Master Software Technology
Software Project Management 2 – [06] Management Aspects: Risk Management

Agenda

Motivation
Terminology
Risk Management Process in Risk Management Standards
Project Risk Management in Project Management Standards
Common Pitfalls

Learning Objectives

You, the students, should …

✓Know the risk management process in risk management standards

✓Know project risk management according to project management standards

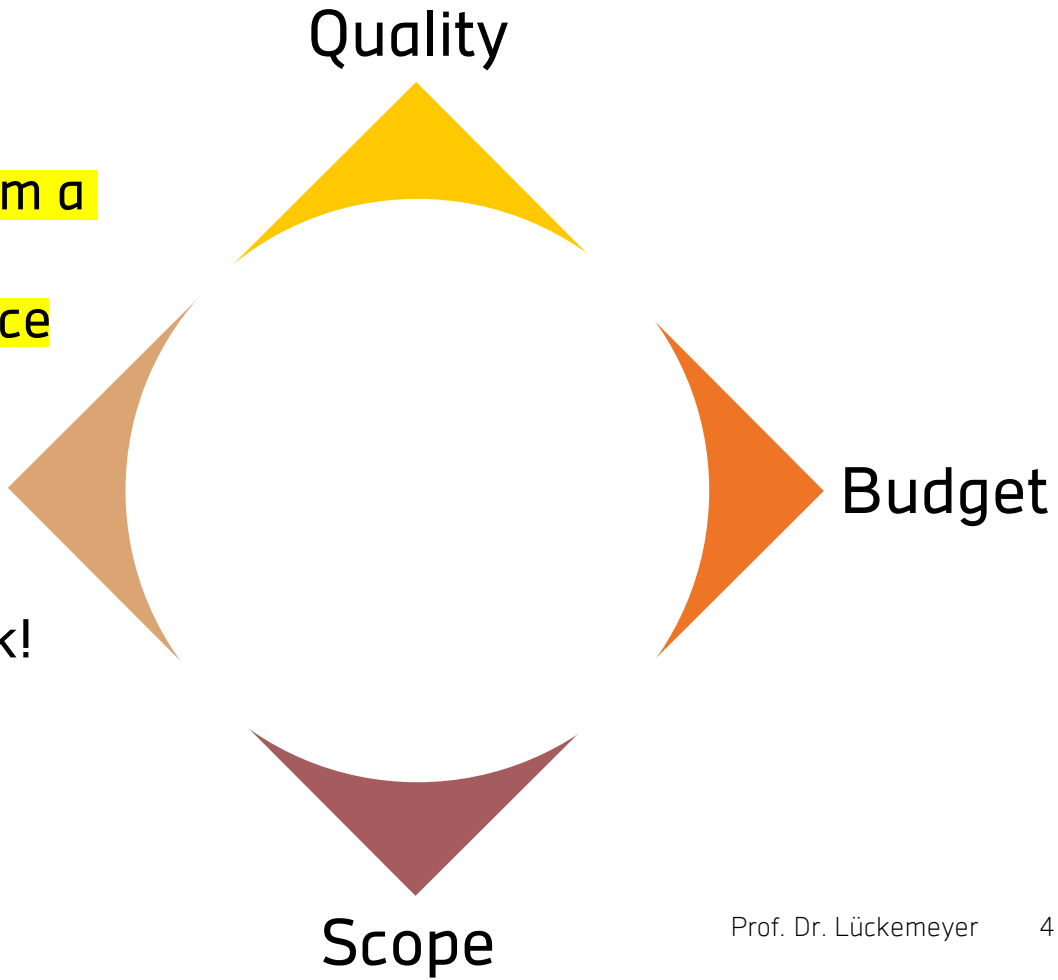
✓Be able to systematically identify risks in a project

✓Know the application of the risk management process to project risk management

Motivation

Risk
- Bears the potential to harm a Project on any dimension
- Materializes on short notice
  → little time to react

Without risk management, project success mostly is luck!



Terminology

Generally: consider possible states/changes of the environment

→ Possibly unknown probable environment states

Uncertainty

- General: neither probabilitites nor consequences known (unknown unknowns)
- Specific: consequences known, probabilities unknown (known unknowns)

Risk

- Probabilities and consequences known
- Def. ISO 31000: effect of uncertainty on the degree of achievement of objectives
- „… weighted pattern of possible events and their consequences“

Problem

Materialized risk

„Risk management is a systematic approach of thinking about corrective actions before problems arise “ [DeMarco, Bärentango, 03] … afterwards: crisis management!

Knowledge

Impact

Only source of new project plan items!

