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Improving Innovation and Cash Flow in Automotive

by AMR Research Staff

Automotive manufacturers recognize that while speeding innovation is the lifeblood of their business, it must be accomplished while keeping costs in check and maximizing quality. As they pursue strategies with global alliance partners and suppliers to differentiate brands and standardize component use, manufacturers find their supporting IT infrastructure is a constraint to innovation. Success will go to those that best manage the cost and resources required to transition the legacy infrastructure of yesterday's strategy to the global product development environment required for tomorrow's innovation.

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The Bottom Line: Automotive manufacturers must use a cost-neutral approach to transition their legacy product development IT infrastructure, considering IT services to reduce the cost of existing environments and provide the necessary resources to transform the innovation process.

The innovation challenge

The Automotive industry is fiercely competitive. The big three U.S. domestic manufacturers have lost market share to non-U.S. brands by a combined 1.5% a year for over a decade. Quality has been a challenge as well: a recent J.D. Power and Associates report indicates that while there has been some improvement by the big three U.S. producers, they still sit above the average for quality problems per hundred vehicles. Market demands have driven a need for ever-increasing levels of efficiency, which has resulted in higher levels of collaboration among the automotive manufacturing supply base in all facets of the product lifecycles. Recent AMR Research studies have found that the Automotive industry spends more than other industries on managing their supply chains, reaching an average of 31% of revenue across producers. While there are many contributors to these problems, Automotive manufacturers recognize that design plays a critical role in achieving success. Rapid introduction of innovative products with distinct brands for increasing sales must be balanced with improving supply chain and quality performance by reducing variability with standardized platforms and components.

Improving Time-to-Market (TTM) is critical to competitive advantage, yet the financial investment community has its own concerns with the New Product Introduction (NPI) process. Financial analysts often view Automotive as a high-risk investment, concerned with tying up $2B in development investment over what has traditionally been a 24- to 36-month development cycle. Risk is also increased when long development cycles reduce the likelihood of meeting customer requirements. Automotive manufacturers have always invested heavily in improving the product development process—for example, DaimlerChrysler's *FastCar* program and GM's emphasis in reducing its development cycle to 18 months. Product Lifecycle Management (PLM) will continue to play a significant role in reducing costs and streamlining the process of innovation.

Automotive suppliers have taken over more design responsibility from the OEMs, developing entire interiors versus just manufacturing components. Therefore, Tier 1 suppliers, including Johnson Controls, are investing heavily in their PLM infrastructure to ensure improved management of OEM programs and improve design collaboration capabilities. These design capabilities extend to lower tier component suppliers as well, where efficiency in sharing design information comes from the need to lower component costs and speed TTM. To highlight the magnitude of the problem, the Automotive Industry Action

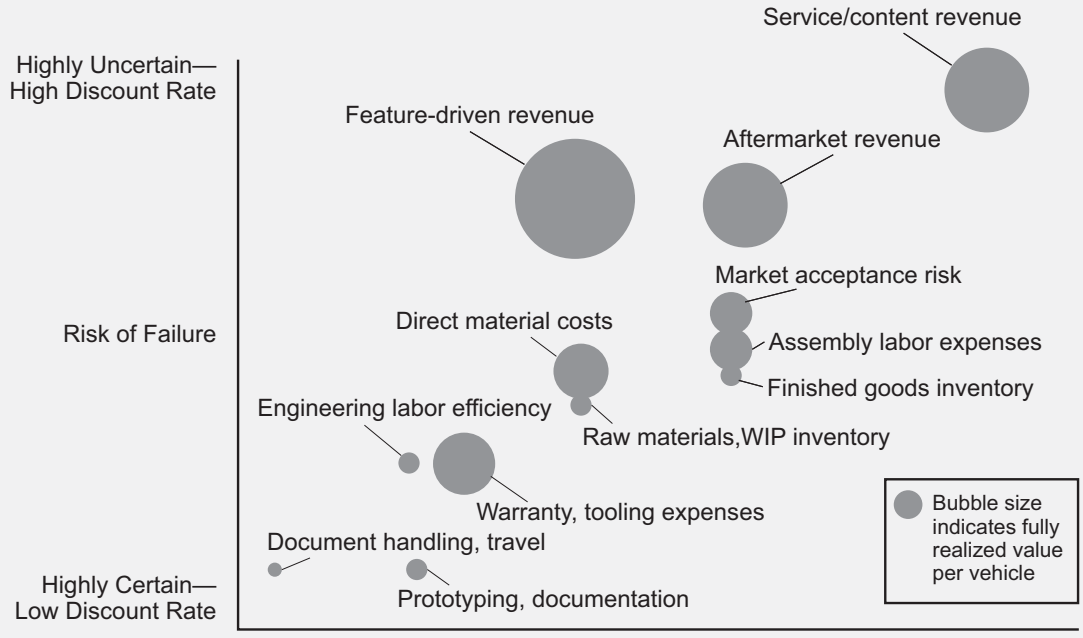
Group's (AIAG) Collaborative Engineering and Product Development initiative estimated that there is $1.4B in waste alone due to the lack of interoperability among the Product Data Solutions used by the supply chain. This has been a problem that industry associations like the AIAG and Original Equipment Suppliers Association (OESA) have been challenged with in the Automotive industry. Compliance and quality continue to be a main area of focus, as evidenced by Congress with the enactment of the Transportation Recall Enhancement, Accountability and Documentation Act, known as "The TREAD Act." An emphasis on Advanced Product and Quality Planning (APQP) continues, as does the ability to execute this process more effectively between trading partners.

The value of transforming innovation infrastructure

Global competition and demand challenges continue to plague the Automotive industry, and the pace continues to accelerate with suppliers assuming greater responsibility for design and development of components and subsystems. This impacts areas such as product platforms with higher levels of communization and better use of subassembly interchange of vehicle components/modules with flexible manufacturing capabilities. The results are a much higher level of collaboration among the tiers and vehicle manufacturers in the product development lifecycle. As the OESA CPD study team reported in a briefing in early 2003, "External processes are the key collaboration points" that will require solutions in place to support "data exchange and process standards to reduce the time and cost." Sharing data across disparate design information systems is an obstacle to this goal, requiring manufacturers to revamp their design IT infrastructures to achieve this strategy.

