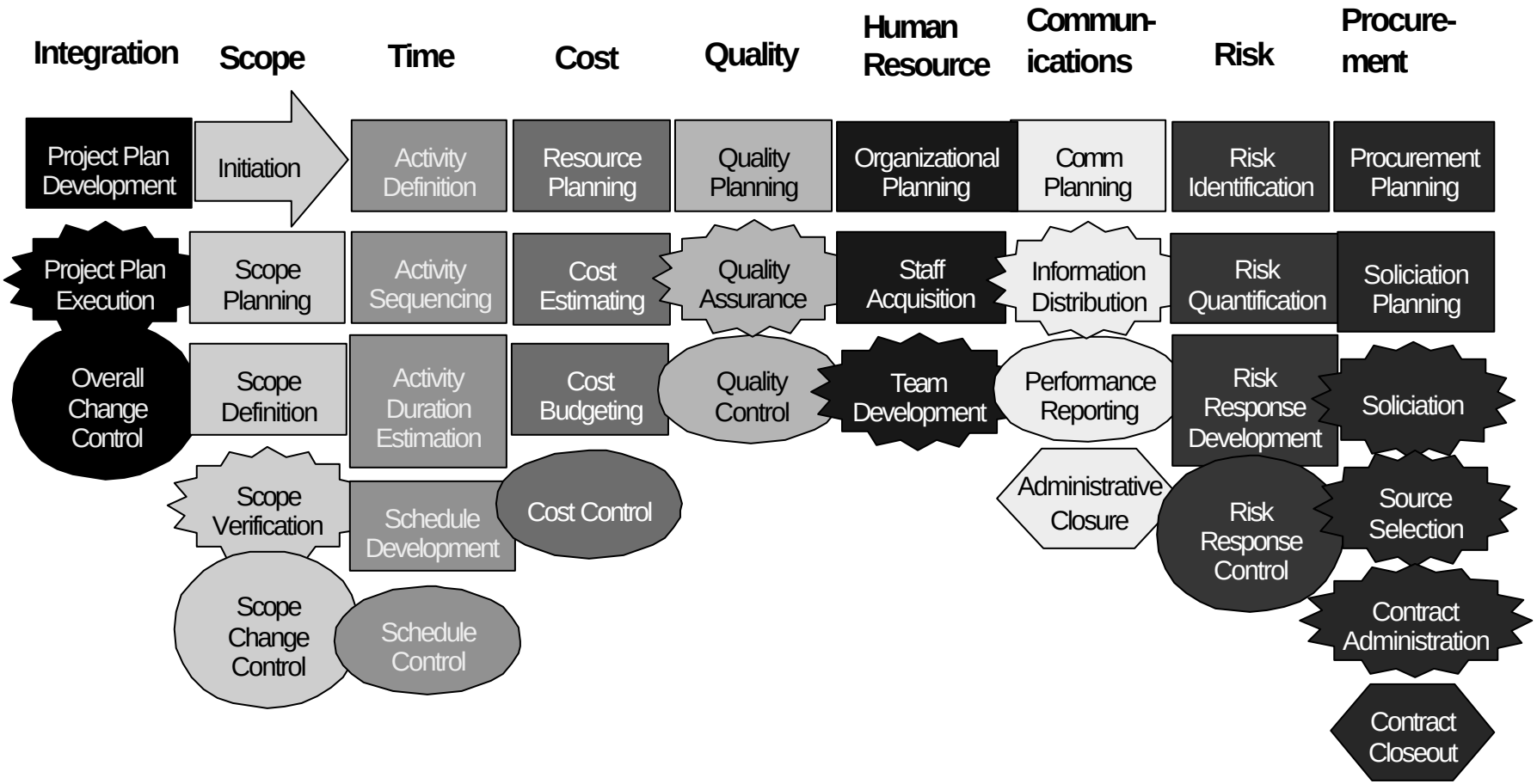
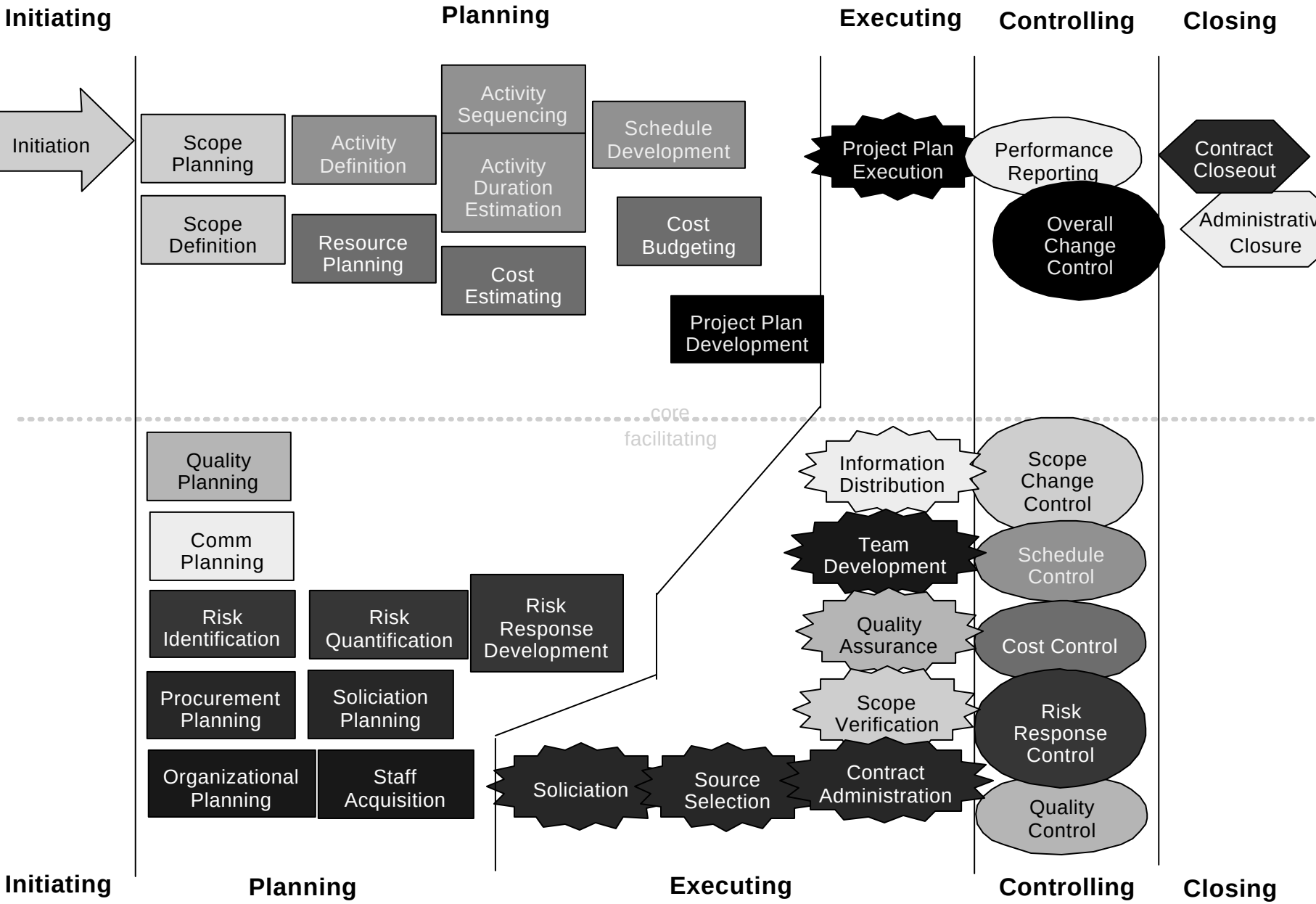
Project Management Focus Areas