Changed project plan item duration/ effort

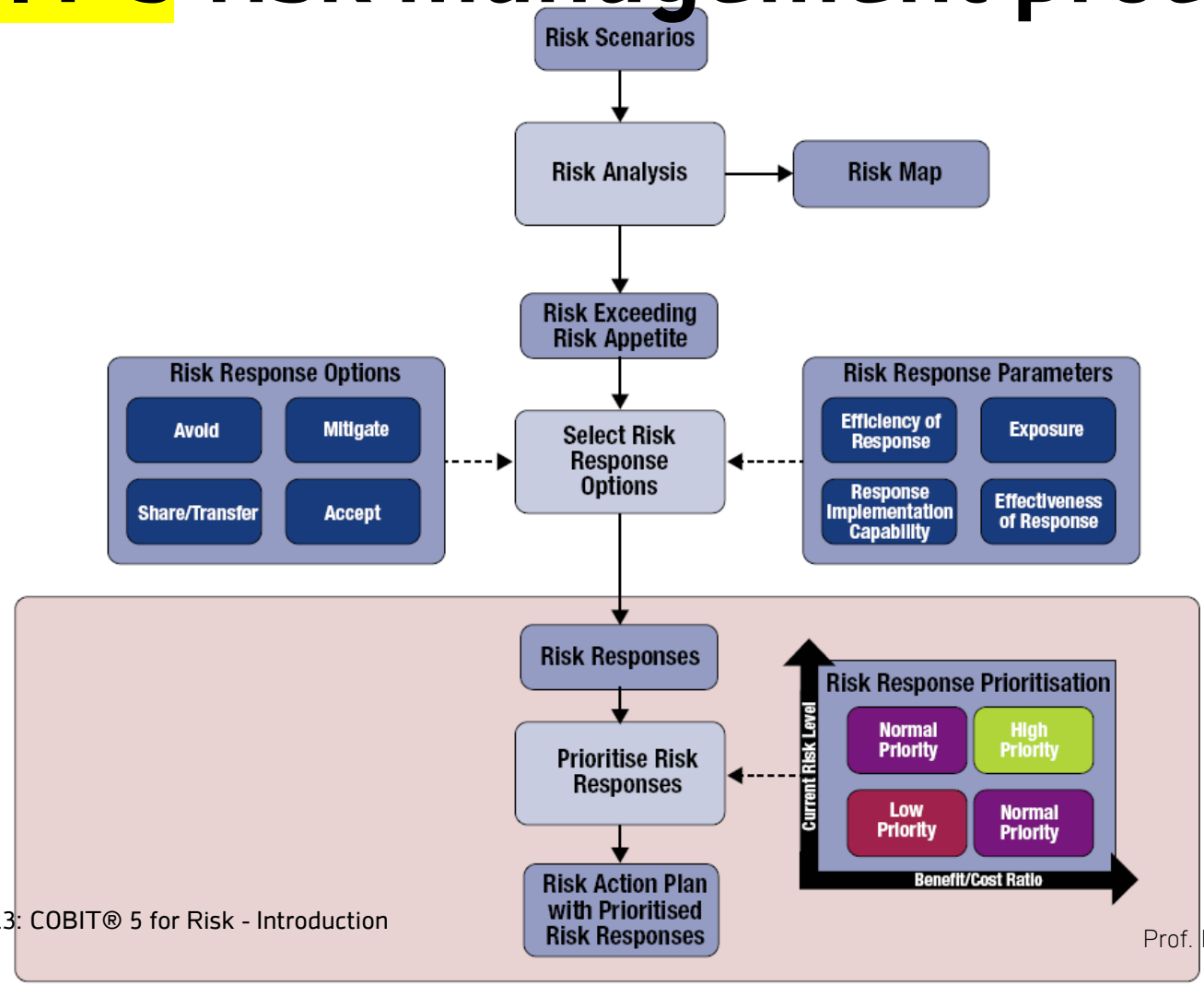
Risk management standards: COBIT 5 for Risk principles

Seven risk management principles

- Systematic, timely and structured management approach
- Contribute to achieving consistent, comparable, reliable results
- Formalise and standardise policy implementation, e.g. over multiple projects

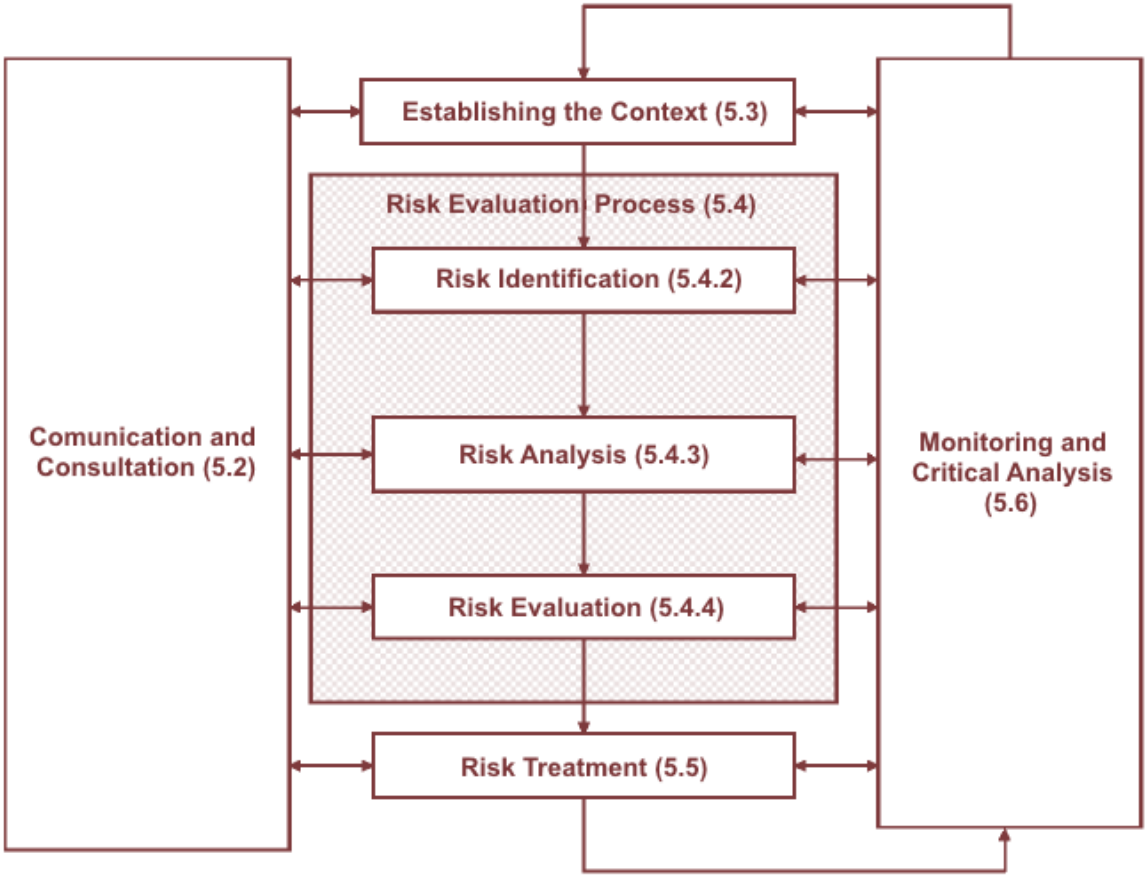
Source: ISACA 2013: COBIT® 5 for Risk - Introduction

