

Beyond Engineering: New Applications of 3D Drive Top Line Growth

August 2007

~ Underwritten, in Part, by ~



Executive Summary

While the advent of 3D solid modeling has fundamentally changed the design process within engineering, it has also dramatically changed how other organizations execute their own processes, training and create deliverables. Aberdeen found that manufacturers leverage 3D design data not to save on costs, but to get to market faster and drive top line growth. This report serves as a roadmap for companies in the manufacturing community that wish to learn from the experiences of top performing companies and adopt their proven strategies.

Best-in-Class Performance

Aberdeen used five key performance criteria to distinguish Best-in-Class companies from Industry Average and Laggard organizations. The following are the mean performance percentages for the Best-in-Class in the following three business areas:

- Hit or beat development budgets 94% of the time
- Meet goals for product revenue 89% of the time
- Meet product launch dates 96% of the time

Competitive Maturity Assessment

Survey results show that firms enjoying Best-in-Class performance share several common characteristics:

- Best-in-Class companies are twice as likely to provide non-engineering organizations direct access to 3D design data (60% vs. 29%) and Product Data Management (PDM) solutions (71% vs. 29%)
- Specifically, they are more likely than Laggards to create 3D design data based deliverables within manufacturing (100% vs. 63%), documentation (75% vs. 50%), training (50% vs. 17%) and marketing and sales (88% vs. 54%)
- They are five times as likely to use HTML / XML authoring tools (47% vs. 9%), four times as likely to use 3D design data authoring tools (68% vs. 15%), and three times as likely to embed 3D design data in documents (74% vs. 23%)

Required Actions

In addition to the specific recommendations in Chapter Three of this report, to achieve Best-in-Class performance, manufacturers must:

- Extend access to 3D design data to non-engineering organizations through PDM
- Deploy applications that embed 3D design data in documents, author deliverables based directly on 3D design data, and use HTML / XML authoring tools

“We have implemented technology solutions that allow us to leverage the 3D design data across departments without having to incur the extra cost of additional expensive CAD seats. This saves us time and money in everything from the quoting stage, through design, and on to manufacturing. The added value can then be passed on to our customers.”

~ Blaine Prout, Engineering
Business Analyst, Philips
Plastics Corporation

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Chapter One: Benchmarking the Best-in-Class

Top Pressure Relates 3D to Top Instead of Bottom Line

Research from Aberdeen Group’s September 2006 “[The Transition from 2D Drafting to 3D Modeling Benchmark Report: Improving Engineering Efficiency](#)” found that 86% of manufacturers currently design in 3D, while 71% do not plan to make the transition in the near future. However, challenges ranging from training, to software performance, to cultural rejection threaten many manufacturers’ chances of a successful transition. Given these barriers, what is driving manufacturers to attempt the next step and leverage burgeoning 3D design data asset outside of engineering? The answer is simple: to save time with top-line implications (Table I).

Table I: Top Five Pressures

Pressures	Response
Development schedules are increasingly shorter	53%
Product development stakeholders are globally distributed	26%
Development budgets are growing smaller	20%
Market demand for higher quality products	20%
Market demand for customized products	18%

Source: Aberdeen Group, August 2007

Overall, shortened schedules were three times as likely as tighter budgets or increased quality demands to be identified as the top pressure pushing departments outside of engineering to leverage 3D design data. Interestingly, Aberdeen Group’s June 2006 “[Product Lifecycle Collaboration Benchmark Report: The Product Profitability “X Factor”?](#)” uncovered similar findings, where 55% of respondents indicated that time-to-market demands are the largest driver of inter-department collaboration.

Improving time to market isn’t necessarily the ultimate goal. Two-thirds of respondents to Aberdeen Group’s September 2005 “[The Product Innovation Agenda Benchmark Report](#)” identified bringing products to market faster as “very important” to increasing revenue, while the August 2006 “[The Product Portfolio Management Benchmark Report](#)” discovered that most companies command at least 11% higher margins on products that have been on the market for less than two years.

The message is simple but powerful: manufacturers are extending the use of 3D outside engineering not to control costs but to get to market on time to increase revenues.

