously.

Benefits:
- Expedited and distributed design and problem-solving power
- Interdisciplinary teams
- Concurrent design
- Cross-functional expertise

Success / Progress Metrics:
- Cost trending vs target cost for clusters?
- Commitments met within clusters
- Meeting milestones for handoffs / coordination tasks across clusters?

Suggested Resources:
- Big room/Collaboration space
- Project Lean Deployment Plan
- Shared documentation
- Book: Don't Conform, Transform - chapter on Work Clusters

Potential Education needs:
- Who will lead each cluster?
- What will each cluster be responsible for?
- Who will be responsible for communication and develop the documentation?

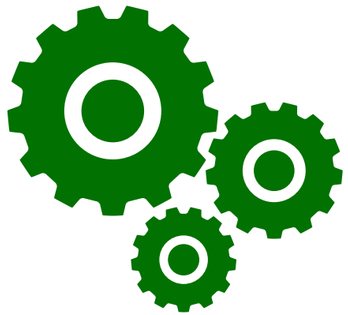


Task Breakdown Planning Questions:
- How will you structure the cluster groups?
- Which cross-functional expertise is needed for each cluster?
- Who will lead each cluster?
- When / where will cluster groups meet and document their work and decisions?
- When / how will interactions across clusters be targeted or coordinated?
- What protocols do clusters need follow for problem-solving or decision-making? (For example: will they use A3 thinking or Choosing by advantages?)

Communication Planning:
- How frequently will cluster groups meet? Leaders?
- How will the clusters document their work and decisions?
- How will the cluster outcomes be shared with the project team?

Continuous Improvement:
- How will the work clusters be used throughout the project?
- How will you identify if changes in cluster make-up are needed?
- Who will evaluate the work clusters performance? When?
- Will there be any need to re-group clusters?

Operating System Method



Big Room Planning

The 'Big Room' is a space where project stakeholders can come together to work and engage in interdisciplinary interactions (Cheng et al., 2016).
The fundamental element to the Big Room is, literally, finding or creating a space (or spaces) to support collaborative efforts. However, the 'Big Room' refers more to the collaborative actions and behaviors supported in collocated, collaborative space (Seed, 2015).

With the ever-changing dynamics of a construction project team and the project itself, having a Big Room allows for some constancy to help onboard new project team members.

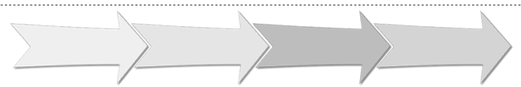
Additionally, having a Big Room allows for hosting the inventory of all project related information, which existing members to re-visit at any time the evidence for decisions made and reasoning for problems solved.

Benefits:
- Faster communication
- Increased transparency
- Supportive of 'team' culture
- Real-time awareness of colleagues' efforts and project progress

Success / Progress Metrics:
- Attendance / participation at events
- Ratio – breakout or working time vs time in meetings
- Pull planning commitments completed

Suggested Resources:
- Space (office or site trailers)
- Layout for open interaction but also meeting space
- Technology to support file and information and communication
- Book: Don't Conform, Transform - chapter on The Big Room

Potential Education needs:
- Who will be responsible for organizing the Big Room Layout?
- Who will manage the information documented in the Big Room?
- Who will manage the overall operations of the Big Room?
- Who will be in be in the Big Room?



Task Breakdown Planning Questions:
- Where will you find / allocate space?
- How will you layout the space to support cluster group interactions?
- How will you use meeting agendas?

Communication Planning:
- How do you want to organize your Big Room to take most advantage of what it has to offer?

Continuous Improvement:
- How will you review the effectiveness of the big room?
- How will you learn from it?

Cheng, R. et al. (2016). Motivation and means: How and why IPD and lean lead to success. Research Report, University of Minnesota, November 2016.

Seed, B. (2015). Transforming design and construction. Lean Construction Institute, Pg. 209. ISBN: 978-0-578-16842-5

Operating System Method

Target Value Design

Target Value Design (TVD) is a process where the project team, mainly the designer and the client engage deeply and share the responsibility to define what is of maximum value to the project. Balancing between the maximum value that can be produced and what the client can pay for without a significant compromise, a target value is determined collaboratively by exploring innovative options with the help of all design partners.

