

A large commercial airplane wing and engine assembly is shown in a hangar. The wing is white with a dark engine nacelle. The engine is mounted on a complex support structure. The hangar has a high ceiling with a grid of steel beams and large windows. The floor is polished concrete.

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*Creating value through  
integrated products  
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# *Executive summary*



**Aerospace and defense** product and equipment manufacturers are facing a challenging period — a simultaneous downturn in both the defense and commercial aerospace markets. On the commercial side, aircraft net orders have evaporated as the recession takes a toll on air travel and carriers revisit fleet expansion and renewal plans. Spending on maintenance, repair, and overhaul (MRO) is also falling as older aircraft are parked due to capacity reductions. The picture is similar on the defense side, where curbed investment is likely after a decade of strong growth.

In the past, aerospace and defense (A&D) companies relied on acquisitions, consolidation, and diversification to find growth when the purchasing environment was tough. While these well-tested approaches to growth will remain available in varying degrees, new opportunities are emerging for companies that approach the marketplace through an integrated product-and-services lens, creating value propositions and business models that link products together with the services required to operate and support them. In short, companies can create additional value by adapting their business models based on an integrated view that spans the product life cycle. In doing so, companies face difficult choices in determining the extent of integration and the operating model to adopt. These choices will be influenced by each company's product mix, its competitive positioning, and its level of capability across the entire product-services continuum.

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# *The growing importance of services*

A&D product and equipment manufacturers are in the midst of a business slowdown as a result of the recession and the reduction in defense spending from recent war-driven peaks. On the commercial side, attenuated air travel is leading to reductions in capacity, resulting in declining aircraft order rates and large numbers of older aircraft being parked. And with that, MRO expenditures are dropping as well. While such declines are nothing new for this intrinsically cyclical business, carriers have moved beyond traditional sources of cost reduction, increasing their emphasis on extracting savings through enhanced logistics management, operations support, equipment health monitoring, and enhanced fleet management techniques to help lower operating costs.

The picture is similar on the defense side. While the current U.S. administration will be able to claim, truthfully, that the Department of Defense budget grew each year President Obama was in power, the investment accounts will have fallen about 40 percent in real terms. As budgets face increasing pressure, big underperforming programs will be at risk and the traditional long-cycle, platform-centric segment will account for less than half of total U.S. defense spending. In a significant shift, U.S. defense customers will spend more on operations and maintenance than on research and development and procurement combined. As a result, by 2013, the U.S. defense market will be primarily one of services and support.

The same thing is occurring in Europe. More and more in the U.K., the total through-life costs of both a product and its accompanying services are viewed as principal criteria for defense contract awards. In France, contracts for helicopters now include integrated logistics support. And in Germany, the first “cooperative model” contract — a public/private partnership — was awarded to the large engine supplier MTU.

New opportunities are emerging for companies that approach the marketplace through an integrated product-and-services lens, looking at products together with the services (e.g., MRO, logistics, engineering services, training) required to operate and support them. We believe one of the biggest challenges in the next decade will be to harmonize the business model of original equipment manufacturers (OEMs) with that of service providers to evolve into a true solutions-based business model. Going forward, companies will need to make decisions based on an integrated view that spans the entire product–services continuum across the entire product life cycle — which can extend for decades.



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# *Answering the right questions*

There is significant opportunity for A&D companies to create additional value through services that are tightly integrated with their product offerings. Historically, OEMs in the aircraft engines segment have been at the forefront of capturing a large portion of the product life cycle value. For example, the service arm of Rolls-Royce aerospace operations has grown from 35 percent of company revenues to 55 percent in a seven-year period. GE's industrial businesses have increased their combined services backlog to US\$122 billion. Specifically, in GE's aviation business, nearly 70 percent of the earnings are generated from service operations. These companies have established long-term service contracts to secure a large portion of the service opportunity spawned by their installed product base. To be able to offer comprehensive solutions to secure long-term contracts, they had to integrate across sustainment services, operational support services, and, in GE's case, even financing services. In addition, they have been able to protect their positions with intellectual property by continuously developing product improvements that extend the operational life of the installed base.

