Topics of Discussion

- Project Management for NASA
- Management of Technology is Project-Oriented
- Modern Project Management: A Continuously Evolving System
- The Formal Project Management System
- Framing the Project
- Defining the Work
- Managing Time and Resources
- Defining the Project Organization
- Using Project Management Tools Properly
- A Model for Project Performance
- Summary

Project Management for NASA

- Mars Exploration Rover (MER), a NASA program managed by Jet Propulsion Laboratories (JPL), http://www.jpl.nasa.gov
  - The Challenges of Getting to Mars
  - Flew through about 300 millions miles of deep space and target a very precise spot to land
  - Space environment
Project Management for NASA

- A Complex Project
  - Exceptional technology & planning
  - traveling 19,300 km/hr
  - During the first 4 minutes into decent
    - Used the friction with atmosphere to slow down, at the end, still traveling at 1,600 km/hr
    - Had 100 sec left and were at the altitude that a commercial airliner typically flies
    - A parachute opened to slow the aircraft to only 321 km/hr and had only 6 sec left and were only 91 meters off the ground
    - Retro rockets fired to bring the spacecraft down to 0 velocity, and at the height of a 4 story building above the surface
    - Hit the ground at 48 km/hr, bounce 30 times, air bag (453 kg)

Management of Technology is Project-Oriented

- What is a Project
  - Single, non-repeat undertaking
  - Have specific results (deliverables)
  - Time and Resource Constraints

- Technology Projects
  - R&D, New Product Developments, Product, Enhancements, IT Infrastructure Upgrades, High-Tech Construction, Aerospace, Military, etc

Management of Technology is Project-Oriented (cont.)

- Project Management Characteristics in a Changing World
  - Technology-based and R&D-oriented projects
    - Increasing level of innovation
    - Cross-functional teamwork & decision making
    - Intricate multicompany alliances
    - Highly complex forms of work integration
Management of Technology is Project-Oriented (cont.)

- Project Management Characteristics in a Changing World
  - Success Factors
    - Member generated performance norms and work processes rather than supervision, policies and procedures
    - Self-directed and commitment-based concepts are gradually replacing the traditional, more hierarchically structured project organization

Example 1 – “Intel Turns to Taiwan for Its Push Beyond PCs,” by Don Clark and Jerry DiColo, WSJ, Tuesday, 3/3/2009
  - Intel - Microprocessor chip maker
  - Intel's One Product-Fits-All Approach (sell identical products to all customers)
  - Limited success over the years expanding into chip markets for cell phones and consumer electronics (TV & cable boxes)
  - Challenges – PC shipments will drop 12% in 2009 (the largest annual decline on record)
  - Competitors: AMD, ARM Holdings PLC
  - Collaboration with Taiwan Semiconductor Manufacturing Co., (TSMC) will speed Intel's entry into new markets by 3 or 4 years

Management of Technology is Project-Oriented (cont.)

Example 1 – “Intel Turns to Taiwan for Its Push Beyond PCs,” by Don Clark and Jerry DiColo, WSJ, Tuesday, 3/3/2009 (cont.)
  - Doubling down on advanced manufacturing technology
  - Partnering with best (intellectual property - IP) and foundry house on the planet
  - The deal with TSMC took 2 years to negotiate: company’s rights to patents and other IP would be safeguarded

Intel Press Room,
  - Intel, TSMC Reach Agreement to Collaborate on Technology Platform, IP Infrastructure, Soc Solutions, 3/2/2009
  - LG Electronics, Intel Collaborate on Future Mobile Internet Devices
Management of Technology is Project-Oriented (cont.)

  - Intel, TSMC Reach Agreement to Collaborate on Technology Platform, IP Infrastructure, SoC Solutions, March 2, 2009
  - LG Electronics, Intel Collaborate on Future Mobile Internet Devices, Feb. 16, 2009
  - Intel to Invest $7 Billion in U.S. Manufacturing Facilities, Feb. 10, 2009

Management of Technology is Project-Oriented (cont.)