To truly understand what is of maximum value to the client, there needs to be an ongoing discussion as the design evolves. To explore and develop options, the set-based design (SBD) method can be incorporated into the TVD process along with choosing by advantages (CBA) to select the best design solution. Please refer pages x and x for SBD

Benefits:
- Client buy-in for design
- Generate high-value, innovative, and feasible design solutions
- Reduce late scope changes

Success / Progress Metrics:
- In progress approved design estimates
- A3 reports with client approvals
- Notes from meetings with client
- Count and frequency of design reviews
- Count of addendums and change orders

Suggested Resources:
- Big room/Design review space
- Project Lean Deployment Plan
- Collaboration meetings
- Book: Target Value Design

Potential Education needs:
- Who will engage and inform the client?
- Who will design the A3 reports?
- Who will develop the design estimates?
- Who will support with design visualization?

Task Breakdown Planning Questions:
- How will you assemble the design team? For example, do you want to use work clusters for developing different design components?
- How will you engage the client in regular design development discussions?
- How will you assess what is of value to the project?
- How will you develop design options?
- How will you compare the design options?
- How will you select the final design?
- How will the target value design scope be reinforced throughout the project?

Communication Planning:
- How will the client decisions be captured?
- How will team members be informed of the design development timelines?
- How will the target value design scope be communicated throughout the project?

Continuous Improvement:
- How will the TVD process be updated throughout the project?
- How will the effectiveness of TVD be evaluated?
- Who will review the content or audit the design review and collaboration meetings with the client?

Operating System Method

Last Planner System

Last Planner System (LPS) is a lean system, i.e. a collection of methods and techniques such as pull (phase) planning, make-ready look ahead planning, and weekly work planning. All are used in combination to outline the entire construction process by first identifying the phases and then planning with greater detail using look-ahead and weekly work planning, as the time to perform the work gets closer.

Planning in detail upfront can consume project resources without truly delivering the value because it is hard to offer reliable commitments until work is ready to be actually performed. LPS is a planning and control system that address this issue by using complimentary techniques that optimize resource allocation based on the value that can be delivered realistically.

Benefits:
- Optimized allocation and utilization of project resources
- Higher workflow reliability
- Increased trust between members

Success / Progress Metrics:
- Percent plan complete
- Reasons for variance
- Team health, maturity, and effectiveness
- Customer satisfaction

Suggested Resources:
- Big room/Collaboration space/LPS expert
- LPS: Business Standard and Guidelines
- The Last Planner Production Workbook-Improving Reliability in Planning and Workflow (Glenn Ballard et al. 2007)

Potential Education needs:
- Who will lead the planning sessions for LPS?
- Who will develop production schedule?
- Who will disseminate the LPS plan for the project?

Task Breakdown Planning Questions:
- How will you develop what should occur, i.e. your project milestones collaboratively with the project team?
- How will you strategically develop components of the larger project scope for detail execution planning?
- How will you conduct detailed execution planning to determine what can occur?
- How will you look-ahead the work that needs to be performed to stay aligned with the project schedule?
- How will you remove the constraints to make sure work is ready to be performed without disruptions?
- What mechanisms or routines will you use to track schedule alignment and measure progress?

Communication Planning:
- How will the plan for LPS be shared?
- How will the planning decisions be recorded?
- What format will be used for developing and updating the schedule?

Continuous Improvement:
- How will the effectiveness of the LPS be evaluated?
- How will you learn from the implementation?
- How will you maintain a collaborative culture among participants?
- How will you maintain an efficient data collection process to assess alignment to the plan?

Last Planner System: Business Process Standard and Working Guidelines developed by the Lean Construction Institute. Available at - https://www.leanconstruction.org/media/docs/chapterpdf/israel/Last_Planner_System_Business_Process_Standard_and_Guidelines.pdf

Ballard, Glenn & Hamzeh, Farook & Tommelein, Iris. (2007). The Last Planner Production Workbook-Improving Reliability in Planning and Workflow. Lean Construction Institute, San Francisco, California, USA, 81pp.

Organization Method

A3 Thinking (PDCA)

A3 thinking is a documentation approach for problem-solving and reporting on project-related critical decisions using the PDCA as a method of continuous improvement.

PDCA stands for Plan - Do - Check - Adjust. It is a method of continuous improvement that focus on a cyclic process of planning, execution, monitoring, and learning.

Construction project teams are dynamic because members come from different backgrounds and possess different skill-sets. Therefore, decision-making can be complex when everyone wants to contribute.

A3 thinking provides a common collaborative platform to channel the differences into creating high quality decisions based upon systematic thinking focused on the project value and continuous improvement.

