Aberdeen Group
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Lean Product Development for the High Technology Sector

While Lean is a familiar word for the manufacturing organizations of most manufacturers, it is a concept that is just beginning to make headway in product development circles. Organizations have found success 'Leaning out' manufacturing operations and supply chains, particularly in terms of cost reduction, but bringing Lean to engineering and design organizations is about removing redundancy and wasted effort from a product's critical path from concept to shipment. High technology manufacturers are behind their peers in the adoption of Lean, with only 31% of these companies indicating they've pursued a Lean initiative for over a year. Given the priority to shave time from product development schedules in high technology companies, it's likely that many of these companies have adopted Lean concepts without formally recognizing it. However, an unfocused approach to Lean can prevent these companies from profiting from the potential of Lean. This Sector Insight provides a roadmap for high tech manufacturers seeking to either begin or simply fine tune Lean initiatives.

The Emergence of Lean Product Development

Originally popularized by Toyota Motor Corporation, Lean principles have been present in the manufacturing organizations of many companies since the early 1980s. As manufacturers have seen success with Lean programs, the concepts have been applied to areas including new product development as well as supply chain management. Wherever it is applied, the basic tenets of Lean remain the same: the elimination of 'waste' and non-valued added tasks.

Lean is a relatively new concept for many engineering organizations, but as manufacturers have seen success with Lean programs, the concepts have begun to be applied to the new product development process. As applied to manufacturing, Lean is typically about cost reduction, but Aberdeen's *Lean Product Development Benchmark Report* found for product development, it's often about improving the speed of processes as often as it is about cost. The situation is no different for high technology, who report global competition, market demand for rapid product introduction, and limited budgets with relatively equal urgency.

Table 1: Pressures Driving Lean Product Development

	High Tech	All Respondents
Global Markets / Competition	41%	39%
Market Demand for Rapid Product Introduction	37%	37%
Limited Product Development Budgets	35%	34%
Shortened Product Profitability Windows	29%	21%
Demand for Increased Product Performance	18%	16%

Source: Aberdeen Group, May 2007

Sector Insight

Aberdeen's Sector Insights provide strategic perspective and analysis of primary research results by industry, market segment, or geography

Sector Definition

For the purposes of this study, respondents who indicated that they operated within the high technology space were isolated and aggregated for comparison against peer manufacturers across industries in Aberdeen Group's performance framework.

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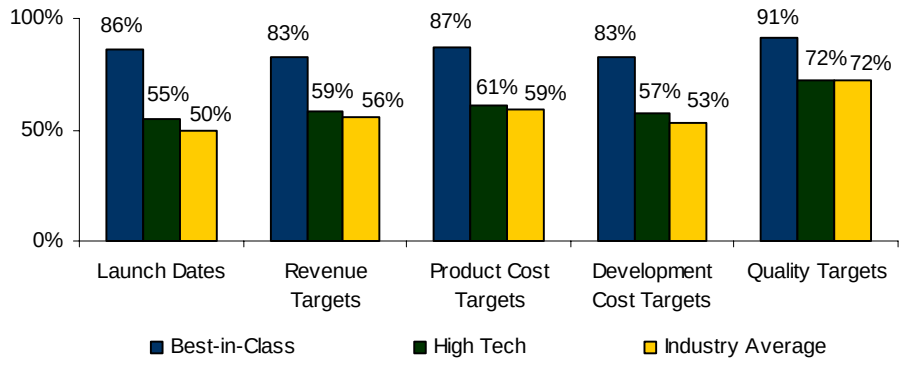
Global competition is the top pressure driving Lean for high tech, although not by much. An eye on global markets and competitors is often related to the following two pressures. More competition means high tech manufacturers need to get their products to market quickly to capture market share plus keep costs down to price competitively. As mentioned above, these dual pressures speak to the role that Lean can plan in product development. Lean, here, is often about streamlining repetitive and redundant processes as often as it is about decreasing budgets in manufacturing organizations.

