The Essence of Project Management

Bob Kinstrey
Director, Pulp and Paper Consultancy
Jacobs
Discussion Points

- Overview
- Scope
- Design Criteria
- Schedule
- Budget
- Resources
- Communications
- Design for Safety
- Documentation
- Tools
Capital Effectiveness

*Capital*  
fuel for the engine of growth

*Effectiveness*  
accomplishing intended result

\[
\text{Capital Effectiveness} = \text{Revenue} - \text{Costs} = \text{Investment}
\]
Getting Projects Right

The Over-Investment Value Destruction Cycle

Slack capacity built into each project

Throughput targets always exceeded

Facilities chronically out of balance

Perpetual de-bottlenecking

Engineers & operators rewarded for "world class" performance

Demand for project capital rises

Projects padded in anticipation of cuts

Capital rationing

Use capital to fix

Do only low-risk projects

Credibility falls & become risk-averse

Fall behind

Must invest for future

No consequences

Note: Adapted from Kayoma and Van Tassel.
Getting Projects Right

Seven Steps For Breaking The Cycle

1. Link Projects To Strategy
2. Exhaust Alternatives
3. Consider Real Options
4. Take a Broad View
5. Hone The Scope
6. Adopt Best Evaluation Practices
7. Stress Accountability

7 Steps For Doing The Right Project
Project Life Cycle
Overlap Diagram

Feasibility Analysis
Conceptual Planning
Detail Scope Definition
Project Execution
Operation

Note: Increasing Size of the Arch Shows Increased Effort and Cost; but the FIRST TWO Stages have the Most Influence on the Outcome!
Scope

Must be written
Must be agreed to by Management
Need to Identify:
  – Expectations
  – Goals:
    ✓ Financial
    ✓ Production
    ✓ Quality

Understand work process
Beware of “Scope Crepe” – “Stay on Coarse”
JSTEPS™ Summary Map

What Is Our Project Execution Process?

Key Interfaces

1) End of Phase 2 Pass Gate
2) EPC/CM Strategic Project
3) End of Phase 3 Pass Gate
4) Construction Readiness

PHASE 1
Business Opportunity Analysis

PHASE 2
Conceptual

PHASE 3
Preliminary Engineering

PHASE 4
Detailed Design & Procure

PHASE 5
Construction

PHASE 6
Start-up

PHASE 7
Close-out

We call this phase gated project execution process the “Jacobs System to Ensure Project Success™.”
PHASE 3 - Continued
Preliminary Engineering

Value Enhancing Practices (VEP’s)

SOP

Measures
Design Criteria

Need to establish at the beginning
- Can’t get meaningful quotations without a firm basis
- Can’t get team buy-in on objectives unless they understand and review written design criteria document
- Need to understand significant of key elements

Typical Parameters
- Production rate
- Quality requirements
- Grade structure
- Financial goals
- Technology utilization
Schedule

Need to establish the overall schedule
  – Study schedule
  – Project milestones
  – Downtime expectations

Need to involve key players
  – Operations and Management
  – Engineering
  – Equipment supplier (s)
  – Contractor (s)

Need to understand critical equipment deliveries

Tools (Excel, MS Project, Primavera)
Budget

- Several different budgets
  - Study
  - Engineering
  - Project

- Need to manage
  - Dollars (by area, discipline, etc)
  - Quantities (pipe, wire, equipment, steel, concrete, etc)

- Establish “Change Order System”
  - Basis
  - Approval
Resources

Establish the Project Organization

- Internal Team
  - Who
  - Availability

- External
  - Corporate
  - Third Party

Previous Studies
Project Organizations

Project Manager

PROJECT ENGINEER

Project Team & Discipline Leads

Dept. Supt.

PROCESS ENGINEER

Process Team & Operations
Project / Process Engineer Has Many Faces

- Technical Lead
- Project Controls (Costs) Lead
- Area Lead on project
- Interface between Engineering and Subcontracts
- Interface between Engineering and Vendors
- Interface between Engineering and Construction
- Discipline Lead and Project Engineer
- Project Manager and Project Engineer
- Home Office PE to Field Engineer
- Coordinator of Multi-office Executed projects
Project / Process Engineer Traits

- Good Communication Skills
- Experienced in Project Execution
- Can Do - Positive Attitude
- Good Listening Skills
- Decision Maker
- Team Player
- Manages Time Well
- Well Organized
- Possesses Leadership Skills
- Flexibility
Communications

- Critical

- Lack of communications is a Key Reason projects run into problems

- Need to establish Matrix early in project
  - Who gets documents
  - Who can approve changes – scope and budget
  - Who approve and signs off on design

- Must be Open
Design for Safety

- Many Different Mandates
  - OSHA (29 CFR - guarding and PSM)
  - EPA (40 CFR – RMP)
  - Home Land Security (6 CFR)
  - Local, State, Corporate, etc

- Codes
  - ASME, IEE, etc
  - Hurricanes, seismic, building
  - American Disability Act

- Maintenance

- Risk Analysis and Management
Management of Change for Design

IDENTIFY PROBLEM & INITIATE THE MOC

IS THIS A COVERED CHANGE?