Benefits:
- Helps create high-performing teams
- Improve collaboration and problem-solving skills
- Helps create high quality project updates for decision-makers

Success / Progress Metrics:
- Key decisions that were made using A3
- Team's confidence level from those decisions
- Consistency in A3 report format structure

Suggested Resources:
- A3 owner/champion/expert
- Project Lean Deployment Plan
- Reporting platform/medium
- Book: Transforming Design and Construction - chapter on A3 Thinking

Potential Education needs:
- Who will lead A3 thinking sessions?
- Who needs to be included to participate in the process?
- Who will own and who will use the A3s?
- Who will develop the A3 report structure?

Task Breakdown Planning Questions:
- What do you want to use the A3 thinking process for and how frequently?
- How will you determine who needs to be included to participate in the process?
- How will you define the problem to solve? For example: divide a larger problem into smaller components and have multiple A3 owners to each component.
- How will you encourage brainstorming during the A3 thinking sessions?
- How will you define the criteria for a go-no go decision?

Communication Planning:
- How will you define the A3 thinking process and share it?
- How will you develop the A3 report format structure?
- How will you share the A3s with the team?

Continuous Improvement:
- How will you update the A3 reports to capture new information?
- How will you assess the effectiveness of the A3 report structure?
- How will you assess the A3 thinking process performance?
- How will you assess A3 champion performance?

Organization Method

Quality Circles

Quality Circles are groups instated that comprise of volunteer or selected project team participants, who meet periodically to review problems or issues arising in the project. Such groups can be used to conduct reflections on past performances to identify future improvements.

A variety of personalities and talents make up a project team. Combining the right personalities and talents to form a group that comprise of individuals who know and understand the fundamentals of problem-solving, can make significant impact on the project's performance, especially in delivering a quality product, i.e. the project.

Benefits:
- Helps resolve problems early
- Can be used in multiple areas
- Increases project team's awareness
- Empowers project team members

Success / Progress Metrics:
- Variety and complexity of problems solved
- Team's confidence level from those solutions

Suggested Resources:
- Problem-solving experts
- Project Lean Deployment Plan
- Article: Creating Effective Construction Quality Circles by Neil D. Opfer.

Potential Education needs:
- Who will lead the quality circles?
- Who will participate in the quality circle?
- Who will plan/document the session?

Task Breakdown Planning Questions:
- How will you define the problem that needs to be solved?
- How will you identify the leader for the quality circle?
- How will you select members of the quality circle?
- How will you encourage participation?
- How frequently will the quality circle meet? How will the session be planned?

Communication Planning:
- How will you communicate the problem that needs to be solved?
- How will you share the solutions?
- How will you capture the quality circle session: discussion and results?

Continuous Improvement:
- How will you assess the effectiveness of the quality circle in solving critical problems?
- How will you assess the problem solving process performance?

Opfer, N. D. (1997). Creating effective construction quality circles. *Cost Engineering, 39*(4), 42-46. Retrieved from http://ezaccess.libraries.psu.edu/login?url=https://search-proquest-com.ezaccess.libraries.psu.edu/docview/220453197?accountid=13158

Operating System Method

Visual Management

Visual management refers to presentation of information such that it enables collaboration, open communication, helps track progress and notice disruptions quickly. Visual management does not necessarily encourage use of technology for applications such as data analytics but also simple diagramming techniques that clearly and quickly communicate work flow patterns, etc.

A picture is worth a thousand words. Based on this philosophy the visual management approach to organization and presentation of project information is supportive of not just rapid communication and understanding but also learning, problem-solving, and decision-making.

Benefits:
- Common understanding
- Team alignment
- Helps with onboarding
- Helps collaboration, communication, facilitated discussions, etc.

Success / Progress Metrics:
- Application of visual management techniques for progress reporting
- Document ownership and accountability
- Dashboards update frequencies

Suggested Resources:
- Display medium
- Book: Transforming Design and Construction, Chapter: Visual Mgt.
- Book: Don't Conform, Transform, Chapter: Visual Management

Potential Education needs:
- Who will maintain information updates?
- Who will maintain project dashboards?
- Who will audit documents, A3s, big room posters, etc.?

Task Breakdown Planning Questions:
- When and where will you use visual management techniques?
- How will they be developed?
- How and where will they be displayed?
- How will routines be established to support and encourage use of visual management techniques?
- How will you acquire the resources required to visually management project information?

Communication Planning:
- What formats will be used for visual management of information, progress reporting, etc.?
- Which locations will be used for posting?
- How frequently will updates occur?

Continuous Improvement:
- How will the quality and accuracy of information be assessed in the visual management documents?
- Where will you gather feedback from users and project team on the presentation formats?

