ALTEN TECHNOLOGY

# SUSTAINING ENGINEERING

## A New Approach to an Old Problem

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Updated: December 2022

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# THE PROBLEM

Every organization with fielded products must deal with sustaining engineering tasks on a daily basis. Whether it is an existing bug in a system, a field complaint, an end-of-life component, or simply keeping up with the technology curve through product enhancements, these tasks cannot be ignored. However, this general maintenance and upkeep distracts the organization's best and brightest from developing the new products that are the source of future revenue for the organization. This is the result of the traditionally reactive approach to executing and dealing with these tasks.

What's more, these tasks are not always properly managed or tracked, making it difficult to control or even be aware of the effects of these efforts on the organization. Also, simply reacting may misdiagnose the root cause of product or organizational issues. The end result is neglected new product development (NPD) and research and development (R&D), as well as frustrated staff and missed corporate targets. We've found that sustaining engineering tasks, if executed properly, can have a significant impact on the organization's overall bottom line. The ALTEN Technology approach keeps the wheels turning, freeing our client's staff to work on NPD.

## EXECUTIVE SUMMARY

This paper will describe the approach used by ALTEN Technology to address sustaining engineering tasks for our clients and partners. By introducing focus and control to typically distracting (yet necessary) tasks, this process provides clients with more control, better metrics, and properly assigned staff. The impact of using this approach is widespread, positively influencing morale, profitability, and production in a cost-effective and metric-based manner.

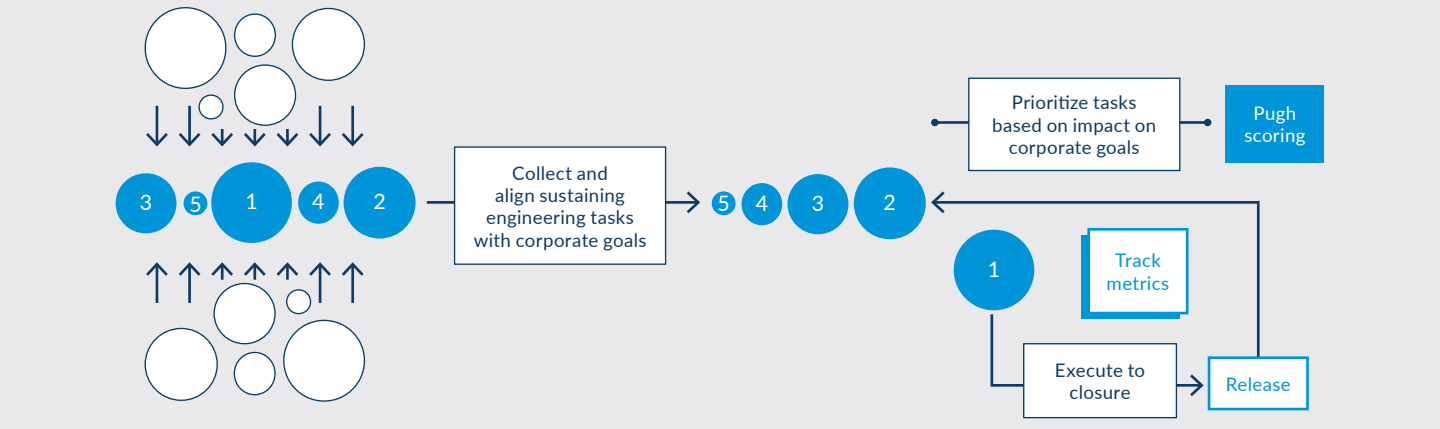
## THE APPROACH

Through our experience working with clients balancing a multitude of efforts, including new product development and maintaining existing product lines, we've found that it is often difficult for organizations to properly prioritize, execute, and track sustaining engineering efforts without sacrificing NPD and R&D productivity. Similarly, it's difficult to outsource this work because firms tend to use the same methods and approaches used for NPD projects or simply throw bodies at the issue.

Sustaining engineering is not new product development and should not be treated as such. Sustaining engineering requires a special approach blending unique elements of ALTEN Technology sustaining execution with the necessary development components of NPD to deliver high-quality, timely, and reliable product maintenance. This approach fosters cooperative execution between work groups and allows clients to retain valuable "tribal" knowledge. By executing sustaining engineering without bias, tasks can be completed more efficiently and support corporate-level goals.

