CPET 575 Management Of Technology

Organizing the High-Technology Enterprise

Paul I-Hai Lin, Professor

http://www.etcs.ipfw.edu/~lin

M.S. Technology - IT and Advanced Computer Applications
Purdue University Fort Wayne Campus

Topics of Discussion

- GM’s Advanced Vehicle Development – Reducing Time to Market with Streamlined Organizational Processes
- Today’s Business Processes Require Flexibility, Speed, and Efficiency
- Organization Designs for Technology-Based Enterprises
- Organizational Layers and Subsystems
- Organizational Choices
- Real-World Hybrids
- Understanding Networking Environment

GM’s Advanced Vehicle Development

GM’s efforts to reduce the time to launch new products and to react to market changes

- Major competitors: Toyota, Honda

Rick Spina, Executive Director, Program Management, GM North America

- “Most of GM’s new product programs are on a 24-month schedule”
- “We are continue to cut it down, but 24 months is pretty much our norm now”

Most Critics agree

- Government safety & emissions standards turned the company bureaucracy into an organizational albatross
- Take 18 months or more to bring a new car model to market

Shrinking Product Development Cycles

- Advances in design technology and processes
- From CAD/CAM, simultaneous engineering, project management, etc
- Time-to-market
  - 18 months for most cars
  - 16 or 14 months: Hammer H2 and Ford GT
GM’s Advanced Vehicle Development (cont.)

- Time-to-market performance - metrics
  - Technology
  - Project management process
  - Improved productivity
  - Elimination of bureaucracy
  - Focused decision making

- Mark Hogan, GM group vice president, Advanced Vehicle Development:
  - “The new approach is possible because the overall product development organization has continue to increase productivity and more focused under the Vehicle Line Executive (VLE) System”

---

GM’s Advanced Vehicle Development (cont.)

- Up-front work to determine if the program is viable and profitable is very complex and includes many different variables
  - Portfolio planning – the work and resources associated with a new product idea
  - Involving all stakeholders
  - Product execution – sound business case
GM’s Advanced Vehicle Development (cont.)

- Ron Pnjewski, GM North America vice president of planning
  - “The previous sequential approach, using a lot of hands-off, is time consuming and invites communication breakdown.”
- The current Advanced Vehicle Development process
  - Organized a new product team
  - Includes all line functions: engineering, design, planning, purchasing, manufacturing, quality, and marketing
  - Managing virtual organizations
  - Integration: various product development stages

Today’s Business Processes

- Require Flexibility, Speed, and Efficiency
- Effective organizational structure – fundamental to business success
- Tools offer
  - Better capabilities for executing operations more integrated with business process
  - Greater emphasis on supply chain integration
  - Horizontal decision making
  - Work/technology transfer
- Tools include
  - Administrative tools, Product development techniques, Project management, etc
Today’s Business Processes

- Performance Evaluation of Functional Units (trend)
  - Measured by contribution to specific enterprise objectives
  - Rather than its ability to provide superior functional services in its specialty: R&D, marketing, engineering, or manufacturing

Today’s Business Processes

- The drive for broader business accountability combined with the pressures for faster, more effective market response have led to many new and innovative organizational designs
  - Simultaneous (concurrent) engineering
  - Concurrent project management
  - Design-build
  - Stage-gate processes

- Overlays to the traditional functional organization
Today’s Business Processes

- Presents challenges
  - The drive toward greater cross-functional efficiency and agility
  - Requires large degree of resource and power sharing
  - Diluting central decision making and control toward unified enterprise objectives
  - Diminish the autonomy of functional resource groups to develop and maintain the best functional capabilities needed by the enterprise

Today’s Business Processes

- Mark Hogan, GM’s group vice president for advanced vehicle development under the Vehicle Line Executive (VLE) System pointed as the importance of
  - Resource alignment
  - Supply chain integration
  - Central organizational focus
  - Senior leadership
Organizational Designs for Technology-Based Enterprises

How can a company be organized to conduct its business most effectively and yields the greatest value to its stakeholder?