While manufacturers inherently understand the strategic benefits of improving the innovation process, they often struggle when it comes time to building the business case. Automotive executives driven for immediate ROI on project initiatives have typically focused on "lean" activities or measures to "eliminate" waste and improve margin. Therefore, champions seeking to embrace "revolution" must be able to deliver value through each step of the "evolution" or transformation process (see Figure 1).

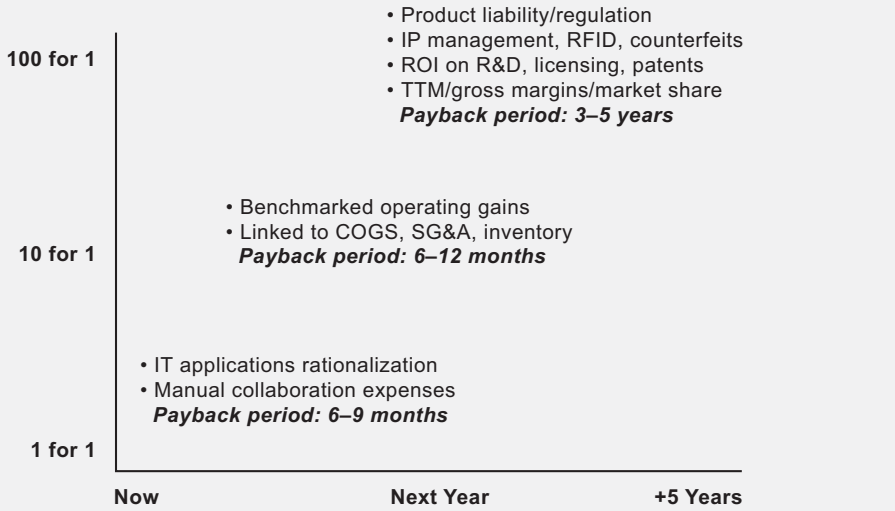
Figure 1: Little wins lead to ultimate victory



Source: AMR Research, 2003

The long-term requirement for survival is for Automotive manufacturers to transform the way that they develop products. Those that do it fastest will be the market leaders in the industry, moving beyond simply improving margins with cost reductions. However, embracing a pay-as-you-go strategy will drive the self-funding transformation. A recent AMR Research study on the value of PLM breaks this strategy into three primary buckets of value (see Figure 2).

Figure 2: PLM payback schedule—three levels of impact



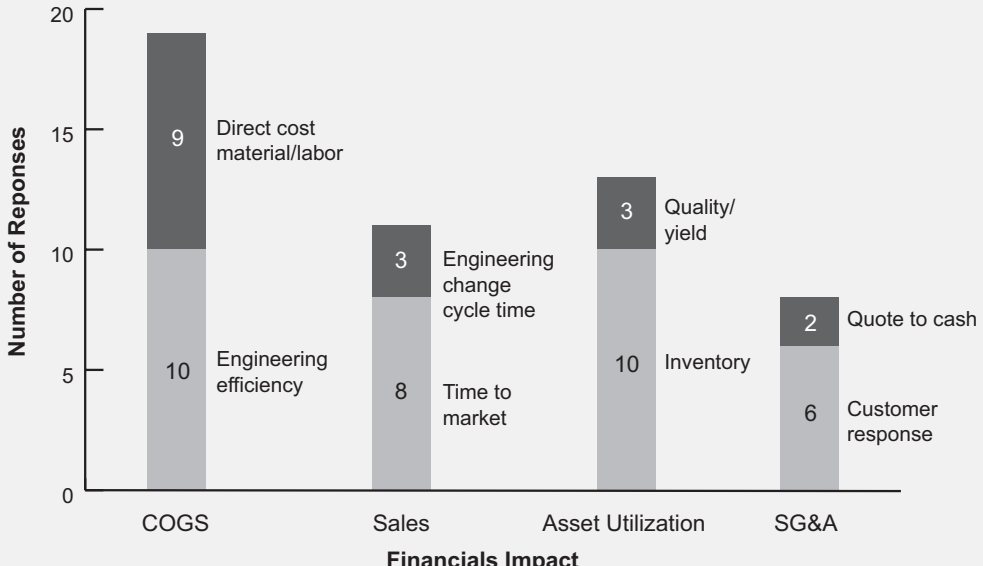
Source: AMR Research, 2003

Building a successful business case requires a roadmap for transforming the process to meet the long-term needs of the business. This roadmap to success works best when ROI benefits are broken into measurable elements that progress toward the strategic business transformation.

From a financial perspective, successful PLM initiatives break down into three categories:

- **Infrastructure savings**—Accrues immediately after go-live. Most users' as-is PLM environment spans many, often dozens of, separate systems. Much of the interaction between these systems is manual, with redundant data entry and hard copy via courier very common forms of integration. Coupling this fact with a general freeze in new IT spending leaves PLM with a simple first gate—any new spending should replace existing spending, delivering lower Total Cost of Ownership (TCO) for PLM infrastructure within six to nine months.
- **Improvement in established operating metrics**—Accrues 6 to 12 months after go-live. Our research finds a number of widely used and generally well-benchmarked operating metrics applied to PLM initiatives (see Figure 3). Any organization intent on performance improvement in areas associated with product development, launch, and retirement should be able to identify several such metrics and tie PLM projects and owners explicitly to them.
- **Strategic competitiveness impacts**—Accrues three to five years after go-live. PLM's impact on a company's strategic position can be very compelling. 10% of PLM initiatives we reviewed commenced with little or no formal financial ROI analysis, relying strictly on the strength of strategic arguments. While this has worked to get some moving, long-term projects have a tendency to lose their way (and momentum) unless some benchmarks can be pointed to along the way as indicators of improvement.

