A Sad Story

- Standish Group Research Study “CHAOS” 1995
  - Fully successful (on-time, on-budget, with all features as initially specified)
  - cancelled prior to completion
  - 16%
  - 43%
  - 31%
- The average unsuccessful project (yellow and red)
  - Lasts 222% longer than it was planned to last
  - Goes over budget by 189% (4% by more than 400%)
  - Offers 61% of originally specified features (yellow)

Why IT-Projects Fail

- Top 5 reasons measured by frequency of responses by IT executive management
- Failure profiles of yellow projects
  1. Lack of User Input
  2. Incomplete Requirements
  3. Changing Requirements
  4. Lack of Executive Support
  5. Technology Incompetence
  - 3.80%
  - 3.23%
  - 11.00%
  - 7.50%
  - 3.70%
- Failure profiles of red projects
  1. Incomplete Requirements
  3. Lack of User Involvement
  4. Lack of Resources
  5. Unrealistic Expectations
  - 3.10%
  - 2.40%
  - 10.60%
  - 9.80%
  - 9.50%

How to Avoid Troubled Projects

- Apply proper engineering
  - Characteristics of IT-projects
  - Phases of IT-projects with their purpose, methods, and deliverables
- Apply proper project management
  - Main processes of project management with their inputs, techniques, tools, and outputs
  - Main areas of project management (scope, time, cost, quality, risk, etc.)
- Recognize the importance of non-technical aspects
  - Some basic rules of successful project management

What is a Project?

- Definition:
  - A project is a temporary endeavor undertaken to create a unique product or service
  - The product or service is different in some distinguishing way from all similar products and services
- In contrast: Operations are ongoing and repetitive
Examples for Projects and Operations

- Projects
  - Developing a new software application
  - Implementing a new business procedure
  - Adding functionality to an IT system
  - Doing a Diplomarbeit

- Operations
  - Bugfixing of an existing software application
  - Selling train tickets
  - Running a car factory

What is an IT-Project?

- Definition:
  An IT-project is a project to create a product or service, of which the usage of information technology is the decisive characteristic

- Examples
  - The development of a software application is an IT-project (IT-based product)
  - The development of a car is not an IT-project, although information technology is involved substantially

From Projects to Operations

- Applications are neither projects nor operations, but products

Characteristics of Projects

- **Temporary** endeavor
- **Unique** product or service
- Performed by **people**
- **Constrained** by limited resources
  - Budget, time, staff
- **Planned, executed, and controlled**
- Have their own **organization**

Core Activities and Project Management

- **Core Activities**
  - ultimately create the product of a project

- **Project Management**
  - organizes and leads the project work to meet project requirements

Project Management

- Definition of Project Management (PM):
  Project Management is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements.
Typical Core Activities in IT-Projects

- Design of a graphical user interface
- Installation of a local area network
- Integration test of all system components
- Training of users on a new application
- Implementation of a set of Java classes
- Documentation of design decisions and code

Typical Project Management Activities

- Communication with team, clients, management
- Effort estimations
- Planning activities and assigning resources
- Comparing actual performance to plan
- Risk analysis
- Negotiation with subcontractors
- Staff acquisition

PM Knowledge Areas

PM activities fall into nine Knowledge Areas

Integration Management
Project Life Cycle
Project Management Life Cycle

The Triple Constraint

- Project objectives are equally important
- Actions in one project area usually affect other areas

Tradeoffs among objectives must be managed
Priorities are set by customers and management
More Competing Objectives

- Scope
- Quality
- Risk
- Time
- Customer Satisfaction
- Cost

Project Success

- Definition: A project is successful if the specified results are delivered in the required quality and within the predetermined time and resource limits.
- Computer scientists tend to focus on scope and quality only
  - The development of a technically perfect application is not a success if the cost exceeds the price clients are willing to pay
  - Excellent project results often are worthless if they come too late (temporary market windows, external deadlines)

