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Web Technologies and Programming

Lecture 02

The web application development process

Web Project Management

Summary of the last lecture

- **Web engineering extends Software Engineering to Web applications**
- **Why web engineering?**
- **Web applications**
- **Categories of web applications**
- **Characteristics of web applications**

Outline

- **Development Process model**
  - **software development process activities**
- **Requirement for a web development process model**
- **Rational unified process model (RUP)**
  - A modern process model derived from the work on the UML and associated process.
  - **suitability for web application development**

1. Process model

- A set of related activities that leads to the production of a software product
  - development of software from scratch
  - extending and modifying existing systems
- Common activities
  - Software specification
  - Designing and implementation
  - System validation
  - System evolution

1.1 Process activities

- **Software specification:**
- **The functionality of the software and constraints on its operation must be defined**
  - **critical stage (can lead to problems in design and implementation)**
- **Activities:**
  - **Feasibility study**
  - **Requirement elicitation and analysis**
  - **Requirement specification**
  - **Requirement validation**

1.1 Process activities…

- **Software design and implementation:**
- **Design is the description of**
  - **System structure**
  - **Data models**
  - **Interface between components**
- **Implementation: Converting a system specification into an executable system**

1.1 Process activities…

- System validation:
- Intended to show that the system
  - confirms its specification
  - meets customer's expectations
- Development testing
  - tested by the people developed the components
- System testing
  - finding component integration errors
- Acceptance testing
  - System is tested by the customer's provided data

1.1 Process activities…

- **Software evolution:**
- **Software is flexible as compared to hardware**
  - **Changes can be made to the system during development or after the development**

1.2 Common approaches

- **The waterfall approach**
- **(**complete each process step before beginning the next)
- **Iterative approach**
- **(**Go quickly through all process steps to create a rough system, then repeat them to improve the system)
- **Reuse oriented approach**
- **(**systems are integrated from existing components)

2. Requirements for a web application development process

- **Evolving from informational medium to application medium**
- **Existing approaches are over-pragmatic**
  - **lead to short development time**
- **Web engineering does not have its own mature development process model**
- **SE development process models are adopted**

2. Requirements for a web application development process…

- **Handling Short development cycles**
  - **Development time is short**
    - **Normally does not exceed six month**
  - **Immediate delivery mechanism**
    - **Capture share in the market**
  - **Leaves less freedom for systematic development process**

2. Requirements for a web application development process…

- **Handling changing requirement**
  - **Requirements often emerge during development**
    - **as developer understand the unknown business**
  - **Integrate changes rapidly to remain in competition**
  - **User involvement is more critical**
    - **due to emerging and unstable requirements**

2. Requirements for a web application development process…

- **Releases with fixed deadlines and flexible contents**
  - **Due to rapid changes in requirements, disposable releases are required**
    - **To detail and validate customer's requirements**
  - **Release intervals are very short**
    - **Time plan for releases is more important than planning requirements for releases**

2. Requirements for a web application development process…

- **Parallel development of different releases**
  - **To meet time constraints, parallel and overlapping development is required**
  - **Several small teams work on similar tasks**
  - **Communication overhead is extensive in web application development**

2. Requirements for a web application development process…

- **Reuse and integration**
  - **to meet time constraints developer try to reuse components**
    - **Leads to integration issues**
  - **Development can not be isolated from the development of other applications within the organization**

2. Requirements for a web application development process…

- **Adapting to web application's complexity level**
  - **process depends upon the level of complexity**
  - **process is adapted dynamically**
    - **for low complexity, it should be like lightweight process**
    - **for high complexity, it should be like heavyweight process**

3. Rational unified process

- **RUP is a heavyweight, phase oriented, incremental and iterative process**
- **Described in three perspectives**
  - **Dynamic perspective: phases over time**
  - **Static perspective: activities in process**
  - **Practice perspective: good engineering practices**

3. Rational unified process

- **RUP phases:**
- **Inception**
  - Establish the business case for the system.
- **Elaboration**
  - Develop an understanding of the problem domain and the system architecture.
- **Construction**
  - System design, programming and testing.
- **Transition**
  - Deploy the system in its operating environment