Product-based companies must begin to view themselves as more than merely manufacturers if they are to benefit from the incremental revenues that service businesses provide. Instead, companies must consider offering an integrated product-and-services portfolio that spans product life cycles — in other words, evolve into solutions-based businesses in order to capture greater value across the life cycle of their products. In doing so, companies can start to realize the stability that long-term service contracts provide, the higher asset-turns service businesses can deliver, and the strong long-term customer relationships they engender.

To do this, companies will need to make strategic decisions based on an integrated view of the entire product-services continuum across the product life cycle, which can extend for decades. That is not easy. And many product-based companies will have to overcome operating model challenges, develop or acquire specific capabilities, and modify

processes to successfully transform. Ultimately, how well companies master this combination of prerequisites will determine the extent to which they maintain growth and competitive advantage in the market.

At the same time, it is essential for these companies to adequately gauge what level of integrated products and services is suited to their particular set of operations. A reevaluation of a company's portfolio of products and services is a logical first step in defining the transformation path. This assessment can measure the potential value of a company's existing or future products and services, and the type of solutions-based model and level of capabilities the company will need in order to capitalize on opportunities that emerge across the entire product life cycle.

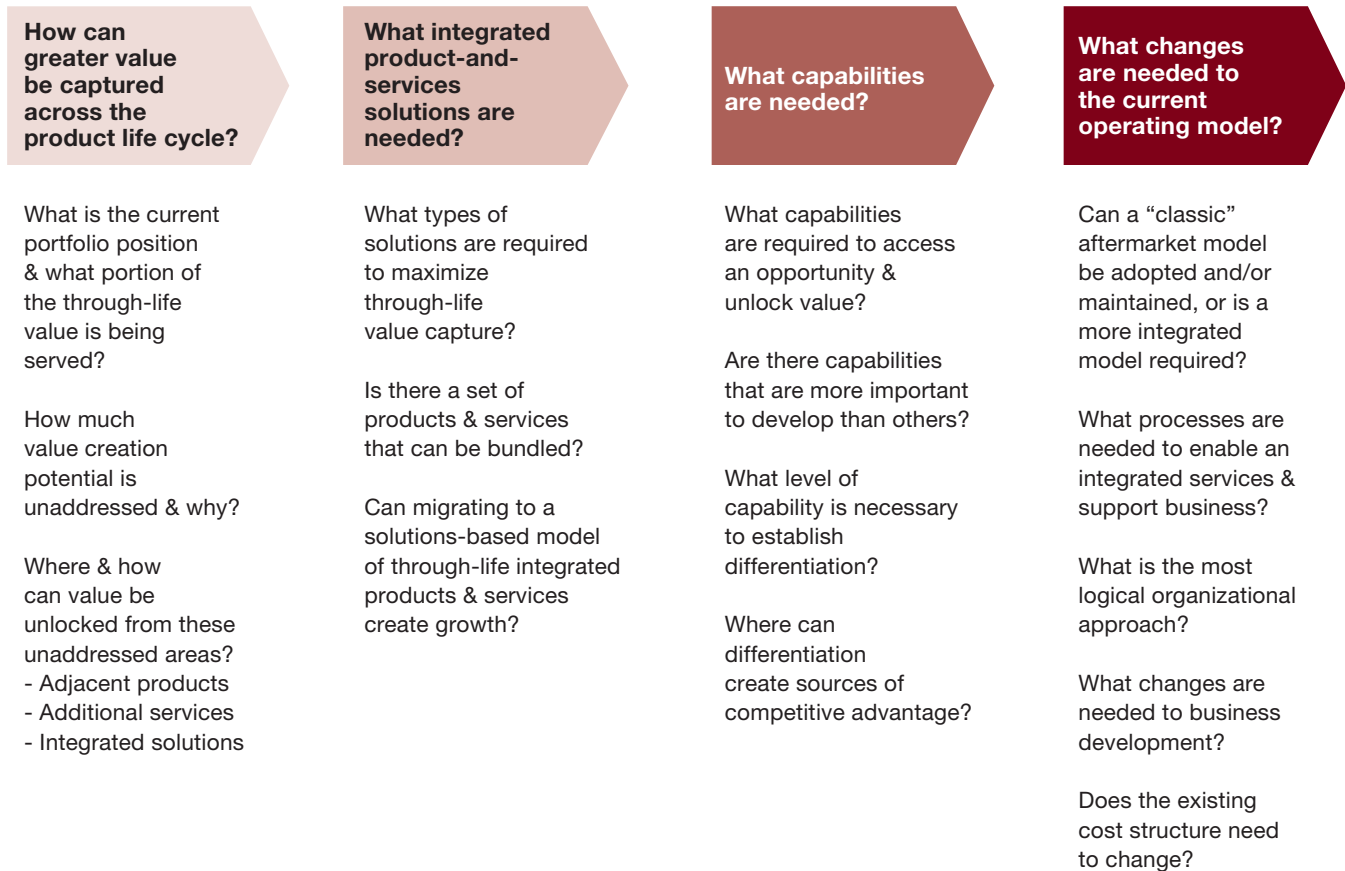
For a company to evolve into a more integrated life cycle-focused model, a number of questions should be considered for each offering in its portfolio (*see Exhibit 1, next page*).