**FIGURE 1. SUSTAINING ENGINEERING TASKS**

The ALTEN Technology approach to sustaining engineering provides better control and resource allocation.



# THE APPROACH

### STEP 1: INITIATE AND EMBED: FARMING IN

What makes the ALTEN Technology approach different is that we aren't simply having the sustaining workload "farmed out." In fact, our approach is more closely described as farming in. Before any work is started, the ALTEN Technology team completely envelops itself in the processes, quality system, and culture of our client's team, effectively becoming an extension of the engineering team rather than a simple supplement. The difference in this approach is that we're able to provide reproducible and reliable output that's consistent with client organizational requirements. An auxiliary benefit to this full immersion is the gains experienced when you don't have to constantly ramp up and ramp down a team. The team can be agile enough to support sudden issues and still appropriately represent the client firm to avoid further inefficiencies that are traditionally experienced when using standard methods of outsourcing.

### STEP 2: COLLECT A BACKLOG

Before launching a sustaining engineering program, a backlog must be collected. Whether a backlog already exists or needs to be developed, getting on the floor and speaking with those intimately involved with the individual products is an easy way to determine what needs to be done. Typically, the folks who work with the product daily (e.g., product managers, engineers, tech service, purchasing) already have their own list of items they would like to see fixed or improved. Most of the time, their lists can have a direct impact on end-user satisfaction and overall product revenue. Once you open the opportunity to voice input on product improvements, a steady flow of tasks will soon follow from stakeholders. We have found people truly want to improve products and make a positive impact. Sustaining engineering is a great way to do that.

This nondiscriminatory collection of program backlog gives us a sense of the type of projects that need to be executed and the type of team required to execute the program. It's intended to be an all-inclusive list of tasks that need to be addressed, either immediately or as time allows.

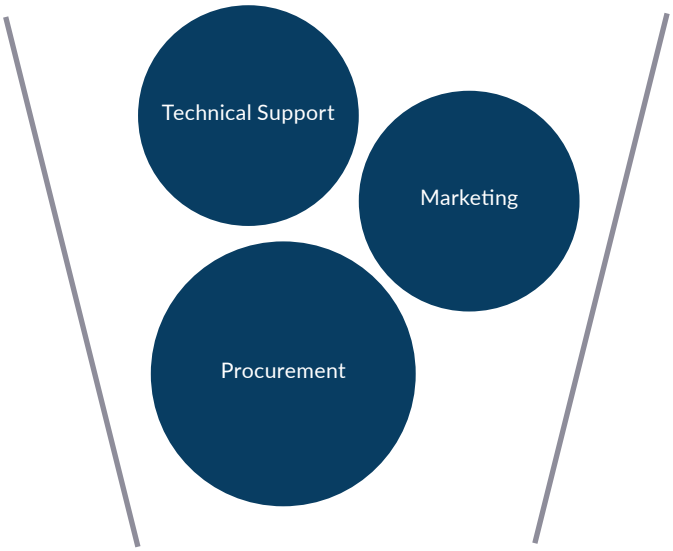
The backlog is typically collected from three places: marketing, technical support, and procurement. Additionally, cost-reduction engineering considerations are included with each task to identify any low-hanging fruit that can lower product cost while maintaining functionality.

It's important to note the initial collection is just the beginning of the backlog. Throughout the program, items will be added, edited and removed from the backlog list.

The backlog is tracked in a central repository (generally a Microsoft SharePoint site), where all team members and stakeholders can quickly access and edit the program's backlog and its current state, progress, and queue in a controlled environment. Background information, status, and anticipated completion information are all tracked in this location.

### FIGURE 2. COMPREHENSIVE BACKLOG COLLECTION

The sustaining engineering process begins by collecting program backlog from key areas.




**ALTEN TECHNOLOGY SUSTAINING ENGINEERING**

# THE APPROACH

## STEP 3: ALIGN BACKLOG WITH CORPORATE GOALS AND PRIORITIZE

Simply collecting the backlog is not sufficient to begin execution of a sustaining program. To be beneficial and justifiable, the backlog must be analyzed, prioritized, and appropriately aligned with corporate goals. If you ask four product teams what the most important sustaining task is to the company, you'll hear four tasks that need to come first. This lack of prioritization lends itself to unfocused execution in which the "squeakiest wheel gets the grease" and no project is ever sufficiently completed or released. It is not uncommon to experience this type of "cubicle engineering," where someone with a problem just goes to an engineer's cubicle to get a resolution.

