the product record

PRODUCT LIFECYCLE MANAGEMENT QUARTERLY

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INNOVATION

Synchronizing Innovation
for Breakthrough Performance

By Peter Koudal
& Bill Poston
Deloitte

For companies in nearly all industries, innovation is the top priority for growth. Paradoxically, however, building or restructuring their operations to profitably bring new products and services to market is near the bottom of most manufacturers' priorities. Overcoming this "innovation paradox," our research suggests, is crucial to survival and success in increasingly complex global markets.[1]

Few of the nearly 650 companies we have studied around the world—in industries ranging from consumer products, automotive, chemicals and process, to pharmaceuticals, high tech, and diversified industrials—have resolved the paradox.[2]

However, those making inroads generate better business performance, with profit levels up to 73 percent higher than all other groups of companies studied. These companies are resolving the paradox by synchronizing their global operations amidst massive complexities across their global operations. We thus refer to these leaders as "complexity masters." (See figure on page 2.)

Based on our research, we believe that nearly every manufacturer will have to master such complexity over the rest of the decade.

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Who's Who in Innovation
Understanding the People Behind Your Innovation Strategy

By Geoffrey Moore
TCG Advisors

As an American living in Silicon Valley at the opening of the 21st century, I am surrounded by innovators. In the technology sector, in particular, a mystique has grown up around the maverick entrepreneur—be it a Bill Gates or Steve Jobs, a Larry Ellison or Scott McNealy, a Jeff Bezos or Jerry Yang—who exploits a technological discontinuity to outmaneuver the best of the old guard.

It is true that innovation depends on the right people, but innovation as a whole covers a much broader landscape. Far from being rare or mysterious it is the essential material from which all competitive strategies are fashioned. Innovation produces differentiation that creates competitive advantage that gains more business at a better price. Innovation is essential to financial success at every stage of a company's or market's existence.

Understanding who in your organization is responsible for innovation and how to find the right people to support your innovation strategy is essential.

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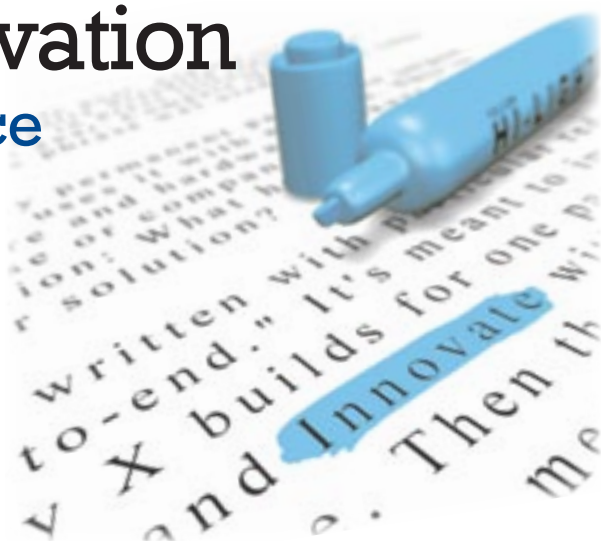
Synchronizing Innovation

for Breakthrough Performance



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By 2007, our research suggests, sales of new products introduced in the three preceding years are expected to generate 35 percent of total revenue, a huge increase from 21 percent in 1998. To achieve this, companies are shortening the time to market for new products from an average of more than 18 months in 2001 to less than 13 months in 2007 on average across industries. The implications are daunting: By 2010, products representing more than 70 percent of today's sales will be obsolete on average. For some businesses in fast-moving technology-intensive industries, this may take only a year or two as leading companies in industrialized as well as emerging markets boost their innovation efforts and customers demand newer and more innovative products and services.