- Different times in history produced different answers
- Missions, Organizational Models
- 1600-1874: the British East India Company, owned nations, and mainly traded in
  - Headquaters - London
  - Cotton, silk indigo dye, saltpetre, tea, opium
  - Exercising military power and assuming administrative functions

In 1900 – Henry Ford (1863 – 1947) invented assembly line for automobile manufacturing

- Organization model - Horizontally and vertically integrated
- Owning virtually all stages in the supply chain and having strong central control
Organizational Designs for Technology-Based Enterprises

How can a company be organized to conduct its business most effectively and yields the greatest value to its stakeholder?

- In 1900 – Henry Ford (1863 – 1947) invented assembly line for automobile manufacturing
  - Organization model - Horizontally and vertically integrated
  - Owning virtually all stages in the supply chain and having strong central control

- Compare to today’s
  - Internet startup?
  - Intel?
  - GM?

Organizational Designs for Technology-Based Enterprises

Today’s Business Environment and Issues?

- Issues:
  - Complexity, Agility, Resource efficiency, Interdependence

- Need:
  - Both centralized control and decentralized decision making
  - Functional autonomy and cross-functional integration

- Tricky balance, great challenge
Organizational Designs for Technology-Based Enterprises

High-Tech Company Challenges?
- Time-to-market pressures
- Accelerating technologies
- Innovation
- Resource limitations
- Technical complexities
- Social and ethical issues
- Operational dynamics
- Risk
- Uncertainty

Table 3.1 High-Tech Business Environment: Today’s Characteristics and Challenges
- Changing business models and structures
- Complex business performance measurements
- Complex joint venture, alliances, and partnerships
- Complex projects
- Complex success criteria
- Different organizational cultures and values
- Global markets
- High risks and uncertainties
- Integrating across functions
Organizational Designs for Technology-Based Enterprises

Table 3.1 High-Tech Business Environment: Today’s Characteristics and Challenges (cont.)

- Integrating broad spectrum of functions and support services
- Integrating many business processes
- Many stakeholders
- Multifunctional buy-in and commitment
- Need for continuous improvement
- Need for sophisticated people skills

Organizational Designs for Technology-Based Enterprises

Table 3.1 High-Tech Business Environment: Today’s Characteristics and Challenges (cont.)

- Organizational conflict, power and politics
- Resource constraints
- Self-directed teams
- Tight, end-date-driven schedule
- Tough performance requirements
- Virtual organizations, markets, and support systems
Organizational Layers and Subsystems

- The three fundamental organizational sublayers
  - Institutional Framework
  - Functional System
  - Operational Areas

Organizational Layers and Subsystems

- High-Tech Company, but relatively undifferentiated, computer assembly plant:
  - Would have a relatively large part of resources organized along functional lines

- Consulting Firms example
  - Would be organized with two strong axes of functional and project/operational responsibilities

- Boeing, Aerospace company
  - Most likely organize the whole company around product lines
  - Integrating both functional and operational areas with focus on a particular product or project
    - 747, 767, 777 etc
Organizational Layers and Subsystems

- The three fundamental organizational sublayers
  - Institutional Framework
    - Strategic direction, Long-range survival and growth plans, Policies, Procedures
    - Staffs: Senior management, corporate officers, directors
    - Responsibilities: provide broad guidelines and resource allocations
  - Functional System
  - Operational Areas

Organizational Layers and Subsystems

- The three fundamental organizational sublayers
  - Institutional Framework
  - Functional System
    - An area of slow change and the provider of stability
    - Positions the enterprise for competitive advantage, growth and profitability by advancing methods of operation, markets, supply lines, and by integrating new technologies into the operating areas of the organization
  - Operational Areas
Organizational Layers and Subsystems