But these tasks are not tracked, managed, or, in some cases, approved. They need to be prioritized and executed in support of the overall corporate goals and mission, not necessarily for the benefit of any one single product.

At ALTEN Technology, we prioritize sustaining tasks within programs using a customized scoring system in which product owners are provided with a prescribed scoring system that prevents intentional inflation of entry scores and gives senior management an accurate view of what's important to the company. This system also automates the work queue by racking and stacking each effort against the other program entries. This reduces the managerial overhead required. Individual scoring categories can be weighted at the top level or

### FIGURE 3. PRIORITIZING SUSTAINING TASKS

A Pugh system helps score and prioritize tasks.

| CATEGORY | TASK A | TASK B | TASK C | TASK D |
|---|---|---|---|---|
| Return on investment (30 percent)<br>(15 => $1m, 10 => $0.5m, 5 => $0.25m, 0 =< $0.25m) | 5 | 10 | 15 | 0 |
| Contractual obligation (20 percent)<br>(10 = Obligated, 5 = Partially obligated, 0 = No obligation) | 10 | 5 | 5 | 5 |
| Customer impact (25 percent)<br>(15 => 10,000 impacted, 10 => 5,000 impacted, 0 =< 5,000 impacted) | 0 | 10 | 0 | 15 |
| Line down threat (25 percent)<br>(15 = Line down now, 10 = Line down in weeks, 5 = Line down in months, 0 = No threat) | 5 | 0 | 0 | 10 |
| FINAL SCORE | 4.75 | 6.5 | 5.5 | 7.25 |
| PRIORITY | 4 | 2 | 3 | 1 |

### FIGURE 4. AUTOMATING TASK TRACKING

Software tools like SharePoint from Microsoft provide easy task tracking.

| BUSINESS UNIT | PRODUCT LINE | PRODUCT NAME | PRIORITY SCORE |
|---|---|---|---|
| State: WIP (6) | | | |
| Fluids | Faucets | Faucet Improvements | 8.5 |
| Cockpit Security | Keypad | PPTC to Solid State | 7.5 |
| Cockpit Security | Door | Cockpit Door/Frame Fixtures | 7 |
| Cockpit Security | Keypad | Latch Process Improvements | 7 |
| Fluids | Heaters | Water Heater Improvements | 7 |
| Hardware | Cockpit Security | Process Improvements | 6.5 |

# THE APPROACH

scaled by the available options (or both) to arrive at a customized scoring system based on company and industry requirements. This information is invaluable to senior management because it supports informed decision-making and is easily backed by data.

As with any program, there must be some room for subjectivity for instances of "ties" in the system or when other unique factors at play are not initially considered. For this reason, some stakeholders do possess the power to amend priority.

### STEP 4: DEDICATED EXECUTION

Once backlog has been collected and properly vetted for execution, it's imperative that each task is opened, executed, and closed uninterrupted. By installing a level of discipline in this regard, we ensure projects are efficiently and fully completed within the specified scope, budget, and timelines and enjoy the benefits of consistency among those resources executing the work. In other words, preventing a stop-and-go mentality provides better metrics and increased productivity. There's no cubicle engineering with ALTEN Technology sustaining engineering. Accountability is distributed throughout the work group. The chain of command between ALTEN Technology and the client is set up in such a way that very few individuals are able to override the priority list. That means more work is truly completed throughout the program.

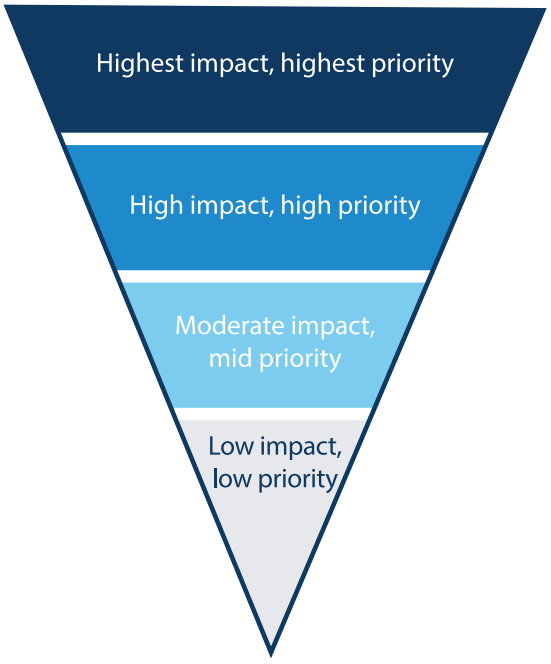
Additionally, resource constraints are minimized by selecting items in the queue based on both their priority and the skill sets available. This eliminates "idle" resources, ensures the fair pairing of resources to tasks, and supports constant productivity.

