



New Product Development:

**A Step-by-Step Approach to Developing
Your Next New Product or Service**

*“You see things, and you say, ‘Why?’
But I dream things that never were,
and I say ‘Why not?’”*

– George Bernard Shaw

BUSINESS DEVELOPMENT DIRECTIVES

BLUE PAPER

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Providing

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Research Park P.O. Box 70 Eagle, Wisconsin 53119

E-mail: [bddlowell@bddonline.com](mailto:bddlwell@bddonline.com) Website: www.bddonline.com

Phone: 262-594-9510 Fax: 262-594-9502 Milwaukee 414-276-9510

TABLE OF CONTENTS

INTRODUCTION	4
PRESSING NEED	4
<i>Declining Returns</i>	4
<i>Responding to Customer Needs</i>	5
IMPORTANCE OF THE PROCESS.....	5
<i>Building the Process</i>	6
ABOUT THIS BLUE PAPER.....	6
PLANNING.....	8
SETTING PRIORITIES / IDENTIFYING OPPORTUNITIES	8
NURTURING COLLABORATION.....	8
<i>Cross-Functional Teams</i>	9
<i>Involve Suppliers and Subcontractors Early</i>	10
RESEARCH	10
BUDGETING	11
<i>Manage Costs from the Start</i>	12
TIME MANAGEMENT.....	12
GENERATING HIGH-VALUE IDEAS.....	13
IDENTIFYING VIABLE IDEA SOURCES	13
<i>Ranking the Sources</i>	14
IDEATION METHODS	15
<i>Voice of the Customer Research (VoC)</i>	15
<i>Open Innovation</i>	16
<i>Others</i>	17
EVALUATION	19
<i>Improve the Design Process Continuously</i>	19
NEW PRODUCT DEVELOPMENT MODELS	21
PDBPA SOFTWARE	21
STAGE-GATE®	24
<i>Stages</i>	24
<i>Gates</i>	25
NEXTGEN STAGE-GATE®	26
<i>Lean</i>	26
<i>Scalable</i>	27
<i>Adaptable</i>	27

<i>Partnerships and Alliances</i>	27
<i>Company Culture</i>	27
QUALITY FUNCTION DEPLOYMENT (QFD) – HOUSE OF QUALITY	28
<i>Determine Customer Needs</i>	28
<i>Prioritize</i>	28
<i>Mapping Process</i>	29
CASE STUDIES	30
TOYOTA	30
NEXEN GROUP	31
<i>Set-Based Design</i>	31
<i>Value Judgments</i>	32
EATON CORPORATION	32
<i>Innovation Summits</i>	32
<i>Design Bursts</i>	33
INTEL.....	33
GOOGLE	34
IKEA	35
<i>Start With Price</i>	35
CONCLUSION	37

INTRODUCTION

Where will the idea for your next product or service come from? How will you turn your next *good idea* into your next *great product or service*? Have you been relying on the same old products or services for too long? Answers to these questions speak volumes about a company's philosophy and commitment to *new product development*. In this **BDD Blue Paper**, we will examine the importance of employing a systematic new product development program so that businesses can stay ahead of the industry curve, compete in today's fast-paced marketplace, increase productivity and grow strong and healthy organizations that yield high economic returns.

Where will the idea for your next product or service come from? How will you turn your next good idea into your next great product or service?

PRESSING NEED

The need for lean, rapid and profitable new product development has never been greater. Product life cycles are shorter, market competition is more intense and customers are more demanding. The *same old-same old* just won't cut it anymore. In fact, studies show that 30 to 40 percent of all products on the market are new.

Declining Returns

But keeping product lines current and competitive is not easy. Nearly *half* of all resources devoted to New Product Development – 46 percent – go to projects that *fail in the marketplace* or never even make it to the store shelf.

Keeping product lines current and competitive is not easy.

Productivity in new product development is down when measured by output over input. Companies are still spending the same amount of money on research and development as they always did. Over the past 10 years, however, the

percentage of sales from new products has decreased from about 32 percent to 28 percent. A recent best practices study conducted by the **American Productivity and Quality Center (APQC)**, reports that well over half of US companies – 60 percent – do not have the key elements of an effective product innovation strategy in place. Another study, this one by **Booz Allen Hamilton**, indicates that throwing money at research and development doesn't necessarily translate into improved company performance. The only way to ensure effective new product development is to *fully commit* to a well designed, comprehensive and carefully plotted new product development program.

Responding to Customer Needs

In addition to keeping up with competition and increasing productivity, an

Whether or not a company is producing new and innovative products tells the customers whether or not the company is responsive to their needs.

effective new product development process plays an important role in a company's indirect communication with customers. Whether or not a company is producing new and

innovative products tells the customers whether or not the company is *responsive to their needs*. In addition, time-to-market, or the timeframe in which the company responds to those needs, is a critical factor in the success of new products. According to a 2007 report by **ARC Advisory Group**, firms are meeting their product launch dates only 45 percent of the time. And less than a third of companies meet their product launch targets more than 60 percent of the time.

IMPORTANCE OF THE PROCESS

The importance of a systematic and continuous system for new product development cannot be underestimated. Think of a production line – every employee, every conveyor belt and every piece of machinery has a specific task. You cannot eliminate one element and expect the system to run smoothly. In the case of new product development, to achieve the end goal – the production of

innovative products and services that make money – there must be a logical process through which *original ideas* translate into *sales* and *profits*.

