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LECTURE 11

SOFTWARE PROJECT MANAGEMENT

COURSE LECTURE SCHEDULE

Teachers:
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Date	Topic	Book Chapter(s)
Wed 8.9.	Course introduction	
Tue 14.9.	Introduction to Software Engineering	Chapter 1
Tue 21.9.	Software Processes	Chapter 2
Mon 27.9	Agile Software Engineering	Chapter 3
Tue 5.10.	Requirements Engineering	Chapter 4
Mon 11.10.	Architectural Design	Chapter 6
Wed 20.10.	Modeling and implementation	Chapters 5 & 7
Mon 1.11.	Testing & Quality	Chapters 8 & 24
Mon 8.11.	Software Evolution & Configuration Management	Chapters 9 & 25
Mon 15.11.	**Software Project Management**	**Chapter 22**
Mon 22.11.	Software Project Planning	Chapter 23
Mon 29.11.	Global Software Engineering	
Wed 8.12.	Software Business	
Mon 13.12.	Project Presentations	

GOALS FOR THIS LECTURE:

After this lecture, you know

1. What are the skills and activities of a project manager?
2. What motivates software developers?
3. How to build high performing teams?
4. The basics of risk management

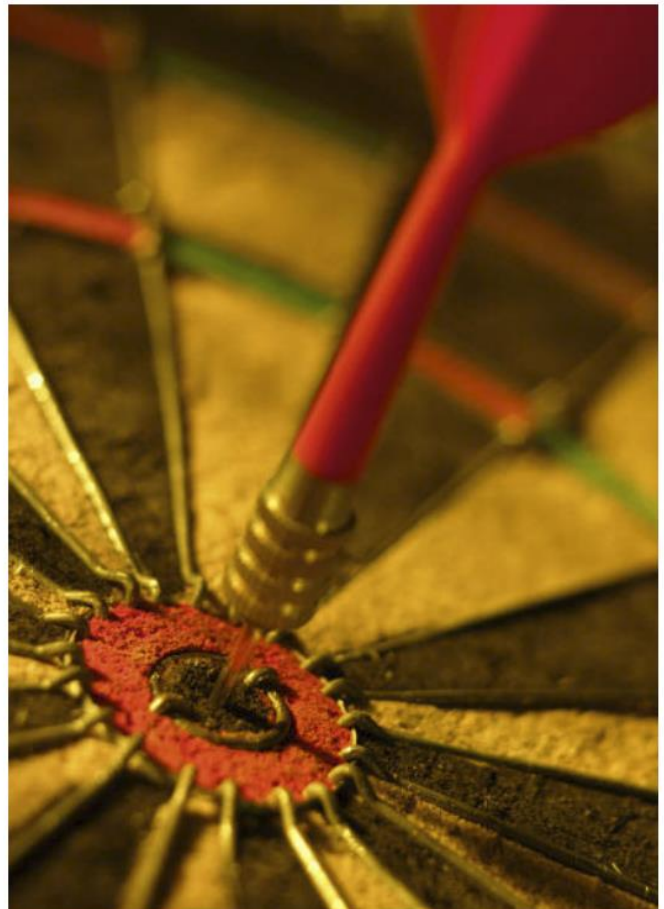
SOFTWARE PROJECT MANAGEMENT

MANAGING SOFTWARE DEVELOPMENT VS. OTHER PROJECTS

- Many techniques of general project management are applicable to software project management
- Software development projects are often very hard to manage
- According to Fred Brooks, software is different because of its
  - Invisibility – you cannot touch or see software
  - Complexity – most complex human endeavor
  - Conformity – conform to requirements of human clients
  - Flexibility – high degree of change
- Other characteristics of software development
  - Detailed requirements specification in the beginning is difficult
  - High productivity differences between individuals
  - Does not scale easily – adding workforce in late phase can be harmful
  - Interconnected – The effect of changes on the system often unknown

SOFTWARE PROJECT SUCCESS RATES

- Standish Group, 2015 (2011) Chaos Report
  - **29% (29%)** Successful (On Time, On Budget, Fully Functional)
  - **52% (49%)** Challenged (Late, Over Budget, and/Or Less than Promised Functionality)
  - **19% (22%)** Failed (Canceled or never used)