Aberdeen Analysis

How is Lean impacting the performance of these organizations? To find the answer, Aberdeen's May 2007 *Lean Product Development* benchmark study surveyed participating companies regarding the percent of their products that meet key product development metrics. Interestingly, Aberdeen found that high technology manufacturers report performance that is roughly on par or slightly above that of the Industry Average across all sectors (Figure 1). In addition, these companies report that 46% of their time is spent on 'value-added' product development activities rather than on activities that they consider to be 'waste.' This is also on par with the Industry Average, which indicates 45% of time spent on 'value-added' product development activities.

Figure 1: The Maturity Class Framework



Source: Aberdeen Group, May 2007

While high tech companies meeting these targets about as often as the Industry Average, they trail leading performers by 19% or more in all of the measures Aberdeen surveyed, leaving them with considerable opportunity for improvement. In addition to their enhanced performance, the Best-in-Class report that 69% of their product development time is devoted to value-added or productive design activities, 1.5 times that reported by high tech manufacturers.

The Competitive Framework Key

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

Best-in-Class (20%) — practices that are the best currently being employed and significantly superior to the industry norm

Industry Average (50%) — practices that represent the average or norm

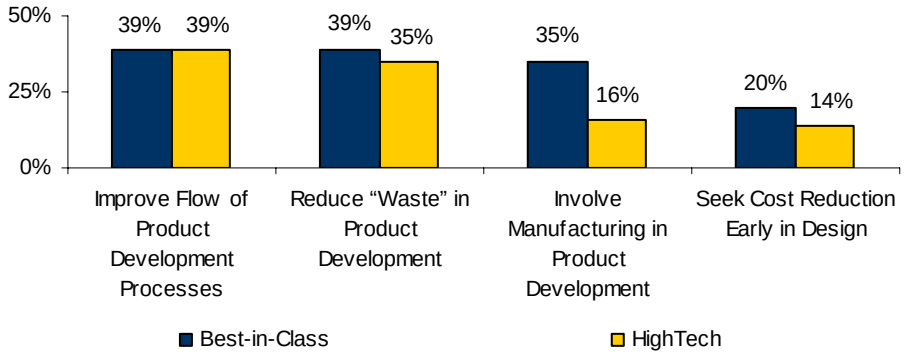
Laggards (30%) — practices that are significantly behind the average of the industry

Lean Strategies of High Technology Manufacturers

What are the Best-in-Class doing differently than high tech companies? When it comes to the core tenets of Lean, such as reducing 'waste' and

improving the flow of development processes, the answer is, 'not much' (Figure 2). However, the Best-in-Class report a particular focus on aligning manufacturing and product development that is lacking among high tech companies.

Figure 2: Top Four Lean Strategies of High Tech



Source: Aberdeen Group, May 2007

Both high tech manufacturers and the Best-in-Class report a lot of attention to improving the flow of product development processes. For high tech manufactures, this is related to both pressures of rapid product introduction and limited budgets. Lean product development is often about streamlining processes to improve efficiency. The second most often reported action of high tech companies also aligns with that of the Best-in-Class: reducing 'waste' in product development. The reduction of 'waste,' or non-value added activities, is a core principle of Lean, so its popularity isn't surprising.

"We are streamlining operations on the production floor, which is reducing waste as well as the cost of rework. Training operators is difficult and take times to see the result, but the results have been encouraging."

~ Engineering Manager
Consumer Electronics Manufacturer

These two concepts are Lean foundations, and the high tech sector's focus drops off sharply when it comes to other initiatives. While these manufacturers have profited significantly from their Lean programs, reporting performance that often exceeds the Industry Average, they are missing considerable opportunities by limiting themselves in this way. The Best-in-Class take a more comprehensive approach to Lean and are over twice as likely as high tech manufacturers to involve manufacturing in product development to seek cost reductions early in product design.

