ALTEN TECHNOLOGY

THE VALUE OF A PHASE 0

A Simple Way to Reduce Unknowns and Boost Product Development Success

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INTRODUCTION

The beginning of a product development project is crucial to its overall success. If your initial plan is clear, you're on track to achieve your objectives and complete your project on time and within budget. If the goals are not clear, however, your project is more likely to blow past its planned timeline and eat up more budget than originally allotted. In fact, according to a 2019 Gartner survey, 45 percent of product launches are delayed by at least one month, and an average of 20 percent of those delayed products don't meet their internal targets.[1]

The key to getting your project off to a good start—and ensuring a successful end product—is having a well-defined scope for the project. The beginning of a project naturally brings with it a host of uncertainties that make it challenging to define the scope concretely and plan effectively, such as not having a clear picture of the problems to be solved, not knowing how much something is going to cost, not having a solid understanding of the technical complexity, or not having a complete view of the risks involved in the project.

Enter the phase 0. This exploratory phase is a great way to work with an expert engineering services team to zero in on the scope of your project and gain the information you need to confidently, efficiently, and cost-effectively execute your project. A phase 0 has several benefits, including avoiding delayed or false starts and starting on large programs sooner, creating a well-developed scope, reducing risk, and adding confidence and predictability to program success. Ultimately, the high degree of confidence in the estimates created at the end of a phase 0 provides valuable information you and your internal stakeholders can use to make informed decisions about your project that directly affect its success.

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WHAT IS A PHASE 0?

A phase 0 is an industry-agnostic, exploratory phase performed collaboratively with a multidisciplinary team of engineers, with project management support, to establish a defined scope for a project, typically before any engineering work takes place. It's easy to estimate, fast to kick off, and may take only a few weeks to complete, depending on the complexity of the problem to be solved. Clients typically partner with ALTEN Technology on a phase 0 engagement when they discover that they are having a hard time communicating their needs when considering a project. Rather than taking the time to independently define the scope of its project, the client partners with ALTEN Technology to collect the information required to develop an implementable, bounded scope of work that can be estimated accurately. A bounded scope of work is based on clear requirements and end goals.

A phase 0 is a highly flexible engagement that is always tailored to your specific needs. Although phase 0 engagements are most commonly done before detailed design and development take place, they are still beneficial further down the workstream, as seen in the case of Aerospace Client B later in this paper.

[1] "Gartner Survey Finds That 45% of Product Launches Are Delayed by at Least One Month." *Gartner*, September 19, 2019.

APPROACH

Once you decide to partner with ALTEN Technology to execute a phase 0, ALTEN Technology builds a project team with a project manager, systems engineer, and applicable engineering leads to work with you. The project team will often visit your site to enhance collaboration and gain further insight into the specific challenges you're facing with your project. The team will work with you on areas necessary to develop a concrete scope for your specific need, which may include ConOps refinement, high-level requirements definition, architecture and conceptual design, and comprehensive program planning. We have performed phase 0s ranging from helping a medtech client create a predictive model used to accelerate device design and development to helping an R&D client productionize an inertial measurement unit (IMU). At the end of a phase 0, the ALTEN Technology team presents you with a document or set of documents that help you better understand the problem you're trying to solve. This can range from a statement of work, ConOps, or a preliminary design and development plan to a series of recommendations about your project.

For example, we worked with one aerospace client to collect enough information to sufficiently bound the scope for the full development of the avionics design of a proliferated low-earth orbit satellite constellation. The goal of the phase 0 was to support detailed planning and a more accurate proposal or ROM for follow-on work. The key tasks for this phase 0 included the following:

- Reviewing input documents
- Defining a more detailed development scope, including analysis activities
- Defining the design spin approach, error-correction philosophy, and prototype fidelity for pre-CDR hardware
- Defining the target reliability, including the confidence interval and reliability level
- Determining the minimum performance needs and standards compliance
- Capturing additional requirements
- Defining the preliminary, high-level architecture and interfaces
- Identifying and prioritizing trade studies for future phases
- Creating the preliminary design and development plan (DDP)
- Defining the process and needs for support software
- Preparing and aligning with external contractors for mechanical analysis support in future phases

The deliverables included a ConOps document and a preliminary design and development plan (DDP) document.

There are several potential outcomes to a phase 0. One outcome is that you and ALTEN Technology have a better idea of your need, ALTEN Technology provides a quote, and then you continue to partner with ALTEN Technology to execute the project. Another outcome is that the phase 0 provides adequate value and information to enable continued internal development. A third outcome is that you are more educated about your need but decide you require additional information from other sources, like your market or other engineering sources, before moving ahead with your project. Lastly, a phase 0 may help you discover that a project isn't necessary, feasible, or a good investment before any costly detailed design and development has taken place.