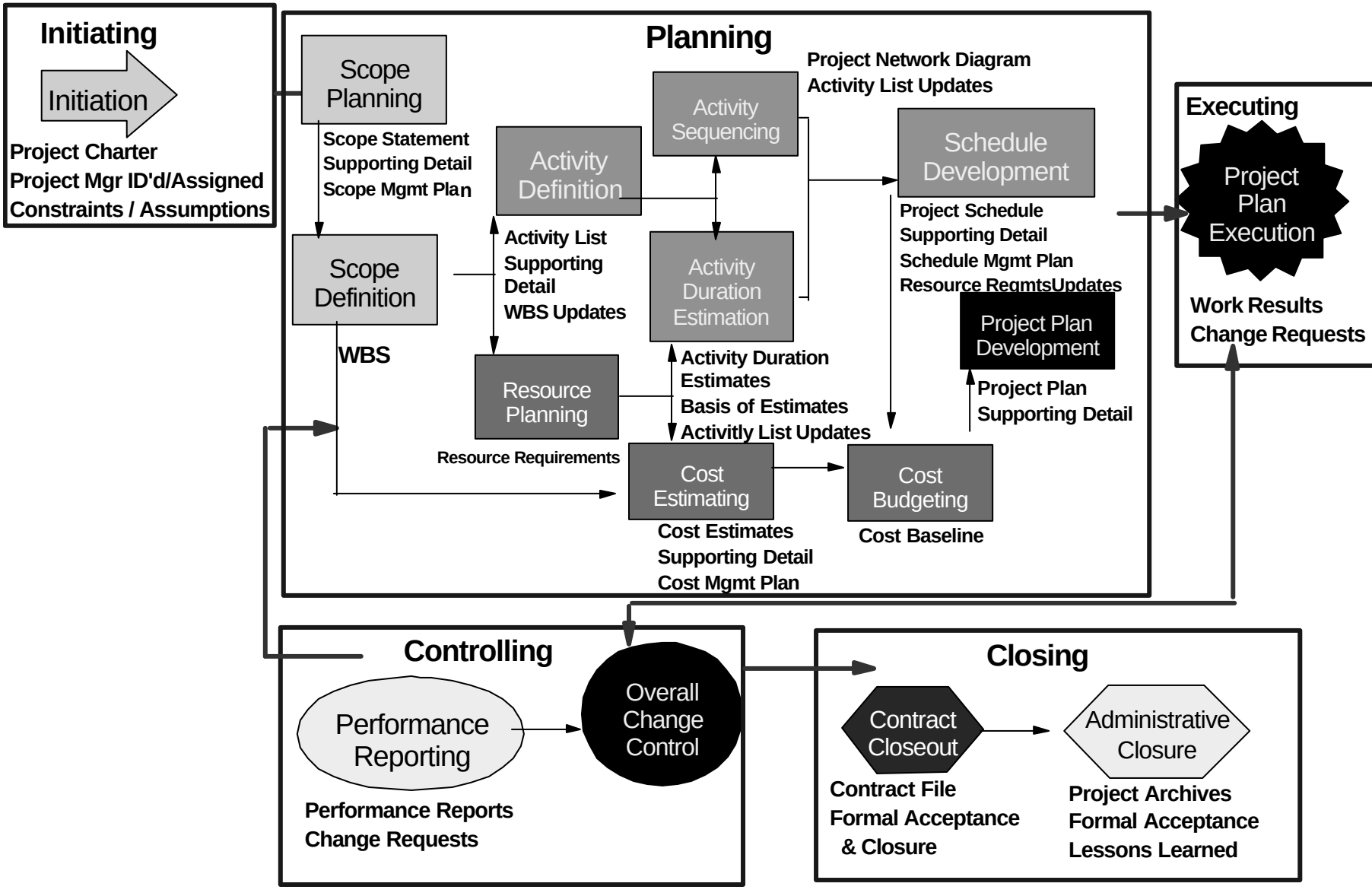


Project Management Processes Groups



Project Management Processes Groups

Core



Project Management Processes Groups

Initiating

Facilitating

Planning

Quality Planning

Quality Mgmt Plan
Operational Defn
Checklists
Inputs to other processes

Comm Planning

Commun Mgmt Plan

Risk Identification

Sources of Risk
Potential RiskEvents
Risk Symptoms
Inputs to other processes

Risk Quantification

Opportunities to Pursue
Threats to Respond to
Opportunities to Ignore
Threats to Accept

Risk Response Development

Risk Mgmt Plan
Inputs to other processes
Contingency Plans
Reserves
Contractual Agreements

Organizational Planning

Role/Respons
Assignments
Staffing Mgmt Plan
Organization Chart
Supporting Detail

Staff Acquisition

Project staff assigned
Project team directory

Procurement Planning