3. Rational unified process

- **RUP phases:**
- **Inception: Define the business case for the project**
- **Goals:**
  - **Business case**
    - **Identify and interact with external entities**
    - **Asses the business contribution**
- **Artifacts:**
  - **business case**

3. Rational unified process

- **RUP phases:**
- **Elaboration: establish understanding with the problem**
- **Goals:**
  - **Establish software scope**
  - **Discriminating critical use-cases**
  - **Estimating cost, schedules and risks**
- **Artifacts:**
  - **development plan, use-case model, architectural description**

3. Rational unified process

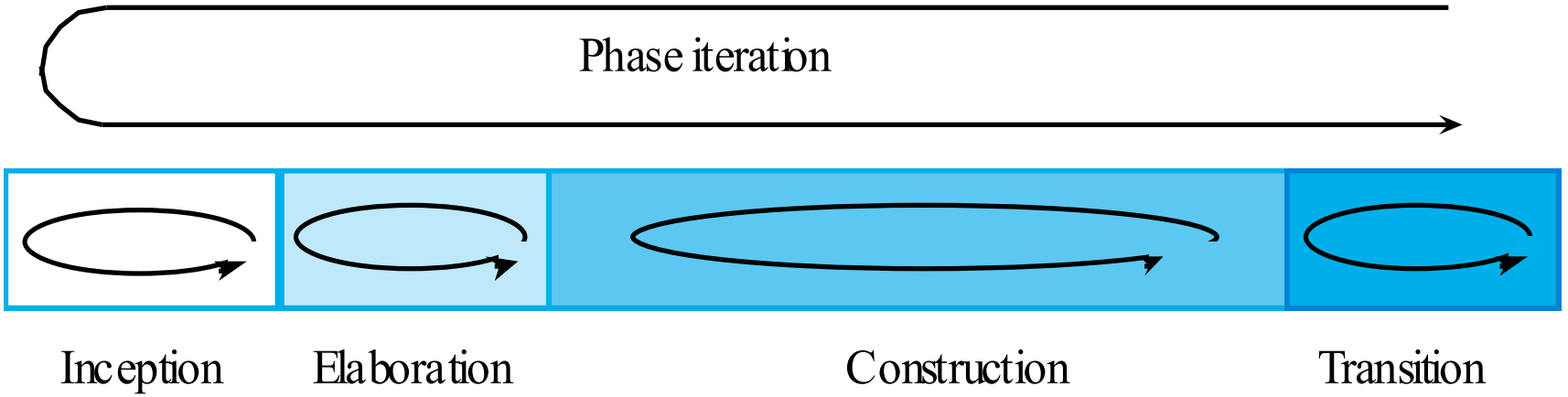
- **RUP phases:**
- **Construction: involves system design, programming and testing**
- **Goals:**
  - **Develop the design**
  - **Implement the design**
  - **Validate the system**
- **Artifacts:**
  - **System, training material**

3. Rational unified process

- **RUP phases:**
- **Transition: Installing the system in real environment**
- **Goals:**
  - **Testing in real environment**
  - **training**
  - **Bug fixing, performance enhancements**
- **Artifacts:**
  - **A documented system working correctly**