### STEP 5: ALLOWANCE FOR LINE-DOWN SUPPORT

Although it's important to stick with consistent planning and execution, reality dictates action. In sustaining engineering, there are always going to be urgent exceptions to the dedicated and planned execution "rule." Examples of such exceptions would be anything threatening or causing immediate line-down situations for revenue-generating products. This could be due to a suddenly end-of-life component, a regulatory or quality inconsistency, or even a strategic customer issue from tech support. A general rule of thumb is these exceptions should only account for 15 to 20 percent of the program's total hour allocation. Anything more is indicative of a larger issue that should be resolved separately (poor component tracking, product quality issues, etc.). This flexibility ensures all urgent issues are resolved quickly and efficiently while minimizing the impact on continuing efforts.

### FIGURE 5. PREPARE TO MAKE EXCEPTIONS TO THE RULES

The ALTEN Technology sustaining engineering approach helps prioritize backlog items appropriately, so efforts executed deliver the highest impact.

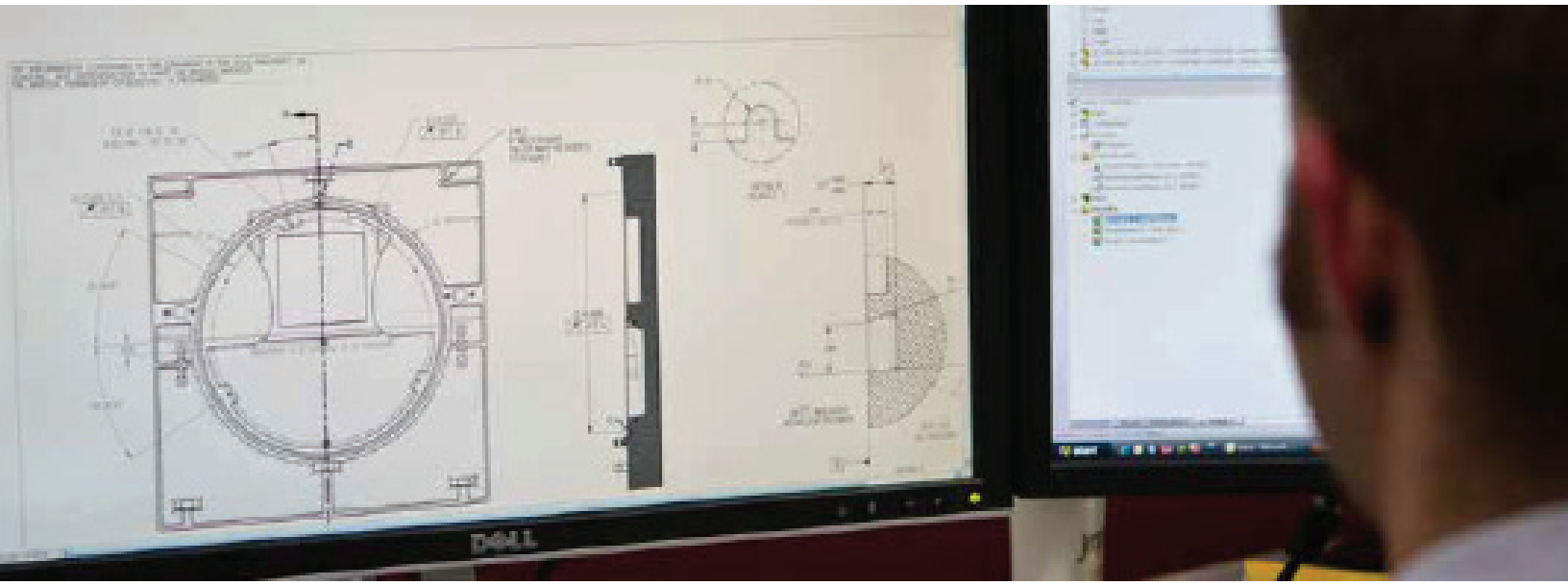


# THE APPROACH

### STEP 6: METRIC TRACKING AND CONTINUOUS IMPROVEMENT

Perhaps the most beneficial element of the ALTEN Technology sustaining engineering approach is the collection of data and other business metrics that are available through the tools and processes we use. Not only do we track productivity, we also provide specific statistics to discover and confirm root causes of sustaining issues at a less granular level. For instance, after executing multiple sustaining efforts for a client, we may find 60 percent of our time is focused on resolving end-of-life and component obsolescence issues. This may open an opportunity to improve internal awareness and the tracking of components to eliminate the need for reactive maintenance on products. Similarly, if the majority of sustaining time is allocated to tech support issues, there may be an opportunity to open a larger-scale project on the product to improve reliability and quality. By collecting sufficient and accurate data, more informed decisions can be made, and core issues can be resolved.

We have found most organizations believe sustaining engineering largely involves improving products by integrating the latest operating system, adding in touch-screen capabilities, and making other enhancements. But in reality, keeping today's revenue-generating products up and running to meet customer and management expectations is critical work that funds future innovation. This work accounts for the majority of sustaining engineering time. The approach described diagnoses the true cost drivers of the organization and allows management to course-correct as necessary.



# THE BENEFITS

## PROACTIVE SUPPORT

ALTEN Technology's sustaining engineering turns the table on reactive product support and allows organizations to proactively address product enhancements and issues. Our approach enables our partners to predict future tasks, issues, and concerns. This appropriately prepares them to minimize product issue surprises. By being proactive in the support of existing products, tasks are completed more efficiently, rigorously, and with less overall effort than if done on the fly. This maintains the quality of the product and increases revenue potential while sustaining profitability. With this approach, engineering costs are lowered, and output is maximized.

