Managing Information System Projects

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Importance of Project Management in IS

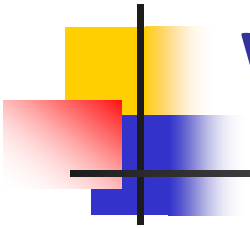
- 1995 survey in USA (Standish group "Chaos" survey
  - 31% of IT projects cancelled before completion
  - 53% over budget / over schedule
  - only 16% were completely successful
  - only 9% of large projects were completely successful
- Dot-com bust 2001
  - poorly conceived projects, poor monitoring
- ERP system project "non-successes"

Definitions

- A **project** is a temporary endeavour undertaken to accomplish a unique purpose
- **Project management** is the application of **knowledge, skills, tools and techniques** to project activities in order to meet stakeholder needs and expectations from a project

Objective of this session

- To give an overview of Project Management of large Information Systems / IT projects
  - Current body of knowledge
  - All aspects of project management as applicable to IT projects with emphasis on e-commerce



What is a successful project?

The project is successful if

- It delivers **measurable organizational value (MOV)**
  - measurable
  - of value to the organization
  - agreed upon
  - verifiable
- It is completed within an acceptable schedule at an acceptable cost

Types of MOV

Table 2.1 Potential Areas of Impact for IT Projects

Potential Area	*Examples of Desired Impact*
Strategic	■ Penetration of new markets ■ Transformation of the terms of competition within the market ■ Increased market share
Customer	■ Customers have more choices of products or services ■ Customers receive better products or services ■ Transaction processes are more efficient or effective
Financial	■ Increased profit ■ Increased margins
Operational	■ Lower costs due to streamlined operations ■ Increased operational effectiveness ■ Improvements to supply chain
Social	■ Education ■ Health ■ Safety ■ Environment

SOURCE: Adapted from *CIO* magazine's Enterprise Value Awards Application Form and Elaine M. Cummings, "Judgment Call," *CIO*, February 2, 2000, http://www.cio.com/awards/eva/index.html.

The Project Management Office

- Provides support and collects data while providing tools and methodologies to all project groups
- Manages the company's portfolio of IT projects
- Provides historical information that can be used as the basis for estimating and conducting checks for projects
- Is a centre of excellence for project management
- Enforces priorities and controls that keep the projects on track
- Coordinates cross functional projects
- Provides a standardized way for all projects to be planned, managed and reported

Project management areas

- Scope management
- Time management
- Cost management
- Quality management
- Human resource management
- Communications management
- Risk management
- Procurement management
- Integration management

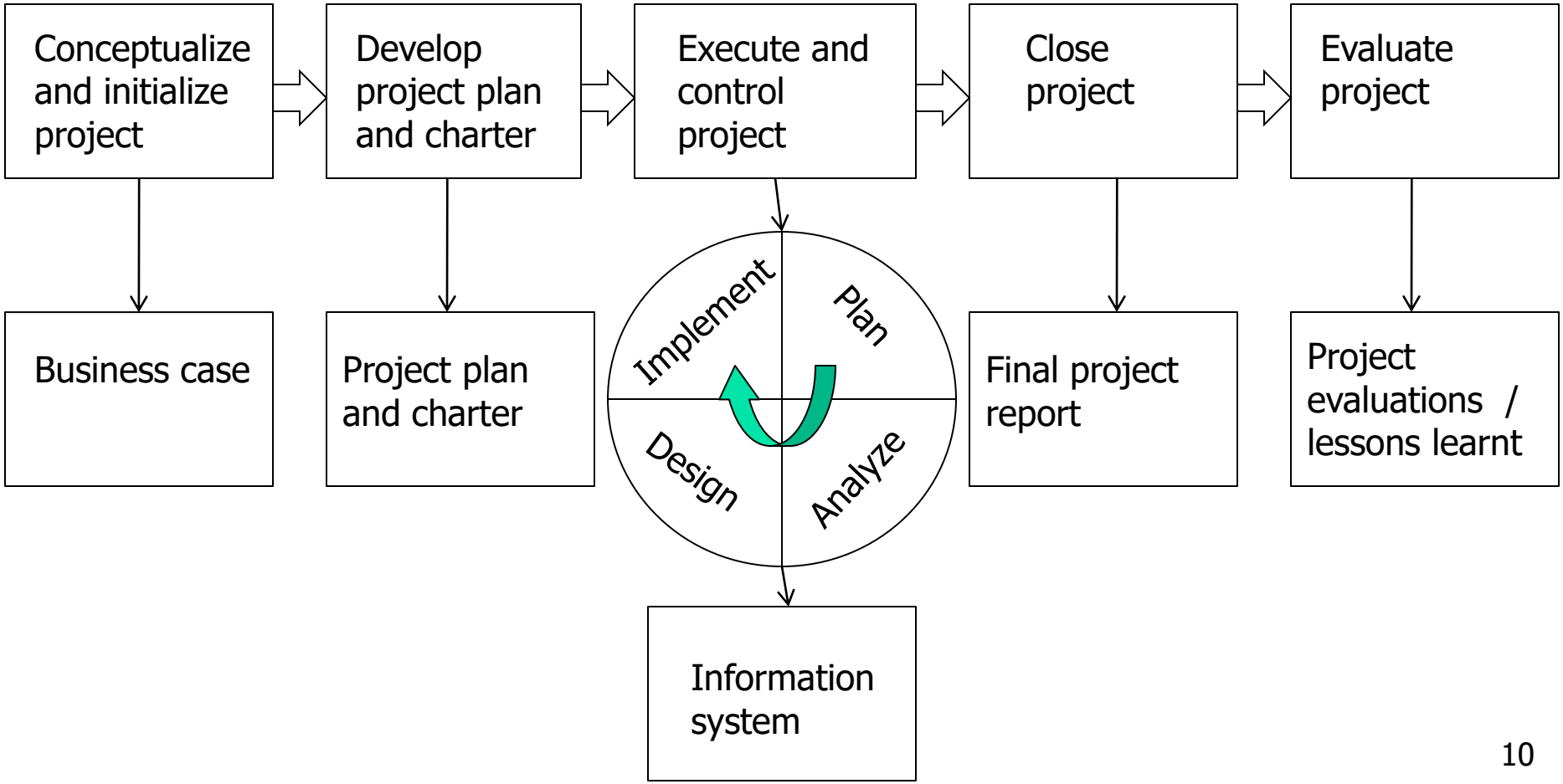
IT project lifecycle

- Define project goal
- Plan project
- Execute project plan
- Close project
- Evaluate / assess project

IT / e-commerce projects have certain peculiarities

- initial estimations are more inaccurate
- the social dimension is more pronounced
- non-technical and technical issues are equally important throughout the project