Operating System Method

SIPS/Takt Planning

Short Interval Production Scheduling (SIPS) focuses on detailed planning of worker and crew level tasks at short (15 or 20 minute) intervals for highly repetitive work.
Takt Planning is similar to SIPS and refer to the pace-setting for specialty work in a construction project to obtain maximum value and eliminate waste in consumption of resources.

By setting a reliable pace for getting work done between multiple trades to best utilize the available resources, SIPS/Takt planning helps eliminate waste in resource utilization and obtain maximum value by planning ahead the details to support the flow of work.

Benefits:
- Well-determined workflow
- Reliable workflow
- Optimized resource utilization

Success / Progress Metrics:
- Documentation supporting progress on the decided scope of work
- Confidence and understanding level of members performing the work based on the presented information

Suggested Resources:
- Takt Planning Initiative Study and Resources available at - http://p2sl.berkeley.edu/research/initiatives/takt-planning/
- Parade of Trades Game

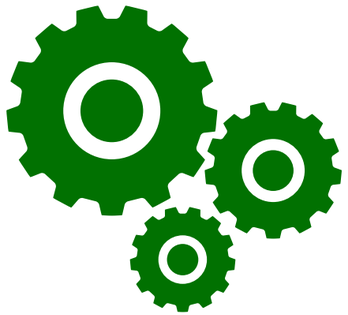
Potential Education needs:
- Who will conduct the planning?
- Who will document and update the plan?
- Who will send communication updates?
- Who will develop progress reports?

Task Breakdown Planning Questions:
- How will you conduct the overall SIPS/Takt planning process? Will it be facilitated?
- How will you structure work to apply this kind of planning?
- How will you help with the visualization of work to be done using this process and its needs to get everyone onboard for participation?
- How will the overall schedule be updated from the detailed level planning and progress made?

Communication Planning:
- How will the plan be documented?
- How will the plan be shared?
- How frequently will the plan be updated?

Continuous Improvement:
- How will the effectiveness of the pace-set be assessed?
- How will the plan be reviewed for quality of assignments?
- How will the alignment of the work scopes to the overall schedule be assessed?

Operating System Method



Modularization

Strategies employed in production to develop assemblies off-site to streamline work flow and add efficiencies to work on-site. Typically this approach can be applied to any building assembly, a particular module, or smaller components that can be manufactured off-site to improve productivity on-site. Therefore, the transportation aspect for such items need to be considered in planning for the level of modular or prefabrication chosen.

Modularization is known to add value to a project, however, if major scopes of the project are being considered for modularization, the planning and scope of the modules need to be defined early and incorporated into the facility and system design, as well as the production planning.

Benefits:
- Higher productivity
- Reduced site congestion
- Increased safety on-site
- Higher control over production quality
- Faster construction

Success / Progress Metrics:
- How will you track module fabrication and installation?
- How will you track module design progress?
-

Suggested Resources:
- LCI Congress Presentation (2017) - Lean and Prefabrication. Available at - http://www.lcicongress.org/pdfs/2017/THE3%20Lean%20and%20Prefabrication%20-%20A%20Process%20Paradigm%20Shift.pdf
- ENR Article - Owners Are Reluctant to Use Prefab and Modular Options, Study Says. Available at - https://www.enr.com/articles/44719-owners-are-reluctant-to-use-prefab-and-modular-options-study-says?v=preview

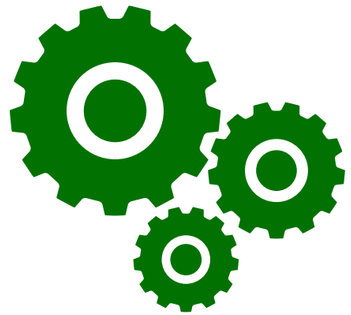
Potential Education needs:
- Who will select the pre-fabrication/ modular components?
- Who will help identify the most optimum means and methods?
- Who will conduct value analysis for this approach to justify implementation?
- Who will help with the planning process?

Task Breakdown Planning Questions:
- How will this approach help you meet your P-COS?
- How will you decide which assemblies to modularize/prefabricate?
- Will you be conducting a means and methods analysis for schedule and cost savings?
- How will you conduct such analysis?
- What factors will you consider?
- What decision-making methods/tools will you use?

Communication Planning:
- How will you develop an integrated project schedule and estimate?
- How will you document the decision-making methods/tools in the planning process?

Continuous Improvement:
- How will you determine the effectiveness of this approach in meeting the P-COS?
- How will you improve the means and methods used for planning and implementation?