3. Rational unified process

- **RUP phases:**



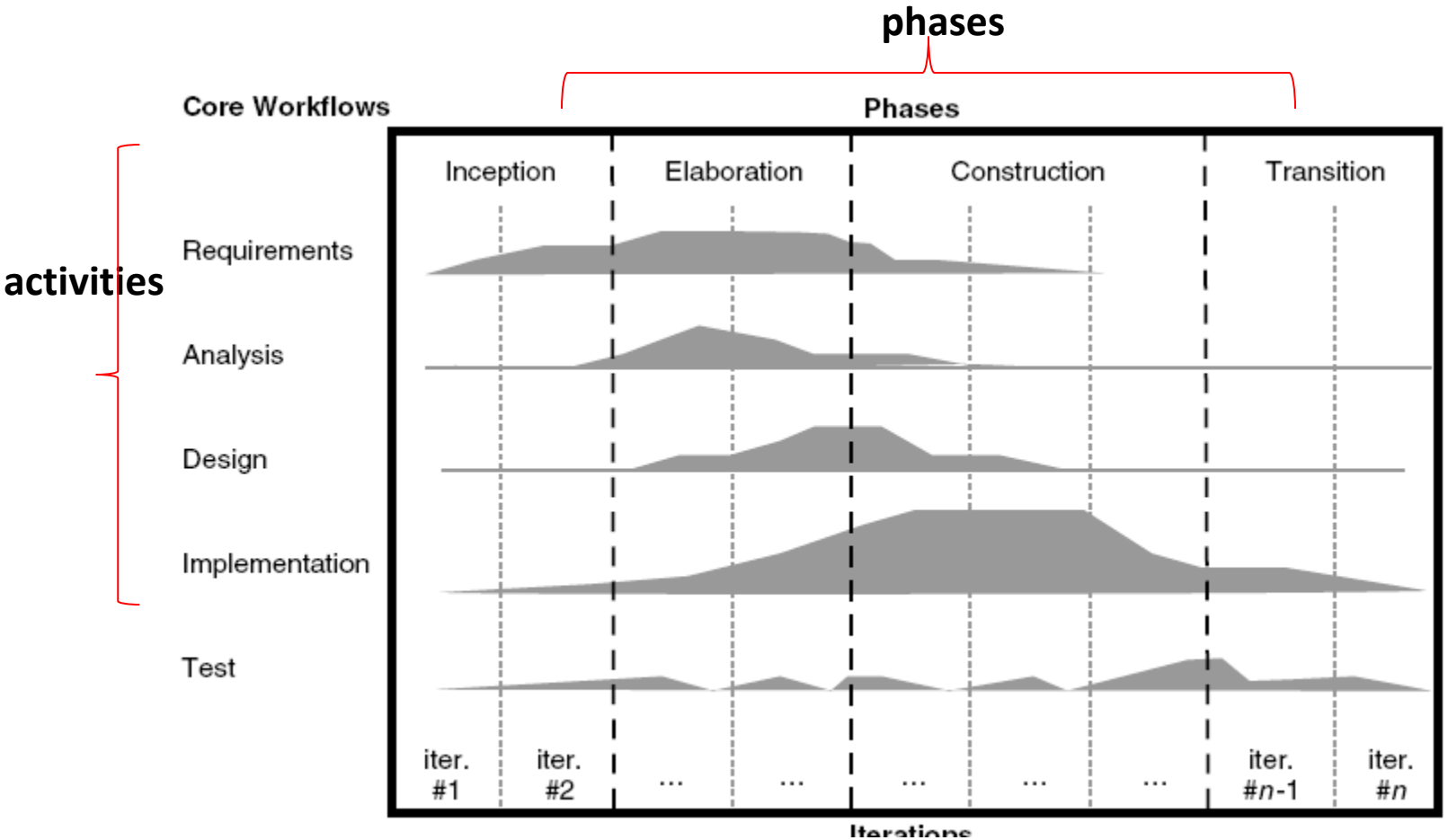
3. Rational unified process

- **RUP activities (workflows):**
  - **Requirements**
  - **analysis**
  - **design**
  - **implementation**
  - **test**

3. Rational unified process

- **RUP good practices:**
  - **Develop software iteratively**
  - **Manage requirements**
  - **Use component-based architectures**
  - **Visually model software-using UML**
  - **Verify software quality**
  - **Control changes to software**

3. Rational unified process…



3.1 RUP for web application

- **Inception phase:**
- **Definition is problematic for web application**
  - **no concrete view of the system at beginning**
  - **has target group but needs are unknown**
- **Elaboration phase:**
  - **due to short development time, first version has priority over clearly defined end-product**

3.1 RUP for web application…

- **Construction phase:**
  - **exists in web development process**
- **Transition phase:**
  - **is meaningful for web application development**

3.1 RUP for web application…

- **Handling short development cycles:**
  - **Conflicting**
    - **short cycle means concession in modeling and documentation while RUP is heavyweight**
- **Handling changing requirements:**
  - **Conflicting with time constraints**
    - **require concrete vision at the end of inception phase which require more time in web application due to evolving requirements**