IT project lifecycle



Developing the Business Case

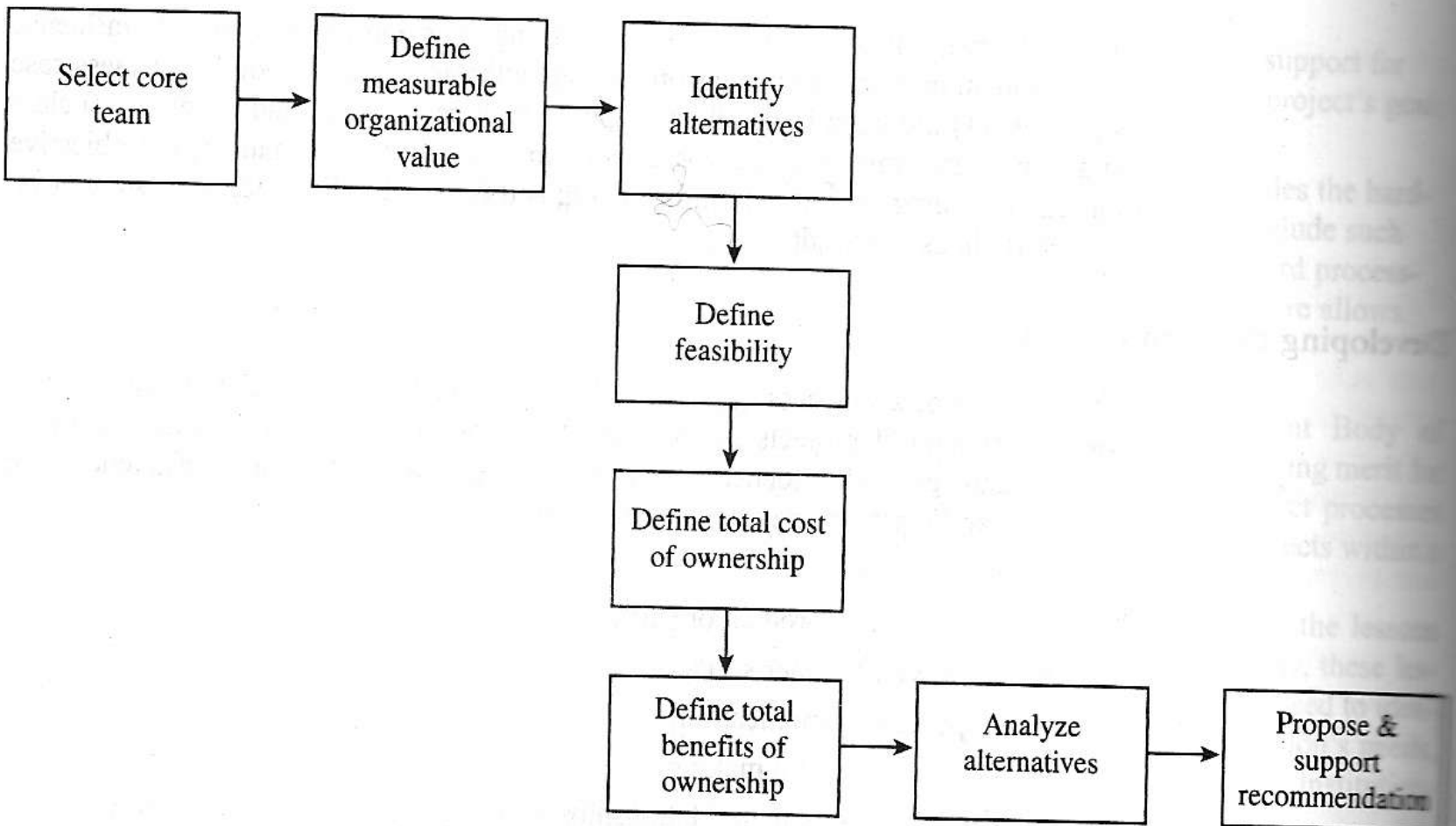


Figure 2.3 The Process for Developing a Business Case

Detailed Project Plan

- What needs to be done
- Who will do the work
- When will they do the work
- How long will it take
- How much will it cost

The Project Charter

- A key deliverable: an agreement between the project sponsor and the project team
- Defines how the project will be organized
- Clarifies the project scope and defines the project objectives in terms of scope, schedule, budget, and quality standards
- Identifies and gives authority to the project manager
- Defines roles and responsibilities
- Identifies project stakeholders

More on the Project Charter and Detailed Project Plan

- The project charter and detailed project plan set out:
  - Who is the **project manager**? the **project sponsor**?
  - Who is on the **project team**, and what **role** does everyone associated with the project play?
  - What is the **estimated scope, cost and time schedule** of the project?
  - What **resources and technology** will be required?
  - What **approach, tools, and techniques** will be used to develop the information system?
  - What **tasks or activities** will be required to perform the project, and **how long** will these tasks or activities take?

Project planning framework

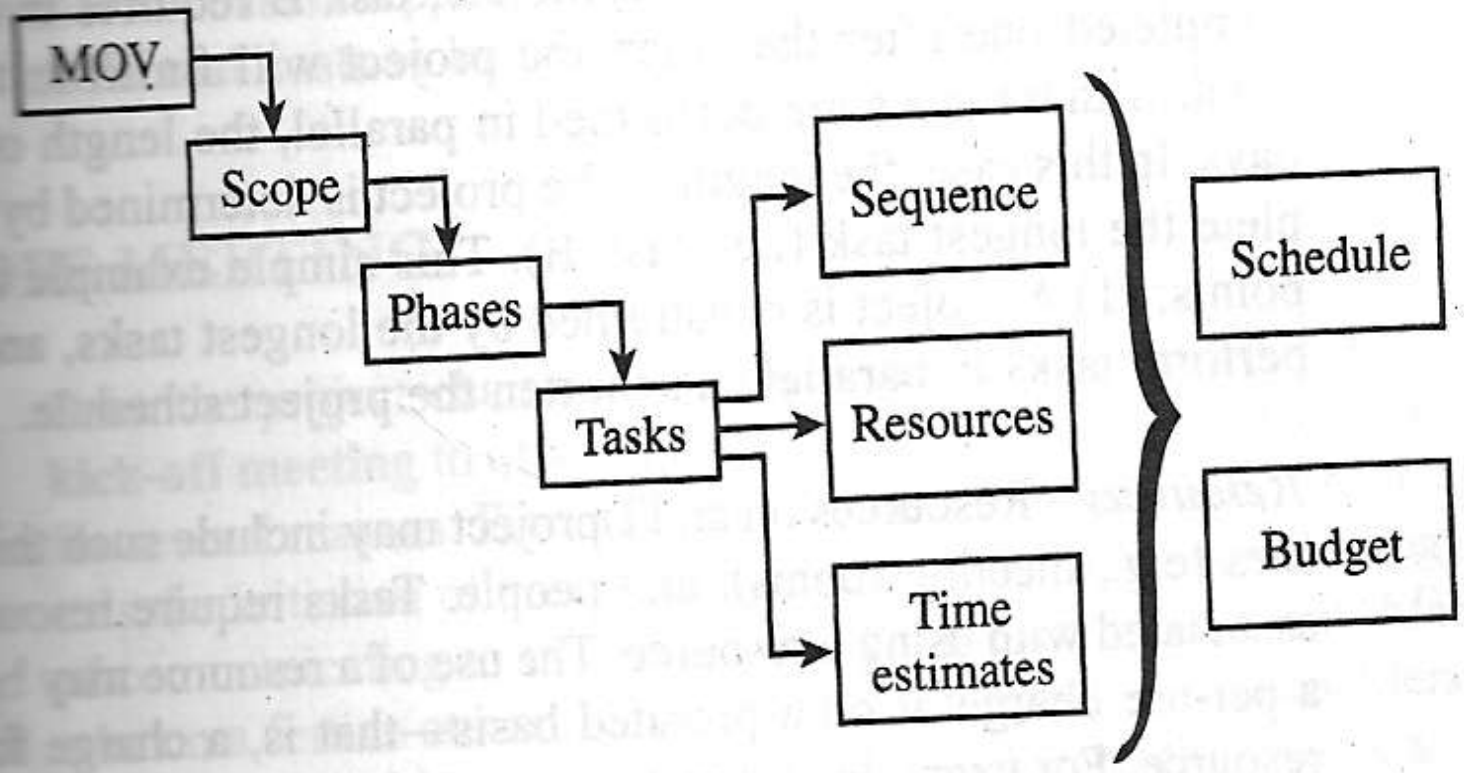


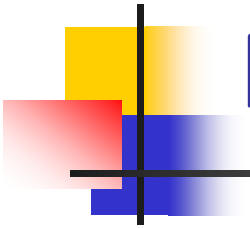
Figure 3.5 The Project Planning Framework—Defining the MOV

