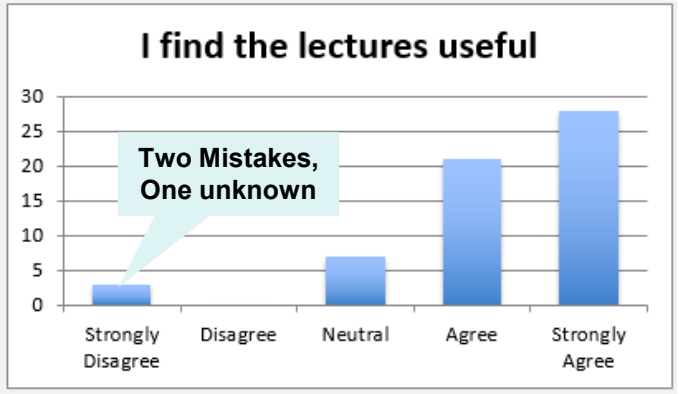
Info6007
Project Management in IT

Lecture 7 – Risk

Dr Steven Sommer

Student Feedback



- Very positive feedback:
  - Best thing about unit: Lecturer ☺, group work, content (useful, interesting, …) interactive, exercises, combined lecture/tute, Room
  - Suggested improvements:
    - None! (100%)
  - Any comments
    - Exercises Rushed (1) - True
    - Too much (1) – Sorry ☺

Resources

- Required Readings
  - Schwalbe 2013: Chapter 11.
- Practice Questions
  - Schwalbe 2013, Chapter 11, Exercises 1 & 4.
- References
  - Schwalbe, K. 2013, Information Technology Project Management (7e) Cengage Learning
  - Goodwin and Wright 2010, Decision Analysis for Management Judgement, Fourth Edition

Lecture Objectives

- Identify and classify different types of risk
- Analyse, assess, report, and display risks and their impact
- Develop and classify different risk responses
- Create and evaluate a risk register
- Estimate probabilities of events and determine the expected value of their impact.

Agenda

- Risk
- Risk Management
  - Risk Management Planning
  - Identifying Risks
  - Analysing and Assessing Risks
  - Responding to Risks
  - Monitoring and Controlling Risks

Risk

- **Negative Risk**
  - A dictionary definition of risk is "the possibility of loss or injury"
- **Positive Risk**
  - Positive risks are risks that result in good things happening; sometimes called opportunities
- The goal of project risk management is to minimize potential negative risks while maximizing potential positive risks
  - Negative risk management involves understanding and reducing potential problems that might occur in the project
  - Negative risk management is like a form of insurance; it is an investment