Operating System Method



Design Structure Matrix

DSM is a method to determine project related interdependencies and accordingly develop the design sequence for the project systems and sub-systems or main components and sub-components. The matrix structure particularly helps determine interdependencies by listing the systems/main components and sub-systems/sub-components as row and column headers and then selecting the ones that interface with each other.

Developing an efficient design development sequence can be a fairly challenging in case of large and complex projects. DSM can be used to break down this complexity by first identifying the different systems/components, then determining the

Benefits:
- Support complex design processes
- Collaborative and integrative approach to determining interface points in design development

Success / Progress Metrics:
- Process map for DSM development
- Responsible parties identified for each system/sub-system
- Completed matrix of dependencies
- Identified rules for prioritization

Suggested Resources:
- DSM development knowledge and input from design consultants
- Presentation at the LCI Congress (2015) available at - http://www.leanconstruction.org/media/docs/2015-congress/presentations/TH12%20-%20Berg.pdf
- Conference paper - Integrating DSM and LPS in the building design. Available at - https://iglcstorage.blob.core.windows.net/papers/attachment-cf5c5f41-e87a-48ff-a3b6-b3863105de81.pdf

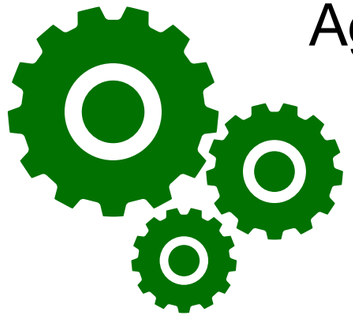
Potential Education needs:
- Who will lead the execution of the DSM?
- Who will document the DSM development process?
- Who will help identify the systems/sub-systems that should be considered in DSM?
- Who will review and approve the prioritization using the DSM?
- Who will develop and maintain the matrix?

Task Breakdown Planning Questions:
- How will conduct the planning for DSM?
- How will you identify the project systems and sub-systems?
- How will you identify the teams who will work on the identified systems/sub-systems?
- How will you capture the interdependencies?
- How will you prioritize and manage the interdependencies?

Communication Planning:
- How will the matrix be documented and updated?
- How will the updates be shared with the design consultants?
- Will the DSM be used in design status meetings?

Continuous Improvement:
- How will you assess the effectiveness of the DSM?
- How will you evaluate if the project systems and sub-systems were correctly identified?

Operating System Method



Agile Planning in Design

An iterative and incremental approach to planning and executing tasks in cycles, typically spreading over two to six weeks, with focus on design deliverables being accomplished in integrated teams.

Each cycle is known as a sprint, which goes through the phases of planning, requirements analysis, design development, review, and release.

Construction projects are dynamic, which results in variability and uncertainty. Breaking down the overall project scope into smaller components and working towards completion in incremental iterations reduces the risk of redundancy and allows for rapid adaptation to changing needs.

Benefits:
- Allows for quick adaptation to changing client/project needs
- Avoids redundancy
- Minimize uncertainty and variability
- Allows for early testing of systems

Success / Progress Metrics:
- Quality of deliverables
- Backlog items from each iteration
- Design team combined qualifications versus the deliverable scope
- Customer satisfaction

Suggested Resources:

Straçusser, G. (2015). Agile project management concepts applied to construction and other non-IT fields. Paper presented at PMI® Global Congress 2015—North America, Orlando, FL. Newtown Square, PA: Project Management Institute.

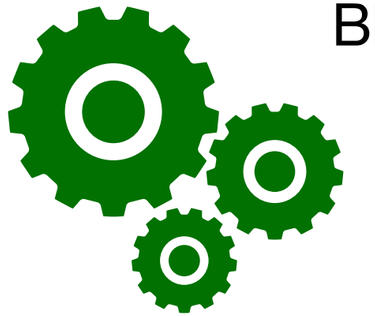
Potential Education needs:
- Who will lead the sprints?
- Who will be sprint participants?
- Who will communicate with client and organize design reviews?
- Who will maintain record documentation?

Task Breakdown Planning Questions:
- How will you use the agile approach to manage your design process?
- Which principles will you use?
- Which techniques will you use?
- How will you structure the project scope for an agile approach?
- How will you engage the customers in providing feedback to deliverables?
- How will you incorporate feedback to plan future deliverables and development cycles?

Communication Planning:
- How will sprint status be communicated?
- What formats will be used for information management, progress or performance reporting, etc.?
- How will the version control be handled for deliverables?