Scope definition

- Two types of scope
  - Project scope
  - System scope
- Project scope is defined by
  - Deliverable definition table
  - Deliverable structure chart: defines detailed work packages
  - Work breakdown structure (WBS): further details the scope
- System scope is defined by
  - Context level data flow diagram (DFD)
  - High level use case diagram

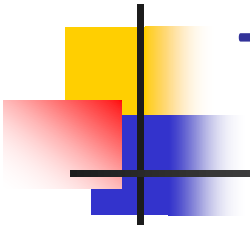
Project scope

- Scope statement
  - Sets expectations
  - Defines constraints
- Work within the scope boundary must support the project's measurable organizational value (MOV)
- Work outside the scope boundary (i.e. not within the project scope) must be identified



Project stakeholders

- Service users
- System users
- Project management team
- Application development team
- Hardware providers
- Software and service providers
- Project steering committee
- Regulatory bodies
- Investors



The project organization

- The formal organization
  - Functional
  - Matrix
  - Project-based
- Roles within the project team
  - Project manager
  - Domain specialist / business analyst
  - Solution architect
  - System analysts, development specialists
  - Quality specialist, estimation specialist
  - Implementation coordinator
  - Finance coordinator

Types of project organization

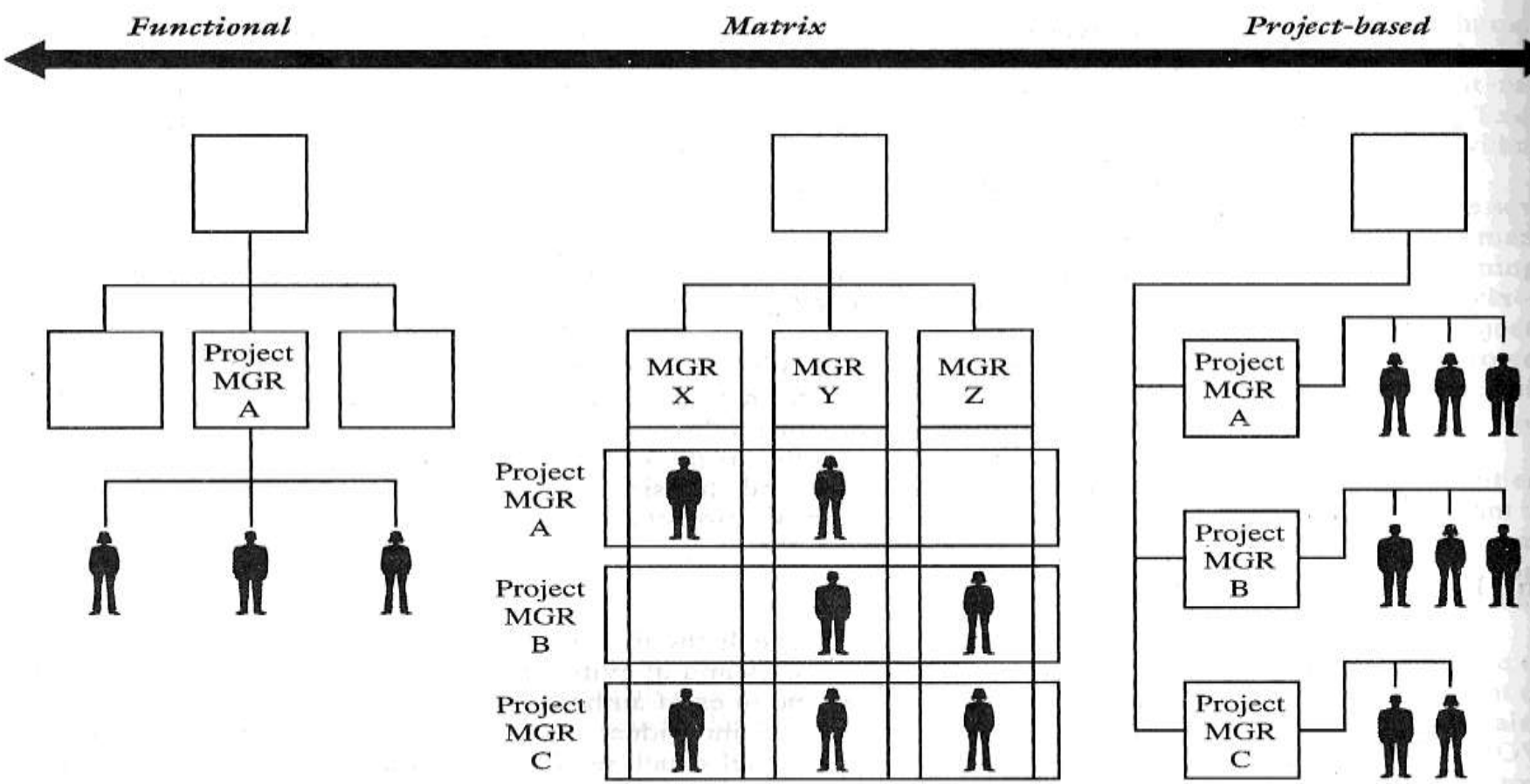


Figure 4.1 Organizational Structures

The informal organization

- Stakeholders
  - Interested in project success
  - Interested in project failure
- Stakeholders exercise varying degrees of influence on the project
- Some informal roles with different objectives and strategies are
  - Project champion
  - Project owner
  - Consultant
  - Decision maker
  - Advocate
  - Ally, adversary, etc.

