Risk Management

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From Previous Class(es)

- The Estimation problem
  - What is Estimation?
  - Why Estimate?
  - When to Estimate?
- Process oriented estimation techniques
  - The WAG – Wild Altogether Guess
  - Estimation by analogy
  - Experts judgment
  - Wideband Delphi
  - Planning Poker
- Bottom-up Estimation: A Real Process

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Outline

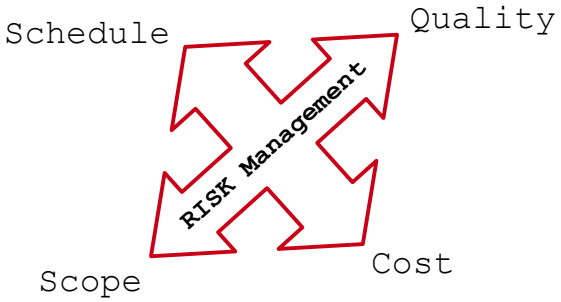
- Small Team Risk Assessment
- Threshold of Success (ToS)
- Risk Identification and Risk Statements
- Risk Attributes
- Exposure Matrix and Prioritizing Risks
- Risk Mitigation

What is Risk?

"RISK is the possibility of suffering loss"
Webster's Third New International Dictionary. Springfield, Ma.: Merriam-Webster, 1981.

Risk Management

- Given the uncertainty felt at a certain point in time, estimate its impact on the project and its possible negative outcome



- Risk Management must be on-going and routine to be effective
  - It should be integrated within the project management environment

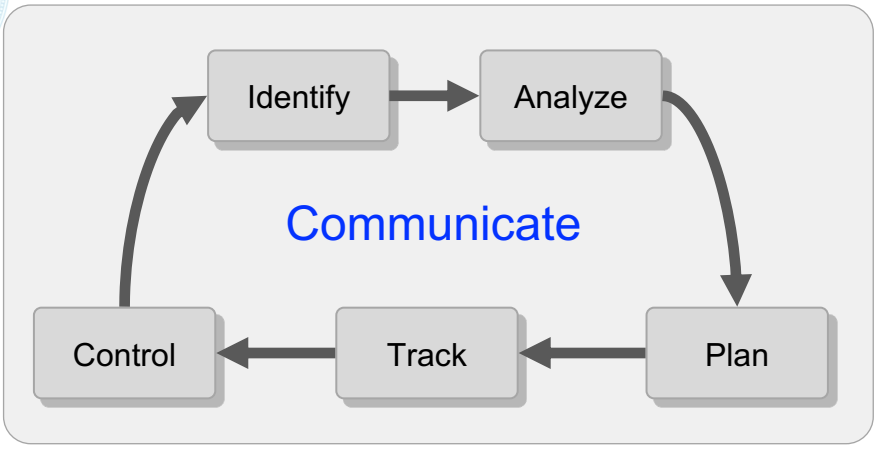
Risk Management in Software Projects

- Risk is characterized by the combination of:
  - Probability
  - Impact
  - Time frame
- Risk management:
  - Maximizing the areas where we have some control
  - Minimizing the areas where we have absolutely no control

Four Ways to Handle Risk

- Avoid – the best thing you can do!!!
  - If you can prevent it from happening, it will not impact your project
- Mitigate – if you can not avoid, you can mitigate it
  - This means taking some sort of action that will cause it to do as little damage to your project as possible
- Transfer – pay someone else to accept it for you
  - Common way is to buy insurance
- Accept – when you can not avoid, mitigate, or transfer
  - But even when you accept a risk, at least you have looked at the alternatives
    - And you know what will happen if it occurs