BENEFITS

Separating work out into a phase 0 has several benefits, including starting on large programs sooner, creating a well-defined scope, reducing risk, and being a value-add regardless of next steps, all of which lead to more positive project outcomes.

Starting on large programs sooner: A phase 0 helps you start working on a large program sooner. Phase 0s themselves are very quick to start because of their exploratory nature, so you don't need to have specific requirements, a clear understanding of the project need, or an understanding of your project's risks before launching a phase 0. Furthermore, you don't need to take the calendar time and internal resources to generate the inputs an engineering services company needs to create an accurate quote, meaning you can start on a project potentially months sooner and launch your product that much faster. When you start on your large program after completing a phase 0, you are better positioned to complete the project efficiently, successfully, and with a reduced likelihood of duplicating work. Moreover, a phase 0 requires little commitment, meaning financial risk is controlled and predictable.

Creating a well-defined scope: A phase 0 provides the information you need to truly understand the scope of your entire project, ultimately giving you a clear road map for development. This enables you to have a better understanding of the project objectives, duration, and magnitude, which are key to gaining stakeholder alignment and securing the budget your project needs. It also helps you uncover important work that may have been overlooked, such as the systems engineering necessary for complete system knowledge. Ultimately, you gain a scope you can implement and estimate without being over-constrained and that includes top-level technical risks along with an implementation plan to overcome them.

Reducing risk: Because a phase 0 thoroughly examines the nature of a problem before any detailed design and development takes place, it helps you identify risks and their potential impact early in the project, giving you the information you need to reduce the likelihood of rework later in the project. Furthermore, establishing a solid set of requirements and concept of operations up front reduces the number of risks that need to be tracked. Overall, this reduces the risk of product failure and can help speed up development times and lower development costs. Having the advantage of prioritizing and burning down critical risk areas before kicking off formal development increases the probability of project success.

Adding value regardless of next steps: A phase 0 always provides value, regardless of whether you choose to continue working with an engineering services company in later development phases. You receive the specific information you need to make well-informed decisions about the best way to continue with your project, whether that involves working with an engineering services partner on subsequent project phases, performing work internally, or deciding the project isn't worth pursuing. If you do decide to continue working with an engineering services partner on your project, the collaborative nature of the phase 0 helps build a foundation of trust and establishes a rapport and communication norms that help the remainder of the program proceed more smoothly.

CASE STUDY

MEDTECH CLIENT A

> The client's R&D engineering manager stated that he was "very impressed with the team, organization, and communication."

Client A is a large medical device company that works on a range of devices, including complex implants. The client wanted a model that would predict whether a cardiovascular stent would move after implantation, and planned to validate the model with a new device it was developing. This predictive model was necessary for the client's goal of incorporating simulation at the beginning of its traditional design-build-test development process. However, the client didn't know how to go about creating the model. The client chose to work with ALTEN Technology because we have a strong background in supporting product development and because the client wanted a unique outside perspective from a team of non-cardiovascular engineers.

In the phase 0, ALTEN Technology worked with the client to take a six-week deep dive into the problem and come up with solutions for how we could meet the client's goals. The client wanted to investigate what factors could cause the implant to move, what ALTEN Technology could reasonably evaluate, and how ALTEN Technology would evaluate each factor. To this end, ALTEN Technology assembled a development team of a project manager, systems engineers, mechanical engineers, and a quality engineer and visited the client's site. There, the ALTEN Technology team met with the client's cardiovascular engineers to learn how the cardiovascular device worked and to build relationships with the client's team. The team then worked on a multiphase plan and cost estimates to realize the client's goals, delivered a simple sample model, and presented recommendations on the steps necessary to create the full-fledged predictive model, including an iterative approach to creating and refining the model over several generations. The client was extremely pleased with the results of the phase 0, and the client's R&D engineering manager stated that he was "very impressed with the team, organization, and communication."

After the phase 0, the client chose to continue working with ALTEN Technology to plan test and analysis activities and bring the model to life. The client customized the scope of the project to suit its needs, including omitting some complex areas of the scope it deemed unnecessary and performing testing in-house because of its extensive test experience. ALTEN Technology delivered the first generation of the model that predicts whether an implant will migrate and is currently working on a second generation of the model that is more complex and more realistically accounts for the unique engineering properties of the materials used in the client's cardiovascular stents. After receiving the first-generation model, a member of the client's technical leadership stated, "Overall, I perceived the two parties to collaborate as one team.... and I think it shows in the outcome." The phase 0 allowed the client and ALTEN Technology to work together to develop a path to the client's goals, create a realistic cost estimate for the project, and establish a relationship that has resulted in a successful partnership and product.