Kick-off meeting

- First meeting after approval of project charter and project plan
- Involves **major stakeholders**
- Signals the closure of the planning phase
- Communicates the project charter and project plan
- Starts each stakeholder off with a positive attitude

Scope management plan

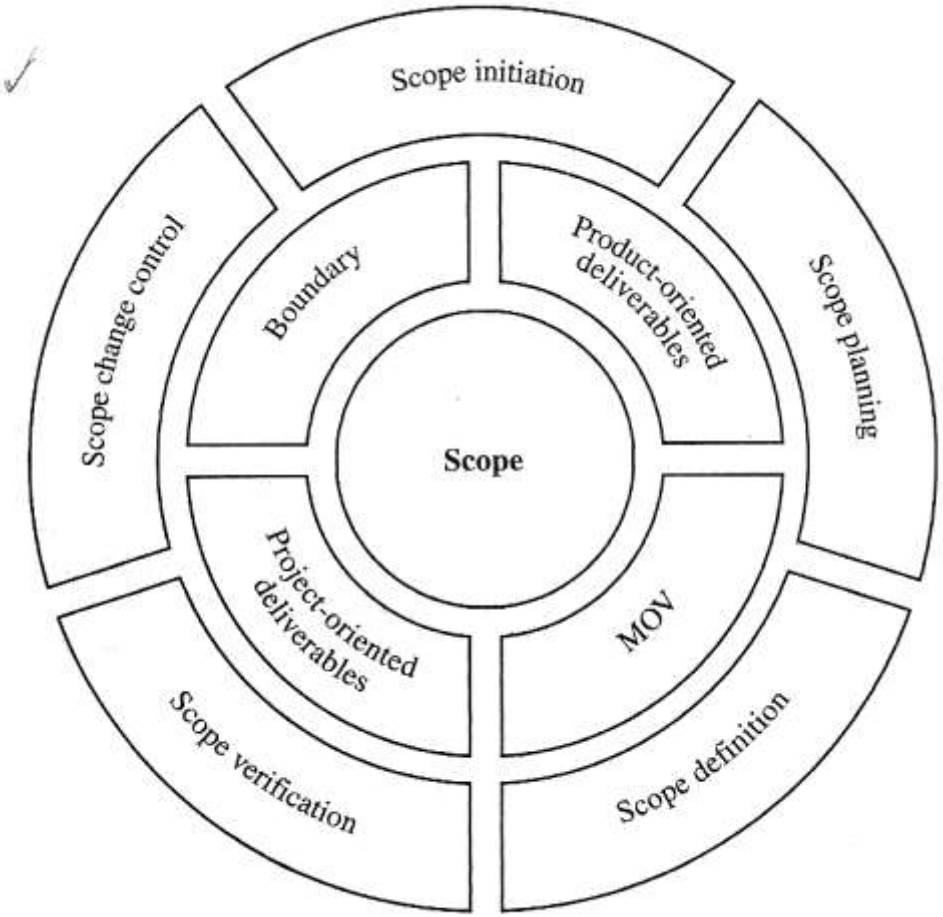
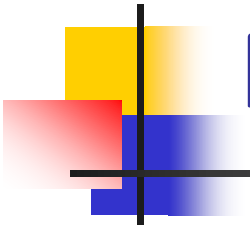


Figure 5.1 Scope Management Plan

Scope change control

- Scope changes can occur during the project
  - Scope grope
  - Scope creep
  - Scope leap
- Scope change control is a must
  - Scope change request form
  - Scope change request log



Project time management

- The size of IT projects and effort involved are difficult to estimate
- The effort estimate has to be made progressively more accurate during the course of the project
- **Work Breakdown Structure** results in manageable chunks of work, called **work packages**
- Individual work packages generally require a few man-days effort to complete

Work package

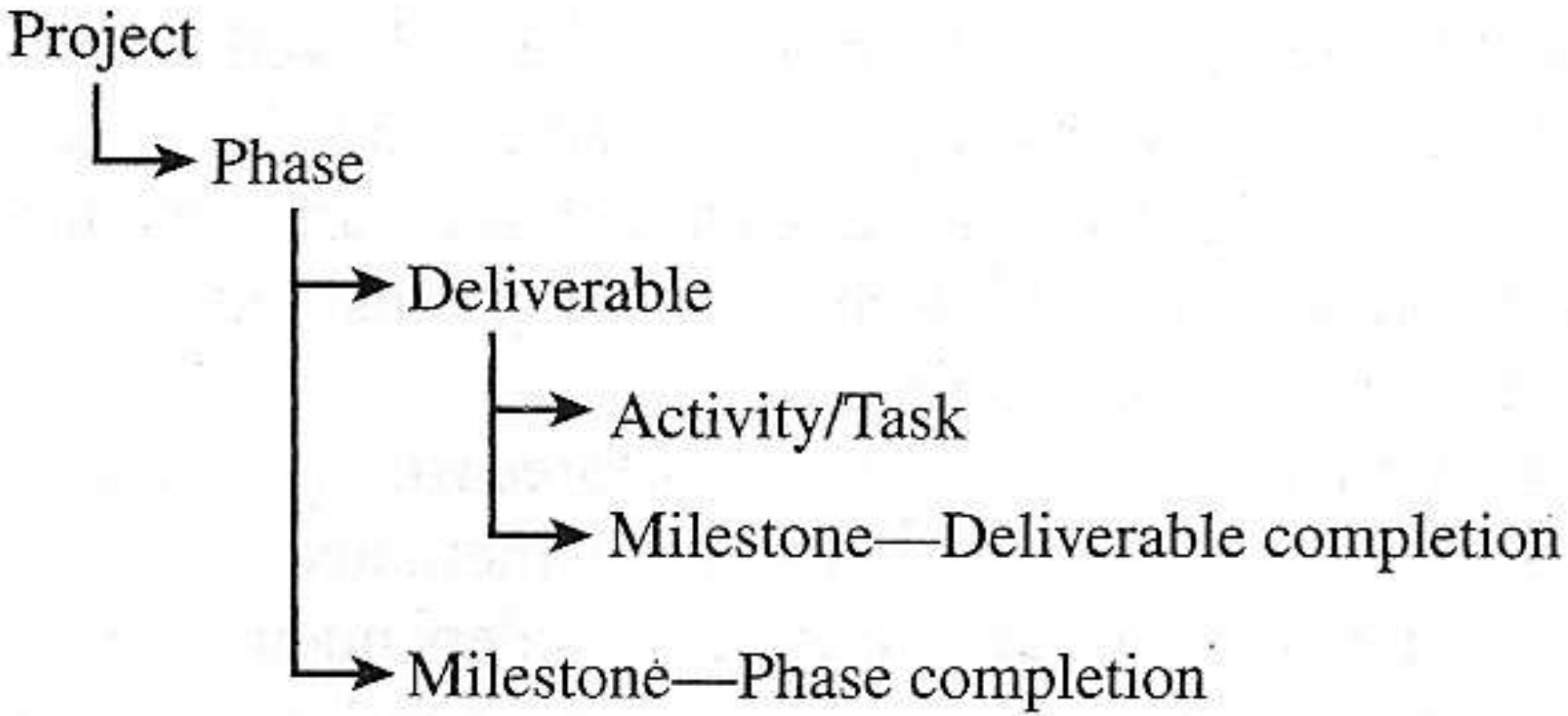
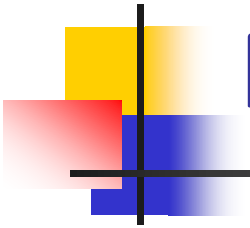
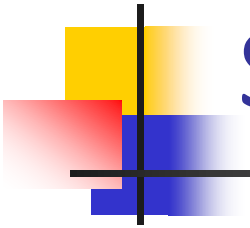


Figure 6.1 Work Package



Project estimation

- Guesstimating
- Delphi technique
  - Experts provide independent anonymous estimates and discuss findings
- Time boxing
- Top-down estimating
- Bottom-up estimating



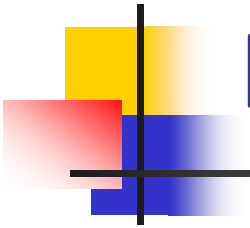
Software estimation

- Function points are an independent measure of system size
  - Unadjusted function points (UAF) are obtained from the specified system requirements
  - UAF are adjusted by applying a Value Adjustment factor (VAF), which is derived from 14 General System Characteristics (GSCs) of the system
- Effort required to develop a system varies according to development platform
- COCOMO II method of effort estimation is used to arrive at
  - Effort estimate in person-months
  - Estimated project duration
  - Estimated team size