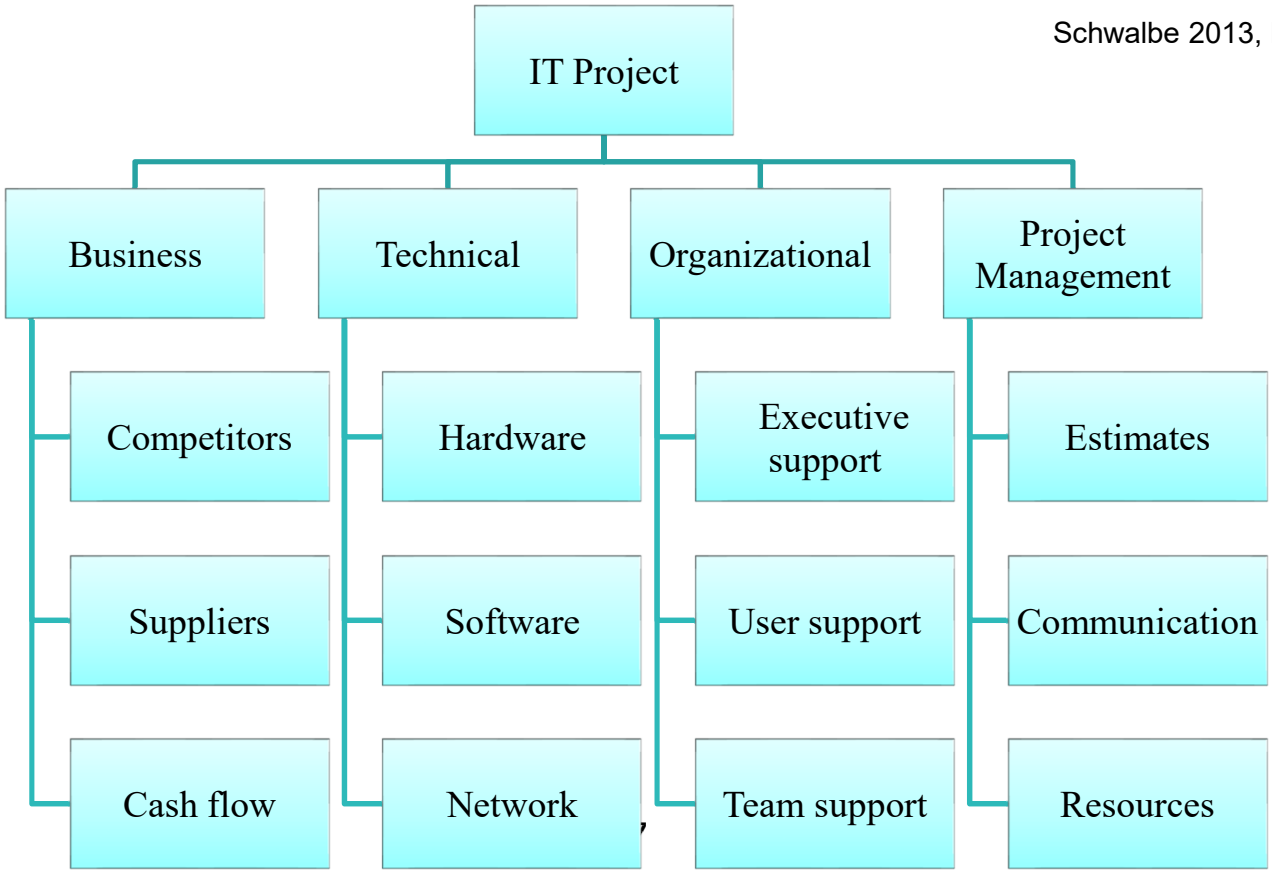
Quiz

- Types of Risk
  - What can go wrong

Risk Breakdown Structure

- A **risk breakdown structure** is a hierarchy of potential risk categories for a project.
- Similar to a work breakdown structure but used to identify and categorize risks.

Schwalbe 2013, Fig 11-3



External and Internal Events/Risks

Internal Events

- Milestone and schedule dates
- Deliverables and work processes
- Performance requirements
- Technology aspects – Hardware, software etc.
- Financial
- People

Internal events are not risks.

They are within the control of the project, and should be addressed through project management techniques.

External Events

- Regulatory issues
- Environmental issues
- Competitive factors

External events are risks: they cannot be controlled by the project. These can then be evaluated, categorised and planned for

"team members may not have the necessary skills" is (generally) NOT a risk: usually the PM can select people with the right skills, or obtain training, or assign tasks appropriately

Agenda – Risk Management

- **Risk Management Planning:** deciding how to approach and plan the risk management activities for the project
- **Identify Risks:** determining which risks are likely to affect a project and documenting their characteristics
- **Analyse and Assess Risks**
  - **Qualitative risk analysis:** characterizing and analyzing risks and prioritizing their effects on project objectives
  - **Quantitative risk analysis:** measuring the probability and consequences of risks
- **Risk Responses:** taking steps to reduce a threats likelihood and/or impact on meeting project objectives
- **Monitoring and Control Risks:** monitoring known risks, identifying new risks, reducing risks, and evaluating the effectiveness of risk reduction

Risk Management Planning

- The main output of risk management planning is a **risk management plan**—a plan that documents the procedures for managing risk throughout a project.
- The level of detail will vary with the needs of the project.
- Topics Addressed in a Risk Management Plan:
  - Methodology
  - Roles and responsibilities
  - Budget and schedule
  - Risk categories
  - Risk probability and impact scoring and assessment
  - Tracking Processes
  - Risk documentation

Risk Identification & Risk Register

- Risk Identification entails gathering all known events which could adversely affect the success of the project.
- These are captured in a **risk register**. It may contain:
  - The name of each risk event.
  - Rank or Importance
  - Description.
  - Category under which it falls.
  - Root cause
  - Triggers – what will make it happen
  - Potential responses.
  - The risk owner
  - **The probability of it occurring**
  - **Impact** (eg., on Cost, Schedule, Scope, and Quality)
  - The status of each risk.

Schwalbe 2013, Tab 11-5

No.	Rank	Risk	Description	Category	Root Cause	Triggers	Potential Responses	Risk Owner	Probability	Impact	Status
R44	1										
R21	2										
R7	3										

Exercise 1

- In groups: create a risk register for your exam and preparation
  - Name
  - Description
  - Probability (High, Medium, Low)
  - Impact (High, Medium, Low)
- 10 minutes

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    - Quantitative risk analysis
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Analyse and Assess Risk

- A qualitative risk analysis involves characterising and analysing each risk in order to determine its importance and relative priority.
  - The analysis is based on the likelihood of the risk occurring, and its impact on achieving the project objectives.
- Two Common techniques/tools
  - Top 10 Risk Tracking Technique
  - Probability / Impact Matrix

Top 10 Risk Item Tracking

- Top 10 Risk Item Tracking is a tool for maintaining an awareness of risk throughout the life of a project
- Establish a periodic review of the top 10 project risk items
- List the current ranking, previous ranking, number of times the risk appears on the list over a period of time, and a summary of progress made in resolving the risk item