Fast Facts

- √ The top pressure motivating manufacturers to use 3D outside engineering is shortening development schedules
- √ On average, Best-in-Class organizations meet product launch dates 96% of the time
- √ Best-in-Class companies are twice as likely as Laggard organizations to leverage 3D design data for onsite product configuration and validation of product direction with customers

Maturity Class Framework

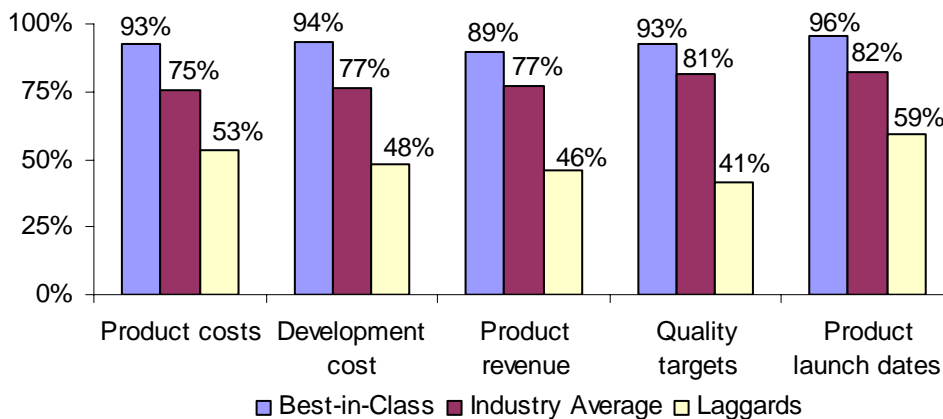
When it comes to leveraging the 3D design data assets created by engineering, there are a few departments that stand to benefit directly: manufacturing and quality, documentation, marketing and sales, as well as training. To gain an understanding of how organizations are doing this most effectively, Aberdeen categorized the organizations according to three levels of performance: Best-in-Class, Industry Average, and Laggard.

Survey respondents were ranked according to five key performance criteria:

- The ability to achieve product cost targets
- The ability to achieve development cost budget targets
- The ability to achieve product revenue targets
- The ability to achieve product quality targets
- The ability to hit product launch dates

Figure I shows the differences between Best-In-Class, Industry Average, and Laggard companies across these five metrics.

Figure I: Performance Across the Competitive Framework



Source: Aberdeen Group August 2007

Overall, the Best-in-Class hit their targets at 89% or better. Laggards, meanwhile, hit the exact same targets at 59% or worse. There is a direct correlation between these performance measures and how a company leverages 3D design data. For example, reusing 3D design data instead of starting from scratch cuts down on the time needed to create non-engineering product deliverables. Subsequently, the Best-in-Class were one-third more likely to launch their products on time. The Best-in-Class also use 3D design data to create interactive and more descriptive quality deliverables and so are twice as likely to achieve their product quality goals. Meanwhile Laggards, by not reusing 3D assets, are twice as likely as to overspend on their product development budgets.

Best-in-Class PACE Model

Achieving the greatest benefit from leveraging 3D design data in non-engineering organizations requires a combination of strategic actions, organizational capabilities, and enabling technologies (Table 2).

Table 2: The Best-in-Class PACE Framework

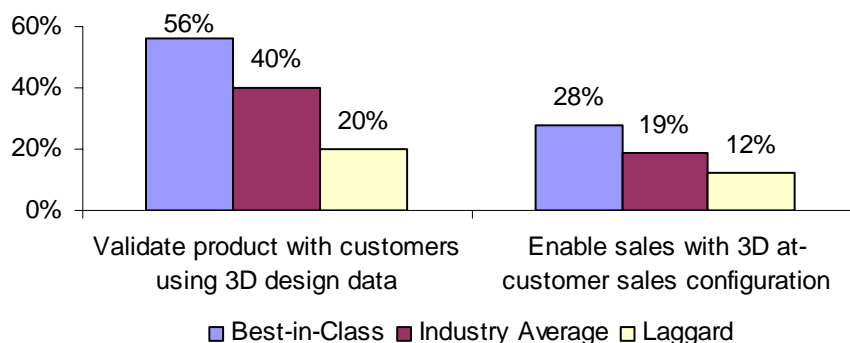
Pressures	Actions	Capabilities	Enablers
<ul style="list-style-type: none"> Shrinking development schedules 	<ul style="list-style-type: none"> Validate product with customers using 3D design data Enable sales with 3D at customer sales configuration 	<ul style="list-style-type: none"> Non-engineering organizations create deliverables from 3D design data Non-engineering organizations start their authoring process prior to design release Non-engineering organizations access 3D design data directly Non-engineering organizations use specialty applications to create deliverables from 3D design data 	<ul style="list-style-type: none"> Product data management (3D models) HTML / XML authoring tools 3D deliverable authoring tools Embed 3D models in documents

Source: Aberdeen Group, August 2007

Strategy in Action

Within the manufacturing, documentation, and training organizations, executives focus on leveraging 3D design data to meet their own product development schedule deadlines. The sales organization, on the other hand, uses it much more directly to impact sales (Figure 2).

