

**Concepts of  
Computing  
Technologies**

**Risk Management Models  
Part One**

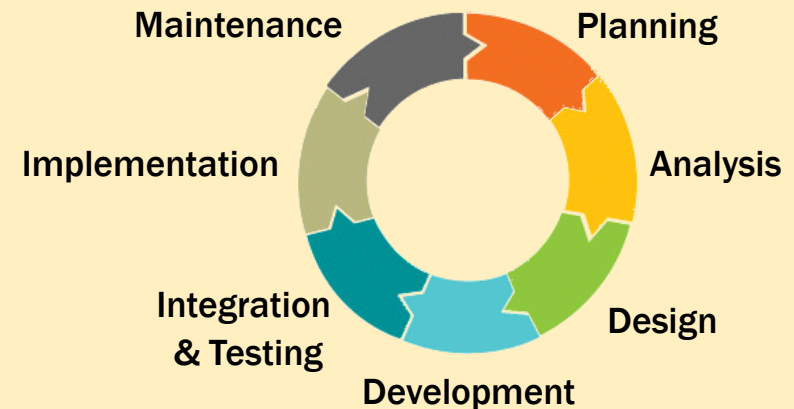
# **Project Management Risk Management Models**

# Two levels of risk

- **Specific Project Risks:** The **project manager** is accountable for the delivery of project objectives, and therefore needs to be aware of any risks that could affect that delivery, either positively or negatively.
  - Scope of interest: specific sources of uncertainty within the project.
  - Answers to the question, “**What are the risks in my project?**” are usually recorded in a risk register or similar document.
  - “Individual risk” defined by PMBOK as “an uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives.”
- **Overall Project Risk:** The **project sponsor** and **project approvers** are interested in risk at a different level. He or she is less interested in specific risks within the project, and more in the overall picture.
  - Scope of interest: “**How risky is my project?**”
  - Looking for: an overall sense of risk or perhaps a focus on the highest risks.
  - “Overall project risk” is defined by PMBOK as “the effect of uncertainty on the project as a whole.”

# Timing of a Project Risk Assessment

- The simplest way to address overall project risk is during the pre-project or planning phase of the Systems Development Life Cycle, when the scope and objectives of the project are being clarified and agreed.



# Planning: The Project Initiation Document (PID)

- Risk is associated with things that are unknown. More things are unknown at the beginning of a project, but risk must be considered in the planning phase and weighed against the potential benefit of the project's success in order to decide if the project should be chosen.



- PID may contain all or most of the sections below

- **Project Scope Statement**

- What is in scope and out of scope
- Will project be delivered in phases?

- **Project Background**

- Why and how project was created.
- History and context

- **Feasibility Analysis**

- **Assumptions, Dependencies and Constraints**

- **Initial Project Plan**

- High level milestones and dates

- **Organization and Governance**

- Team Organization Chart.
- Governance structure and checkpoints

- **Communication Plan**

- e.g. weekly project team meetings, biweekly governance meetings, minutes...

- **Quality Plan**

- Often a list of deliverables

- **Risk Assessment**

- **What are expected risks & mitigation strategies**

- **Estimated Cost and ROI**

# What makes for a good PID?

1. As an **IT approver** of this document, I am looking to understand whether I should allocate scarce IT resources for this project or choose another one.

## The "Go / No-Go" decision

- Do I believe the author understands enough (at this early stage) about the **technology** that could be in play?  
Is this project **feasible**?
- Do I feel the author has adequately defined the **resources** needed to complete this project?  
*(Is it a team of 9? A team of 12? What roles are required? Does the team need a database professional? A UI specialist?)*
- Things will go wrong. Do I believe that the author understands the most important project **risks**? Does the author have strategies for risk **mitigation**?
- Do I understand the **business value** of this project?
- Has the author developed an **approach / methodology** to complete the project?  
*(Is there a high-level plan that makes sense? What training will be required? How will transparency to stakeholders be achieved? Are there review points? Agile? Waterfall? Hybrid?)*

2. As a **business approver** of this document, I am looking to be satisfied that the PID **adequately documents my needs**

- Does the **project description** cover the key aspects from my perspective?
- Are my high-level **requirements** well stated?
- Is the **scope** correct?  
*(Are the right elements included Do the exclusions make sense?)*

3. As a **consumer** of this document, I am looking to gain **a good understanding of the project**

- What is the **purpose** of the project?
- Why is the project **important**?
- How will communications occur?

