

SWE20001

Managing Software Projects

Lecture 7

Software Project Risk Management



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Principal References

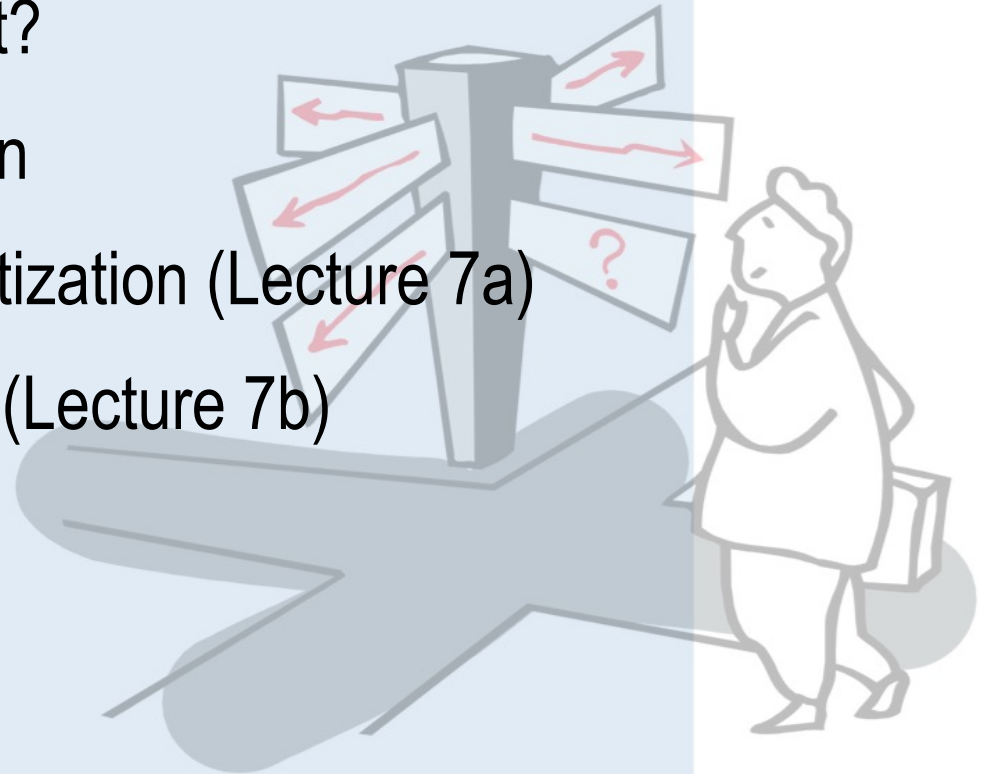


- Roger S. Pressman, *Software Engineering - A Practitioners Approach* (7th Edition), McGraw Hill, 2010, Chapter 28.
- Bob Hughes and Mike Cotterell, *Software Project Management* (4th Edition), Wiley, 2006, Chapter 7.
- Pankaj Jalote, *Software Project Management in Practice*, Addison-Wesley, 2002, Chapter 6.

