SWINBURNE UNIVERSITY OF TECHNOLOGY

SWE20001
Managing Software Projects

Lecture 7b

Risk Mitigation

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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.

Risk Mitigation

- “Handle” the relevant risk items so that they do not have adverse effect to the progress of the project

Risk Mitigation Strategies

- 4 different types of mitigation strategies in a generic sense
  - Risk prevention/avoidance
  - Likelihood reduction
  - Impact reduction
  - Risk transfer
- If above fails to address risk
  - Contingency planning

☞ *Sometimes, the distinction between them are fuzzy*

Risk Prevention

- Prevent a hazard from occurring or reduce its likelihood to an insignificant level
- Examples
  - Use of unknown technology can be prevented by choosing existing, proven technology
  - Unclear/ambiguous requirements can be prevented by using formal requirement specification techniques
  - (Too) frequent changes of requirements can be managed by using a time-boxed SDLC methodology

Likelihood Reduction

- Reduce the likelihood of an unavoidable risk by prior planning
- Examples
  - Choosing a wrong technology can be mitigated by spikes/prototypes
  - Decline of team morale (resulting in lower productivity) can be reduced by providing free coffee, staff BBQs, etc.

Impact Reduction

- Reduce the impact of an unavoidable risk by adding "buffers"
- Examples
  - Reduce the impact of the "Truck Factor" by *distributing knowledge amongst team members*
  - Reduce impact of "develop the system wrong" by having more than one team developing a system ("NASA Principle")
    - Traditional jargon – N-version programming

Risk Transfer

- The impact of the risk can be transferred away from the project by contracting out or taking out insurance
- Example
  - The risk of shortfalls in external supplied (software or hardware) components can be transferred away by quality assurance procedures and certification, and contractual agreements.

Contingency Planning

- It assumes that the previous attempts (strategies for hazard prevention, likelihood reduction, impact reduction and risk transfer) are not successful
- Contingency plans (i.e. "Plan B") are needed to reduce the exposure of those risks that cannot be avoided
  - If new, unproven technology is part of the project specification, risks cannot be avoided
- Example
  - The impact of any unplanned absence of programming staff can be minimized by using agency programmers.

☞ *Risks that require contingency plans need careful monitoring!*

Risk Mitigation Strategies – Example

Risk Item	Strategy	Category
Poor database performance	Invest on a higher-performance DBMS	Hazard prevention
Staff lack of skills	Outsourcing, staff training, buying components	Likelihood reduction
Defective components	Replace potential defective components with bought-in components of high reliability	Risk avoidance
Underestimate development time	Outsourcing some components to contractors or agency	Risk transfer
Organizational financial problems	Prepare a briefing report for senior management showing how the project is making a significant contribution to the goals of the business	Contingency planning

Adapted from Fig. 5.13 (Sommerville, 2007)

Cost of Action – Recap

- Risk management is *not for free*, there are costs associated with mitigation strategies
  - E.g., to prevent a (short-term) power failure, need to acquire a UPS (Universal Power Supply)
- Cost-Benefit analysis
  - Does the cost associated with the mitigation strategy merit its implementation?
  - E.g., cost of risk exposure of power failure smaller than cost of UPS, no need for mitigation strategy.
- If a mitigation strategy costs too much
  - Look for an alternative
  - If not possible, carefully monitor the risk!

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.