

The Financial Impact of Late Delivery and How to Accelerate Your Time-to-Market

Read About

Time-to-market

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COTS

Modified COTS

Introduction

The time it takes to bring a product to market is affected by many factors, a variety of which can be industry, company, or product specific. Every industry has its own way of measuring time-to-market (TTM) and, in the aerospace and defense industry, the time from concept to final product is often a lengthy process that involves years of certifications and approvals.

System design and development has the biggest impact on the time it takes from the initial product concept through to market introduction. If aerospace and defense system developers and integrators had all the time and resources in the world, they would prefer to keep development in-house, where every step of the process could be managed. In reality, however, TTM acceleration is a key differentiator – and fortunately, there is a better, faster way to bring products and systems to market without sacrificing product quality or the integrity of the development process.

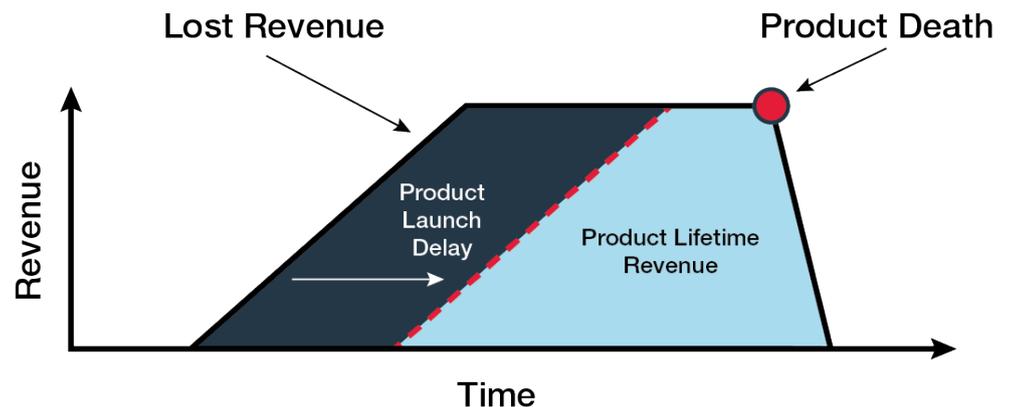


Figure 1: Effects of being late to market

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The Importance of Time-to-Market and Potential Impact of Being Late

The aerospace and defense industry is risk averse when it comes to adopting new technology, yet pressures still exist to deliver the highest quality products in the shortest timeframe and at the lowest cost. This focus on quality, speed, and cost can result in the suppliers with the most effective and efficient development processes winning new business and growing. In order to thrive in this space, it's critical that a new program or product launch (NPL) not only aligns with market demand, but is also built on a solid foundation of successful internal partner and supplier collaboration.

According to Deloitte, in 2009, a staggering 67 percent of weapons programs missed delivery, resulting in a 26 percent budget increase. Similarly, in the electronics industry, the impact of TTM delays is substantial. In their book, "Competing Against Time: How Time-based Competition is Reshaping Global Markets", economists George Stalk and Thomas Hout posit that "introducing a [electronics] product 9 to 12 months late can cost 50 percent of its potential revenues."

The real impact of a delayed product launch is highly dependent on the industry, competition, and product. In the aerospace and defense industry, late to market can often mean years or even decades behind competitors due to the long development processes and certifications that are required for the industry's highly engineered systems. While the barriers to entry in this industry are high, meaning the threat of new incumbents is low, existing competitors could concurrently be working on a similar technology and beat you to market. If your new product or system had a useful life of 20 years when it was in concept phase and you are late to market by 10 years, given the advancement of technology, you can potentially lose 10 years of market availability where incumbents will have entered the market and shrunk your total addressable share.

Being late to market usually happens when product development takes longer than originally expected, resulting in an increase in overall costs associated with the product development process through additional headcount and overhead. The Center for New Product Development

approximates that new product development typically exceeds its schedule by 120 percent. For the aerospace and defense industry, where new products and systems take an average of 9 years to go from concept to launch, this slippage could mean your product doesn't get launched for almost 2 decades.