Procurement Mgmt Plan
Statement(s) of Work

Soliciation Planning

Procurement Documents
Evaluation Criteria
Statement(s) of Work Updates

Executing

Information Distribution

Project Records

Team Development

Performance Improvements
Input to Performance Appraisals

Quality Assurance

Quality mprovements

Scope Verification

Soliciation

Formal Acceptance

Source Selection

Proposals

Contract Administration

Contract

Correspondence
Contract Changes
Payments Requests

Controlling

Cost Control

Revised Cost Estimates
Budget Updates
Corrective Action Plan
Estimate at Completion
Lessons Learned

Schedule Control

Schedule Updates
Corrective Action
Lessons Learned

Scope Change Control

Scope Changes
Corrective Action
Lessons Learned

Risk Response Control

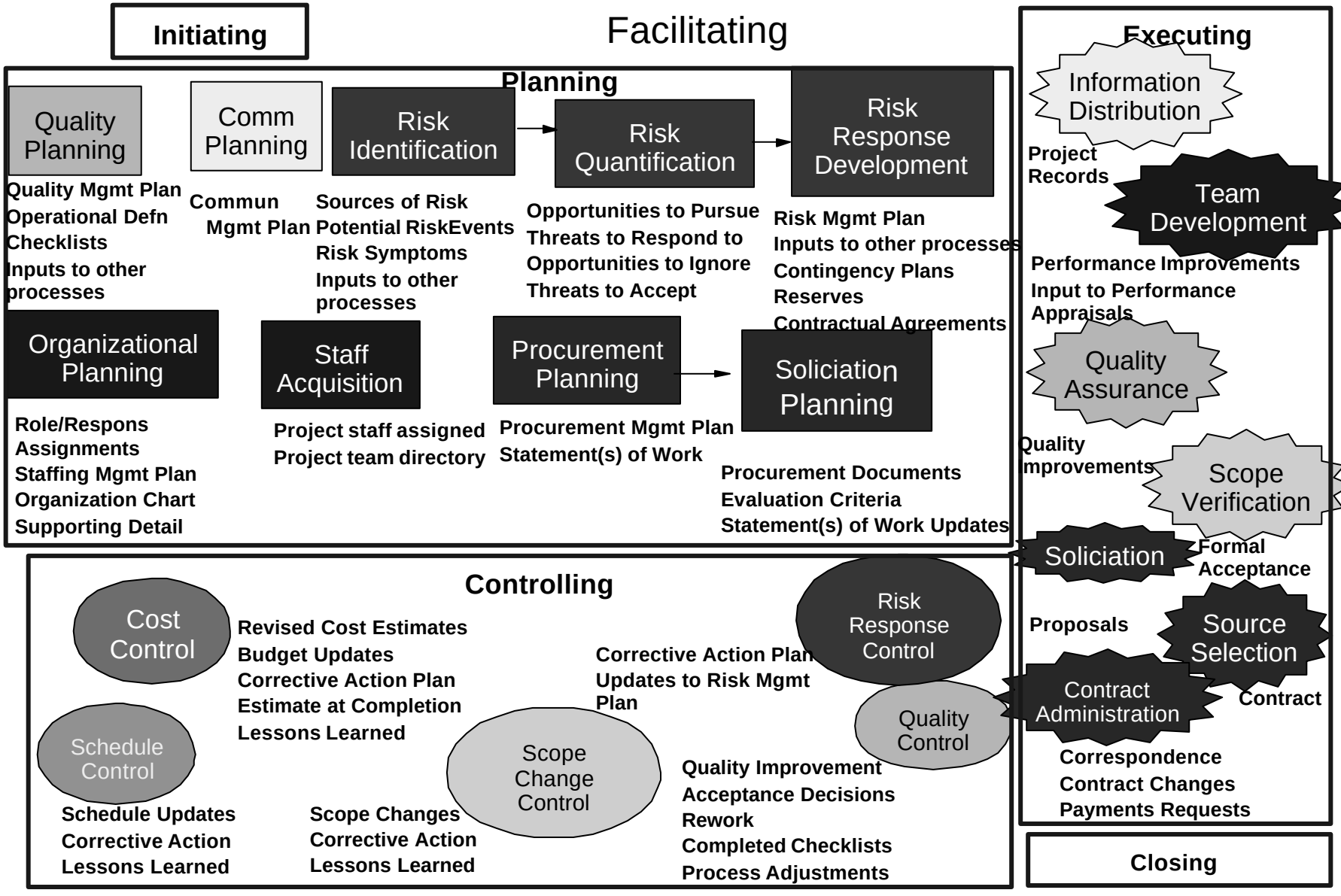
Corrective Action Plan
Updates to Risk Mgmt Plan