Top 10 Risk Item Tracking

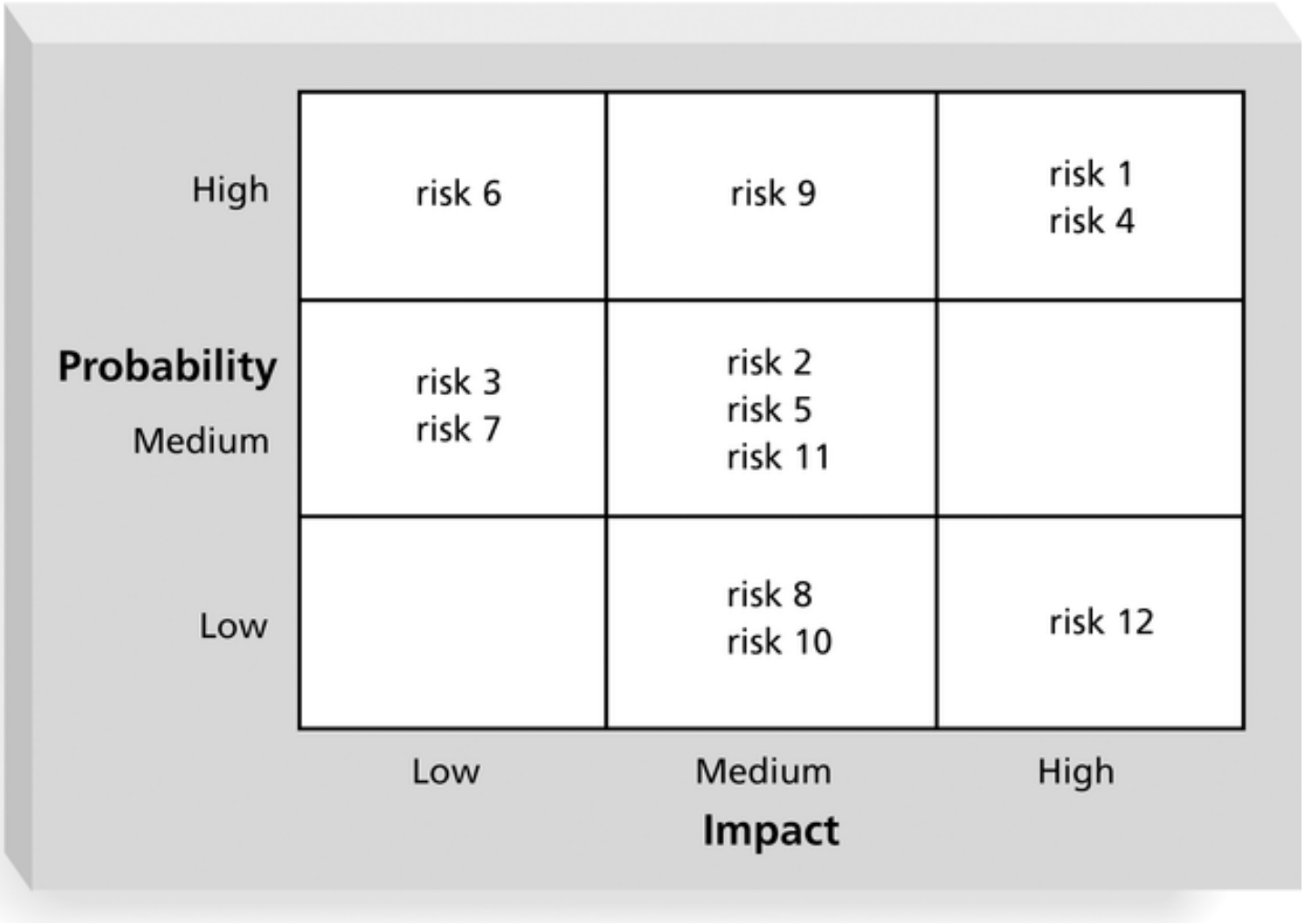
	Monthly Ranking			
Risk Item	**This Month**	**Last Month**	**# of Months**	**Risk Resolution Progress**
Chief Architect has given notice. Both time and budget impact	1	-	0	Advertising for new role Building contingency project plan
Microsoft has announced Windows go-live date delay again	2	-	0	Monitor. Another change will result in late delivery of entire system.
Rapid decline in AUD v Indian Rupee causing cost blowout in off-shore dev.	3	2	1	Used 15% contingency (5% remaining). India not interested in AUD contracts, now investigating hedging options.
Module “Green Jelly” is running late. Now on critical path	4	3	2	Team lead investigating root cause and providing assistance to speed remainder
Delays have resulted in project now having 4 critical paths	5	4	2	Applying to steering committee for 2 weeks of contractor resources to fast track Tasks 192 and 196

Probability/Impact Matrix

- A **probability/impact matrix** chart shows the relative probability of a risk occurring on one dimension and the relative impact of the risk occurring on the other.
  - Basic (Qualitative) Approach: evaluate each risks as high, medium, or low in terms of its probability of occurrence and on its impact if it did occur
  - Better (Quantitative) Approach: use numbers that represent the overall risk of specific events based on their probability of occurring and the consequences to the project if they do occur (see next section)

Basic Probability/Impact Matrix

Schwalbe 2013, Fig 11-5



Expert Judgment

Many organizations rely on the intuitive feelings and past experience of experts to help identify potential project risks

Experts might categorise risks as high, medium, or low with or without more sophisticated techniques

Exercise 2

- In groups:
  - Extend your risks from Exercise 1 to include those mentioned by other teams
  - Graph the risks on a Probability/Impact Matrix
- Time: 10 mins

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Quantitative Analysis

- **Quantitative Analysis**: uses mathematical probability analysis or modelling to combine or more accurately model the probability and consequences of risks.
- Often follows qualitative risk analysis, but both can be done together.