Project Integration Management

- Ensure that various elements of the project are properly coordinated
  - Estimate cost of staffing alternatives
  - Determine effects of a scope change on schedule
- Make tradeoffs among competing objectives and alternatives
- Primarily task of project manager since he / she is responsible for seeing the overall “big picture”

Integration Management Processes

- Project plan development
  - Integrates various planning outputs (time, cost, risk, etc.)
  - Produces a formal, consistent document to manage project execution
- Project plan execution
  - Produces actual work results
- Integrated change control
  - Determines that a change has occurred
  - Manages the changes as they occur
  - Results in corrective actions and project plan updates

Agenda

- Basics
- Integration Management
- Project Life Cycle
- Project Management Life Cycle

Projects are Complex

- At project start, only broad information about characteristics of product are available
- Average size of IT projects is 500-2000 person days
- Different tasks have to be performed such as designing a GUI, testing a module, installing hardware, training users, or negotiating with customers
  - How can we handle this complexity?
Decomposition According to Product

Requirements → Subproject → Unique Product or Service

Subprojects
- Decomposition usually follows structure of product
- Subprojects are easier to manage
- Subprojects enable one to use specialized staff
- Remaining and new problems
  - Only broad information about product characteristics
  - Managing the interfaces between subprojects
  - Integrating the results of the subprojects
  - Increased need for communication
- Subprojects are still complex

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Progressive Elaboration

Characteristics of a unique product or service must be progressively elaborated

- During the project, characteristics are defined in more detail as the project team develops a better and more complete understanding of the product

Deliverables

- Definition: Any measurable, tangible, verifiable outcome, result, or item that must be produced to complete a project or part of a project
- Examples
  - An object-oriented design, described by a UML diagram
  - A project schedule as MS Project file
  - A user guide for a new application
  - Software, delivered as compiled binary

Project Phases

- Definition: A collection of logically related project activities, usually culminating in the completion of a major deliverable
**Project Phases**

- **Definition:** A collection of logically related project activities, usually culminating in the completion of a major deliverable.

  ![Project Phases Diagram](image)

**Property of the Project Life Cycle**

- Stakeholders’ influence on product characteristics and final cost is highest at project start and decreases progressively.
- Cost of changes and error correction increases during the project life cycle.

  ![Property of the Project Life Cycle Diagram](image)

**Waterfall Model of Project Life Cycle**

- Analysis Phase
- Design Phase
- Implementation Phase
- Test Phase
- Deployment Phase

  ![Waterfall Model Diagram](image)

**From Projects to Operations**

- Project phases are surrounded by related activities that are not part of the project.

  ![From Projects to Operations Diagram](image)

**Product Life Cycle**

- Business Requirements
- Technical Requirements
- Customer Request
- Market Demand

  ![Product Life Cycle Diagram](image)

**Agenda**

- Basics
- Integration Management
  - Project Life Cycle
  - Project Management Life Cycle
Core and Project Management Processes

Grouped into phases

Grouped into process groups

Project Management Processes

Initiating Processes
Planning Processes
Controlling Processes
Executing Processes
Closing Processes

Initiating
Planning
Controlling
Executing
Closing

Project Management Processes

Core Processes

Project Management Life Cycle

Initiating Processes
Planning Processes
Controlling Processes
Executing Processes
Closing Processes

Process Groups

- Project groups are not discrete one-time events
- They overlap and occur at varying levels of intensity within each phase of the project

Interaction between Phases

Input and output of the processes depend on the phase in which they are carried out
But processes are not limited to one phase (overlaps)

Example: Time Management

Schedule Development
Schedule Updates
Task List for Each Team Member

Schedule Control
Status Reports
Corrective Actions

Project Plan Execution
Execution

Corrective Actions
Schedule Updates
Schedule Control

Status Reports
Task List for Each Team Member

Project Plan Execution

Project Management Life Cycle

Design Phase
Implementation Phase

Initiating Processes
Planning Processes
Controlling Processes
Executing Processes
Closing Processes

Initiating Processes
Planning Processes
Controlling Processes
Executing Processes
Closing Processes

Core Processes

Project Management Processes
Core and Project Management Processes

Core Processes

Project Management Processes