Quality Control

Quality Improvement
Acceptance Decisions
Rework
Completed Checklists
Process Adjustments

Closing

Project Management Processes Groups



Project Management Definitions

Scope

Initiation

committing the organization to begin the next phase of the project

- Project Selection Methods
  - (Benefit Measurement; Constrained Optimization)
- Expert Judgement

Project Charter
Project Mgr ID'd/Assigned
Constraints / Assumptions

Scope Planning

developing a written scope statement as the basis for future project decisions

- Benefit / Cost Analysis
- Product Analysis
- Expert Judgement

Scope Statement
Supporting Detail
Scope Mgmt Plan

Scope Definition

subdividing the major project deliverables into smaller, more manageable components

- WBS Templates
- Decomposition

WBS

Scope Verification

formalizing acceptance of the project scope

- Inspections

Formal Acceptance

Scope Change Control

controlling changes to the project scope

- Scope Change Control System
- Performance Measurements

Scope Changes
Corrective Action
Lessons Learned

Initiating Process | Planning Process | Executing Process | Controlling Process | Closing Process

Project Management Definitions

Time

Activity Definition

identifying the specific activities that must be performed to produce the various project deliverables

- Templates
- Decomposition

Activity List
Supporting Detail
WBS Updates

Activity Sequencing

identifying and documenting interactivity dependencies

- PDM (AON fs,sf, ff, ss), ADM (AOA fs),
  CDM (GERT, System Dynamics)
- Network Templates

Project Network Diagram
Activity List Updates

Activity Duration Estimation

estimating the number of work periods which will be needed to complete individual activities

- Analogous Estimating
- Expert Judgement
- Simulation (Monte Carlo)

Activity Duration Estimates
Basis of Estimates
Activitly List Updates

Schedule Development

analyzing activity sequences, activity durations, and resource requirements to create the project schedule

- Mathematical Analysis (CPM, GERT, PERT)
- Duration Compression (Crashing, Fast tracking)
- Simulation
- Resource Leveling Heuristics
- PM Sofftware

Project Schedule
Supporting Detail
Schedule Mgmt Plan
Resource ReqmtsUpdates

Schedule Control

controlling changes to the project schedule

- Schedule Control System
- Performance Measurements
- PM Software

Schedule Updates
Corrective Action
Lessons Learned

Project Management Definitions

Cost

Resource Planning

determining what resources (people, equipment, materials) and what quantities of each should be used to perform project activities

- Expert Judgement
- Alternative Ideas

Resource Requirements

Cost Estimating

developing an approximation (estimate) of the costs of the resources needed to complete project activities

- Analogous Estimating
- Parametric Modeling
- Bottoms-up Estimates
- Computer Tools

Order of Magnitude	-25% to +75%
Budget	-10% to +25%
Definitive	-5% to +10%

Cost Estimates
Supporting Detail
Cost Mgmt Plan

Cost Budgeting

allocating the overall cost estimate to individual work items

- Analogous Estimating
- Parametric Modeling
- Bottoms-up Estimates
- Computer Tools

Cost Baseline

Cost Control

controlling changes to the project budget

- Cost Change System
- Performance Measurements
- Computer Tools

Revised Cost Estimates
Budget Updates
Corrective Action Plan
Estimate at Completion
Lessons Learned

Project Management Definitions

Quality

Quality Planning

identifying which quality standards are relevant to the project and determining how to satisfy them

- Benefits Cost Analysis
- Benchmarking
- Flowcharting
- Design of Experiments

Quality Mgmt Plan
Operational Defn
Checklists
Inputs to other processes

Quality Assurance

evaluating overall project perfomrance on a regular basis to provide confidence that the project will satisfy the relevant quality standards

- Quality Audits
- Benefits Cost Analysis
- Benchmarking
- Flowcharting
- Design of Experiments

Quality Improvements

Quality Control

monitoring specific project results to determine if they comply with relevant quality standards and identifying ways to eliminate causes of unsatisfactory performance

- Inspection
- Control Charts
- Pareto Diagrams
- Statistical Sampling
- Flowcharting

Quality Improvement
Acceptance Decisions
Rework
Completed Checklists
Process Adjustments