3.1 RUP for web application…

- **Parallel development of different releases:**
  - **can be met with RUP**
    - **RUP only allow parallel development in construction phase**
- **Reuse and integration:**
  - **Conflicting**
    - **It requires coordination with development processes of other applications RUP does not describe this**

3.1 RUP for web application…

- **Adapting to a Web application's complexity level:**
  - **RUP can be adopted for later stages when complexity of web application is understood**

Web Project Management

Outline

- **Project management**
- **Project manager: tasks/responsibilities**
- **Traditional vs. web project management**

1. Project Management

- **Project management is the process of planning, organizing, motivating and controlling resources and procedures to develop a software/web project**
- **Is essential part of software/web engineering**
- **Projects need to be managed**
  - **to ensure budget and time constraints**

1. Project Management…

- **Project manager's job is to ensure**
  - **project meets budget and timing constraints**
  - **high quality product is delivered**
- **Good management does not guarantee the project success**
- **Bad management usually results in project failure**
  - **schedule delays**
  - **budget overrun**
  - **low customer's acceptance**

1. Aim of Project Management…

To complete a project:

- On Time
- On Budget
- With required functionality
- To the satisfaction of the client
- Without exhausting the team

To provide visibility about the progress of a project

1. Project Management…

- **Project management goals are**
  - **deliver software on time**
  - **meet budget constraints**
  - **fulfill customer's expectation**
  - **maintain a happy and well-functioning team**

1. Aspects of Project Management…

Planning

- Outline schedule during feasibility study
- Fuller schedule for each part of a project (e.g., each process step, iteration, or sprint)

Contingency planning

- Anticipation of possible problems (risk management)

Progress tracking

- Regular comparison of progress against plan
- Regular modification of the plan
- Changes of scope, etc. made jointly by client and developers

Final analysis

- Analysis of project for improvements during next project

2. Project Manager's tasks

- **Project planning**
- **Risk management**
- **People management**
- **Reporting**
- **Proposal writing**

2. Project Manager's tasks…

Project planning:

- **Project managers are responsible for**
  - **cost estimation**
  - **project scheduling**
  - **resource allocation**
- **Monitoring**
  - **work is carried out according to standards**
  - **progress is according to budget and schedule**

2. Project Manager's tasks…

Project planning:

- **At proposal stage:**
  - **are resources available to complete the project**
  - **what price to ask (effort, s/w,h/w, travelling)**
- **At startup stage:**
  - start-up time is typically three to six months
  - **who will work**
  - **decide about the increments and allocate resources**
  - **refine estimates as more information is available**