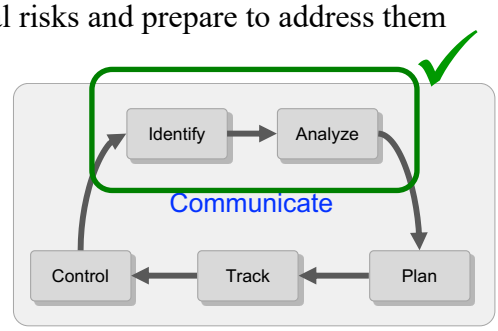
SEI Continuous Risk Management Cycle



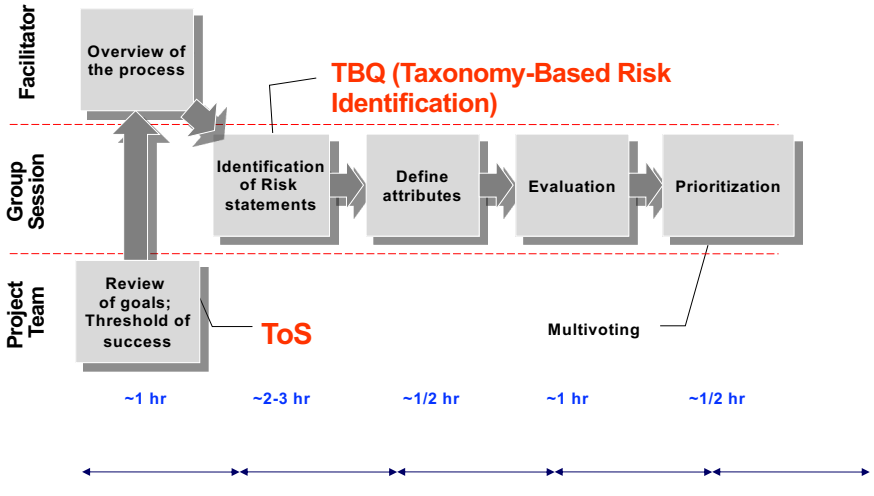
Source: "Continuous Risk Management Guidebook", by A. Dorofee et al. Software Engineering Institute, 1996

Small Team Risk Assessment

- We will be focusing on the "Identify" and "Analyze" parts
  - Specifically, on the Threshold on Success (ToS) and Risk Categorization
- Light weight process for risk identification in small teams
  - 5-10 members; one-day workshop (~ 6 hours)
- Make the team aware of potential risks and prepare to address them



STRA Process



Threshold of Success (ToS)

- Risk statements are identified to help decision makers understand what might prevent success
- You can only know that you succeed if you have a criteria to measure against
- The Minimum Threshold of Success is defined as the boundary between success and failure
- Must be define before/as the project begins (KOM)

Building a ToS

- Define a minimum number of conditions that must ALL BE MET to consider the project a success

- Your goals need to be:
  - Specific (e.g. finish all 'must have' requirements).
  - Measurable (e.g. do not exceed budget by more than 5%)
  - Time Bound (e.g. by the end of the project)

- Stay within roughly 3 to 5 items
- Things to normally look at:
  - Scope – Schedule – Budget – Quality

Guidelines for Building a ToS

- Put yourself at the end of the project
- Build yourself a picture of failure
  - List those things it would take for your project to fail
  - e.g., We did not meet all "must requirements", "we did not deliver on schedule", etc.
- Now, convert these statements into those you would need at a minimum for success
  - e.g., We delivered all "must have requirements", etc.