NO

RETURN MOC TO ORIGINATOR & NOTIFY LEADS

IMPLEMENT CHANGE & UPDATE DOCUMENTS

YES

REPLACE EQUIPMENT

UPDATE EQUIPMENT SAFETY INFORMATION

CONDUCT DESIGN HAZARD REVIEW

CONDUCT SAFETY REVIEW

PREPARE ENGINEERING PACKAGE & UPDATE SAFETY INFORMATION DOCUMENTATION

TURNOVER MOC PROCESS TO CLIENT

ASSIGN MOC A NUMBER & ENTER IN LOG

PREPARE CHANGE ORDER

IS THIS A MAJOR OR MINOR CHANGE?

MAJOR

PREPARE CHANGE ORDER

MINOR

IS THIS A REPLACEMENT IN KIND?

NO

PREPARE CHANGE ORDER

YES

UPDATE EQUIPMENT

PREPARE ENGINEERING PACKAGE & UPDATE SAFETY INFORMATION DOCUMENTATION
Design Safety Documents

- HSE Procedure Manual HSEP 1.7
- Design Safety
- JSTEPS CPI & Baseline Maps
- P-350, G-350 HSE Program
- P-201 Design for Safety
- G-200 Engineering and Design
- Client Expectations
- Local Regulations
- Lessons Learned
- Design Safety Plan
- P-203 Deliverable Verification Plans
- 1.7 Design Hazard Review
- Other Reviews LOPA, CHAZOP, FTA, FMEA, ETC.
- Management of Change
- Construction Risk Assessment
- Pre-Startup Safety Review
- Discipline Checklists
- Preliminary Hazard Review
- Design Hazard Review
- Deliverable Verification Review
- TG-G36231 Standard for Design Safety Checklist
- TG-G36230 Standard for Project Hazard Review
- Process Safety Design Manual
- TG-36XXX or Client Procedures
Documentation

- Report
  - Criteria and basis
  - Alternatives

- Estimate
  - Basis for design

- Quotations

- Drawings

- Meeting Notes, including phone calls
Tools

- Programming
- Interactive Planning (IAP)
- Project Definition Rating Index (PDRI)
- Modeling
- Estimating
- Value Engineering
- Constructability
Information Sources:

Construction Industry Institute (CII)
The University of Texas at Austin
Austin, TX
(512) 471 4319

The Business Roundtable
An Association of Chief Executive Officers
Washington, DC
Analytical tool used to define the entire scope of work for the project.
Interactive Planning

- Project expectations are identified
- Schedule restraints are identified
- Facilitates understanding
- Identifies work packages
- Schedule milestones are identified
- Obtains ownership and commitment
- Identifies barriers and concerns from all participants
- Presents a view of total project completion
- Wraps up with team buy-in
- Participants, Owner (A), E & C, Vendors
Project Definition Rating Index (PDRI)

- Created by CII to measure degree of scope development on industrial projects
- Identifies and precisely defines each critical element in scope
- Predicts factors that impact project's risk
- Allows team to quantify, rate and assess level of scope development
- Checklist Used by Project Team to Determine Steps
- Internal Benchmarking Tool
- Objective Negotiating Tool Between Owner / Contractor
- A Best Practices Tool
Project Definition Rating Index
It is a Process!

Scope Validation

High Probability of Success

Scope Definition → PDRI → < 200 → Detail Design

Scope Definition → PDRI → > 200 → Redefine Scope
Project Scope Development Assessment

- Qualify the Quality of Scope Definition - PDRI*
- Relates to Probability of Achieving Project Objectives

<table>
<thead>
<tr>
<th>PDRI Score</th>
<th>&lt;200</th>
<th>&gt;200</th>
<th>△</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>- 6%</td>
<td>16%</td>
<td>22%</td>
</tr>
<tr>
<td>Schedule</td>
<td>- 2%</td>
<td>12%</td>
<td>14%</td>
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<tr>
<td>Change Order Cost</td>
<td>3%</td>
<td>8%</td>
<td>5%</td>
</tr>
</tbody>
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*Results of CII Study
Modeling

- High Level
  - Used to assess changes in one part of the mill on the mill as a whole

- Mass and Energy
  - WinGems, CadSim, Pinch
Estimating

Establish the Class

- Class 5 – Order of Magnitude
- Class 4 - Preliminary
- Class 3 – Early Budget
- Class 2 – Budget Control
- Class 1 – Definitive/Construction

Database
Value Engineering

- Fosters an environment of project cost reduction
- Initiated at the outset of the project
- Greatest impact is during scope definition
- Continuing impact during detailed design and constructability reviews

Barometer measures cost reduction throughout the life of a project
Constructability Features

- Formal approach
- Interactive planning
- Prioritize engineering efforts
- Offsite preassembly and modular opportunities
- Equipment releases by engineering
- Address maintainability and operability issues
- “Best Practices and Lessons Learned” built in
- Continuous refinement and implementation
Many Bad Projects Have One Thing In Common

Lack of Communications

- Failure to communicate is a sure path to disaster
- Communicate early, frequently and routinely
- Discuss issues, don’t let them linger