Often companies will let a product launch or development schedule slip due to budgetary constraints, under the assumption that they will save money in the long run by spreading out the costs over a longer period, but this isn't always the case. "Technological products which arrive on the market 6 months late but on budget generate 33 percent less profit over 5 years, whereas getting the product to market on time but 50 percent over budget only reduces profits by 4 percent." (LaBahn, 1995)

In addition to losing revenue in sales, potential market share, and useful product life, being late to market can also affect the company value perceived by shareholders. In fact, product delay announcements decreased average shareholder value by about 12 percent, according to Singhal and Hendricks. "Our results suggest that negative stock market reaction to product introduction delays is actually quite rational given the impact of delays on profitability." (Kevin B. Hendricks, 2008).

The speed at which companies can introduce products into the market is critical for maintaining a competitive advantage while ensuring stakeholder value doesn't drop, and has become a strategic objective for many technology-driven firms. Figure 1 illustrates the effect of being late to market on sales over time with respect to the product adoption. As can be seen, getting to market late means fewer overall units are sold because the time in which you are able to sell the product is reduced. Additionally, you lose market share early and are unable to regain it later, limiting the number of prospects.

Measuring Time-to-Market

Calculating the approximate cost of being late to market requires basic information about a project and can give you a rough idea of its impact on revenue. Based on the Initial State Technologies late to market calculator, the variables needed to calculate the cost of being late to market are shown in Table 1.

Industry Average	Late to Market Variable
36	Target launch date (months from today)
12	Ramp to capture maximum revenue (months)
120	Revenue life cycle (months)
200	Maximum product revenue per year (\$M)
10	Development costs per year (\$M)
12	Launch delay (months)
3%	Revenue penalty for each month delayed (3%)

Table 1: Late to market variables

Given an average aerospace project’s timeline and costs, Figure 2 shows cash flow over time. In the early stages of research and development, the money spent can be approximated by multiplying the number of months until your launch date by the development cost per month. Once launched, your revenue starts to ramp up and, eventually, your product matures and your market share and revenue are at a maximum. Finally revenue ramps down as the life cycle nears its end. When you are late to market, you incur an industry/timing specific revenue penalty. Combined with your continued spending in R&D, your profits are negatively impacted while you lose market share as customers go to your competitors.

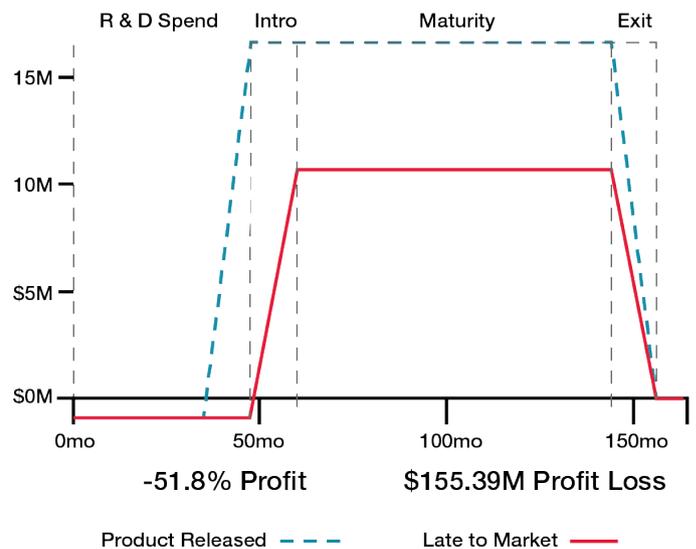


Figure 2: Example time-to-market calculation

In-House Development versus Product Outsourcing

A way to significantly decrease the time it takes to bring a new product to market is to outsource. Outsourcing can take the form of buying components or sub-systems, or hiring outside firms to take some of the workload. In the aerospace and defense industry, companies typically outsource the testing and certification of products while many try to keep the entire development process in-house, resulting in a custom-built system.