## MAXIMIZED PRODUCTIVITY AND FREED MINDS

It's difficult to balance new product development and sustaining tasks with a single staff. Engineers typically are motivated (and compensated) for being innovative, creative, and savvy in their respective disciplines. Sustaining engineering distracts them from their core competencies and reduces their overall contribution to the organization. With our approach, we bring on team members who thrive on being problem solvers, investigators, and "fixers." The group is motivated by the challenge to resolve an issue that plagues products with minimal information. This blend of talent allows our partners to get more done with less and keep all the plates spinning adequately.

Our experience working with clients on sustaining engineering has proven that organizations want to pay their best and brightest to work on future revenue-generating projects. By eliminating the distraction of sustaining engineering, we allow clients' internal resources to do what they do best: extending the internal dollars being spent and maximizing the return on their internal efforts. This keeps internal staff more satisfied, engaged, and focused on their work without sacrificing legacy product performance and revenue.

## INCREASED CONTROL AND VISIBILITY

By tracking program metrics and statistics, the ALTEN Technology sustaining engineering approach provides management with unrivaled control of their corporate destination and visibility into what is affecting both individual products and the company's bottom line. Knowledge is power, and our approach provides a wide variety of information that allows senior management to be more agile and confident in the decisions they make. By introducing process-based automation, managers spend less time dealing with issues and more time driving new revenue. The workload, resourcing, and productivity can be easily scaled to meet any corporate budget, demand, or circumstance to best support the sustaining engineering need. The increased control and visibility provided by our approach almost always has an immediate impact.

# THE CONCLUSION

By partnering with our clients and integrating a proven sustaining engineering model and approach, we're able to efficiently and effectively execute our clients' sustaining engineering needs in a way that frees internal resources, maximizes productivity, and minimizes managerial overhead.

Since 2009, we have employed our sustaining engineering approach for a variety of clients. Whether we provide a dedicated team of engineers focused on a single client's product lines or ongoing support executed as needed, ALTEN Technology sustaining engineering brings the necessary rigor and discipline to execute projects in the toughest industries while maintaining enough flexibility in our processes to ensure scalability in an effort to keep costs low and returns high. Whether it's a line of consumer devices or life-saving medical products in highly regulated environments, ALTEN Technology sustaining engineering can be applied. The end result is higher predictability, increased visibility, and the opportunity to proactively manage your business. There's no universal mold for sustaining engineering, but at ALTEN Technology, we have refined our approach based on years of experience providing clients with this service, and we understand how to customize and build programs aligned with goals and to just be great.