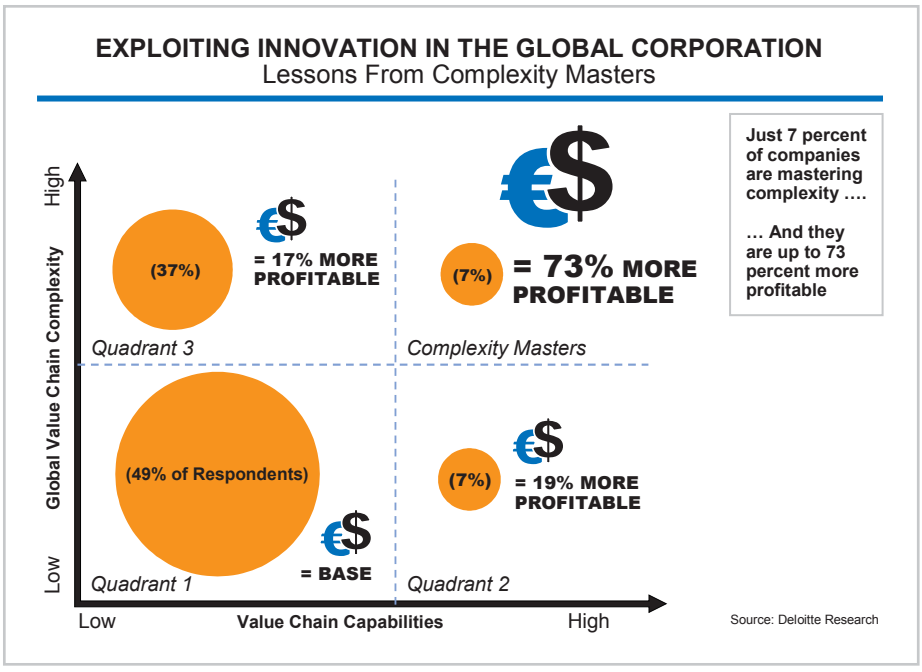
Without innovation, companies are doomed to decay. But generating profitable innovation is far from easy. Many companies fail to effectively generate big new concepts and assess whether they are "sustaining" (improvements to existing lines) or "disruptive" (potentially cannibalizing, and thus needing to be nurtured as a whole new business)[3]. And, once a new concept is developed, the value chain that builds and brings it to market often cannot cope effectively with the dramatically increasing complexities of global markets[4].

The reasons for this are many. Most manufacturers lack incisive information on customer needs, supplier capabilities, product profitability, and supply chain costs. Others are ineffective at collaborating internally and with customers and suppliers. Still others have difficulty matching supply with uncertain demand or are thwarted by inflexible, high-cost supply chains. Given the challenges for effectively managing the entire product lifecycle—from idea to launch to after-sales service—it is perhaps of little surprise that companies overall are reluctant to spend more on R&D. Executives forecast average R&D spending as a percentage of revenues to increase only slightly over the next three years, from 4.1 percent today to just 4.4 percent in 2007.

Based on our research of the success factors behind complexity masters and in-depth analysis of best practices, there are some very decisive steps that companies can take to generate profitable growth through innovation:[5]

- **Creating Innovation: Generating and evaluating ideas:** Leading companies aim to better identify both "sustaining" and "disruptive" innovations, the latter of which are typically ignored by managers of established companies trying to protect their current products. They are superior at generating ideas or sourcing concepts from outside the organization, developing business cases upon which enlightened investment decisions can be made, understanding the gap between the performance of existing products that satisfy customer demands and proposed new offerings, and deciding on the best organizational model for putting the innovations into action.

- **Exploiting Innovation: Turning ideas into growth and profits:** Companies that successfully exploit innovation maximize profits throughout the



entire lifecycle of a new product; essentially they look at it as a "profit cycle" rather than as a lifecycle. Most companies focus on the front end of the cycle – on creating a product that will make a big splash with customers. Good companies realize that this is only the first leg of a long race. They know the profitability of a new product can erode rapidly if its design cannot be updated quickly and cheaply, if it cannot be marketed and serviced cost-effectively, and if other "downstream" activities are not dealt with at the outset. The best at product innovation synchronize the entire value chain, not just the product development process.

- **Building Innovation Capabilities:** Behind the ability to create and exploit new ideas are four key capabilities that propel complexity masters to success:
  - Better visibility, both upstream and downstream in the value chain, through access to information on product profitability, production and distribution costs, and the ability to model future scenarios.
  - Flexibility in product designs and platforms that allow for quick modification of product offerings to meet market demands, and flexibility in the supply chain network to quickly shift manufacturing loads, production volumes, and product mixes.
  - More extensive collaboration with customers to define product requirements and with suppliers to design components and new materials. Complexity masters are also far more likely to have methodologies and processes in place for managing the lifecycle of their products.
  - Use of advanced technologies for product lifecycle management (PLM), customer relationship management (CRM), and advanced planning and scheduling (APS).