Eliciting Probabilities

- Often probabilities need to be "estimated".
- On a scale of 0.0 to 1.0 assign probabilities to events that are described as "Low" and "Medium"
  - Do this individually

Verbal expressions of probability

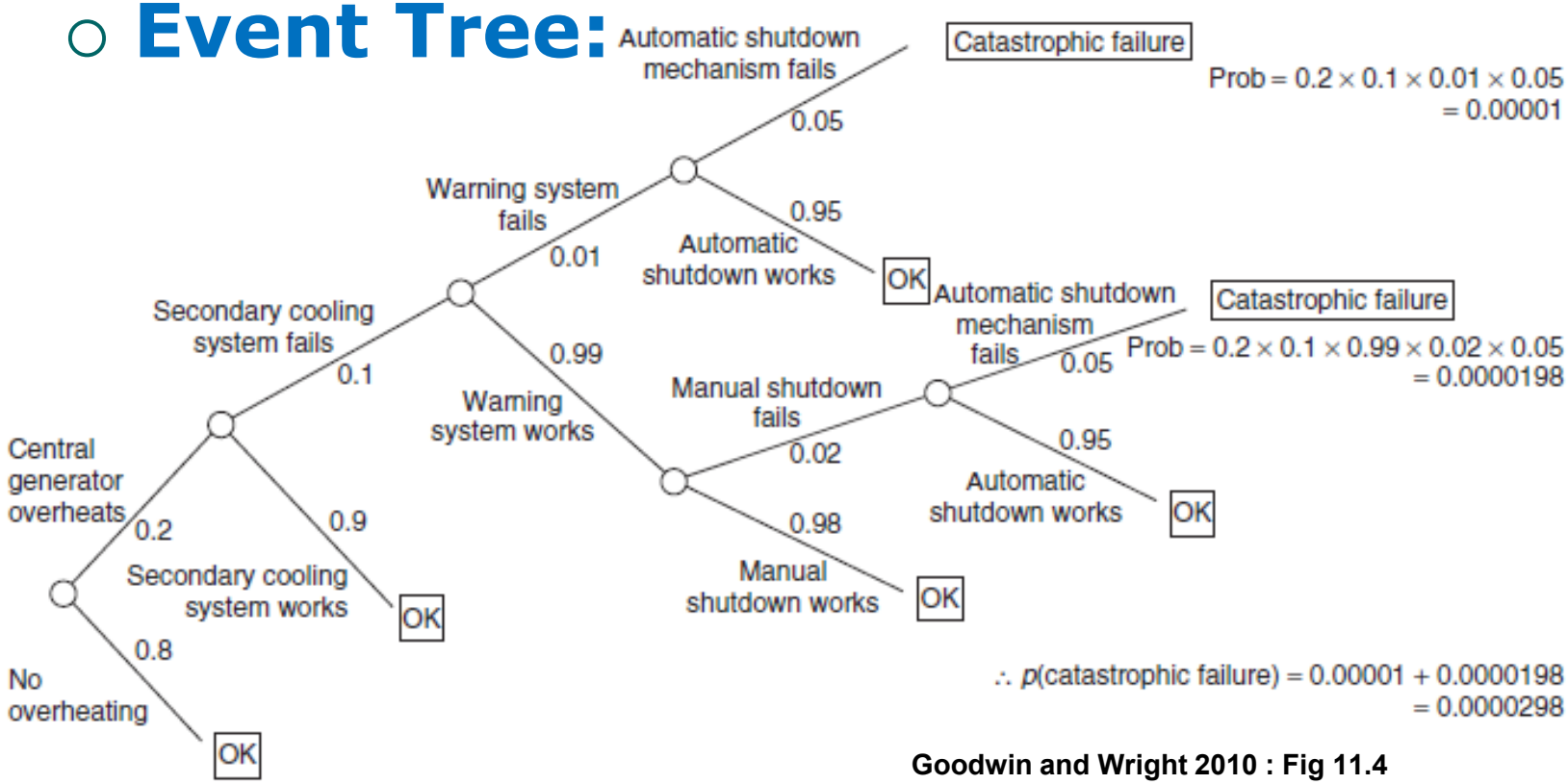
- People attach different meaning to phrases such as ‘unlikely’, ‘probable’ & ‘expected’.
- Interpretation of probability is influenced by
  - (a) Context;
    - “This winter you are likely to develop a cold”
    - “This winter you are likely to develop a lung infection”
  - (b) whether it is about a positive or negative event; and
    - “Small chance of you repeating this unit next year”
    - “Small chance of you being a parent of a highly talented child”
  - (c) whether it is about you or someone else.
    - “small chance of Linda repeating this unit next year”
- Obviously numerical estimations are less ambiguous.