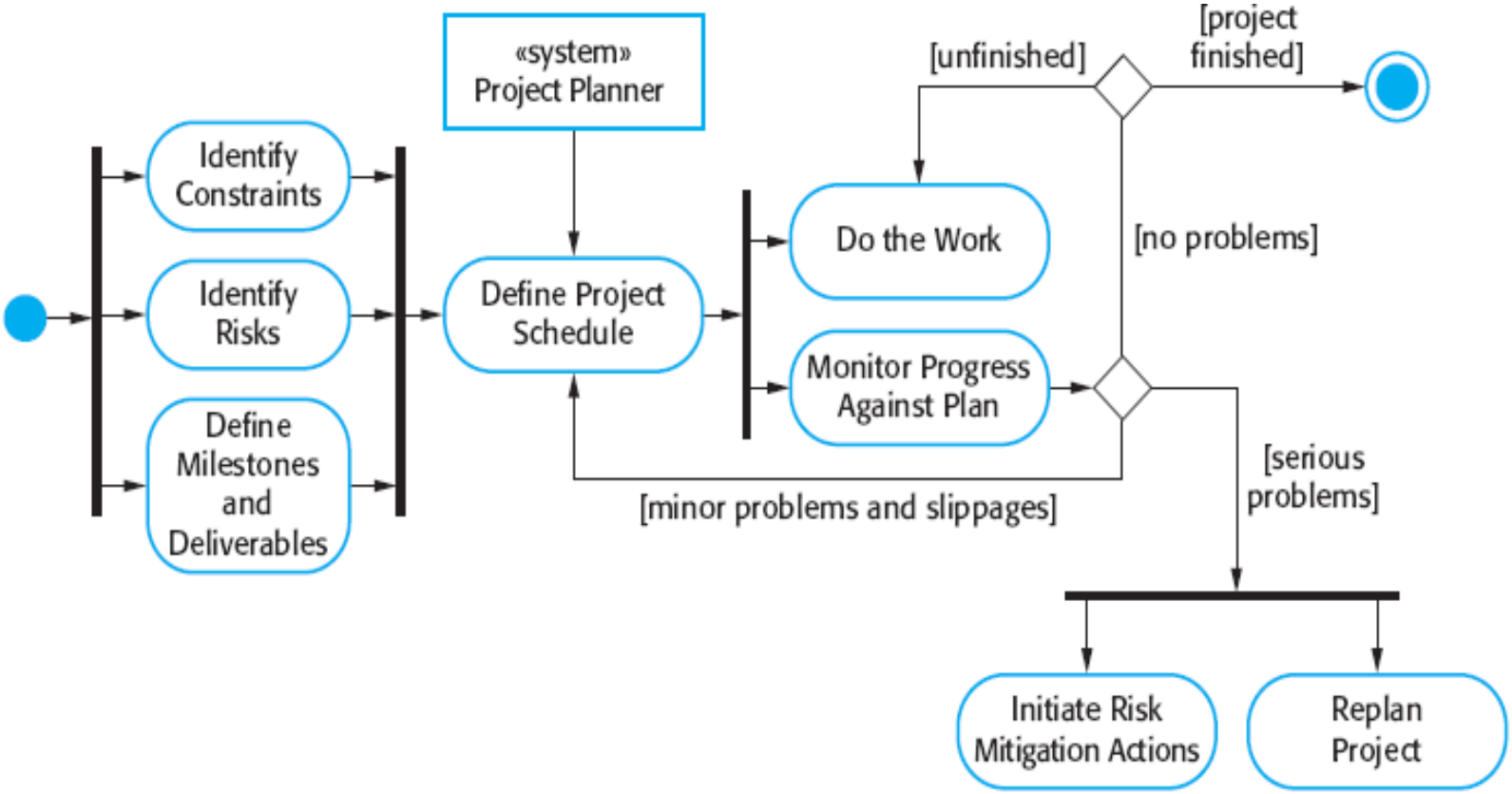
2. Project Manager's tasks…

Project planning:

- **During development process:**
  - **when project plan needs to be changed**
  - **can make more accurate estimates about time and cost**

2. Project Manager's tasks…

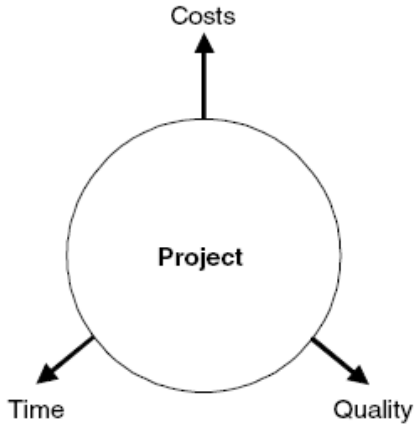
Project planning:

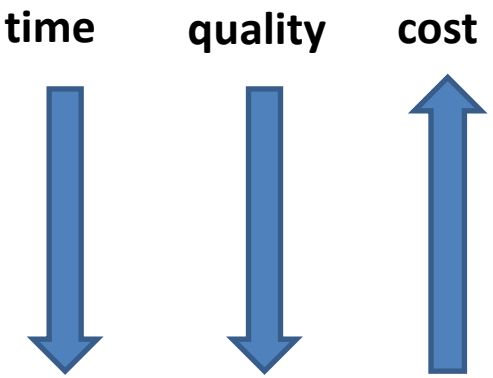


Source: 'software engineering' by Sommerville

2. Project Manager's tasks…

- **Conflicting areas:**
- **Project requires to have a well balanced between budget, time and quality**
  - **change in one can influence others**





Source: Web Engineering – Kappel et al.