Figure 2: Strategies with a Focus on Sales



Source: Aberdeen Group August 2007

Specifically, the sales organization is using 3D design data as a means to validate the direction of product development without making physical prototypes. This method allows for a more accurate representation of the product even in the midst of the high rate of change work in the process design phase. As a result, the feedback from the customer is timely and relates to the latest version of the product design.

Additionally, the sales organization is using 3D design data to support the mass customization of products to specific markets or individuals. In this scenario, the sales group can enter the client's requirements and immediately review the resulting product configuration. The immediate visualization of a customized product provides the tangibility that accelerates sales. This is again related to the Best-in-Class's ability to meet their targets. The ability to validate products up front as well as to configure products to customer specifications enables these manufacturers to be twice as likely to hit their product sales targets.

The theme behind the utilization 3D design data outside of engineering is clear: it's all about the top line.

Aberdeen Insights – Strategy

For some manufacturers, the transition from 2D drafting to 3D modeling has been arduous but fulfilling. Research from Aberdeen Group's [*The Transition from 2D Drafting to 3D Modeling Benchmark Report: Improving Engineering Efficiency*](#) revealed the Best-in-Class built 1.4 fewer prototypes than Laggard companies, resulting in an advantage in time to market and smaller product development costs.

It seems, however, that some executives aren't satisfied. They are very aware of the significant time and the necessary resource investment it takes to create 3D design data. Their perspective has changed: 3D design data is more of an asset than simply a deliverable to manufacturing. Their attitudes towards 3D design data have shifted to reflect that of any other company asset: how do you maximize its use?

As a result, these executives are looking for ways to reuse 3D design data to help non-engineering organizations work more efficiently and quickly. But the goal is much more about product development schedules rather than cost. And ultimately, that affects top line revenues.

In the next chapter, we will see what the top performers are doing to achieve these gains.

Chapter Two: Benchmarking Requirements for Success

The aggregated performance of surveyed companies determined whether they ranked as Best-in-Class, Industry Average, or Laggard. In addition to having common performance levels, each class also shared common practices supporting the departments that directly benefit from leveraged design data: manufacturing and quality, documentation, training and marketing, and sales. These characteristics (identified in the tables in this chapter) serve as a guideline for best practices and correlate directly with Best-in-Class performance across the key performance metrics.

Manufacturing and Quality Planning

Manufacturing and quality planning have a history of leveraging 3D design data and utilizing it downstream from engineering. Best-in-Class organizations, however, are getting a head start on Laggards by creating their deliverables earlier and by using this data in unexpected new ways (Table 3).

Table 3: The Competitive Framework for Manufacturing and Quality Planning

	Best-in-Class	Average	Laggard
Manufacturing and Quality Planning	Manufacturing creates deliverables from 3D design data		
	100%	77%	63%
	Quality creates deliverables from 3D design data		
	50%	40%	29%
	Manufacturing starts authoring process prior to design release		
	88%	67%	46%
	Quality starts authoring process prior to design release		
	69%	44%	17%
Planning part manufacturing or assembly			
84%	75%	52%	

Source: Aberdeen Group, August 2007

Specifically, top performing manufacturers are using 3D design data to plan out the fabrication sequence of the product. By doing so in a 3D environment rather than in two dimensions, they are able to avoid the need to create text-based plans. This increases the 'virtual prototype' accuracy of their plans. Further, Best-in-Class quality organizations are utilizing 3D design data to document non-conformances and to see how specific parts fail to meet quality standards. This makes documentation easier, which in turn allows for more portable feedback for engineering.