Seeking cost reduction earlier can simply entail an expansion of Lean further upstream, as manufacturers design for the cost of production. Where high tech companies possess significant opportunity for improvement is in the involvement of the manufacturing organization in product development. Lean product development processes can make little difference if manufacturing organizations can't produce the product. The delays and scrap caused when these organizations have to find fixes that could have been resolved by earlier collaboration can negate the benefits a Lean product development organization can provide.

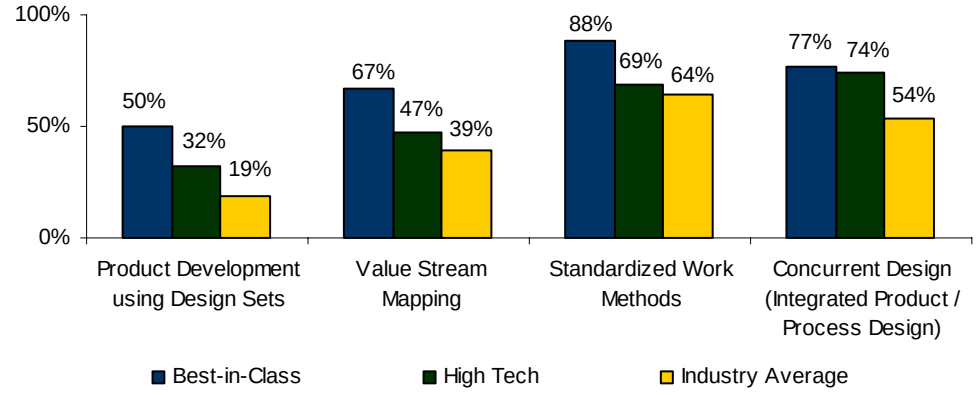
Optimizing Lean for Product Development

Even without a formal program in place, leveraging Lean is not necessarily a daunting prospect for high tech manufacturers. Aberdeen found that many of these manufacturers already exhibit many of the same capabilities of the Best-in-Class. In fact, their adoption of these capabilities frequently eclipses that of the Industry Average. There are, however, a number of key areas where these companies are missing critical opportunities to expand on their Lean product development programs.

Streamlining Product Development Processes

While high tech manufacturers indicate roughly the same focus on improving the efficiency of product development process on a strategic level as the Best-in-Class, they tend to fall around the Industry Average when it comes to the adoption of the capabilities of that the Best-in-Class adopt to 'Lean out' product development processes (Figure 3). For those high tech companies that haven't, applying these concepts to their own product development departments can help them to increase the time spent on value added tasks and improve overall efficiency.

Figure 3: Process Capabilities of the Best-in-Class



Source: Aberdeen Group, May 2007

At the heart of the approach taken by the Best-in-Class are two hallmarks of Lean process improvement: value stream mapping and standardized work methods. Value stream mapping is often an initial step of Lean, by which the steps of a process are scrutinized for inefficiencies and wasted effort. Activities that do not contribute to achieving customer value are redefined or removed in order to streamline the overall product development process. Once greater efficiency is achieved, the next step is often to standardize these processes across an organization. High tech manufacturers report adoption of standardized work methods about on par with the Industry Average and value stream mapping far more often. This relatively high adoption reflects a healthy, if often hidden, foundation for Lean in high tech.