Evaluating Estimates

- Consistency and coherence checks
  - How consistent are probabilities elicited using different methods?
  - Do the elicited probabilities of the event occurring and not occurring sum to 1?
  - Do estimated probabilities for a set of mutually exclusive and exhaustive events sum to 1?

Estimating Low Probability Events

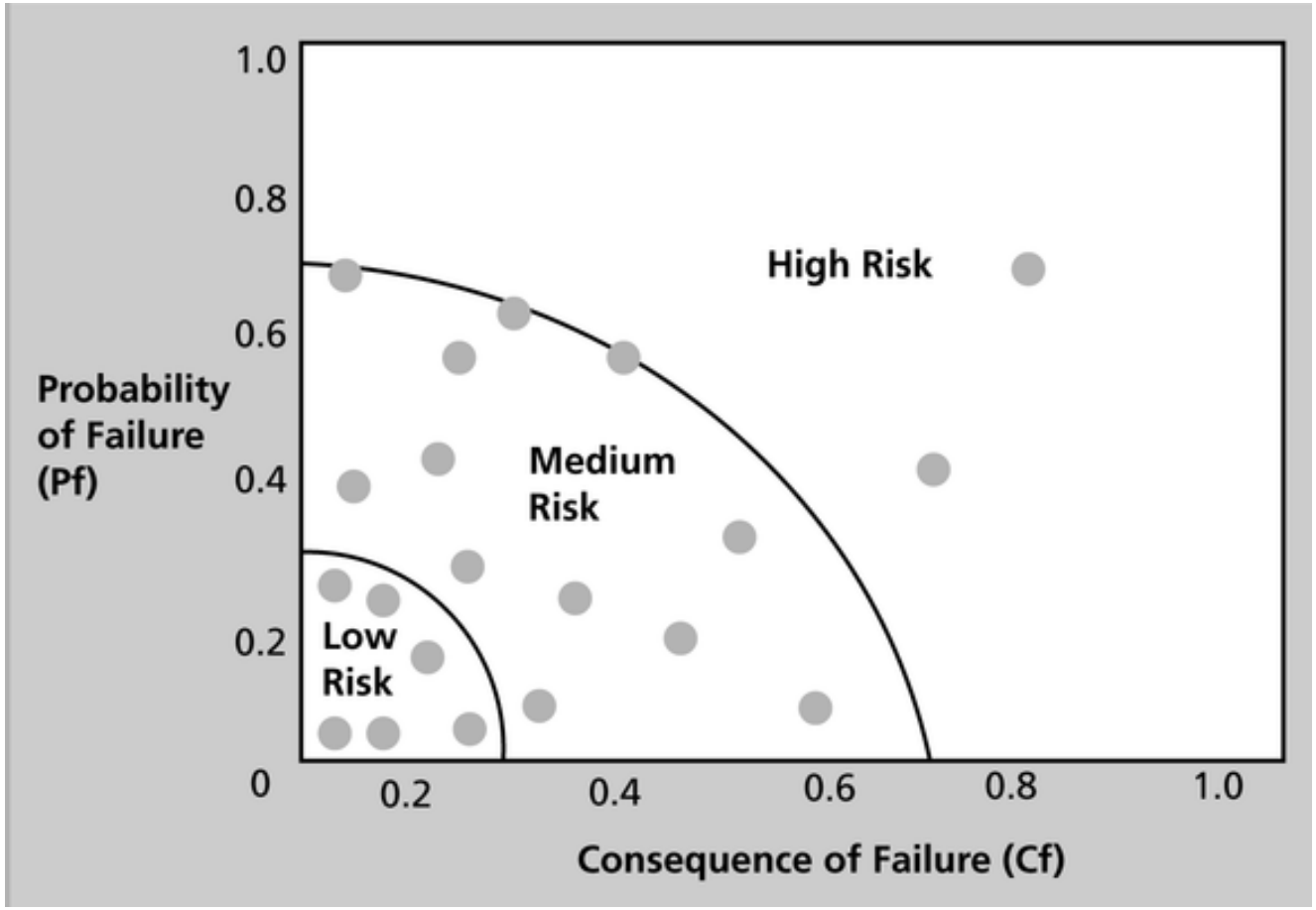
- It is hard to estimate low probabilities accurately
- **Event Tree:**



Goodwin and Wright 2010 : Fig 11.4

Better Probability/Impact Matrix

Schwalbe 2013, Fig 11-6



- Consequence of failure should tie directly into Scope, Time, and/or costs impacts.