System size in different development environments

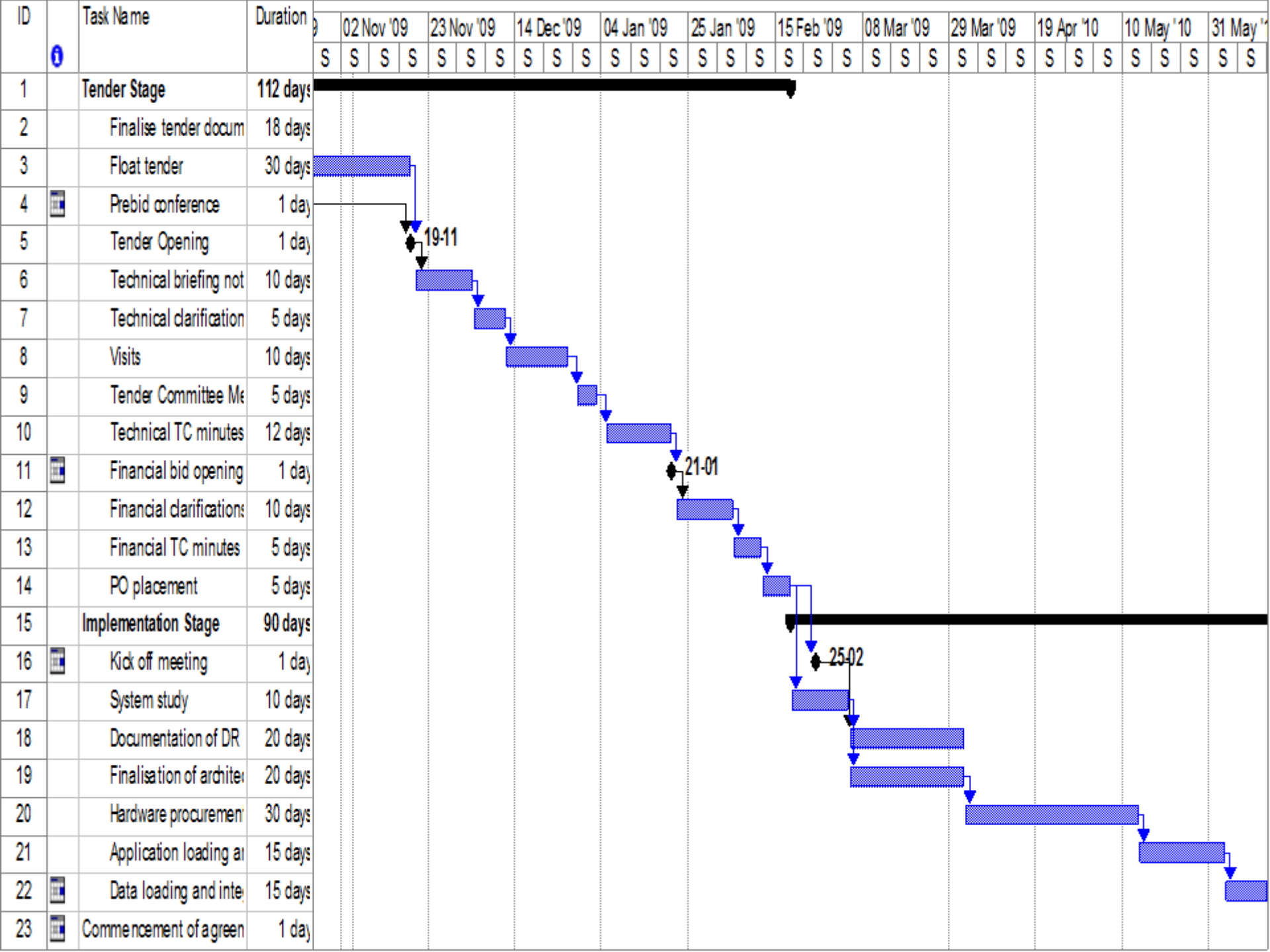
Table 6.3 Function Point Conversion to LOC

Language	*Average Source LOC per Function Point*	*Average Source LOC for a 210 FP Application*
Access	38	7,980
Basic	107	22,470
C	128	26,880
C++	53	11,130
COBOL	107	22,470
Delphi	29	6,090
Java	53	11,130
Machine Language	640	134,440
Visual Basic 5	29	6,090



Project schedule

- The project schedule is derived from the Work Breakdown Structure
  - Activities
  - Milestones
- Gantt chart
  - convenient depiction of the project schedule
- PERT / CPM diagrams
  - help in analyzing the project schedule
  - provide the critical path
- Project schedule also depends on
  - Utilization of resources
  - Availability of key resources

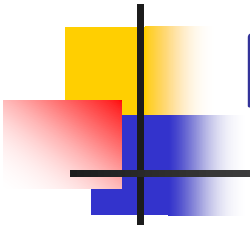

ID
Task Name
Duration
02 Nov '09
23 Nov '09
14 Dec '09
04 Jan '09
25 Jan '09
15 Feb '09
08 Mar '09
29 Mar '09
19 Apr '10
10 May '10
31 May '1
S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S
1 Tender Stage 112 days
2 Finalise tender docum 18 days
3 Float tender 30 days
4 Prebid conference 1 day
5 Tender Opening 1 day
6 Technical briefing not 10 days
7 Technical clarification 5 days
8 Visits 10 days
9 Tender Committee Me 5 days
10 Technical TC minutes 12 days
11 Financial bid opening 1 day
12 Financial clarifications 10 days
13 Financial TC minutes 5 days
14 PO placement 5 days
15 Implementation Stage 90 days
16 Kick off meeting 1 day
17 System study 10 days
18 Documentation of DR 20 days
19 Finalisation of architec 20 days
20 Hardware procuremen 30 days
21 Application loading ar 15 days
22 Data loading and inte 15 days
23 Commencement of agreen 1 day
19-11
21-01
25-02

Cost estimation and budgeting

- Direct costs
  - Cost of resources directly involved in work
- Support costs
  - Office space, travel and transport, consultants
- Implementation costs
- Maintenance costs
- Sunk costs
- Costs of learning curve
- Contingent reserves