The True Cost of In-House Development

A lot of the perceived advantage of keeping development in-house revolves around cost savings and the idea that, once you have created the product, you can re-use the built up knowledge, capability, and stock for future, similar projects. The reality is that this often isn’t the case in the defense and aerospace industry. As most new product development is driven by customer orders, success is often determined by meeting technical requirements within a defined timescale. Once the product is clearly defined, companies often have to hire new people to both fill the knowledge gap and ensure standard operations can continue while the new project takes up existing bandwidth. According to Occam

Design, a medical device development and manufacturing company, the true cost of hiring an internal team is not just the salary of employees, but can be calculated using the following equation:

Cost of new employee = salary + 25% taxes and benefits + 25% overhead + 15% non-productive time

If, for example, an engineer makes \$80k per year, the true cost of that engineer is \$132k per year. That's 40 percent above the engineer's salary, and this number doesn't factor in the additional cost of equipment that is needed to develop the new product. On top of that, the new engineer may experience significant downtime, waiting on other departments or test houses to provide results, further accumulating a reduction in costs savings. Finally, there are management overheads that are accrued with the addition of new team members, such as human resources.

Once the project completes, there often isn't enough existing work to keep the new staff on-board until another project gets awarded. In a matrix structured organization, project staff may get reallocated to other projects or areas of the business.

In a project based organization, engineering development teams may be pulled together to work either full or part-time on new product developments. The team may often need to relearn and reapply some of the knowledge previously acquired. As the project evolves and time moves on, the level of knowledge, and application of it, improves and can be refined. Once the development is complete however, knowledge and memory of how best to apply it can gradually deteriorate over time unless it is soon applied to another project. If left for too long, the process of relearning will be repeated (Figure 3).

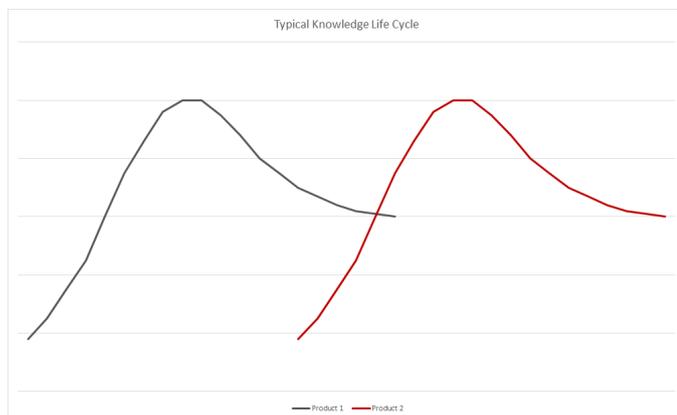


Figure 3: Typical infrequent in-house development knowledge life cycle

Infrequent product development can necessitate the hiring of new staff or acquisition of resources from elsewhere in a matrix structured organization. Another consideration is the cost of maintaining the team between infrequent developments. Often referred to as a 'marching army', this can also represent a significant cost to an organization.

Product Development Outsourcing

Outsourcing new product development can reduce these overheads and significantly shorten TTM if done correctly, but that's not often the case. Significant issues can arise with product quality or integration (due to legacy interfaces, for example). Even communication can be challenging. For example, though product development outsourcing gives you access to a larger talent pool, often they are geographically dispersed or their corporate culture doesn't match yours, resulting in a communication breakdown that can affect product quality, project time, and cost. Because the entire product development is outsourced in this case, you are left with very little oversight into the end product; getting a product developed exactly how you originally envisioned it will be unlikely because the developer won't support the entire product life cycle, from requirements definition to system integration.

Using COTS Components

An alternative to outsourcing the complete product development is to purchase commercial off-the-shelf (COTS) components and keep the integration in-house. Though this COTS approach to product development had been around for over two decades in the U.S. defense industry, and has been proven to decrease risk and cost, it comes with its own set of challenges. For example, if your program has unique requirements not built into the original COTS hardware or needs a tailored solution, any costs savings through COTS can disappear during in-house system modification and integration, which requires similar engineering capabilities and management overhead as in-house development from scratch.

Modified or Packaged COTS

When you need to architect a slightly tailored solution, the best development process usually involves a combination of COTS and custom development. Called Modified or Packaged COTS (MCOTS or PCOTS), this type of development relies on the modification of COTS hardware to fill your particular requirements and/or subsystem pre-integration modification. Outsourcing this work to the original COTS manufacturer provides the most cost, time, and risk savings because the suppliers, being the original developers, already have the knowledge, experience and capabilities in house to help you address your customers' requirements. Ranging from the design and manufacture of custom boards to board support software packages and drivers, and rapid subsystem pre-integration capabilities, working with a trusted, proven leader in COTS system development will give you a competitive edge and help you bring your products to market faster.

