MCX

CMAA
Construction Management
Association of America

Member Communication Experience

NAC Executive Insights

Project Planning

Key Points

- **Importance of Planning** - Effective planning is crucial for project success.
- **Strategic Business Objectives (SBOs)** - Failure to define and align on SBOs is a primary reason for project failures .
- **Project Procedures Manual (PPM)** - Essential for guiding project execution.
- **Project Requirements** - Documentation of key decisions is critical.
- **Agile Planning** - Highlighted as a flexible and iterative approach that allows teams to adapt to changes.
- **Lessons Learned –** capture and share lessons learned broadly.
- **Consequences of Poor Planning** - Effective planning is essential to mitigate risks.

Introduction

Project and construction planning are foundational aspects of all projects undertaken in the engineering and construction industry. This Executive Insight looks at planning for these projects focusing on those activities at the earliest stages of the project. In a well-executed project, planning continues throughout the entire lifecycle of the project.

This Executive Insight touches on six aspects of project planning. The insight comes from the author's perspective gained in nearly 50 years of working on, overseeing, and developing turnaround strategies on large, complex mega and giga projects with values up to $25 billion US dollars.

The six aspects of project planning this Executive Insight covers include:

1. Strategic Business Outcomes/ Strategic Business Objectives (SBO)
2. Importance of Project Planning to Project Success
3. Lifecycle Planning Process
4. Project Planning as a Primary Management Function
5. Project Plan
6. Agile Planning

1. Strategic Business Objectives

Strategic Business Objectives represent the fundamental business drivers in a well-executed program.

They also represent the number one reason that large complex projects fail. In addressing the turn-around of 20 underperforming large projects there was only one failure mechanism common on all these failing projects. And that was the inability of the top person in the owner's organization to

describe what the strategic business outcome was that he wanted to achieve by spending billions of dollars. These are the senior most individuals, in a couple of instances the CEO.

There are three aspects of SBO failure. The first is the failure to articulate what the SBOs are. Everyone kind of knows but there are slightly different interpretations of what they actually are.

The second aspect of SBO failure is failing to get agreement on them. That agreement includes the owner's board, the senior management team in all elements of the owner's organization, key external stakeholders and of course the main contractors engaged by the owner to achieve these SBOs – his engineer, PMC, and contractors delivering the work.

The third aspect of SBO failure is failing to continuously communicate them to the extended project team. Once is not enough. Many of the people there on day one will be gone at the end of one year and many new people will have been added. They all need to be marching, in unison, together.

SBOs must be truly strategic. Achievement should result in the transformational outcome that is desired. In this Executive Insight we refer to SBOs as both strategic business objectives and strategic business outcomes. This in part reflects how the author's experience changed his view over the years and in this Executive Insight we use them interchangeably.

SBOs should describe "Outcomes" and not be confused for strategy or tactics which occur at a different level. They must be clearly and consistently articulated. They must be bounded in time.

Open-ended SBOs describe a direction or intent, not a rate of progress towards an end goal. Without adequate bounding, progress is not measurable and ultimate success uncertain. Bounded strategic business objectives are not enough. There must be broad stakeholder buy in. Remember the importance of getting agreement on them.

A lack of consensus acts as a passive drag on many programs. It's not like people are going in opposite directions but rather small differences in views create unneeded organization friction which builds organizational calluses that impede communication and timely decision making.

An owner's inability to clearly articulate his SBOs creates uncertainty in the foundations of a project. Weak foundations of any kind create the conditions for project failure.

SBOs become more important than requirements and in some instances, projects may be faced with emergent SBOs especially when "influencing flows" cross the semi-permeable project boundary over an extended timeframe. This is an important point. Conventional project management theory says projects are well-bounded. They are not.

Finally, SBOs must be linked with Key Performance Indicators (KPIs) or progress and achievement cannot be measured. Many large projects measure progress on tangible elements of work but lack the broader view of whether they are achieving what we really wanted to achieve. This is particularly important when soft-goals or time-to-market considerations are present.