Figure 3: Operating metrics tracked in business cases



Source: AMR Research, 2003

Timing and scale of impact pose ROI problems for PLM champions

Each of these three classes of benefit has problems in terms of developing a sound ROI argument. Infrastructure savings fail, in the words of one manufacturer, to "move the needle"—in other words, $40K here or $100K there just doesn't merit attention when C-level executives have so much else to worry about.

Improvements to operating metrics suffer from process dependencies. PLM tools that should allow for better part selection or faster quote-to-cash cycle time work only if users across functions adopt them. Typically, therefore, the champion pushing to move forward on a PLM initiative is obliged to secure a lot of political buy-in before taking the first material step.

Strategic competitiveness is too far away in time and too complicated a financial impact model to pass muster as a legitimate ROI input. Some companies we have worked with accept the value of this benefit based on faith and move forward, despite a weak ROI analysis.

The value of PLM stretches beyond traditional internal product development and must be viewed in terms of its internal, supplier-facing, and customer-facing impact (see Table 1). Automotive OEMs and Tier 1 manufacturers must use the expertise of lower tier suppliers to design out product and supply chain cost, while suppliers need to respond faster to new customer RFQs. All tiers of the supply chain need to improve the efficiency of internal engineering organizations, sharing data to create innovative designs while utilizing common platforms and components.

Table 1: Case examples of internal, supplier-facing, and customer-facing impact of PLM

Internal	Business
ECO cycle time reduced by 50%; ECO administration expense reduced by 60%	Electronic Systems
Reduced TTM from 48 months to 18 months between 1997 and 2002; engineering productivity increased 10% per year 1997–2002; 35% reduction in Global Product Development budget	Automotive
Concurrent product and process design to speed time-to-market	Automotive
Supplier-Facing	**Business**
Internal supply chain organization found 2% savings on direct materials purchase; $640M in materials acquisition savings potential across all groups	Industrial Products
Year-to-year savings of $3.9M in Year One, $8.5M in Year Two	Seat Belts for Automotive
50% increase in component reuse, resulting in 5% to 15% decrease in prices for standard parts	Aircraft
Customer-Facing	**Business**
"Significant" savings on allowances for warranty and returns	Farm Equipment
RFQ response time reduction from 2 weeks to 24 hours	Electronic Manufacturing Services
30% reduction in cycle time for complex custom order taking, pulling in live CAD models, cost models, thermal models all linked	Custom Electrical Switch Gear
Reduced order lead time by 50% (from 8 to 12 weeks to 4 weeks), using what-if scenarios on screen and direct feedback from distributor customers	Custom Aftermarket Wheels
50% customer RFQ to prototype cycle time reduction	Bearings and Motion Control

Source: AMR Research, 2003

The cost of transforming innovation infrastructure

Naturally, the benefits of transforming the product development process do not come free, and the complexity of this transformation grows with the complexity of the organization's size, product attributes, and functional silos.

Table 2: PLM investment range

PLM costs	High	Average	Low
Core PDM, per user seat license* (net)	$6K	$3K	$0.5K
Implementation costs (multiple of SW)	2X	1X	0.5X
Maintenance costs (per year, percentage of license)	22%	18%	12%
Additional costs	**High**	**Average**	**Low**
Database licenses	$200K	$125K	$50K
Internal allocations (multiple of SW)	3X	2X	1X
Specialty Applications (per deal)	**High**	**Average**	**Low**
Product portfolio management	$1,500K	$500K	$50K
Implementation costs (multiple of SW)	2X	1X	0.5X
Component supplier management	$2,000K	$500K	$100K
Implementation costs (multiple of SW)	4X	3X	0.5X
Configurators	$3,000K	$600K	$120K
Implementation costs (multiple of SW)	4X	2X	1X

Source: AMR Research, 2003

*Deployments may be supplier-facing, customer-facing, or internally oriented.

Investing in technology to improve the innovation process is not new to Automotive manufacturers—resulting in considerable existing investment in legacy systems. These systems are a bucket of homegrown applications, mainframe, and older commercial applications that often function in silos, or require significant IT support for integration and maintenance. DaimlerChrysler, Ford, and GM have thousands of seats of Computer-Aided Design (CAD) as well as Product Data Management (PDM) applications across their global operations. Table 3 provides a comparison of this environment for a variety of industries, while Figure 4 is a before-and-after representation of simplifying this complex environment.

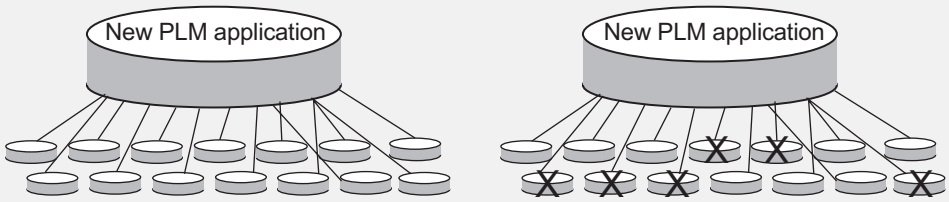
Table 3: Complex disparate infrastructures are currently supporting the innovation process

Legacy Product Development Systems Across Industries	Automotive	A&D	High-Tech
Contract Management		◆	
Earned Value Management		◆	
Program Management	◆	◆	
Portfolio Management			◆
Project	◆	◆	◆
Parts Database	◆	◆	◆
Military Specifications		◆	
Material Specification	◆	◆	◆
Configuration Management	◆	◆	
Requirements Management	◆	◆	◆
Drawing File Server	◆	◆	◆
Bill of Materials (BOM)	◆	◆	◆
Mechanical Computer Aided Design (MCAD)	◆	◆	◆
Electrical CAD (ECAD)	◆	◆	◆
Computer-Aided Engineering (CAE)	◆	◆	◆
Government Procurement		◆	
Spreadsheets	◆	◆	◆
Adobe Documents	◆	◆	◆
Software Development	◆	◆	◆
Typical number of disparate systems in a $1B company	**10 to 15**	**20 to 30**	**5 to 8**

