Managing the New Product Development Process

The question posed

Despite the intense attention paid to innovation, failure rates are still very high.

More than **95%** of new product development projects fail to earn an economic return.

This chapter summarizes research on how to make new product development more effective and efficient.

The high failure rate for such projects underscores the **importance of identifying the most effective process for managing new product development**.

Key objectives **of the new product development process are**

(1) maximizing fit with customer requirements,

(2) minimizing cycle time,

(3) controlling development costs**.**

1. Maximizing fit with customer requirements

Maximizing fit with customer requirements requires knowing

- which **features are most important** to customers,
- what a customer is **willing to pay**, and
- how to **resolve competing customer desires**

2. Minimizing development cycle time

Minimizing development cycle time can afford a firm the opportunity to be **first to market** with a new product (i.e. better opportunity to **build brand loyalty**, **capture scarce assets**, **build customer switching costs**, and **develop complementary goods)**.

A shorter development process is also required to minimize costs (including providing a longer period of time over which to amortize costs).

3. Controlling development costs

Controlling development costs **is also important because even if products are a good fit with customer requirements and are brought to market quickly, if development costs are uncontrolled the firm will have a difficult time recouping its expenses**

Means

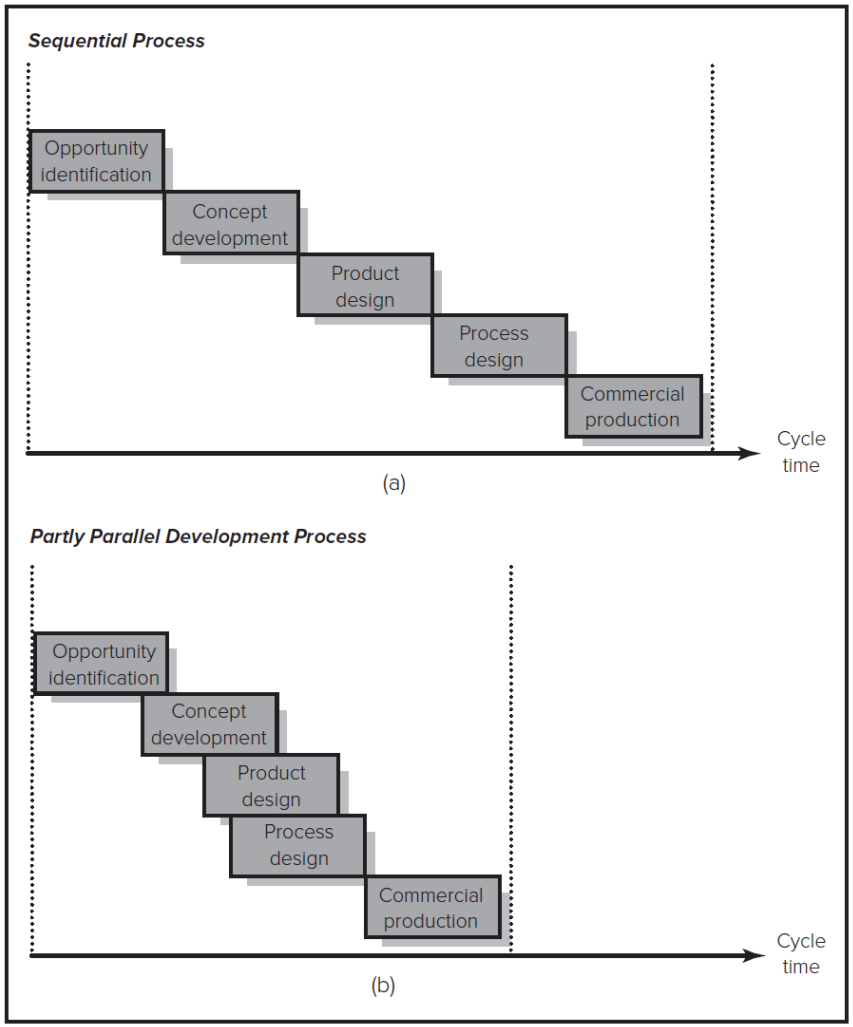
The means by which these objectives may be accomplished include **adopting parallel development processes**, **using project champions**, i**nvolving** customers and suppliers **in the process, and using** tools **that may improve the process**

Sequential versus Party Parallel Development Processes

Before mid-1990s, most US companies used sequential NPD process; now many use partly parallel process.

Partly parallel process shortens overall development time and enables closer coordination between stages.