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CxO PERSPECTIVE

NOT JUST INNOVATION... INNOVATION WITH RESULTS

By Bryan Stolle

CEO, President & Chairman, Agile Software

The business environment has changed dramatically in the last few years. Virtually everyone competes in a global economy where competitors literally anywhere in the world can get to our customers and deliver products just about as easily as we can. This reality fundamentally changes what it takes to compete and succeed. Innovation is critical, but many other things must now happen to generate a meaningful profit and ROI from the R&D investment. If a vendor can deliver faster, with better quality, and lower prices, customers will turn to them. It is no longer just about innovation—it's about innovation with business results.

To achieve results, we must take a more holistic view of the innovation process, and understand what's going on inside. Little mistakes, missteps, and delays cause profit and margin leaks throughout the new product development pipeline, detracting from both top-line and bottom-line results. Forget to notify a supplier about a change, or inadvertently communicate the wrong information and it is going to cost you more, slow you down, and ultimately diminish your revenue and profits.

Sony's failure to deliver enough product at Christmas for the PlayStation 2 is a perfect example. By not preparing their manufacturing and supply chain for the product demand, they not only missed out on substantial revenue, margin and profitability but actually opened the door for Microsoft to successfully enter the gaming console market. Sony may have delivered the innovation but they failed to deliver on the results.

Do you have visibility into your product development process to ensure all the right steps are happening at the right time? When CEOs ask about the status of products in the development pipeline, their teams are not always prepared to answer the important questions. Will it be on time? Will the price point be right? Is the supply chain lined up to deliver on the expected demand? Is the product compliant with all applicable environmental regulations? The inability to answer these fundamental questions is not comforting to CEOs who are trying to drive the top-line and provide profitability to shareholders. It's time to start rethinking the innovation process to guarantee results.

Innovation with results begins with one common system of record about what the product is, was, and will be. You cannot collaborate with your supply chain, design partners and customers if everyone is working off different versions of the product. That's a recipe for chaos, delays and lost revenue and profits. The common product record must be leveraged to understand what is happening with the cost and margins of the product over time; to know whether the materials comply with environmental regulations; to quickly respond to quality issues; and to balance resources and effort strategically across your entire product portfolio, maximizing the profitability of your investments in R&D and new products.

In this issue of *The Product Record*, we focus on the innovation process, and some of the best minds in the industry provide their viewpoints on how to achieve "Innovation with Results".

Medicine for Product Development Ills

How the BioPharmaceutical Industry Can Gain Innovation Productivity by Leveraging the Product Record

By Dr. Susan J. Ward

The BioPharmaceutical industry has been both one of the most profitable industries in history and one of the least efficient. Facing unprecedented fiscal and political pressure to transform into providers of important new medicines for intractable diseases at drastically reduced prices, BioPharmaceutical companies are highly motivated to make radical improvements in productivity.

The factors governing productivity of new product development in the BioPharmaceutical industry resemble challenges common in all complex industries. Beyond the pre-requisites of a sound corporate strategy and a healthy dose of luck, productivity of new product development boils down to superior ability to pick the right project to do, and then do it the right way.

It is estimated that as much as 70% of the annual $50B pharmaceutical expenditure in R&D is spent on that which fails before reaching the marketplace—only 1 in every 10 products entering clinical trials gains regulatory approval. Clearly, the earlier one can identify those products that are destined to fail—i.e. pick the right projects to do—the better. Operational excellence in executing those chosen projects "the right way" also offers a very substantive productivity opportunity, which is why many BioPharmaceutical companies are now focused on achieving operational excellence in key development processes such as clinical trial patient recruitment, clinical trial supplies, and technology transfer of manufacturing processes.

