

Toward a Unified Conceptualization of Operational Readiness: An Organizational Capability for Converting Project Success into Sustainable Operational Performance ¹

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Why Does Operational Performance Still Lag Behind Project Success?

Across industries, organizations continue to spend significant amounts of capital to build new infrastructure for producing assets. Sophisticated methodologies and increasingly rigorous governance frameworks have supported the delivery of these projects, along with major advances in engineering, digital technologies, and construction practices. All this has substantially improved the ability to deliver scopes on time and on budget. Despite this, however, a persistent paradox remains present that restrains and inhibits the full materialization of value: projects that are widely regarded as successful frequently struggle to achieve the operational performance they were intended to create.

This paradox is recurrent across virtually every industry: Oil and Gas facilities that take months, or even years, to reach planned levels of production; healthcare facilities that experience prolonged stabilization periods before achieving expected levels of service; and airports that had to stop operations in day one due to failures in activation protocols are just a few sectors where these challenges materialize. Physical assets that have been completed continue to struggle in realizing the outcomes that justified the investment. These issues are rarely attributable to a single source of failure. Instead, they emerge at the interactions of various technical, organizational, human, and managerial elements whose aggregated contribution influence how of these newly delivered projects will transition to live operations.

On the other hand, how transition of projects to live operations are managed and controlled often rely on traditional project metrics, providing an incomplete view of how the project and the organization itself will create value after start-up. Schedule performance, cost control, construction progress, and commissioning completion among others are essential indicators of project execution, yet none of them demonstrate that an organization is

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genuinely capable of sustaining safe, reliable, and value-generating operations. As projects grow in scale and complexity, it becomes more cumbersome to understand, measure and control the performance of complex networks, within the project and the whole execution ecosystem, that interconnect multiple stakeholders whose interactions emerge asynchronously and extend beyond mechanical completion. Success depends therefore on ensuring that the organization itself develops capabilities to operate, maintain, govern, and continuously improve the asset under real operating conditions, beyond the delivery of the physical asset.

It is precisely within this transition that many organizations experience what may be considered the last mile of capital projects: the critical period separating successful project delivery from sustainable operational performance. Challenges experienced in this final stage often remain largely invisible during project execution, appearing only after the project has been declared complete in the form of delays in production ramp-up and stabilization, operational disruptions and, in the worst cases, safety incidents. These issues are essentially the result of a lack of readiness to absorb and operate the delivered asset. In response, organizations have progressively developed a wide variety of Operational Readiness activities, with a main focus on operators training, commissioning, procedures development, maintenance preparation, in an attempt to close the distance in this “last mile” by effectively addressing emergent situations during start-up and transition to live operations



Figure 1. The Last Mile of Capital Projects

Although the collective contribution of these Operational Readiness practices has brought significant benefits for project delivery, they have evolved as collections of activities and processes rather than as expressions of a broader organizational capability. As a result, Operational Readiness is frequently considered as a project function to be executed rather than as a capability that enables organizations to transform completed projects into sustained operational value. This distinction is critical as it influences how readiness is planned, measured and governed: When Operational Readiness is embraced strictly with a project mindset, its success is naturally associated to the completion of deliverables and not as a capability to timely uncover risks that can impact performance and the overall organization's capacity to navigate uncertainty and sustain value.

At the same time, risk identification has traditionally been anchored in the fundamental question **"What if?"** seeking an understanding and the management of uncertainty. This philosophical orientation has been paramount to frame the identification of potential events, estimate likelihoods, consequences and design control measures to reduce exposure before operations begin. Beyond this, the equally important question **"Even if?"** emerges as an executive paradigm that enhances the view of risks and provides an enhanced forward-looking view that assists the organization to perform in a range of plausible scenarios: Even if unexpected conditions arise, does the organization possess the capability to continue operating safely, reliably, effectively and in a resilient manner? It is precisely this extended perspective what elevates Operational Readiness from a process that anticipates uncertainty identifies risks to a performance-enabler capability that, extending beyond completion, creates confidence and resiliency to sustain value.