Figure 4 illustrates just how much faster. Defining requirements alone for a new product in-house could take six months or more. When working with a COTS supplier who has experience developing similar systems, requirements definition can be over 60 percent faster. In-house development typically takes the longest amount of time in new product development. In the aerospace and defense industry, this process typically takes at least two and a half years when developing in-house from scratch, while outsourcing the development to a COTS supplier who is capable of MCOTS/PCOTS development can significantly reduce this development time by up to 70 percent.

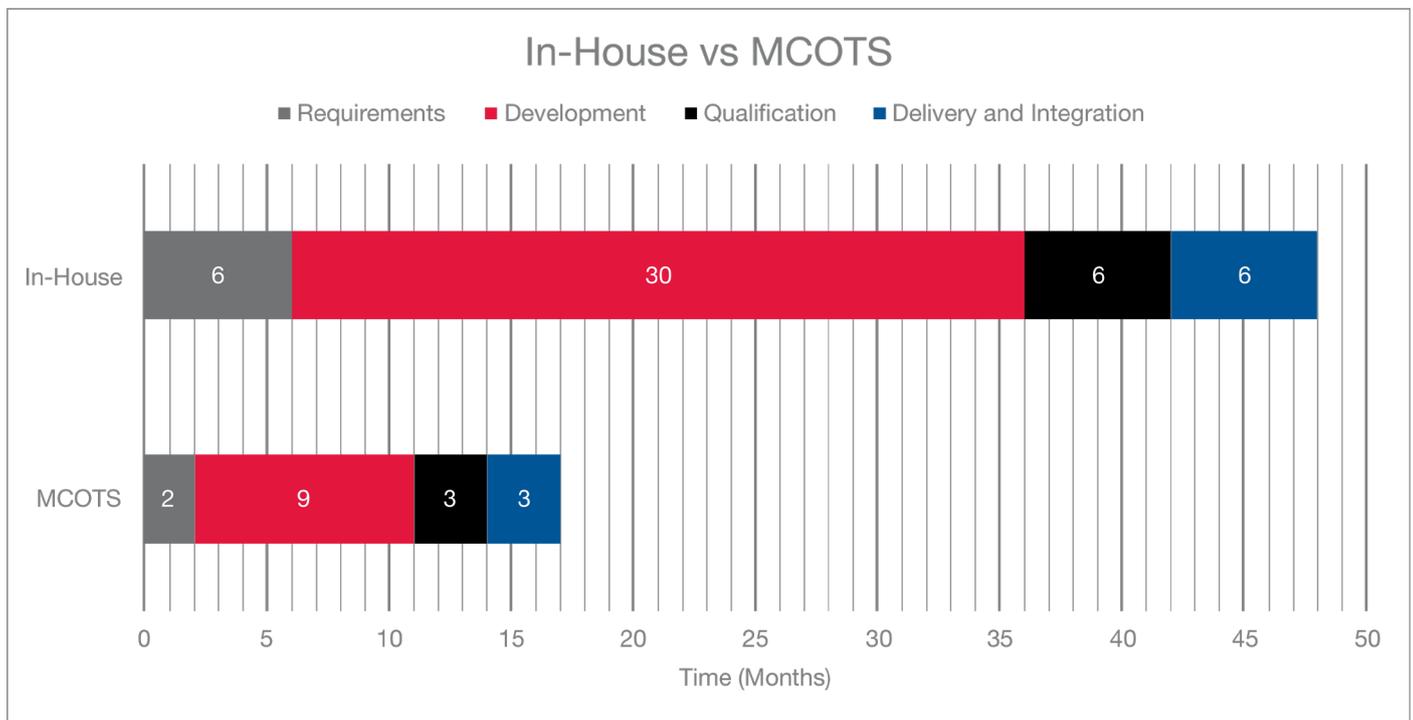


Figure 4: In-House development vs using a PCOTS/MCOTS partner

Once the system has been developed, it needs to go through qualification and testing, to ensure it's capable of reliable operation in the harsh environment encountered in the air, on land, or at sea. When working with an trusted, experienced supplier, this can be completed in just three months. MCOTS products are often pre-qualified, and any additional qualification that is needed is streamlined, since the COTS vendor has been through the process so many times before.