Source: AMR Research, 2003

Common Issues:
Custom homegrown supported by internal IT specialists
Stand-alone applications requiring point-to-point integration
Manual transfer of data between systems
Minimal Internet access
Limited ability for electronic collaboration with external partners

Figure 4: Reducing complexity in innovation infrastructure

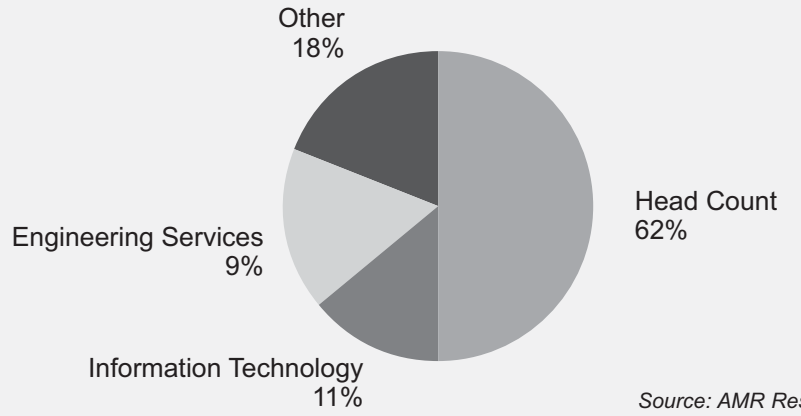


	Add complexity	Remove complexity
Project costs	• Software license • N point-point integrations • Process, data definition • Training	• Software license • N-X point-point integrations • X data conversion/transfer • Process, data definition • Training
Comp cost index	**100**	**90**
Ongoing costs	• New app maintenance • N existing apps maintenance • N point-point integration maintenance • HW/infrastructure	• New app maintenance • N-X existing apps maintenance • N-X point-point integration maintenance • Reduced HW/infrastructure
Comp cost index	**100**	**80**

Source: AMR Research, 2003

It is common within Automotive to have 15 dedicated IT personnel supporting every 100 engineers. One manufacturer described its 10-to-1 ratio as a lean operation. Considerable investment is required to keep these professionals trained on the latest technologies, and they are often too busy with day-to-day firefighting to take on the more strategic requirement of transforming the product development environment. As Automotive manufacturers are pressured to improve innovation and speed TTM, they are asked to do more with the same or fewer development dollars. Automotive manufacturers dedicate anywhere from 2% to 4% of revenue to product development. DaimlerChrysler, which invested $6.4B dollars in R&D worldwide last year, has over 27,000 people working within its product development organization. This combines with additional IT and support costs to create a significant investment in the product development operation. Figure 5 shows a typical allocation of this full investment for Automotive.

Figure 5: Allocation of the product development budget—Automotive



Source: AMR Research, 2003

What is your cost containment strategy for innovation infrastructure over the next five years?

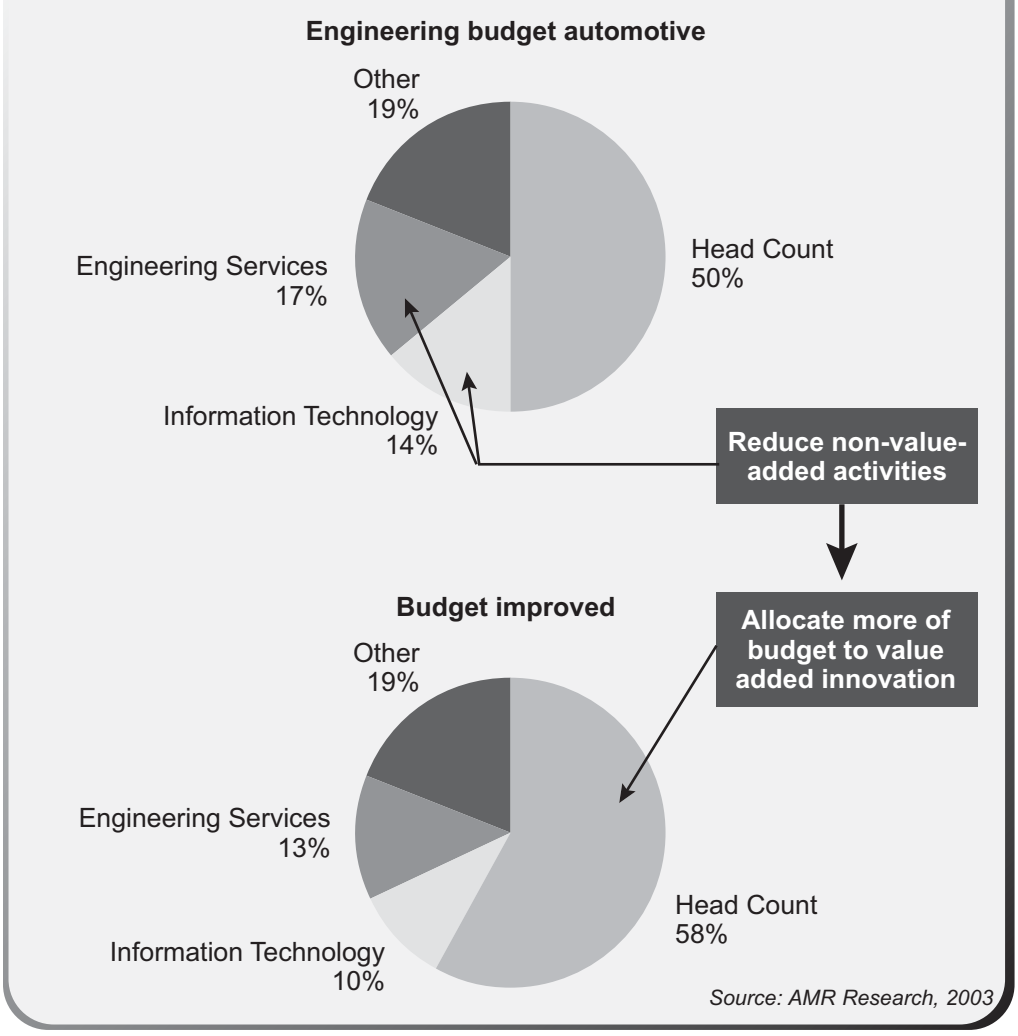
As Automotive manufacturers work to transform their IT infrastructure to support global product development strategies, they are faced with cost and resource constraints because of the pressure to improve profit margins. While new technology investment must be carefully managed, the risks associated with a fragile legacy infrastructure cannot be taken lightly.

