

## CPET 575 Management Of Technology

### Lecture On Measuring and Controlling the Work

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<sup>1</sup>Hans J. Thamhain , *Management of Technology*, John Wiley & Sons, Inc, ISBN 978-0-471-41551-0, 2005 – Chapter 7 of Text Book

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### Topics of Discussion

- The Challenges of Managerial Control in Technology
- What We Know About Managerial Controls in Complex Work Environments
- Characteristics of Effective Controls
- How Do Managers Control Technology-Intensive Work?
- Recommendations for Using Management Controls Effectively
- Summary

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### The Challenges of Managerial Control in Technology

- Managerial Control
  - The process of taking the necessary actions for implementing a plan and reaching its objectives, in spite of changing and often unpredictable conditions.
  - A Plan
  - Measure status and performance
    - Determine possible deviations from a plan
    - Asses impacts
  - Determine the root cause and corrective measures

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### The Challenges of Managerial Control in Technology – Why Is It So Difficult

- Table 7.1 Challenges of Managerial Control in High Technology
  - Contingencies, risks, problems
  - Ambiguous progress and performance measures
  - Determining causes (not symptoms)
  - Learning curve; uncertain estimates
  - Changes, interference
  - Constraints: time, budget, quality, features
  - Complex organizational interactions
  - Tough enterprise mandates
  - Complex solutions
  - Unfavorable perceptions: anxieties, fear, confusion, fairness
  - Conflict, power, politics

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### The Challenges of Managerial Control in Technology – Why Technology Projects Fail

- Table 7.2 Top Reasons for Project Failure (Project Manager's Perspective):
  - Too many changes and contingencies (scope, \$, priorities, technology, market, sponsor, ...)
  - Lacking project support (inside and contractors)
  - Suboptimal resources (competencies)
  - Underestimating project complexity
  - Cascading effects
  - Interfering administrative processes and requirements

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### The Challenges of Managerial Control in Technology – Why Technology Projects Fail

- Table 7.2 Top Reasons for Project Failure (Senior Management Perspective):
  - Inaccurate/insufficient planning
  - Insufficient performance measurements
  - Insufficient communication/escalation of problems
  - Lacking change control
  - Weak project leadership

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## The Challenges of Managerial Control in Technology – Why Technology Projects Fail

- **Table 7.2 Top Reasons for Project Failure (Outsider Perspective - Field Research):** Difficulties in understanding/communicating complexities of projects, its applications, and support environment.
  - Unrealistic expectations (scope, \$)
  - Underfunding
  - Underestimating complexities
  - Unclear requirements
  - Weak sponsor commitment

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## What We Know about Managerial Controls in Complex Work Environments

- **Managerial Control**
    - Concepts
    - Methods
    - Tools
  - **New Organization Forms and Special Processes**
    - Concurrent engineering
    - CAD (Computer-Aided Design)
    - CAM (Computer-Aided Manufacturing)
    - IRM (Information Resource Management)
    - MRP (Manufacturing Resource Planning)
    - DFMA (Design for Manufacture and Assembly)
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- intricate multicompany alliances

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## What We Know about Managerial Controls in Complex Work Environments

- **Evolution of Control Tools and Techniques**
  - Upgraded and Integrated with Modern IT Systems and Overall Business Processes
    - **Conventional Project Management Tools: Schedules, budgets, status review**
  - 1950+:
    - **Basic project management tools and techniques formalized**
    - **Focus: Schedule and budgets**
  - 1975+:
    - **New tools emerge to deal with organizational interfaces and people issues**
    - **Focus: People and integration**

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## What We Know about Managerial Controls in Complex Work Environments

### ■ Evolution of Control Tools and Techniques

- 1990+:
  - IT tools enhance p-tracking. Control involves intricate organizational & behavioral variables.
  - Focus: People, multi-organizational integration, alliance
- 2000+
  - More tech-based tools, increased complexity of projects and business environment.
  - Focus: Multi-variable optimization
- 2010+++
  - More IT support, networked communications and integrated control across organizations

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## What We Know about Managerial Controls in Complex Work Environments

### ■ Control Tools and Techniques Available Today

#### ■ Table 7.3 Contemporary Measures of Project Performance

- Producing agreed-on results (deliverables) on time and within budget
- Innovative, value-added project implementation
- Time-to-market acceleration
- Capturing opportunities for performance enhancements and time and cost savings
- Quality concerns and enhancements of deliverables
- Ability to work toward objectives and target results (e.g. evolving solutions, R&D, etc)

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## What We Know about Managerial Controls in Complex Work Environments

### ■ Control Tools and Techniques Available Today

#### ■ Table 7.3 Contemporary Measures of Project Performance (cont.)

- Ability to deal with risks and contingencies
- Ability to deal with conflict and politics
- Reaching stretch goals
- Recognizing changing environment and proactive response
- Recognizing new market opportunities for technological applications
- Flexibility toward customer requirements (i.e. change orientation)

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**What We Know about Managerial Controls in Complex Work Environments**

