Managing Information System Projects

Railway Staff College, Vadodara
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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

<table>
<thead>
<tr>
<th>Potential Area</th>
<th>Examples of Desired Impact</th>
</tr>
</thead>
</table>
| 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  

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

Conceptualize and initialize project
- Business case

Develop project plan and charter
- Project plan and charter

Execute and control project
- Information system

Close project
- Final project report

Evaluate project
- Project evaluations / lessons learnt
Developing the Business Case

Select core team → Define measurable organizational value → Identify alternatives → Define feasibility → Define total cost of ownership → Define total benefits of ownership → Analyze alternatives → Propose & support recommendation

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?
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>
<thead>
<tr>
<th>Language</th>
<th>Average Source LOC per Function Point</th>
<th>Average Source LOC for a 210 FP Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access</td>
<td>38</td>
<td>7,980</td>
</tr>
<tr>
<td>Basic</td>
<td>107</td>
<td>22,470</td>
</tr>
<tr>
<td>C</td>
<td>128</td>
<td>26,880</td>
</tr>
<tr>
<td>C++</td>
<td>53</td>
<td>11,130</td>
</tr>
<tr>
<td>COBOL</td>
<td>107</td>
<td>22,470</td>
</tr>
<tr>
<td>Delphi</td>
<td>29</td>
<td>6,090</td>
</tr>
<tr>
<td>Java</td>
<td>53</td>
<td>11,130</td>
</tr>
<tr>
<td>Machine Language</td>
<td>640</td>
<td>134,440</td>
</tr>
<tr>
<td>Visual Basic 5</td>
<td>29</td>
<td>6,090</td>
</tr>
</tbody>
</table>
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
<table>
<thead>
<tr>
<th>ID</th>
<th>Task Name</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tender Stage</td>
<td>112 days</td>
</tr>
<tr>
<td>2</td>
<td>Finalise tender document</td>
<td>18 days</td>
</tr>
<tr>
<td>3</td>
<td>Float tender</td>
<td>30 days</td>
</tr>
<tr>
<td>4</td>
<td>Prebid conference</td>
<td>1 day</td>
</tr>
<tr>
<td>5</td>
<td>Tender Opening</td>
<td>1 day</td>
</tr>
<tr>
<td>6</td>
<td>Technical briefing note</td>
<td>10 days</td>
</tr>
<tr>
<td>7</td>
<td>Technical clarification</td>
<td>5 days</td>
</tr>
<tr>
<td>8</td>
<td>Visits</td>
<td>10 days</td>
</tr>
<tr>
<td>9</td>
<td>Tender Committee Meeting</td>
<td>5 days</td>
</tr>
<tr>
<td>10</td>
<td>Technical TC minutes</td>
<td>12 days</td>
</tr>
<tr>
<td>11</td>
<td>Financial bid opening</td>
<td>1 day</td>
</tr>
<tr>
<td>12</td>
<td>Financial clarifications</td>
<td>10 days</td>
</tr>
<tr>
<td>13</td>
<td>Financial TC minutes</td>
<td>5 days</td>
</tr>
<tr>
<td>14</td>
<td>PO placement</td>
<td>5 days</td>
</tr>
<tr>
<td>15</td>
<td>Implementation Stage</td>
<td>90 days</td>
</tr>
<tr>
<td>16</td>
<td>Kick off meeting</td>
<td>1 day</td>
</tr>
<tr>
<td>17</td>
<td>System study</td>
<td>10 days</td>
</tr>
<tr>
<td>18</td>
<td>Documentation of DR</td>
<td>20 days</td>
</tr>
<tr>
<td>19</td>
<td>Finalisation of architecture</td>
<td>20 days</td>
</tr>
<tr>
<td>20</td>
<td>Hardware procurement</td>
<td>30 days</td>
</tr>
<tr>
<td>21</td>
<td>Application loading area</td>
<td>15 days</td>
</tr>
<tr>
<td>22</td>
<td>Data loading and integration</td>
<td>15 days</td>
</tr>
<tr>
<td>23</td>
<td>Commencement of a green</td>
<td>1 day</td>
</tr>
</tbody>
</table>
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)
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

<table>
<thead>
<tr>
<th></th>
<th>MIS Software Risks</th>
<th>Systems Software Risks</th>
<th>Commercial Software Risks</th>
<th>Military Software Risks</th>
<th>Contract or Outsourced Software Risks</th>
<th>End-User Software Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creeping user re-requirements</td>
<td>80%</td>
<td>Long schedules</td>
<td>Inadequate user documentation</td>
<td>70%</td>
<td>Excessive paper work</td>
<td>High maintenance costs</td>
</tr>
<tr>
<td>Excessive schedule pressure</td>
<td>65%</td>
<td>Inadequate cost estimates</td>
<td>Low user satisfaction</td>
<td>55%</td>
<td>Low productivity</td>
<td>Friction between contractor &amp; client personnel</td>
</tr>
<tr>
<td>Low quality</td>
<td>60%</td>
<td>Excessive paper work</td>
<td>Excessive time to market</td>
<td>50%</td>
<td>Long schedules</td>
<td>Creeping user requirements</td>
</tr>
<tr>
<td>Cost overruns</td>
<td>55%</td>
<td>Error-prone modules</td>
<td>Harmful competitive actions</td>
<td>45%</td>
<td>Creeping user requirements</td>
<td>Unanticipated acceptance criteria</td>
</tr>
<tr>
<td>Inadequate configuration control</td>
<td>50%</td>
<td>Canceled projects</td>
<td>Litigation expense</td>
<td>30%</td>
<td>Unused or unusable software</td>
<td>Legal ownership of software &amp; deliverables</td>
</tr>
</tbody>
</table>

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

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

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