2. Project Manager's tasks…

Risk management:

- **Project managers are responsible for**
  - **anticipation of risks**
    - **can affect schedule or quality**
  - **taking actions to avoid these risks**

2. Project Manager's tasks…

Risk management:

- **Risk categories:**
- **Project risks: affect the project schedule or resources**
  - **experienced developer leaves the job**
- **Product risks: affect the quality and performance of the product**
  - **a purchased component does not work as expected**

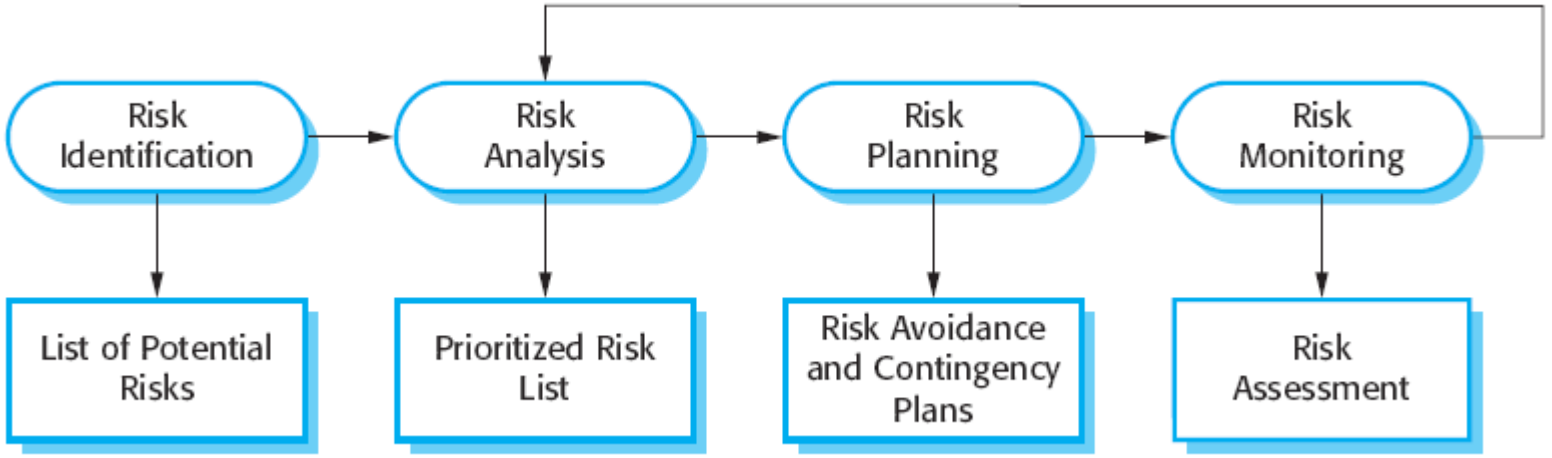
2. Project Manager's tasks…

Risk management:

- **Risk categories:**
- **Business risks: affect the organization developing or procuring the product**
  - **a competitor introduced a new product**