Project Management Definitions

Human Resource

Organizational Planning

identifying, documenting, and assigning roles, responsibilities, and reporting relationships

- Templates
- HR Practicies
- Organizational Theory
- Stakeholder Analysis

Role/Respons Assignments
Staffing Mgmt Plan
Organization Chart
Supporting Detail

Staff Acquisition

getting the human resources needed assigned to and working on the project

- Negotiations
- Pre-Assignment
- Procurement

Project staff assigned
Project team directory

Team Development

developing individual and group skills to enhance project performance

- Rewards & Recognition System
- Training
- Co-Location
- Team Building Activities
- Gen Mgmt Skills

Performance Improvements
Input to Performance Appraisals

Project Management Definitions

Communications

Comm Planning

determining the information and communications needs of the stakeholders: who needs what information, when they need it, and how will it ge given to them

Stakeholder Analysis

Communications Mgmt Plan

Information Distribution

evaluating overall project perfomrance on a regular basis to provide confidence that the project will satisfy the relevant quality standards

Information Retrieval System
Information Distribution System
Communication Skills

Project Records

Performance Reporting

collecting and disseminating performance information, including status reporting, progress measurement, and forecasting

Earned Value Analysis	CV = BCWP - ACWP
Performance Reviews	SV = BCWP - BCWS
Variance Analysis	CPI = BCWP / ACWP
Trend Analysis	SVI - BCWP / BCWS
Infromation Distribution Tools	EAC =BAC / CPI

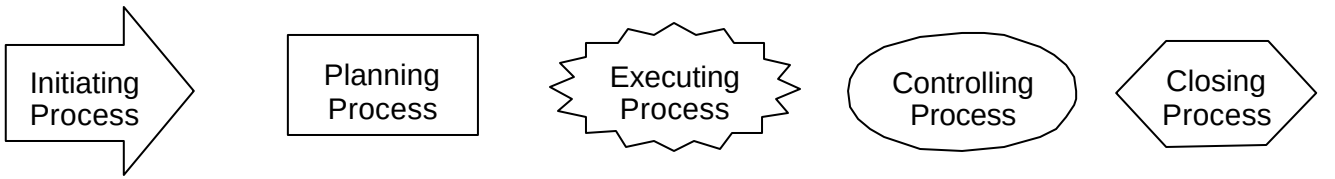
Performance Reports
Change Requests

Administrative Closure

generating, gathering, and disseminating information to formalize phase or project completion

Earned Value Analysis
Performance Reviews
Variance Analysis
Trend Analysis
Infromation Distribution Tools

Project Archives
Formal Acceptance
Lessons Learned



Project Management Definitions

Risk

Risk Identification

determining which risks are likely to affect the project and documenting the characteristics of each

- Checklists
- Flowcharting
- Interviews

Sources of Risk
Potential Risk Events
Risk Symptoms
Inputs to other processes

Risk Quantification

evaluating risks and risk interactions to assess the range of possible outcomes

- Expected Monetary Value
- Statistical Sums
  - (Triangular Distribution, Beta Distribution)
- Simulation (Monte Carlo)
- Decision Trees
- Expert Judgement

EMV = Risk Event * Risk Probability

Triangular

mean = (o + ml + p)/3

signma **2 = variance =

[(p -op) **2 + (ml - o)(ml p)] / 18

Beta

mean = (o + 4ml + p)/6

signma**2 = variance =[(p - o) / 6]**2

Opportunities to Pursue
Threats to Respond to
Opportunities to Ignore
Threats to Accept

Risk Response Development

defining enhancement steps for opportunities and responses to threats

- Procurement
- Insurance
- Alternate Strategies
- Contingency Planning

Risk Mgmt Plan
Inputs to other processes
Contingency Plans
Reserves
Contractual Agreements

Risk Response Control

responding to changes in risk over the course of the project

- Work Arounds
- More Risk Response Development

Corrective Action Plan
Updates to Risk Mgmt Plan

Project Management Definitions

Procurement

Procurement Planning

determining what to procure and when
- Make or Buy Analysis
- Expert Judgement
- Contract Type Selection

Procurement Mgmt Plan
Statement(s) of Work

Soliciation Planning

documenitng product requirements and identifying potential sources
- Standard Forms
- Expert Judgement

Procurement Documents
Evaluation Criteria
Statement(s) of Work Updates

Soliciation

obtaining quotations, bids, offers, or proposals as appropriate
- Advertising
- Bidders Conference

Unilateral:
- Purchase Order -- low cost,routine

Bilateral:
- IFB - High cost, standard
- RFQ - Low cost, materials & supplies
- RFP - High cost, non-standard

Proposals

Source Selection

choosing from among potential sellers
- Contract Negotiation
- Weighting System
- Screening System
- Independent Estimates

Unilateral:
- Purchase Order -- low cost, routine

Bilateral:
- CPPC, CPFF, CPIF, FPI, FFP

Contract

Contract Administration

managing the relationship with the seller
- Contract Change Control System
- Performance Reporting
- Payment System

Correspondence
Contract Changes
Payments Requests

Contract Closeout

completion and settlement of the contract, including resolution of any open items
- Procurement Audit