Finally, the product or system is ready for delivery to your customer and integrated into their system or platform. Cutting this time in half, an industry leader will lean on past experience and their own capable experts to ensure your customer is getting a tailored solution on-time and within budget. Overall, in this example, working with a COTS partner could reduce your TTM by up to 65 percent, going from 47 months for new product development to just under 17 months!

Looking at the typical knowledge life cycle of a leading COTS organization highlights that agile, concurrent system development enables internal knowledge and skills to be continuously leveraged and optimized (figure 5).

Typically, established COTS system developers work on four or more new products a year. This type of development requires a fully mobilized team at all times which means that knowledge is retained and reutilized on a regular basis. Lessons learned are quickly applied to the next project and a constant eye is on new/current technology to be fed into the next product development. This 'well-oiled machine' reduces risk and enables the development team to operate in a more efficient manner. Customers are then able to realize these risk and cost savings.

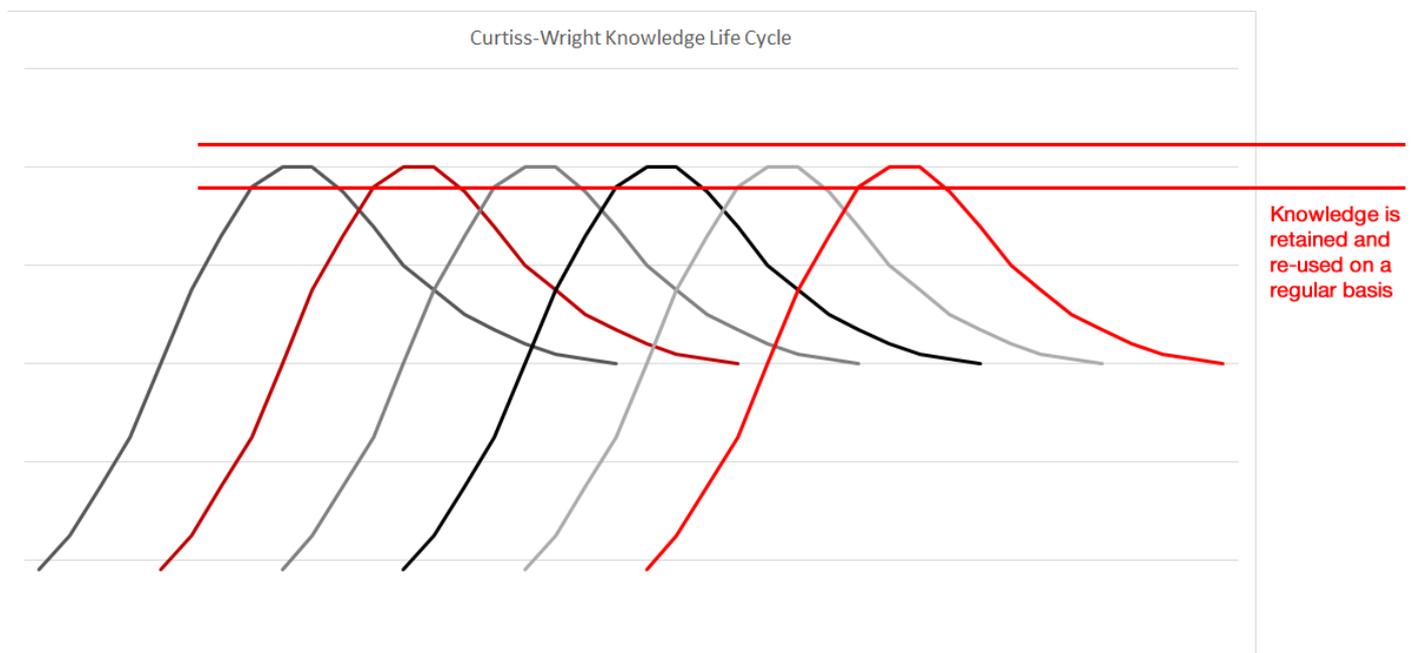


Figure 5: Curtiss-Wright product development knowledge life cycle

COTS Designed for DO-254

Using [safety-certifiable airborne electronics hardware](#) (AEH) lets system integrators jump-start development efforts for avionics systems. Instead of taking on the risks, time, costs, and headaches associated with developing, documenting, and certifying hardware components themselves, integrators have ready-to-use building blocks that offer a clear path to certification.

