NEW PRODUCT DEVELOPMENT (NPD) PROCESS

Submit
1. Project Preference form & resume
2. Signed C&I P signature pages (6 sheets)

Today
1. Web site access (Williams)
2. Lecture (Durfee)

Wednesday
1. Lecture: Project Mgmt (Adams)
2. Team meeting
Task

- Form groups of approximately six
"The Knowledge Economy as we know it is being eclipsed by something new -- call it the Creativity Economy"
Task

- List 10 products (not services), introduced in the last 20 years, that have changed people's lives
- Deliverable: List of 10, pick two to report
- Time: 5 minutes
Classic Failures

- Optimistic sales ramp up (< 3 yrs)
- Too far out there (Segway)
- Focus on features v. benefits
Habits of Effective Product Development Teams

- Study the customer
- Creativity
- Quick and dirty prototyping
- Objective evaluation
- Cross-functional teams
- Established NPD process
- Manage risk, abandon if necessary

Adapted from S. Eppinger, Shocker lecture 2003
New Product Categories

New to the world

New to the company

Product line addition

Product improvement

New application

Source: Crawford, *New Products Management*
Another NP Index

- Market pull
- Technology push

Market driven = customer demands it
Technology driven = dot.bomb

Where are the six NPDBD projects?
Investigative Reporting on Your Client

Medtronic

SEC Edgar

Value Line

UMN Library
Generic NPD Design Process

Planning  Concept Development  System-Level Design  Detail Design  Testing and Refinement  Production and Launch

Source: Ulrich & Eppinger, *Product Design and Development, Exhibit 2-2*
Baxter Health Care NPD

Innovation and Portfolio Planning

Development and Commercialization

Optimization and Maintenance

Research & ideation

Feasibility & Prototype

Develop

Validate

Commercialize & FDA Review

Scale-Up

Support

Do the “Right products”

Do “products Right”

“Six Ways to Six Sigma”

Source: Axiom Business Concepts
FDA Design Process

DESIGN CONTROL GUIDANCE FOR MEDICAL DEVICE MANUFACTURERS

This Guidance relates to FDA 21 CFR 820.30 and Sub-clause 4.4 of ISO 9001

March 11, 1997

III. APPLICATION OF DESIGN CONTROLS

Design controls may be applied to any product development process. The simple example shown in Figure 1 illustrates the influence of design controls on a design process.

![Diagram of design controls process]

**Figure 1** - Application of Design Controls to Waterfall Design Process (figure used with permission of Medical Devices Bureau, Health Canada)

The development process depicted in the example is a traditional waterfall model. The design proceeds in a logical sequence of phases or stages. Basically, requirements are developed, and a device is designed to meet those requirements. The design is then evaluated, transformed to production, and the device is manufactured. In practice, feedback paths would be required between each phase of the process and previous phases, representing the iterative nature of product development. However, this diagram has been created from the figure to make the influence of design controls on the design process more distinct.

Introduction
Stage-Gate NPD Process

Gate 1: Ideas
Gate 2: Idea screen
Gate 3: Scoping
Gate 4: Second screen
Gate 5: Build Business Case
Gate 6: Evaluate
Gate 7: Development
Gate 8: Evaluate
Gate 9: Test & Validate
Gate 10: Evaluate
Gate 11: Launch
Gate 12: Post-Launch Review

Source: www.stage-gate.com and Cooper, Winning at New Products
Generic Product Development

Opportunity Identification

Concept Development

Detail Design

Test and Refine

Launch and Ramp-Up

Fuzzy Front End

$\$\$$

$\$\$$
Opportunity Identification

- Discover a need
- Invent a new technology
- Understand the competition
- Find a gap

1. Define the problem
2. Understand the users
3. Research the current solutions
Task

- Examine the collection of cell phones being used in your group. List what's right and what's wrong with them. List the ideal features of a cell phone.
- Deliverable: List of 5 ideal features, pick two to report.
- Time: 6 minutes
The 3 F’s

- **Market Feasibility**
  Does anyone want it?

- **Technical Feasibility**
  Can we make it?

- **Financial Feasibility**
  Will $ be made?
Technical Feasibility

Market Feasibility

Financial Feasibility

FULLY REFINED PRODUCT
Market Feasibility
Understand the Customer

- Voice of the Customer (VOC)
- Who?
  - Market segmentation
  - Personas
- How
  - Observation
  - Interviews
  - Survey
  - Focus Group

ETHNOGRAPHY
Customer-Driven Design

1. Understand needs
2. Gather reaction to concept
3. Gather reaction to prototype
Task

- The team is conducting interviews with customers in the pill reminder target market. Create the interview script.
- Deliverable: Report two questions.
- Time: 5 minutes.
Technical Feasibility
Idea Generation

- External
  - Patents
  - Reverse engineering
  - Trade magazines, trade shows, stores
  - Experts
  - Users
- Internal
  - Brainstorming (many methods)
  - Solo storming
Concept Screening

- Define the metrics
- Include all stakeholders
  - Internal screen
  - Customer screen
- Be objective
- Step back and reflect

Ulrich and Eppinger, *Product Design and Development*, Exhibit 7-4
Engineering Design

- Analysis-based design
  - Use equations to ball park
  - Use computer simulations to fine-tune
  - Show that you know physics and engineering
- Get in the ball park with the prototype
  - But don't obsess over the details

VIRTUAL PROTOTYPING
Build Prototypes

- Quick and dirty is good
  - Fast
  - Cheap
- Learn from the prototypes
  - Internal communication
    - Solo/Team
  - External communication
    - Customer
    - Boss

If you have many prototypes, you will impress your client!
IP is Critical

- Value of company is in its intellectual property and the ability of staff to generate IP, not in the products
- VCs look at people more than at concept
- IP, utility patents
  - Technology disclosure
  - Provisional patent
  - Patent application
  - Issued patent
Financial Feasibility
When Forecasting

- Use client's process
  - Provide a framework
- The art of assumption
  - Be explicit
- Provide a range
  - Likely, Optimistic, Pessimistic
- Be realistic about market share, sales volume
- Cite sources for data (be credible)
Adoption Rate of Consumer Electronics

NPDBD Pro Forma Financials

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The graph shows the sales trend from Year 1 to Year 5.
Measuring NPD Success

- ROI, NPV
- Sales, growth rate
- Growth in related products
- Warranty and returns
- Customer satisfaction

Post-launch evaluation
About 40% of new products fail post-launch.
Top Ten Risky Assumptions

1. We will rapidly gain market share
2. We don't have to worry about the competition
3. Product will launch on time and on budget
4. Retailers will be desperate to stock our product
5. It is for everybody
6. Product will sell itself
7. Customers will find us
8. Customers will immediately see that our product is superior
9. Product will sell because it is technologically superior
10. I like the product so the customer will like it!
Take-home messages

- NP development is complex and uncertain
  - learn to manage risk
- NP development is an iterative process
  - prototype and evaluate early and often
- NP development is interdisciplinary
  - have the right team
- NP development needs structure
  - have a process
The NPDBD Mantra

Market Feasibility

Technical Feasibility

Financial Feasibility