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## Exhibit 1

### Four steps to an integrated product-and-services strategy



Source: Strategy&

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# *Capturing greater life cycle value*

With these questions answered, companies can begin to understand how to evolve beyond a product-centric focus by examining the opportunity, understanding how to capture incremental value, and investing in requisite capabilities to establish a competitive advantage.

Many A&D companies leave much value creation opportunity unaddressed or let competitors seize a disproportionate amount because they have relied on only a small portion of the product-services continuum to generate revenues. During periods of steady growth, OEMs have focused primarily on original equipment and new product sales, while treating the aftermarket as an afterthought and shortchanging such activities as system engineering and technical support, maintenance and repair, asset management, performance-based logistics, health monitoring, training, and financing services. Consequently, large portions of the product-and-services life cycle are neglected as a source of value creation and a means to protect current market positions, potentially leaving significant sources of revenue on the table for competitors to capture.

Moreover, this product-centric view of the marketplace often overlooks the strategic benefits of integrated products and services. Among them are the opportunity to create value by enhancing customers' operations through continuous life cycle improvement, and the competitive advantages gained by not having to compete for services downstream. Remaining integrated with customers throughout the product life cycle not only creates an additional revenue source, but also allows an OEM to profitably influence the customers' future product requirements and gain an advantage over rivals for future purchases. Some OEMs have already recognized the opportunity of a product life cycle strategy, setting aggressive growth targets for their service businesses — as high as 50 percent of total revenues in some cases.

Indeed, OEMs are not the only companies that can benefit from a more holistic view of their role in the A&D marketplace. Third-party providers, operators, and other players can capture additional value by playing varying roles across the product-services continuum (*see Exhibit 2, next page*).

## Exhibit 2

### Product-services continuum

		OEM products & services		MRO & sustainment services					Logistics & operations support services			Other related services	
		Original equipment sales	Design & product engineering services	Spare parts & part repair services	Line/field maintenance services	Overhaul/depot & remanufacturing services	Engineering & sustainment services	Modifications, conversions & customization	Logistics management services	Fleet & asset management services	Health monitoring & data services	Training services	Financing services & other
OEM suppliers		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Third-party providers			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Airlines & operators					✓	✓	✓	✓	✓	✓	✓	✓	✓
Description		Product installed base creates the services market		Areas with the most opportunity for non-OEMs to participate and extract value					Growing areas driven by focus on increasing asset utilization and lowering inventory cost			OEMs have an advantage at point of sale for products	
		Opportunity for OEM to establish technological differentiation		These segments are often riddled with excess capacity					Information management and data collection is often critical to optimization of processes			Challenging for providers with weak balance sheets	
		Extent of pricing discounts depend on future services opportunity		Managing costs throughout these segments becomes a critical trade-off activity for operators					Requires niche expertise that cannot be replicated easily				
				Sizable incremental costs to expand into services for multiple OEMs' products					Requires seamless linkage of processes between customer and supplier for maximum benefit				
				Access to data and information can help to optimize MRO, sustainment, and modification activities									
				Oftentimes, managing the availability and sustainment of the products results in strong customer relationships and foreknowledge of needed improvements									

Source: Strategy&

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# *Operating model choices*

One of the biggest challenges for traditional A&D product manufacturers is to determine how far to evolve their service and support model beyond their traditional product focus. For third-party providers, the challenge is to determine which operating model can differentiate a company's capabilities from those of the OEM and deliver enhanced value at a lower cost to operators. For airlines and operators, the challenge is determining whether service capabilities provide competitive, operational, and cost benefits, or if they should be outsourced to OEMs and third-party providers. Each type of provider must evaluate its position and understand which operating model makes the most sense for its business. For service providers, there are three operating models to consider, each representing varying levels of value capture potential and integration along the product-services continuum (see *Exhibit 3, next page*).