Continuous Improvement:
- How will you assess the quality of deliverables from each sprint?
- How will you minimize backlog?
- How will you assess the timeliness of every sprint?
- How will you measure the performance of an integrated team?

Operating System Method



BIM Execution Planning

Practice of planning for implementation of building information modeling using a well-defined structured process, preferably early in the project to support the information management throughout the development of the project.

BIM execution planning includes planning for the resources needed, the communication standards, the information exchange formats, and the implementation process, while incorporating different uses of BIM based on the project needs.

With proper planning for BIM has the potential to help us visualize the project right from the inception and also sort the information about the facility as the different systems and features are developed. Visualization helps with conducting more productive design reviews with the client.

Benefits:
- Information management
- Visualization, high performance designs
- Maintain record of changes
- Rapid prototyping
- Collaborative and integrative approach

Success / Progress Metrics:
- Process performance KPIs
- Data accuracy
- Level of development
- Project status metrics
- Client satisfaction with design reviews

Suggested Resources:
- National BIM Standards Available at - https://www.nationalbimstandard.org/files/NBIMS-US_V3_5.3_BIM_PxP_Guide.pdf)
- BIM execution planning guide available at - https://www.bim.psu.edu
- BIM User Guide Available at - https://psu.app.box.com/v/BIMUserGuide

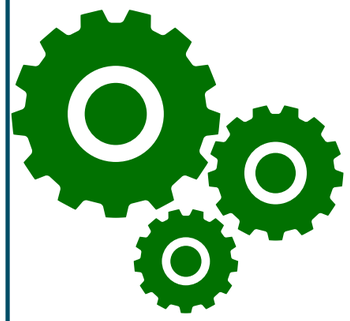
Potential Education needs:
- Who will participate in execution planning?
- Who will conduct the design reviews and develop rendered prototypes?
- Who will manage information?

Task Breakdown Planning Questions:
- Why do you want to use BIM?
- Do you have the expertise to use BIM?
- Will you use a pre-developed guide or develop your own guide to plan the execution process?
- How will you integrate the BIM execution along with the project's natural delivery process?
- Which particular uses of BIM is particularly helpful to your project and will help fulfill your client's needs?
- How will you plan the execution process in detail? What resources will you use? How will you acquire the resources you need?

Communication Planning:
- How will the execution process be documented?
- How will the information required for model development be gathered?
- How will model version be controlled?
- How will the model be shared with project team?

Continuous Improvement:
- How will you assess the data accuracy?
- How will you assess the effectiveness of the process designed for execution?
- How will you assess the information exchange quality?
- How will evaluate the performance of the model in project delivery?

Operating System Method



Value Stream Mapping

Mapping the process by including value and non-value add work activities to identify areas of improvement in the delivery process collaboratively in teams.
VSM is particularly useful and maximum value is accomplished in application to work that is repetitive. By gathering input from groups who actually perform the work, VSM helps with accurately identifying the means and methods that are needed to perform that work.

The VSM methodology is supportive of adding transparency to the visualization of work flow by mapping it to differentiate between activities that are value or non-value add, simultaneously maintaining a customer focused approach.

Benefits:
- Increased visualization of workflow information, and means/methods
- Differentiate between value and non-value add work
- Highlights problem areas

Success / Progress Metrics:
- How many non-value add activities were identified and eliminated using VSM?
- What were the savings (cost, time, resources) from the improvements between the current and future states?

Suggested Resources:
- VSM facilitator and key information contributors
- Book: Transforming Design and Construction: Chapt on Value Stream Mapping.
- LCI presentations:
  - Value Stream Mapping. Available at -https://www.leanconstruction.org/media/docs/chapterpdf/san-diego/LCI-San_Diego_CoP_Value-Stream-Mapping012116.pdf
  - VSM. Available at - http://www.lcicongress.org/pdfs/MONTUE5_Value%20Stream%20Improvement_Luckman.pdf

Potential Education needs:
- Who will facilitate the VSM methodology?
- Who will participate in the value stream mapping sessions?
- Who will review and approve the future states of the value streams?
- Who will be responsible for individual value streams being mapped?

Task Breakdown Planning Questions:
- How will assemble the VSM team? Will you use clusters to map different value streams?
- How will you define the scope for VSM implementation?
- Will you use it for more than one value streams?
- How will you map the process being considered?
- How will you identify and document potential improvements between the current and future states of the Value stream? Will you use Gemba (Direct observations on site)?
- How will you conduct the collaborative sessions? Will you appoint champion/cluster leader for this method?