Building the Process

While many companies agree there is a need for a systematic approach to new product development, most don't know how to go about developing or implementing such a process. Bringing in a *trained professional* to

Bringing in a trained professional may be the most effective way to harness the valuable thoughts and ideas of employees.

facilitate meetings, discussions and brainstorming sessions may be the most effective way to harness the valuable thoughts and ideas of a company's best resource – its own employees. Once a basic process is in place, choosing the parts that will keep the system running like a well-oiled machine is a much easier task. Through this examination of best practices in new product development strategy and an examination of effective models and frameworks, your company will be well on its way to establishing a system through which good ideas are turned into great products and company profits.

ABOUT THIS BLUE PAPER

Like everything else in your business, new product development requires planning, creativity / idea capture and an ongoing process for evaluating those

Our goal is to provide you with the basic information you need to begin the new product development process.

ideas. In the following **BDD Blue Paper**, we will examine each of these functions in great detail. In

addition, we present a useful “how-to” guide of new product development models and finally, a selection of case studies to highlight best practices and success stories. Our goal is to provide you with the basic information you need to begin the new product development process, but no report can be entirely comprehensive. We invite your questions and comments and look forward to

working with you to get the best results from your new product development efforts.

William E. Lowell, CMC
President
Business Development Directives
(262) 594-9510
wlowell@bddonline.com

PLANNING

New product development is a journey, but where does it begin and where does it end? In today's highly competitive marketplace, it is very important for organizations to carefully assess their current situation, identify their goals for new product development and formulate a workable plan for achieving those goals.

SETTING PRIORITIES / IDENTIFYING OPPORTUNITIES

There are eight *essential questions* all organizations must consider before beginning the new product development process.

New Product Development: Eight Essential Questions	
1	How do we compare with the rest of industry? With the best in industry?
2	What are our strengths and weaknesses?
3	Is our development process aligned with our strategic objectives?
4	What improvements need to be made?
5	Where do we start?
6	What are our priorities given the resources that we have available?
7	What benefits can we expect?
8	How can we figure this out quickly so that we can get started?

Answers to these questions will provide a useful framework to set priorities and identify opportunities throughout the entire new product development process.

NURTURING COLLABORATION

New product development does not happen in a vacuum, even at the Hoover Company. It is a creative and collaborative endeavor that requires buy-in from all levels of the organization and from important external constituencies such as customers, partners and suppliers. Management plays a very important role in creating the kind of positive working environment that promotes new product

development. The following *management strategies* are important in the success of new product development.

- Focus on *long term potential*, not just short-term profitability. A short-term outlook may bring in high profits for existing products, but halts new product innovation and makes employees very risk-averse.
- Give employees the *freedom* and *support* to take risks.
- Respect *individual ideas* from employees at all levels of the organization.
- Top managers should spend 5 to 15 percent of their time each month on new products and functional departments should allocate a minimum of 20 percent of their time to new product development.
- *Communicate* with group members. When a leader communicates excitement, recognition, integrity and compassion, followers perceive trust and genuine interest in the group.
- Take *responsibility* for selected tasks.
- Encourage and accept *criticism*.
- Always *teach* others.
- *Share* leadership responsibilities.
- *Know* and *use* the resources of the group.

Cross-Functional Teams

Cross-functional teams consist of key players from different parts of the organization. The players are clearly assigned and each team member has an equal stake in and commitment to the project. These teams may include representatives from departments impacted by new products or departments that are part of new product development processes. In order for this approach to be successful, a manager must be assigned to take responsibility for process. This manager should be a *senior-level employee* who has the appropriate experience, respect and knowledge to facilitate discussion among departments. In addition, organizational leadership must provide strong support and commitment to the development teams. Lastly,

Cross-functional teams consist of key players from different parts of the organization.

a well-defined system for team accountability, including an evaluation of results versus success criteria, is critical to effective team performance. In the end, team members and those in senior management positions must be rewarded for the success of the process and resulting new products and not just quarterly profits.

Involve Suppliers and Subcontractors Early

Suppliers know their product technology, product applications and process constraints better than anyone else. Thus, it is important to *harness* and *utilize* this expertise during product development. Through early involvement, suppliers are able to save themselves time and effort later in the process and in turn, save

Suppliers know their product technology, product applications and process constraints better than anyone else.

money for all parties involved. In addition to being open to improvement suggestions from suppliers, it is important to reduce the supplier base to focus more attention on long term relationships. Through a long term working relationship with suppliers and sub-contractors, companies will be able to continuously develop and offer superior products in a timely manner.

RESEARCH

Even today, many organizations plunge headlong into new product development without quite knowing what they're doing or what they're up against. Doing your *homework* pays off in the long run. The following steps should be accomplished early in the new product development process:

- A ***preliminary market assessment*** to determine market size and potential, customer interest, insights into customer needs and the competitive situation.
- ***Technical assessments*** to gauge technical risk, probable technical solutions, an appropriate development route, potential risks and the intellectual property situation.
- A ***manufacturing analysis*** to identify operating requirements, necessary materials, equipment needs, outsourcing opportunities and potential suppliers / partners / alliances.