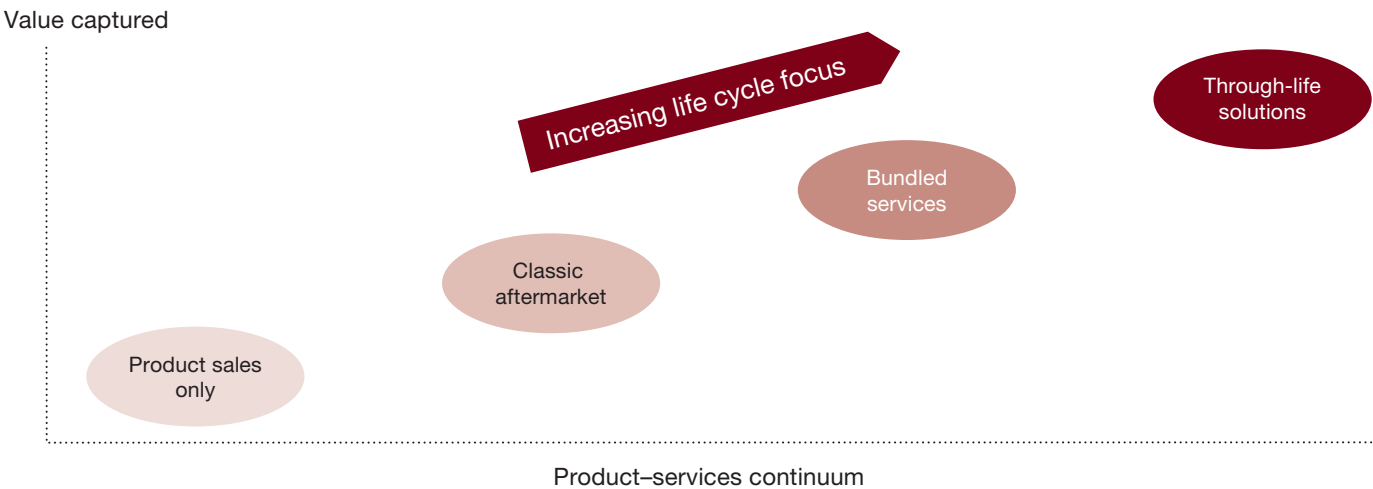
## ***Classic aftermarket model***

This represents the traditional aftermarket approach, typically based on providing parts. Value is captured through the sale of spare parts and to a lesser extent from repairs. This can be viewed as the traditional “razor and blade” operating model — i.e., sell the customer the basic product, perhaps at a discount, in hopes of acquiring greater life cycle value through the sale of spare or disposable parts. But what's important is that under this arrangement the customer is not bound to buy the spares from the OEM. Frequently, this model is used by manufacturers whose original product sales are smaller than the lifetime value of spare parts.

In some cases, the targeted customer base in the aftermarket is quite different from that in the equipment market. For example, a company may sell products to airlines and Tier One suppliers in the equipment market, but sell services to MRO providers and distributors in the aftermarket. The aftermarket business, usually supported by a service and support business operation, is managed separately from the product business and seldom requires changes to the existing OEM operating

Exhibit 3  
Operating model choices

Advancement in integrated product & services value capture



Source: Strategy&

model. Often the two businesses are at odds when the product business provides sales incentives (e.g., giving away extended service warranties, free training, discounts on spare parts) that adversely impact the service business. Since the installed base does not guarantee aftermarket value capture, companies using this model tend to be more product-focused than service-oriented.

### ***Bundled services model***

This model represents a more integrated life cycle approach to the market. Instead of marketing individual products or services, such as spare parts, repair, technical publications, training, and so on, companies can combine these items into more comprehensive offerings. The goal is to build an installed base of equipment and capture life cycle revenue by tying equipment purchasers into service contracts. Rolls-Royce's TotalCare for aircraft engines and SKF's Integrated Maintenance Solution for industrial bearings have bundled services by understanding life cycle economics to capture the most value from the aftermarket. SKF's Integrated Maintenance Solution is a performance-based contract through which customers can avoid capital expenses for inventory, asset, and supply management of components, and utilize SKF's engineering resources to increase machine reliability and lower cost of ownership.