Communication Planning:
- How will you document and share the future value stream maps?
- How will you document the mapping process and maintain version control for each value stream?

Continuous Improvement:
- How will you gather information to update the value stream maps?
- How will you capture the changes in terms of what is of value to the client/customer?

Appendix C - Method Examples

Example - Onboarding

Project A

Method Name: Onboarding	Date: 10/15/19	Method Champion(s): Andy

Project Conditions of Satisfactions / Method Goals:
Create high quality documentation to enable common understanding among project team members
Create continuous workflow by providing timely communication through onboarding efforts

Measures for Tracking Succcessful Implementation	Responsible Party
Observed actions	Name(s) of indvidual/group
Reward system	Name(s) of indvidual/group
Health check	Name(s) of indvidual/group
Quiz (2 minute drills)	Name(s) of indvidual/group

Participants/Session Attendees		
Core project team member names		
Owner's representative name		
Onboarding cluster member names		

What education/Training is required for individuals/groups to avoid breakdowns?

Which Individual/Group?	Training Needs	By When?	Resource (How)?
All project team	Onboarding content introduction	Prior to onboarding	Project lean coach
Onboarding cluster members	Onboarding content development	Prior to onboarding	Project lean coach
Onboarding champion/facilitators	Onboarding session facilitation	Prior to onboarding	Project lean coach

Tasks Associated with Method Implmentation	Responsible Person/Group	Completion Due by
Integrate the organization processes with the project's management processes	Project team member name	mm/dd/yy
Leadership team defines information for all members. Example: Not IFOA but interdependence of parties	Project team member name	mm/dd/yy
Define Lean/IPD briefing for safety orientation	Project team member name	mm/dd/yy
Define communication or visual management strategies	Project team member name	mm/dd/yy
Train the trainers and facilitators	Project team member name	mm/dd/yy
Design assessment/health checks	Project team member name	mm/dd/yy
Track performance metrics and performance audits	Project team member name	mm/dd/yy
Conduct Monthly “Reconnect” or “Lean Learning” sessions	Project team member name	mm/dd/yy

How do you want to communicate the information from this plan to your team?

Topic	Format	Audience	Responsibility	Frequency
Onboarding sessions	Slide Decks	All project team	Name(s) of individual/group	TBD
Onboarding content display	Big Room Posters	All project team	Onboarding cluster members	TBD
Innovative initiatives	Lunch Rewards	All project team	All project team	Continuous
Creative contributions	Rewards System Board	All project team	All project team	Continuous

How will you ensure that your method implementation is continuously improving?

Strategy	Responsibility	Frequency	Future Steps
Audits and Check-ins	All project team	Bi-weekly	
Rotating reponsibilities	Onboarding cluster members	Bi-weekly	

Related Methods and Strategies:	
Weekly Work Planning	
Big Room Planning	
Visual Management	
Meeting Agendas	

What are follow-up/action items from this planning session to support implementation?

Items:	Responsible Person/Group
Identify onboarding task-owners and set due dates	Onboarding cluster members
Assign responsibility for tracking implementation	Onboarding cluster members
Determine frequency of onboarding sessions and documentation updates	Onboarding cluster members
Determine future steps based on results from continuous improvement initiatives	Onboarding cluster members

Example - Set-Based Design

PROJECT B

Method Name: Set-based Design	Date: 10/15/19	Method Champion(s): Cluster Leaders

Project Conditions of Satisfactions / Method Goals:
Maximize value/decrease cost by managing design options until final decision is due.
Maintain continuous workflow by continuing to develop design options for smaller components.

Measures for Tracking Succcessful Implementation	Responsible Party
Budget/Cost of Work versus Targets, Innovation	TBD
Conditions of Satisfaction (Enact 3 new innovations)	TBD
Percent risks mitigated and cost-savings/gain	TBD
Percent opportunities achieved and cost-savings/gain	TBD

Participants/Session Attendees		
Owner's representative		
Design partners		
Facility users		

What education/Training is required for individuals/groups to avoid breakdowns?

Which Individual/Group?	Training Needs	By When?	Resource (How)?
Design partners	Pull Planning	During onboarding	Lean consultant
Cluster leaders	Facilitator-level training	During onboarding	Lean consultant

Tasks Associated with Method Implmentation	Responsible Person/Group	Completion Due by
Identify Risk/Opportunities by brainstorming,	Project team member name	TBD
initiate log/register	Project team member name	TBD
Define key design decisions	Project team member name	TBD
Plan/Identify timeline for: decisions (last responsible moments)	Project team member name	TBD
Identify responsible party/clusters to investigate options	Project team member name	TBD
Define decision-making process	Project team member name	TBD
Work with your const. Partners for Rough order magnitude (Designers think more about opportunities and constructors think more about risks).	Project team member name	TBD
Cluster groups at the level that is of value	Project team member name	TBD
Who can decide? Informed decision. Critical decision makers can add to lead time for project.	Project team member name	TBD

How do you want to communicate the information from this plan to your team?