- **Market research, concept testing** and **value determination** to quantify a product's value from the perspective of the customer. This process often involves an assessment of the economic impact of a new product on a customer's current operations.
- A detailed **business and financial analysis** is imperative – after all, the ultimate goal of new product development is to generate more revenue and improve profitability.

BUDGETING

Investments of time and money into new product development programs must be thoroughly examined and sharply focused.

Investments must be thoroughly examined and sharply focused.

A systematic portfolio management system that aligns with the organization's strategic goals must be the foundation for any new product development efforts. The following list of ideas will help to ensure that new products align with the strategic goals and the overall direction of the organization.

- **“Buckets of Resources”** are created to ensure the right mix and balance of projects at the right times. New product ideas are arranged in these buckets which are organized by project type, organizational goals, market segments and new technologies.
- Product and technology **roadmaps** are used to map out the major product development initiatives required over the next five to seven years. These roadmaps include major product development efforts, new technologies, future platforms and organizational goals.
- **Scorecards** provide a record of rigorous qualitative analyses performed by employees at regularly scheduled meetings. Reviews of these scorecards help organizations select and prioritize the most effective product development projects.
- A **Productivity Index** is a financial tool used to assess and maximize the economic value of the portfolio. This index evaluates potential projects but takes into full consideration personnel or financial resource constraints.

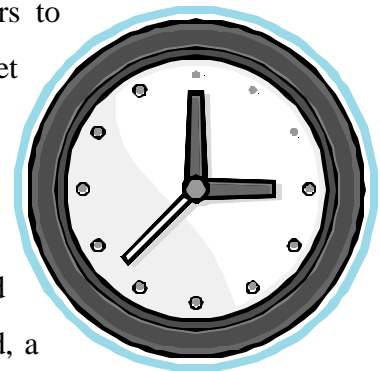
Manage Costs from the Start

The process of developing new products to advance goals, become more competitive and gain greater profits is an exciting time for any organization. Thus, it is important to be sure that costs are evaluated and managed responsibly.

- ***Conduct appropriate research*** to develop a greater awareness of affordability and life cycle costs.
- ***Use available tools*** to project product and life cycle costs and consider these cost projections when making decisions.
- ***Involve development team members*** in the plans and proposals for new products. Obtain their input, solicit their feedback and secure their commitment.
- ***Clearly establish target costs***, put specific managers in charge of budgetary concerns and strictly manage target costs.

TIME MANAGEMENT

With new product development, time is the tyrant. In a ***linear development*** process, a project often takes months or even years to move from concept to endgame. Meanwhile, market conditions can change dramatically. Customers change their minds. The need for the product evaporates. Competitors come and go. As a result, the end product based on outdated assumptions could be a bust. In ***spiral development***, on the other hand, a team creates an original prototype and presents it to a potential customer or group of customers to gather ***immediate*** feedback. The prototype is presented as a work in progress, and based on customer feedback, alternate models are created. These continuous improvements are built into the process.



GENERATING HIGH-VALUE IDEAS

The new product development process comes down to three essential steps:

Information is the jet fuel of modern business.

generating, processing and *implementing ideas*. Information is the jet fuel of modern business, just

as scarce and valuable as crude oil. Unlike the environmentally sensitive energy industry, however, most companies do not have to worry about restrictions on when and where they can explore for new ideas. Thus, at the beginning of the process, it is important to identify potential information resources, both internal and external, to provide critical answers about market conditions, technology trends, supply, demand and pricing.

IDENTIFYING VIABLE IDEA SOURCES

“Ideation” is the portion of the development process that precedes the formal development process. It is the part where ideas enter the funnel

Ideation is the portion of the development process that precedes the formal development process.

before they are organized, examined, evaluated and processed. The pool of potential ideas is bottomless. Therefore businesses need to constantly have their *fingers on the pulse* of the industry, making themselves aware of potential concepts and products through:

- ***Attendance*** at conferences, workshops, annual meetings, seminars and trade shows.
- Thorough ***literature review*** and industry research.
- ***Telephone discussions*** and ***onsite visits*** with customers, technology vendors, business consultants and end users of intermediary and final products.
- ***Collecting information*** on employee and customer needs and wants through routine satisfaction surveys and analysis.

Idea Collection: Potential Sources		
High Profile Industry Events	Staff	Employee Working Groups
Individual Members / Customers / Purchasers	Customer Prospects	Board of Directors / Governors
Internal Sales Teams	Internal Customer Service Representatives	Informal Employee Networks
Consultants	Industry / Business Membership Organizations	Other Leaders in New Product Development
Interactive Online Chat Environment	Other Similar Companies or Organizations	Articles / Secondary Research
Industry Newsletters	Training, Seminars	Lobbyists
Resellers / Integrators / Distributors / Vendors	Membership, Trade Industry Organizations / Complementary Associations	Trade Publications
Industry or Community / List Serves	Media	Venture Capitalists / Start-Up Companies

Ranking the Sources

Once these sources for new ideas are identified and evaluated, they should be ranked according to priority, based on their potential reward and the timeline for implementation. ***High priority items***, for example, are often deemed to be immediately productive with great potential for the short-term. ***Medium priority items*** are those considered worthy of follow-up in the mid-term, perhaps over the next two years. ***Low priority items*** are relegated to the back burner, to be revisited in future planning sessions for long-term consideration.

Once the sources for new ideas are identified they should ranked according to priority.