Safety-certifiable AEH components are already developed and tested to DO-254 and DO-160 standards, meaning there is no question that certification is achievable. The certification audits have already been completed and the documents required for certification are provided with the hardware, reducing the considerable time commitment associated with the mammoth effort that is required to develop and document certifiable AEH and pass certification audits. Readily available, safety-certifiable hardware also accelerates system prototyping efforts, which further reduces program risks and TTM.

Skipping the development, documentation, and audit stages associated with designing safety-certifiable AEH components can dramatically reduce overall program time and costs. With certifiable hardware components, integrators get key elements needed to meet overall system certification requirements and can reduce program times by 2 to 3 years. Safety-certifiable COTS hardware designed according to open standards reduces integration complexity and, as a result, overall development time.

Effects of Supply Chain on Time-to-Market

While outsourcing product development results in significant TTM improvements, designing for the supply chain can result in further improvements.

Because supply chain issues can halt production, resulting in increased downtime and a loss of revenue, it is important to think about where the system components can be sourced and their potential lead times when designing a product. With high tech products that have hundreds of components, discovering a quality issue while in production can be detrimental to a product's success if there is not a fast turnaround form, fit, and function replacement. Similarly, realizing a component has reached end-of-life

without a plan in place could result in unhappy customers and a loss of market share. These types of issues could be mitigated if the supply chain was considered earlier in the design phase.

Even so, managing the bill of materials and logistics for hundreds of components and sub-components for a new product can be a nightmare. If a product had 500 line items, 80 percent of which purchased parts and 20 percent of which are manufactured in-house, that's 400 line items with their own supplier, lead time, quality standard, and management overhead. Additionally, the room for human error puts your project at risk.

This risk can be reduced by decreasing the number of components and suppliers involved in the project. By working with proven, trusted industry leaders who can help identify the best mix of off-the-shelf components and modified or custom developed solutions you will see the greatest impact on your TTM, project cost, and product quality.

Conclusion

As the aerospace and defense industry continues to race to release better products, faster and at a lower cost, being late to market can have detrimental effects on revenue, market share, and shareholder value. In-house new product development can be akin to reinventing the wheel if you don't already have the personnel, stock, and experience in the development of a similar product. Outsourcing the product development from start to finish leaves you with little product oversight and can result in a communication breakdown with your supplier, leaving you with a sub-par product. Working with COTS suppliers while keeping the integration in-house will solve these issues but will still require management overhead and could lead to integration issues. Choosing a partner that specializes in the development of COTS systems and provides customization and integration services will have the biggest positive impact on revenue, TTM, and shareholder value.

Working with Curtiss-Wright, you benefit from a partner with decades of proven experience working on projects and programs similar to yours. Leveraging our global design, development, and manufacturing teams, you can develop a dependable budget and schedule based on lead times and headcount planning. Our engineering teams can work

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concurrently and leverage our own stock and supply chain, leaving you with fewer components, people and processes to manage, freeing up time to focus on your core competencies.

As the most experienced single source of comprehensive, rugged, and secure COTS modules, highly engineered subsystems, and fully integrated systems for defense and commercial aerospace applications, Curtiss-Wright can cut years from your development process. Based on a combination of agile principles, concurrent engineering, and existing technology, Curtiss-Wright can reduce development time by nearly 50 percent, compared to traditional sequential development. We have taken care of the product development journey so you don't have to, and can deliver systems that meet your customers' requirements, enabling you to move directly to sales and system integration.

Learn more

White Paper: [Accelerate Time-To-Market With Safety-Certifiable Airborne Electronics Hardware](#)

Blog: [Take the Fast Track to Market with Mission Critical Systems](#)