■ **Control Tools and Techniques Available Today**

■ **Table 7.3 Contemporary Measures of Project Performance (cont.)**

- Recognizing and capturing follow-on business
- Minimizing organizational disruptions and interferences
- Creating synergism among enterprise units (i.e. leveraging resources)
- Aligning project work with enterprise strategy
- Concern for natural environment
- Capturing experiences and organizational learning
- Training of personnel

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**What We Know about Managerial Controls in Complex Work Environments**

■ **How Do Companies Cope?**

- Heavily invested in New Management Tools and Techniques
  - Analytical Tools and Techniques
  - Procedural Tools and Techniques
  - People-Oriented Tools and Techniques

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**What We Know about Managerial Controls in Complex Work Environments**

■ **Contemporary Project Management Methods, Tools, and Techniques**

- No universal evidence on the effectiveness of these tools
- Few guideline have been published in the literature on how and where to use those tools and techniques most appropriately
- More Challenges?

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### What We Know about Managerial Controls in Complex Work Environments

- Project Management Methods, Tools, and Techniques
  - The Greatest Challenge - meet the triple constraints of being
    - 1. Compatible with the business environment, processes, cultures and values
    - 2. Conducive to specific problem solving, which usually involves a whole spectrum of factors from innovation to decision making, cross-functional communications, and deal with risks and uncertainty
    - 3. Useful for tracking and controlling the project according to established plans

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### What We Know about Managerial Controls in Complex Work Environments

- Project Management Methods, Tools, and Techniques
  - The Second Major Challenge
    - Implement selected project control tools and techniques as part of the business process
  - The Third Major Challenge
    - Create and facilitate learning process for these tools and techniques so that they become institutionalized and therefore are used by the people in the organization, because these tools help in getting project done more effectively and create visibility and recognition for their work.

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### What We Know about Managerial Controls in Complex Work Environments

- Project Management Methods, Tools, and Techniques
  - More Challenges
    - Require new administrative skills and more sophisticated management style
    - The methods of communication, decision making, soliciting commitment, and risk sharing are shifting constantly away from a centralized, autocratic management style to a team-centered, more self-directed form of project control
    - Focus on more broader and more balanced managerial approach – effective search of solutions to complex problems

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**What We Know about Managerial Controls in Complex Work Environments**

- Project Management Methods, Tools, and Techniques
  - More Challenges
    - Trade-offs among many parameters
      - Creativity
      - Change-orientation
      - Quality
      - Traditional Schedule and budget constraints

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**What We Know about Managerial Controls in Complex Work Environments**

- Table 7.4a Analytical Management Techniques for Project Control (Technique, Description, Elements of Control, Conditions for Successful Control)
  - Action Item/Report
  - Computer Software
  - Critical Path Analysis
  - Budget Tracking
  - Deficiency Report
  - Earned Value Analysis
  - PERT/CPM (Program Evaluation and Review Technique/Critical Path Method)

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**What We Know about Managerial Controls in Complex Work Environments**

- Table 7.4a Analytical Management Techniques for Project Control (Technique, Description, Elements of Control, Conditions for Successful Control)
  - Schedule Compression Analysis
  - Schedule Tracking
  - Simulation
  - Status Assessment
  - Variance Analysis

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**What We Know about Managerial Controls in Complex Work Environments**

- Table 7.4b Process-Oriented Management Techniques for Project Control (Technique, Description, Elements of Control, Conditions for Successful Control)
  - Concurrent Engineering
  - Benchmarking
  - Design Review
  - Out-of-Bounds Review
  - Project Definition
  - Project Review
  - Prototyping

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**What We Know about Managerial Controls in Complex Work Environments**

- Table 7.4b Process-Oriented Management Techniques for Project Control (Technique, Description, Elements of Control, Conditions for Successful Control)
  - Quality Function Deployment (QFD)
  - Requirement Analysis
  - Stage-Gate Process
  - Stage-Gate Review
  - Voice of Customer

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**What We Know about Managerial Controls in Complex Work Environments**

- Table 7.4c People-Oriented Management Techniques for Project Control (Technique, Description, Elements of Control, Conditions for Successful Control)
  - Core Team
  - Design/Build
  - Focus Group
  - Joint Performance Evaluation
  - Self-Directed Team

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### Characteristics of Effective Controls

- Realistic Plans
- Commitment
- Competence
- Measurability
- Appropriate Controls
- Focus on Key Objectives
- Simplicity and Adaptability
- Early Problem Detection
- Controlling Authority

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### How Do Managers Control Technology-Intensive Work?

- **Recent Field Studies of Best Practices**
  - Popularity and Value of Project Control Techniques
  - Skills Needed
    - Analytical skills (AN)
    - Business administrative skills (BA)
    - Leadership skills (L)
    - Team building skills (TB)
    - Senior Management Support (SM)
  - Managerial Implications and Recommendations

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### How Do Managers Control Technology-Intensive Work?