However, managers in the BioPharmaceutical industry commonly lack the experience to translate these concepts into tangible productivity measures in the context of the practical realities of the day-to-day. Many managers are skeptical that tools automating key operational processes can make a meaningful difference, and consequently, lack the right tools to drive operational excellence. Product Lifecycle Management (PLM) technology, coupled with a commitment to maintaining an up-to-date and easily accessible product record, are rapidly emerging as an important approach to deliver improvements in performance.

How much benefit might a BioPharmaceutical organization realize from keeping a contiguous product record?

- Maintaining a contiguous product record, rather than having to search for information to create a record retrospectively obviates significant administrative overhead currently borne by scientists who are best deployed in higher value tasks.
- Ready access to an evolving product record will make it easier to comply with future regulatory requirements for describing the scientific rationale underlying an evolving manufacturing process or clinical label claims.
- As the scientific path becomes more explicit through the product record, a company can better leverage its own knowledge base in downstream clinical trials, manufacturing and future product development.
- Capturing and documenting the emerging critical information about a product in between milestones allows many departments in a company to monitor and proactively react to product modifications that may be required due to regulatory changes, unexpected outcomes from emerging data, or key events in the marketplace.

Finally, it should be noted that a well-articulated framework for a product record can help a project team keep its eye on the project goal which requires fulfilling a complex network of sometimes competing criteria. Teams that deliver high performance are already adept at focusing on the critical path. Helping all project teams stay focused on their own scientific critical path would result in shortened time and cost to milestones or to termination of a project, and a higher quality product profile or process—which may translate into literally tens and hundreds of millions of dollars, and can even make the difference between success and failure.

Susan J. Ward, Ph.D., has served as an interim executive helping young Biotechnology and pharmaceutically-oriented software companies transition technology into products since 2002. During more than 20 years working for leaders in the Biotechnology industry, Dr. Ward has written more than 50 articles and holds 9 patents.

For for information, please visit the Agile PLM for the Pharmaceutical Industry web page at **http://www.agile.com**.

PULL THE RIGHT LEVERS FOR INNOVATION PRODUCTIVITY

Adapted and copyright-protected from an article appearing in PRTM'S Insight, Summer 2004

By Mark Deck
PRTM Management Consultants

The recent economic downturn placed a huge strain on product development. Companies must now refuel their innovation engines without spending more. The solution is innovation productivity—getting more revenue from new products with the same or less investment. Anything that improves project throughput, customer value, product or service quality, or cost performance without increasing input levels will also improve innovation productivity.

At PRTM we have identified 10 levers for innovation productivity. A lever is a way to move more mass with less effort, and an innovation productivity lever is a way to generate more innovation output with the same or fewer inputs. In this article we examine 3 of these levers:

Lever 1: Platforms and Architectures

A product "platform" is a strategic set of technologies and capabilities along with an integrating architecture that form the basis for a group of related products. Companies can use this lever to decrease costs in three ways: reuse components and subsystems across product lines; use modular architectures to reduce complexity and decrease product and maintenance costs; and move final configuration closer to the customer—postponing assembly and integration until late in the development cycle, for lower inventory costs.

Companies that use this lever can also improve innovation productivity in three ways. First, they get new product generations to market faster than competitors. Second, companies can focus investment on a defining technology that differentiates a product line. Third, they can focus new development efforts on different modules instead of creating an entirely new product.

Lever 2: Resource Management

Making better use of resources can sharply increase innovation output, allowing companies to do more without hiring additional staff and increasing costs. Companies can increase resource utilization by measuring and managing it in three ways.

First, know what your current utilization rate is, and set goals for improvement. Many companies are surprised to find that although their people are busy to the point of overload, actual utilization on high-value, approved projects that create new product revenue is 10% to 15% lower than expected. Simply measuring and managing utilization to a reasonable goal can have an immediate impact on productivity—especially when you focus your resources on innovative, high-value, new revenue producing projects.

Second, improve how you balance resource supply and demand. This means matching the right people with the right projects at the right time to minimize the bottlenecks that reduce throughput.

Third, use resource planning and scheduling to better meet your current and future needs. This kind of information access depends on integrated systems, with visibility across the entire product development cycle, making it possible to synchronize resource schedules, and to accommodate more projects.