2. Importance of Planning to Project Success

Let's look at why project planning is so important to project success. We've already discussed the #1 reason large complex projects fail:

- Failing to clearly articulate the project's SBOs
- Failing to get agreement on them
- Failing to continuously communicate them

But weak pre-project planning is another one of those elements we see in weak project foundations. One tool to help check the readiness of a project is the Project Definition Readiness Index or PDRI.

The PDRI is a project scope definition tool developed under the guidance of the Construction Industry Institute (CII), that is an easy-to-use tool to measure project scope definition for completeness. PDRI allows a project team to evaluate the completeness of scope definition prior to detailed design or construction and helps a project team to quickly analyze the scope definition package and predict factors that may impact project risk. Extraordinary risks are many times the result of unresolved scope issues or unforeseen conditions.

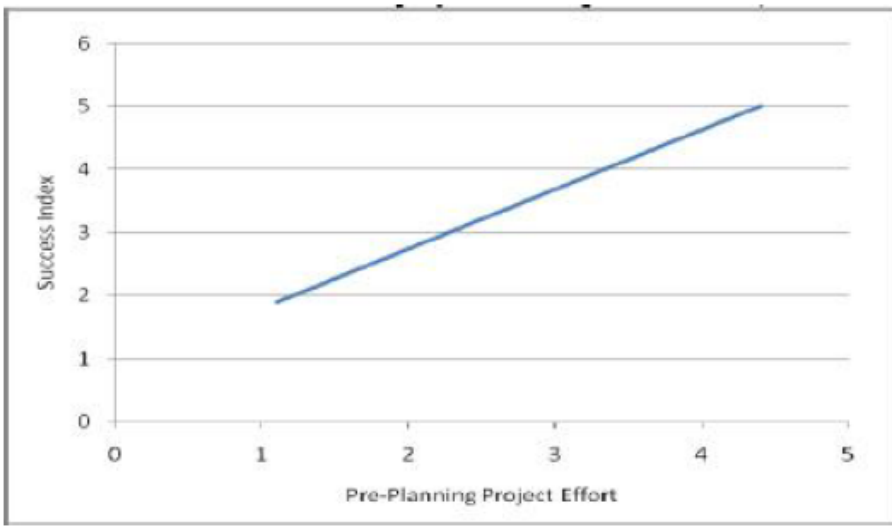


Exhibit 1 - Success Index vs. Pre-project Planning Effort

Project Definition Rating Index (PDRI)

Gibson et. al. 2006

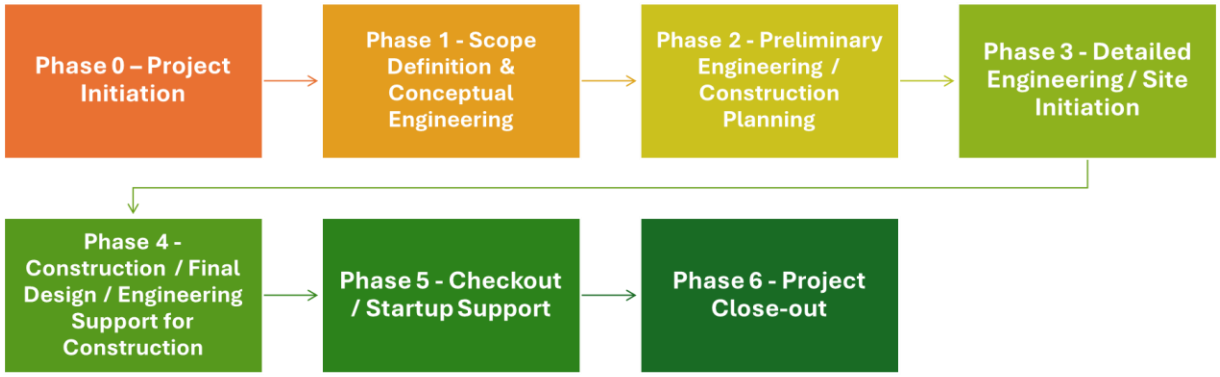
3. Lifecycle of the Planning Process

The lifecycle of the planning process can be defined as including 7 phases:

- **Phase 0 – Project Initiation**
- **Phase 1 - Scope Definition & Conceptual Engineering**
- Phase 2 - Preliminary Engineering / Construction Planning
- Phase 3 - Detailed Engineering / Site Initiation
- Phase 4 - Construction / Final Design / Engineering Support for Construction

- Phase 5 - Checkout / Startup Support
- Phase 6 - Project Close-out

In this Executive Insight we look at **Phase 0 and Phase 1** more closely. Project planning, however, extends through the full project lifecycle.



Phase 0 – Project Initiation

Project Initiation begins at the sales stage and may extend to immediately after contract signing. This link between pre-contract and contract is often weak. It is during this handoff where the project baseline is fully aligned with the contract requirements, including those elements of the owner's SBO being addressed by the work at hand. Management of a project must be very much focused on this baseline and Baseline Centric Execution has proven its value over the years.

The Baseline is initially established in the sales phase. It is finalized on contract execution and the seven major elements of that baseline include:

1. **Prime Contract**
2. **Scope of Work** – Prime Baseline Document. Recognize that in effect two scopes of work exist.
   - **Facilities** – what is to be designed and constructed
   - **Services** – the company's role in delivering those facilities. Understanding what you are not doing is as important as what you are doing since these elements represent important interfaces and potentially constraints in your execution.
3. **Project Execution Plan**
4. **Cost Estimate** – This estimate must reflect the "Cost Competitive Engineering & Design" that you built into your bid, but even more. It must also reflect an Expanded Basis of Design (BOD^X) which is really what the owner wants. This is often implied in contracts and not adequately addressed in project execution.
5. **Management Level Schedule**
6. **Risk Assessment**
7. **Commercial Baseline**

Phase 0 Sample Activities

Certain activities begin at Sales Stage. These are then expanded on contract signing. These include:

- **Project Kick-off Meetings** both internal & external. Think carefully about who needs to be in these meetings, especially from the owner's side. It is not just their PM but also their contracts, legal and even accounts payable leads. Don't assume the owner's organization is fully aligned.
- **Project Alignment Meeting** initially should occur here and then be conducted in more detail in Phase 1. The Phase 0 and Phase 1 alignment meetings may be combined.
- **Project Procedures Manual (PPM)** – The initial PPM should highlight special or unique aspects even as other procedures are being developed. Good company PPM go-by documents are very valuable.
- **Project Requirements Checklist** – This checklist documents key decisions that have already been made. Maintaining this checklist and sharing with the client is a good strategy to capture client driven changes in scope and other requirements.
- **Project Execution Plan** – This outlines the project's strategic plan, and in less detail tactical plans for each project phase. At this stage an initial mobilization plan should be present in some detail.
- **Security Considerations**, including cybersecurity, an area of increasing concern, should be established in Phase 0.

Project Taskforce Organization should be laid out in Phase 0 especially any project startup team that will be used. The use of highly skilled and specialized project startup teams is a highly recommended practice. It helps ensure that the project is well founded.

Reference projects, processes or other existing guidance sources should be laid out here. Will the design be based on a similar project or will a construction execution approach such as preassembly or modularization used on a previous project be repeated here?