# Risk in the Analysis Phase

- Generally simultaneously with Product Owners or Business Analysts analyzing customer requirements, Project Managers are planning the project activity including risk.
- Once the project is approved, risks are identified with each major group of activities. A risk breakdown structure (RBS) can be used to identify increasing levels of detailed risk analysis.



# Risk Breakdown Structure (RBS)

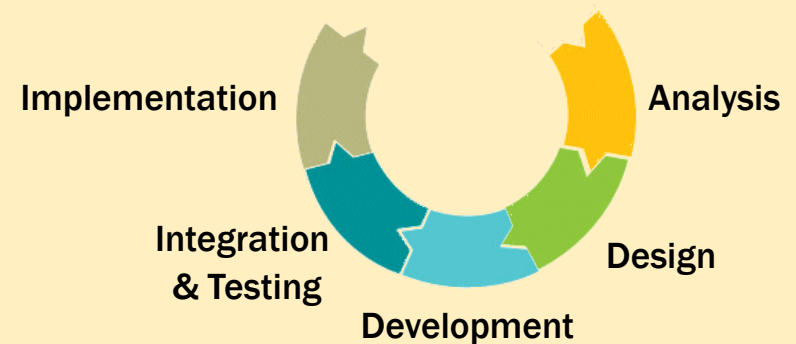
- Provides clearer understanding of where risks are most concentrated.
- Here is a sample for SW development

LEVEL 0	LEVEL 1	LEVEL 2	LEVEL 3
Project risk	Product engineering	Requirements	Stability Completeness Feasibility ...etc...
		Design	Functionality Interfaces Testability ...etc...
		Code & unit test	Feasibility Testing Coding/implementation ...etc...
		Integration test	Environment Product System ...etc...
		Engineering specialities	Maintainability Reliability Security ...etc...
	Development environment	Development process	Formality Process control Product control ...etc...
		Development system	Capacity Reliability System support ...etc...
		Management process	Planning Project organisation Management experience ...etc...
		Management methods	Monitoring Configuration management Quality assurance ...etc...
		Work environment	Cooperation Communication Morale ...etc...
	Program constraints	Resources	Staff Budget Facilities ...etc...
		Contract	Type of contract Restrictions Dependencies ...etc...
		Program interfaces	Customer Subcontractors Corporate management ...etc...



# During "execution"

- As the project progresses and more information becomes available to the project team, the total risk on the project typically reduces, as activities are performed without loss.
- The risk plan needs to be updated with new information and risks checked off that are related to activities that have been performed.



# Processes in Maintenance Phase

- In the maintenance phase, the project risks are over.
- However other risk monitoring should take over, especially security risk monitoring.