If IT budgets can't grow much more, and R&D spending is expected to be more efficient, then some sort of cost containment strategy is needed. Several issues unique to the innovation infrastructure demand special attention when coming up with a strong cost containment approach that will enable transformation as necessary.

- **Higher degree of system complexity**—The drivers of system complexity include the fact that engineering, R&D, and product design are technically sophisticated user groups that are often willing and able to buy their own tools, independent of corporate IT. The resulting proliferation of CAD tools, parts databases, and engineering process controls makes for massive heterogeneity in application programming languages, databases, hardware, and networking protocols. This makes integration difficult and system upkeep expensive.
- **More expensive downtime**—The high cost of engineering and other product development human resources implies a greater burden on the organization when systems go down. The ratio of support personnel to users in engineering environments is often as high as 1 for 10. Making matters worse is the interdependency of tasks in a typical product development environment. Problems in any phase of engineering may become huge overall program slippages as successor tasks wait and delays accumulate.
- **Wider partnering adding to communication costs**—Increasing outsourcing of manufacturing and design stands to increase infrastructure costs as new partners are added and more product information is exchanged.

Faced with the requirements to do more with less, manufacturers must shift the allocation of product devolopment investments toward optimizing the use of engineering talent and less on IT and support services. This calls for managing the current IT investment more efficiently, implementing process change, and deploying appropriate technology to support process improvement (see Figure 6).

Figure 6: Reducing IT support costs frees funds for transforming the innovation process



Source: AMR Research, 2003

Cost-neutral ways are needed for creating an innovative product development infrastructure

In a recent survey by AMR Research of more than 100 manufacturing companies, 65% reported that their product development IT budgets will be flat or increase slightly, and only 12% reported that their budgets will increase by more than 5%. Within Automotive, only 6% reported that their budgets would increase by more than 5%. With this level of budget growth, users interested in transforming their product development organizations in order to maintain competitive advantage will have to find creative ways to be cost-neutral.

Because of budget constraints, users are not able to spend huge budget increases on hiring new IT employees to effect a product development transformation. Rather, they must find projects that allow them to cut operational costs while investing in process and technology improvements. However, finding resources with the necessary skills while maintaining the status quo is difficult, if not impossible, for most users. For many companies, effectively leveraging the efficiencies of scale and skill and the cost advantages of offshore resources that can be delivered by outsourced services providers is an efficient way to overcome their staffing hurdle.

Developing internal support for using outsourced services while transforming product development IT requires the following:

- **Defining core processes that should not be outsourced and non-core processes that can be outsourced**—Not everything done in product development is a core process, and successful companies can identify potential areas for cost savings based on a realistic assessment of their competitive advantages.
- **Developing a realistic financial analysis of the costs and benefits involved**—The cost analysis must include not only implementation costs, but also the ongoing maintenance and operations costs. AMR Research finds that most people ignore the ongoing maintenance and operational costs in their analysis, grossly underestimating their actual costs. The benefit analysis must capture the potential cost savings for IT and product development that results from the transformation.
- **Addressing user attitudes about the risks associated with changing product development tools and the way that IT supports product developments**—Issues that must be addressed include the perceived risks, such as loss of control, reduced service levels, and increased costs resulting from using outsourced resources.

Develop the business case for outsourcing existing, non-core pieces of product development IT support

When surveyed by AMR Research, most users responded that they needed to see at least a 30% cost savings from an outsourcer to compensate for the perceived risk of outsourcing a core competency. Since most users within product development organizations are skeptical that a large IT outsourcing arrangement can deliver 30% savings, many quickly dismiss outsourcing IT support for product development. However, we believe that by selectively outsourcing—rather than outsourcing everything—a business case can be constructed that leads to a positive return.

Rather than attempting to outsource all of IT for product development, selective outsourcing can be shown to provide specific skills that are preventing new strategic projects from being started. For example, targeted elements of the product development environment that have been successfully outsourced include the following:

- **Data conversion**—The outsourcer redraws files from one format to another using offshore labor.
- **PDM help desk support**—The outsourcer provides help desk support for stable PDM applications.
- **Hardware preparation and setup**—The outsourcer manages the complexity of multiple suppliers and delivers a standardized configured platform to the user.
- **Legacy PDM application management**—The outsourcer maintains custom code for the few remaining groups required to use it.

In all four examples, the IT groups doing this outsourcing saved money because of better efficiencies provided by the outsourcing partner and, in the case of the data conversion example, because of lower cost offshore resources.

Essential to pursuing this strategy is the ability to segment product development activities into multiple categories:

- Core processes that are critical to the company's product development and that provide competitive advantage
- Critical processes for product development that provide no competitive advantage; an example of this may be managing the ECO process or ensuring proper process data collection for regulatory compliance
- Commodity processes that provide little value, such as managing access to a repository of legacy engineering drawings

Focus on outsourcing support for the critical and commodity processes. Use this activity to develop a relationship with an outsourcing partner, refine internal processes to support working with an outsourcing partner better, and eventually provide demonstrated success with an outsourcing strategy.