Phase 0 Construction Management (CM) Activities

As part of Phase 0, certain construction management activities occur. These include:

- **Construction Execution Plan** – This should have been reflected in your proposal and most certainly in your bid cost.
- **Constructability Planning** – Again this an element of a good construction plan and should have been carefully thought about at the proposal stage and is further refined as part of Phase 0.
- **Regional Labor Survey** – Do the skills the project requires exist in sufficient quantities in the required project timeframes. In particular are the specialized skills available. What projects are competing for the same labor?
    - On overseas projects, where will any offshore labor come from? Can you get the required number of visas and how long will it take? If you are sourcing from multiple countries, what cross-cultural issues should you anticipate and how do you plan on handling them?
- **Licensing** – This includes any special licenses or approvals you require to undertake the work but also any required technology licenses the owner must obtain and also any technology licenses you may require for various software tools.
- **Area Labor Market Analysis** – What is going on in the immediate area of your project? What interface, interference or logistical challenges should you anticipate and what is your approach to address them?

- **Establish Labor Posture** – This is more of an issue in markets with both unionized and non-unionized labor.

Phase 1 - Scope Definition & Conceptual Engineering

Phase 1 begins on contract signing. The baseline that you should have established during the pre-contract phase is now updated per contract. This baseline is handed off from sales to operations at contract signing and benefits from a formal handover process. The baseline, as discussed previously, includes:

- **Prime Contract** – all issues and agreements made during negotiation should be documented and communicated to the Client and the Project Team. A summary is prepared and distributed to all Project Leads.
- **Scope of Work** – This includes both facilities and services.
- **Project Execution Plan** –
    - Project organization established and key roles filled.
    - Project strategy is communicated to all Leads
- **Project Procedures Manual** or PPM is finalized in Phase 1. The PPM contains detailed instructions that describe how to execute the project scope of work within the specific terms of the contract.
- **The Project Execution Plan** or PEP, we select and implement appropriate methods for measurement, analysis and improvement. Don't forget KPIs related to the project's SBOs.
    - It also establishes the Control Structure we will use for the project. One insight to share: think about your control structure and metrics for things outside the project boundary which can wreak havoc on your project. These are those influencing flows mentioned earlier. Project execution more often than not is impacted by what happens away from the project site.
- **Cost Estimate** – update the cost estimate for what you have learned since your bid. Update it for changes in the market and other externalities. Your supply chain staff need to carefully weigh in here. Commodity markets are dynamic and influenced by local, regional and global factors.
- **Management Level Schedule** – make sure this adequately reflects owner reviews and approval time frames. Don't underestimate these. This is a common mistake. Be sure they reflect your experience --Work not just what is in the contract.
- **Risk Assessment** – This must be updated just before contract signing and communicated to all Project Leads
- **Commercial Baseline** – The commercial alignment process is initiated in Phase 1 and will continue to be refined throughout the project. A commercial summary is communicated to all Project Leads. Everyone must know the true condition of the project.

Phase 1 is foundational for project success. A lot happens at this stage and the amount of effort is often underestimated. This is where a project startup team can bring real value.

Phase 1 Activities

Let's look at some of the activities happening during Phase 1.

Project Alignment is happening in earnest. Often Phase 0 and Phase 1 alignment activities will happen together at this stage. Alignment in Phase 1 must underscore the project's SBOs.

It is also at this stage where we will identify topics for Value Improvement workshops. The value improvement process is important to meeting not only the project's SBOs but also the company's commercial objectives.

The Project Procedures Manual which we began in Phase 0 is completed in Phase 1 and reviewed with the project team. Projects benefit if there is a PPM go-by document to start with. The PPM must include a well-developed RACI (responsible, accountable, consulted and informed) matrix.