Before such a capability-oriented perspective is presented, it is necessary to understand how Operational Readiness has evolved over time and why existing approaches continue to prove insufficient to successfully close the gap between project completion and operational performance in a consistent manner.

Existing Perspectives on Operational Readiness

Operational Readiness is not a new concept. For decades, organizations delivering complex capital projects have recognized that ensuring operational performance goes beyond the completion of engineering, construction, or commissioning activities. This recognition has driven the development and implementation of a broad range of practices to prepare organizations for the assumption of operational responsibility. The experience gained in the progressive development and implementation of these practices has improved the industry's ability to manage transitions of projects to sustained operations.

Accordingly, Operational Readiness has not evolved as a single body of knowledge. Instead, it has matured through the contribution of several established disciplines. For instance, project management has provided the governance, planning, control and delivery practices that coordinate increasingly complex investments (Project Management Institute, 2021); commissioning and systems completion have focused on testing to demonstrate that systems and facilities perform according to their intended design; asset management has extended toward lifecycle performance and long-term value realization (ISO 55001, 2024); risk management has provided structured approaches for anticipating uncertainty and strengthening organizational resilience before operations begin (ISO 31000, 2018). Moreover, organizations that advance professional practice, such as the Construction Industry Institute (CII), have played a significant role in advancing guidance, lessons learned, and leading practices that continue to shape Operational Readiness across multiple sectors.

While it is necessary to recognize the collective contribution of these perspectives in helping to mature and understand Operational Readiness as a professional practice, each discipline has approached readiness through its own optics, defining specific objectives, terminology, and methods. This variety of viewpoints has caused organizations to embrace Operational Readiness in different ways, assigning responsibility to different functions and evaluating success using different criteria. Consequently, some organizations associate readiness primarily with commissioning; others, with operational transition; others with project close-out. All these interpretations are valid and complementary, yet they provide different pieces of readiness without fully defining the phenomenon itself.

Finally, it is important to keep in mind that organizations are complex adaptive systems where performance is the result of interactions between numerous technical, organizational, and human systems operating simultaneously. Furthermore, outcomes in complex environments are shaped by the relationships among interconnected elements, rather than by the actions of individual components alone (Snowden & Boone, 2007). This explains the emergence of multiple views and the fragmentation of Operational Readiness practices. However, this should not be seen as a weakness in established disciplines, but as the natural consequence of approaching an inherently systemic challenge from multiple professional perspectives.

A Capabilities-Driven Perspective

The fragmentation of Operational Readiness practices provides a valuable opportunity to explore the advancement of readiness-relevant disciplines such as project management, commissioning, asset management, and risk management. One of the most robust frameworks to explore the contribution of these advancements to readiness in a structured manner is the Dynamic Capabilities theory. In essence, the Dynamic Capabilities theory suggests that enduring performance depends not simply on what organizations do, but on what they are collectively capable of becoming (Teece, 2007). Therefore, by observing the integration of these complementary views through this conceptual lens, it will be possible to gain a broader perspective of readiness that can be effectively translated into sustained operational performance.

Contemporary approaches implicitly describe Readiness as the result of achieving milestones, verification of systems, or the delivery of project outputs required before operations commence. This perspective provided organizations with practical methods to plan, coordinate, and verify increasingly complex transitions. Unfortunately, it has also framed readiness as a collection of project functions, measured by with the successful completion of tasks rather than by the organizational capability those tasks are intended to create. Instead of viewing Operational Readiness as an extension of project execution, it may be more useful to understand it as an organizational capability that is progressively developed throughout the project lifecycle, ultimately expressed when operational responsibility is assumed.