Some companies try to bundle these offerings at the point of product sale to prevent competition with third-party providers later. However, even if the products and services are bundled at the point of sale, in most cases internal metrics for pricing and returns are evaluated for them separately. The goal is to manage the original equipment and aftermarket businesses concurrently as a combined portfolio with an effort toward maximizing product life cycle value. This model typically involves a considerable shift in management mind-set for product and support services teams to work effectively together, as a higher degree of enterprise integration is required to ensure customer satisfaction across the product-and-services portfolio.

### ***Through-life solutions model***

This model extends the bundled services approach to include taking responsibility for the customer's processes, such as asset and logistics management, maintenance planning, etc. And it requires transforming the OEM business into an integrated through-life support provider. Xerox Corporation pioneered this model in the 1960s, providing an integrated solution to fill a business need. Xerox maintained ownership and maintenance of the copier and charged customers on a per-copy



basis. While the customers benefited from not having to manage the copying equipment, Xerox was motivated to maintain performance.

A conceptual analogy in the aerospace industry is an “operations by the hour” approach, in which airlines would buy thrust, availability, and operations support when needed, instead of buying engines initially and MRO, health management, and operational support later. In defense circles, this model is characterized by the performance-based product support integrator (PSI) role in the U.S., optimized weapon system support (OWSS) contracts in Canada, and through-life customer support (TLCS) relationships in the U.K. At its best, customers would no longer purchase the physical product and support services separately, but instead would buy an integrated solution that guaranteed a certain level of performance over a long-term contract. This approach should seek to identify and solve customer needs by providing services to design, build, integrate, operate, maintain, and even finance the cost of the solution across the life cycle. Doing this means converting a traditional OEM operating model to a solutions-based approach. And it requires a major rethinking of virtually all aspects of business operations to optimize service and operating economies and displace the carrier and government stakeholders that have traditionally overseen the integration of products and services. This will require a fundamental shift in operating models and capabilities from those generally adopted in the equipment market, sometimes involving a major acquisition or series of acquisitions to accelerate the change.

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# ***Migrating to integrated solutions***

By moving to a solutions-based model, suppliers can unlock and capture incremental value, which is created along several dimensions:

- Customers demand higher equipment availability, reliability, lower cost of operation, guarantees on maintenance cost, and lower escalation on spare parts pricing, all of which limit the profitability on product sale as well as traditional services. Through an integrated solution, the incentives of the customer and the provider are aligned. The customer pays for performance, and the supplier is motivated to meet the performance requirements.
- The supplier is motivated to optimize life cycle cost through a combination of proactive reliability and condition-based maintenance approaches, which would not be possible for the customer or a transactional service provider. This allows the operator to share in the productivity gains.
- Moving to integrated solutions opens up new market areas where the company can exploit its capabilities and offer complementary products and services.
- Suppliers gain significant competitive advantage by having a closer relationship with customers and a deeper understanding of their processes related to product upgrades and installed base renewal. This benefit increases with the size of the supported fleet, as knowledge of product through-life behavior enhances predictability.
- Suppliers are better able to protect their intellectual property, improve product integrity, and enhance their brands.

Customers can benefit from increased asset efficiency driven by reduced equipment downtime, transfer of risk to suppliers, lowered opportunity cost as a consequence of higher reliability, reduced transactional costs, and elimination of duplicate activities in supply chain, logistics, asset management, and maintenance planning activities.

To be a true integrated solutions provider, a company has to use the best combination of products and services — its own and sometimes its competitors' — to meet customers' needs. Structurally, due to the concentration of companies involved in major systems and subsystems, the A&D industry is well positioned to maximize value through the integration of products and services. The level of success for any one company, however, will depend on whether its integrated service offerings meet customer needs efficiently enough to displace existing players and create value in the eyes of the customer.