Topic	Format	Audience	Responsibility	Frequency
Cost-tracking	Risk-opportunity register/log (poster)			
Design development tracking	Pull plan with timelines			
Team decisions tracking	A3 for Visual management focusing on outcomes and decisions			
Design innovation and creative contributions	Innovation wall showing: ideas, to do, doing, and done			
Progress updates	Monthly meeting agenda: feed into the cluster lead report outs			

How will you ensure that your method implementation is continuously improving?

Strategy	Responsibility	Frequency	Future Steps
Frequency/Cadence: are all ideas progressing?			
Who is/has contributed/rewards system?			

Related Methods and Strategies:	
Pull Planning in Last Planner System	
Work Clusters	
Choosing by Advantages	
Target Value Design	
A3 Thinking	

What are follow-up/action items from this planning session to support implementation?

Items:	Responsible Person/Group
Determine task-owners for implementing Set-based design and set due date for tracking status	SBD cluster
Assign responsibility for measures associated with tracking SBD implementation	SBD cluster
Determine due dates for completion of all SBD related trainings	SBD champion/cluster leader
Update/complete the communication and continuous improvement sections during the next collaborative planning/work session	SBD cluster

Example - (Last Planner System) Pull Planning

PROJECT C

Method Name: Pull Planning (LPS)	Date: 10/15/19	Method Champion(s): Andy

Project Conditions of Satisfactions / Method Goals:
Create design/construction schedule alignment.
Identify when design deliverables are needed for the production system.

Measures for Tracking Succcessful Implementation	Responsible Party
Percent Plan Complete	TBD
Are we meeting enough (too much/too little)?	Pull plan champion/cluster lead
Reasons for Variance	TBD
Constraints Log	Pull plan cluster members

Participants/Session Attendees		
Design group		
Construction group		
Trade partners		
Major supplier representatives		
Project leadership contact		

What education/Training is required for individuals/groups to avoid breakdowns?

Which Individual/Group?	Training Needs	By When?	Resource (How)?
All project team	Introductory-level training	Monthly	Lean coach
Pull Planners	Facilitator-level training	Just-in-time	Lean coach

Tasks Associated with Method Implmentation	Responsible Person/Group	Completion Due by
Invite “right people”, who should be in the planning meeting. Example: project leadership team	Pull planning champion/Lean coach	mm/dd/yy
Use meeting agendas/guidelines, so team members can come ready to plan	Pull planning cluster	mm/dd/yy
Collaborative pull plan workshop/session	Pull planning cluster	mm/dd/yy
Frequency/timing of pull planning (meetings for major planning)	Pull planning cluster	mm/dd/yy
Determine check-in meeting times for updates and how	Pull planning cluster	mm/dd/yy
Maintain record/log/online system	Pull planning cluster	mm/dd/yy
Maintain risk versus opportunity log/register (long lead items)	Pull planning cluster	mm/dd/yy

How do you want to communicate the information from this plan to your team?

Topic	Format	Audience	Responsibility	Frequency
Big room planning/visual management	Big room displays (Posters, A3s)	Project team all	Big room cluster group	Continuous
Big room rules	Posters, A3s	Project team all	Big room cluster group	Continuous
Big room/pull plan updates	Daily brief and stand-up meetings	Pull planning cluster	Pull planning clusters	Weekly/bi-weekly

How will you ensure that your method implementation is continuously improving?

Strategy	Responsibility	Frequency	Future Steps
Review reasons for variance	TBD	Weekly	TBD
Look at the “right duration” during look-ahead planning 3 weeks versus 6 weeks, etc.	Pull planning cluster members	Every pull plan session	TBD

Related Methods and Strategies:	
Weekly Work Planning in Last Planner System	
Set-Based Design (enabling)	
Big Room Planning	
Visual Management	

What are follow-up/action items from this planning session to support implementation?

Items:	Responsible Person/Group
Update/assign responsibility for measures associated with implementation of pull planning	Pull planning cluster
Identify the project's lean coach for pull planning education/traini	Pull planning cluster
Update the continuous improvement section in the next collabora	Pull planning cluster