مدیریت پروژه بر اساس PMBOK به همراه الحاقیه ساخت

(ویرایش هفتم)

بخش چهارم:

بررسی تفصیلی راهنمای پیکره دانش مدیریت پروژه PMBOK + الحاقیه ساخت

ارائه دهندگان:

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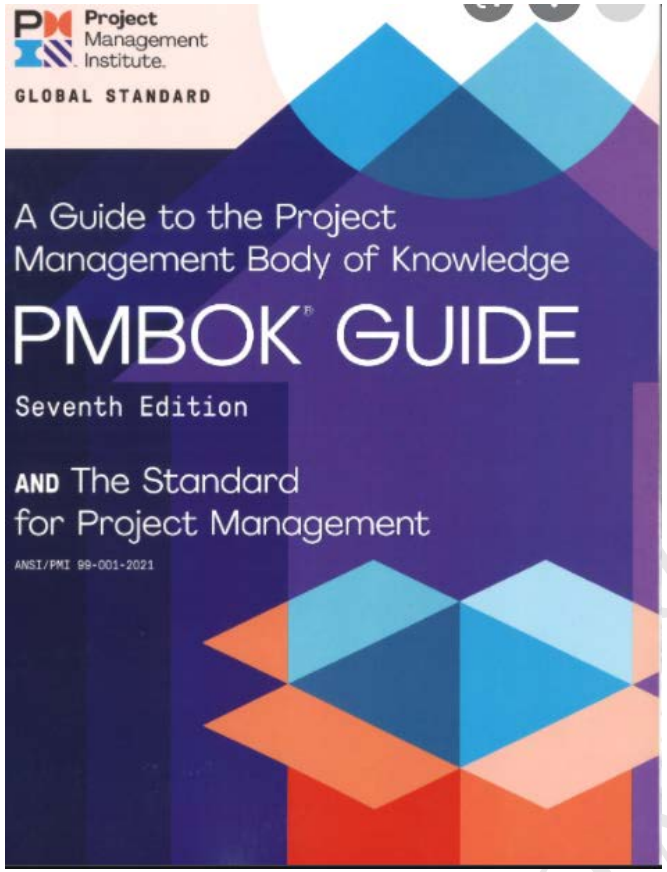
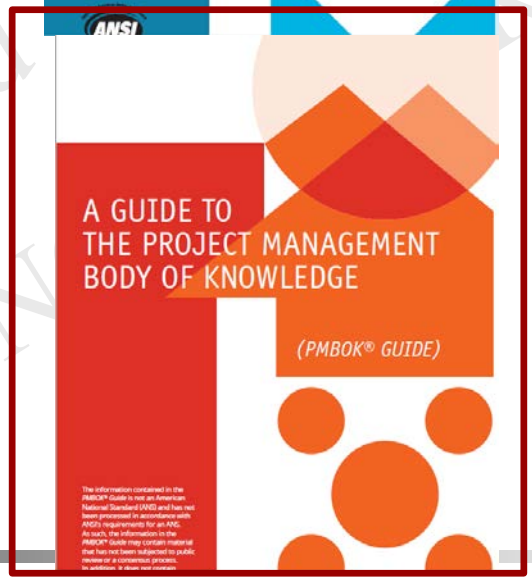
What we will learn?

- Introduction
- A Guide To the Project Management Body of Knowledge
  - 7th Edition – Project Performance Domains
  - Domain 1 (7th edition + PMBOK Construction Extension)
  - Domain 2 (7th edition + PMBOK Construction Extension)
  - Domain 3 (7th edition + PMBOK Construction Extension)
  - Domain 4 (7th edition + PMBOK Construction Extension)
  - Domain 5 (7th edition + PMBOK Construction Extension)
  - Domain 6 (7th edition + PMBOK Construction Extension)
  - Domain 7 (7th edition + PMBOK Construction Extension)
  - Domain 8 (7th edition + PMBOK Construction Extension)

Introduction

A guide to the project management body of knowledge in PMBOK 7th Edition





What is the difference with 6th Edition?

A Guide To the Project Management Body of Knowledge

(Domain 7: Measurement Performance Domain)

Measurement performance domain

ACEMI

Measurement performance domain

- We will talk about the following in this section:

1. **Establishing effective measures**
2. **What to measure**
3. **Presenting information**
4. **Measurement pitfalls**
5. **troubleshooting performance**
6. **Growing and improving**
7. **Interactions with other performance domains**
8. **Checking results**

Measurement performance domain – What to measure

- Common categories of metrics include:
  - Deliverable metrics,
  - Delivery,
  - Baseline performance,
  - Resources,
  - Business value,
  - Stakeholders, and
  - Forecasts.

Measurement performance domain – What to measure: Stakeholders

- Related metrics:

  ▶ **Net Promoter Score® (NPS®).** A Net Promoter Score measures the **degree** to which a **stakeholder (usually the customer)** is willing to recommend a product or service to others. It measures a range from **-100 to +100**. A high Net Promoter Score not only measures satisfaction with a brand, product, or service, it is also an indicator of customer loyalty.