In some situations, however, a parallel development process can increase risks.



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Project Champions

- Assigning a **senior executive** to champion a new product development project can **shorten cycle time** and ensure that the **product attributes match customer requirements** by **facilitating the allocation of resources** to the project and by **ensuring proper communication and cooperation** among the different functional groups needed on the project.

Project Champions

- **Risks of Championing** include the **loss of objectivity** by the project champion that can result in an inability to admit when a project has no future and if the champion occupies a senior level position in the organization **others may be reluctant to express their true thoughts** regarding the value of the project.
- To counteract these risks, firms may create the role of **"anti-champion"** to play devil's advocate.

Project Champions

68% of North American firms, 58% of European firms, and 48% of Japanese firms report using senior executives to champion their NPD projects.

Benefits of Championing

- Senior execs have power to fight for project.
- They can gain access to resources.
- They can communicate with multiple areas of firm.

Risks of Championing

- Role as champion may cloud judgment about project.
- May suffer from escalating commitment.
- Others may fear challenging senior executive.

May benefit firm to develop “antichampions” and encourage expression of dissenting opinion.

Five Myths About Product Champions

Markham and Aiman-Smith argue that a number of myths have become widely accepted about champions.

Myth 1: Projects with champions are more likely to be successful in the market (many factors determining market success are typically beyond champion's control).

Myth 2: Champions get involved because they are excited about project rather than from self-interest (results suggest that champions more likely to support projects that benefit their own departments).

Myth 3: Champions are more likely to be involved with radical innovation projects (equally likely to be involved with incremental projects).

Myth 4: Champions are more likely to be from high (low) levels in firm (either is equally likely).

Myth 5: Champions are more likely to be from marketing (15% from R&D, 14% from marketing, rest were from other functions or were users).

Involving Customers and Suppliers in the Development Process

Involving **customers** and **suppliers** in the development process may ensure that products fulfill customer performance/price requirements, **and** help control costs while speeding up development

Involving Customers

- Customer is often best able to identify the maximum performance capabilities and minimum service requirements of new product.
- Customers may be involved on N P D team.
- Firms may also use *beta testing* to get customer input early in the development process.
- Some studies suggest that it is more valuable to use “lead users” than a random sample of customers.
  - **Lead users**: Customers who face the same general needs of marketplace but experience them earlier than rest of market and benefit disproportionately from solutions.
- **Crowdsourcing**
  - Firms can also open up an innovation task to the public through crowdsourcing, where people voluntarily contribute their ideas or effort.

Involving Customers

Involving customers often involves **beta testing** early version of a product by customers to get early feedback.

Reliance on "**lead users**" (i.e. those who often recognize a need in advance of the general market) may more effective and practical than relying on a random sample of users.

Some firms are even involving customers in the "cocreation" of products

Involving Suppliers

Involving suppliers can improve the new product development process by sourcing information regarding **alternative inputs** and by improving coordination between the firm and its suppliers that should result in the **timely availability of inputs.**

Evidence shows firms that involve suppliers produce new products in **less time**, at **lower cost** and with **higher quality**.

Involving Suppliers

- Involving suppliers on N P D team or consulting as an alliance partner can improve product design and development efficiency.
- Suppliers can suggest alternative inputs that reduce cost or improve functionality.