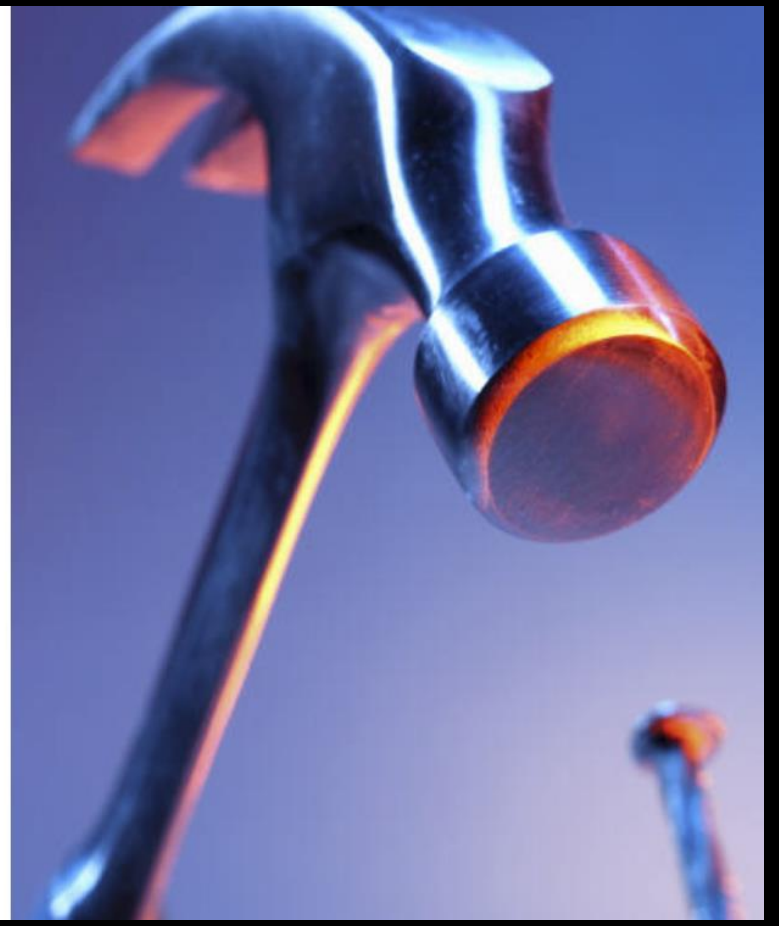


REASONS FOR FAILURE (ACCORDING TO STANDISH GROUP)

- "Most projects failed for lack of skilled project management and executive support"
- "Underestimating project complexity and ignoring changing requirements are basic reasons why projects fail"
- "The problem – and the solution – lay in people and processes"

RECIPE FOR SUCCESS

- Smaller project size and shorter duration
- More manageable
- “Growing”, instead of “developing”, software engages the users earlier and confers ownership.
- -> Iterative and interactive process



WHAT IS A PROJECT?

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- A project is a planned activity that involves non-routine tasks and has a beginning and an end.
- Other project characteristics:
  - Specific objectives are to be met or a specific product is to be created
  - Work is carried out for someone else than yourself
  - The resources that are available for use on the project are constrained
  - The project has goal(s), schedule, resources and budget

WHAT KINDS OF SOFTWARE DEVELOPMENT PROJECTS ARE THERE?

- There are many different types of software development projects, e.g.
  - Projects that are developing
    - One-of-kind customer specific systems
    - Totally new software products
    - New versions of software products
    - New features or improvements to old systems
    - SaaS (Software as a service)
    - Embedded software
  - Projects that are
    - Internal and co-located
    - Intra-organizationally distributed
    - Using software subcontractors
    - Developing or using open-source software

DO WE NEED SOFTWARE DEVELOPMENT PROJECTS?

