

High Tech Corner

Building a gated Product Development process at Lexmark International

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Today, a growing number of PDMA members work in the “high tech” field—as defined by software, hardware, and consumer electronics. To provide them with more relevant information on how to create effective New Product Development and Management systems and processes, Ed Crowley has volunteered to work as our Technology Industry Editor. In his first article, Ed shares experiences at his own company, Lexmark, and how it developed a gated Product Development process for its Printer Division.



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High tech firms—corporations that produce software, hardware, and consumer electronics—face a series of unique Product Development challenges. First of all, Product Development times and product life cycles in this industry are extremely short. For example, in the desktop PC and printer market, product life cycles are often 18 months or less, while development cycles may also be 18 months.

Secondly, while products are differentiated, the pervasive industry standards set by Microsoft (its operating system, connectivity, and

very significant. For example, in 2000, the average color laser printer cost over \$2,000. Today, the average price is less than half that and rapidly heading to \$500.

Challenges in high tech

There are a number of ramifications to this unique high tech environment. The most significant is the absolute necessity of not only having the right product with the right features, performance, and pricing, *but to also produce and distribute it on time*. If you are late to market you not only shorten the life of the product, but also

The challenge is further compounded by the complexity of the products in this market. In fact, a laser printer is actually a combination of multiple technologies as shown on the box on this page.

Technologies Used in Lexmark Laser Printers

- An imaging system based on chemical, optical, and electrophotographic processes;
- A paper handling system based on complex and precise mechanics; and,
- Sophisticated control systems based on high performance processors, network communications, and complex image processing software.

SOURCE: Steve Mullins, Manager, Product Assurance, New Technology, Lexmark

networking) have made new products are fairly interchangeable. As a result, most customers consider all competitive alternatives before they buy a new product and will switch vendors based on product availability. So if a product comes out six months late, its life cycle may be effectively shortened by one-third.

Finally, in this industry, over half the total profits from product sales usually come in the first six months of introducing a new “generation” of product. This is due to the rapid price declines that are typical during the life of a product. Additionally, price declines from generation to generation can be

miss out on a major portion of the total profit.

This article examines how the Printer Division of Lexmark International implemented a gated process to integrate its technical and business development processes and thus, meet many of the challenges described above. Lexmark produces monochrome and color laser printers, multifunction products, and print management software. It does this within a very competitive market. We have over 40 major competitors, and printers themselves have very short Product Development cycles, just 18 to 24 months, and a very short product life cycles, usually less than 24 months.

Integrating technologies

Integrating these core technologies into a reliable, cost effective product that meets the customer’s requirements is an expensive and challenging proposition. In this environment, bringing the right product to market on time is not a nicety; it is a requirement for survival.

Prior to 2002, each development team within Lexmark’s business printer division was able to use its own process for bringing products to market. Lexmark was spun off from IBM in 1995; and while Lexmark’s IBM heritage provided a common framework for development terminology and limited common checkpoints, product managers had a high degree of latitude in terms of which checkpoints were used and how to measure the progress of each program. As a result, it was difficult for the executive management team to ascertain the real status of each program, and to determine which programs were in trouble, and which were on target for a timely launch.

Perhaps of greatest concern, the Printer Division did not have a link between the business checkpoint process; that is, the

Lexmark International is a leading developer, manufacturer, and supplier of printing solutions, including laser and inkjet printers, multifunction products, associated supplies and services for offices and homes in more than 150 countries. Recognized worldwide for its customer-driven approach to developing its wide array of award-winning products, Lexmark meets the demanding and constantly changing workflow management needs of today’s businesses, and the performance and convenience demands of home-printing consumers.

gate for approving capital for development, finalizing product pricing, and approving full development funding based on projected financials and the technical checkpoints, such as entering Design Verification Testing, Manufacturability Readiness Reviews, etc. As a result, a program might pass based on the business case, but it might not pass a technical checkpoint. Without a link between the two checkpoints, there was no way to ensure a program was both technically viable, and viable from a business perspective.