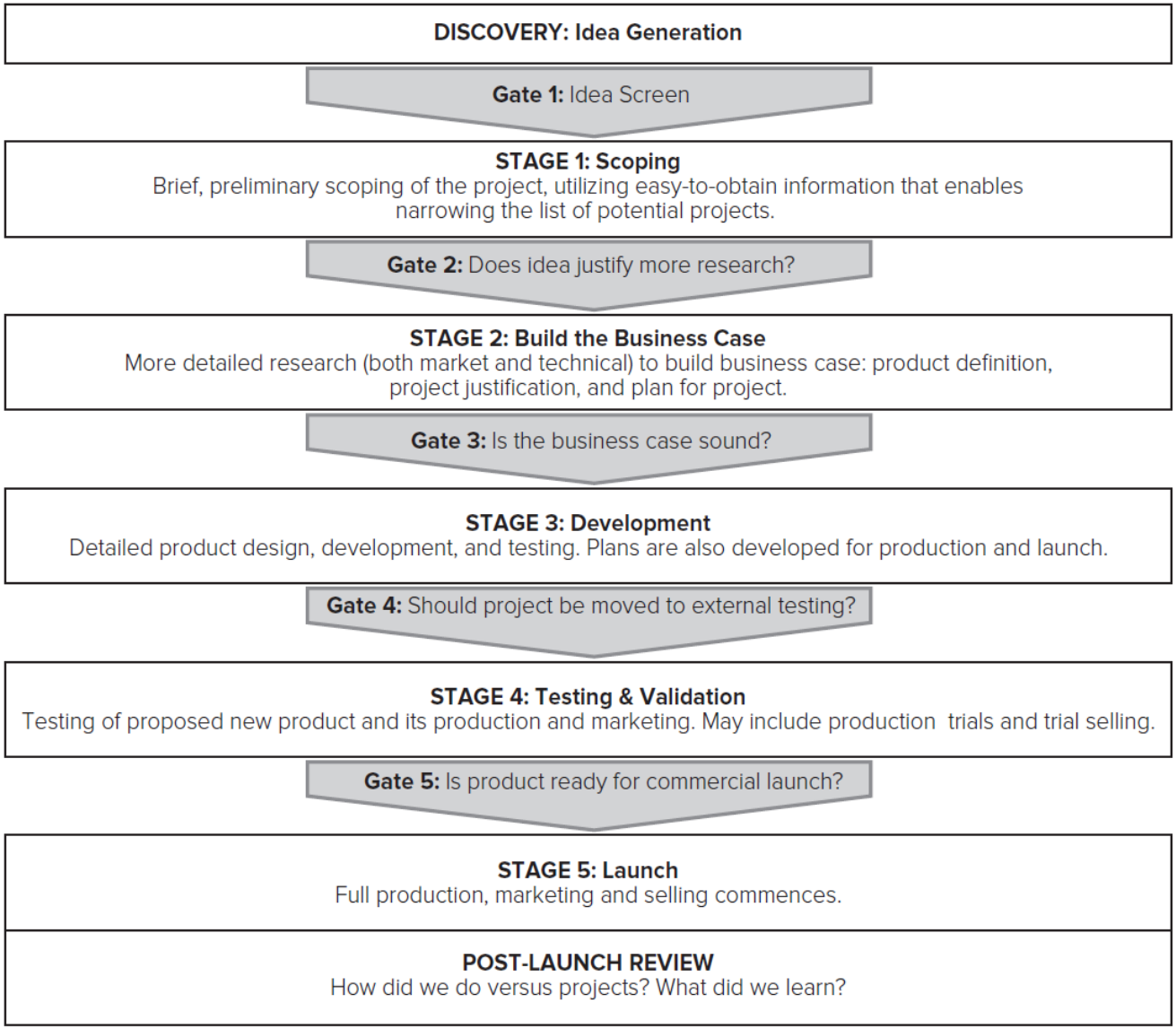
Stage-Gate Process

The **Stage-Gate Process** applies a **tough multi-functional review** at the end of each stage of the design process to ensure that only those projects demonstrating increasing certainty with regard to success move forward.

Prior to moving to the next stage the project must clear a **Go/Kill gate**

► **This is important since risks and costs escalate as a project proceeds**.

Stage-Gate Processes



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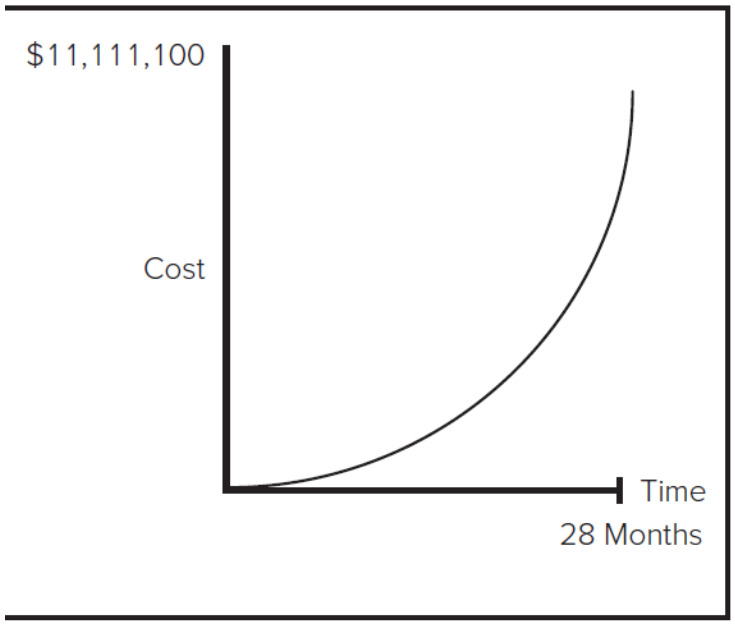
Utilize tough go/kill decision points in the development process help filter out bad projects.