Exercise 3

- In groups,
  - Update your probabilities to be more real.
  - Decide on a defined scale for the consequences of failure and convert your ratings to numbers
  - Plot the risks in the new form
- Time: 15 mins

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Using the analysis

- Based on the quantitative analysis the following tools can be used to choose appropriate actions
  - **Expected Monetary Value** – for combining the impact and probability to a dollar amount
  - **Decision Trees** - for choosing the right course of action
  - Simulation
  - Sensitivity analysis

Expected Monetary Value (EMV)

- Expected Monetary Value (EMV) = Event Probability X Monetary Value if that event occurs
- So if there is a 20% chance of losing $1m, then the Expected Monetary value of that risk is -$200,000

Exercise (EMV)

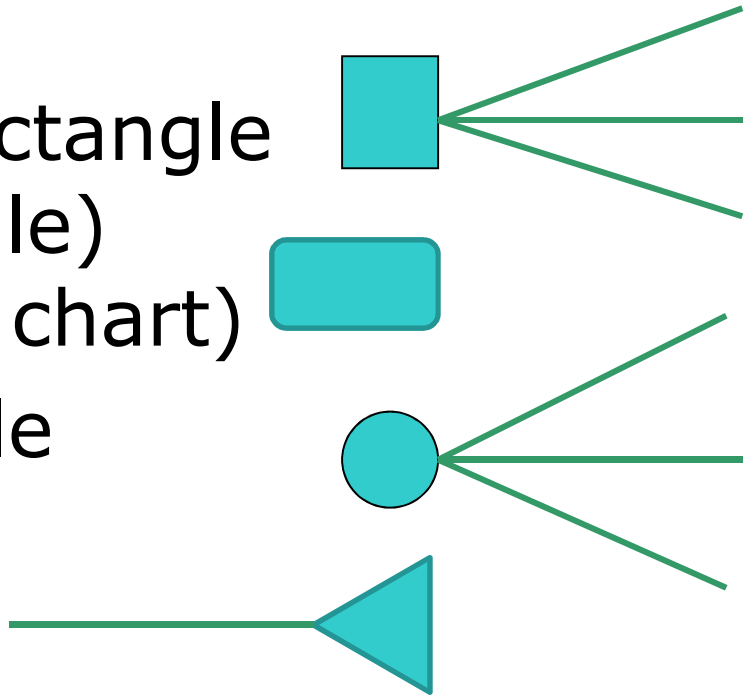
- Choosing between to options by comparing EMVs:
- A cake shop owner is deciding whether to make 1 or 2 deluxe cakes. The daily demand is 1 with 30% chance, and 2 with 70% chance. Cakes are discarded if not used. The following table describes the payoffs. What should she do?

(Daily profits)	Cake Demand	
	1	2
Probability	0.3	0.7
Course of action		
Produce 1 cake	$200	$200
Produce 2 cakes	–$600	$400