IDEATION METHODS

The following techniques may help to solicit highly-valued creative and innovative ideas from the appropriate sources at the appropriate times (based on levels of priority).

Voice of the Customer Research (VoC)

A company's customers hold the **seeds** necessary to **grow a new product**, but often times neither they nor the company know it. By working with customers and users (walking in their shoes, understanding their problems and what they see as valuable and figuring out their unmet and articulated needs), companies can begin to plan for new product lines.

- ***Listening to the Customer:*** “Voice of the customer” research does not mean “voice of the salesperson” or “voice of the product manager.” According to a recent study conducted by the **Product Development Institute**, more than two-thirds of high productivity businesses work directly with customers to identify their needs.
- ***Customer Visits:*** A team of three is most effective and includes an employee involved in marketing, sales and technical areas. The interview guide asks questions about unmet needs, unarticulated problems, functions and benefits sought, etc.
- ***Ethnography*** or ***Camping Out:*** Spending time with and observing users in their homes, offices or factories. Researchers are unobtrusive, observing the use and misuse of products in order to understand daily customer challenges.

Ideation Methods

Voice-of-Customer (VOC)

- Customer Visits
- Ethnographic Research
- Customer focus groups for problem detection
- Lead user analysis
- Focus group problem detection sessions
- Brainstorming group events with customers
- Crowd Sourcing / Community of Enthusiasts
- Customer advisory board or panel

Open innovation

- Partners and vendors
- Soliciting the external scientific/technical community
- Scanning small business and business startups
- Invite external finished product designs
- External submission of ideas
- External idea contest

Other

- Peripheral vision
- Disruptive technologies
- Patent mapping
- Idea capture internally

- **Lead-User Analysis:** Identifying innovative users or customers and setting up a customer group meeting to probe them for ideas and creative solutions.
- **Focus Group Sessions:** Customers are brought together to identify current problems and challenges so that the researchers can understand common challenges and brainstorm solutions.
- **Brainstorming with Customers:** Customers are invited to an “innovation day,” where they are divided into teams with marketing, sales and technical employees. Some groups brainstorm about product problems, while others discuss potential solutions or new innovations.
- **Crowd Sourcing:** Seeking input and ideas from customers by forming a community of enthusiasts to discuss the product online. As high speed Internet becomes more common, soliciting ideas via the company website, email surveys, etc. has become an important way to gather information.
- **Customer Advisory Boards:** Panels can be effective sources for quality ideas. The success depends largely on the way in which meetings are structured. For example, it is more beneficial to structure meetings as an open discussion rather than a pointed attempt to identify product opportunities.

As high-speed Internet becomes more common, soliciting ideas via the company's website, email surveys, etc. has become an important way to gather information.

Open Innovation

Open Innovation approaches encourage companies to ***look outside*** of their organizations for new product ideas. The approaches are relatively new, in relation to “voice of customer” methods. Some of these emerging techniques include:

- ***Soliciting information from partners and vendors.*** Both may have technical expertise or capabilities that your company does not have. But partners and vendors also have an edge over others in that after working

with your company, they may have special insights into your organizational capabilities and potential.

- **Accessing the external technical community.** This method involves soliciting ideas and technology solutions from external scientific and technical communities. There are online tools that make this easier (NineSigma, Yet2.com, Innocentive), and most companies use this method for identifying technology solutions rather than for finding new product ideas.
- **Scanning small businesses and business start-ups.** The thought process here is that a scientist or designer may have the next great idea for your industry. And most likely, this entrepreneurial type is working in a small start-up enterprise.
- **External submission of ideas.** This method involves inviting customers, users and others in the external world to submit new product ideas via the Internet or company website. In this method, the whole world becomes a resource, which greatly magnifies the chances of the emergence of a great idea.
- **External idea contest.** This method involves inviting the outside world to submit new product ideas in contest form. It is similar to the external submission of ideas method, with an added incentive for the consumer.
- **External product designs.** This method uses the Internet to invite customers, users and others in the external world to submit finished product designs (not just ideas). This method is also known as “crowd sourcing.”

Accessing the external technical community involves soliciting ideas and technology solutions from external scientific and technical communities.

In this method, the whole world becomes a resource, which greatly magnifies the chances of the emergence of a great idea.

Others

- **Peripheral vision:** In this formal strategic exercise, companies assess the external world to identify trends and threats and, in the process, define

potential new products. The approach is based on the tenet that most firms get blindsided by major external events and miss opportunities for new products because they lack peripheral vision.

- ***Disruptive technologies:*** Proponents argue that disruptive technologies—radical changes in a technology—pose great threats to many organizations, but also provide great opportunities to those firms that see the disruptions coming. The approach here is to monitor technological trends formally; to identify potential disruptive technologies; and, most important, to define resulting new product ideas.
- ***Idea capture internally:*** This typically involves formally soliciting new product ideas from employees (often via an internal Web page), and then screening and handling these ideas through a structured process. The challenge is that most systems to capture employee ideas are poorly constructed and mismanaged.
- ***Patent mapping:*** This method involves mapping others' patents to see where the technical and competitive activity is and to identify the potential areas for new products.

Proponents argue that disruptive technologies pose great threats but also provide great opportunities to those firms that see disruptions coming.

EVALUATION

In any successful product development program, *well-defined goals*, coupled with *appropriate evaluation criteria*, are critical elements in ensuring success. The following steps should be taken to create a system that holds implementers accountable for the overall success of each new product that is developed.