COBIT 5 risk management process



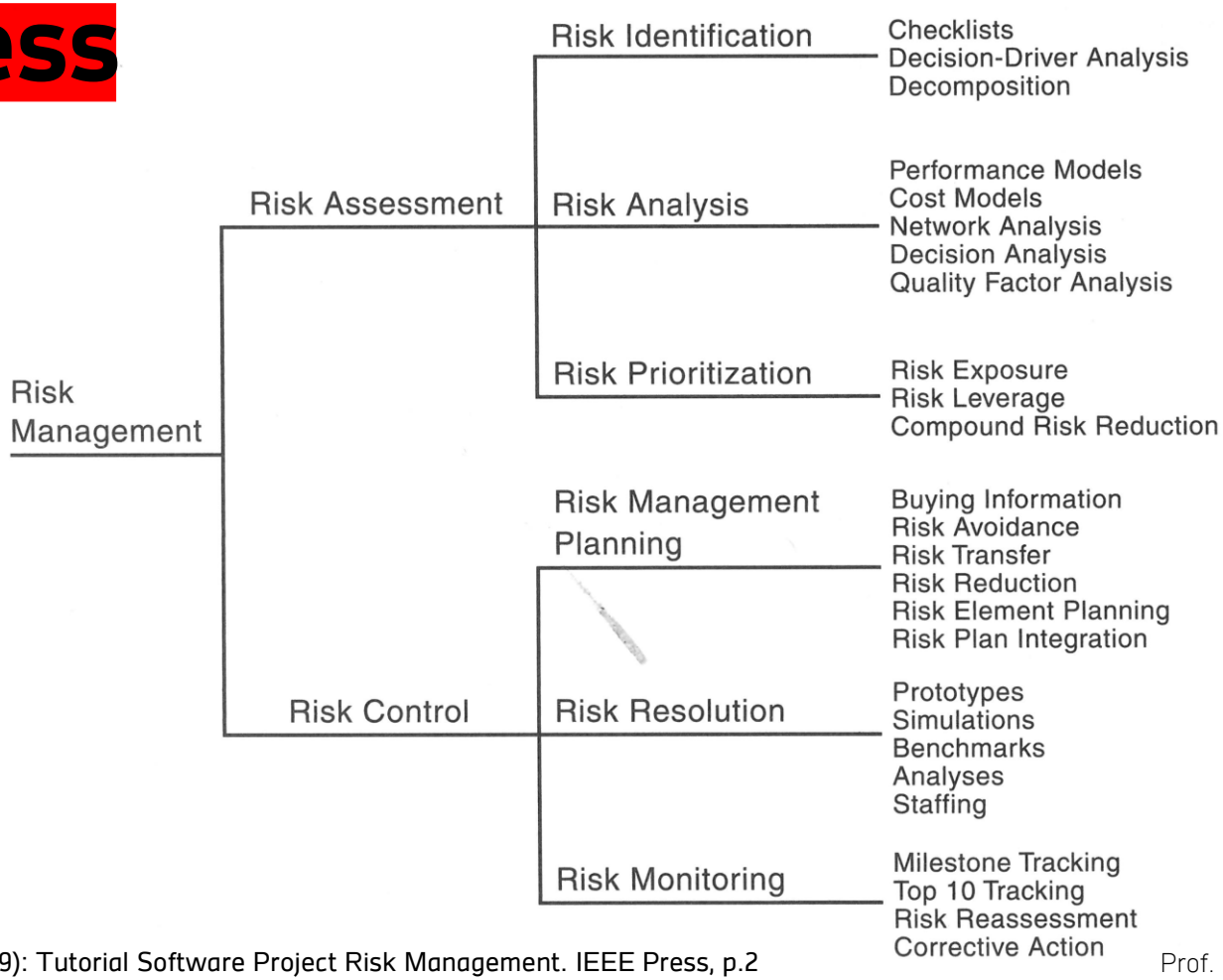
Source: ISACA 2013: COBIT® 5 for Risk - Introduction