Project Requirements documenting key decisions are prepared in Phase 1 and include:

- Safety
- Technical baseline including codes, standards, stamping requirements, approvals
- Use of phased engineering, if any
- Quality Activity Plans
- Automated Systems & Tools such as CADD, BIM, and GIS
- Guidelines for input to weekly / monthly/ specialty reports
- Change Management
- Guidelines for use of Job Bulletins, Project Notes, Action Items, Needs Lists, Meeting Minutes
- Material Management process and requirements
- Construction (sub)contracting approach and impact to deliverables
- Work Breakdown Structure (WS and impact to deliverables

In Phase 1 we also:

Expand and complete the Project Execution Plan, in particular addressing:

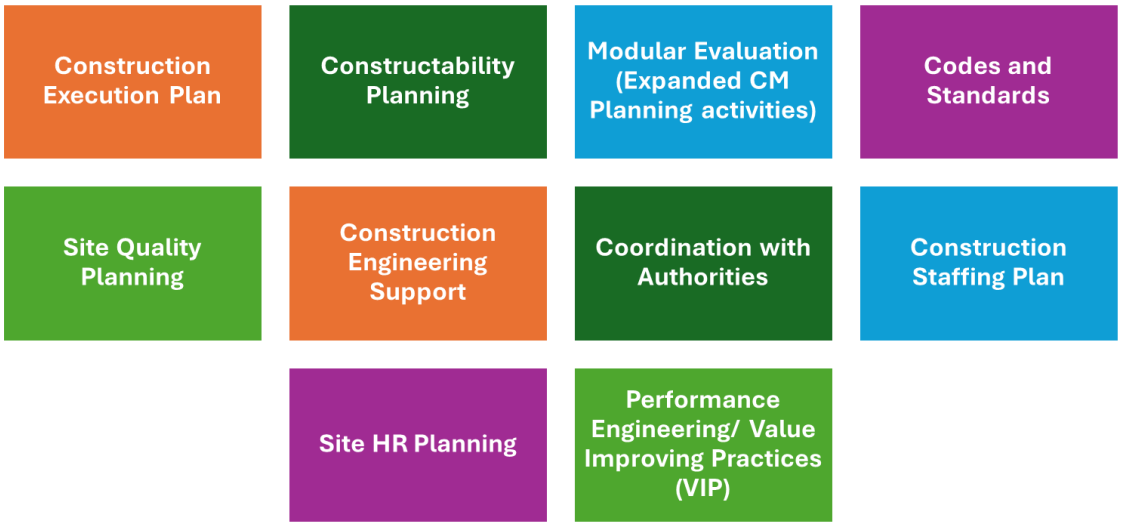
- **Early & Enabling work**. These are immediate activities and identification of these should have been well developed in Phase 0. For example, rough grading can often begin while final grading plans are being completed.
- **Granular approach to real estate or right of way acquisitions, permits, utility relocations, actions by others**. All too often this is inadequately reflected in the WBS and tie-out to individual construction work packages not made. On one project, 600 utility relocations to be accomplished by 5 different utility companies based on designs the contractor was to provide was reflected as five activities, one per utility, with start and end dates. This did not support the sequence of relocations the project required. On this turnaround the project was six months along with zero progress on the critical path.
- **Approach to modularization, off-site construction**. Remember these are other construction sites. Treat them as such.
- **Workface planning.**
- **Startup Plan.** Think "vertical startup". Begin planning startup on the first day of the project to minimize how long it will take along the critical path. What provisions can you build in just by doing something a little different that will facilitate startup?
- **Closeout Plan** – This is where money you have earned or are entitled to can be easily lost.

Project Organization – This needs to reflect linkages and interfaces within both the Company and Client organizations. For example, how does the project interface with accounts payable in each organization.

Phase 1 – CM Activities

Some specific Phase 1 CM Activities include:

- **Construction Execution Plan** – This benefits, from any construction management manual or practices the company has but also with any more granular construction handbook, procedures, go-by documents or checklists. It is also good to look at manuals and procedures of the owner to insure alignment.
- **Constructability Planning**
- **Modular Evaluation** – This is an expanded CM Planning activity. Consideration should be given to a separate guide for modular engineering and construction.
- **Codes and Standards** – make sure that these fully reflect contract requirements, including any inspection standards referenced in the contractually required standards. On one project the standard for testing and acceptance, included by reference in a contractually required standard, changed to reflect later technology for weld inspection. Several hundred million dollars of welds that passed the old standard had to be redone to reflect the changed inspection standard.
- **Site Quality Planning**
- **Construction Engineering Support**
- **Coordination with Authorities**
- **Construction Staffing Plan**
- **Site HR Planning**
- **Performance Engineering/ Value Improving Practices (VIP).** This is a project-long effort, not just a one and done.