- Continuous software development

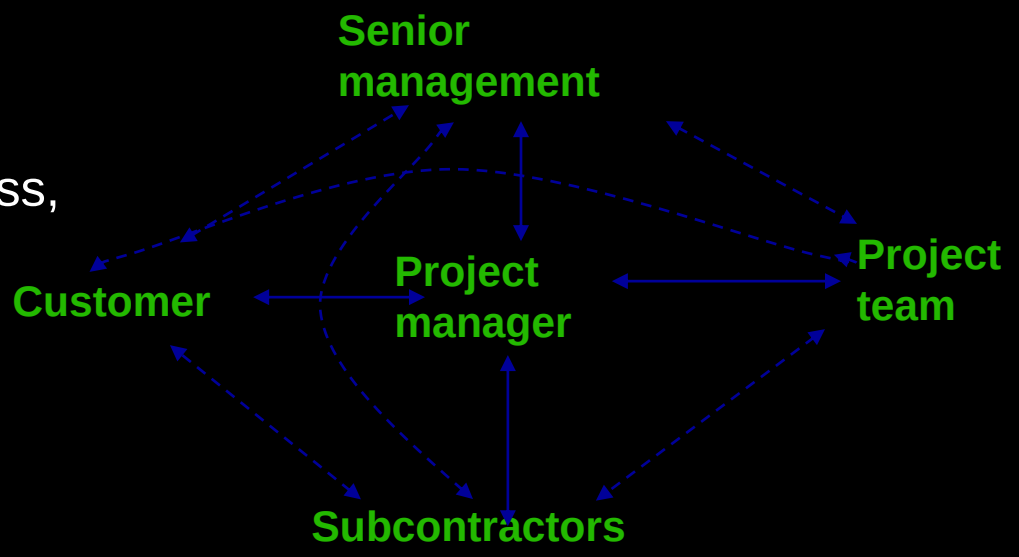
GO TO: MENTI.COM

SUGGESTED SKILLS FOR A PROJECT MANAGER

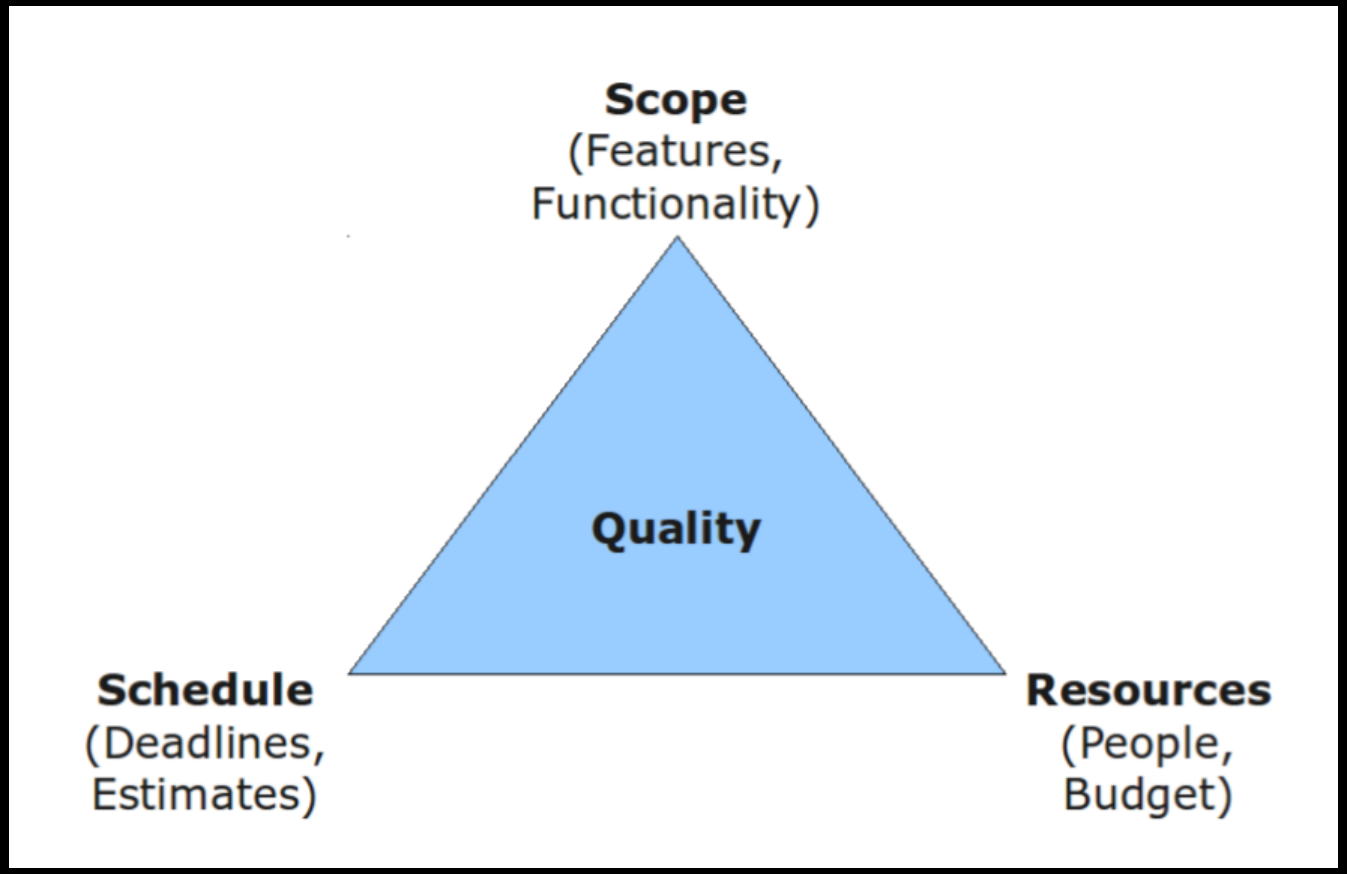
- Communication skills: listening, persuading
- Organizational skills: planning, goal-setting, analyzing
- Team building skills: empathy, motivation
- Leadership skills: set example, energetic, positive, delegates, vision (big picture)
- Coping skills: flexibility, creativity, patience, persistence
- Technological skills: experience, project knowledge
- Negotiation skills: negotiates with management to get good team members, enough resources and reasonable goals and schedules