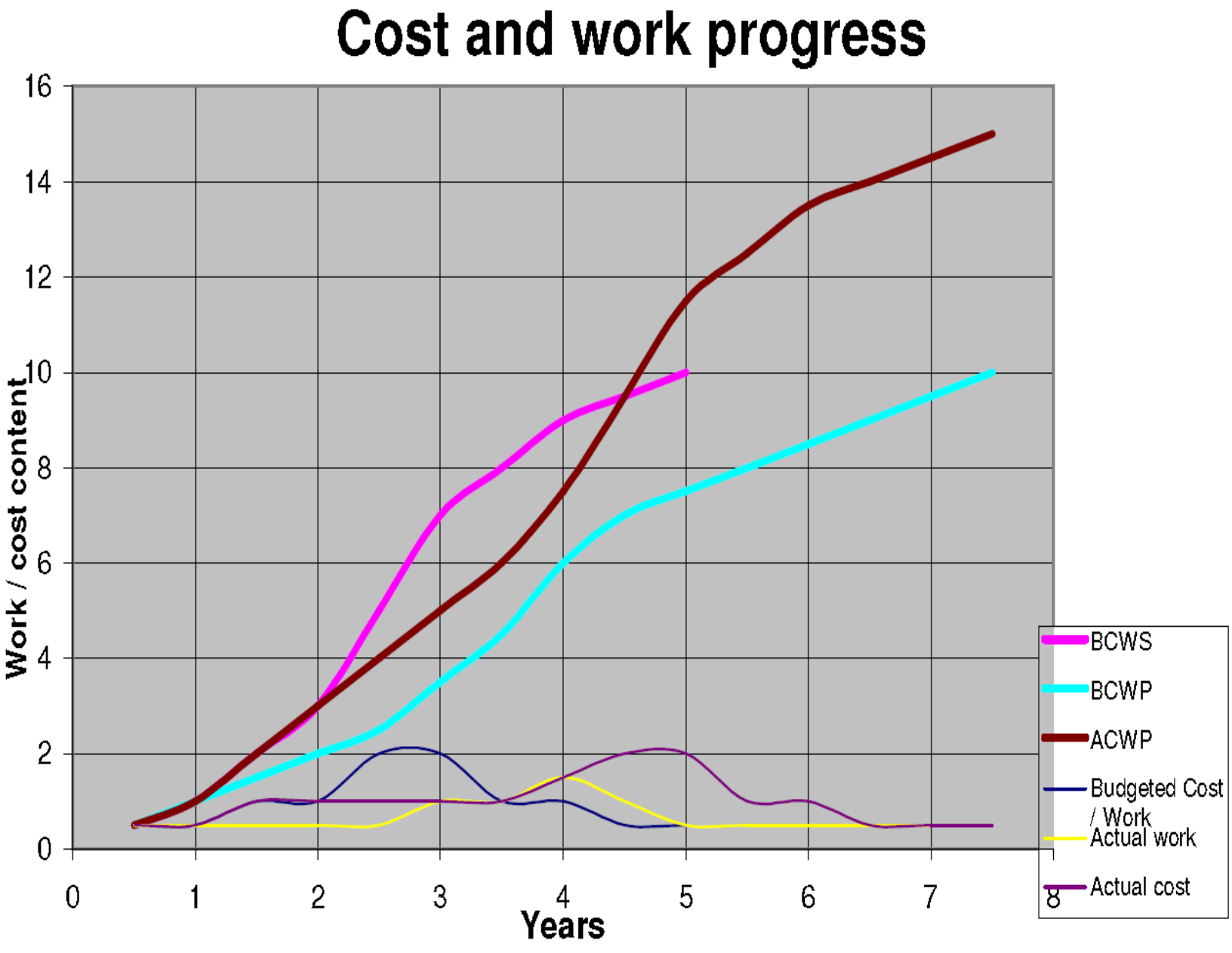
Budgeting and costing (cont'd)

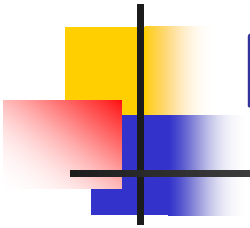
- Abstract cost estimate at inception of project
- Detailed estimate at the time of project initiation: **baseline** estimate
- Part estimates are prepared for large projects
- Progressive refinement of the estimate is generally required
- Revisions and material modifications have to be made



Measuring project progress

- High level costing metrics help in overall project control
  - Budgeted cost of work scheduled (BCWS)
  - Actual cost of work performed (ACWP)
  - Earned value / Budgeted cost of work performed (BCWP)
  - Cost performance index (CPI) = BCWP ÷ ACWP
  - Schedule performance index (SPI) = BCWP ÷ BCWS
  - Minimum funds needed = Original budget ÷ CPI
  - Probable funds needed = Original budget ÷ (CPI x SPI)


Cost and work progress
Work / cost content
Years
0
2
4
6
8
10
12
14
16
0
1
2
3
4
5
6
7
8
BCWS
BCWP
ACWP
Budgeted Cost / Work
Actual work
Actual cost



Risk in IT projects

- "An uncertain event or condition that, if it occurs, has a negative (or positive) effect on the project objectives"
  - A positive risk is an opportunity
- Effective risk management
  - minimizes the probability and consequences of negative events
  - maximizes the probability and benefits of positive events

Risk identification methods

- Learning cycles
- Brainstorming
- Nominal group technique
- Delphi technique
- Checklists
- SWOT analysis (strengths, weaknesses, opportunities, threats)
- Cause-and-effect (Ishikawa) diagrams