4. Project Planning is a Primary Management Function

Project planning is a primary management function. It addresses:

- **WHAT** – Focus is on the SBOs
- **HOW** – Revolves around:
  - available resources - labor (both capability & capacity), material, equipment, information and knowledge;
  - available means & methods, processes;
  - stakeholder constraints and policies. This includes the client, your company, regulators and other authorities.

Decisions constitute –

- **WHO –** who is to do the work
- **WHEN –** when will the work be done

The purposes of **project planning** are:

- **Communication**
  - Staff involved in developing the SBOs into specific strategies and tactics. This reinforces the SBOs, provides one dimension of agreement, and begins the essential continuous communication.
  - Information for action is provided to all staff.
- **Supports creating a well-founded project**. It addresses:
  - What is required, who should perform it, when it should happen and what decisions have been made or need to be made.
  - Importantly project planning helps identify what feedback is required to assess and adjust.
- **Defines "problems" to be solved**. It defines goals and objectives
  - This starts with SBO clarity - #1 reason large complex projects fail.
  - Alternate strategies are also defined and evaluated from the perspectives of schedule, cost, quality, risk.

Project Plan - Let's look a little closer at the **project plan**:

- It consists of project baselines such as those for scope, schedule, cost, and risk
- Supports communication, organizational alignment and resource management
- Guides project execution
- Provides basis for control

A good, well-founded plan is an important first step to a successful project.

Elements of a project plan include:

- **Project charter** - overview of project stating the project's SBOs and describing the underlying reasons and drivers.
- **Key stakeholders** and issues/concerns described.
- **Statement of Work**
  - **Scope** – This is the primary baseline for the project. Don't lose sight of it and understand what is not included as well as what is included.

    - **Basis of Design** may be here – be aware of any expanded basis of design (BOD^X) requirements.
- **Schedule** – deliverables, milestones, review and approval timeframes. This should include any hold period, interim or limited Notice to Proceed (NTP).
- **Work Breakdown Structure (WBS)**
    - Disaggregates scope – phases, subprojects (example: offsite modules), deliverables (including enabling and intermediate), and work packages.

Typical sections of a Project Plan include:

- **Scope management**
- **Quality management,** sometimes as part of scope management
- **Risk assessment and risk management plan**
- **Schedule management** – resource loaded schedule; precedencies and constraints must be clearly identified.
- **Resource management** including labor, materials, and equipment and associated costs. These must be reflected in:
    - Project organization and RACI Matrix – Responsible, Accountable, Consulted, Informed
    - Startup plan and organization
- **Stakeholder management**
- **Interface management.** This may be incorporated in scope, schedule, or stakeholder sections
- **Information management**, which importantly includes document management, and the project communications plan. Late implementation of document management can create problems throughout the project especially when looking for supporting documentation related to potential changes. Think about document management as a key startup team activity.
- **Change management plan**
- **Start-up and Close-out plans**

5. Agile Planning

Large complex projects, in particular, benefit from agile planning. Agile planning is a flexible, adaptable, iterative approach to deal with change. High level plans are developed for major deliverables & milestones and task start/stop dates limited to only those required. This allows teams to pull work forward and take advantage of contingent execution. Agile planning shifts the focus to flows (arrows) vs. tasks.

There is a lack of detail when it can be avoided. This provides optionality, allowing you to commit as late as possible. Detailed plans are for short periods of time; change as needed. This fosters frequent accomplishments. Dates are probabilistic ranges vs. deterministic

Agile planning and execution are best supported by engaged senior management and a knowledgeable and empowered client. An appropriate contract structure is required and explicit feedback helps to improve subsequent periods.