From this viewpoint, readiness is not something an organization performs immediately before start-up. Instead, it is something an organization becomes through the intentional integration of people, organizational arrangements, systems and processes, and operational assets. Interestingly, this aligns with a contemporary and broader shift in management thinking that clearly differentiates the execution of activities from the development of enduring organizational capabilities (Teece, 2007). Capabilities are not defined by isolated processes, but by the organization's capacity to achieve desired outcomes under varying conditions in a consistent manner. Operational Readiness therefore extends beyond demonstrating that facilities can operate as designed: its purpose is to develop the organizational conditions that enable reliable, resilient, and sustainable operations from day one and throughout the asset's lifecycle.

Viewing Operational Readiness through the capabilities lens also changes the nature of the questions organizations ask. Instead of concentrating exclusively on whether predefined readiness activities have been completed, attention shifts toward whether the organization

has developed the ability to absorb uncertainty, adapt to operational realities, and consistently translate project delivery into operational success. Completion remains essential, yet it becomes evidence of capability rather than its definition.

It is important to highlight that this shift in perspective does not replace existing Operational Readiness practices. Instead, it provides the conceptual foundation that connects them. As such, commissioning, organizational change, risk management, asset management, governance, and operational planning become complementary expressions of a larger organizational capability rather than independent disciplines pursuing parallel objectives. Understanding how that capability is developed (and what organizational dimensions collectively shape it) provides the basis for a more integrated conceptualization of Operational Readiness.

The Two Dimensions of Operational Readiness

As we have discussed above, performance in complex organizations is the aggregated result of the interactions among technical, organizational, and human systems, whose collective behaviour cannot be fully understood in isolation (Snowden & Boone, 2007). In this perspective, organizational capabilities do not emerge spontaneously, nor are they produced simply by completing a sequence of project activities. Instead, they develop through the interaction of organizational elements that progressively mature throughout the project lifecycle. This brings an important challenge: Operational Readiness relies on the coordinated development of multiple interdependent workstreams and organizational capabilities that must be effectively orchestrated in a coherent and progressive maturity lifecycle.

This challenge does not inhibit the exploration of readiness as a phenomenon. Instead, it provides an important basis to examine and reconceptualize Operational Readiness as an organizational capability deliberately created, progressively developed, and ultimately demonstrated through, the interplay of two complementary dimensions: a **Structural dimension**, representing the foundations that must be in place to sustain operations, and a **Developmental dimension**, representing the progressive evolution through which those foundations evolve toward a demonstrable state of readiness.

The Structural dimension represents the foundational architecture that enables and sustains operational performance. In essence, it is the dimension where Operational Readiness resides and evolves as a capability. This structural dimension comprises four interdependent Core Capabilities: People, Systems and Processes, Organization, and Assets:

- **People Capability** is the organization's ability to develop, mobilize, and sustain the human capital required to perform successfully from the first day of operation.
- **Systems and Processes Capability** represents the organization's ability to establish, integrate, and continuously execute governance mechanisms, operational processes, digital systems, workflows, and controls that enable safe, reliable, and consistent performance.
- **Organizational Capability** is the organization's ability to place, align and reconfigure structures, roles, interfaces, culture, accountabilities, and leadership to ensure integrated decision-making that allows to successfully operate in complex environments
- **Asset Capability** is the organization's ability to deliver and sustain physical assets that are operable, maintainable, reliable, and fit for their intended operational purpose throughout their lifecycle.

It is important to recognize that Operational Readiness, as a capability, is inherently dynamic. Rather than appearing at a single point in time, it develops progressively across the project and the asset lifecycle. Therefore, if the structural dimension explains where the capability resides, the second dimension, the Developmental dimension, explains how Operational Readiness matures throughout the project lifecycle. This maturation occurs through three developmental states: Awareness, Preparedness and Readiness:

- **Awareness** state establishes the organizational understanding of future requirements. This includes elements as performance expectations, interfaces, opportunities and risks.
- **Preparedness** state is the progressive transformation of that understanding into orchestrated actions and strategies across the four Core Capabilities. This is expressed in strategic activities and actions that include planning, integration, capability development, organizational alignment and systematic implementation
- **Readiness** represents the point at which those capabilities have matured sufficiently to enable the organization to assume operational responsibility with confidence, resilience, and operational discipline, enabling a robust decision-making process.