Pragmatic approaches to managing costs are available

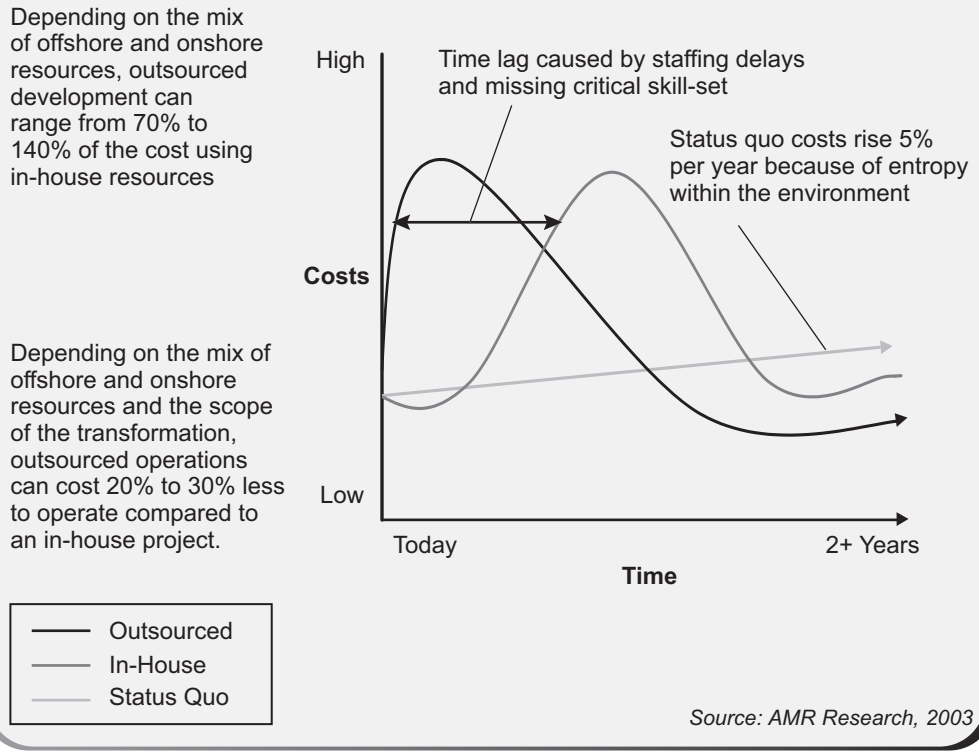
When developing a strategy for transforming IT support for product development, it is necessary to compare in-house costs with potential outsourcing costs. However, simple cost comparisons are not enough. Users must also factor in the risk associated with delayed and poor implementations. Users must also consider the benefits to be achieved by higher quality and better maintained solutions that consolidate and integrate applications (see Table 4). Figure 7 compares the cash flow associated with maintaining the status quo, transforming with in-house resources and with outsourced resources.

Table 4: Cost and benefit considerations for transforming product development IT

Decision Criteria	Factors to Consider
In-house labor costs versus outsourced labor costs	Outsource labor costs are now undergoing a dramatic transformation as companies offer more offshore capabilities. Most large service companies now offer blended service offerings comprising a mix of local and offshore resources. Since offshore resources can be as low as 30% of onsite resources, substantially lower labor costs can be achieved through outsourcing. The skills provided by offshore labor is primarily for development and maintenance of custom code using standard tools (e.g., Java, C++, .NET) and development practices. Offshore labor has significantly fewer skills in project management and packaged application support. The actual labor rate savings provided by a mix of local and offshore resources will depend heavily on the mix project management, custom applications and packaged applications. AMR Research has seen projects using blended outsourced resources to cost in a range of 70% to 130% of estimated costs using in-house resources. However, outsourced projects done without offshore labor can cost 140% as much as similar projects done with in-house labor. For PLM-related projects, offshore savings will be most significant for application development and data conversions and less significant for ongoing application operations and maintenance.
Startup costs and project delays	When doing the transformation with existing in-house resources supplemented with permanent new hires, users must factor in the cost of project delays caused by delays in freeing up critical resources from current assignments or in hiring critical resources and project delays caused by in-house resources not having the necessary skills to quickly solve critical problems. For example, a user implementation of a new PLM system was about to miss its go-live date because the in-house staff no longer had the expertise to complete the integration with a legacy IMS system. An outsourcing partner was brought in that could provide IMS expertise within 24 hours.
Operational benefits from well-integrated system	In a study of the benefits of application integration, AMR Research found that companies with well-integrated application platforms spent 11% less on application maintenance and operations than companies with multiple non-integrated applications. Creating an integrated environment for product development applications involves integration with non-product development-specific applications such as the ERP, procurement, and supply chain planning applications. It is highly unlikely that the IT staff within product development will have the necessary expertise and a more efficient way to succeed with an integration strategy is to leverage skills of a services partner.
Operational benefits from consolidated systems	In a study of the benefits of application consolidation, AMR Research found that companies that have with consolidated their applications down to a limited number save between 20% and 25% on operations. However, an effective consolidation strategy depends on an effective team with the ability to manage both the technical and organizational challenges necessary to reduce the number of little used customized applications. The most effective examples of consolidation projects used outsourced resources for about 25% of the project teams and focused the resources on the following: • Change management and facilitation for guiding team to best practices • Specialized technical knowledge (new products from vendor) • One-time tasks that could be done offshore (data conversion programs)
Operational benefits from well maintained systems	Software vendors report that users running properly configured applications and systems running the appropriate latest service packages report significantly fewer defects that users running poorly maintained systems. One vendor reports that 80% of defects found and reported by users are duplicates of known defects that a user would not have experienced had they been running the latest appropriate service packages. Because they have multiple clients running similar applications and technologies, outsourced service providers can leverage maintenance expertise across multiple users—that is, they know the proper service packages and configurations because they install them at multiple sites.

Source: AMR Research, 2003

Figure 7: Cash flow comparisons for product development IT strategies



Source: AMR Research, 2003

When developing a specific plan for transforming your product development organization's technical infrastructure, you need to quantify the following items:

- How many product development applications does your company currently operate, and what is the average number of users per application?
- Who supports the applications, and how many of the support people are hard-to-replace experts?
- What are the maintenance requirements (scheduled and unscheduled) for your product development applications?
- Are the support service levels and problem resolution times for the applications acceptable?
- What is the service-level performance of these systems?
- What is the percentage of custom applications compared to packaged applications, and how stable is the integration between systems?
- What does all of this cost in terms of hard costs and opportunity costs?