Fast Facts

- √ Best-in-Class organizations are three times more likely than Laggards to create training deliverables from engineering data
- √ Best-in-Class companies are four times more likely than Laggards to automatically update non-engineering deliverables as the product design changes

“The use of 3D data at Dell in the Mechanical Engineering organization is allowing earlier engagement by our design for manufacturability, usability, and technical writing teams. In the past, they had to wait for first or second prototypes to start their work. Now, they access the assemblies via a (CAD) viewer or (CAD) application and begin their work. So far, this has led to better first prototypes, and fewer late in development snafu’s for the aforementioned groups.”

~ Voll Corn, Project Manager,
Dell

Documentation

3D design data has been used to generate technical illustrations for some time now. Creating technical illustrations from 3D design data has been tedious and time-consuming, especially when design changes forced technical illustrators to abandon a work in progress and start over from scratch. Best-in-Class manufacturers are leveraging new tools that automate the illustration process and update as design changes are made (Table 4). Further, while authoring electronic documentation, documentation departments within these companies embed 3D design data directly into their documentation.

A trend is emerging where technical communicators embed documentation directly into the 3D design data assets already created by engineering. Design based documentation communicates more clearly and efficiently, allowing users to interrogate the model themselves by spinning the model or directly digging into information. These documents offer the added benefit of text reduction, which can dramatically reduce localization costs when moving products into foreign markets.

Table 4: The Competitive Framework for Documentation

	Best-in-Class	Average	Laggard
Documentation	Creates deliverables from 3D design data		
	75%	58%	50%
	Starts authoring process prior to design release		
	73%	49%	46%
	Service diagnostic documentation		
	32%	20%	4%
	Creation of owner's manuals		
	63%	45%	44%

Source: Aberdeen Group, August 2007

Training

The integration of 3D design data into training is a relatively new process, but one that holds great promise. If a picture is worth a thousand words, design based training materials are worth a million. They offer a presentation style that is more easily consumed than traditional training methods. These materials also provide employees with a certain amount of familiarity with the equipment they will use because they are trained on a direct representation of the product they will eventually manufacture, operate, or service.

A secondary benefit of design-based training is in the cost and production of the training materials themselves. Instead of investing time in writing large amounts of text, training authors at Best-in-Class companies begins with existing 3D design data and adding only the information (text or graphic)

“Sharing our 3D design data with our customers provides us with a tremendous competitive advantage. Customers can easily visualize the design and avoid the difficulty of interpreting a 2D drawing. This is especially valuable to business owners who may not have an engineering background, but need to sign off on the order. The ability to freely interact with the model also means they are not losing details that are obscured when views are scaled down to fit on paper. Our process provides benefits to our customers that they see right off the bat. I charge the same amount as my competitors, but I can give my customer more information which translates to better value for them.”

~ Carl Brown, Chief Design Engineer, Motovation Corporation

necessary to train the individual (Table 5). Furthermore, training in a virtual environment allows manufacturers to reserve the physical equipment on the plant floor for production.

Table 5: The Competitive Framework for Training

	Best-in-Class	Average	Laggard
Training	Creates deliverables from 3D design data		
	50%	42%	17%
	Starts authoring process prior to design release		
	53%	30%	13%
	Training of product operators		
	53%	36%	19%
	Training of manufacturing employees		
	47%	39%	22%
Training of service employees			
42%	32%	7%	

Source: Aberdeen Group, August 2007

“We convert our 3D design data into images for marketing material. As a result, marketing creates better brochures that contain a realistic rendition of our product rather than just a generic image. Not only is the quality of the brochure better, but by getting the images directly from the CAD data, we save \$1000 a brochure.”

~ Carl Brown, Chief Design Engineer, Motovation Corporation

Sales and Marketing

Sales and marketing is the area where Best-in-Class performers are showing the greatest differentiation from Industry Average and Laggard organizations in the expanded use of design data (Table 6). High resolution rendering capabilities were originally added to CAD applications in an attempt to allow industrial designers to 'virtually prototype' the look and feel of their products. Over time, however, sales and marketing departments recognized that they could leverage these capabilities to create graphics and content for collateral long before the product itself was complete – thus they could start selling sooner.