Risk management standards: ISO 31000 risk management process



Source: ISO 31000

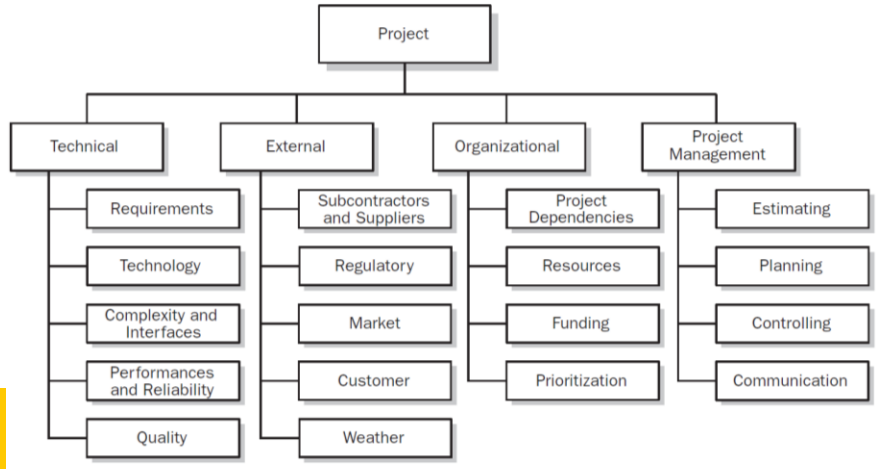
Software project risk management process



Source: Boehm (1989): Tutorial Software Project Risk Management. IEEE Press, p.2

Risk source categories

Project Management Area	General Categories
Mission & Goals	Internal
Organisation management	External
Customer	
Budget/Cost	People
Schedule	Process/Organisation
Content/Scope	Technology
Performance	Material
Project Management	Environment
Development Process	Legislation
Development Environment	Regulation
Staff	Market
Maintenance	



The Risk Breakdown Structure (RBS) lists the categories and sub-categories within which risks may arise for a typical project. Different RBSs will be appropriate for different types of projects and different types of organizations. One benefit of this approach is to remind participants in a risk identification exercise of the many sources from which project risk may arise.

Source: PMBOK Guide V4 (2008)

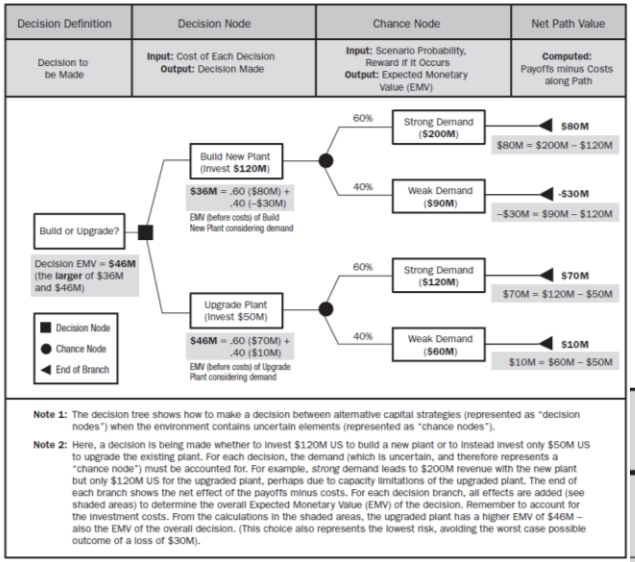
Risk gathering & analysis methods

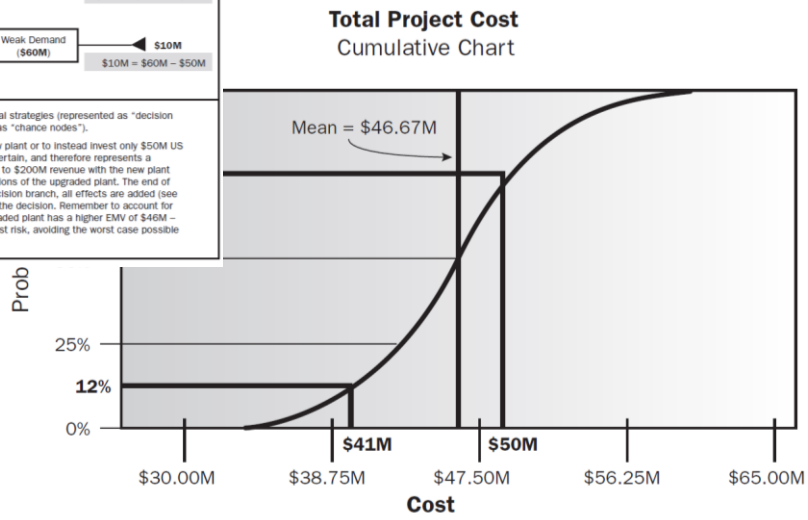
Risk identification

- Brainstorming
- Checklists
- Assumption analysis
- SWOT analysis
- Root cause analysis
- Interviews
- Delphi method

Risk evaluation

- Sensitivity analysis
- Probability analysis
- Utility theory
- Decision trees
- Simulation





This cumulative distribution, assuming the data ranges in Figure 11-13 and triangular distributions, shows that the project is only 12 percent likely to meet the $41 million estimate. If a conservative organization wants a 75% likelihood of success, a budget of $50 million (a contingency of nearly 22 % ($50M - $41M/$41M)) is required.