Alternatives exist when selecting an outsourcing partner to assist with the transformation. When you are selecting an outsourcing partner, consider the following:

- **Specific application expertise**—Outsourcing saves you money when the outsourcing partner has access to skills that can enable it to more efficiently perform the outsourced tasks. You should not pay for nonexistent expertise.
- **Integration expertise**—Successful integration is a key component for reducing operating costs and achieving better product design efficiencies.
- **Operations expertise**—Look for specific abilities to manage complex environments with well-structured Service-Level Agreements (SLAs).
- **Global labor delivery process**—You want access to lower cost offshore resources, but you don't want the management burden of directly managing these resources. Look for a provider that can offer a blend of onshore and offshore resources.

User attitudes are a critical barrier for transforming product development IT

When asked about interest in outsourcing aspects of IT support for product development, respondents across industries have varying answers. Automotive is the most receptive to the idea of outsourcing, as evidenced by the following:

- 65% of Automotive IT and engineering managers expressed interest in, or were already outsourcing, PLM application maintenance or hosting and PLM application infrastructure maintenance or hosting.
- Compare this to 49% of A&D IT and engineering managers expressing interest in PLM application maintenance or hosting, and 44% expressed interest in PLM application infrastructure maintenance or hosting.
- Meanwhile, 30% of High-Tech IT and engineering managers expressed interest in PLM application maintenance or hosting, and 41% expressed interest in PLM application infrastructure maintenance or hosting.

Where Automotive manufacturers do show a combination of interest and relatively low levels of existing outsourcing is in the PLM applications development and break/fix support. In PLM application development and PLM application break/fix support, the percentage claiming to be very interested in outsourcing is 24% to 29%, while the same functions are currently outsourced in only 18% of user situations. The implication of these figures, coupled with detailed interview findings, suggests that Automotive manufacturers do see some value in targeted domain expertise specific to PLM applications, which were primarily challenging to IT and engineering resources internally because of their lack of integration skills. When developing your transformational strategy, you should look for areas in which a high interest but low outsourcing penetration exists as a starting point.

Table 5: Interest in outsourced services

Outsourcing Type	No Interest in Outsourcing	Somewhat Interested	Very Interested	Already Outsourcing This Activity
PLM application development	6%	47%	29%	18%
PLM application maintenance or hosting	35%	41%	12%	12%
PLM application break/fix support	29%	29%	24%	18%
PLM infrastructure managed services (hardware, app servers, etc.)	35%	41%	12%	12%
PLM infrastructure break/fix support	29%	53%	6%	12%
Other application maintenance or hosting	29%	59%	6%	6%
Other application break/fix support	29%	47%	18%	6%
Help desk	29%	53%	0%	18%
Product design work	41%	29%	18%	12%

Source: AMR Research, 2003

Auto manufacturers' relatively high level of response of claiming interest in PLM application development outsourcing appears to reflect the prevailing habit of turning to outsource service providers to fill in narrowly defined skill gaps. One senior engineering IT executive had a typical response: "We look to outsiders for gap filling. The internal IT organization steps up to support any approved projects. It can decide how much to use outsiders." Users also want to shape development direction for the packaged applications vendors supplying their software. One noted, "We need some of our skin in the game" with our applications suppliers. Another said, "Outsourcing buffers us from our apps providers." This may seem a benefit when considered in light of applications rationalization, but there seems to be a meaningful distinction between older or lesser applications from small, nonstrategic vendors and the more critical relationship sought with leading application vendors that can serve as a foundation layer or product information backbone.

For most Automotive companies, working capital is the main issue when it comes to outsourcing. More than other manufacturers, they have had incredible cost pressures over the last decade that have made them consider outsourcing well before other industries.

Detailed interviews do show some hesitation in jumping on the outsourcing bandwagon. The main area for skepticism is long-term costs. Most executives interviewed, whether in engineering or not, felt that outsourcing agreements were beneficial in the short-term, but lack of visibility into future demand made them very risky. This can be directly attributed to outsourcing companies' back-end loading many contracts. This allows the user company to have the PLM infrastructure it needs quickly and cheaply, but leads to disillusionment when, after several years into the contract, contract costs quickly accelerate. Most companies have direct experience with this phenomenon through data centers and other IT infrastructure outsourcing. A hidden concern that generates skepticism is the lack of visibility into their companies' own IT and PLM cost structure. Most Automotive companies lack a detailed understanding of their own costs and need significant help from the outsourcing company to define cost metrics.

One area in which Automotive companies see little room for outsourcing is in outsourcing the engineering process itself. User companies are willing to outsource some commodity engineering skills to allow flexibility, but the long-term nature of platform-based contracts means that the engineering skills are eventually brought in-house. Offshore outsourcing is raising interest, but detailed interviews generally show that user executives don't care where the engineers are, as long as they perform at a given price.

When asked what benefits from outsourcing are important, Automotive user responses highlight expertise in the PLM applications deployment and upgrades. Expertise in PLM deployment is cited as extremely important by 47% of respondents, and expertise in upgrading and operations is cited as very important by 50% of the respondents.

Among the most interesting observations to emerge from the survey data is the relatively strong importance scores attached to cost savings relative to in-house costs. Detailed interviews, at all levels and across functions in Automotive, almost automatically start with the comment, as offered by one IT executive, that "it's all about cost." The conversation, however, gradually moves toward the idea that certain critical skills are lacking in-house and that outsiders are attractive for their ability to deliver those skills. It is clear that users need to address cost first, but they must recognize the strategic importance of this technology environment and, in the end, gravitate to demonstrated skills with PLM applications in the field.