Lever 3: Information Automation

Innovation and product development are arguably the most knowledge-intensive processes that a company has. After all, product development is about transforming market and technology opportunities into ideas, and then into products and services—all while discovering, refining, combining, changing, sharing, and communicating knowledge. Yet most of the information that product development needs is hopelessly trapped on paper or in siloed applications that are invisible or inaccessible.

Enterprise application software drives both cost savings and greater innovation output by allowing companies to do more with less—simply because people no longer waste time looking for information. These tools minimize the manual collection and management of disparate information, for significant time and cost savings. Moreover, companies no longer have to regenerate product information that already exists and could be leveraged—such as multiple component libraries that can't be accessed across business unit or location silos.

Enterprise application software also allows partners inside and outside the company to better coordinate development efforts. This minimizes errors, speeds up changes, and reduces duplication of effort. Today, it can take days or even longer to communicate changes to all affected people, recognize and assess the alternatives, and implement a coordinated response. With the right enterprise development system, this coordination process can be accomplished in just hours.

Information automation also delivers at least three benefits: more time for people to focus on the innovative aspects of product development; more cross-functional collaboration that generates innovative solutions; "Digitization" of product development which enables more innovative problem-solving.

We recommend conducting a simple audit to assess both the applicability of each lever, and its degree of use. The results of your audit can form the foundation of a roadmap for improvement.

To read the complete *PRTM's Insight* article, or for a copy of the white paper, *10 Levers for Innovation Productivity*, please contact: Mark Deck, Director of IP and Alliances at PRTM at 781.434.1200 (mdeck@prtm.com)

Mark Deck is a Director at PRTM Management Consultants, where he has led PRTM's PACE® practice for the past 10 years, specializing in implementing product development best practices. He is also the Immediate Past President of the PDMA and has published extensively on various PLM topics.

Innovation in Packaging

By George H. Young
Kalypso Partners LLC

Packaging serves a greater purpose than just retail and consumer storage. Since 25%-50% of the cost of a product will go into packaging[1], companies want to get the most from their investment. Many companies are focusing their efforts in product development and product innovation on packaging innovations as a result of three factors: (1) increased focus on product image, (2) packaging as a new product, and (3) the need to manage packaging information and product safety in an increasingly regulated environment.

1) Product Image

The package is the first product aspect a customer sees and handles. It immediately sets the consumer's expectation about the product inside and the brand it represents. The way a product is packaged suggests to us certain qualities about the product contained inside. For example, in food packaging clear windows relay the idea that the product is fresh, while foil can give the impression that the product is hot or cold. A zipper or re-sealable package conveys convenience and value.

The success of the Lunchables product stems from the image it conveys to parents—convenience and compartmentalization (a mini-lunchbox), and to kids—fun and multiple ways to combine ingredients. Here the image conveyed by the package is the product innovation.

The need for global brand management has led companies to use PLM solutions such as Agile to manage the artwork associated with their packaging to ensure that the colors and graphics comprising the brand are consistent globally.

2) New Product Introductions

As consumer packaged goods companies have introduced more and more new products they have not been rewarded as in the past with increased revenue. From 1994 – 2003 the CPG industry increased the number of new product introductions by 7% but realized only a 3% growth rate as a whole, because 62% of all new products introduced failed to generate their targeted revenue[2].

The package is increasingly the innovation that drives increased sales from new products as in the Lunchables example. Motor oil underwent a paradigm shift in packaging from the traditional oil can to the easy-to-use plastic bottle. This packaging innovation rejuvenated a product once considered in decline as ease of use led many consumers to try changing and replacing their own oil. Similarly the days of the coffee can are numbered.

The success of private labels is due in some part to innovation in packaging. This is most evident today in the success that Albertsons is having in the roll-out of its Essensia brand, and that Costco enjoys with its Kirkland brand. Albertsons packages its Essensia product family to clearly position it as a high-end offering. Private label products have evolved from low-cost generic competitors to well-known brands, to product leaders with recognized brands separate from the stores that offer them.

3) Product Safety and Regulatory Compliance

Federal and State governments may mandate that packaging must fulfill certain requirements. For example, the Food Allergen Labeling and Consumer Protection Act (FALCPA) states that companies must label their packages so it is easily understood what the ingredients are. Improper labeling or display of product claims costs companies millions every year in fines.