Goal: assess risk exposure (RE, criticality) as probability * consequences (loss)

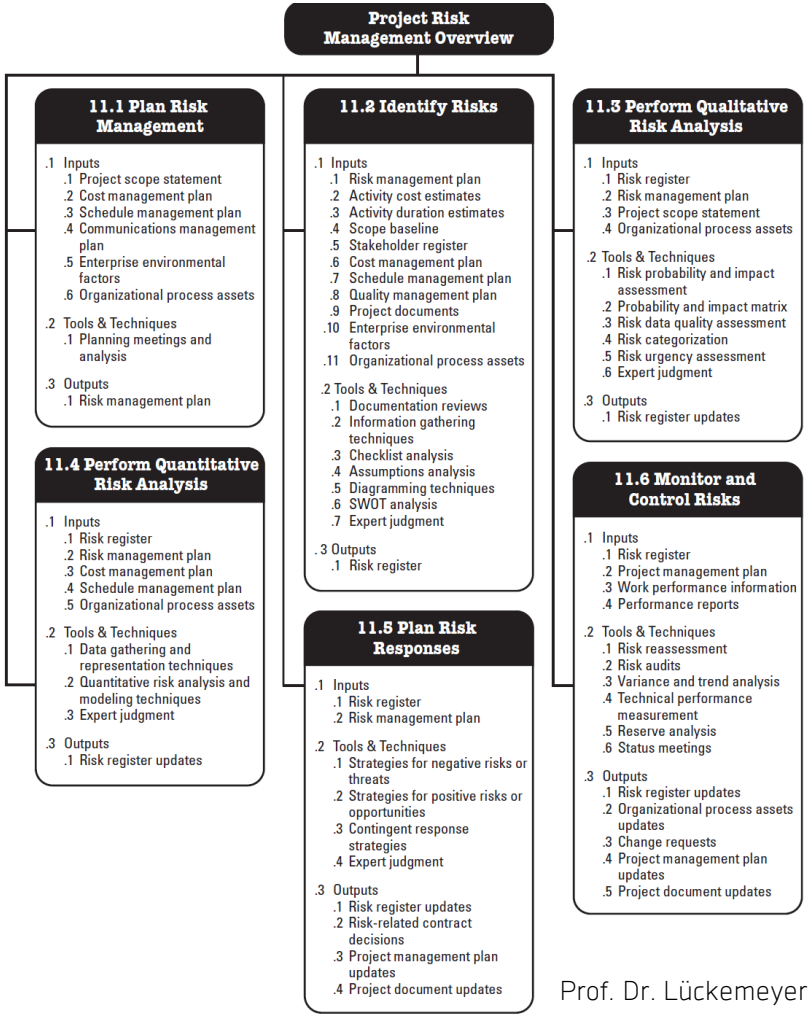
PMBOK: project risk management

Planning Processes

- Plan Risk Management
- Identify Risks
- Perform Qualitative Risk Analysis
- Perform Quantitative Risk Analysis
- Plan Risk Responses

Monitoring & Control Processes

- Monitor & Control Risks



PMBOK: risk management artifacts

Defined Conditions for Impact Scales of a Risk on Major Project Objectives
(Examples are shown for negative impacts only)

Project Objective	Relative or numerical scales are shown				
	Very low /.05	Low /.10	Moderate /.20	High /.40	Very high /.80
Cost	Insignificant cost increase	<10% cost increase	10-20% cost increase	20-40% cost increase	>40% cost increase
Time	Insignificant time increase	<5% time increase	5-10% time increase	10-20% time increase	>20% time increase
Scope	Scope decrease barely noticeable	Minor areas of scope affected	Major areas of scope affected	Scope reduction unacceptable to sponsor	Project end item is effectively useless
Quality	Quality degradation barely noticeable	Only very demanding applications are affected	Quality reduction requires sponsor approval	Quality reduction unacceptable to sponsor	Project end item is effectively useless

This table presents examples of risk impact definitions for four different project objectives. They should be tailored in the Risk Management Planning process to the individual project and to the organization's risk thresholds. Impact definitions can be developed for opportunities in a similar way.

Probability and Impact Matrix

Probability	Threats					Opportunities				
0.90	0.05	0.09	0.18	0.36	0.72	0.72	0.36	0.18	0.09	0.05
0.70	0.04	0.07	0.14	0.28	0.56	0.56	0.28	0.14	0.07	0.04
0.50	0.03	0.05	0.10	0.20	0.40	0.40	0.20	0.10	0.05	0.03
0.30	0.02	0.03	0.06	0.12	0.24	0.24	0.12	0.06	0.03	0.02
0.10	0.01	0.01	0.02	0.04	0.08	0.08	0.04	0.02	0.01	0.01
	0.05	0.10	0.20	0.40	0.80	0.80	0.40	0.20	0.10	0.05

Impact (numerical scale) on an objective (e.g., cost, time, scope or quality)

Each risk is rated on its probability of occurring and impact on an objective if it does occur. The organization's thresholds for low, moderate or high risks are shown in the matrix and determine whether the risk is scored as high, moderate or low for that objective.