Overview



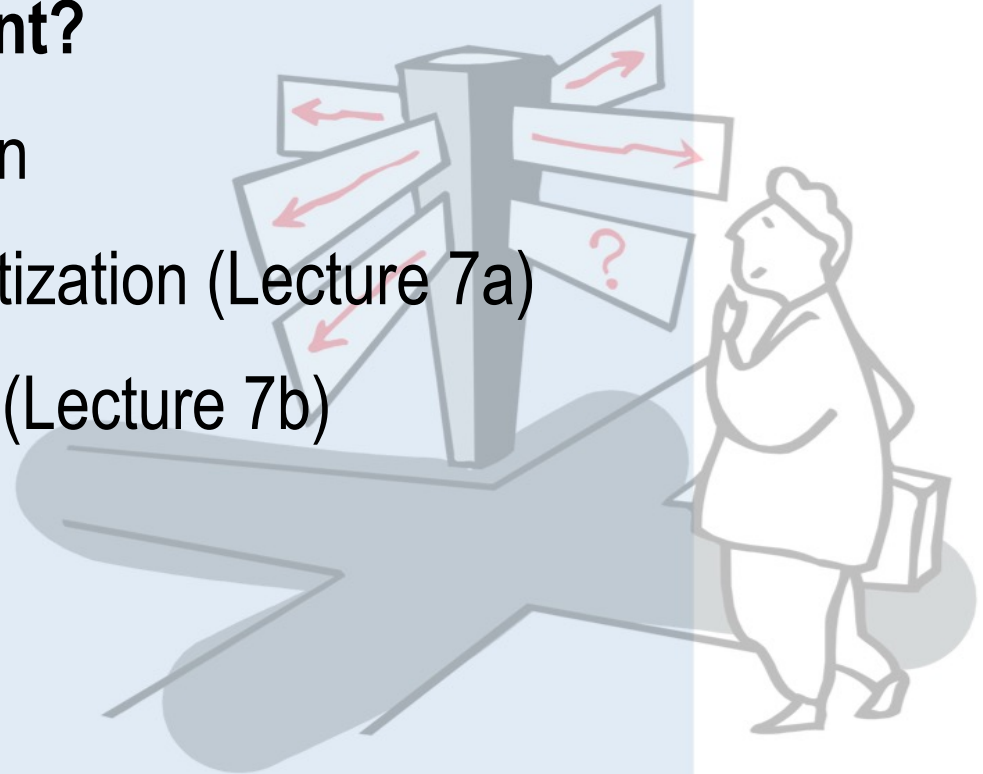
- What is Risk Management?
- Risk and Risk Identification
- Risk Estimation and Prioritization (Lecture 7a)
- Risk Mitigation Strategies (Lecture 7b)
- Final Remark



Roadmap



- **What is Risk Management?**
- Risk and Risk Identification
- Risk Estimation and Prioritization (Lecture 7a)
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Risk Management



Software project risk management defines the way to *identify*, *analyse*, and *respond* to software risks during the execution of a project.

Why Risk Management?



Be prepared!

Why Risk Management (cont.)?



Risk management

- has a positive impact on
 - ☐ Selecting projects
 - ☐ Determining the scope of projects
 - ☐ Developing realistic schedules and cost estimates
- helps project stakeholders to understand the nature of the project
 - ☐ and may give additional justifications why a project should *not* be undertaken!

Risk Management Framework



■ Risk assessment:

- ☐ Risk identification
- ☐ Risk analysis and estimation
- ☐ Risk prioritization

■ Risk mitigation/control:

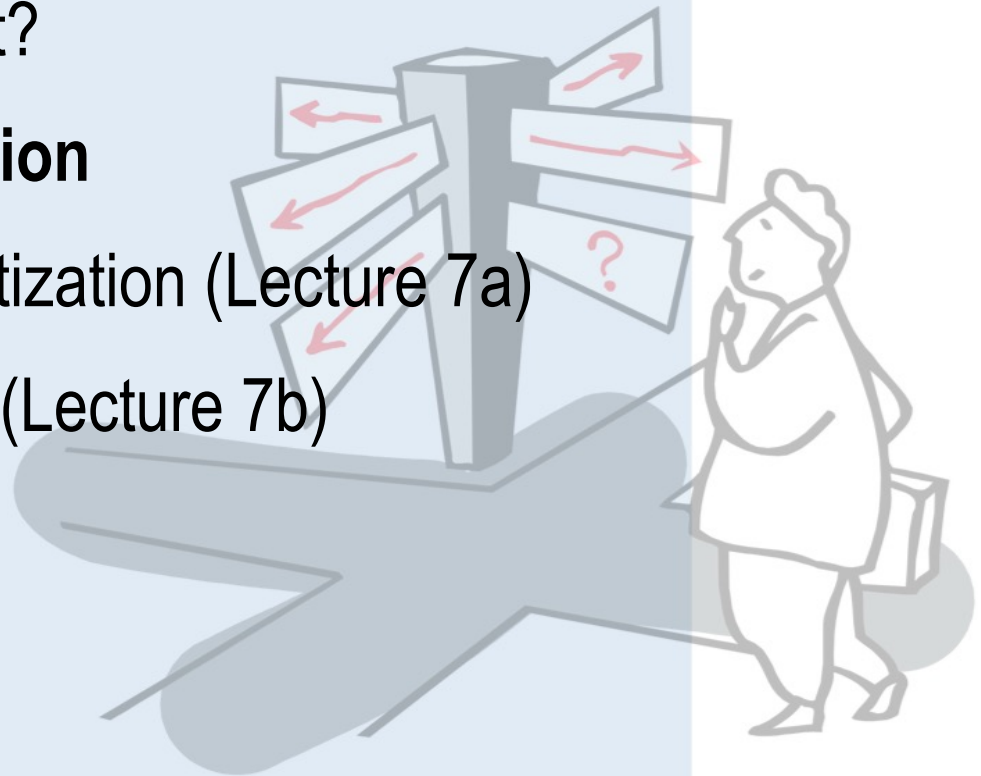
- ☐ Risk avoidance
- ☐ Risk planning
- ☐ Risk monitoring