Table 6: The Competitive Framework for Sales and Marketing

	Best-in-Class	Average	Laggard
Sales and Marketing	Creates deliverables from 3D design data		
	88%	47%	54%
	Starts authoring process prior to design release		
	44%	40%	30%
	Creation of website materials or media		
	58%	43%	26%
	Creation of marketing graphics and collateral		
	79%	57%	37%
Customer validation of product prior to prototyping			
63%	55%	30%	

Source: Aberdeen Group, August 2007

“By leveraging our 3D design data, our sales department can work directly with the customer as the design is developing. This way we can solicit customer feedback early on in the design and be sure we deliver exactly what the customer wants. Our customers appreciate the early insight as well.”

~ Blaine Prout, Engineering Business Analyst, Philips Plastics Corporation

With the advancement of technologies, high end rendering capabilities have been extending into tools that are employed directly by sales and marketing rather than engineers. Another benefit is that more manufacturers are able to incorporate 3D design data into their websites to allow potential customers to customize or configure a product to their own specifications. This results in immediate feedback, providing 'tangibility' to the product's fit to the customer's need, thus further shortening the sales cycle.

Technology Enablers: The Three Pillars

New applications are enabling individuals without any engineering background to access and utilize 3D design data (Table 7). These tools include fabrication planning applications for the manufacturing organization, high-end rendering applications for marketing, and field diagnostic and repair applications for service. Specifically, three key capabilities make this sort of software possible and relevant: direct access to engineering data by those downstream, authoring deliverables based on 3D design data, and real-time updates or notifications that automatically react to design changes.

“We used a rendering of the 3D model of a new product to create a teaser flyer to gauge customer interest before the prototypes were even built.”

~ Dustin Green, Mechanical Engineer, Olympic Medical, a Natus Company

Table 7: The Competitive Framework for Technology Enablers

	Best-in-Class	Average	Laggard
Technology Enablers	Product data management		
	71%	70%	27%
	HTML / XML authoring tools		
	47%	20%	9%
	3D deliverable authoring tools		
	68%	38%	15%
	Embedding 3D models in documents		
74%	45%	23%	

Source: Aberdeen Group, August 2007

Best-in-Class performers are between two times and four times as likely as all other companies to deploy technologies to author deliverables based on 3D design data. Creating deliverables from 3D design data, however, involves much more than simply deploying the right authoring technologies. Non-engineering organizations need to be provided with direct access to the data. Overall, Best-in-Class performers are twice as likely as Laggard performers to provide non-engineering organizations with direct access to their 3D design data (Table 8).

In addition to providing direct access to 3D design data and 3D design data authoring tools, Best-in-Class performers circumvent the common troubles associated with design changes. Typically, such a change to the product design would invalidate documentation that was authored earlier. The more troubling problem is that unless manually notified of the change, the author would not realize the documentation was incorrect. Instead of being victimized by these issues, the Best-in-Class are using PDM solutions to

automatically notify owners of the deliverables that a change has been made. Additionally, many of the 3D design data authoring tools can automatically update their deliverables to the design change. Overall, it means the deliverables are accurate with minimal manual rework.

Table 8: The Competitive Framework for Knowledge Management

	Best-in-Class	Average	Laggard
Knowledge Management	Non-engineering organizations can directly access design data		
	60%	58%	29%
	Non-engineering deliverables update as the product design changes		
	67%	40%	17%

Source: Aberdeen Group, August 2007

Aberdeen Insights — Technology

As executives have started to view 3D design data as a company asset instead of simply a deliverable from engineering to manufacturing, their focus has been on maximization. And true to form, the Best-in-Class performers have their manufacturing and quality, documentation, training, and marketing and sales organizations all creating deliverables out of 3D design data.

Repeatedly, the story across these organizations is similar. The new 3D design data based deliverables are easier to author. The data already exists and is easier to consume as it graphically and accurately represents the actual product. Furthermore, the concept of concurrent product development is finally emerging where organizations within Best-in-Class enterprises now begin planning or authoring processes prior to design release.

All in all, three capabilities enable the authoring of 3D design data based deliverables: direct access to 3D design data, organization application specific 3D design data based authoring tools and notification, and automatic update to design changes.

Chapter Three: Required Actions

Whether a company is trying to move its performance from “Laggard” to “Industry Average,” or “Industry Average” to “Best-in-Class,” the following actions will help spur the necessary performance improvements:

Laggard Steps to Success

- **Step 1: Extend Access to 3D Design Data within PDM Outside of Engineering**

Before any non-engineering organizations can start authoring deliverables based on 3D design data, they need to access it. The Best-in-Class use open up access to 3D design data through PDM systems.