Figure 2 below summarizes the two dimensions that comprise Operational Readiness:

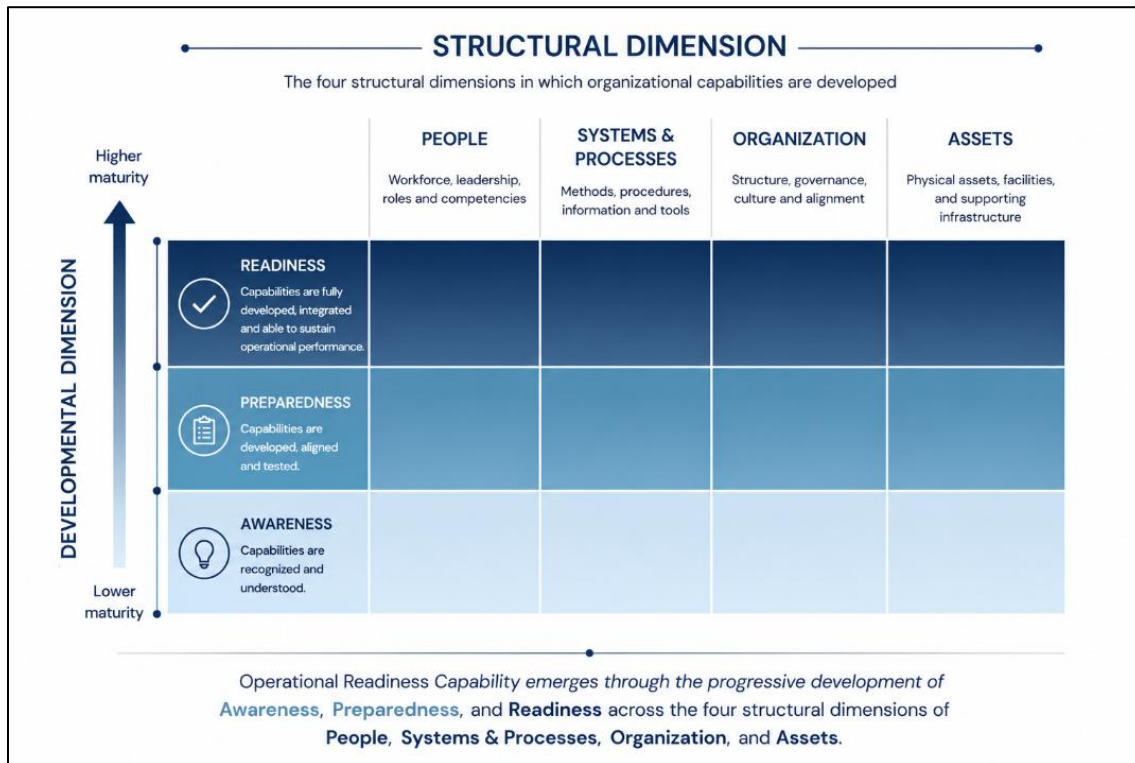


Figure 2. The Two Dimensions of Operational Readiness

By observing Operational Readiness through the lens of Dynamic Capabilities, it is possible to understand how through the interplay of these dimensions, organizations can enhance their ability to timely identify, respond and adapt to emergent constraints when bringing assets to life and sustaining operations, ultimately increasing their value-creation potential. Enduring organizational performance depends not simply on the execution of individual activities, but on an organization's ability to integrate, develop, and continuously reconfigure its resources in response to changing operational conditions (Teece, 2007). Operational Readiness, therefore, extends beyond preparing an asset for start-up. It develops the organizational ability to repeatedly achieve successful operational transitions across different projects, technologies, and operating environments.