CASE STUDY

AEROSPACE CLIENT B

Client B is an R&D organization developing a highly precise inertial measurement unit (IMU) for applications in a variety of industries, including aerospace, UAV, automotive, and oil and gas. Because Client B is a research organization and not an engineering organization, productionizing the product was outside its area of expertise. Additionally, it didn't have many resources to devote to its productionization effort and instead needed to focus on its core R&D competency. The client decided to work with ALTEN Technology in a phase 0 to understand the exact problems it was facing and the specific options for support that would enable it to get its device closer to market within its desired timelines.

ALTEN Technology worked with Client B in a four-week engagement to identify key issues the client was experiencing with the IMU. We reviewed the client's data and put together a small team to visit the client's site, including an electrical engineer to address the client's specific electrical engineering needs, a systems engineer to help us and the client understand the system-level need, and a project manager to meet the client's stakeholders and understand the project as a whole. At the client's site, the ALTEN Technology electrical engineer held one-on-one technical discussions with the client's engineers to review the details of the IMU and to understand the issues the client was seeing. Additionally, a systems engineer worked with the client engineers to review the requirements and identify areas for improvement in the requirement sets. After investigating the problems and issues that needed to be solved, the team held estimating sessions to estimate the cost of the potential resolutions. At the end of the engagement, the team presented the client with a proposal and a report containing multiple recommended options for improving the IMU, with estimates for how much each option would cost. This gave the client the information it needed to make an informed decision about the direction of the project and helped its team secure approval for the continuation of the project.

> "The phase 0 enabled the client and ALTEN Technology to better plan what resources would be needed in phase 1.

The client chose to continue working with ALTEN Technology in phase 1 of the engagement, picking and choosing different options from the recommendations we presented at the end of the phase 0. The phase 0 was a valuable input for the phase 1 of the project because we identified the client's exact needs—including previously overlooked ones such as the need to improve the requirement sets—during the phase 0, providing the client with information necessary to make a well-informed decision about the best path forward and who should be responsible for what scope. The client elected to pursue some of the options and carefully tailored the scope of the chosen options to each party's strengths. It executed some options in-house, assigned some of the efforts it was less experienced with to ALTEN Technology, and removed unneeded scope from some items before assigning them to ALTEN Technology. This enabled the client to produce results within its desired timeline and budget. Additionally, the phase 0 enabled the client and ALTEN Technology to better plan what resources would be needed in phase 1, such as a systems engineer to support the requirements improvement effort.

The phase 0 ultimately enabled the client and ALTEN Technology to understand exactly how ALTEN Technology could fit into the client's program and help the client get to the finish line in a way that met the client's specific needs and timelines. While phase 0 engagements typically occur much earlier in a project, this phase 0 was invaluable because it allowed the client to leverage ALTEN Technology's experience to better understand its specific needs in an area outside its expertise.

CONCLUSIONS

While starting a large, complex project can be challenging, a phase 0 gives you the information you need to execute your project confidently, efficiently, and cost-effectively with a clear understanding of its scope, regardless of industry. This time-boxed, exploratory phase delivers several benefits, including starting on large programs sooner, creating a well-defined scope, reducing risk, and adding value regardless of next steps. Furthermore, while a phase 0 is frequently held at the beginning of a project, it can deliver benefit even later in the workstream due to its highly tailored nature, as seen in the case of Aerospace Client B. The phase 0 with Medtech Client A allowed us to partner together to map out a successful path to the client's desired predictive model, develop realistic cost estimates, and build a relationship that led to successful project execution. The phase 0 engagement with Aerospace Client B enabled it to make an informed decision about the best way to execute its project and to leverage ALTEN Technology's expertise during the subsequent phase 1.

Ultimately, a phase 0 provides you the information you need to make informed decisions that lead to product development success. **Get in touch with our experts** if you would like to learn how ALTEN Technology can execute a phase 0 to eliminate your project's unknowns.

ABOUT ALTEN TECHNOLOGY

ALTEN Technology is an engineering services company that provides innovative solutions for engineering, IT, and product development projects across the product life cycle. For decades, ALTEN Technology has been helping clients develop products that are changing the world. We provide support across industries, including aerospace, defense, automotive (including commercial vehicles), medtech, life science, rail, energy and environment, robotics, and uncrewed systems.