- The three fundamental organizational sublayers
  - Institutional Framework
  - Functional System
    - An area of slow change and the provider of stability
    - Positions the enterprise for competitive advantage, growth and profitability by advancing methods of operation, markets, supply lines, and by integrating new technologies into the operating areas of the organization
  - Resource groups: R&D, Engineering, Development, Manufacturing, Marketing, HR, Legal, Quality Control, Purchasing, IT
- Operational Areas

Organizational Layers and Subsystems

- The three fundamental organizational sublayers
  - Institutional Framework
  - Functional System
  - Operational Areas
    - Most directly responsible for business results
    - Organized as programs or projects
    - New product development
    - Contracts
    - Off-the-shelf deliverables
    - Internal maintenance
    - Field support operations
Two Organizational Axes: project Operations and Resource Functions

![Diagram of Two Organizational Axes: project Operations and Resource Functions](image)

Organizational Choices

- Choices for Structuring Business Operations
  - Functionally Organized
  - Project Organized
  - Matrix Organized: Function/Project Hybrid
Organizational Choices

- Choices for Structuring Business Operations
  - The Functional Organization
    - Traditional and most fundamental form of organization and management
    - Functional Responsibilities: R&D, Engineering, Product development, Marketing, Finance, HR, etc.
    - Examples: Governments, Military Organizations, Churches, Commercial enterprises
  - Strengths
  - Weaknesses

- The Projectized Organization
  - The enterprise is partitioned into project units (or programs)
  - Resources allocated to specific projects, managed autonomously and independently
  - A center for each project or program
  - The organization has a limited life
  - Strengths
  - Weaknesses
Organizational Choices

- Choices for Structuring Business Operations
  - The Functional Organization
  - The Projectized Organization
  - The Matrix Organization
    - Strengths and Weaknesses
    - Four Categories
      - Project-Function Matrix
      - Product-Function Matrix
      - Product-Regional Matrix
      - Multidimensional Matrix

Real-World Hybrids

- Five businesses in financial services, Infrastructure, and media market
  - Energy Infrastructure: Energy, Oil & Gas, Water & Process Technologies
  - Technology Infrastructure: Aviation, Enterprise Solutions, Healthcare, Transportation
  - GE Capital: Aviation Financial Services, Commercial Finance, Energy Finance Services, GE Money
  - NBC Universal: Film, Sports & Olympics
  - Consumer & Industrial: Appliances, Consumer Electronics, Electrical Distribution, Lighting
Understanding The Working Environment

- High-Tech Companies
- Businesses info
  - A company Web site
  - Annual reports
  - News release
- How people fit into the enterprise and what their responsibilities are?
- Management processes
  - Command and control structure
  - Responsibilities
  - Reporting relations and Interfaces

Understanding The Working Environment

- Principal Tools
  - Policy Directive – Appendix 1.1, page 357
  - Procedure
  - Charter of Key Positions – Appendix 1.2 and 1.3, page 360
  - Organization Chart
  - Responsibility Matrix
  - Job Description
- Make Interdisciplinary Relations work for you
Topics of Discussion

- GM’s Advanced Vehicle Development – Reducing Time to Market with Streamlined Organizational Processes
- Today’s Business Processes Require Flexibility, Speed, and Efficiency
- Organization Designs for Technology-Based Enterprises
- Organizational Layers and Subsystems
- Organizational Choices
- Real-World Hybrids
- Understanding Networking Environment

---

Six Selected Business Subsystems (cont.)

- Managerial Tools and Techniques
  - Project Management
  - Product Management
  - Quality Control
  - General Management (legal, HR, accounting, training)
  - Strategic

- Impact Areas
  - Effectiveness of Tools and Techniques
  - Trade-offs Factors
    - Efficiency vs. Speed
    - Control vs. Flexibility
    - Optimization vs. Risk
  - Implementation Challenges

---

Questions & Summary

- Critical Thinking: Questions for Discussion