At the same time, the systemic nature of Operational Readiness is evident. Neither dimension is sufficient on its own and they are mutually-reinforcing. For example, developing strong People core capability without robust Systems and Processes capability will derive inefficiencies and inconsistent outcomes; technically complete assets cannot deliver sustainable value without the organizational capability required to operate them effectively. By the same token, progressing unevenly through the Developmental states without a well calibrated synchronization across the four Core Capabilities creates risks of suboptimal

integration and latent vulnerabilities that will manifest during start-up or along the stabilization period. Operational Readiness Capability therefore emerges but from a coherent maturation of the structural dimension across the Awareness–Preparedness–Readiness continuum.

The integrated two-dimensional model also changes how Readiness is evaluated and further exposing its fundamental differences with completeness. It is not enough to measure and control the completion of activities, deliverables, or milestones since, although these project components remain important indicators of progress, they do not necessarily demonstrate Readiness. Operational Readiness is therefore neither a checklist nor a project phase. Instead, it is an organizational capability that emerges from the orchestration of four Core Capabilities through three progressive Developmental states. It is precisely this coherent and progressive development what enables the organization to deliver safe, reliable and sustainable operational performance under real conditions.

Why This Matters

The conceptualization of Operational Readiness as a dynamic organizational capability framed within two interdependent dimensions allows to distinguish whether a project is simply completed or truly prepared to succeed in operation. Furthermore, it also provides a common language through which commissioning, operational transition, organizational change, governance, risk management, and asset management can be understood as complementary contributors to a single organizational outcome.

Numerous findings suggest that challenges in projects extend beyond execution stage. A growing body of evidence shows that successful project delivery does not automatically translate into successful operational performance or sustained value realization (Morrow, 2011; PMI, 2021; ISO 55001:2024). Similarly, contemporary research on megaproject performance concludes that technical success and operational success frequently diverge, with organizations completing projects while continuing to experience delayed benefits realization, prolonged operational stabilization, or lower-than-expected performance (Flyvbjerg, 2021). The examples below from major projects across different sectors reinforce this conclusion:

- In oil and gas, Kashagan development in the Caspian Sea experienced years of delay between initial start-up and sustained production. Technical completion gave way to the more complex challenge of achieving stable and reliable operations, illustrating the organizational difficulties associated with transitioning highly complex assets into service (Miller & Lessard, 2000; Morrow, 2011).

- In the mining sector, the transition of Codelco's Chuquicamata Underground Project in Chile from construction to sustained operations encountered repeated delays, equipment failures, construction deficiencies, operational disruptions, and regulatory findings concerning deficiencies in operational controls, highlighting the complexity of converting a technically completed asset into a stable operating system (Reuters, 2024; SERNAGEOMIN, 2024).
- In aviation, the opening of Heathrow Terminal 5 demonstrated that even world-class infrastructure can experience significant operational disruption when the readiness of people, processes, baggage handling systems, and organizational interfaces fails to mature at the same pace as the physical asset (House of Commons Transport Committee, 2008; Davies & Brady, 2016).

From the examples above, Kashagan was particularly significant. The Operator, NCOC, deployed a highly sophisticated Operational Readiness and Assurance (ORA) process, yet the effort was framed to demonstrate readiness through technical conformance, compliance with international standards and scope completion. The project entered initial production in 2013, but pipelines leaks forced production to be suspended within weeks. The project restarted 3 years later after major works were conducted to address the deficiencies. This remarkable example shows that just that having an ORA process does not guarantee that readiness has been adequately demonstrated (Verre, 2008; North Caspian Operating Company N.V., 2015; North Caspian Operating Company N.V., 2016).

Another significant body of evidence across industries was presented in Deloitte's *Ready to Operate* report. The document collected lessons from major infrastructure programs, concluding that when organizations underestimate Operational Readiness, they increase their exposure to increased capital costs, delayed revenue generation, higher operating costs, unnecessary burdens on their workforce, and diminished stakeholder confidence (Deloitte, 2023).