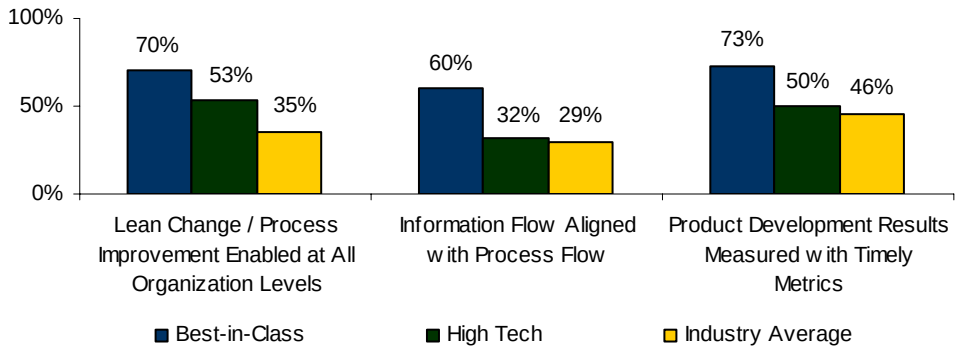
Given the high tech sector's relative inattention to involving manufacturing in product development, it is interesting to note that high tech companies report a concurrent approach to product design and the development of production processes. This sort of approach can enable high tech manufacturers to reduce time to market and remove many obstacles from manufacturing before they arise. However, these manufacturers only appear to be looking at the problem from one direction; requiring manufacturing to accommodate the engineering organization. The Best-in-Class is over twice as likely as these companies to involve manufacturing in the product development process, ensuring that engineers are able to plan for the manufacturing environment. By taking both perspectives into consideration, the Best-in-Class improve the efficiency of hand offs between both organizations, lowering the cost of scrap and rework and closing time to market cycles more quickly.

The other area that stands out as a potential opportunity for improvement for the high tech sector is in the adoption of design sets in product development. This is an approach that breaks a design into a series of functional 'modules' with standardized interfaces that buffer each area from dramatic changes that may be made to others. This enables engineers to explore a wide variety of new options in parallel with minimal impact to one another. Modularity also enables increased reuse across designs through common modules, while increasing the variability of designs through combinations of different modules. The Best-in-Class are 56% more likely than high tech manufacturers to adopt this approach, effectively enabling innovation without introducing risk.

Supporting Lean Development

High tech manufacturers have given themselves a significant head start on their Lean programs as a result of their focus on streamlining processes. However, truly 'Leaning out' the product development requires more than attention to processes. The Best-in-Class adapt their organizations in a way that supports the implementation and effectiveness of Lean concepts (Figure 4).

Figure 4: Support Capabilities of the Best-in-Class



Source: Aberdeen Group, May 2007

A key component of the success of the Best-in-Class is the recognition that it is the individuals performing a task who best understand it, and thus, how to best improve it. To this end, the Best-in-Class are twice as likely as the Industry Average to authorize Lean process improvements at all levels of the organization. This places responsibility for Lean directly in the hands of the people with the most insight into how a process can be improved, increasing employee buy-in and driving the continuous improvement programs that improve the efficacy of a Lean product development organization. The same is true of the measurement of product development results with formal metrics. The Best-in-Class are 37% more likely than high tech manufacturers to report this capability, which helps them to identify areas they need to continue to improve.

A more critical step for improving the efficiency of processes with more short term impact is the alignment of information flow with process flow may be a more critical step. Improving the flow of product development processes is the top strategy of high tech companies, and they have begun to find ways to streamline and standardize processes. However, streamlining processes without similarly adapting the flow of information through the organization to match it, they are creating what are often unseen roadblocks to organizational efficiency. The Best-in-Class are nearly twice as likely as high tech manufacturers to align information flow to process flow. Ensuring that individuals at all steps of the process have the right information to do their jobs without waiting, excessive searching, or rework of data has the potential to reduce cycle times and improve overall product development efficiency.

A less pressing, but still important, area where high tech manufacturers have the opportunity to improve is through the application of formal product development metrics to measure the success of Lean. The Best-in-Class are 46% more likely than high tech manufacturers to drive continuing improvements by measuring the success of Lean programs with formal and timely metrics. Doing so allows these organizations to recognize what's working and what areas they need to continue to find the means to improve.

The Role of Technology

Further, the Best-in-Class are taking advantage of technology tools as part of their Lean programs. The solutions they are using range from knowledge based engineering to advanced search technologies, and product portfolio management (Table 2).