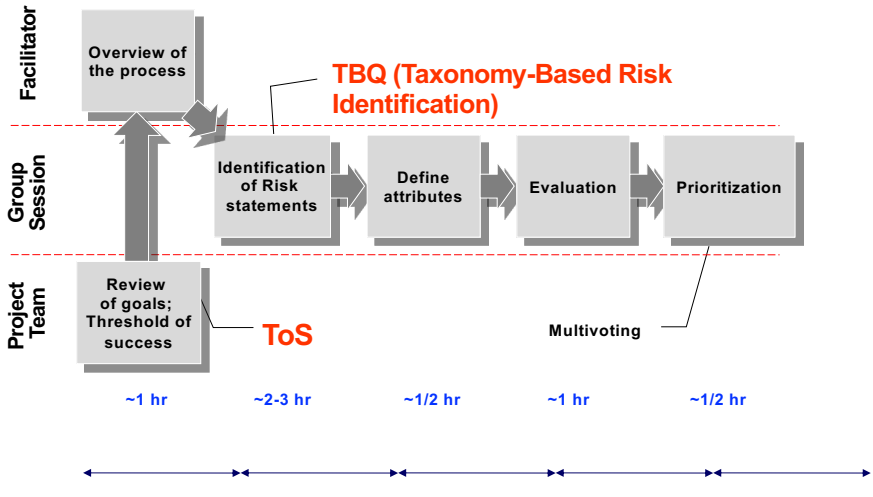
ToS Good Examples

- We deliver all "must have" requirements present in the Statement of Work before December 2008
- We meet code defect goals of less than 4 defects per 1KLOC at acceptance testing
- Project is delivered within two weeks of original scheduled as defined in the statement of work (SOW)
- Product satisfies all quality attributes as defined in the Software Requirements Specification

Build S.M.A.R.T. Goals

- Specific
- Measurable
- Attainable
- Relevant
- Time Bound

STRA Process

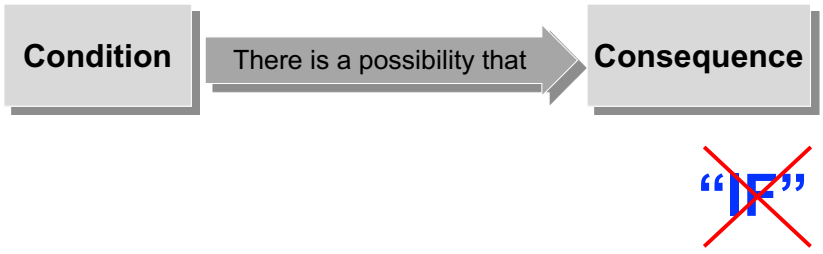


Risk Statements

- Risks are captured in statements to:
  - Help understand those issues/concerns that might stop the project from being successful
  - Provide consistency in how the information is displayed within and across projects
  - Understand and follow project concerns
  - Better communicate concerns to project stakeholders
- Statements create a concise description of particular issues or concerns that can be understood and acted upon

Guidelines

- Consider and capture those fact-based conditions (true now!) that are causing concern for a potential loss
- Followed by a brief description of the potential negative consequences of these conditions



Statement Format

- Condition
  - A single phrase or sentence that briefly describes the key circumstances, situations, etc., that have caused concern, doubt, anxiety or uncertainty
- Consequence
  - A single phrase or sentence that describes the key negative outcome(s) that might result

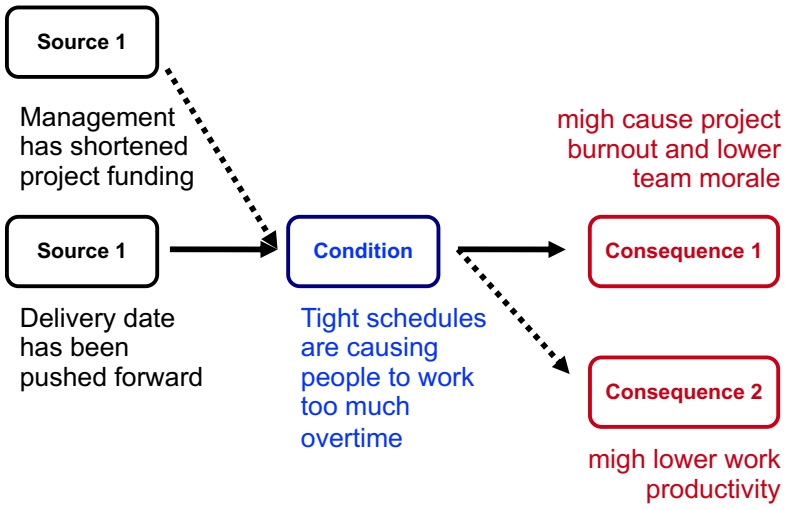
"Tight schedules are causing people to work too much overtime; might cause project burnout and lower team morale"

How Does a Good Statement Look Like?