Goodwin and Wright 2010 : Table 6-2

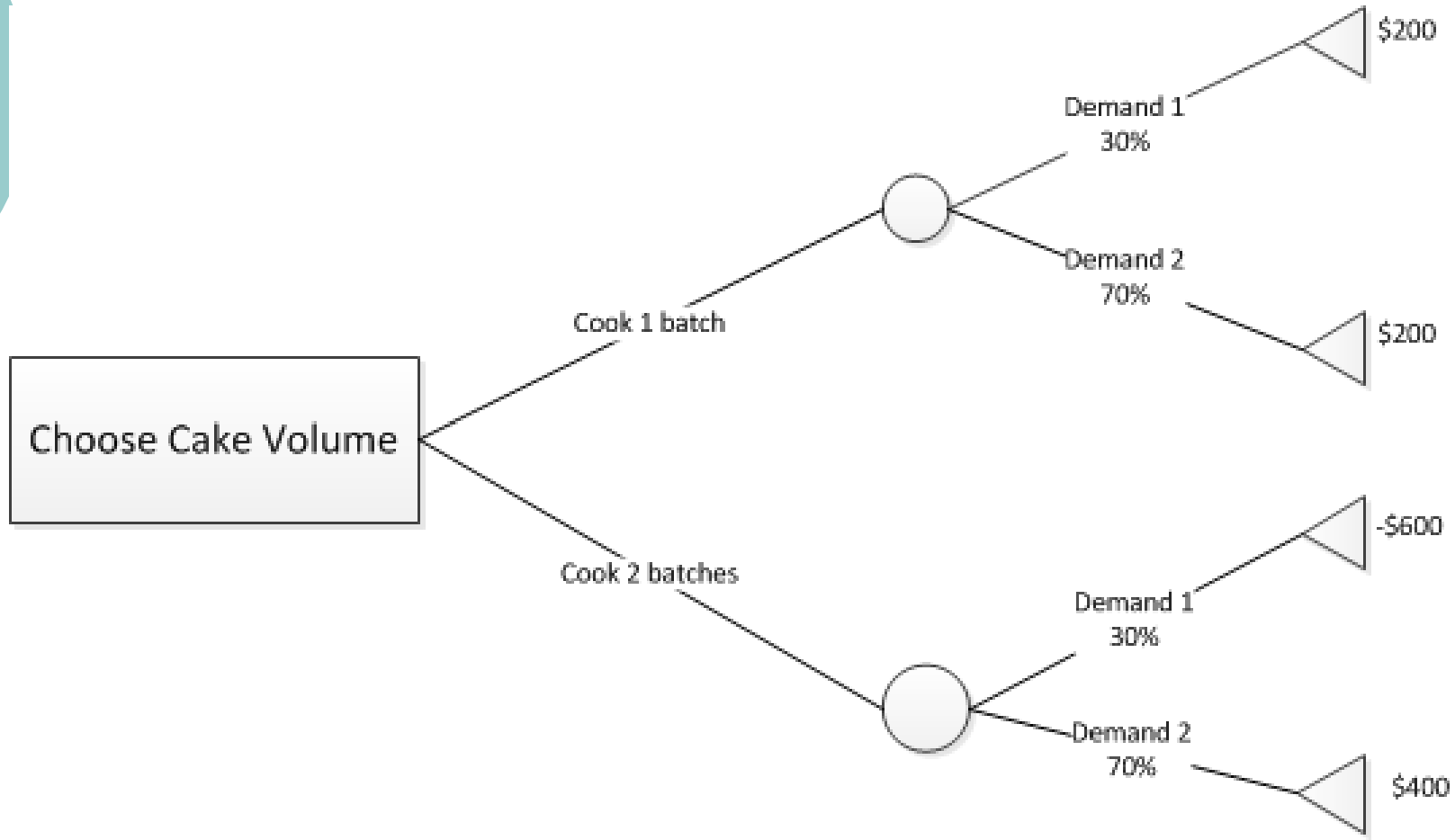
Symbols used on decision trees

- **Decision node**: Rectangle (or rounded rectangle) (or diamond in flow chart)
- **Chance node**: Circle
- **End node**: Triangle (or nothing)