Automotive engineering did stress that responsiveness is also critical, but the response was in the context of cost. One of the more interesting trends to come out of the IT side of the Automotive interviews concern compliance of suppliers to OEM PLM IT initiatives. All IT executives responded very positively to the concept of the outsourcing company guaranteeing compliance to OEM mandates.

Table 6: Value of outsourcing

Outsourcing Benefit	Not at All Important	Somewhat Important	Extremely Important
Expertise in PLM deployment	12%	41%	47%
Expertise in PLM application upgrades	0%	50%	50%
Expertise in application-to-application integration	6%	59%	35%
Resources for day-to-day operations and application management	7%	60%	33%
Reduce cost of PLM software deployment	6%	31%	63%
Reduce cost of PLM software upgrades	0%	44%	56%
Reduce cost for day-to-day operations and management	6%	29%	65%
Reduce integration cost	0%	44%	56%
Expertise to respond to change requests from the product design group	6%	44%	50%
Resources to react to changes in demand for IT	19%	50%	31%
Expertise in the most current technologies	19%	56%	25%
Ability to leverage relationships with application vendors	0%	69%	31%
Reduce assets on books	6%	81%	13%

Source: AMR Research, 2003

Table 7: Attributes of outsourcing partner

Outsourcing Partner Selection Criteria	Not at All Important	Somewhat Important	Extremely Important
Demonstrated expertise	6%	35%	59%
Price relative to in-house cost of providing the service	6%	31%	63%
Financial stability of outsourcing partner	12%	59%	29%
Price relative to other potential outsourcing partners	0%	25%	75%
Partner's ability to provide training, change management, and project management	0%	69%	31%
Potential partner's relationship with application vendors	0%	31%	69%
Previous relationship with outsourcing partner	0%	71%	29%

Source: AMR Research, 2003

Successful transformation requires the support of executive management, product development staff, and IT staff. Ensuring support depends on developing a transformation plan that addresses their concerns realistically. The reasons most users give for not wanting to outsource their product development IT support and strategies for addressing these concerns are in Table 8.

Table 8: Common concerns with outsourcing IT support for product development

User Concerns	Strategies for Addressing Concerns
Cost savings do not materialize (users have seen too many outsourcing deals for which promised savings never materialize)	When developing cost / benefit model be sure to include both deployment and ongoing operational costs as well as cost savings achieved with IT operations and savings achieved within product development. Consider outside help for benchmarking current costs.
Outsourcing support for core competencies is a poor strategy (90% of the companies surveyed feel that product development is either a core competency or that they have a capable product development organization and can't risk damaging product development capabilities)	Although product development may be a core competency, not every activity within product development is core to the company. Users need to clearly identify core activities, critical but not core, and low-value activities within product development and focus initial outsourcing efforts on the low-value and critical but not core activities.
Loss of control and response latency (Having to negotiate for extra support rather than telling an employee down the hall to go do it—despite comprehensive SLAs, resolving problems will take too long)	Ensure that SLAs are carefully prepared and define escalation paths and criteria for managing non-standard service requests. Also ensure that outsourced resources are balanced between higher cost on-site resources to address control and latency issues and lower-cost off-site (or off shore) to address cost concerns. Finally, benchmark response times for current in-house procedures to ensure that outsourced service levels equal or exceed.
Loss of expertise (Loose access to tool experts that assisted engineers with design techniques if the tool support was outsourced)	Ensure that outsourced tasks are focused on low value and critical but not core tasks where local expertise is not providing competitive advantage. Also balance onsite and offsite resources so that core tools support remains local.
Encroaching bureaucracy (Managing change via an SLA would result in an overly bureaucratic organization)	Develop a partnership relationship with the outsourcing partner and develop a shared risk and reward structure around business objectives. Nothing cuts through bureaucracy like rewarding someone for exceptional service. Invest in the necessary training to ensure that line management has the necessary relationship management skills to successfully manage an outsourcing relationship.

Source: AMR Research, 2003

Closing Comments

A structured approach to cost-neutral transformation of product development is essential for future growth

Automotive manufacturers must develop cross-functional support systems for this new approach to product design, both within the company and beyond, or risk becoming noncompetitive in their market. To do so, they will have to increase coordination among external suppliers, which are becoming increasingly responsible for delivering preassembled subsystems, not merely raw materials or parts.

To effect this change, users must develop four steps:

- **Strategic goals**—Company-specific, CEO-level drivers to competitive position
- **Distinctive capabilities**—Unique skills required to complete the transformation
- **Cost containment**—Infrastructure savings based on tapping global scale and low-cost resources; integration competence to utilize existing systems; and organizational will and skill to rationalize applications, systems, and people
- **Risk mitigation**—A mechanical approach to controlling buyer risk, including SLAs, process operating benchmarks, and financing terms

Appendix

Research methodology

The findings in this Report are based on surveys conducted by AMR Research of more than 100 IT and engineering managers from companies within the Aerospace and Defense, Automotive, and High-Tech verticals. Information gathered from the surveys is supplemented with in-depth interviews of more than 50 product development, IT, and financial control managers.

AMR Research is a strategic advisory firm that provides business and technology executives with the critical analysis and practical advice needed to manage resources, mitigate risk, and increase business value. The company's industry-specific research initiatives focus on key trends, issues, and developments in Enterprise Management, Customer Relationship Management, Supply Chain Management, and other strategic business applications and enabling technologies that drive the market. AMR Research, founded in 1986, is headquartered in Boston with an office in Irvine and European headquarters in London. More information is available at www.amrresearch.com.

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Acronym List

Acronym	Definition
A&D	Aerospace and Defense
APQP	Advanced Product and Quality Planning
CAD	Computer-Aided Design
ECO	Engineering Change Order
IT	Information Technology
NPI	New Product Introduction
OEM	Original Equipment Manufacturer
PDM	Product Data Management
PLM	Product Lifecycle Management
R&D	Research and Development
RFQ	Request for Quotation
ROI	Return on Investment
SLA	Service-Level Agreement
TCO	Total Cost of Ownership
TTM	Time-to-Market