



# Asset Performance Networks

## Challenges Facing Plant-Based Projects

By

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## Summary

Plant-based projects (or small projects managed by the plant) are largely unpredictable, and appear to management that they are inefficiently managed. Rarely does a plant-based project system satisfy all its direct and indirect customers. Many owner companies either neglect their plant-based project systems, or apply large project processes and metrics to manage them. Both positions result in frustrating inefficiencies at best, and at worst - significant operational risks. This paper describes the challenges facing plant-based projects and how they are distinct from those of large projects, and hence they require different metrics and a fit-for-purpose approach to effectively manage them.

## Challenges facing Plant-based Projects

Plant-based projects are small projects (typically ranging between \$50M and \$5MM) intended for plant betterment and are typically managed by project engineers residing at the plant. In our experience, plant-based projects (or small projects managed by the plant) seem to have a consistent reputation of not meeting managements' expectations. Rarely do we come across a plant-based project system that satisfies all its direct and indirect customers.

Many operators believe that governing plant-based projects is not critical because of the false view that small projects pose a lesser risk than large ones. Others, who believe differently, infer that plant-based project systems, as large-projects, need to be governed by a project process and project metrics – naturally jumping to the conclusion of adapting their large project process and metrics to smaller projects. Both positions result in frustrating inefficiencies at best, and at worst - significant operational risks<sup>1</sup>.

In this paper, I attempt to describe some of the challenges facing plant-based projects and how they are distinct from those of large projects. I highlight four major differences, although I recognize there are many more:

Differences during the phases of each project's life-cycle: During installation or construction, plant-based projects have to consider live systems and the coordination with shutdowns and turnarounds, which requires integrated and often accelerated construction schedules during shutdown. During their design phase, design basis documentation for plant-based projects have to rely on

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<sup>1</sup> Once installed, most plant-based projects are modifications (major or minor) to an operating plant directly affecting various operational aspects e.g. conduct of unit operations, process control, maintenance, documentation, training, configuration and design basis, and many other process and operational aspects. These aspects raise the likelihood of errors in an operating environment and hence, a potential for catastrophic consequences.

existing equipment configuration and their material condition, as well as the accuracy of existing drawings (e.g. P&IDs, As-built) relative to what is actually installed in the plant, including active temporary modifications and the likes. In their inception stage, the drivers behind plant-based projects differ from large projects which are typically driven by a business proposition with a Return on Investment (ROI). A plant-based project may be ROI driven, but it could also be triggered by safety, regulatory, performance, technological, obsolescence, or behavioral causes. They could also be triggered by a commitment made by an executive to an outside agency, or other stakeholders. These drivers directly affect the prioritization (discussed in more detail later in this paper) of plant-based projects which in turn directly impact the allocation of engineering resources and the inefficiencies resulting from “starts, stops, slow-downs, and speed-ups” of various projects in an environment that, by its nature, could be characterized by continuously changing priorities.

Differences in the structure of the organization that manages projects: In addition to the above mentioned differences between large and plant-based projects, the organizational and management structures surrounding plant-based projects differ from large project organizations. Large projects have dedicated project managers and project teams, while one project engineer may be responsible for many plant-based projects and sharing a project controls team with many other projects managed by others, for instance. Plant-based project organizations are structured to manage a complete portfolio of projects. Some project durations cross annual budget cycles, and some may not. Some have pre, post, and turnaround installation phases, and some do not. Some have turnaround only phases. Further complicating the organizational structure, some high-cost complex plant-based projects may be managed similarly as large projects, in that they may have dedicated leaders and staff.

Differences in Project Initiation,

The plant-based project organization is typically either embedded into the site-engineering organization or closely tied to it. This umbilical tie is rooted in the fact that many, but not all, plant-based projects start as an issue. There are many types of issues, but to name a few an issue may be a recurring failure, or may not be resolvable by like-for-like maintenance, or may be a discrepancy between plant and drawings, or a possible improvement that requires an engineering study to confirm it or refute it, etc. Furthermore, a plant-based project may start with a stated solution, rather than the problem – this, at times, enable the solution to take the life of a project all the way to completion to find out after installation that the solution does not work or may have not been the right solution to the problem that was never thoroughly investigated.

Differences in Project Categorization, and Prioritization: As mentioned above, the drivers behind initiating a plant-based project are, in most cases, different than large ones. Large projects are initiated to achieve strategic or business

objectives. Plant-based projects may also be initiated to achieve a business objective (measured by ROI), or to improve safety or operations or process efficiency, or to meet a new regulatory requirement or a commitment to an outside agency or stakeholder, and the list goes on. The drivers behind initiating a plant-based project are too many to list or even to manage – however, each project should be categorized according to its effect on safety, operations, process improvements, ROI, level of commitment, and other factors. Categorization is important for passing through the phases of the life of the project: verification (i.e. a project is needed to resolve the issue); selection (i.e. the right project concept has been selected to meet the project objective and close the issue); and prioritization (i.e. which projects should the organization be working on now). Additionally, prioritization is an essential element of an efficient plant-based project process. AP-Networks is developing a proprietary prioritization system based on a Calculated Value Constant (CVC) that is adjustable to meeting annual corporate priorities (e.g. Balanced Score Card). The CVC is a function of the various project categories and the time-frame windows of project phases. Each project would be assigned a CVC, which will be held constant at a pre-set point in its phased development to ensure it is ranked according to its business priority or intended objective.

As many of you know, we have developed a comprehensive product to assess plant-based project systems – Maturity Assessment of Plant-based Project Systems (MAPPS). It is truly a breakthrough in establishing the right metrics for a plant-based project system. This write-up is intended to frame the need for MAPPS and to illuminate the distinctive challenges facing plant-based projects. I encourage you to find out more by contacting AP-Networks.