(Source: P. Jalote, *Project Management in Practice*)

Roadmap



- What is Risk Management?
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What are Risks?



*“First, risk concerns **future happenings**. Today and yesterday are beyond active concern, as we are already reaping what was previously sowed by our past actions. The question is, therefore, by changing our actions today, create an opportunity for a differently and hopefully better situation for ourselves tomorrow. This means, second that risk **involves change**, such as in changes of mind, opinion, actions, or places. Third, risk **involves choice**, and the uncertainty that choice itself entails.”*

– Robert Charette, 1989

What are Risks (cont.)?



- PMBOK: “an *uncertain event* or condition that, if it occurs, has a positive or *negative effect* on a project’s objectives.”
 - PRINCE2: “the chance of exposure to the adverse consequences of *future events*.”
- ☞ Key elements:
- ☐ Risks relate to the future (“speculating about future events”)
 - ☐ Risks involve *cause* (“why”) and *effect* (“measurable consequence”).



“I never look back, dahling. It detracts from the now.”

– Edna Mode, The Incredibles





Risk Items

- Hazard → Problem → Risk Item
- Chances of Happening
- Impact / Damage caused by the risk item

- Examples of hazards
 - ☐ New, unproven technology
 - ☐ Unclear requirements
 - ☐ Lack of experience in problem domain
 - ☐ Overall size/complexity of problem

Identifying Risk



☞ Guidelines:

- ☐ Use checklist that lists the potential hazards and their corresponding factors
 - ☐ Knowledge
 - ☐ Risk Drivers (Gap Analysis)
 - ☐ Risk Causes
- ☐ Identify both, *cause* and *effect* of risks!
- ☐ Maintain an updated checklist for future projects
- ☐ Think of other things that may go wrong...

Knowledge



Information = Data + Meaning

Knowledge = Information + Processing (Domain Context)

Domain Knowledge: scopes context we are dealing with!



Risk Drivers

Principal risk drivers (KoST):

- **Knowledge** Gap (*don't know*)
- **Skill Gap** (inexperience)
- **Technology** Gap (unknown/young or unavailable)

Other important risk drivers:

- Team Dynamics + Management
- Research & Development Component



Risk Causes

The two most common causes for project failures are:

- **Problem framing** (solving “wrong” problem)
- **Project approach** (methodology, resources, processes etc.)

Other, more “traditional” risks causes include:

- **Project planning:**
 - budget, schedule, resources, size, personnel, morale, ...
- **Business:**
 - market, sales, management, commitment, ...

Project vs. Business Risks



- Typically, a *project risk*, if it occurs, will threaten a project's **cost and schedule**.
- A *business risk* will threaten the **viability** of the software to be built.
 - Examples:
 - Building a product that no one really wants.
 - Building a product that does not fit into the overall business strategy of the organization (any more).
 - Losing support from senior management due to a change in focus or a change in people.
 - Losing budgetary or personnel commitment.