- **Step 2: Embed 3D Models within Documents**

As most non-engineering organizations use document authoring applications to create their deliverables, a simple progression is to include 3D design data in those documents.

- **Step 3: Start Authoring Processes Prior to Design Release**

By accessing 3D design data earlier, non-engineering organizations can start their authoring processes earlier. The Best-in-Class are able to compress their overall product development process as a result.

Industry Average Steps to Success

- **Step 1: Setup Design Change Notification through PDM**

Because design changes are commonly poorly communicated outside of engineering, non-engineering deliverables often contain obsolete information and errors. The Best-in-Class are updating their deliverables because they know when these changes happen through PDM notifications.

- **Step 2: Author Deliverables with 3D Design Data Based Authoring Applications**

Graphical communication is easier to author and communicates more efficiently than textual communication. The Best-in-Class are more likely to author them within their manufacturing, documentation, training, and sales organizations.

- **Step 3: Validate Product with Customer with 3D Data**

Rather than collaborate with customers with textual communications, and risk misunderstanding, the Best-in-Class are instead using the 3D design data generated by engineering as a more efficient and error-free way to validate with the customer that product development is progressing as planned.

Fast Facts

- √ Best-in-Class manufacturers are extending the use of 3D design data outside of engineering to achieve top line growth
- √ Best-in-Class manufacturers are using PDM systems to provide non-engineering organizations with direct access to 3D design data
- √ Best-in-Class manufacturers enable their non-engineering organizations to start their authoring processes earlier in the product development process
- √ Best-in-Class manufacturers are embedding 3D design data in documents, using HTML and XML authoring tools, as well as 3D design data based authoring applications to create 3D design data based graphical communications

Best-in-Class Steps to Success

- **Step 1: Author Deliverables with HTML / XML Tools**

Increasingly, communication deliverables of all types are being reused and published into a wide variety of formats. The Best-in-Class are using HTML / XML authoring tools to combine textual information with 3D design data to meet these demands.

- **Step 2: Customize Products Onsite at Customers with 3D Design Data**

While spec sheets and sales collateral can certainly leave a positive impression, customizing the product and showing configured 3D design data lends a tangibility that can't be replaced. The Best-in-Class are using these approaches to make top line impacts.

Aberdeen Insights – Summary

When considering how to extend the use of 3D design data to non-engineering organizations, the first step is simple: enable access to the 3D design data itself. As seen in [The Product Innovation Agenda Benchmark Report](#), the Best-in-Class are more likely to already maintain centralized control of design data. Broadened access to this data is a very natural and achievable extension of that practice.

Next, non-engineering organizations need to focus on creating deliverables based on 3D design data. The easiest step is to embed 3D design data in the documents those organizations are already creating. This requires minimal upgrades to technology or employee training. Once achieved, the opposite should be pursued. Those organizations can then start embedding textual information into the 3D design data itself. They can further use HTML / XML authoring tools to create deliverables that can be published to a wide variety of formats.

Last, but not least, manufacturers should focus on how to facilitate the propagation of changes to the design throughout all of the deliverables non-engineering organizations are generating. This comes in two parts. First (as another extension to PDM use) those organizations should setup change notifications for those non-engineering organizations that use 3D design data as the basis for their deliverables. With this step, they become aware of the change. Second, those organizations should focus on applications that allow them to update their non-engineering deliverables automatically or in an automated way based on the changed 3D design data. This way, propagating the design change can involve minimal effort.

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Appendix A: Research Methodology

Between July and August 2007, Aberdeen Group examined the utilization of 3D simulation data outside of the engineering room, taking into consideration the experiences and intentions of more than 135 enterprises in a diverse set of enterprises. Responding executives completed an online survey that included questions designed to determine the following:

- The degree to which simulation data is utilized outside of engineering
- Existing structures enabling downstream organizations to leverage simulation data
- Current and planned use of simulation data to aid operational and promotional activities
- The benefits, if any, that have been derived from these initiatives

Aberdeen supplemented this online survey effort with telephone interviews with select survey respondents, gathering additional information on their strategies, experiences, and results. The study aimed to identify emerging best practices for downstream use of 3D data and provide a framework by which readers could assess their own management capabilities.