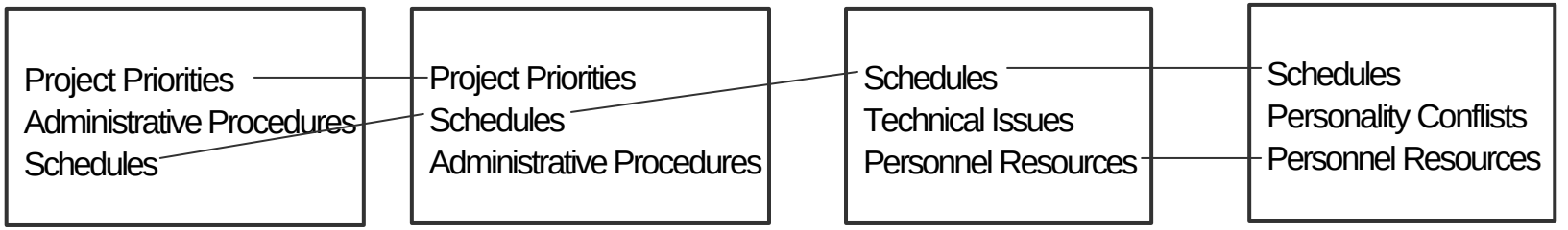
Contract File
Formal Acceptance & Closure

Initiating Process → Planning Process → Executing Process → Controlling Process → Closing Process

Project Life Cycle

CONCEPT PHASE	DEVELOPMENT [PLANNING] PHASE	IMPLEMENTATION [EXECUTION] PHASE	TERMINATION [CLOSE-OUT] PHASE
Gather data Identify needs & alternatives Establish goals, feasibility, risk, strategy Guessitimate resources Present proposal Develop Project Charter	Appoint key team members Develop scope baseline Establish master plan, budget, WBS, & policies/procedures Assess risks Confirm justification and obtain approval to proceed	Set up organization Establish detailed technical requirements Set up & execute work packages Direct, monitor, and control scope, quality, time, & cost	Review & accept project Transfer responsibility Document & evaluate results Release & redirect resources

Sources of Conflict



Project Selection Techniques

Benefit Measurement Methods

- Benefit-Cost Models
- Peer Review
- Scoring Models
- Murder Board
- Pairwise Comparisons

Constrained Optimization Methods *note these are NOT costing models*

- Linear & Nonlinear programming
- Integer Programming
- Dynamic Programming
- Multiobjective Programming

Key INTEGRATION / SCOPE Terms

80 Hour Rule => Work Package

Configuration Management

1. develop specifications
2. develop general design
3. develop detailed design
4. implement & test system

Change Control Board - CCB

Management by Objectives

system of managerial leadership that defines individual managerial responsibilities in terms of corporate objectives

1. establish unambiguous objectives
2. periodically evaluate
3. act

Midproject Evaluation results

identification of problems and need for changes
significant changes in project's objectives
termination

Scope Verification

occurs at the end of each phase; formalizes acceptance of the project scope by stakeholders

Delphi Technique

forcasting technique for gathering expert opinion

Key Formulae

Standard Deviations

1 = 68.3%
2 = 95.5%
3 = 99.7% (Six Sigma)

PERT Estimate

$$\frac{\text{Optimistic} + 4*\text{Most Likely} + \text{Pessimistic}}{6}$$

$$\text{Sigma} = \frac{\text{Pessimistic} - \text{Optimistic}}{6}$$

Duration

$$\frac{\text{Amount of Work}}{\text{Avail Res} * \text{Res Productivity Rate}}$$

Benefit Cost Ratio (BCR)

$$\frac{\text{PV Revenue}}{\text{PV Cost}}$$

Present Value - value today of future cash flows

$$PV = \frac{M}{(1 + r)^t}$$

M = amount payment *t* years from now
r = interest rate or discount rate
t - time period

Communications Channels

$$\frac{N * (N-1)}{2}$$

IRR - Internal Rate of Return

= interest rate which make PV costs = PV benefits
the higher the IRR, the better the project

Key Formulae

BCWP = *earned value*

Schedule Variance

BCWP - BCWS

dif in budgeted cost of work performed & scheduled

Schedule Performance Index

$$SPI = \frac{BCWP}{BCWS}$$

Ratio of budgeted cost of work performed vs scheduled

Schedule Variance %

$$\frac{BCWP - BCWS}{BCWS}$$

schedule variance as percentage of budgeted cost of work scheduled

Everything about SCHEDULE is compared to WORK SCHEDULED

Key TIME Terms

PERT - Program Evaluation and Review Technique

three time estimates per activity: 1. Pessimistic, 2. Most Likely, 3. Optomistic
Event Oriented (SLACK) [amount time activity can be delayed w/o delay of project]
AOA or AOL - Activity on Arrow / Line

Critical Path Method

emphasis on controlling cost & leaving the schedule flexible
one time estimate per activity
Activity Oriented (FLOAT) [amount time activity can be delayed w/o delay of project]
AOA or AOL - Activity on Arrow / Line

AOA

Activity Sequencing by order of tasks
Mandatory Dependencies (HARD LOGIC)
Discretionary Dependencies (SOFT LOGIC or PREFERENTIAL LOGIC)
External Dependencies
Critical Path is longest path through the network
Dummy Activities
Always F-S (finish to start)

Precedence Diagram Method

improved PERT and CPM by adding LAG (waiting time) relationships to activities
LEAD (accelerated time)