PROJECT MANAGER'S ROLE

- Communicator with stakeholders:
  - Senior management – gaining and maintaining support
  - Client – informing, negotiating
  - Subcontractors – controlling, negotiating
  - Project staff- conflict resolution, problem solving
  - External world – informing (e.g. press, other interest groups)
- Facilitator or coach for own team
  - provides possibilities for effective work
- PM spends 50-90% of his time on communication!



PROJECT CONSTRAINTS - THE IRON TRIANGLE

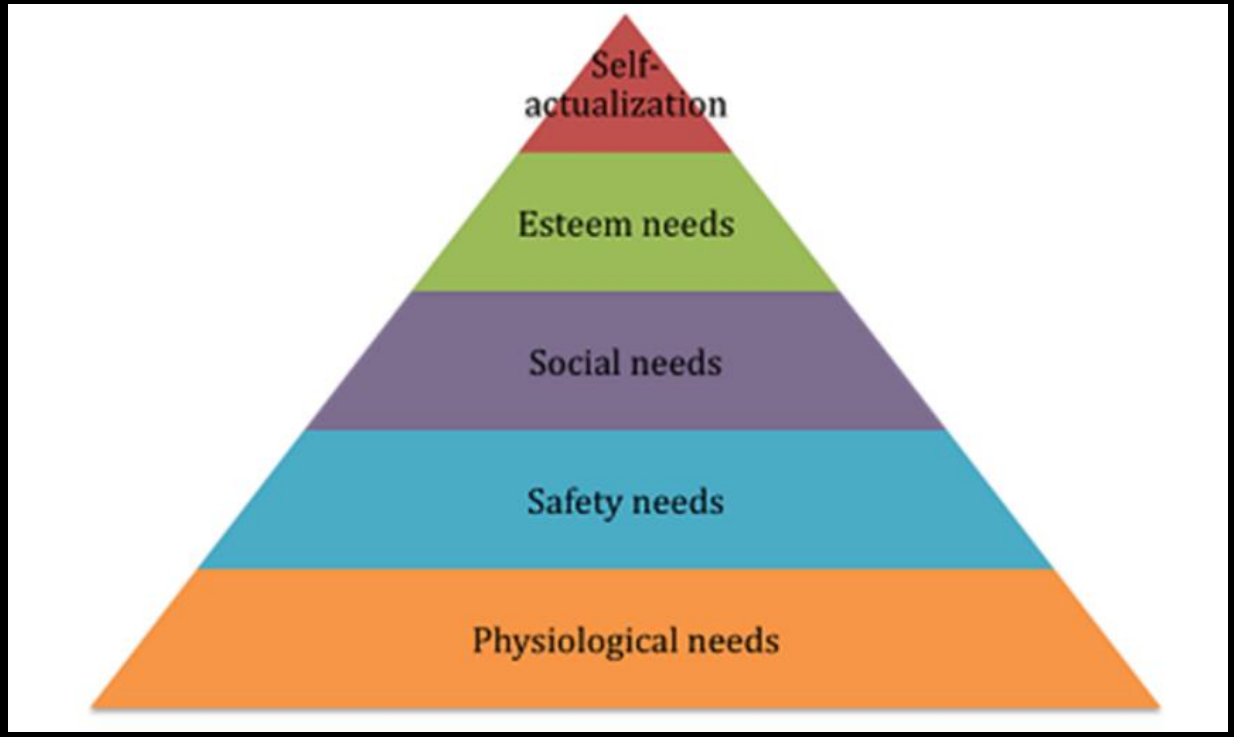


MANAGING PEOPLE AND ORGANIZING TEAMS

- Often the most difficult areas in managing software development projects
  - *“Most managers are willing to concede the idea that they’ve got more people worries than technical worries. But they seldom manage that way.”* (DeMarco & Lister, Peopleware)
  - One reason: technical experts become managers
- Important areas:
  - Selecting right people for the job
  - Motivating people
  - Working as a team

MOTIVATION – MASLOW HIERARCHY OF NEEDS

- Self-actualization/realization needs – responsibility, challenging tasks, learning new
- Esteem needs – show people that they are valued
- Social needs – communication, collaboration
- Safety needs
- Physiological needs



MOTIVATION IN SOFTWARE ENGINEERING

- Watch Daniel Pink's video on human motivation: https://www.youtube.com/watch?v=u6XAPnuFjJc
- Autonomy, self-direction
- Mastery, challenge
- Purpose

WHAT IS A TEAM?

- A team consists of
  - at least two people, who
  - are working towards a common goal/objective/ mission, where
  - each person has been assigned specific roles or functions to perform, and where
  - completion of the mission requires some form of dependency among group members (Dyer)
- Team size
  - Less that 20 people
  - Optimal size is 4-8 persons for software teams
  - In a larger project add the number of teams