Barry Boehm's Top Ten Risks



1. Personnel shortfalls
2. Unrealistic schedules and budgets
3. Developing the wrong software functions
4. Developing the wrong user interface
5. Gold Plating
6. Continuing stream of requirements changes
7. Shortfalls in externally performed tasks
8. Shortfalls in externally furnished components
9. Real-time performance shortfalls
10. Straining computer science capabilities



Other Common Risks

- *Lack of communication*

- ☐ within team
- ☐ between team and client/customer

- Lack of resources/time for *testing*

- ☞ or Quality Assurance in general

- Lack of trust

- Development platform vs. deployment platform

- “Uninformed” decision making (about technology etc.)

- “Heroism”

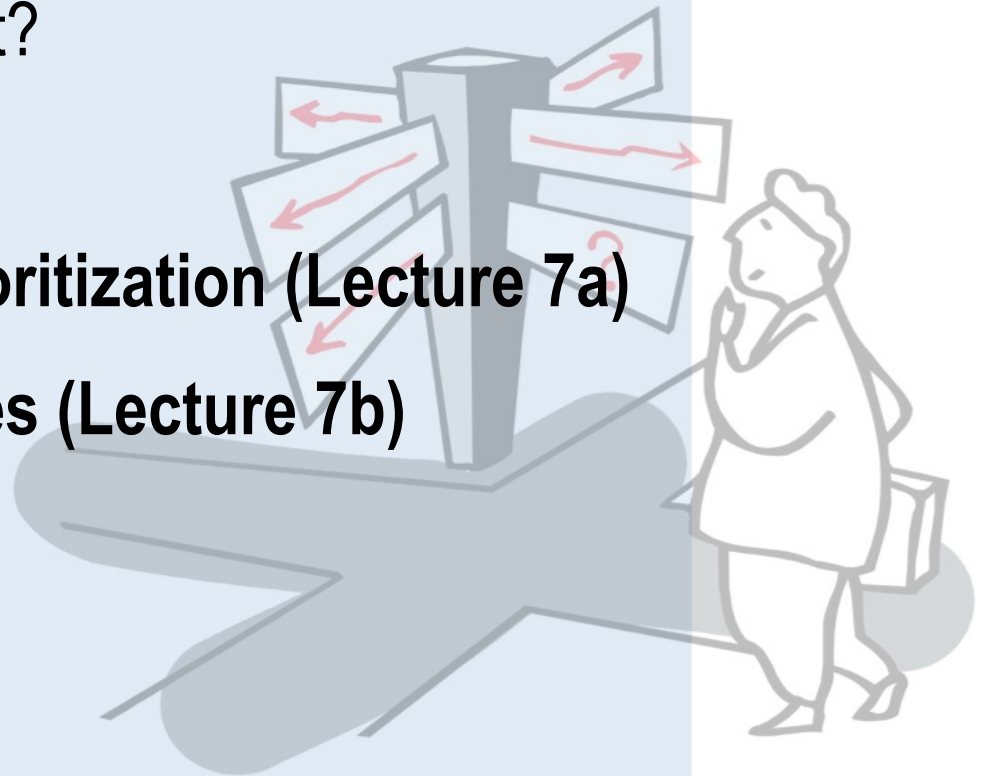
“The Truck Factor”