- *Evaluation criteria* are established for each new product, and projections of key performance metrics are examined before the development stage (i.e. year one sales, time-to-market, etc.).
- A *project timeline* is established in sync with success criteria, creating deadlines by which each milestone should be reached.
- The *project team* is held accountable for meeting success criteria in a timely manner throughout the project.
- A *post-launch review* is the final point of accountability. Actual results are determined and measured against original projections.
- Shortfalls are examined and a *continuous learning* and *improvement process* is established.

Evaluation criteria are established for each new product and projections of key performance metrics are examined.

Improve the Design Process Continuously

Continuous improvement is the key to success. As technology progresses and competition toughens, it becomes increasingly important to stay ahead of the curve. The following are some ideas to help companies create a process that is founded on continuous improvement:

- *Evaluate and re-evaluate* the design process. Eliminate the high effort and low return activities.
- *Constantly question* why things are done and how they could be done better.
- *Make quality* the basis for decisions.
- *Use benchmarking* as an objective basis for comparing the organization and its products to other companies and their products.

- *Use secondary research* to identify opportunities for improvement.
- *Invest in training* and develop personnel to improve productivity.

NEW PRODUCT DEVELOPMENT MODELS

In the automotive, biotechnology, electronics, pharmaceuticals and computer industries, firms rely on the development of new products to stay ahead of the competition. In fact, companies in these industries depend on products developed in the last five years for *more than half* of their annual sales revenues.

The rate of failure for new products is alarmingly high. A majority of products that go through the research and development process never make it to market.

Despite these statistics, the rate of failure for new products is still alarmingly high. A majority of products that go through the research and development process never actually make it to market, and nearly half of those products that do reach the market fail to yield economic returns. To combat these negative trends in new product development, it is essential for companies to employ a *systematic program* to move potential product and service ideas through an “*idea production line*.” In the following sections we describe several frameworks used by companies worldwide.

PDBPA SOFTWARE

California-based consulting firm, **DRM Associates**, offers *Product Development Best Practices and Assessment (PDBPA)* software. The program describes **270** best practices identified by researching and examining companies’ product development practices from around the world. Though the steps discussed below are automated, it is worth examining the process.

The PDBPA software provides a structured benchmarking and assessment methodology.

- The PDBPA software provides a *structured benchmarking* and *assessment methodology* for the product development process based on best practices. Sources used to compile these best practices include:
 - Company visits
 - Technology vendors
 - Conferences
 - Corporate handbooks
 - Telephone discussions and interviews
 - Consulting experience
 - Panel of experts
 - Literature review
 - Internet (and other secondary) research
 - Workshops and meetings
- A *self-assessment* step describes these best practices and guides company personnel through the software-based assessment process. This assessment and improvement process is illustrated below.
- In addition to a description of best practices, the software contains questions that attempt to assess the use of these practices within a company. Responses are then processed using an *evaluation scale*, a *weighting factor* and a *final performance rating*. The performance rating is then compared to that of other companies, indicating the importance and potential urgency of improving the development process.
- Using *gap analysis*, the software presents appropriate opportunities for improvement that will yield the highest economic returns.

The software also assists companies in developing product development strategies aligned with their own organizational goals and strategic orientations. Through this complex analysis, the software helps each company focus on employing the strategy that best meets its needs while still developing products and services that will help the company distinguish itself in the marketplace. The six primary product development *strategic orientations* described by the program include:

Strategic Orientation	Description
Time-to-Market	The priority here is to get a product to market fast. This is typical of companies involved with rapidly changing technology or products with rapidly changing fashion. Pursuit of this strategy typically will lead to tradeoffs in optimizing product performance, cost and reliability.
Low Product Cost	This orientation is focused on developing the lowest cost or highest value product. This is typical of companies with commodity type products, products reaching a mature phase in their life cycle, or where there is consolidation or a shrinking market.
Low Development Cost	This orientation focuses on minimizing development cost or developing products within a constrained budget. While this orientation is not as common as the other orientations, it occurs when companies are developing products under contract for other parties or where a company has severely constrained financial resources.
Product Performance, Technology & Innovation	This orientation focuses on having the highest level of product performance, the highest level of functionality or functions and features, the latest technology or the highest level of product innovation. This orientation can be pursued by companies in many industries or many products except commodity products.
Quality, Reliability, Robustness	This orientation focuses on assuring high levels of product quality, reliability and robustness. This orientation is typical of industries requiring high quality because of the significant costs to correct a problem (e.g., recalls in the automotive or food processing industries), the need for high levels of reliability (e.g., aerospace products), or where there are significant safety issues (e.g., medical devices, pharmaceuticals, commercial aircraft, nuclear plants, etc.).
Service, Responsiveness & Flexibility	This orientation focuses on providing a high level of service, being very responsive to customer requirements as part of development, and maintaining flexibility to respond to new customers, new markets and new opportunities.

Source: <http://www.npd-solutions.com/pdbpa.html>

- Based on the *performance ratings*, the software determines how well the company's current development practices support its desired strategic orientation.

- More than 50 companies, including **Bayer, Earthlink, Motorola, Nokia, Rockwell Automation** and **Sun Microsystems** have successfully used this software to benchmark their product development processes, understand best practices, align product development practices with strategy and improve their new product development processes.