- A good risk statement is:
  - Short and clear (~30 words).
  - Understood by project members
  - Has a fact-based condition or source of concern (something that is true NOW)
  - Has a consequence that is clear and easy to follow
  - Actionable (you can act upon the information)
- Context should be captured separately

"Team members have never developed user interfaces in Java; might cause the GUI to take longer to develop than initially estimated"

Sources and Consequences

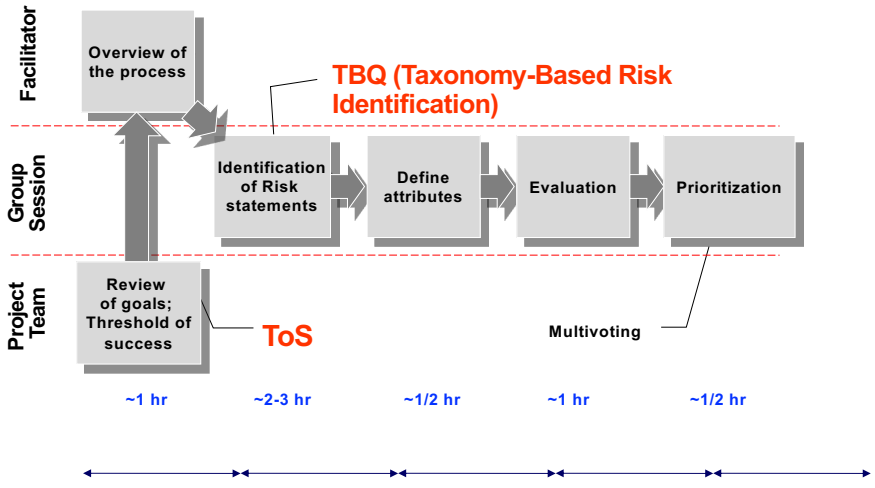


Some Structure

- Most people use free-form brainstorming as a way to identify risks
- Another way is to look at a collection of possible sources of risk and determine if they apply to your project
- The Software Engineering Institute has developed a Taxonomy of Software Development as a basis for Risk Identification

Taxonomy-Based Risk Identification
Technical Report
CMU/SEI-93-TR-6
ESC-TR-93-183

STRA Process



Risk Attributes

- To better understand the risk by determining its expected impact, probability, and timeframe

- Impact
  - The loss or effect on the project Threshold of Success if the risk occurs
- Probability
  - The likelihood that the risk will occur having this impact
- Timeframe
  - The time from identification to when one is required to deal with this risk

Attribute Levels

- Set by the project team itself based on their specific conditions
- Include typically three levels:
  - Impact (Catastrophic, Critical, Marginal)
  - Probability (High, Medium, Low)
  - Timeframe (Long, Medium, Short)

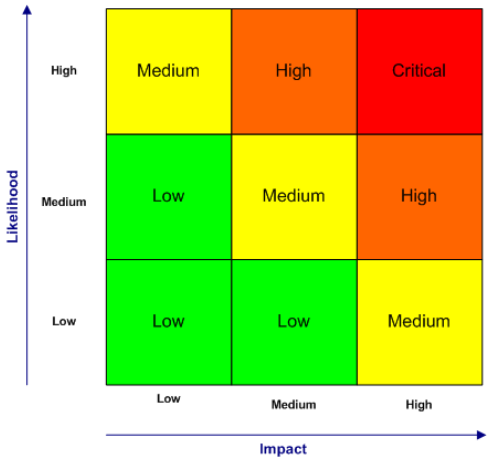
Levels Should Be Defined

- Impact
  - Catastrophic (can not reach ToS)
  - Critical (can reach ToS, but with great effort/cost)
  - Marginal (can reach ToS without great difficulty)
- Probability
  - High or likely (>70%)
  - Medium (between 40% and 70%)
  - Low or unlikely (<40%)
- Timeframe
  - Long (>3 months)
  - Medium (between 1 and 3 months)
  - Short (a few weeks)