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# ***Understanding the requisite capabilities***

It's critical to understand the capabilities and operational approach required to take advantage of opportunities enabled by a more integrated operating model. In many cases, requisite capabilities will exist inherently in the organization but may need to be enhanced. But, before a company makes investment decisions, it must understand how a more integrated product-and-services approach will impact its strategy, infrastructure, organization, and processes (*see Exhibit 4, next page*).

Here are some of the important operating model elements for companies to consider:

## ***Product-and-services strategy***

Life cycle considerations and offering integrated solutions significantly impact a product strategy. For example, managing the cost of spare parts and upgrades is a significantly more important capability in a solutions model than in a pure product sales approach. Beyond the usual considerations of market potential and competition, the benefits of optimizing an existing portfolio of solutions have to be considered and understood when decisions are made on developing product improvements and upgrades. Managing services and support either through owned facilities or through alliances and partnerships provides a way to gain critical competitive intelligence about products. By capturing this in a structured fashion and learning how to funnel the information back to engineering and product development teams, companies can gain insight about which new products are the most valuable to pursue. Providing solutions throughout a product's life cycle involves dealing directly with end customers in addition to distributors and third-party providers. Particularly in the commercial aerospace sector, as the product ages, assets migrate, and ownerships change, the asset base itself becomes more diverse and fragmented. Consequently, product strategy and solution offerings must ensure that value capture is not interrupted by asset ownership changes. Indeed, the visibility of the life cycle afforded by the solutions-based approach provides a relatively easy way to manage contract portability.

*Before a company makes investment decisions, it must understand how an integrated product-and-services approach will impact its strategy, infrastructure, organization, and processes.*

*Exhibit 4*

**Integrated product-and-services operating model elements**

<b>Strategy</b>	<b>Product-and-services strategy</b> <ul style="list-style-type: none"> <li>Actively managing life cycle</li> <li>Capitalizing on diverse customer base &amp; asset ownership changes</li> <li>Ability to capture &amp; utilize competitive intelligence</li> </ul>	<b>Pricing and investment</b> <ul style="list-style-type: none"> <li>Life cycle considerations in product pricing &amp; investment decisions</li> <li>Reducing volatility &amp; increasing stability in operations</li> </ul>	<b>Managing channel conflict</b> <ul style="list-style-type: none"> <li>Balance between selling to distributors &amp; third-party providers while competing against them</li> </ul>
	<b>Global support services</b> <ul style="list-style-type: none"> <li>Optimized by considering scale, speed of delivery, regional coverage, labor cost, regulatory issues &amp; customer proximity</li> </ul>	<b>Information management</b> <ul style="list-style-type: none"> <li>Knowledge of internal customer processes</li> <li>Data integration across different systems to capture customer- &amp; supplier-specific information</li> </ul>	<b>Engineering services</b> <ul style="list-style-type: none"> <li>Support customized integration, installation &amp; functionality</li> <li>Differentiated capability by providing solutions that lower cost of ownership</li> </ul>
	<b>Customer relationship</b> <ul style="list-style-type: none"> <li>Initial product sale as beginning of long relationship</li> <li>Decision rights for managing the customer interface, delivery, and satisfaction issues</li> </ul>	<b>Risk management</b> <ul style="list-style-type: none"> <li>Leveraging opportunity to capitalize on asymmetric product knowledge</li> <li>Managing risk due to performance, credit, utilization, inflation, etc.</li> </ul>	<b>Structure and incentives</b> <ul style="list-style-type: none"> <li>Structuring incentives based on life cycle cost, delivery, quality &amp; customer satisfaction</li> <li>Functional matrix vs. profit &amp; operations cost centers</li> </ul>

Source: Strategy&

Engineering capabilities plays a key role in a product-and-services strategy because these skills support customized installation and integration and identify solutions that enable continuous product improvement and lower the total cost of ownership for the customer. This includes devising condition-based maintenance techniques by monitoring product performance, optimizing maintenance procedures, extending maintenance intervals, proactive repair development, and designing retrofit upgrades for improved performance, durability, and lower cost.