Adding team members

As the number of products in development increased and as more new developers were hired who did not share the common IBM heritage, the need for a consistent, disciplined development process increased. Greg Survant, Senior Vice President of Electrophotographic Printers Development recognized the need to bring more discipline to this development process. Survant's goal was to optimize the way in which his organization brought products to market; more specifically, they had to be developed on time and within budget. The organization needed a decision-making process which would synchronize the technical and business processes.

Team formation

Jim Hoskins, Director of Product Lifecycle Management, was assigned to improve the existing process. Hoskins formed a very small team that focused on finding the right tool to drive a decision-making process. However, as work progressed, the team determined that the real key to success would be a process that would produce cultural change, not just another set of numbers and reports. This new process would need to drive collaboration and sequencing of key decisions among the technical and non-technical functional organizations, while fitting within the Lexmark culture. In Lexmark's technically-driven culture this meant that the process had to be thorough without being bureaucratic, allow for exceptions to the process, and be intuitive for all the various users.

Lexmark began to work on developing a new process in August of 2001. The first element of the process was the sequencing of both technical and business decisions. Next came the integration of the technical and business decisions into a series of "milestones." This is a home grown process in that the team did not rely upon external consultants to develop and define the process. Rather, they built upon the foundation of Lexmark's historical processes and refined them to meet the current needs of

Three Main Tenets of the Lexmark NPD Design Process

- Each milestone can only have one functional owner and each checkpoint can only have one owner.
- Instead of tying the process to a calendar schedule, it is tied to milestones. Product schedules will have different lengths depending upon their complexity and innovation requirements.
- There is no single process or software that will work for each company. The identified process must allow for and embrace the organization's existing culture.

SOURCE: Steve Mullins, Manager, Product Assurance, New Technology, Lexmark

the organization. Perhaps most importantly, the process continues to evolve after it was created. For example, during the last two years the Market Requirements Documentation (MRD) process has gone through significant modifications in order to achieve better alignment with the needs of the technical organization.

Process support

Another hurdle was the creation of support for the new processes since it directly impacted the existing culture. The environment at Lexmark had evolved into a more entrepreneurial and less structured organization in terms of making key decisions. Countless meetings were required for communicating and adjusting the new process to Survant's man-

Closer collaboration

While Lexmark's system is not perfect, it has resulted in the alignment between business processes and technical processes. It has also encouraged a cultural shift within the business division at Lexmark. For instance, today there is a much closer level of collaboration among the functional teams, such as development, manufacturing, supply chain, and marketing, which are required to bring the right product to market both on time and on budget.

Lexmark developed three key tenets early in the design process. These have helped keep the process viable and usable, and are shown in the box on this page.

Clearly, improvements still need to be made. At times, the process can suffer from a "funnel effect." What this means is that once products make it into the process as is determined by an annual strategic portfolio planning and budgeting process, they are seldom stopped. This results in a tendency for the checkpoints to become *funnels* rather than *go / no-go*

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agement and technical teams, and to achieve support needed for proper implementation. Once resolved, Survant established himself as both the owner and champion of the improved process. He put his organization on notice that the new process would be embraced and executed within his organization.

Three years later, Lexmark has a fully functional gated process called the Product Delivery Process (PDP). This process is a core part of the development process at Lexmark. The process checkpoints are not just technically related, but also cross functional. For instance, they tie together the Manufacturing Readiness Review and the Announcement Readiness Review (ARR). In fact some of these processes are actually owned by non-development groups. For example, the ARR process is owned by Worldwide Marketing.

gates. As a result, at times resources may be spread too thin because of too many development projects with inadequate prioritization among projects. However, the process has clearly had an overall significant impact on Lexmark's ability to produce new products on time and within budget. It has met its primary goal: bringing business processes and technical processes into alignment.

In the January 2006 issue of *Visions*, we will examine the challenge Konica Minolta faces in driving a global Product Development effort. ♠

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