Responding enterprises included the following:

- **Job title/function:** The research sample included respondents with the following job titles: procurement, supply chain, or logistics manager (29%); operations manager (27%); IT manager or staff (24%); sales and marketing staff (13%); senior management (7%).
- **Industry:** The research sample included respondents from a variety of industries. The largest set of respondents included: Automotive (27%), Industrial Equipment (27%), and Aerospace and Defense (30%). Other respondents included enterprises from: Consumer Packaged Goods, Medical Devices, and Telecommunication Equipment.
- **Geography:** The majority of survey respondents were located in North America (81%). Remaining respondents were from Europe (11%) and the Asia-Pacific region (8%).
- **Company size:** Twenty-one percent (21%) of respondents were from large enterprises (annual revenues above US\$1 billion); 36% were from midsize enterprises (annual revenues between \$50 million and \$1 billion); and 43% of respondents were from small businesses (annual revenues of \$50 million or less).

Solution providers recognized as sponsors of this report were solicited after the fact and had no substantive influence on the direction of the Extending 3D Benchmark Report. Their sponsorship has made it possible for Aberdeen Group to make these findings available to readers at no charge.

Table 9: PACE Framework Key

Overview

Aberdeen applies a methodology to benchmark research that evaluates the business pressures, actions, capabilities, and enablers (PACE) that indicate corporate behavior in specific business processes. These terms are defined as follows:

Pressures — external forces that impact an organization’s market position, competitiveness, or business operations (e.g., economic, political and regulatory, technology, changing customer preferences, competitive)

Actions — the strategic approaches that an organization takes in response to industry pressures (e.g., align the corporate business model to leverage industry opportunities, such as product/service strategy, target markets, financial strategy, go-to-market, and sales strategy)

Capabilities — the business process competencies required to execute corporate strategy (e.g., skilled people, brand, market positioning, viable products/services, ecosystem partners, financing)

Enablers — the key functionality of technology solutions required to support the organization’s enabling business practices (e.g., development platform, applications, network connectivity, user interface, training and support, partner interfaces, data cleansing, and management)

Source: Aberdeen Group, August 2007

Table 10: Competitive Framework Key

Overview

The Aberdeen Competitive Framework defines enterprises as falling into one of the following three levels of practices and performance

Best-in-Class (20%) — Practices that are the best currently being employed and significantly superior to the Industry Average, and result in the top industry performance.

Industry Average (50%) — Practices that represent the average or norm, and result in average industry performance.

Laggards (30%) — Practices that are significantly behind the average of the industry, and result in below average performance

In the following categories:

Process — What is the scope of process standardization? What is the efficiency and effectiveness of this process?

Organization — How is your company currently organized to manage and optimize this particular process?

Knowledge — What visibility do you have into key data and intelligence required to manage this process?

Technology — What level of automation have you used to support this process? How is this automation integrated and aligned?

Performance — What do you measure? How frequently? What’s your actual performance?

Source: Aberdeen Group, August 2007

Table 11: Relationship Between PACE and Competitive Framework

PACE and Competitive Framework How They Interact

Aberdeen research indicates that companies that identify the most impactful pressures and take the most transformational and effective actions are most likely to achieve superior performance. The level of competitive performance that a company achieves is strongly determined by the PACE choices that they make and how well they execute.

Source: Aberdeen Group, August 2007

Appendix B: Related Aberdeen Research

Related Aberdeen research that forms a companion or reference to this report include:

- [Product Lifecycle Collaboration Benchmark Report: The Product Profitability "X Factor"?](#) June 2006
- [The Product Portfolio Management Benchmark Report: Achieving Maximum Product Value](#) August 2006
- [Next-Generation Product Documentation: Getting Past the "Throw It over the Wall" Approach](#) December 2006
- [Publishing Technical Communications to a Multi-Channel World](#) May 2007
- [Nimble Product Design: CAD/CAM/CAE for the Small to Mid-Sized Enterprise](#) June 2007
- [The Protecting Product IP Benchmark Report: Safeguarding Design Intellectual Property in a Global Market](#) November 2006
- [The Global Product Design Benchmark Report](#) December 2005

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Dassault Systèmes' ENOVIA PLM applications provide unmatched levels of 3D digital collaboration in companies large and small, to speed delivery of new products to market. Leveraging ENOVIA companies can more easily manage the complexity of product development and introduction processes, and the distribution of information along the entire value chain

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