Enactment of Technology Strategy: Creating and Implementing a Development Strategy

- Overview
- Development Strategy and Pre-project Management
- Project Organization and Management
- Learning Across Development Projects
- Conclusion
**Overview**

- Benefits (Promises) of Development Projects Through a Series of Product and Process Enhancement Activities:
  1. They can lead to market success in rapid changing, intensely competitive setting
  2. They can be the vehicle for entering new distribution channels and garnering new customers; target untapped niche markets
  3. Organization renew and change

**Overview - Questions**

- Why is it that so many development projects fail to deliver fully on their planned goals and anticipated benefits?
- Who do firms—even those that explicitly recognize the importance of product development—find it so challenging to focus resources and execute projects as intended?
- Why don’t the increased dosages of management attention that inevitably result when major projects slip seen to have any impact on project effectiveness?
Overview

Practice and Techniques Required by the New Product Development Team:

- Product development process
- Customer centric product development (identifying needs, selecting solutions)
- Global product development (global strategies, market & culture)
- Product portfolio/project planning (allocation of resources, project mix & priority)

Enactment of Technology Strategy:
Creating and Implementing a Development Strategy

- Organizations/firms
  - Can achieve robust and predictable development capabilities, but
  - Must develop a host of skills and concepts that can differ significantly from the natural inclinations common in organizations.

- Senior management’s involvement in the development process can be
  - Part of the Problem
  - Than part of the Solution
Enactment of Technology Strategy: Creating and Implementing a Development Strategy

- Development Projects
  - Product and Process Enhancement
  - New products and associated manufacturing processes and delivery system

- Product and process enhancement
  - Leapfrog competition
  - Create strong barriers
  - Leadership position as a dominant design
  - Overcome past weaknesses and establish stronger resource base for the future

- New product and new process
  - Hot, new, distinctive products
  - Enter new distribution channels/customers
  - Organizational renewal and change

- Adoption and implementation of new technologies
Reality of Many Development Projects: Schedule Slippage and Other Problems

  - Boeing delays first 787 delivery, 8/27/2010, MSNBC-MSN
  - Suppliers Sees Weak 787 Delivery Outlook, Doug Cameron, Dec. 1, 2010, WSJ

- Battery Incidents/Problems:
  - Boeing confirms new 787 battery incidents, USA Today, Jan 15, 2014

Regulatory Agencies and Compliances


- Regulatory Agencies and Compliances
  - Food and Drug Administration (FDA), www.fda.gov
  - Federal Communications Commission (FCC), www.fcc.gov
  - Federal Highway Administration (FHWA), www.fhwa.dot.gov
  - etc
Regulatory Agencies and Compliances

  - Protecting the confidentiality, integrity and availability of information that impacts a corporation’s stakeholders.
  - HIPPA (Health Insurance Portability and Accountability Act)
  - European Union Data Protection Directive
  - Payment Card Industry Security Standard (PCI data security)
  - etc

New Product Development Project

- Development Phases (5 stages)
- Milestone dates
- Resource planning
- Aggressive market goals
- Robust and predictable development capabilities?
- Risks and unexpected problems
  - Unexpected delay (completion time)
  - Over budget
  - Less than desired performance or quality
  - Management leadership required for success at all levels
Product Development Project – Typical Phases

- Knowledge acquisition
- Conceptual investigation
- Project resource requirements planning and management
- Product design, cost estimate
- Prototype build and test
- Pilot production run
- Manufacturing ramp-up

Exhibit 2 Timing and Impact of Management Attention and Influence

[Graph showing phases and attention levels]
Timing and Impact of Management Attention and Influence

- Knowledge acquisition phase – Senior Management (N/A)
- Conceptual investigation phase
  - Actual management activity profile
  - SM – N/A
- Basic Design
  - Ability to influence outcome (SM – N/A)
- Prototype building – SM attention
  - Demonstrate performance characteristics
  - Prototyping problems/resolving problems
- Pilot production – SM
  - Customer discovered a number of remaining issue and problems
  - Problems and issues resolution
- Manufacturing ramp-up

New Product Development Process

  1. Idea Generation
  2. Idea Screening
  3. Idea Development and Testing
  4. Business Analysis
  5. Beta Testing and Market Testing
  6. Technical Implementation
  7. Commercialization
  8. New Product Pricing
Microsoft Windows Desktop Application: Software Development LifeCycle (SDL)

- Pre-SDL Requirements: Security Training
- Phase 1: Requirements
- Phase 2: Design
- Phase 3: Implementation
- Phase 4: Release
- Post-SDL Requirement: Response

Development Strategy and Pre-project Management

Three Areas of Management Activity that constitutes development strategy for a business

- Pre-project planning
- Project execution
- Post-project learning
Development Strategy and Pre-project Management

Roles of Senior Management in Pre-project Planning

- 1) Traditional role:
  - Select, screen and evaluate project ideas, decide which to pursue

- 2) Development strategy leadership approach:
  - Motivate and guides the organization to create the best set of projects by articulating the criteria for the “correct set” of projects

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Development Strategy and Pre-project Management

- Traditional Senior Management Approach
- The Development Funnel (Exhibit 3)
  - Select, consider (screen), and evaluate project ideas
  - Go/No-go decisions
  - Commit resources
  - Develop products

Senior management's involvement in the development process is far more likely to be part of the problem than part of the solution.
Development Strategy and Pre-project Management