- Example 2 – “Intel Turns to Taiwan for Its Push Beyond PCs,” by Don Clark and Jerry DiColo, WSJ, Tuesday, 3/3/2009 (cont.)
  - Doubling down on advanced manufacturing technology
  - Partnering with best (intellectual property - IP) and foundry house on the planet
  - The deal with TSMC took 2 years to negotiate: company’s rights to patents and other IP would be safeguarded

Modern Project Management: A Continuously Evolving System

- Project Performance Measurement
  - In the past: In terms of achieving agreed-on results within given time and resource constraints
  - Due to Changing Business Culture, Project Complexities, Technological Capabilities, and Market Structure
  - Today
    - Those measurement used in the past:
      - Threshold Competence, Core capabilities
    - Need to assess competitive factors that relate to True Competitive Advantages:
      - Innovative Results, Technological Breakthroughs, Time-to-market capabilities, Flexibility and responsiveness to changing requirements, Future business positioning, Client satisfaction
Modern Project Management: A Continuously Evolving System

- Forces Driving Modern Project Management
  - Shift from linear processes to dynamic project systems
  - Shift from efficiency toward effectiveness
  - Shift toward more integrated information technology
  - Shift from information to decision support
  - Shift from project management tools to integrated systems
  - Shift from managerial control to self-direction and accountability
  - Shift from executing projects to enterprise-wide project management
  - Shift from project management as a support function toward full operational responsibilities and professional status

- New Tools, Techniques, and Management Philosophies
  - Today's Project Environment: Changing Business Culture, Project Complexities, Technological Capabilities, and Market Structure
  - Conventional project management tools: Schedules, Budgets, Status Reviews
  - Effectively integrated with modern technology systems and overall business processes
  - Shift focus from simple tracking schedule and budget data to Integrating Human Factors and Organizational Interfaces into Project-Control Formulae

- New Tools, Techniques, and Management Philosophies (cont.)
  - Deal with a broad spectrum of contemporary challenges
    - Time to market
    - Accelerating technologies
    - Innovation
    - Resource limitation
    - Technical complexities
    - Project metrics
    - Operational dynamics
    - Risks and uncertainty
The Formal Project Management System

Managers using formal tools so they can better respond to:

- Specific contract requirements (government clients)
- Better performance measurements of work in progress
- Shorter product development cycles
- Organizing multifunctional teams effectively
- Questions of individual accountability
- Changing requirements
- Negotiating resource requirements
- Potential conflict and confusion over plans
- Personnel changes
- Subcontractor support requirements
- Geographically dispersed work units
- Language and culture barriers

The Formal Project Management System (cont.)

Project Management Tools and Techniques

- Six Principle Categories
  1. Top-down Project Definition and Integration
  2. Project Scope Management
  3. Project Time Management
  4. Project Cost Management
  5. Project Human Resource Management
  6. Tracking and Control Focus


The Formal Project Management System (cont.)

Project Management Tools and Techniques

- Six Principle Categories
  - Top-down Project Definition and Integration
    - Work Breakdown Structure
    - Work Breakdown Structure Dictionary
    - Project Scope Definition
  - Project Scope Management (Work)
    - Statement of Work
    - Work Package
    - Task Authorization
  - Project Time Management (Time)
    - Milestone Schedule
    - Bar Graph Schedule (Gantt Chart)
    - Networks (i.e. PERT – Program Evaluation and Review Technique, CPM – Critical Path Method, GERT – Graphical Evaluation and Review Technique)
The Formal Project Management System
(cont.)
- Project Management Tools and Techniques
  - Six Principle Categories
    - Project Cost Management (Resource)
      - Resource Plan, Manpower Plan, Budget, Cost Account
    - Project HR Management (Responsibility)
      - Task Matrix, Task Roster, Project Charter
    - Project Integration Management (Tracking & Control)
      - PERT – Program Evaluation and Review Technique
      - Earned Value System
      - Variance Analysis
      - Performance Measurement System

Framing the Project
- Project Management Tool for Framing the Project
  - Work Breakdown Structure
  - Statement of Scope
  - Milestone Schedule
  - Project Budget
  - Project Charter