Maintenance

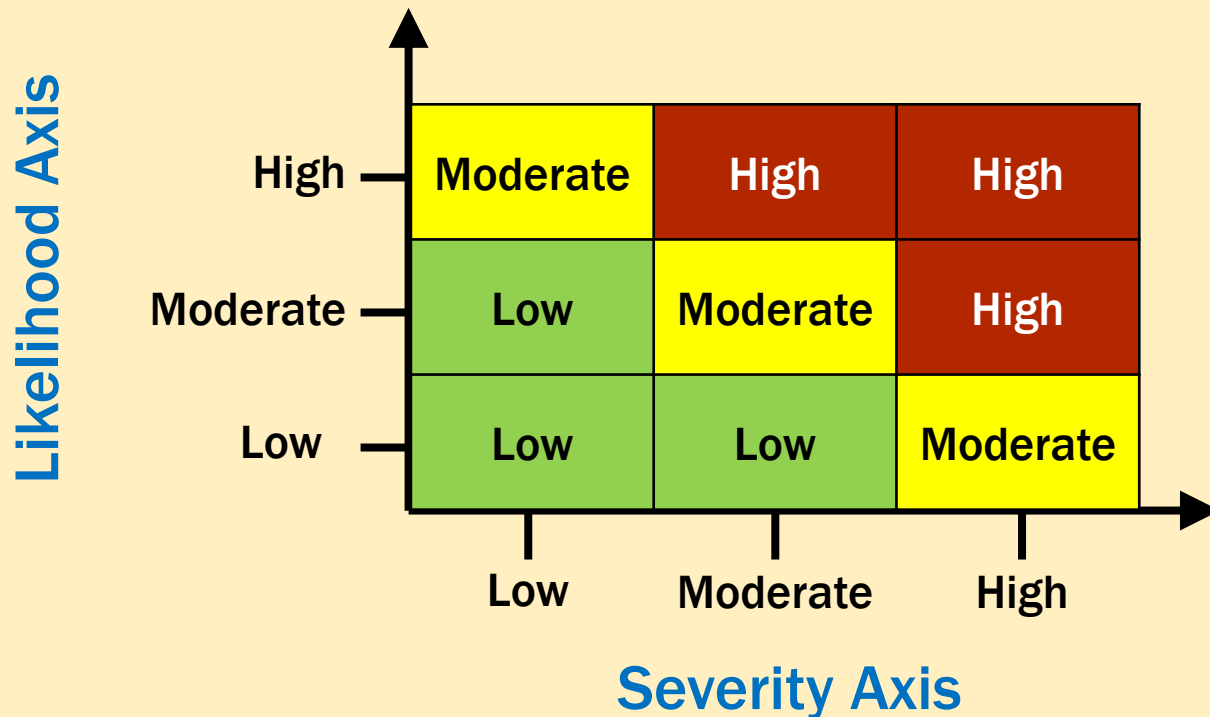


# Types of Project Risks to Consider

- One needs to be comprehensive in identifying project risks.
- There are several pneumonic frameworks that help one think about all possible risk categories:
  - PESTLE – Political, Economic, Social, Technological, Legal, Environmental
  - PESTLIED – as PESTLE, with the addition of International (or Informational) and Demographic
  - STEEPLE – as PESTLE, with the addition of Ethics
  - InSPECT – Innovation, Social, Political, Economic, Communications, Technology
  - SPECTRUM – Socio-cultural, Political, Economic, Competitive, Technology, Regulatory/legal, Uncertainty/risk, Market
  - TECOP – Technical, Environmental, Commercial, Operational, Political
  - VUCA – Volatility, Uncertainty, Complexity, Ambiguity