  - It is optimal that a person works only in one project team at the time

THE JELLED TEAM

- *"A jelled team is a group of people so strongly knit that the whole is greater than the sum of the parts. The production of such a team is greater than that of the same people working in unjelled form. Just as important, the enjoyment that people derive from their work is greater that what you would expect given the nature of the work itself."* (DeMarco & Lister, Peopleware)

HOW TO BUILD EFFECTIVE TEAMS

Team cohesion

- Kick-off meeting
- Collocation
- Sense of team identity
- Frequent and open communication
- Trust building (e.g. role based, achievement based)
- Give frequent, easy opportunities for the team to succeed together and celebrate the achievement (e.g., team dinner after achieving a milestone)
- Jelled teams have fun working together!

HOW TO BUILD EFFECTIVE TEAMS

Challenging goals

- “Establish a vision”
- Goals must
  - be specific and measurable
  - represent a significant challenge
  - be achievable and accepted by team members
- Setting goals
  - By having all team members participate in defining the team goals helps them to accept the goals
  - Goal achievement should be monitored and goals adjusted if needed

HOW TO BUILD EFFECTIVE TEAMS

Establishing plans

- Agreeing together on a strategy for achieving the goals
- Agreeing about the work process and practices used
- Team members must
  - feel that the tasks are achievable
  - understand their role and responsibilities
  - agree on how to accomplish them

HOW TO BUILD EFFECTIVE TEAMS

Selecting roles

- Roles and responsibilities should be defined and assigned together to all team members
- Roles should include communication responsibilities

Feedback

- Goals must be tracked and progress visibly displayed
- Frequent and precise feedback motivates
- Remember to give positive feedback