Source: R. G. Cooper, "Stage-Gate Idea to Launch System," *Wiley International Encyclopedia of Marketing: Product Innovation & Management* 5, B. L. Bayus (ed.), (West Sussex UK: Wiley, 2011).

Tools for Improving the New Product Development Process 2

The time and cost of projects escalates with each stage, thus stage-gate processes only permit a project to proceed if all assessments indicate success.

Stage	Time	Cost
0. "Here's an idea!"		
1. Formulate-describe and sketch	1 week	$100
2. Conduct preliminary investigations	2 weeks	$1,000
3. Design and define specifications	1 month	$10,000
4A. Develop prototype and test		
4B. Market research		
4C. Strategic fit evaluation and NPV risk analysis	2 months	$ 100,000
5A. Scale up, build pilot plant		
5B. Market test	8 months	$ 1 million
6A. Build plant		
6B. Promote, launch, market	16 months	$ 10 million



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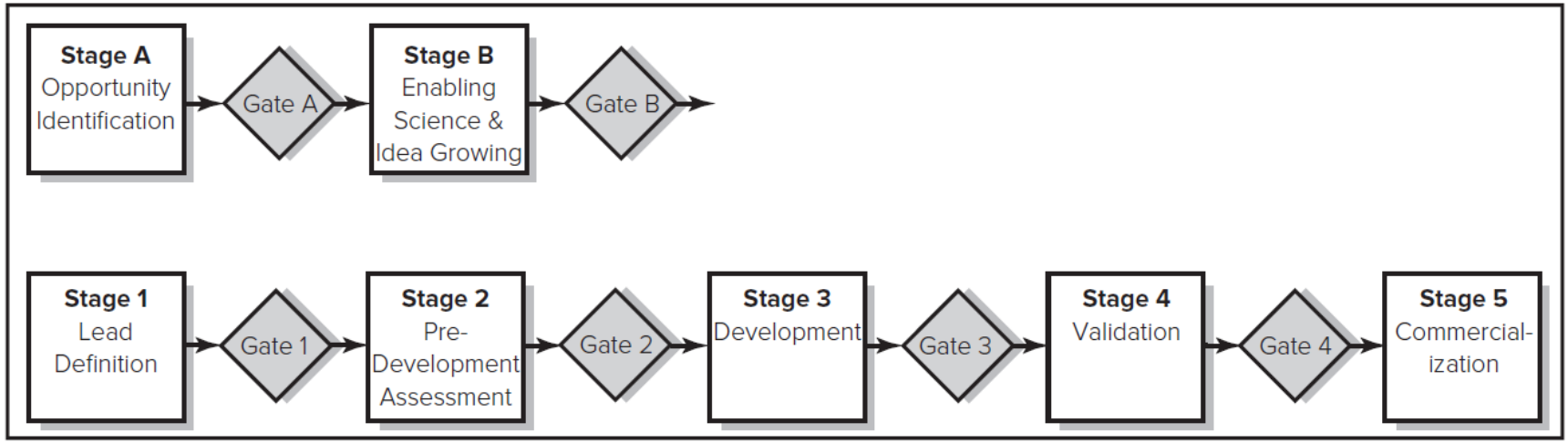
Tools for Improving the New Product Development Process

The stage-gate process can be modified to better fit a firm's particular development needs.

- For example, Exxon Research and Engineering's stage-gate system.



- Nearly 60% of firms use some type of stage-gate process to manage their NPD process.

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House of Quality

Quality Function Deployment or the "**House of Quality**" was developed in Japan as a comprehensive process for **improving communication and coordination** between engineering, marketing and manufacturing personnel.

The house of quality **maps customer requirements and product attributes** and provides a **common language and framework,** through which teams can understand the **relationship between product attributes and customer requirements**, identify **design tradeoffs**, highlight the **competitive shortcomings** of existing products and identify the steps to improve them.

