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How to Overcome the Curse of Excessively Detailed Specifications Leading to Uneconomic Infrastructure Projects

In a number of industries or organizations, excessive growth of the formal technical specifications requirements fuelled by risk prevention has led to deep non-competitiveness, with not only dramatic consequences on individual organizations, but also wide-ranging consequences on public welfare. Yet, it is extremely difficult to reverse this situation, as public outcries of excessive risk taking and very high personal and collective liability immediately looms. In this White Paper we examine some ways to overcome this situation.

The drama of excessive formal specifications

Organizations or countries that have let their requirements and other specifications grow over time up to a point where they severely constrain any project face significant non-competitiveness. This can have dramatic consequences on the longer term.

As an illustration, it is currently not rare to observe in the project industry that detailed specifications applied by some Owner organizations can double or even triple the cost of a facility without necessarily visibly enhancing safety or reliability compared to competitors' (source: private communication of feedback from bid optimization exercises). This might make whole organizations significantly uncompetitive compared to new entrants or other organizations that might not have developed detailed formal specifications.

Organizations with stringent specifications also tend to be extremely conservative and adverse to innovation, here again leading to substantial loss of competitiveness on the long run. That situation might be alleviated sometimes through Joint Industry Research Projects that develop common standards based on research. Additional requirements on top of these common standards are often very onerous.

Because various organizations have various requirements and specifications, suppliers have to adapt to each particular case, which creates substantial additional costs and a higher risk of non-compliance.

The mechanisms of formal specification growth

Growth of a body of standard specifications in any organization is a process akin to bureaucratic growth. It is deeply founded in a lack of widespread accountability and competency and results in additional control layers in a hierarchical organization. "Bureaucracy was born out of the human desire for complete assurance before taking action" (Scott Belsky).

Under the pretext of diminishing risks, every event is the source of additional requirements which are then made general. Controlling the actual application of extensive specifications creates work for an army of employees whose interest is not to make it more straightforward.

There remains the possibility to obtain a waiver, but the process is designed to be complicated with a low throughput, and designed to discourage such practice. Hierarchies of Technical Authorities are typically put in

place, with limited space for appreciation and expert judgment.

The ultimate goal of such systems can be seen to dilute responsibilities so that in case of an accident the organization can hide behind its comprehensive set of specifications. Site operators at the base of the pyramid are generally made the culprits while the intermediate management and the Technical Authorities find escape routes in the lack of accountability of the system.

Non-acceptable assumptions regarding specifications limitations

Before we tackle the issue of simplification, let us note that in some countries or organizations certain assumptions are made to minimize the onus of requirements growth. These assumptions are not acceptable. While there are several presentations and versions, they

basically consider that specifications attached to a facility should not be modified from the original construction specifications notwithstanding:

- The evolution of scientific knowledge (e.g. typically, seismic resistance of structures, occurrence of major natural events, etc.),
- Lessons-learned from actual events (accidents and near misses) in the industry or other industries.

We believe that if scientific knowledge or lessons learned shows that a major change needs to be made to specifications because of a real danger, with possibly costly retrofit actions to existing facilities, it should be made within a reasonable timeframe. Our aim here is not to avoid these aspects, but to investigate how to simplify excessive formal requirements while still being open to these necessary evolutions.

Characteristics of a 'lean' risk management system

It has been demonstrated in a number of high risk industries since at least the 1980's that best technical design and strict technical requirements by themselves is necessary, but not sufficient to diminish the risks to the level that is expected today. Safety culture and behavioural based approaches are required to improve systems safety beyond a certain point. Lean risk management organizational systems thus operate as a network or a matrix organization with counter weights so as to make sure that all decisions are being taken in a balanced and informed manner. They typically include:

In general, and contrary to intuition, complicated specifications are not the best remedy to the control of complex systems.

- Developing competent decision-makers that derive their competency from real-life experience and sound scientific knowledge (this implies long term Human Resource development and retention policies, and frequent changes in position and location),
- Stating general principles and objectives in the requirements rather than trying to address in detail every possible specific case, which will dramatically shorten the formal specifications,
- Referring to commonly accepted industry standards without adding requirements on top,
- Delegating decision-making to the lowest pertinent level, with the advice of technical experts that are not in charge of the decision. In regulated industries this implies creating auditable ‘internal authorization’ systems within the operators instead of systematically relying on regulatory authorities’ formal authorizations for small issues,
- At the same time, designing the organization so as to address the most common decision-making psychological biases, which are now well identified from the scientific literature – this involves peer reviews, challenge from people that are not directly involved, an independent safety organization etc.
- Implementing very strong feedback loops from scientific knowledge and lessons learned from actual events.

Excessively developed specifications impact significantly competitiveness both on the short term and on the long term

The approach also needs to address upfront the economic issues related to increases in safety, and create some criteria in that respect that can be used to decide if a new requirement is reasonable. This approach is used for example in road safety where safety improvements are weighted and prioritized based on the average cost to society of a life lost. It is important to recognize that safety improvement is asymptotic with cost increasing dramatically for the ultimate gains, and that the key cause of accidents nowadays in most industries being organizational behaviours, technical improvements may only have marginal effects compared to a similar investment in organization development and behaviour-based safety.

The three steps for a successful simplification are thus:

- Develop an adequate behaviour in the field of risk management throughout the entire organization, which includes adequate reporting of deviations, and a thorough lessons learned system,
- Then, develop the organization in terms of competency and experience and re-establish subsidiarity and the possibility to apply judgment to specific cases, by making exception management easier, while remaining within a controlled and documented framework. Specific instances can be created to review as a team the most critical deviations.
- Finally only, extract what are the underlying key principles that need to be applied in terms of technical specifications and requirements, and make these Golden Rules to be followed, while the rest of the requirements is considered as a guidance only.

Create the frame, but do not dictate the specifics.

Solving this conundrum thus requires developing the organization and not just resolving a technical issue. A proper balance needs to be found between the technical experts that can assess the technical integrity of a facility and a separate decision-making authority linked to management, with an adequate level of competency to take and document the appropriate decisions. The challenge is then to define how disagreements are resolved and to what extent a veto can be exercised by the other party.

Summary

In general, and contrary to intuition, complicated specifications are not the best way to increase control of complex systems. In a context where technical systems become ever more reliable, behaviour and organizational culture become key to safety.

It is thus possible to simplify the formal specifications while increasing safety at the same time by re-establishing competence and accountability in the organization, resulting in a more cost effective situation. The key to this transformation is the adherence of the organization to the new paradigm, and the permission to exercise judgment on each particular case.

How to approach simplification

In general, and contrary to intuition, complicated specifications are not the best remedy to the control of complex systems. Still, once the cancer of hyper-detailed requirements has grown, it becomes extremely difficult to resorb it. Numerous failed attempts at ‘simplification’ in many contexts (regulations, specifications etc.) testify that it is not the right approach if just considered by itself. In particular, these initiatives are doomed if left to the same people whose livelihood depend on the complication of the current requirements – such is currently the fate of all simplification initiatives in the area of government regulation when left to civil servants.

Any effective modern approach to the problem of increasing safety thus requires shifting the reflection beyond purely a formal simplification exercise. It requires first re-establishing accountability and competence in the organization. It should not evacuate individuals’ or groups’ judgment capability when studying a specific issue. At the same time, and this is where the challenge lies, it needs to provide the same level of protection to the organization in terms of liability in case of accident (or in case of control by regulating agencies), which requires documenting the formal decision-making process.



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