These examples, originated from different industries, countries, and regulatory environments, reveal a remarkably consistent pattern: Challenges are rarely confined to engineering, construction, commissioning, or technology in isolation. Organizations frequently succeed in delivering physical assets, yet they don't develop the capabilities required to operate these assets in a safe, effective and sustainable manner. Success, therefore, requires organizations to steer away from asking whether predefined readiness activities have been completed, and begin asking whether the four Core Capabilities, People,

Systems & Processes, Organization, and Assets, have matured sufficiently through the three Developmental States of Awareness, Preparedness, and Readiness to support sustained operational performance.

This perspective also has important connotations in the role of risk management. While risk management has traditionally focused on identifying uncertainty by asking "What if?" Operational Readiness Capability extends that thinking by asking "Even if?": Even if unexpected events occur, even if assumptions prove incomplete, even if operational conditions differ from those anticipated during project delivery, has the organization developed the capability to timely adapt, respond, and continue performing safely and sustainably? From this perspective, readiness becomes more than the absence of known risks: it becomes the carrier of organizational resilience.

Looking Ahead

The persistence of transition-related challenges across industries suggests that organizations have long been addressing different manifestations of the same underlying phenomenon. Viewing Operational Readiness as an organizational capability provides a significant conceptual advancement in the discipline through which these diverse experiences can be understood, integrated, and ultimately improved. This brings important implications for at least four key actors in the execution ecosystem:

- For project organizations, a capability-oriented perspective facilitates and streamlines an earlier integration between delivery teams and future operators. This strengthens decision-making processes throughout the project lifecycle rather than concentrating readiness efforts immediately before start-up.
- For asset owners and operators, it provides a framework for developing and deploying organizational capabilities in parallel with technical delivery, recognizing that sustainable operational performance depends as much on people, organizational systems, and institutional preparedness as it does on engineering excellence.
- For investors and project sponsors, it brings the possibility for Operational Readiness Capability to become an enabler to convert capital investment into reliable operational performance and sustained value realization.
- For insurers, underwriters and financiers, it provides a structured basis to assess whether an organization is genuinely prepared to convert a completed asset into a safe, reliable and sustained operational performance, providing a stronger indicator for risks associated to transition, ramp-up, revenue and value realization than traditional, project-based, completion measures alone.

The implications of this model extend equally to the institutions that shape professional practice and advance knowledge in the disciplines of project delivery, governance, commissioning, asset management, systems integration, and organizational performance. Adopting a capability-oriented approach opens the way for professional institutions, standards bodies, and industry associations to view their contributions as components of a broader organizational capability incubated around a common objective: the consistent transformation of completed projects into successful operations.

This new perspective also opens new opportunities for research in strategic project and organizational streams such as outcome assurance, capability development, organizational maturity, governance, resilience, and value realization. These streams can now be explored within an integrative conceptual framework rather than as isolated topics belonging to separate disciplines, bringing the potential to harmonize and strengthen dialogue between researchers and practitioners while encouraging greater integration across fields that have traditionally evolved independently.

Finally, an important implication for future research lays on the epistemological implications from synthesizing Operational Readiness into a two-dimensional model: If Operational Readiness is indeed a distinct organizational capability, then many of the recurring challenges observed across industries may not be the result of isolated execution failures. Instead, they may be manifestations of a common phenomenon that has remained largely implicit despite decades of professional practice. Recognizing that possibility sets a solid stage to explore how organizations systematically develop the capability to transform investment into enduring operational value.

Every mature discipline reaches a point at which familiar practices begin to reveal a deeper pattern. Concepts that once appeared independent progressively become understood as different expressions of the same underlying phenomenon, creating valuable opportunities to rethink established assumptions to advance and reshape professional practice. Operational Readiness may be approaching such a moment.

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