Ishikawa diagram

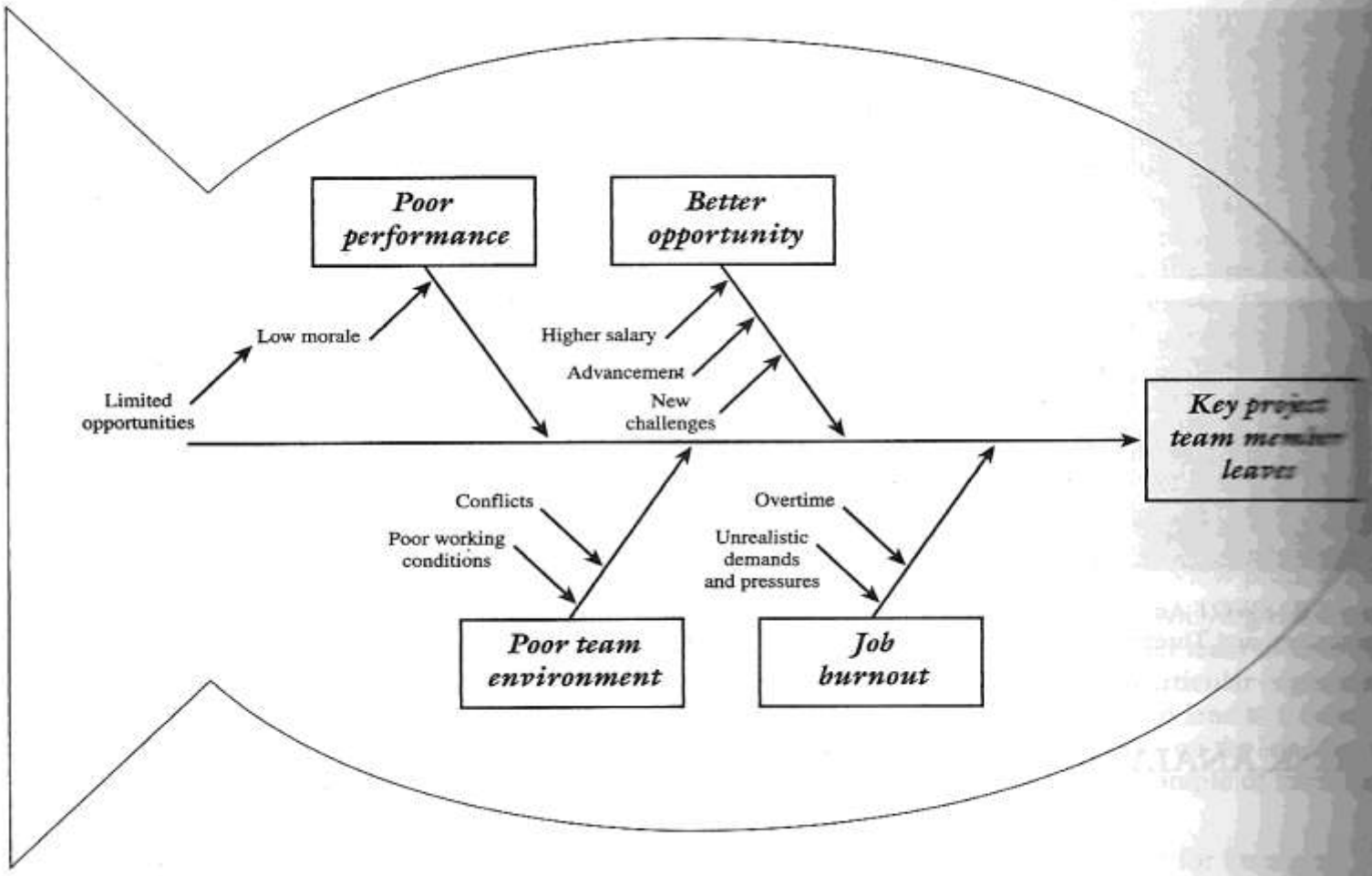


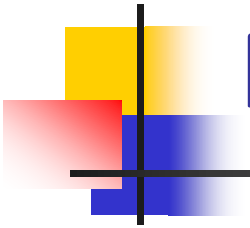
Figure 8.4 Cause and Effect Diagram

Various project risks

Table 8.1 Various Software Risks for IT Projects

MIS Software Risks		*Systems Software Risks*		*Commercial Software Risks*		*Military Software Risks*		*Contract or Outsourced Software Risks*		*End-User Software Risks*	
Creeping user requirements	80%	Long schedules	70%	Inadequate user documentation	70%	Excessive paper work	90%	High maintenance costs	60%	Non-transferable application	[illegible]
Excessive schedule pressure	65%	Inadequate cost estimates	65%	Low user satisfaction	55%	Low productivity	85%	Friction between contractor & client personnel	50%	Hidden errors	[illegible]
Low quality	60%	Excessive paper work	60%	Excessive time to market	50%	Long schedules	75%	Creeping user requirements	45%	Unmaintainable software	[illegible]
Cost overruns	55%	Error-prone modules	50%	Harmful competitive actions	45%	Creeping user requirements	70%	Unanticipated acceptance criteria	30%	Redundant application	[illegible]
Inadequate configuration control	50%	Canceled projects	25%	Litigation expense	30%	Unused or unusable software	45%	Legal ownership of software & deliverables	20%	Legal ownership of software & deliverables	[illegible]

SOURCE: T.C. Jones, *Accessment and Control of Software Risks,* 1994.



Risk strategies

- Accept or ignore risk
- Avoid risk
- Mitigate risk impact or probability
- Transfer risk responsibility

The project risk plan contains

- Risk identifier
- Risk trigger
- Owner of the risk
- Planned response

Project risk checklist and classification

Risk Checklist

- ✔ Funding for the project has been secured.
- ✔ Funding for the project is sufficient.
- ✔ Funding for the project has been approved by senior management.
- ✔ The project team has the requisite skills to complete the project.
- ✔ The project has adequate manpower to complete the project.
- ✔ The project charter and project plan have been approved by senior management or the project sponsor.
- ✔ The project's goal is realistic and achievable.
- ✔ The project's schedule is realistic and achievable.
- ✔ The project's scope has been clearly defined.
- ✔ Processes for scope changes have been clearly defined.

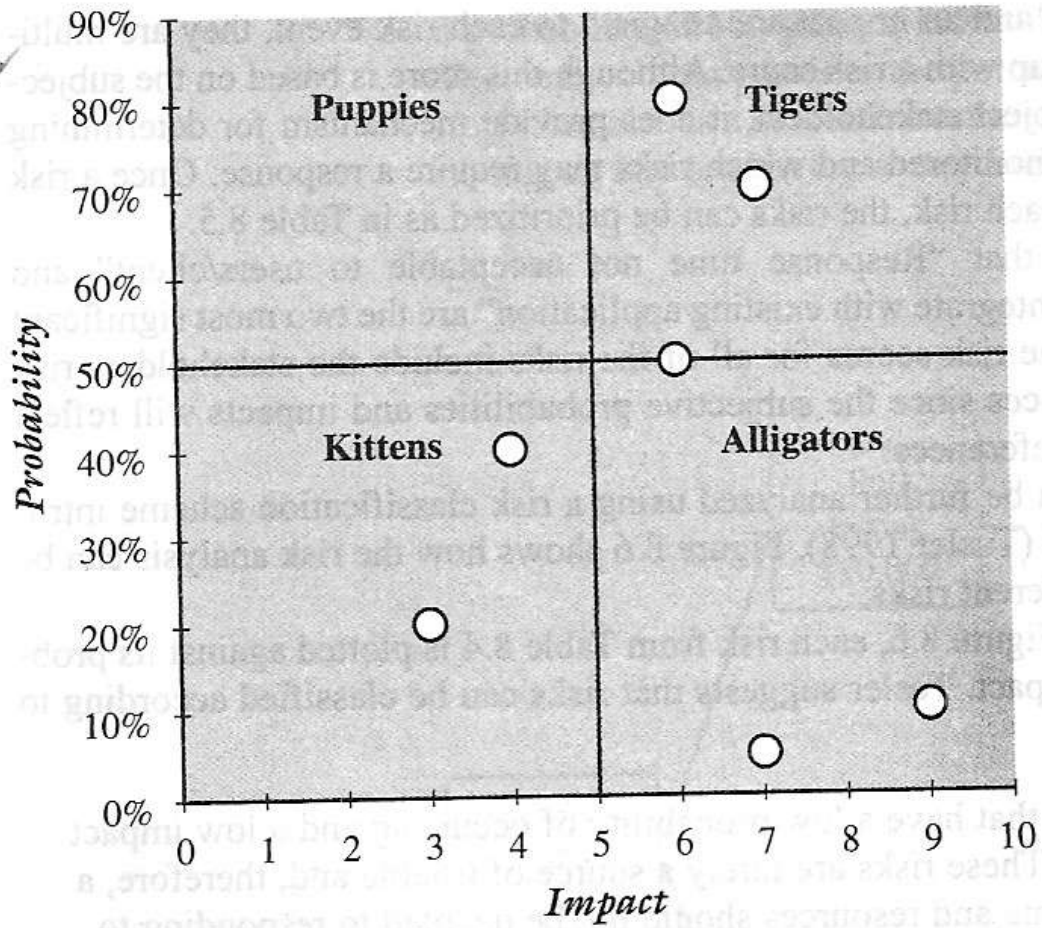
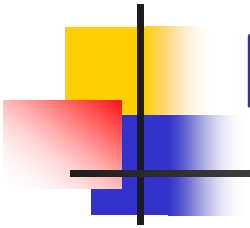
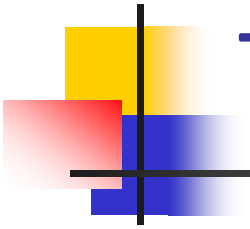


Figure 8.6 Tusler's Risk Classification Scheme



Project communication

- Communication plan
  - what is to be communicated
  - to whom
  - at what interval
  - in what format
- Project metrics: measurement of some aspects of the project
  - understandable
  - quantifiable
  - easy to collect
  - high impact
- “Trying to run a project team without a good measurement system is like trying to drive a car without dashboard instruments”