Companies are increasingly turning to PLM systems to ensure that the packaging data on their products is correct. Albertsons' private label group (Our Own Brands) recently went live with an Agile solution based on a single product record that unifies and ties product and packaging information together. Another Agile customer, GlaxoSmithKline, recently won the DuPont Diamond Award for innovative packaging for its holographic foil.

The new Procter and Gamble coffee canister won the Diamond Award in the 17th DuPont Awards for Innovation in Packaging. The new can is lightweight, dent resistant and stackable, setting it apart from its metal counterparts.

Perhaps the greatest innovation in packaging is active packaging. Active packaging actually interacts with the product. As an example, Radio Frequency Identification (RFID) tags allow products to be instantly recognized and tracked. RFID tagged food products will enable the world's food supply to be protected from threats such as Mad Cow disease. The FDA is currently running a pilot RFID program with pharmaceutical companies in the US and many expect the FDA to mandate the use of RFID tags with all drugs.[3]

In order to stay competitive in the marketplace, producers must differentiate themselves. Since introducing new products successfully has been difficult, companies must find ways to increase sales of their current products. One major way in which companies can do that is to focus innovation on packaging. Agile PLM has helped a number of CPG and healthcare companies in developing innovative packaging solutions.

George Young is a founding principal of Kalypso Partners LLC with over 20 years of professional experience in business management and consulting roles. He was previously a partner with Deloitte Consulting where he established and led the Product Lifecycle Management practice, and he is the author of numerous publications concerning product development and commercialization.

[1] *AMR Research, Product Innovation Resource Center (http://www.amrresearch.com/content/resourcecenter.asp?id=433)*

[2] *Productscan Online*

[3] *Packaging World Magazine, Jan. 2005, p. 82*

Who's Who in Innovation

Understanding the People Behind Your Innovation Strategy

CONTINUED FROM PAGE 1

Basically, innovation strategy is a coordinated effort led by top management and developed by middle management.

Top leadership's key responsibility in innovation is to prioritize and allocate the company's resources to balance innovation and operation. It can only create confusion in middle management when leaders don't make the allocation priority clear. On the other hand, top management should not be involved in the daily innovation process. They should act as the "steering committee" that does the initial innovation types review, selects and staffs the middle management innovation teams, analyzes and synthesizes the outputs, and declares the innovation strategy.

The middle management innovation teams should be seen as the "operating committee" responsible for the innovation output. Top management should not micro-manage this group. One mistake often made is under-steering and over-managing by executive teams who at first delegate their navigational responsibilities. They fail to declare strategy with sufficient clarity that middle management teams can chart innovation courses with confidence. Then, once the enterprise ship begins to drift, these same captains of industry show an alarming tendency to reach in and grab the tiller out of the first mate's hands. This is frustrating to all involved. The correction is for the top team to step up to the genuinely dicey business of betting the company's future by allocating resources, and entrust the detail work to the operating committee, while holding them accountable to the goals.

The operating committee is the cross-functional innovation team that brainstorms possibilities, develops, evaluates, and prioritizes a portfolio of opportunities, recommends specific innovation proposals, and translates them into market development programs. It is important to keep the innovation team in tact as much as possible throughout the entire process, from inception to market launch. There is nothing harder to transition in business than the intangibles—enthusiasm, experience, trust, and consideration. The makeup of the core team shifts after the initial release of the product, however, as the market becomes more established and marketing people gain a stronger voice in the team.

Recruiting the right people to lead these innovation teams is critical. At different market stages, companies should consider tapping the resources of a very divergent industry. For example, when the more process-driven non-tech industries need to break into a new market, they should find an entrepreneurial person, maybe from a tech company, who has that sense of urgency and is passionate and energetic enough to overcome the internal resistance to new things. On the other hand, when high tech companies need to maintain success once a market has become established, they should recruit a more process-oriented individual who has a sense of the long-term market rhythm and can still command respect from an organization that is addicted to product innovation.