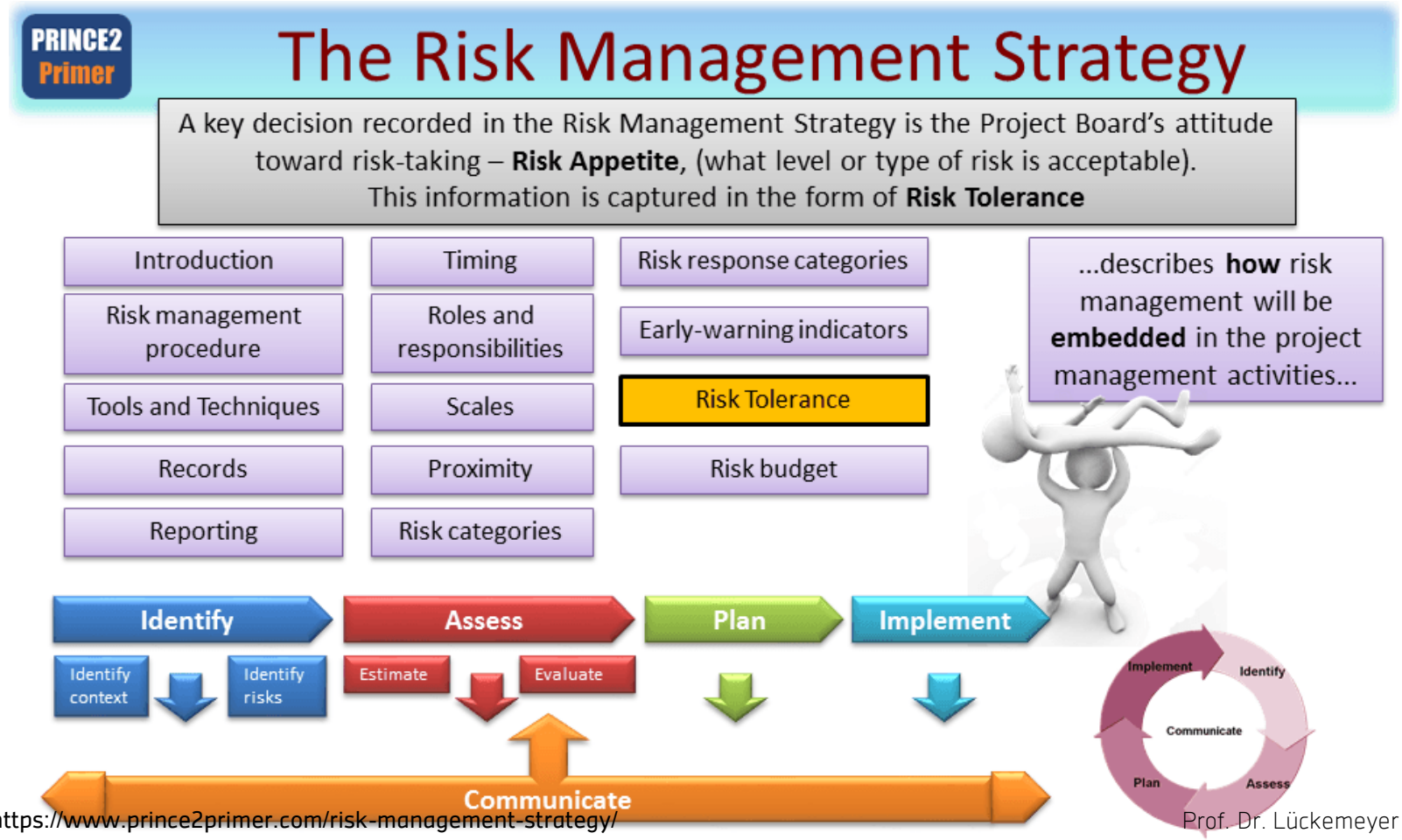
Risk register

- Risks as CAUSE, EVENT, [PROBABILITY,] EFFECT/IMPACT with potential responses
- Prioritized risk list
- Risk indicators
- Response strategies
- Residual & secondary risks
- Contingency/fallback plans & contingency reserves
- Risk owners

PRINCE2: project risk management

Source: https://www.prince2primer.com/risk-management-strategy/

PRINCE2: project risk management



Source: https://www.prince2primer.com/risk-management-strategy/

PRINCE2: risk management procedure

Identify

- Context
  - e.g., risk management policy of the organization ('risk appetite')
  - Clarify project objectives, and identify which are at risk
  - Create a Risk Management Strategy
- Risks
  - Identify risks (both threats and opportunities): cause, uncertain event, its impact
  - Enter risks into the project's Risk Register

Assess

- Estimate
  Before the risk can be evaluated, the Project Manager must estimate three factors:
  - Probability (how likely the risk is to happen)
  - Impact (its effect)
  - Proximity (how soon it is likely to take place if nothing is done)
- Evaluate
  - The purpose of risk evaluation is to describe the net effect of all project risks
  - Risk evaluation reveals the overall risk severity of the project

PRINCE2: risk management procedure (2)

Plan

- Identify possible risk responses
  - Risk responses should be proposed and selected in order to minimize threats and maximize opportunities.
- Recommend which is to be carried out
  - Choose a risk response to balance the cost of its implementation against the probability and impact of the risk
- Incorporate the chosen response into the appropriate plan.

Implement

Implementation of the risk response, undertaken by the risk actionee, must be appropriately monitored. If its effects do not match expectation, it may require corrective action. Possibly repeat the risk management procedure for re-assessment of the risk.

Communicate

It is crucial to continually communicate risk information, both to project team members and stakeholders external to the project. PRINCE2 recommends several management products that can be used to communicate this information: Checkpoint and Highlight Reports, End Stage and End Project Reports, and Exception Reports.