- Development Strategy Leadership Approach
  - Create the best set of “criteria” of development projects
    - Product strategy, Market strategy, Technology strategy
  - Create the aggregate set of projects
    - Use available resources to support existing market segments and to open new market segments
    - Appropriately utilize new technologies

The Aggregate Project Matrix

- Defines individual projects according to the degree of change in the product and manufacturing process they entail
- The greater degree of change along either dimension, the more resources that are likely to be needed in completing the project
The Aggregate Project Matrix

- Classifies individual projects into five types
  1. Derivative/enhancement/hybrid
  2. Platform/next generation
  3. Unique/radical
  4. Sustaining: Maintain or support existing products and processes or tailor them for a single customer
  5. Research and advanced development

- Three Central Types: 1, 2, 3 => Commercial development projects

A Mix of All Five Types of Projects

- For any ongoing business, a mix of all five types of projects is essential to long-term success
  - Majority – created, defined, and resources within the organization
  - Develop relationships with an industry association group or a university
  - Acquire another business to gain ownership of a unique/radical new product or process
  - Subcontract to a service organization or field support group – sustaining effort
The Aggregate Project Matrix

Product Changes

- New core product
- Next generation of core product
- Addition to Product family
- Add-ons and enhancements

Process Changes

- New core process
- Next generation process
- Single dept. upgrade
- Tuning And incremental

- Unique radical
- Platform or next generation
- Enhancements, hybrids, and derivatives
- Sustaining

Charting and Bounding Individual Projects

- Derivative Projects
  - Cost reduced versions of existing products to add-ons or enhancement for an existing production process
  - Less time and fewer resources
  - Constrained in its achievements by the existing platform product or process from which it is derived

- Breakthrough Projects

- Platform Projects
Charting and Bounding Individual Projects

■ Derivative Projects

■ Breakthrough Projects
  • Significant changes to existing products and processes and require much more creativity, greater degree of freedom, and more time and resources
  • Require dramatic changes in manufacturing processes
  • Results and requirements – much less certain
  • High risk and high return

■ Platform Projects

Charting and Bounding Individual Projects

■ Derivative Projects

■ Breakthrough Projects

■ Platform Projects
  • Considerably harder to define and bound because they need to be compatible with existing products and processes and yet be sufficiently new and bold that they can serve as a basis for subsequent derivatives, enhancements, and other variations of a basic product/process.
Classification of Development Teams

- Functional team structure
- Lightweight team structure
- Heavyweight team structure
- Autonomous team structure

Exhibit 5. Creating Product Families via Development Project

- Three generations of product, each involving one or more new platforms and a number of carefully selected and positioned derivative products aimed at different segments and distribution channels.

- Examples
  - Microsoft OS
  - Intel CPU and Chip Sets
  - Carrier Communication Systems: 1G, 2G, 3G, 4G, etc
  - Smartphones
Exhibit 6. Typical Development Capacity Predicament

- **80 full-time development and design staff** (Manager, Engineers, Technician) available to work on commercial development projects (Derivative, Platform, and Breakthrough)

- **960 people-months = 80 x 12** can be allocated each year to these three types of development projects

- **Over one-third of time actually available is spent on non-development engineering tasks** (such as sustaining engineering or other special requests the organization might place on these resources)

- **More projects under way** than they have resources to staff and complete the projects by the desired introduction dates.

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Exhibit 6. Typical Development Capacity Predicament

- **Catch-22 mode**: priorities continually shift and people are moved from one project to another project as the organization **robs Peter to pay Paul** in hopes of completing projects as scheduled

- **Large companies** normally assign multiple projects to Scientist, Engineers, or Marketing: at any point in time each person can work on only one project
  - Many projects are in state of **Work In Progress** (WIP) – slow them down

- **Small companies**
  - Most of them have only one project to work
  - No WIP to slow them down
Eight Step Procedure

1. **Define the primary types** of commercial development, advanced development, and sustaining activity projects.

2. **Determine the FTEs** (full-time equivalent) and cycle time requirements for representative projects of each of those types.

3. **Identify existing resources** and compare those with the capacity required to complete existing projects on time.

4. **Compute the implied capacity utilization** from Step 3 and make the adjustments to bring supply and demand into balance.

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Eight Step Procedure

5. **Determine the mix of project types** required in the future to achieve the firm’s business objectives.

6. **Estimate the number of projects of each type** that can be undertaken to provide the desired mix and yet not over commit existing development resources.

7. **Create and define the set of specific projects** that will be underway at various points of time in the future.

8. **Work to increase the productivity of the development resources**, thereby enhancing development capacity and capability in future time periods.
Project Organization and Management

- Marketing
  - Organized by product families and market segments

- Engineering
  - Organized around functional disciplines and technical focus (electrical, control, mechanical, etc)

- Manufacturing
  - A mix of functions, process technologies, and product/market structure

Types of Development Teams

Exhibit 7 Types of Development Teams

- Functional Team Structure
  - Advantages/Disadvantages
  - Projects require deep technical excellence

- Lightweight Team Structure
  - Advantages/Disadvantages
  - Derivative and enhancement projects

- Heavyweight Team Structure
  - Advantages/disadvantages
  - Projects require outstanding system solution

- Autonomous Team Structure
  - Advantages/disadvantages
  - Radical or break through projects
Types of Project Development Teams

Conclusion