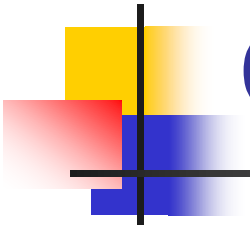


The pillars of system quality

- Standards, metrics, tools and methods
- Verification and validation
- Change control and configuration management
- Lessons learnt and best practices

Quality management principles

- Customer focus
- Leadership and human resources
- System and process approach
- Continual improvement
- Factual approach to decision making

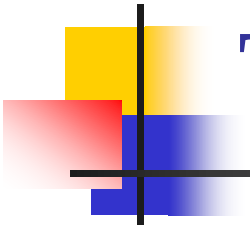


Quality management standards

- ISO9000 quality management system
  - Plan-do-check-act (PDCA) philosophy
  - TickIT guidelines: specifically for ISO9000 implementation for software development
- Six Sigma
  - Define – measure – analyze – improve – control (DMAIC) philosophy
- Capability maturity models (SEI-CMM, PCMM, ICMM)
  - Process capability
  - Process performance
  - Process maturity
  - Level 1: Initial
  - Level 2: Repeatable
  - Level 3: Defined
  - Level 4: Managed
  - Level 5: Optimized

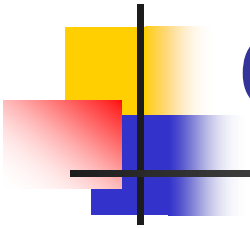
Verification and validation

- IVV – Independent verification and validation
- Verification
  - Technical reviews
  - Inspections by peers
  - Business reviews
  - Management reviews
- Validation
  - Scope validation
  - Functional validation
  - Performance validation



Testing

- Unit testing
  - Testing of single unit of the system
    - Black box testing
    - White box testing
- Integration testing
  - Testing a number of units to see if they work together
- Acceptance testing
  - Testing to see whether a system meets acceptance criteria
- Regression testing
  - Testing to ensure that there is no ripple effect after a configuration change



Configuration management

- Component identification
- Version control
- Configuration building
- Change control
- Configuration management tools provide a common interface

Managing change in IT projects

- IT projects are “socio-technical” projects
- User perceptions and attitudes can make or break a project
- All stakeholders may not dislike the change
- Present state → transition state → final state
- But all stakeholders will resist the transition
- Unfreezing → changing → re-freezing
- Change management is therefore a real challenge and not “fancy jargon”

Willingness, readiness and ability to change

- Identify the players
  - Sponsor
  - Change agents
  - Targets
- Understand depth of change
  - Lines of authority
  - Work content
  - Power equations
  - Informal relationships

Strategies for change

- Rational-empirical approach
  - People follow predictable behaviour patterns
  - People follow their own self-interests
  - Consistent information flow is the key to effective change management
- Normative-reeducation approach
  - Focus on core values, beliefs, and relationships within groups
- Power-coercive approach
  - Power-authority-rewards-threat approach
  - Often results in temporary compliance
- Environmental-adaptive approach
  - Focus on immediate and drastic action
  - “there is no alternative”
- Different strategies needed for different situations
- Combinations might be needed

Conflict

- "Conflict ignored is conflict nurtured: confront conflict"
- Traditional view
  - Avoid conflict
- Contemporary view
  - Positive conflict can be beneficial
- Interactionist view
  - Conflict is important and necessary for performance

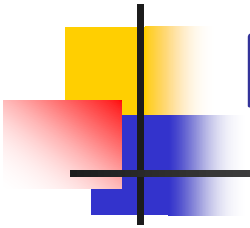
Categories of conflict

- Conflicts associated with goals, objectives, or specifications of the project
- Conflicts associated with administration, management structures, underlying philosophies
- Conflicts associated with interpersonal relationships: work ethics, styles, egos, personality clashes
- Project managers will spend 20% of their time managing conflicts!
  - Avoid
  - Accommodate
  - Force a resolution
  - Compromise
  - Collaborate

Project implementation

- Direct cutover
  - “big bang” approach
- Parallel run
  - “extra effort”
- Phased approach
  - “extra time and cost”

Project closure



- Normal
  - Planned orderly closure
- Premature
  - “Loose ends”: needs extra resources for maintenance
- Failed
  - “plug pulled” : needs a cancellation plan
- Reprioritized
  - “on the back burner”: resources should be pulled out quickly
- The perpetual project
  - At some point the organization needs to decide the fate of languishing projects
  - Terminating a perpetual project needs courage
  - Project reviews, mandated in advance, can prevent projects from becoming perpetual projects

Project closure activities

- Complete documentation
- Reduce bugs / deviations to an acceptable level
- Get project sponsor acceptance
- Prepare final project closure report
- Project closure report includes final project cost

Project appraisal and evaluation

- Initial appraisal
  - When project has just started
- Mid-term appraisal
  - During project execution
- Post-project appraisal / evaluation
  - Review the project's measurable organizational value
  - Review the scope, schedule, budget, and quality objectives
  - Review the project deliverables
  - Review the project team's performance
- Project audit

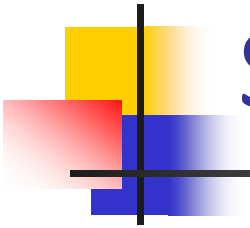
Factors affecting project success

Table 1.2 Summary of Factor Rankings for Successful, Challenged, and Impaired Projects

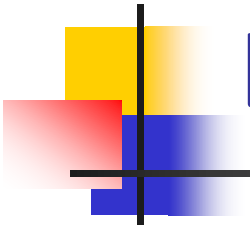
Rank	*Factors for Successful Projects*	*Factors for Challenged Projects*	*Factors for Impaired Projects*
1	User involvement	Lack of user input	Incomplete requirements
2	Executive management support	Incomplete requirements	Lack of user involvement
3	Clear statement of requirements	Changing requirements & specifications	Lack of resources
4	Proper planning	Lack of executive support	Unrealistic expectations
5	Realistic expectations	Technology incompetence	Lack of executive support
6	Smaller project milestones	Lack of resources	Changing requirements specifications
7	Competent staff	Unrealistic expectations	Lack of planning
8	Ownership	Unclear objectives	Didn't need it any longer
9	Clear vision & objectives	Unrealistic time frames	Lack of IT management
10	Hard-working, focused team	New technology	Technology illiteracy

SOURCE: Adapted from The Standish Group, *CHAOS* (West Yarmouth, MA: 1995), http://www.standishgroup.com /visitor/chaos.htm.

Selecting a project: the Balanced Scorecard

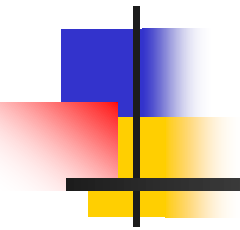


- A **Balanced Scorecard** can be used as a basis for selection of projects
- **Financial perspective:** Rate of return, economic value added
- **Customer perspective:** level of customer satisfaction
- **Internal process perspective:** efficiency and effectiveness of key processes
- **Innovation and learning perspective:** investing in the future
- Each of the above perspectives should be provided with measurable parameters



Lessons from past projects

- Analyze failed projects
  - Key failures
  - Technical versus organizational failures
  - “Critical failure factors”
- Analyze successful projects
  - Key success indicators
  - Critical success factors
  - Calculated risks taken
- Seek to know the “failures within the success and successes within the failure”



Thank you