S-S, S-F, F-S, F-F

AON - Activity on Node

PM I believes -- CPM & PERT tend to underestimate project durations by comparison to Monte Carlo analysis

Key TIME Terms

Crashing

add more resources to activities on the critical path
increases **COSTS**

Fast-tracking

analyze critical path to see what activities can be done in parallel
increases **RISK**

Resource-constrained schedule

Time-constrained schedule: absence of resources creates negative float

Responsibility Matrix: **who** does **what**

Resource Spreadsheet: quantifies **how much effort** needed from each resource

Resource Gantt chartt: shows **time** periods of work

Resource Histogram / Resource Loading Chart:

vertical bar representing **total number** of resources during each period

Range Estimation

range of possible results or the probability that the activity will meet the estimate

Heuristic Scheduling (Rule of Thumb)

trial and error; simple to use but good result

Key COST Terms

WBS at lowest level = WORK PACKAGE

COST ACCOUNT

one level below WORK PACKAGE - used for monitoring & controlling

PMI -- lowest level in a project at which organizational responsibilities are assigned

Analogous Estimating

top down estimating; usually early in project & relies on similar project outcomes

Parametric Estimating

regression analysis - uses scatter diagram where regression line estimates average value for dependent variable (e.g. learning curve)

Bottom-up Cost Estimating

detailed estimates from project work packages

Accuracy of Estimates

1. **Order of Magnitude** - early 'ballparks' - 25% to + 75%
2. **Budget Estimates** - initial funding - 10% to + 25%
3. **Definitive Estimates** - detailed data - 5% to + 10%

Key COST Terms

Law of Diminishing Returns

more put in, proportionately less get out

Variable vs Fixed Costs

Variable - rise directly w/project size Fixed - non-recurring

Direct vs Indirect Costs

Direct - applies to specific project Indirect - spread across

Contingency Reserve

normally included in project's cost and schedule baseline - *Known Risk*

Management Reserve

separately planned quantity to allow for future situations impossible to predict

Unknown Unknowns

Performance Measurement Baseline (PMB)

Sum of Cost Account w/Contingency Reserves included

Budget Baseline (BBL)

PMB + Mgmt Reserve

Working Capital

Current Assets - Current Liabilities

Value Analysis

Cost reduction tool - anlyze design to consider whether function is required or can be done at lower cost

Life-Cycle Cost (LCC)

total cost of ownership -- cradle to grave -- extends beyond project

Key RISK Terms

PMI -- ***need not manage pure risk if you can insure against it***

Business Risks — both gain and loss

Insurable (pure) — only loss (property damage, indirect loss, legal liability, personnel)

Key Risk Factors

Risk Event, Risk Probability, Amount at Stake

Risk Identification

1. potential sources of risks (technical nature, cost & schedule, WBS, staffing plan, procurement plan)
2. possible risk events (probabiity, possible outcomes, expected timing, anticipated frequency)
3. risk symptoms

Risk Quantification

evaluating risks & risk interactions to assess the range of possible project outcomes

primary objective -- use set of structured tools to help decide which risk events warrant a response

Statistical Independence

two events statistically independent if occurence of one not related to occurence of the other

Expected Monetary Value (EPM)

Sum of the products of each Risk Events value and probability

Decision Tree Analysis

each decision has total sum probability of 1.0

Monte Carlo Analysis

superior to PERT & CPM because it considers **path convergence**

Impact Analysis

considers trade-offs: likelihood of event will occur versus severity of impact if it does

Key RISK Terms

Risk Response Development

1. AVOIDANCE alternative strategy
2. ACCEPTANCE contingency plan (retention)
3. MITIGATION take specific actions or deflect / transfer or use reserve (reduce)

Risk Response Control

responding to changes in risk over the course of the project

1. whenever a problem or a risk arises
2. whenever the project reahes a major decision point or milestone

Contingency Plans

Workarounds

Types of QUALITY Charts and/or Diagrams

HISTOGRAM

simple probability distribution

SPC Chart

Statistical Process Control; shows current capability of the process

Top-Down Flowchart

presents only the major or most fundamental steps in a process or project

Detailed Flowchart

provides very specific information about a process flow

Work-Flow Diagram

graphic representation of how work actually flows thru a physical space

Pareto Charts

data is arranged in descending order of their importance, generally by magnitute of frequency, cost, time, or other similar parameter
shows frequency but not impact

Cause-&-Effect Diagrams ISHIKAWA or FISHBONE

graphic representation among a list of items or factors

Control Charts

graph that display data taken over time & computed variations of those data
usually shows Upper and Lower Control Limits (natural variations in the process)
Rule of Seven applies as indicator that something is wrong
Assignable (random) Causes are Special Events outside the control limits (problem/defect)

Checksheets

Key QUALITY Terms

***Quality is Free* - Crosby**

Quality Management involved carrying out a project through its phases with zero deviations from project specifications

Quality Management Maturity Grid

1. Uncertainty, 2. Awakening, 3. Enlightenment, 4. Wisdom, 5. Certainty

Gold Plating

giving customer more than what was required --- not good

Formative Quality Evaluation - Quality Audit

Summative Quality Evaluation - Quality Improvement

Ownership of Quality

individual performing the task has the ultimate responsibility

Cost of Quality

cost of Conformance (proactive) and cost of Non-Conformance (failure)

85% of cost of quality are direct responsibility of management

Kaizen

continuous improvement

Warusa-kagen refers to things not yet problems, but not yet quite right (Masaaki Imai)