STAGE-GATE®

Many leading companies have used best practice research to overhaul their new product development processes, using a Stage-Gate new product development process. According to a **Product Development & Management Association**

Almost 70 percent of leading U.S. product developers now use some type of the Star-Gate process.

(PDMA) best practices study, almost 70 percent of leading U.S. product developers now use some type of Stage-Gate process. A Stage-Gate system takes a new product project from *idea* to

launch. It divides the project into distinct stages separated by management decision gates. Cross-functional teams must successfully complete a set of related tasks in each stage prior to moving to the next stage of product development. The process is illustrated below.

Stages

The players on the project team represent *various departments*, bringing a *variety of perspectives* to the project.

Team members are responsible for key tasks to gather the information necessary to move the project to the next *gate* or *decision point*. To

Team members are responsible for key tasks to gather the information to move the project to the next gate.

effectively **manage risk**, the activities in each stage must be designed to gather vital *technical, market-based, financial and operations* information. Uncertainties decrease at each stage as the process progresses; thus, **expenditures** in each stage rise but *risk* is managed effectively. A brief description of each stage follows:

- **Scoping:** A quick and inexpensive assessment of the technical merits of the project and its market prospects.
- **Build Business Case:** This is the critical homework stage - the one that makes or breaks the project. Technical marketing and business feasibility are assessed, resulting in a business case with three main components: product and project definition; project justification and a project plan.
- **Development:** Business case plans are translated into concrete deliverables. The product development activities occur, the manufacturing or operations plan is mapped out, the marketing launch and operating plans are developed and the test plans for the next stage are defined.
- **Testing and Validation:** The purpose of this stage is to provide validation of the entire project: the product itself, the production process, customer acceptance and the economics of the project.
- **Launch:** Full commercialization of the product - the beginning of full production and commercial launch.

Technical marketing and business feasibility are assessed resulting in a business case with three main components.

Gates

Prior to each stage is a **gate** that serves as a decision or a “go / kill” point. At these gates, substandard and mediocre projects and ideas are eliminated and resources are appropriately distributed among the remaining projects. The structure of each gate is illustrated below, followed by a brief description of each component:

Prior to each stage is a gate that serves as a decision point.

- **Deliverables:** This is the information that is presented by the project team in the gate review meeting. This includes any supporting information to assist the group in making a go / kill decision. The information gathered is well-defined in advance of the meeting, as a result of the actions in the preceding stage.
- **Criteria:** What the project is judged against in order to make the go / kill decision. These criteria also serve as a metric by which the group

organizes and prioritizes projects and next steps. This step typically involves a scorecard that includes technical, financial and qualitative evaluations.

- **Outputs:** The final outcome or result of the gate review process. Some examples of clearly defined and previously determined outputs include: a final decision (go / kill / hold / recycle) and a plan with next steps including a *strategic project plan, timeline* and *deliverables* for the next gate.

NEXTGEN STAGE-GATE®

It is common to find companies employing the Stage-Gate System that have turned the process into a *bureaucratic nightmare*. The following steps were written to supplement the original process. The new and improved process has been called NextGen Stage-Gate. By using the same framework as the original model and incorporating some of the following principles, companies are continuing to make Stage-Gate work.

It is common to find companies that have turned the process into a bureaucratic nightmare.

Lean

Companies are constantly looking to streamline processes and reduce waste. Borrowing concepts from *lean manufacturing*, they hope to become more efficient and cut costs in the system. Questions to guide a company's self-assessment include: Is this really necessary? How can projects be completed faster? Better? Continuous learning and improvement is a key facet of the lean method. Constant evaluation of current and discarded projects and processes is a critical step in a company's growth, development and improvement.

Companies are constantly looking to streamline the process and reduce waste.

Scalable

The Stage-Gate process has evolved into multiple versions: **Stage-Gate XPress** for projects of moderate risk (such as improvements, modifications and extensions), **Stage-Gate Lite** for small projects (such as simple customer requests) and **Stage-Gate TD** for technology development projects. Regardless of the size or scope of a project, there is undeniably some form of the Stage-Gate concept that will work.

Regardless of the size or scope of a project there is some form of Stage-Gate that will work.

Adaptable

NexGen Stage-Gate is flexible, allowing the project team to determine necessary actions and appropriate deliverables at each gate. It acknowledges and adapts to fluid and dynamic information. Through *spiral development*, fast-paced teams cope with changing data to correct and improve the process and final product.

Partnerships and Alliances

The new product development process often involves *partnerships* and *alliances* with suppliers, subcontractors and outsourced vendors. Companies are increasingly finding the value of building sub-processes into their traditional new product development systems to more effectively manage relationships with these third parties. Ingrained in each stage of the Stage-Gate process are critical external activities such as identifying the need for partners, seeking potential partners and gathering vital information on prospective partners.

The new product development process often involves partnerships and alliances.

Company Culture

Within companies that believe in the value of the process, Stage-Gate has become much more than an organizational framework, process or set of flow charts and checklists. These successful companies recognize that an effective

product development system requires *fundamental behavioral changes*, including: discipline; deliberate, fact-based and transparent decision-making; responsible, accountable and truly cross-functional teams; continuous improvement; risk taking and risk awareness. Taking these elements into consideration, NexGen Stage-Gate is designed to be a “vehicle for change: altering how people think, act, decide and work together.”