Futrell: software project risk management

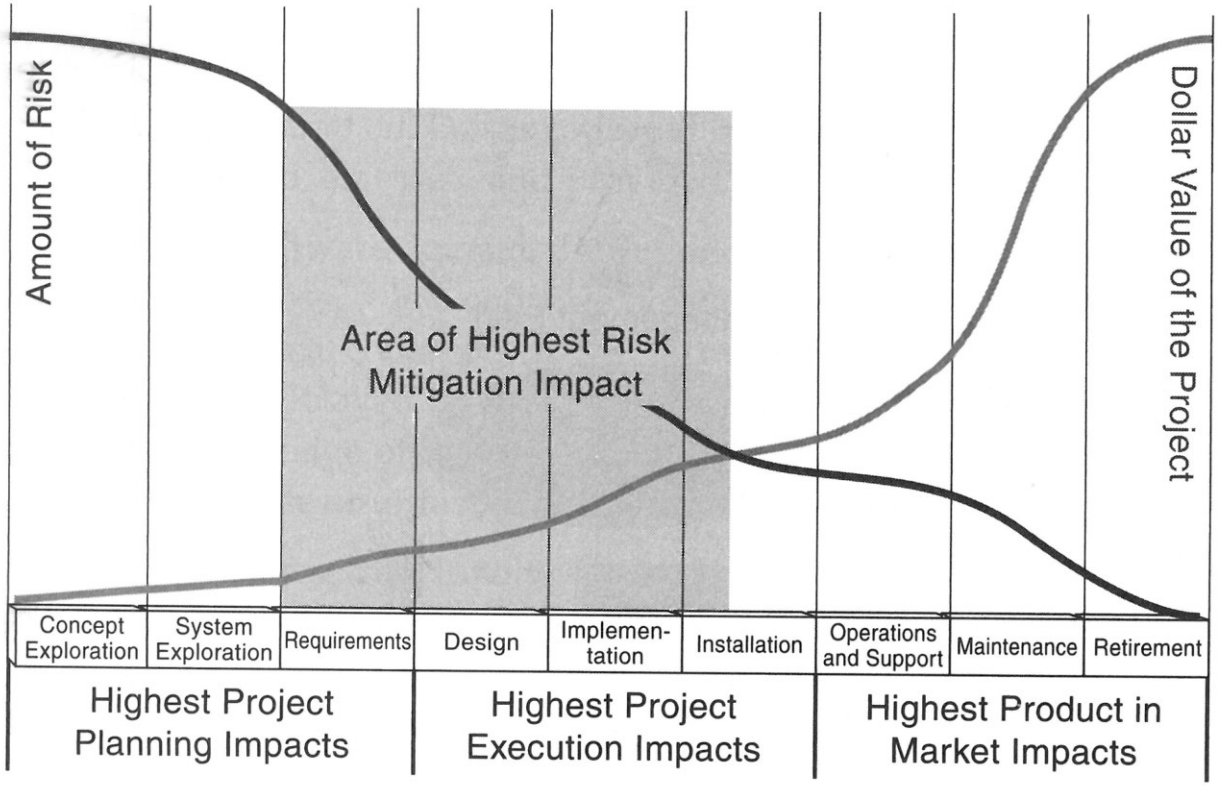


FIGURE 18–4
Project Risks During the Life Cycle

Futrell: software project risk management

Step 1: fill risk categorization table (see Risk Source Categories slide)
Step 2: rough risk ranking by category (classes high/medium/low)
Step 3: sort risks
- For top ten and all risks rated „high“, calculate risk exposure
- Determine risk control means & their owner & deadline
- Integrate measures into project plan

Step 4: establish risk report format
- Minimum: top ten risk rank (change), weeks on list, status, response (progress), risk change

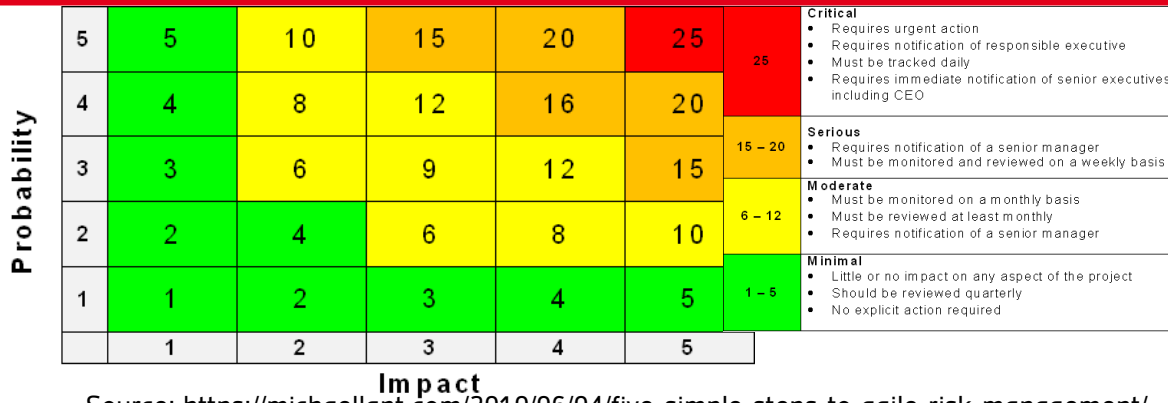
Step 5: ensure ongoing process

Common development project risks and Agile

Common Risk (from McConnell, 1996)	Agile's impact on risk
1. Feature creep	Reduce
2. Requirements or developer gold-plating	Reduce
3. Shortchanged quality	Reduce
4. Overly optimistic schedules	Reduce
5. Inadequate design	Possibly increase
6. Silver-bullet syndrome	Increase
7. Research-oriented development	Reduce
8. Weak personnel	–
9. Contractor failure	–
10. Friction between developers and customers	Reduce

Source: http://itsadeliverything.com/agile-risk-management

Agile risk management



Source: https://michaellant.com/2010/06/04/five-simple-steps-to-agile-risk-management/

Agile Risk Identification

- All project members identify and report risk
- The project manager owns the risk log containing the risk list.

Regular meetings (e.g. Stand Up or Scrum) highlight impediments to the project → many dealt with immediately, rest logged by the project manager

Collaborative estimation → more likelihood of identifying risky elements at the start.

The empirical Agile Project Planning and Agile Project Control ensure capacity (i.e. velocity) is continuously recalibrated (at least once per timebox) → threats to the schedule highlighted early.

Source: http://itsadeliverything.com/agile-risk-management

Agile Risk Analysis

Assess likelihood and impact of each risk, e.g. both on a simple scale from 1 (low) to 5 (high).

