

Strategic Foresight: A Method for Addressing Fragility in Engineering Plans



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Abstract

Engineers are very meticulous planners when preparing for a new development or construction effort. These thorough plans lay out a path to success for the project and are generally followed very strictly. However, engineers inability to evaluate the plans objectively and vehement adherence despite evolving and unforeseen circumstances have led to a negative outcome in many historical cases. Adapting the discipline of strategic foresight shows promise in helping engineers objectively evaluate plans and identify risk factors proactively.

Keywords: Blinders; Adversity; Engineers; Mars climate orbiter; Engineering planning; Fragility

Opinion

Engineers are usually very adept at developing a thorough plan, particularly for new construction or development efforts. These meticulous plans provide a roadmap to success that teams generally try to adhere to at all costs, even when facing adversity. The desire to maintain the plan is often exacerbated by schedule and cost pressures. Strict adherence to the plans often serves as blinders, narrowing the vision of engineers and scientists [1].

One tragic example is the Challenger Space Shuttle explosion, which resulted in the deaths of seven crew members. The NASA program proceeded with launch to adhere to a strict schedule, despite concerns from many of the engineers over the O-Rings. In addition to disregarding information, strict adherence to a plan may preclude individuals and organizations from even considering potential deviations. The NASA Mars Climate Orbiter (MCO) Failure Report found both an inadequate contingency planning process and an inability of the team to analyze “what could go wrong” [2].

NASA is known as one of the most process-oriented agencies in the government. Despite the meticulous planning and decades of past experience many NASA programs experience adversity to their planning, including the two cases noted. In many cases, the inability to react to plan deviations and lack of foresight to evaluate potential issues has led to failure. This highlights the fragility in engineering planning. Given this historical perspective, it is unreasonable that engineers should expect that their own carefully laid plans will not face complications. The question

then becomes: How can engineers foresee potential issues and be prepared to react? This will, perhaps, require a mentality shift in engineers to focus on gray instead of the black and white.

One method for looking into the future is by employing strategic foresight methodologies and frameworks. Strategic foresight is the ability to create and sustain forward views and applying the emerging insights in organizationally useful ways [3]. Strategic foresight is often used to detect adverse conditions, guide policy, and shape strategy. Strategic Foresight allows practitioners to think about the future in uncertain terms. “Futurists”, as they are called, know that they cannot predict the future. However, futurists focus on identifying the drivers and uncertainties that will likely dictate the future and plan accordingly based on those signals.

Strategic Foresight is most often associated with broad subject matter, such as political science and consumer science. The time horizons tend to be in the span of decades instead of the typical 1–5-year development cycle of a system. Yet, there is immense applicability in many areas and industries including engineering. It is not unreasonable to believe that the same methods that allow practitioners to predict the challenges in the pharmaceutical industry over the next 20 years could be used to predict the challenges a construction project may face over the next 20 months.

Adapting a strategic foresight mentality in planning an engineering program could have immense value and provide

increased flexibility into construction and development efforts. Strategic foresight enables the practitioner to envision multiple futures: some futures will represent a “perfect world” scenario and others will identify potential risk factors to an identified plan. Identification of risk factors will drive the practitioner to evaluate “what if” scenarios as identified in the MCO Failure Report. The implications of the scenarios will, in turn, cause the practitioner to start considering mitigation paths.

While it is implausible for the utilization of strategic foresight to identify every failure mechanism that exists within a development or construction plan, the process will transform the practitioner’s mindset from reactionary to proactive. From an organizational perspective, having program and project managers that are proactively identifying and mitigating potential risk factors will significantly decrease organizational fragility to change.

Historical efforts such as the MCO and Challenger have shown that engineers must be prepared to face adversity in their plans

and adapt accordingly. Profit margins, project success, and, in some cases, lives depend on the ability to adapt to changing situations. Strategic Foresight is one such method that would allow organizations to shift their leaders to a proactive mindset from a reactive one. It is time to start assimilating some of the practices, frameworks, and methodologies of Strategic Foresight into engineering program and project management activities. It is impossible to engineer the future with eyes fixed firmly on the present.

References

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