Quality should share equal priority with cost and schedule

Benchmarking - comparing your practices to those of others

JIT - just in time - inventory control approach

Key HR Terms

Forms of Organization

1. Functional
2. Project Expeditor
3. Weak Matrix
4. Balanced Matirx
5. Strong Matirx
6. Projectized

Project Manager Functions

just PLOCing along

MOST IMPORTANT: PLANNING, ORGANIZING, LEADING, CONTROLLING

Also: Reporting, Client Relations, Logistics, Procedure Writing & Admin

Project Manager Roles

I Could Tell Laura D'Antoni My Choice Clues

Integrator, Communication, Team Leader, Decision Maker, Climate creator/builder

PM Qualiications

WORKS WELL WITH OTHERS

Experience in area, supervisory experience, education, contract admin, reflect company's position, profit oriented, qualfied negotiator

Types of Power

**** PM I suggests PMs use these**

1. Legitimate	position in organization hierachy & degreeof control over project, as mod by org
2. Coercive	control over project and project personnel
3. Reward **	position in organization hierachy & degreeof control over project
4. Expert **	personal reputation, knowledge, & experience
5. Referent	position in the organizaton

Key HR Terms

Project Conflict Sources

High to Low

1. **Schedules**
2. **Project Priorities**
3. **Personnel Resources**
4. **Techical Opinions and Peformance Trade-offs**
5. Administrative Procedures
6. Cost Objectives
7. Personalities

Conflict Management

in PMI strongest to weakest

1. Problem Solving / Confrontation
2. Compromising
3. Smoothing
4. Withdrawl
5. Forcing

Key HR Terms

Team Building

- Team members INDEPENDENT
- CONSENSUS on well-defined project goals & objectives
- Team members COMMITTED to working together
- Team is ACCOUNTABLE as unit with larger organizaton
- Moderate level of COMPETITION and CONFLICT

Symptoms of Poor Teamwork

- Frustration
- Conflict & unhealthy competition
- Unproductive meetings
- Lack of trust or confidence in the project manager

Team Building Process

- Plan for Team Building
- Negotiate for Team Members
- Organize team
- Hold 'kickoff' meeting
- Obtain eam member committments
- Build communications links
- Conduct team building exercises
- Incorporate team building activities into all project activities

Key HR Terms

Maslow's Hierarchy of Needs *low to high*

Physiological
Safety
Social
Respect, self-respect, self-esteem
Self-fulfillment and creativity (self-actualization)

McGregor's Theory X and Theory Y

X = workers are inherently LAZY, SELF-CENTERED, LACKING AMBITION
Y = workers can achieve their own goals best by directing their own efforts toward organizational objectives

Herzberg's Theory of Motivation

Hygiene Factors

pay, attitude of supervisor, working conditions
poor may destroy motivation, but improvements not likely to increase

Motivators

positive motivation results from an opportunity to achieve and experience self-actualization

Expectancy Theory

People tend to be highly producive and motivated if:

1. they believe their efforts will likely lead to succesful results
2. they believe they will be rewarded for their success

Key PROCUREMENT Terms

Procurement Planning

Specification
Drawings
Delivery Dates
Estimated Cost or "Should Cost" or Independent Estimate

Make or Buy Decision

considers both direct and indirect costs of prospective procurement

Contract Types and Risks

Cost Plus Percentage CPPC

Reimburses allowable costs plus agreed upon percentage of est cost as profit
Buyer funds all overruns

Cost Plus Fixed Fee CPPF

Reimburses allowable costs plus a fixed fee paid proportionately as contract progresses
Ceiling on profit but NO motivation to control costs
Risk with Buyer
Research & development projects

Cost Plus Incentive Fee CPIF

Reimburses allowable costs with predetermined bonus for superior performance
Long performance periods and substantional HW development & test requirements

Fixed Plus Incentive Fee FPIF

Performance incentive
Shared risk
High-value projects over long performance periods

Firm Fixed Price FFP

Lump sum
Seller bears risk and had opportunity for greatest profit
Definite specifications and relatively certain costs

Key PROCUREMENT Terms

Solicitation Planning

Preparing documents needed to support solicitation

Contract Origination

Unilateral contract = Purchase Order

Bilateral contract =

Invitations to Bid - appropriate for routine items where objective is best price

Request for Quotations - relatively low monetary purchases of commodity items

Request for Proposals - complex/non-standard items, high monetary value

Evaluation Criteria

used to rate or score proposals

understanding of need
overall or life-cycle cost
technical capability
management approach
financial capacity

Key COMMUNICATIONS Terms

Communications Modes

- **Communicator**
- **Message**
- **Medium**
- **Recipient**

Communications Channels

Number of Channels = (n * (n-1)) / 2

Kickoff Meeting --- PM I believes in the value of the kickoff meeting

Note -- PMI emphasizes the team building possibilityes that accompany this mtg

Note -- PMI says the presence of communications barriers leads to increased **conflict**
Note -- PMI says the project mgr spends **90%** of time in acquiring & comm info
Note -- PMI believes communications flow is **most difficult in matrix** organization style

PMI's 6 Actions for PMs to take

Be an Effective Communicator
Be a Communications Expeditor
Avoid Communications Blockers
Use a "Tight Matrix"
Have a Project "War Room"
Make Meetings Effective