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Beyond buildability: Operability and commissioning of industrial facilities

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Abstract

Industrial projects are growing bigger and more complex, producing new challenges for their completion. As such, project management, and the perception of project success, must be aligned with a new paradigm: the plant's completion is not enough. It is necessary to deliver the benefits envisaged during the project formulation, including successful commercial operation. This new paradigm requires new processes and behaviors related not only to engineering best practices but also to new managerial approaches. Closure is pivotal throughout the life cycle when the facility transitions from plant completion to start-up, followed by the ramping up of operations. To deliver what was previously planned, three main drivers must be in place: quality of the scope definition; alignment of the business strategy; and operability of the asset delivered. Traditionally, commissioning has been considered an activity that is executed just before the operations take over from the start-up systems. Increasingly, it has become a comprehensive and systematic process to verify and document the systems of a new or remodeled plant functioning as designed to meet the owner's requirements. Thoroughly planned and executed commissioning has become critical to allow the facility to operate as intended. The purpose of this paper is to demonstrate that a focus on operability and the commissioning of new or refurbished facilities represent opportunities for owners and operators to eliminate and mitigate exposure to numerous risks and increase the chance of success for the facility life cycle and the likelihood of satisfying the operational needs and requirements.

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1. Introduction

The context of industrial operations has been changing fast in the last decades. Pictures of plants from the beginning of the last century show a reality that is already difficult to recognize, so many and so deep are the technological, organizational and environmental differences. Such differences widened from the 1950s onwards, being identifiable amongst others by four elements: the size of the plants; the complexity of the production processes; the production costs (both capital and operational expenditures); and the performance requirements (product and process). At the same time, the market has become increasingly demanding and dynamic, requiring fast and accurate responses. Slippage of just a few weeks in the time-to-market of a product may cause a missed window of opportunity and serious financial losses to a company. Just one ill-conducted project that fails to deliver as planned (and needed) may put a company's survival at stake.

Industrial projects involving heavy building and construction, concentrating very high capital demands and touching the main business objectives of a company, are specially sensitive to that reality. However, the construction industry presents a historical difficulty in delivering running facilities. This issue has been extensively discussed by the Construction Industry Institute (CII, 2004), an international forum of the building industry. The CII states that:

> Project Management and the perception of project success must be aligned with a new paradigm: mechanical completion is not the project objective, successful commercial operation is.

The challenge of successful commercial operation requires the replacement of conventional management and engineering practices by new models that can assure the integration between the effort of creating the production asset and the business context. This need becomes obvious and critical in the last phase of the project, when the asset must demonstrate its conformity to the specifications and its capacities and produce as planned. Although it could have seemed rather simple to our grandfathers, or at least not an essential issue, presently it is not feasible to overcome this challenge without proper methodology, best practices and adequate project organization. Without these tools, the risk of failure in achieving business objectives due to a poorly delivered or underperforming asset increases dramatically.

From an industrial project management standpoint, there are at least three major factors influencing that context directly and decisively:

- Scope definition
- Integration between business objectives and project strategy/planning
- The operability maturity level of the project

For reasons of space, the first two will be briefly outlined as an introduction to the analysis of the third one.

2. Scope definition

The handover of an industrial facility to its customers/operators requires a sound definition of the conditions under which that critical activity will take place. After all, the facility is the main deliverable and the raison d'être of the project. However, due to insufficient WBS/SOW detailing and/or low-quality technical specifications, those conditions are frequently unclear, creating responsibility issues, contractual claims and, sometimes, inadequate scope at the end of the project.

The lessons learned from big industrial projects point to complexity as one of the root causes of this recurrent problem. The project team focuses spontaneously on the costlier and more complex deliverables (which are not few). The "lighter" ones receive less attention than would be advisable. Compared with the main deliverables, many elements, or work packages, connected to the start-up/handover of industrial facilities are actually small (in terms of