HOW TO BUILD EFFECTIVE TEAMS

- **Maintaining communication among team members**
  - The most common team problem is poor communication
  - High performing teams
    - know what is happening
    - can anticipate problems and quickly adjust to changes
    - know when someone needs help
    - can see the effects of their work
  - Both formal and informal communication is needed
    - Formal: e.g. regular meetings daily or once a week to discuss issues, resolve problems, plan work, follow progress
    - Informal: Continuous communication among team members

AGILE TEAMS

- Sit in the same room
- Small team size <10
- No specific roles - everybody can do all tasks (coding, testing, etc.)?
- Self-organized teams, often no project manager (Scrum Master in Scrum)
- The team has the responsibility to
  - plan its work
  - solve problems
  - develop its processes and working methods

SUMMARY – AS A PROJECT MANAGER…

- Set project goals and objectives
- Define roles and responsibilities
  - Decision making rights
- Involve team to planning as early as possible
  - Commitment to plans & motivation
- Arrange a project kick-off meeting
  - Formal and informal parts
- Build trust (e.g. role based, achievement based)
- Provide transparency of progress
- Give feedback
- Project manager is a facilitator - provides possibilities for effective work, supports team, follows progress, steps in when problems, reports to management, communicates

RISK MANAGEMENT

RISK MANAGEMENT

- Risk management is concerned with identifying risks and drawing up plans to minimise their effect on a project.
- A risk is a probability that some adverse circumstance will occur
  - Project risks affect schedule or resources
  - Product risks affect the quality or performance of the software being developed
  - Business risks affect the organisation developing or procuring the software

THE RISK MANAGEMENT PROCESS

- Risk identification: Identify project, product and business risks
- Risk analysis: Assess the likelihood and consequences of these risks
- Risk planning: Draw up plans to avoid or minimise the effects of the risk
- Risk monitoring: Monitor the risks throughout the project

EXAMPLES OF COMMON PROJECT, PRODUCT AND BUSINESS RISKS

Risk	Affects	Description
Staff turnover	Project	Experienced staff will leave the project before it is finished.
Management change	Project	There will be a change of organizational management with different priorities.
Hardware unavailability	Project	Hardware that is essential for the project will not be delivered on schedule.
Requirements change	Project and product	There will be a larger number of changes to the requirements than anticipated.
Specification delays	Project and product	Specifications of essential interfaces are not available on schedule.
Size underestimate	Project and product	The size of the system has been underestimated.
CASE tool underperformance	Product	CASE tools, which support the project, do not perform as anticipated.
Technology change	Business	The underlying technology on which the system is built is superseded by new technology.
Product competition	Business	A competitive product is marketed before the system is completed.

RISK IDENTIFICATION

- May be a team activitY or based on the individual project manager's experience
- A checklist of common risks may be used to identify risks in a project
  - Technology risks
  - People risks
  - Organisational risks
  - Requirements risks
  - Estimation risks

RISK ANALYSIS

- Assess probability and seriousness of each risk
- Probability may be very low, low, moderate, high or very high
- Risk consequences might be catastrophic, serious, tolerable or insignificant.