QUALITY FUNCTION DEPLOYMENT (QFD) – HOUSE OF QUALITY

The QFD framework was originally developed in Japan and is most often used to

This model involves a very structured process and a matrix that maps customer needs and requirements.

“encourage and enhance communication and coordination between engineering, marketing and manufacturing employees.” In the end, QFD seeks to link the *needs of*

the customer with the *design, development, engineering, manufacturing and service functions*. This model involves a very structured process and a matrix that maps customer needs and requirements against key product attributes. The following steps describe the process in more detail.

Determine Customer Needs

The first step in this process is to *determine customer needs and requirements*. This information is collected through some combination of the following techniques: soliciting customer feedback, conducting surveys and studies of current and prospective customers and conducting secondary market research.

Prioritize

The next step is to *prioritize these requirements* in terms of their relative importance to the customer. This is accomplished through the creation of a weighting scale by which a specific weight is assigned to each customer requirement.

Mapping Process

Next, the product development team must identify the ***engineering attributes*** that guide the product's performance. Once customer requirements and product attributes are mapped out, product developers determine and explain the ***direction and strength*** of their relationships. In addition, interactions between ***specific design parameters*** are identified. Lastly, the process includes a competitive summary of ***customer perceptions*** of a company's existing products compared to those of its competitors. A variety of software programs exist to help move a company through this complex process step-by-step.

Once customer requirements are mapped out, product developers determine the direction and strength of their relationships.

CASE STUDIES

Now that we have examined some of the key *models* and *frameworks* used to implement new product development strategies, we will turn to some examples of specific *systematic approaches* used by a number of successful companies. While mapping out organizational models is important, companies often use a hybrid of models and ideas when creating a *unique system* that meets their specific needs. Below are some examples of effective programs that have led to the development of a variety of successful new products and services for companies around the globe.

Companies often use a hybrid of models and ideas when creating a unique system that meets their specific needs.

TOYOTA

The Toyota Product Development System, Integrating People, Process and Technology (2006, Productivity Press) was authored by James M. Morgan and Jeffrey K. Liker. The book describes the *product development guidelines* practiced by the world-renowned lean manufacturing pioneer, **Toyota Corporation:**



- Establish *customer-defined value* to separate value-added from waste.
- *Front-load the product development process* to thoroughly explore alternative solutions while there is maximum design space.
- Create a *level flow* for the product development process.
- Utilize *rigorous standardization* to reduce variation while creating flexibility and predictable outcomes.
- Develop a *chief engineer system* to integrate development from start to finish.
- *Balance* functional expertise and cross-functional integration.
- *Develop towering competence* in all engineers.
- *Fully integrate suppliers* into the product development system.

- Build in *learning* and *continuous improvement*.
- Build a **culture to support excellence** and relentless improvement.
- **Adapt technologies** to fit your people and process.
- Align your organization through **simple visual communication**.
- Use powerful **tools for standardization** and organizational learning.

NEXEN GROUP

The **Nexen Group Inc.** of Vadnais Heights, Minnesota has employed and embraced its own version of the **Toyota Product Development System** to improve its new product development efforts. *“The results are a rebirth at Nexen,”* says David Hein, Vice President of Engineering at this manufacturer of brakes, clutches and other motion control systems. The following are brief descriptions of some of the steps involved in the product development system.



Set-Based Design

Nexen adopted *“set-based design”* in 2006. In this process, four solid models are created and then narrowed down to two prototypes. From these two prototypes comes one final unit. Designs are selected to move ahead in the product development process based on how well they stack up against a value distribution chart. Integral to Nexen’s approach is the relationship between the engineer and the customers. Each product development project requires a minimum of ten customer visits. The Vice President of Engineering says he prefers a *“Noah’s Ark”* approach to those visits, sending engineers out in teams of two for onsite visits with the people making buying decisions.

In this process, four solid models are created and then narrowed down to two prototypes.

Value Judgments

Nexen also asks customers to *accept or reject* preconceived value propositions that they have written. Based on customer feedback, the manufacturer constructs a value distribution, which is a visual tool that translates “customer-care-about” into design priorities. These value distributions are essential to design reviews.

EATON CORPORATION

Eaton Corporation, a designer and manufacturer of hydraulic power generation



and fluid conveyance systems for the aerospace industry, employs a *systematic process* for new product development and evaluation. Central to

the company’s approach is the Eaton value cycle process, by which all projects are measured. This process identifies variables that help define the target market, such as: market trends, the long and short term needs and wants of

Eaton fuels the product development process using innovation summits and design bursts.

customers and value to shareholders. This preliminary assessment is a precursor to any innovation and is vital to Eaton’s ability to meet aggressive growth goals. The company’s new product development process can be described as a **State-Gate** approach, not unlike what many other manufacturers do. However, the ideation step leading up to this process is unique. Eaton fuels the product development process using “*innovation summits*” and “*design bursts*,” as described below.

Innovation Summits

Innovation summits are two-to-three-day events that involve representatives from multiple levels of the organization. Participants often include the chief technology officer, program management representatives, engineering staff, sales and marketing employees, customers and even competitors.