Corporate culture should feature prominently in the search for innovation team leaders. Companies approach innovation in four distinct ways:

- **Cultivation Cultures** favor disruptive innovation to come up with the next new great idea.
- **Collaboration Cultures** focus their innovation on understanding the customer and the market, and adapting to their needs.
- **Competitive Cultures** are expert at reacting to the competition and co-opting ideas already in the market.
- **Command and Control Cultures** are more process-driven, and succeed at delivering on a large scale.

Each one of these cultures has an inner creative voice, but they are very different voices. When you transplant a creative person from one culture as the creative voice in another culture, it takes a special person to overcome the cultural mismatch. That is why it is important for companies to recognize their own corporate culture, and recruit with these factors in mind. Finding the right person to fit the culture or to add some experience or attitude to enhance the culture is a foundation for success in innovation.

Geoffrey Moore is Managing Partner and Founder of TCG Advisors, a consulting practice focused on business strategy and organizational transformation, and a venture partner with Mohr, Davidow Ventures. He is also the author of four best selling books: Crossing The Chasm, Inside the Tornado, The Gorilla Game, *and* Living on the Fault Line.

plm in motion

Hitachi Uses Agile to Support Product Innovation

HITACHI

Innovation is a core value at Hitachi, and the company must bring new products to market faster than ever and shorten cycle times from product concept to introduction. To address this need, global technology leader Hitachi has leveraged the Agile platform to rapidly introduce the highest quality products to market.

Agile was chosen to support collaboration for Hitachi's entire worldwide hi tech and electronics operations—including data storage systems, digital media, disk array systems, mechatronics systems and enterprise servers—comprising about 5,000 Agile users.

Agile supports Hitachi innovation on all these products by helping the company:

- exchange and manage product information
- collaborate around the product record
- accelerate new product introductions
- improve product quality
- reduce manufacturing costs

Agile is at the heart of a system that unites engineering processes across Hitachi's organizations, as well as with the supply chain. Using Agile, Hitachi's design, production, and service & support teams have collaborated to manage and compress the product design and change cycles and new product introduction lead times. Agile PLM Solutions also work as a driver to provide rich decision support for deploying time-to-market, time-to-revenue and time-to-value.

Via Agile, Hitachi has achieved this impressive roster of successes:

- expanded control of product change records by 12 times
- improved product design change cycle times by 65%
- reduced product design process steps by 9%
- increased revenue per design by 30%

Synchronizing Innovation

CONTINUED FROM PAGE 3

Such capabilities give these manufacturers an edge in creating, evaluating, and exploiting innovation throughout the entire lifecycle, from idea to launch to after-sales service. Profitable growth through innovation may be difficult at best. But without innovation, companies will eventually languish and fail. As our research shows, however, companies with an in-depth understanding of the challenges, opportunities, and capabilities for building an "innovation machine" are rewarded handsomely with higher profits, stronger growth, and more value for shareholders.

Peter Koudal is Director at Deloitte Research, Deloitte Services LP, and can be reached at Tel: +1.212.436.2647 or e-mail: pkoudal@deloitte.com. Bill Poston is a Partner and a leader of the Product Innovation and Lifecycle Management practice at Deloitte Consulting LLP and can be reached at Tel: +1.713.982.4755 or e-mail: wposton@deloitte.com.

[1] For more on this research, see also Deloitte Research, *Mastering Innovation: Exploiting Ideas for Profitable Growth* (New York: Deloitte, 2004).

[2] In this article, we use the terms "manufacturer," "business unit," "company," etc., interchangeably. The focus of the survey research is on the relevant business unit level at which business strategies are defined and operations are managed.

[3] For more on "sustaining" and "disruptive" innovation, see Clayton M. Christensen and Michael E. Raynor, *The Innovator's Solution: Creating and Sustaining Successful Growth* (Boston, MA: Harvard Business School Press, 2003).

[4] By "value chain," we not only include the supply chain operations of sourcing, manufacturing, and logistics but also the product development activities including R&D, innovation, product design, engineering, and transition, and the customer-related activities of marketing, sales, and service.

[5] See also Deloitte Research, *Creating Unique Customer Experiences: The Next Stage of Integrated Product Development* (New York: Deloitte, 2001).

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Please direct all inquiries to *theproductrecord@agile.com*.
For editorial inquiries, please contact Terri Pruett at *Terri.Pruett@agile.com*.

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