Framing the Project
- Figure 1. Work breakdown structure (WBS) for a laptop computer development project
- Table 6.4 WBS Index based on the breakdown shown in Figure 1
  - Laptop Computer NPD
    - Design/Development
    - Production
    - Marketing
    - Field Support
    - Project Management
Framing the Project

Table 6.4 WBS Index based on the breakdown shown in Figure 1

Statement of Scope

- Laptop Computer NPD
  - Design/Development
    - CPU
    - Memory
    - Control
    - Display
    - Keyboard
    - Power
    - Mechanical
  - Production
    - Prototype
    - Volume
    - Logistics

- Marketing
  - Task A
  - Task F

- Field Support
  - Task A
  - Task F

- Project Management
  - Reports
  - P-Tracking
  - P-Reviews
  - C-I/F
  - Travel
  - Website

Other Project Management Topics

Defining the Work

- Scope statement
- Project name and sponsor/customer data
- Project mission and key objectives
- Statement of work to be performed
- Key deliverables
- Key milestones
- Key interfaces
- Key resource and constraints
- Statement of Work
- Work Authorization
- Work Package
- Specification
- Deliverables

Defining the Work

- Statement of Work
  - The project name and definition of the task module with reference to the corresponding WBS elements
  - A description of the task
  - The results and deliverable items to be produced: system concept, hardware, software, tests, documentation, training, etc
  - References to specifications, standards, directives, and other documents
  - All inputs required from and to other tasks
Other Project Management Topics

- Defining the Work
  - Specifications
    - Describe the metrics of project elements to be delivered
    - Specs from the baseline for developing, producing, and controlling the technical part of the project or program
  - Work Package
    - The work to be performed including reference to the corresponding statement of work and specifications
    - The responsible organization or individual
    - The resource requirement
    - The schedule

- Work/Task Authorization
  - Responsible individual organization
  - Schedule
  - Budget
  - Work Statement

- Deliverables
  - Plans
  - Prototypes
  - Documentations
  - Software
  - Decisions
  - Approvals

Other Project Management Topics

- Managing Time and Resources
  - Schedules and Networks
  - Milestone Chart
    - Project Kickoff
    - Requirement Analysis Complete
    - Preliminary Design Review
    - Critical Design Review
    - Prototype Fabricated
    - Integration and Testing
    - Value Engineering Review
    - Start Volume Production
    - Promotional Program Defined
    - First Shipment
    - Customer Acceptance Test Complete
  - The Gantt Chart
Other Project Management Topics

- Managing Time and Resources
  - Schedules and Networks
  - Milestone Chart
  - The Gantt Chart
    - Task #
    - Task
    - WBS
    - Calendar time
    - Others
      - Critical Path
      - Major Milestone (scheduled)
      - Major Milestone (completed)
  - Network Techniques

- Critical Path
- Major Milestone (scheduled)
- Major Milestone (completed)

- Network Techniques

Other Project Management Topics

- Managing Time and Resources
  - Schedules and Networks
  - Milestone Chart
  - The Gantt Chart
  - Network Techniques
    - PERT/CPM
    - Computer Assisted Project Management
    - Government Reporting Requirements
  - Project Budgets and Cost Accounts
  - The Budgeting Process
  - Cost Accounts

Other Project Management Topics

- Defining the Project Organization
  - Project Charter
    - Top-down mission
    - Authority structure
    - Key parameters of the projects
    - Policies and procedures
  - Task Matrix (project/program name, customer, project manager, cost center, primary responsibilities, supporting responsibilities)
    - Description
    - WBS Reference
    - R&D, System Design, Engineering, Testing, Quality Assurance, Manufacturing, Marketing, etc
  - Task Roster
Other Project Management Topics

- Defining the Project Organization
  - Project Charter
  - Task Matrix
  - Task Roster
    - Project Name
    - Customer
    - Project Manager
    - Cost Center
    - Responsible Individual
    - Organization Telephone
    - Task
    - WBS Ref

Conclusion