Table 2: Technology Enablers Supporting Lean

	Best-in-Class	Industry Average	High Tech
Product Portfolio Management	72%	53%	57%
Specialty Tools for Lean	61%	21%	43%
Knowledge Based Engineering (KBE)	62%	25%	32%

	Best-in-Class	Industry Average	High Tech
Advanced Search Technologies	53%	23%	36%
Workflow / Business Process Management	57%	38%	36%

Source: Aberdeen Group, May 2007

The Best-in-Class are nearly twice as likely as high tech companies to leverage tools to capture engineering knowledge and use design automation applications to standardize and automate routine or complex engineering tasks. Because these simple tasks are automated, errors and variability are reduced and more focus can be placed on value-added product development tasks. They are also using specialty Lean tools which automate business processes to execute process improvement, communicate standardized work processes, or promote consistent execution of Lean activities. While these tools see particularly high adoption among high tech manufacturers, the Best-in-Class are 41% more likely than high tech to take advantage of these kinds of specialized solutions.

Further, the Best-in-Class are 26% more likely than high tech companies to leverage product portfolio management (PPM) solutions. These tools allow the Best-in-Class to apply Lean to product development from a planning perspective. PPM tools are used to target resources and efforts on products that are best aligned to customer needs and business value, effectively 'Leaning out' the portfolio to allow these organizations to focus on projects that will provide the greatest value.

The Best-in-Class continue to improve efficiency through two additional investments. On one hand, these companies are 58% more likely than high tech manufacturers to take advantage of workflow and business process management solutions, effectively automating the processes that they have streamlined. On the other, they are leveraging advanced search technologies that search by specific elements of a design or formula. They are 47% more likely than high tech companies to use these tools. Searching for previously created design information is part of any product development project, so much more so when an organization is actively seeking to reuse prior data. But time spent looking for information is not time developing products. The Best-in-Class keep these activities to an absolute minimum through the use of centralized data and sophisticated search tools.

Recommendations

Lean concepts have been well established in the product development departments of high tech manufacturers. However, this does not mean that these organizations have arrived at the full value that Lean has to offer. In fact, it is somewhat surprising that given rather robust set of Lean product development capabilities, high tech manufacturers indicate performance that is roughly on par with the Industry Average in most areas. For many of these companies, the next steps are to find ways to better leverage the tools and capabilities they have adopted in a coordinated way:

"While we have been inclined to focus on becoming more flexible, it is more important to reduce waste. We have seen great improvements from Lean in engineering and R&D, it's production where more processes and training have to be implemented."

~ Engineer
Electronics Engineering Services

- **Streamline Product Development with Design Sets** - The Best-in-Class are 56% more likely than high tech companies to take advantage of design sets to develop products in a platform fashion, which can help increase variation in design with minimal rework as well as consolidating and reusing parts.
- **Empower Lean Decision Makers at all Levels of the Organization** - Often the individual with the best insight into how to improve a process is the one who performs it. The Best-in-Class take advantage of the experience of their staff and empower the engineers who are responsible for a process to determine how it can be best improved. Additionally, by locating ownership of Lean programs at all levels of the product development organization, the Best-in-Class stimulate greater enthusiasm for Lean because everyone feels a part of the process and more empowered to make a difference.
- **Involve manufacturing in the product development process** - This is an area where high tech manufacturers have considerable opportunity for improvement. The Best-in-Class are more than twice as likely as these companies to involve the manufacturing organization in product development as part of a specific Lean initiative. High tech companies have made half the journey by adopting a concurrent approach to manufacturing process planning, but miss opportunity to streamline the handoffs between engineering and manufacturing by not providing for manufacturing feedback on product development.

For more information on this or other research topics, please visit www.aberdeen.com.

Related Research	
The Engineering Executive's Strategic Agenda; June 2008	*The Lean Product Development Benchmark Report*; May 2007

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