Agile planning relies on:

- Quality being built in. There is no separate quality assurance phase.
- Data driven decisions

- Kanban methodology is real time communication of capacity
- Transparency of work underway and upcoming
- Statistical simulations are used

Kanban (Japanese meaning signboard) is a scheduling system for lean manufacturing (also called just-in-time manufacturing, abbreviated JIT).Taiichi Ohno, an industrial engineer at Toyota, developed kanban to improve manufacturing efficiency. The system takes its name from the cards that track production within a factory.

Effective planning is essential to mitigate these risks. Agile does not equal ~~≠~~ Scrum. Scrum is subset of Agile that relies on a series of sprints. You learn through experiences, self-organize, continuously improve. Scrum describes a set of meetings, tools, and roles that work in concert to help teams structure and manage their work.

6. Lessons Learned

Let's turn now to some construction planning lessons learned. These include:

- Keep project SBOs front and center. Remember they are the #1 reason projects fail.
- Ensure adequate support and buy-in. That comes with agreement, communication and alignment.
- Document and share insights gained in planning process.
- Document and communicate all decisions made as well as any specific rejections and rationale. This last step recognizes that circumstances may change in the future.
- Foster a culture of continuous improvement.
- Capture and share lessons learned broadly. Use the National Academy of Construction's Executive Insights.

Conclusion

This Executive Insight describes project planning during the all-important foundational phases of a project. It describes essential elements of good project and construction planning. What happens if you have poor plans and maybe even more importantly, poor planning? Inevitably you see:

- Schedule delays
- Cost overruns, often flowing from those schedule delays
- Slow adaption to emerging technologies such as the use of BIM, drones, GPS enabled real-time safety and the all-popular technology of the moment, artificial intelligence
- Inadequate communication which leads to poor client and team relations and slow decision making
- Labor shortages, exacerbated by many competing projects
- Poor planning, forecasts and budgets at later stages
- Disastrous document management
- Cash flow problems. Yes, cash is king. It is a major lubricant in project progress.

- Increased safety risks. Good planning and good safety outcomes go hand in hand.
- Failure to see major risks, or so-called black elephants.

This Executive Insight discussed:

Importance of Planning: Project and construction planning are foundational aspects that continue throughout the project lifecycle. Effective planning is crucial for project success and helps avoid common pitfalls such as schedule delays and cost overruns .

Strategic Business Objectives (SBOs): SBOs are fundamental business drivers that must be clearly articulated and agreed upon by all stakeholders. Failure to define and align on SBOs is a primary reason for project failures .

Project Procedures Manual (PPM): The PPM is developed and finalized during Phase 1, including a RACI matrix to clarify roles and responsibilities. This document is essential for guiding project execution and ensuring alignment with SBOs .

Project Requirements: Key decisions regarding safety, technical baselines, quality plans, and change management are documented in Phase 1. This documentation is critical for maintaining project integrity and meeting objectives .

Agile Planning: Agile planning is highlighted as a flexible and iterative approach that allows teams to adapt to changes. It emphasizes high-level planning for major deliverables while maintaining the ability to adjust as needed .

Lessons Learned: The document stresses the importance of documenting insights gained during the planning process, fostering a culture of continuous improvement, and sharing lessons learned to enhance future projects .

Consequences of Poor Planning: Poor planning can lead to various issues, including schedule delays, cost overruns, reputational damage and failure to achieve SBO.

These points collectively emphasize the critical nature of thorough and strategic planning in ensuring the success of engineering and construction projects.

About the Author

Bob Prieto was elected to the National Academy of Construction in 2011. He is a senior executive who is effective in shaping and executing business strategy and a recognized leader within the infrastructure, engineering, and construction industries. Bob received the 2024 ASCE OPAL Award (Outstanding Projects and Leaders) for his Outstanding Lifetime Achievement in Management.