The first day of an innovation summit includes multiple outside speakers to help generate ideas. “*Then we lock ourselves in a room for two days and see what percolates up based on what we heard the first day,*” explains a company representative. The anticipated end result of an innovation summit is **three to five technologies** that are worthy of moving to the next step in the development process. Generally, the result includes a “fairly simplistic” evaluation of the technology in addition to ballpark estimates about the market and projected revenues. Estimates are then reported to senior level managers, who decide which ideas will move on to the next step – a design burst.

“We lock ourselves in a room for two days and see what percolates.”

Design Bursts

Design bursts offer deeper insights into the thoughts and ideas generated in the innovation summits. Like the innovation summits, design bursts typically last two to three days. While the innovation summits are about ideas and creativity, design bursts are engineering-focused. The end result of a design bursts is more concrete ideas about the design and appearance, financial investments required and potential economic returns associated with each project. Like innovation summits, design bursts conclude with reports to decision makers in senior management positions.

While the innovation summits are about ideas and creativity, design bursts are engineering focused. The end results is more concrete ideas about design and appearance

INTEL

In an effort to ***connect engineers with customers***, Intel has created the “***Itopian vision***,” embracing a “***listening***” ***marketing model*** making engineers available for one-on-one conversations with technology users.

Itopia is a section of Intel’s website that allows IT professionals to chat with engineers (who have also been trained to participate in industry forums) in order to address customer needs and suggestions. Intel is also creating communities for IT pros to talk to each other. To build awareness of the effort, Intel is running an ad campaign themed “*IT Utopia*” using banners on tech sites that connect directly with engineers. The goal of the effort is to embrace social media not just as a marketing channel but also as a source for product ideas and customer feedback. Other examples of this technique include:



- **Starbucks** began a website called *MyStarbucksIdea.com* that solicits ideas about how the company can improve its service and products to better meet customer needs.
- Computer giant **Dell** has a website called *IdeaStorm* that is used to gather ideas and feedback from users. As a result of feedback from the site, the company created a Linux-compatible laptop.
- **Intel** plans to use the *live chats* and *forums* to gain insights on everything from product development to effective marketing language.

GOOGLE

Google’s many new product releases can appear random and even a bit confusing. For instance, the organization has introduced everything from a *blog search engine* to an *instant messaging program* to an *online payment system*. “*The philosophy is, try a bunch of ideas, refine them, and see what survives,*” says Marissa Mayer, Google’s Vice President of Search Products and User Experience. Below are some excerpts from Mayer’s conversation published in an article in *BusinessWeek*.



- “*We believe that we should be launching more products than what will ultimately become phenomenally popular. The way you find really successful new innovation is to release five things and hope that one or two of them really take off. We should be able to put products out there and, without a lot of promotion, a good product will grow. We like to put*

products out there early, see what users say about them, what additional features they'd like to see, and then build those out."

- When asked about internal engineering and product development processes, Mayer responds, *"We still don't do very high-definition product specs. If you write a 70-page document that says this is the product you're supposed to build, you actually push the creativity out with process. The engineer who says, you know what, there's a feature here that you forgot that I would really like to add. You don't want to push that creativity out of the product. The consensus-driven approach where the team works together to build a vision around what they're building and still leaves enough room for each member of the team to participate creatively, is really inspiring and yields us some of the best outcomes we've had."*

IKEA

The new product development process at **IKEA**, the furniture retailing phenomenon, could be summed up in one phrase – *collaborative design*. IKEA sells everything from desk lamps to wine glasses, kitchen countertops to area rugs, and tea candles to patio furniture, to *millions* of people around the world. The furniture is simple, relatively easy to put together and comes with everything a customer needs for assembly. In short, every part of the IKEA experience seems to *run smoothly*. This is likely due in large part to a solid *collaborative development and design process*.



Start With Price

"When we decide about a product, we always start with the price," says June Doboehmier, an IKEA product developer. For example, in the concept step of the process, designers are told there is a need or demand for a specific type of product. Next, the developer gives the lead designer some basic design features, project parameters, goals and a target price: *"We'd like to have a cabinet to hold a large screen TV that is 42 inches, and priced to come out at X*

"When we decide about a product, we always start with price."

dollars.” Once the specific price is set, the responsibility is on the designer to create a product that fits the specific parameters.

The involvement of a variety of people with different perspectives on a project

“There’s no real end to the year cycle. It’s continual.”

and different end goals is a great way to ensure the emergence of a well-rounded

product. IKEA is constantly developing new products (about 5-10 new products are in the development process at any given time) and is constantly developing the product development process itself. *“It’s an ongoing process,”* Doboehmeir said. *“There’s no real end to the year cycle. It’s continual.”*

CONCLUSION

Today there are endless options and infinite differences in product development processes among organizations worldwide. Many of these differences are a direct result of logical differences in organizational environment, business strategy, the nature of the products or services or customer requirements. However, some of these differences can be attributed to a lack of knowledge of the best practices of product development described in this paper.

Today there are endless options and infinite differences in product development processes among organizations worldwide.

It is now clear that new product development is *so much more* than a few brainstorming sessions and an engineered design. While both of these things are indeed a vital part of the process, they are just that – part of the process. Don't be mistaken – developing a culture of new product development in your business and encouraging employees to be creative and offer ideas is important. But it is equally important to create a systematic process through which thoughts and ideas are collected, organized, evaluated and processed. And it is through the creation of an efficient and effective “idea production line” that good ideas are molded into great products and services that meet and exceed client and customer expectations.

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