2. Project Manager's tasks…

- **Risk management:**



Source: 'software engineering' by Sommerville

2. Project Manager's tasks…

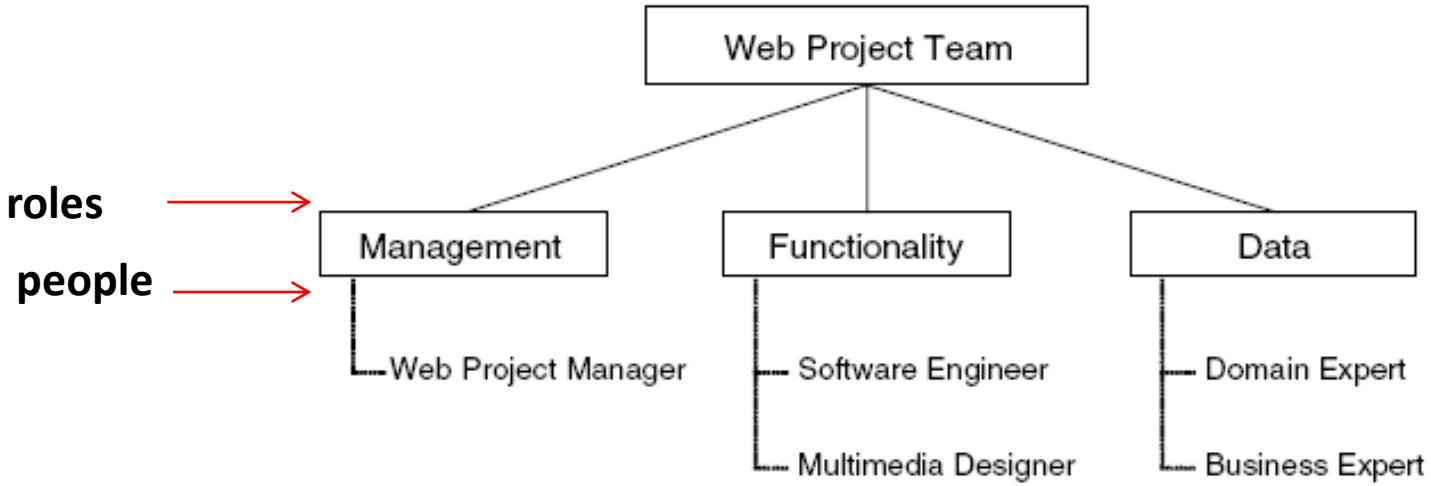
- People management:
- Project managers responsible for
  - choosing people
  - establishing ways of working
- Characteristics of web development team
  - multidisciplinary: experts from diverse fields
  - Parallelism: parallel work on large task
  - Small size: due to budget constraints/short development cycles

2. Project Manager's tasks…

- **People management:**
- **PM solves conflicts if members are working as group**
  - **must be solved early to meet time constraints**
  - **due to short development time, even suboptimal solution is acceptable**

2. Project Manager's tasks…

- **People management:**
- **Web team composition**



Source: Web Engineering – Kappel et al.

2. Project Manager's tasks…

- **Reporting:**
- **Project mangers are responsible for reporting**
  - **on progress of a project to customers and managers of the company**
- **Proposal writing:**
- **write proposal to win a project**
  - **critical task**

2. Project Manager's tasks…

- Golden rules for Web project managers:
- Take care of ethics in the team
- Stress the importance of different application knowledge for the project
- Solve conflicts quickly. Make sure no team member is a winner or a loser all the time
- Explain to each team member his or her roles and responsibilities continuously
- Identify parallel developments

2. Project Manager's tasks…

- Golden rules for Web project managers:
- Distribute documentation tasks to team members fairly according to their scope
- Promote and coordinate the continuous use of tools from the very beginning of the project
- Translate costs and values into different project areas
- Promote the continuous involvement of the customer in the project
- Always keep an eye on the project progress and the project objective

3. Traditional vs. web project management

- **Main objective:**
  - **Create a quality product at lowest possible cost!**
  - **Create a usable product in shortest possible time!**
- **Project size:**
  - **Medium to large (10 to 100 people and more)**
  - **Usually small (6 +/– 3 people)**
- **Duration:**
  - **12 to 18 months on average**
  - **3 to 6 months on average**

3. Traditional vs. web project management

- **Cost**
  - **several million dollars**
  - **several thousand dollars**
- **Development approach**
  - **based on requirements; structured into phases; incremental; documentation-driven**
  - **Agile methods**
- **Technologies**
  - **OO methods**
  - **web technologies**

3. Traditional vs. web project management

- **Product**
  - **Code-based; poor reusability; complex applications**
  - **High reusability; standard components; many standard applications**
- **Staff profile**
  - **Professional software developers with several years of experience**
  - **Multimedia designers; Web programmers (Java, etc.); PR/marketing people**

Summary

- **Development Process model**
  - **software development process activities**
  - **conventional software development approaches**
- **Requirement for a web development process model**
- **Rational unified process model (RUP)**
  - **suitability for web application development**

Summary

- Project management
- Responsibilities/tasks of a Project manager
  - Planning
  - Risk management
  - People management
  - Reporting
  - Proposal writing
- Traditional vs. web engineering

THANK YOU