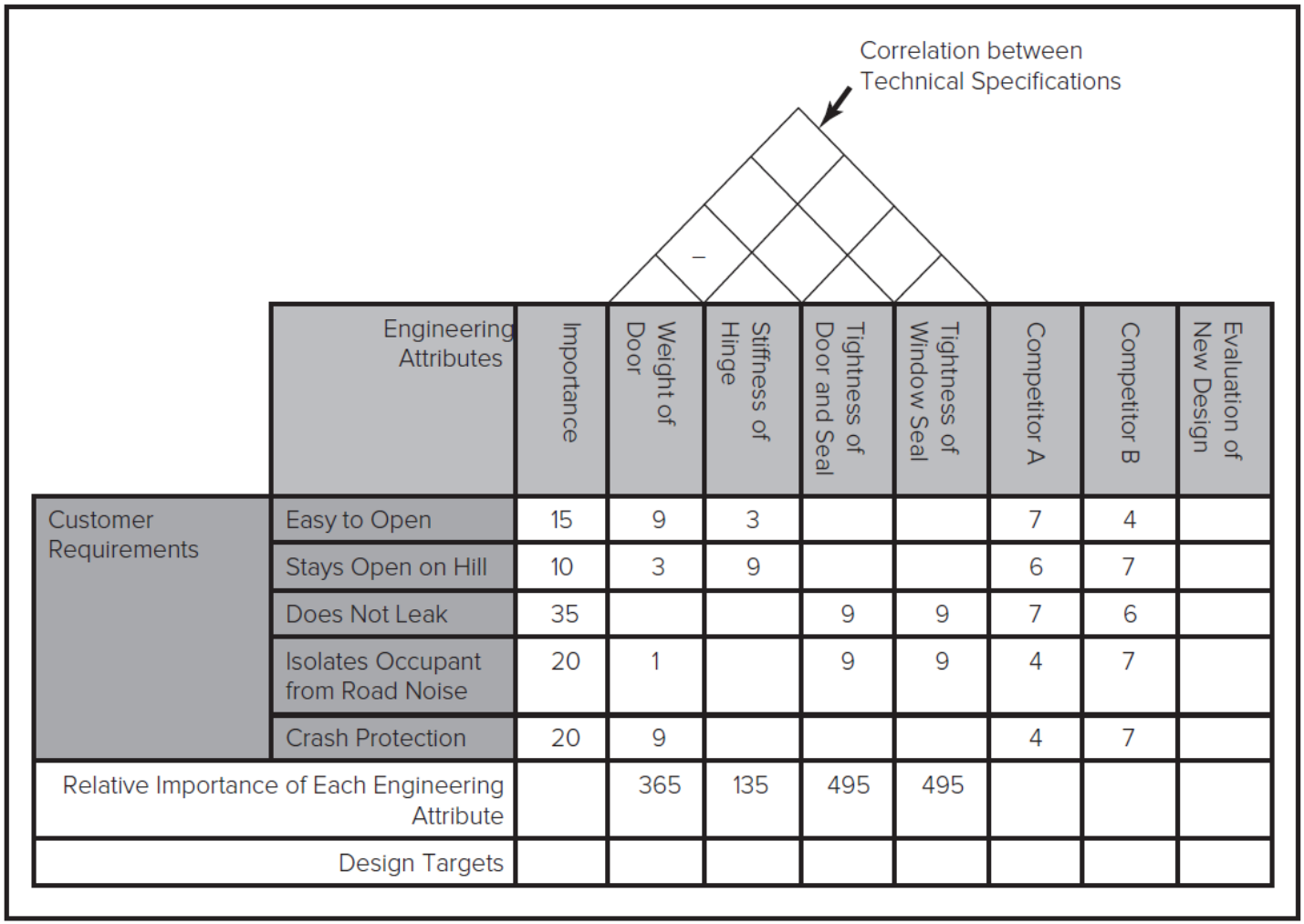
Steps in the process are as follows:

Quality Function Deployment (Q F D) – The House of Quality

Steps for QFD

1. Team identifies customer requirements.
2. Team weights requirements in terms of relative importance.
3. Team identifies engineering attributes that drive performance.
4. Team enters correlations between different engineering attributes.
5. Team indicates relationship between engineering attributes and customer requirements.
6. Team multiplies customer importance rating by relationship to engineering attribute and then sums for each attribute.
7. Team evaluates competition.
8. Using relative importance ratings for engineering attributes and scores for competing products, team determines design targets.
9. Team evaluates the new design based on the design targets.