Another Example

- Probability
  - High: Likely to occur at least once a year during the project
  - Medium: Likely to occurs at least once during the project
  - Low: not likely to occur during the project
- Impact
  - High: budget will not be fully executed, and negotiation procedure must be started; Scope will not be met; quality will not be achieved having deliverables rejected
  - Medium: budget must be rearranged within allowed amounts; scope will be met by reallocating resources; quality, deliverables approved after additional effort;
  - Low: no significant deviations on budget and no significant impact on scope and no impact on quality of deliverables

Risk Exposure Matrix



Prioritizing

- Multiple approaches exist

- Pareto Top-N
  - Risk exposure (impact x probability) cut-off level
- Comparison risk ranking
  - pair-wise comparison of statements
- Multi-voting
  - For dealing with a large number of statements

Multi-voting

1. Review risk statements for understanding
2. Select prioritization criteria
3. Select number of votes
   - Typically, 1/3 of the number of risk statements
4. Conduct voting individually
   - Team members can distribute their votes asymmetrically
5. Rank Items
6. Review ranking by participants
7. If the votes are split with no agreed consensus, discuss voting discrepancies and repeat steps 4-6

Multi-voting

Id	Risks	Carl	Anne	Mike	Sue	Total
1	The developer does not have enough experience in system acquistion; might take her too long to understand requirements.	3	1	3	1	**8**
2	The free version of the PowerSim has variable limitations; might be necessary to use the commercial license in the product.					
3	POWERSim is a Swedish company and we do not know how good the support is in the US; might not have access to specific knowledge when it will be most needed.					
5	We don't have a maintenance plan on the long term; might not be able to release product control to the maintenance team.		1			
7	The developer has not given specific milestones for the project; might not be possible to assess if the project is falling behind schedule.					
8	The inicial design of some of the models was not done correctly; might be necessary to reimplement them if used on production.	1	2	1	3	**7**
9	The design is difficult to test without domain knowledge; we might have to spend our time to help the test team analyse the results.	2	3	3	1	**9**
10	The developer is coming from a different culture (Turkish); might not be able to capture the right requirments due to communication problems.	3	2	2	3	**10**
(…)	(…)	(…)	(…)	(…)	(…)	(…)

- 27 risk statements
- 27/3 = 9 votes per team member

Multi-voting Discrepancies

- Discrepancies occur when multiple people vote differently:
  - Some people do not vote at all on some risks while others ranked them high
- Sometimes this is an indication that some team members know/are aware of something that others are not
  - Due to experience, lack of communication, etc.
- The discussion in reviewing the ranking with the participants can shed some light on why the items were ranked a specific way
  - This discussion is fundamental and should be promoted by the facilitator before the following round

Ranking of Risks

- The result is a ranked list of risks that can be used to define the Top-N Risk List
  - The team should PLAN for the Top-N risks, defining mitigation plans and timeframes – there are specific techniques for those
  - Throughout the project the list should be kept up-to-date and be periodically reviewed