Roadmap



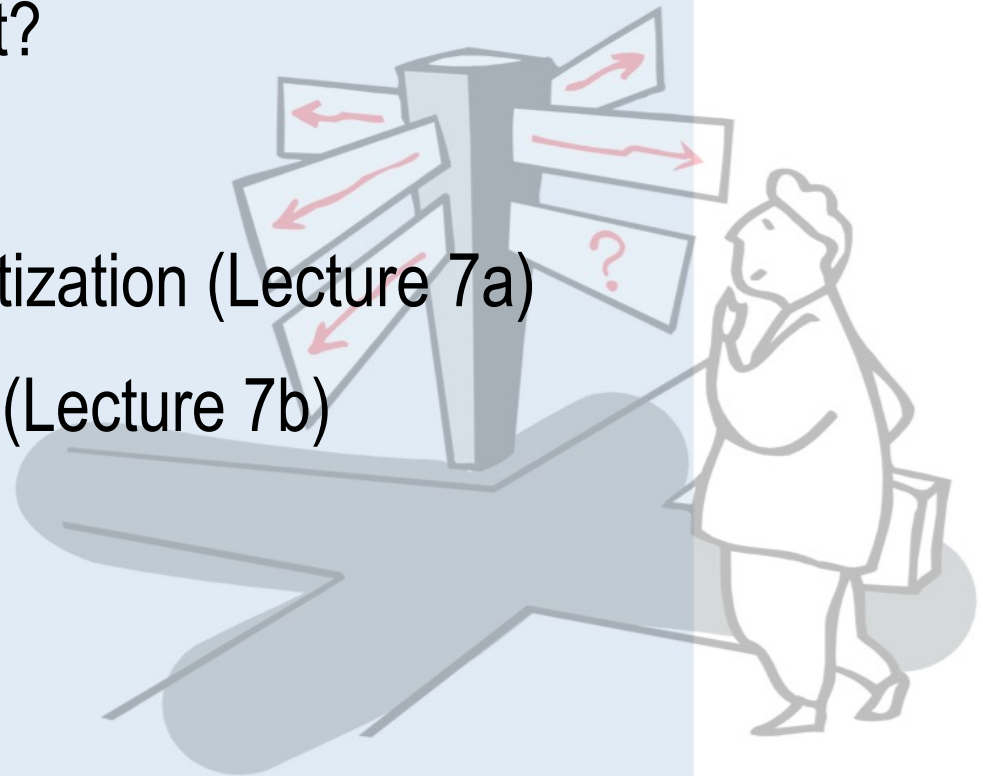
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SEI Principles of Risk Management



- Maintain a global perspective
- Take a forward-looking view
- Encourage open communication
- Integrated management
- Emphasize a continuous process
- Develop a shared product vision
- **Encourage teamwork**

(Source: <http://www.sei.cmu.edu/risk/principles.html>)

Balance of Power



Business decisions should be made by business people
(and not technical people)

Technology decisions should be made by technical people
(and not business people)

•
☞ *A project is at immediate risk if this is reversed!*

Summary



- Risk: an uncertain event that may effect a project
 - has cause and effect
- Risk exposure = Risk probability * Risk impact
- Risk drivers: Knowledge, Skill, Technology (KoST)
- Risk management: identify, analyze, respond to risks
- Risks are not fixed, they will change over time!
- Risk management is not for free, costs are associated
 - Cost of risk not always “obvious” to identify

Closing Remark



*“Projects with no real risks are losers.
They are almost always devoid of benefit;
that is why they were not done years ago.”*

– Tom DeMarco, Tim Lister

What you should know!



- What are the key characteristics of risks?
- What is risk management?
Why do we need to manage risks in software projects?
- What are the main risk drivers?
How do they assist in identifying risks in a project?
- What is the relationship between risk probability, risk impact, and risk exposure?
- Why is it recommended to regularly watch the “Top 10” risks?

Can you answer these questions?



- Should a risk mitigation strategy be implemented at all cost?
- What may happen if risk probability and risk impact are measured at a too fine-grained scale?
- What kind of risks does N-Version Programming attempts to mitigate?
- What kind of risks does Pair Programming attempt to mitigate?
What other strategies could be put in place to achieve the same outcome?

Recommended Reading Lecture 7



- Bob Hughes and Mike Cotterell, *Software Project Management* (4th Edition), Wiley, 2006, Chapter 9.
- Ian Sommerville, *Software Engineering* (8th Edition), Addison-Wesley, 2007, Chapter 28.