Quality Function Deployment (Q F D) – The House of Quality: Case of Car Door



	Engineering Attributes	Importance	Weight of Door	Stiffness of Hinge	Tightness of Door and Seal	Tightness of Window Seal	Competitor A	Competitor B	Evaluation of New Design
Customer Requirements	Easy to Open	15	9	3			7	4	
	Stays Open on Hill	10	3	9			6	7	
	Does Not Leak	35			9	9	7	6	
	Isolates Occupant from Road Noise	20	1		9	9	4	7	
	Crash Protection	20	9				4	7	
Relative Importance of Each Engineering Attribute			365	135	495	495			
Design Targets									

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Design for Manufacturing

Design for Manufacturing often involves a set of design rules that reduce cost and development time, while boosting quality.

Design Rule	Impact of Performance
Minimize the number of parts	Simplifies assembly; reduces direct labor; reduces material handling and inventory costs; boosts product quality
Minimize the number of part numbers (use common parts across product family)	Reduces material handling and inventory costs; improves economies of scale (increases volume through commonalty)
Eliminate adjustments	Reduces assembly errors (increases quality); allows for automation; increases capacity and throughput
Eliminate fasteners	Simplifies assembly (increases quality); reduces direct labor costs; reduces squeaks and rattles; improves durability; allows for automation
Eliminate jigs and fixtures	Reduces line changeover costs; lowers required investment

Failure Modes and Effects Analysis

FMEA is a method by which firms identify potential failures in a system, classify them according to their severity, and create a plan to prevent them.

- Potential failure modes are evaluated on three criteria of risk: severity, likelihood, and inability of controls to detect the failure.
- Each criteria is given a score (1-lowest, 5-highest).
- Composite score is used to prioritize development efforts.

Computer-Aided Design/Computer-Aided Manufacturing

Computer-Aided Design (CAD) is the use of computers to build and test designs.

- Enables rapid and inexpensive prototyping.

Computer-Aided Manufacturing (CAM) is the use of machine-controlled processes in manufacturing.

- Increases flexibility by enabling faster changes in production set ups. More product variations can be offered at a reasonable cost.
- **Three-dimensional printing** is where a design is printed by laying down thin horizontal strips of material until the model is complete.

Theory In Action

Computer-Aided Design of an America's Cup Yacht.

Normally designing America's Cup yachts required several months to develop smaller-scale models at a cost of $50,000 per prototype.

Using computer-aided design, Team New Zealand was able to consider many design specifications in a matter of hours at little cost, enabling more insight into design trade-offs.

Computer-aided design also avoided inaccurate results from using scaled-down prototypes.

Tools for Measuring New Product Development Performance

While the means used to conduct an assessment may vary, many firms use some means of **evaluating the new product development process** in order to **identify which projects met their goals** and why, and to **benchmark performance** against competitors or historical experience.

Results of the assessment are used to improve resource allocation, employee compensation and to refine future innovation strategies.

Tools for Measuring New Product Development Performance

Measuring performance of NPD process can help company improve its innovation strategy and process.

- Measures of NPD performance can help management:
  - identify which projects met their goals and why.
  - benchmark the organization's performance compared to that of competitors, or to the organization's own prior performance.
  - improve resource allocation and employee compensation
  - refine future innovation strategies

Tools for Measuring New Product Development Performance

New Product Development Process Metrics include:

1. What was the average cycle time (time-to-market) for development projects? How did this cycle time vary for projects characterized as breakthrough, platform, or derivative projects?
2. What percentage of development projects undertaken within the last five years met all or most of the deadlines set for the project?
3. What percentage of development projects undertaken within the last five years stayed within budget?
4. What percentage of development projects undertaken within the last five years resulted in a completed product?

Tools for Measuring New Product Development Performance

Overall Innovation Performance measures include:

1. What is the firm's return on innovation? (This measure assesses the ratio of the firm's total profits from new products to its total expeditures, including research and development costs, the costs of retooling and staffing production facilities, and initial commercialization and marketing costs.).
2. What is the percentage of projects that achieve their sales goals?
3. What percentage of revenues are generated by products developed within the last five years?
4. What is the firm's ratio of successful projects to its total project portfolio?

Discussion Questions

1. What are some of the advantages and disadvantages of a parallel development process? What obstacles might a firm face in attempting to adopt a parallel process?
2. Consider a group project you have worked on at work or school. Did your group use mostly sequential or parallel processes?
3. Are there some industries in which a parallel process would not be possible or effective?
4. What kinds of people make good project champions? How can a firm ensure that it gets the benefits of championing while minimizing the risks?
5. Is the Stage-Gate process consistent with suggestions that firms adopt parallel processes? What impact do you think using Stage-Gate processes would have on development cycle time and development costs?
6. What are the benefits and costs of involving customers and suppliers in the development process?