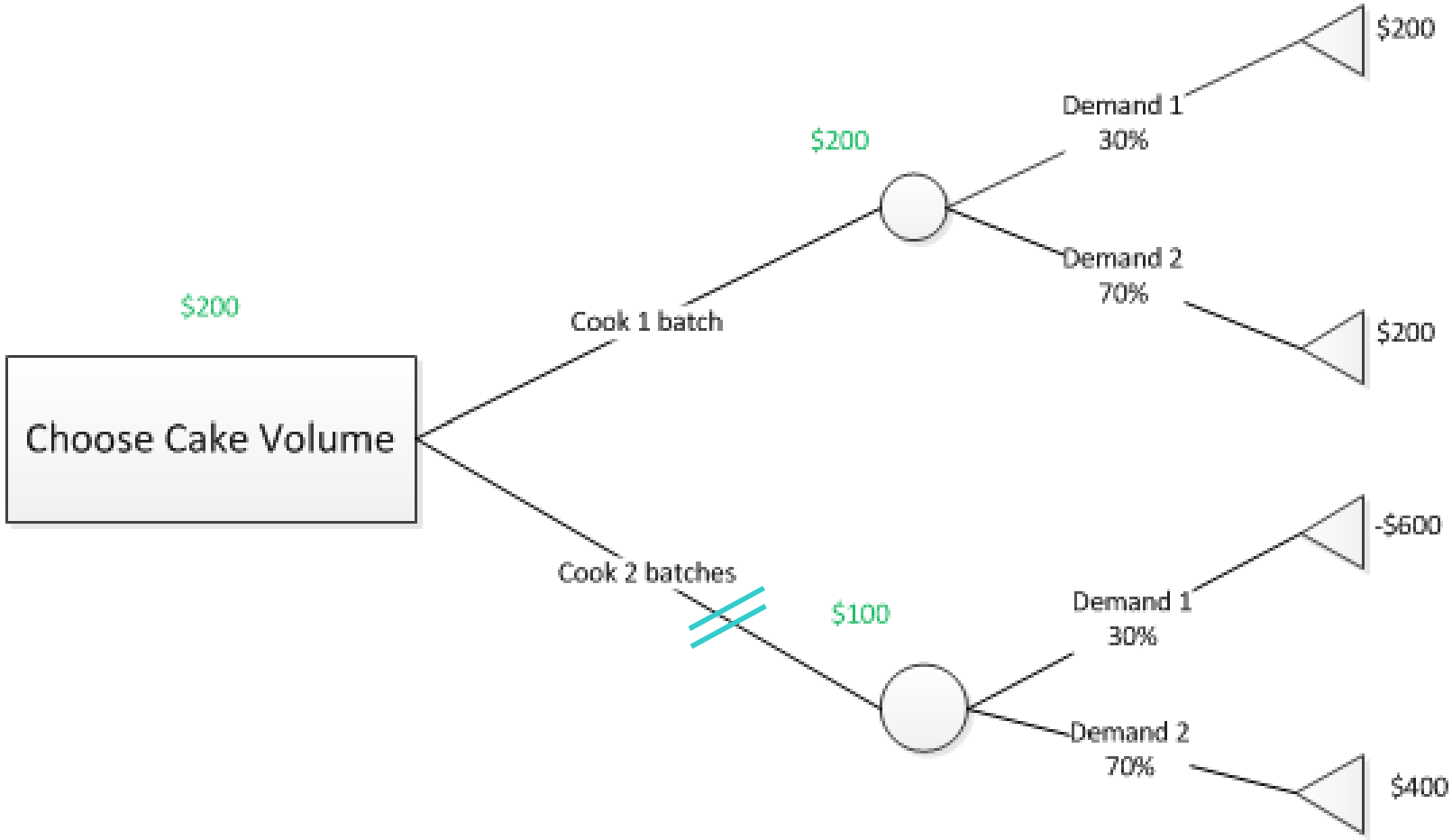


- If there are only chance nodes, it can be called a probability tree (and also a type of event tree)

Cake as a decision tree



Solve from right to left



Exercise

- SIT industries is running a project to build a new type of robot. We only have enough resources to create an electric powered one, or a gas powered one, but not both. We could also choose to make neither.
  - The electric one has 75% chance of being successful and making us $10m. If it fails we lose $3m
  - The gas one has a 60% chance of being successful and making us $15m. If it fails we lose $7m
- Draw an initial decision tree representing this.
- Solve the tree

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Planning Risk Responses

- After identifying and quantifying risks, you must decide how to respond to them
  - **Avoidance**: eliminating a specific threat or risk, usually by eliminating its causes
  - **Mitigation**: Implies that an identifiable action(s) can be taken to reduce the negative outcomes of a risk – by reducing its impact, or reducing it likelihood
  - **Transfer**: shifting the consequence of a risk and responsibility for its management to a third party
  - **Accept**: accepting the consequences should a risk occur

Risk Mitigation Plan							
Risk	Type of Risk	Likelihood	Impact Level	Response	Response Type	Person Response.	Target Resolution date

Mitigation Response Types

- Avoidance
- Mitigate
- Transfer
- Acceptance

Exercise

- Classify the following risks:

Risk	Risk Response
Supplier cannot deliver	Find alternative supplier as backup
Building approval looks likely to be delayed for new offices	Move to temporary site
Immature Technology	Import specialist team member from overseas
Business division to be sold	None - Outside control of project
Fire destroys building	Insure building

Exercise Home Business

- You have started a home business in Sdyeney where you buy goods at garage sales and sell them on eBay. You spend 5-10 hours each week and net about $10,000 pa. You manage the business from your home computer
- In groups, complete the following security risk assessment for the 4 identified risks
  - Time: 10 mins
- Note: these are likely not useful risks to consider as part of your assignment!

Exercise Home Business

Risk	Likelihood	Worst Case Impact	Expected Loss	Suggested Response and Type
Virus and Worms				
Remote Hacking Attack				
Theft				
Fire, Earthquake, Hurricane, Flood and similar				

Residual and Secondary Risks

- **Residual risks** are risks that remain after all of the response strategies have been implemented.
- **Secondary risks** are a direct result of implementing a risk response.
  - For example, installing a sprinkler systems to protect against fire

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Monitor and Control Risks

- Risk monitoring and control:
  - Monitor known risks and identifying new risks
  - Controlling risks - executing the risk management plans
- Sometimes workarounds or unplanned responses to risk events are needed when there are no contingency plans
- The main outputs of risk monitoring and control are:
  - corrective actions,
  - project change requests,
  - updating the risk register
  - and updates to other plans

Sample Risk Roles

Risk Originator

- The Risk Originator initially identifies the risk and formally communicates the risk to the Project Manager. The Risk Originator is formally responsible for:
- The early identification of the risk within the project
- The formal documentation of the risk, through the completion of an Risk Form
- The submission of the Risk Form to the Project Manager for review

Project Manager

- The Project Manager receives, records and monitors the progress of all risks within a project. The Project Manager is formally responsible for:
- Receiving all Risk Forms and identifying which of the risks raised are appropriate to the project
- Recording all risks in the Risk Register
- Presenting all risks to the Project Review Group
- Reporting and communicating all decisions made by the Project Review Group
- Monitoring the progress of all risk mitigating actions assigned

Sample Risk Roles

Project Review Group

- The Project Review Group confirm the Risk 'likelihood' and 'impact' and assign risk mitigating actions where appropriate. The Project Review Group is formally responsible for:
- The regular review of all risks recorded in the Risk Register
- The identification of change requests required to mitigate risks raised
- The allocation of risk mitigating actions
- The closure of risks which have no outstanding actions and are no longer likely to impact the project

Project Team

- The Project Team undertake all risk mitigating actions delegated by the Project Review Group.

Results of Good Risk Management

- Unlike crisis management, good project risk management often goes unnoticed.
- Well-run projects appear to be almost effortless, but a lot of work goes into running a project well.

Summary

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