- **Table 7.5 Management Techniques: Popularity, Skill Level, and Value** [Popularity, AN, BA, TB, SM, L, V]
  - Schedule Tracking (99%, 2.0, 1.0, 3.0, 2.0, 3.5, 3.25)
  - Project Definition (99%, ...)
  - Project Review (93%)
  - Budget Tracking (92%)
  - Design Review (87%)
  - Prototyping (82%)
  - Status Assessment (82%)
  - Computer Software (71%)
  - Deficiency Report (68%)

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### How Do Managers Control Technology-Intensive Work?

- **Table 7.5 Management Techniques: Popularity, Skill Level, and Value** [Popularity, AN, BA, TB, SM, L, V]
  - Action Item Report (65%)
  - Requirement Analysis (52%)
  - Benchmarking (52%)
  - PERT/CPM (42%)
  - Earned Value Analysis (41%)
  - Stage-Gate Process (40%)
  - Variance Analysis (39%)
  - Core Team (38%)
  - Interface Chart (38%)
  - Stage-Gate Review (35%)
  - Critical Path Analysis (32%)

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### How Do Managers Control Technology-Intensive Work?

- **Table 7.5 Management Techniques: Popularity, Skill Level, and Value** [Popularity, AN, BA, TB, SM, L, V]
  - Concurrent Engineering (32%)
  - Quality Function Deployment (28%)
  - Focus Group (28%)
  - Voice of the Customer (25%)
  - Self-Directed Team (23%)
  - Design/Build (18%)
  - Schedule Compression Analysis (18%)
  - Joint Performance Evaluation (15%)
  - Out-of-Bounds Review (12%)

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### How Do Managers Control Technology-Intensive Work?

- **Satisfaction with Project Management Techniques**
  - Anxieties Caused by New Tools and Techniques
    - Lack of confidence that tools will produce benefits
    - Anxieties over potentially harmful side effects
    - Conflicts among users over the method or results
    - Method is too difficult and burdensome, or interfaces with the work process

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### How Do Managers Control Technology-Intensive Work?

- Table 7.6 Perception of New Project Management Techniques (Why project management tools and techniques are rejected?)
  1. Lack of understanding on how to use tools properly.
  2. General anxiety over methods and information used and misused.
  3. Use of tool requires too much work, is too-time consuming, and requires too much paper works.
  4. Tools reduce personal drive and willingness to fix ad hoc problems and contingencies
  5. Not consistent with already established project management procedures and business processes.
  6. Control method is threatening regarding performance assessment, performance freedom, or autonomy.

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### How Do Managers Control Technology-Intensive Work?

- Table 7.6 Perception of New Project Management Techniques (Why project management tools and techniques are rejected?)
7. Conflicting points of view among team members regarding the tool value or appropriate use.
  8. "Not invented here" syndrome exists.
  9. Conflict among managers or project team members about value of tool or application method.
  10. Cost of acquisition and implementation is too high.
  11. Tools focus on project management metrics, neglecting the importance of teamwork and cooperation.

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### How Do Managers Control Technology-Intensive Work?

- Table 7.6 Perception of New Project Management Techniques (Why project management tools and techniques are rejected?)
12. Purpose, objectives, benefits, and value of tool unclear.
  13. Tool leads to unwanted additional policies and procedures.
  14. Too busy to learn tool or technique.
  15. Uncomfortable with new or unfamiliar methods.
  16. Disagreement over application method or use of data.

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### How Do Managers Control Technology-Intensive Work?

Table 7.6 Perception of New Project Management Techniques (Why project management tools and techniques are rejected?)

- 17. Tools don't help in control, but help to maintain status quo when project performance deteriorates.
- 18. Stifle multifunctional communication and complex decision making.
- 19. Reduce face-to-face communication and multidisciplinary problem solving.
- 20. Stifle technical innovation and search for solution to complex problems

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### How Do Managers Control Technology-Intensive Work?

Table 7.6 Perception of New Project Management Techniques (Why project management tools and techniques are rejected?)

- 21. Tools are seen as a substitute for management support and decision making.
- 22. Tools isolate team members and their leaders.
- 23. Prior band experience with tool and technique.
- 24. Tools weaken managerial power.
- 25. Not consistent with self-directed team concept.

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### Recommendations for Using Management Controls Effectively

- **Three Important Criteria**
  - Tools and techniques must be properly integrated with the business process.
  - The impact on intrinsic project performance must be considered.
    - **Innovation, Creativity, Quality, Customer Relations, Ability to cope with changing requirements**
  - The human side of organizational change must be carefully considered

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**Recommendations for Using Management Controls Effectively**

- **The Recommendations for Controlling Technology-Intense work**
  - Involve the Team
  - Make Tools Consistent with Work Process
  - Build on Existing Tools and Systems
  - Connect with Established Management Practices
  - Make Tools User-Friendly
  - Anticipate Anxieties and Conflicts
  - Ensure That There is No Threat
  - Foster a Challenging Work Environment

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**Recommendations for Using Management Controls Effectively**

- **The Recommendations for Controlling Technology-Intense work**
  - Pretest New Tools and Techniques
  - Continuous Improvement
  - Senior Management Support
  - Ensure Proper Direction and Leadership

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Conclusion

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