Agile Risk Prioritisation

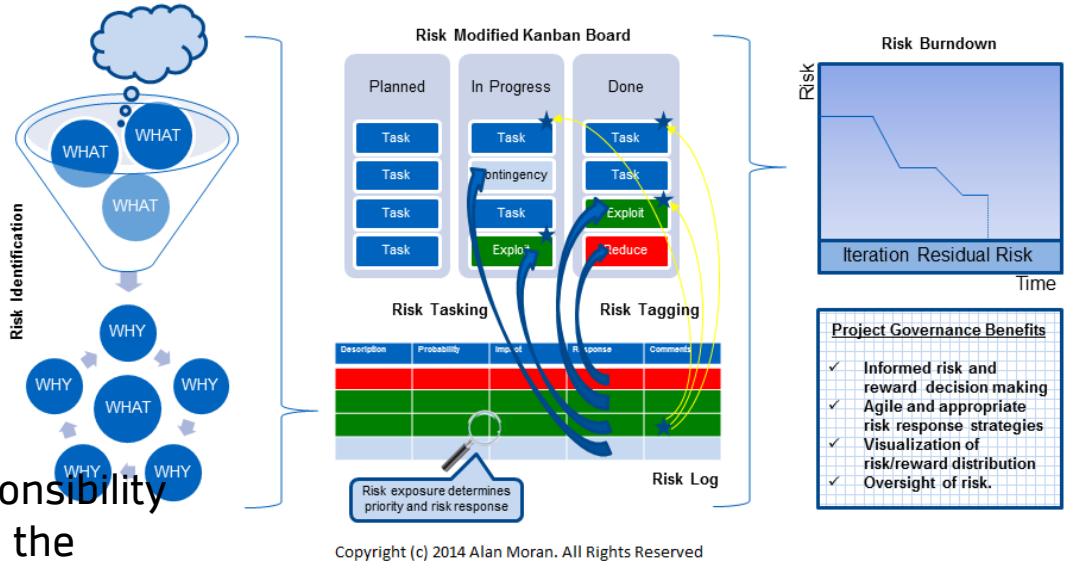
Identify the significant risks.

Risk Exposure = likelihood (scale of 1-5) * impact (also a scale of 1-5) → value of 1-25.

Any risk with a risk exposure of 15-25 is a significant risk that you need to manage.

Risks with a risk exposure of 1-5 are not worth managing.

Agile risk management



Source: A. Moran (2014): Agile Risk Management & Scrum.

Agile Risk Management Planning

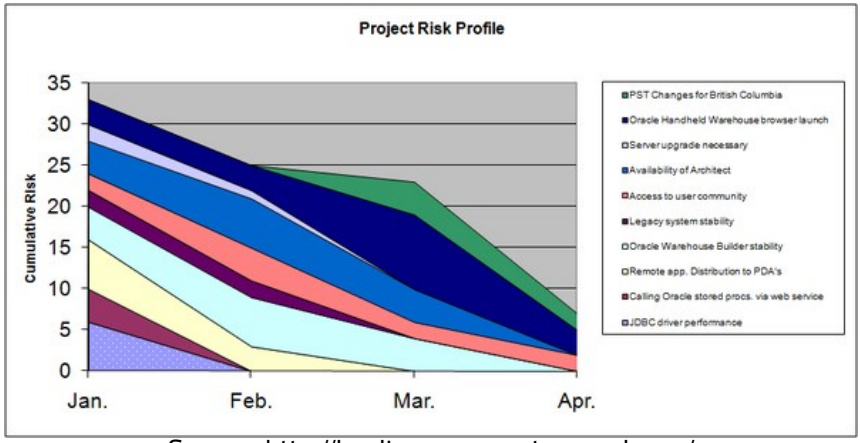
- Collaborative nature → shared responsibility
- Bring risky requirements forward in the schedule → more time to assess risk and identify feasible solutions, e. g. investigate by feasibility prototype (DSDM) or a spike (XP).

Agile Risk Resolution

Risk resolution means executing the risk management plan → factor all work for the Agile team into the Release Plan as requirements and/or the Timebox Plan as tasks.

Agile Risk Monitoring

Continually monitor the risk management plan (also for risks that are being dealt with outside the Agile team). Also continue risk identification → next risk management cycle.



Source: http://leadinganswers.typepad.com/leading_answers/2007/09/agile-risk-mana.html

Source: http://itsadeliverything.com/agile-risk-management

Agile Risk Management Principles

First Things First: Deal with the high Risk items first.
Deferring is project suicide, do the difficult, risky tasks up front → could bring to light unrealistic success criteria and change the definition of project success → revised, more realistic set of stakeholder expectations, may also stimulate commitments like a larger budget or access to key people.
Fail Early: becoming very popular also in the world of venture capital. Figure out as early as possible whether or not what you are doing will succeed → project go/no go.
Success impossible → stop (kill) or rethink the project.
Repeat: Lightweight, quick process.
Identifying Risks early, and implementing appropriate Risk Mitigation Strategies for each is essential to the success of projects → continuous virtuous circle of Assessment and Action to constantly identify, manage and minimize Risk. At least every iteration planning, review Risk Register & look for any new Risks.

Risk Management: common pitfalls

Wrong Risk Response Handling
- Deferred
- Not monitored

→ Too late

Not communicated properly

Too little effort to clarify probabilities

No management cycle

Responses not planned

Questions? Questions!

THANK YOU VERY MUCH FOR YOUR ATTENTION!