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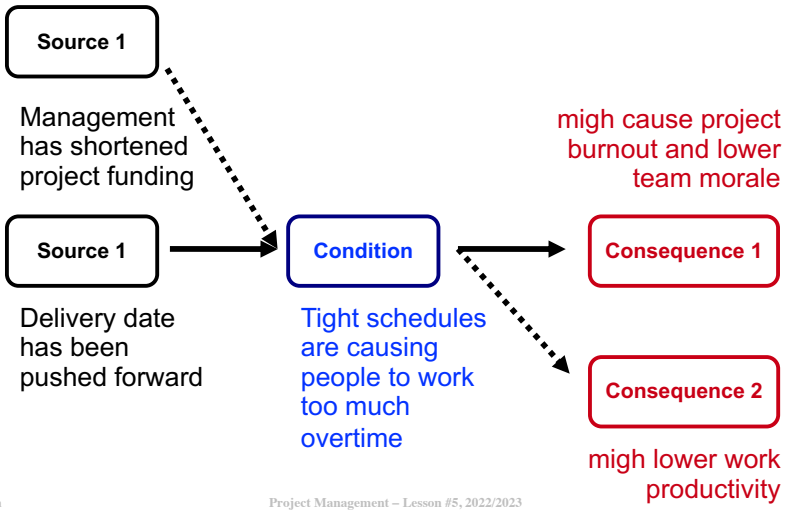
(…)	(…)	(…)	(…)	(…)	(…)	(…)

Risk Mitigation

- Risk avoidance
  - Involves an alternative strategy that has a higher probability of success but usually at a higher cost
- Risk sharing
  - Involves partnering with others to share responsibility for the risky activities
- Risk reduction
  - An investment of funds to reduce the risk on a project
    - e.g., .in international projects, companies often purchase the guarantee of a currency rate to reduce the risk of fluctuations in the currency exchange rate
- Risk transfer
  - Method that shifts the risk from the project to another party
    - e.g., purchase of insurance on certain items is a risk-transfer method

Mitigation Plans

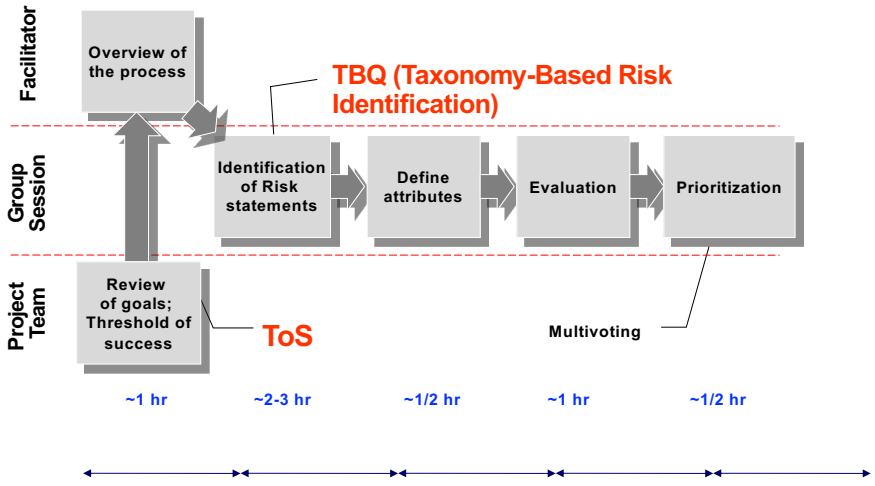
- Designed to eliminate or minimize the impact of risk



Mitigation Actions?

- "Tight schedules are causing people to work too much overtime; might cause project burnout and lower team morale"
- "Team members have never developed user interfaces in Java; might cause the GUI to take longer to develop than initially estimated"
- "Team members are from different university programs and are taking very diverse courses; might impact task allocation and lead to delays"

STRA Process



VIDEO #1

- https://www.youtube.com/watch?v=BKorP55Aqvg&t=94s

Take-Away(s)

- Small Team Risk Assessment
- Threshold of Success (ToS)
- Risk Statements
  - Condition and Consequence
- Risk Attributes
  - Likelihood, Impact, and Timeframe
- Exposure Matrix and Prioritizing Risks
- Risk Mitigation
  - Avoidance, Sharing, Reduction, and Transfer

Next Lesson(s)

- Project planning
- Planning and tracking techniques
  - WBS
  - PERT
  - Gantt charts
- Tracking and oversight techniques
  - Earned Value Management
  - Burndown Charts

Q&A

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