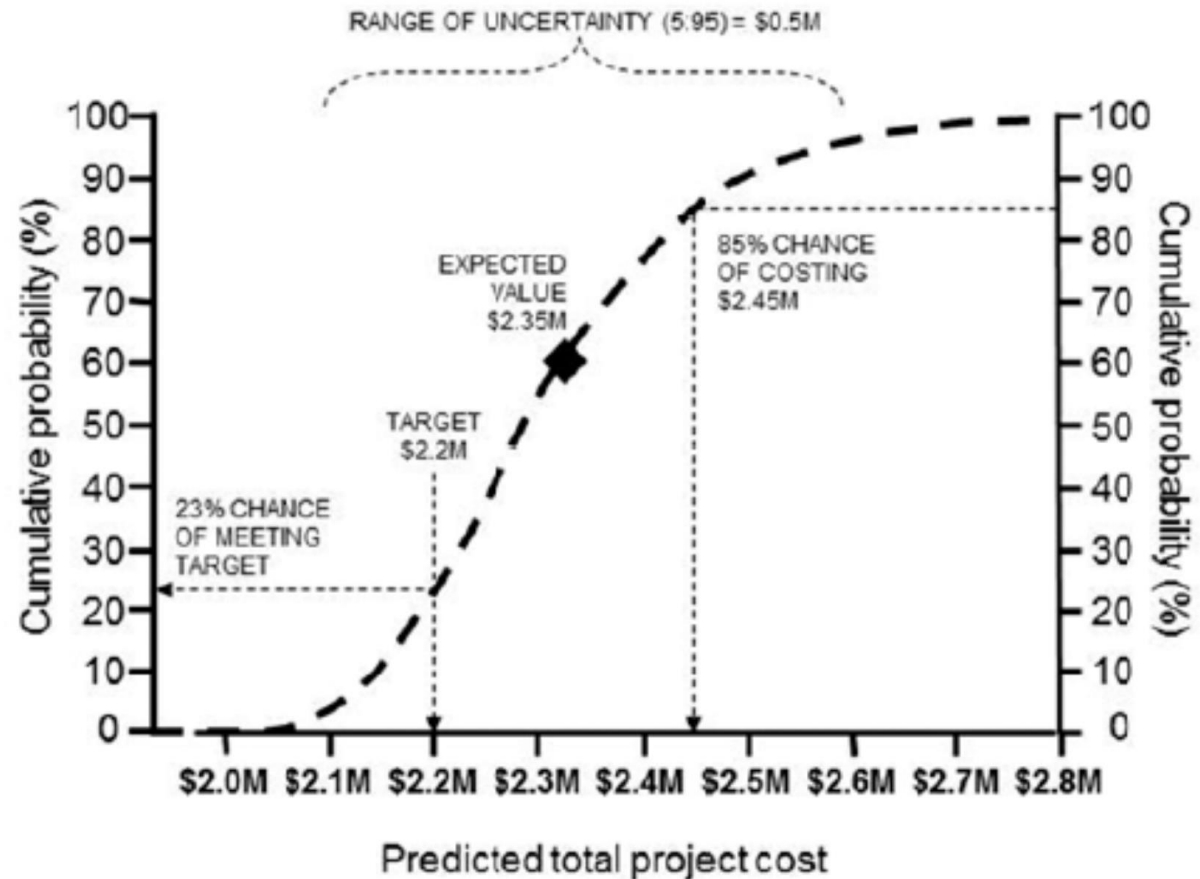
# Qualitative Model: Risk Matrix

- When describing project risks instead of security risks, a simpler approach like this 3x3 matrix is sufficient.
- There is a **positive correlation**—both increase or decrease together—between project risk and project complexity.  $\uparrow$  complexity =  $\uparrow$  likelihood



# Quantitative Model: Monte-Carlo S curves

- Monte Carlo simulation approach is ideal for this type of analysis, since the main output presents the range of possible outcomes against the probability of each value being achieved.
- This is usually shown as a cumulative probability density plot, or S-curve



# Reporting and Monitoring Project Risk

- It is important to communicate the status of overall project risk to key stakeholders throughout the lifetime of the project, including:
  - Current level of overall project risk
  - Major causes of overall project risk
  - Key responses underway or planned
  - Trend in overall project risk since the project started
  - Predicted level of overall project risk at next reporting point
- Overall project risk is dynamic—changing constantly as the project progresses
- A key principle of risk management is that ownership of a particular risk should lie with the person or party who owns the objective that would be affected if the risk occurred, known as the **risk owner**.

# Risk Management Results

- Tzvi Raz, Aaron Shenhar, and Dov Dvir<sup>3</sup> studied risk management practices on one hundred projects in a variety of industries. The results of this study suggested the following about risk management practices:
  - Risk management is not widely used.
  - The projects that were most likely to have a risk management plan were those that were perceived to be high risk.
  - When risk management practices were applied to projects, they appeared to be positively related to the success of the project.
  - The risk management approach influenced project schedules and cost goals but exerted less influence on project product quality.
  - Good risk management increases the likelihood of a successful project.

# Examples of Project Risk

- **Technical**
- **Cost**
- **Schedule**
- **Client**
- **Contractual**
- **Weather**
- **Financial**
- **Political**
- **Environmental**
- **People**



# Match Risk Tracking to Project Complexity

<b>Complexity of Project</b>	<b>Tracking Rigor</b>
<b>Low</b>	<b>Project manager may informally track items that may be considered risk items</b>
<b>Moderate</b>	<b>Project management team may develop a list of items perceived to be higher risk and track them during project reviews</b>
<b>High</b>	<b>More formal with a risk assessment meeting or series of meetings during the life of the project to assess risks at different phases of the project</b>
<b>Very High</b>	<b>Outside expert may be included in the risk assessment process, and the risk assessment plan may take a more prominent place in the project execution plan</b>

# Types of Complexity

## ■ External Complexity

*(stemming from clients, customer(s), market, competitors, strategic position, regulation, environment,..., and external risk structured for business decision-making)*

- Projects are larger and longer than usual for the project management group and the project manager and the available resources are lacking.
- Due to lack of experience on this size project, unknown risks are significant. The inadequacy of resources will cause risks that are more predictable.

## ■ Internal Complexity *(affecting products, processes, resources, costs)*

- Risks to the budget, schedule, and quality due to organizational complexity and changes of scope due to lack of clarity in project and scope statements.

## ■ Technological Complexity

- High levels of risk due to unknown flaws in the technology and lack of familiarity with it. These problems result in risks to the schedule, budget, and quality.

## ■ Environmental Complexity *(legal, cultural, political, and ecological factors)*

- High risks for delay and expensive resolution to lawsuits, public opposition, changes for political considerations, and unforeseen ecological impacts.

# References

- Hillson, D. (2014). Managing overall project risk. Paper presented at PMI® Global Congress 2014—EMEA, Dubai, United Arab Emirates. Newtown Square, PA: Project Management Institute.