### ***Pricing and investment***

Customers always expect products and services to be delivered faster and at lower cost. To continually do this involves exploring new design architectures, developing new material options, improving manufacturing processes, and reducing maintenance complexity. Most important, capabilities must be developed through technology investments that help manage data (e.g., system diagnostics, prognostics, and usage information) in an integrated fashion to support operational optimization along the product-services continuum. These investments in technology should provide a competitive advantage, allowing a return on investment through pricing of integrated solutions. The business case for justifying such strategic investment decisions needs to be evaluated by considering life cycle economics. Also, a holistic portfolio evaluation is needed to structure and price attractive solutions instead of targeting profitability metrics on products and services separately. This would entail robust analytical processes involving risk transfer and premiums, forecasting, fleet performance and monitoring, supply chain logistics, and productivity.

### ***Managing channel conflict***

Many companies use multiple channels to sell their products and services to end customers. For example, product manufacturers are accustomed to selling to distributors and third-party providers. This typically involves catalogs with prices along with fixed-volume or variable-volume negotiated discounts. However, deciding to focus on the entire life cycle opens up additional complexity and requires additional capabilities. Distributors and third-party providers, which have been the company's traditional customers in the aftermarket, now become competitors for providing life cycle services to end customers. Key decisions must be made about which to compete against and which



to partner with to prevent cannibalizing value. Detailed understanding of channel economics is required to settle on a successful channel strategy without conflicts.

## **Global support services**

Manufacturers typically operate factory sites as centers of excellence for each type of subassembly or component, where the goal is to develop core capabilities for the highest level of assembly operations, while maximizing economies of scale. However, integrating products and services requires additional infrastructure capabilities: Engineering services must provide customized integration and installation of mission systems; global support services must provide maintenance and personnel for regional coverage, better proximity to supply chain and distribution, alliances and partnerships, and logistics for large customers; and information management must provide hardware and software to strengthen an understanding of customer processes and to manage usage data across systems.

Organizational structure is the backbone of all business processes and decision making and plays a significant role in whether a company succeeds or fails. We have seen manufacturing facilities in product-dominant companies structured as cost centers, and managerial incentives based on product cost reduction and throughput. We have also encountered maintenance and repair facilities in services-dominant companies structured as profit centers, and incentives based on delivery, quality, and customer satisfaction. But an integrated product-and-services organization demands coordination among several organizational functions and key changes in structure and incentives. Structuring incentives beyond product cost, delivery, and quality — to include total cost of ownership — is critical for the success of a life cycle management organization. Incentives should be designed to enable a consistent focus on offering customers collaborative solutions that deliver quantifiable results.

## **Customer relationship management**

Managing customer relationships is a critical business issue for A&D manufacturers for two reasons. First, these companies are dealing with a finite set of customers. Second, the decision rights for the relationship have to be managed throughout the product-services life cycle and include the customer interface, delivery, and satisfaction issues, since customers are making a long-term commitment in choosing a product or a solution. In product companies, the customer relationship is typically transferred from sales to support after the delivery of the

equipment. Warranty and concession issues critical to maintaining customer satisfaction are handled by product support teams whose primary goal is to minimize payouts. For life cycle management to be successful, the initial product sale should be considered the beginning of a long relationship. Often this requires a primary customer relationship manager and integration of the seller's business development, engineering, production, and product support processes to provide guaranteed levels of performance. Similarly, knowledge of internal customer processes is critical for effective life cycle management, and IT tools are needed to ensure that data involving customer processes, product usage, and needs is integrated across different OEM networks accessible to all critical functions.

### ***Risk management***

Product businesses typically wrestle with technical and program execution risks and have processes and mitigation plans to manage them. Life cycle management opens up a new realm of risk areas including performance, inventory ownership, credit, equipment utilization, metric development, and material cost inflation. Add the complexity of integration, global supply chains, and scale and scope of solutions, and it is clear that companies pursuing integrated product-and-services solutions will require new models and skills to quantify risk and ensure that adequate premiums are captured.

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# *Conclusion*

Unlocking and capturing value from a set of opportunities may not always be as easy as it seems for many companies. It may require displacing competitors, some traditional and some nontraditional, that have become deeply embedded with the customer. It is possible that certain competitors in certain segments of the product–services continuum of a platform or system will have superior assets, lower production costs due to scale or scope, a higher-quality operating model, or an inherent intellectual property advantage over rivals. Product manufacturers must carefully analyze these aspects and assess their existing business portfolios to determine how far to integrate their product and service businesses. Choosing the right options and operating model, and implementing them along with the required investments to build the right capabilities, can help players sustain a growth path to capture greater life cycle value.

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