RISK PLANNING

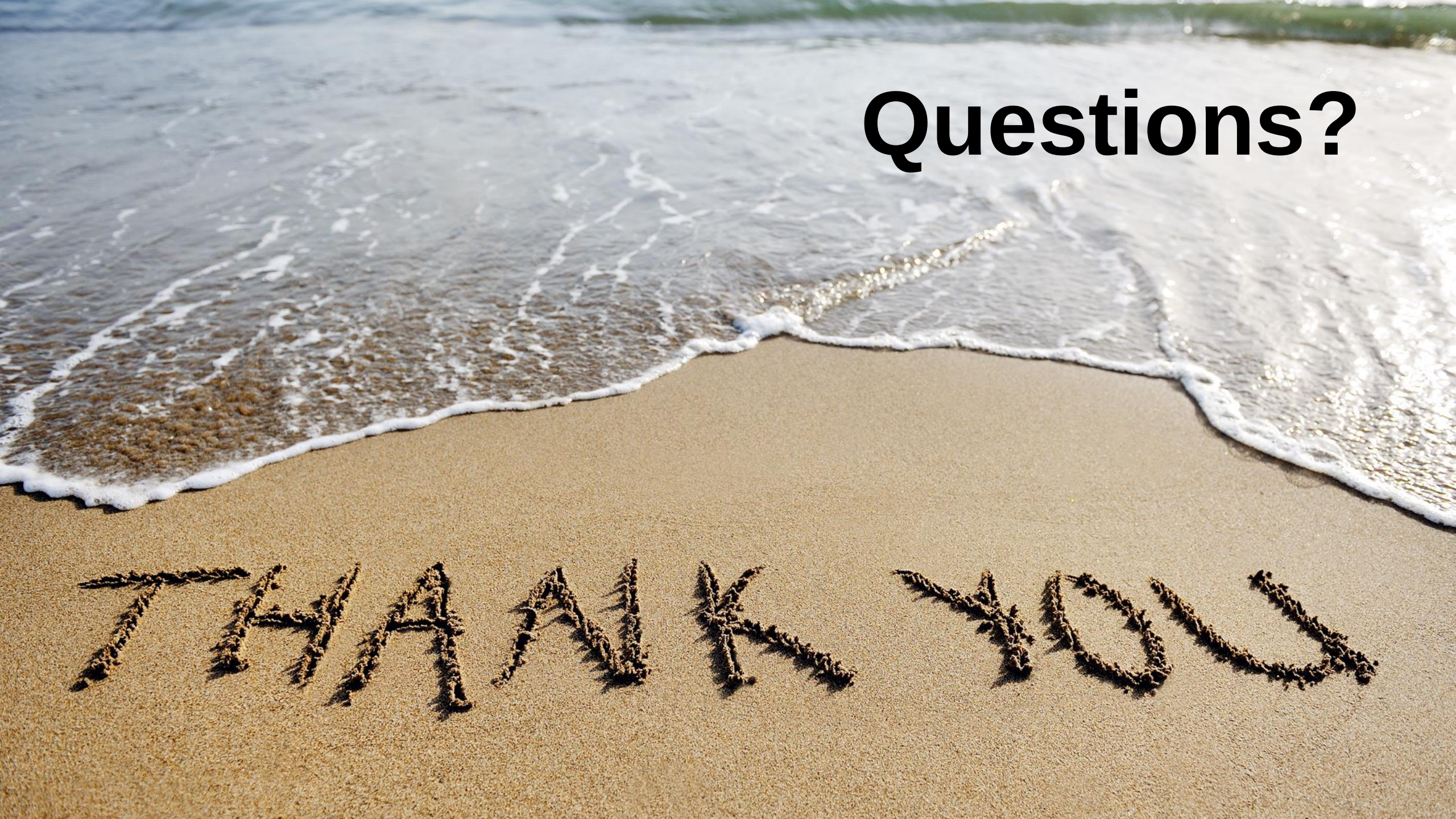
- Consider each risk and develop a strategy to manage that risk
- Avoidance strategies: The probability that the risk will arise is reduced
- Minimisation strategies: The impact of the risk on the project or product will be reduced
- Contingency plans: If the risk arises, contingency plans are plans to deal with that risk

RISK MONITORING

- Assess each identified risks regularly to decide whether or not it is becoming less or more probable
- Also assess whether the effects of the risk have changed
- Each key risk should be discussed at management progress meetings

ESSAY – BUILDING A HIGH PERFORMING TEAM

- You are a newly appointed project manager for a collocated software project with 8 people, who have not worked together before. What do you do to turn this group of people into a high performing team? In addition, discuss, how you can take into account the motivational factors presented by Daniel Pink in his video.
- As material use the attached book chapters and the video (and whatever other material you find useful):
  - Chapter 12, “Teamwork”, from book McConnell, Steve., 1996. Rapid development: taming wild software schedules. Pearson Education.)
  - Chapter 21, “A Spaghetti Dinner” from book: DeMarco, Tom and Lister, Timothy, 1999. Peopleware: Productive Projects and Teams. Dorset House Publishing Co.
  - Daniel Pink: “Drive: The surprising truth about what motivates us” https://www.youtube.com/watch?v=u6XAPnuFjJc
- Length: max 700 words
- Use references as needed, e.g. “A good practice for strong teams mentioned by McConnell (1996) is… Therefore, in my project I would do…“


Questions?
THANK YOU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