  ▶ **Mood chart.** A mood chart can track the **mood or reactions of a group** of very important stakeholders—the project team. At the **end of each day**, project team members can use **colors, numbers, or emojis** to indicate their frame of mind. Tracking the project team's mood or individual project team member's moods can help to identify **potential issues** and areas for improvement.

Measurement performance domain – What to measure: Stakeholders

- Related metrics:

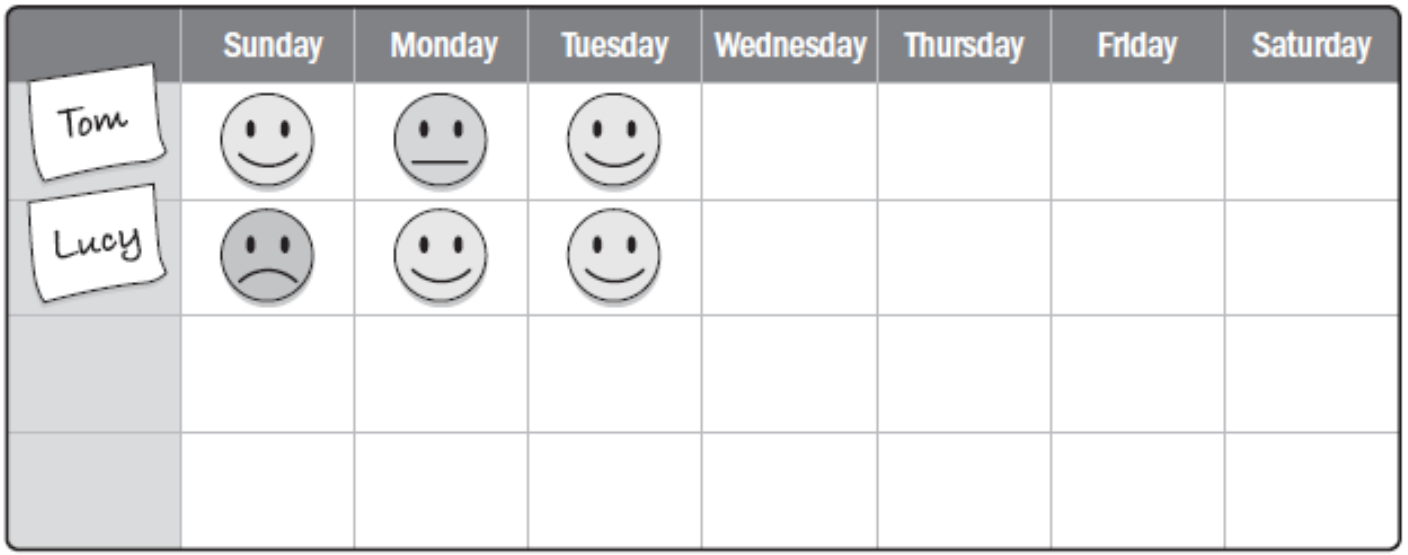


Figure 2-25. Mood Board

Measurement performance domain – What to measure: Stakeholders

- Related metrics:

  ▶ **Morale.** Since **mood boards** can be subjective, another option is to measure project **team morale**. This can be done by surveys, asking project team members to **rate** their agreement on a scale of **1 to 5 to statements** such as:

  - I feel my work contributes to the overall outcomes.
  - I feel appreciated.
  - I am satisfied with the way my project team works together.

  ▶ **Turnover.** Another way to **track morale** is by looking at **unplanned** project team **turnover**. High rates of unplanned turnover may indicate low morale.

Measurement performance domain – What to measure: Forecasts

- Could be **qualitative**, **quantitative** or **casual**
- **Quantitative forecasts** seek to use **past information** to estimate the future and include:

Quantitative forecasts associated with earned value management are often used for very large projects.
Some deliverables in those projects may use adaptive development methods.

However, the forecasting metrics in earned value management are predominantly used in predictive environments.

Measurement performance domain – What to measure: Forecasts

▶ **Estimate to complete (ETC).** An **earned value management** measure that forecasts the expected cost to finish **all the remaining project work**. There are many different ways to calculate the estimate to complete. Assuming past performance is **indicative** of future performance, a **common measurement** is calculation of the budget at completion minus the earned value, then dividing by the **cost performance index**. For more calculations to determine the ETC, see The Standard for Earned Value Management.

Is it that simple?

Measurement performance domain – What to measure: Forecasts

- **Quantitative forecasts** seek to use **past information** to estimate the future and include:
  - **Estimate at completion (EAC).** This earned value management measure forecasts the **expected total cost of completing all work**. There are many **different ways** to calculate the estimate at completion. Assuming **past performance is indicative of future performance,** a **common measurement** is the budget at completion divided by the cost performance index. For more calculations to determine the EAC, see The Standard for Earned Value Management.

Is it that simple?

Measurement performance domain – What to measure: Forecasts

- **Quantitative forecasts** seek to use **past information** to estimate the future and include:

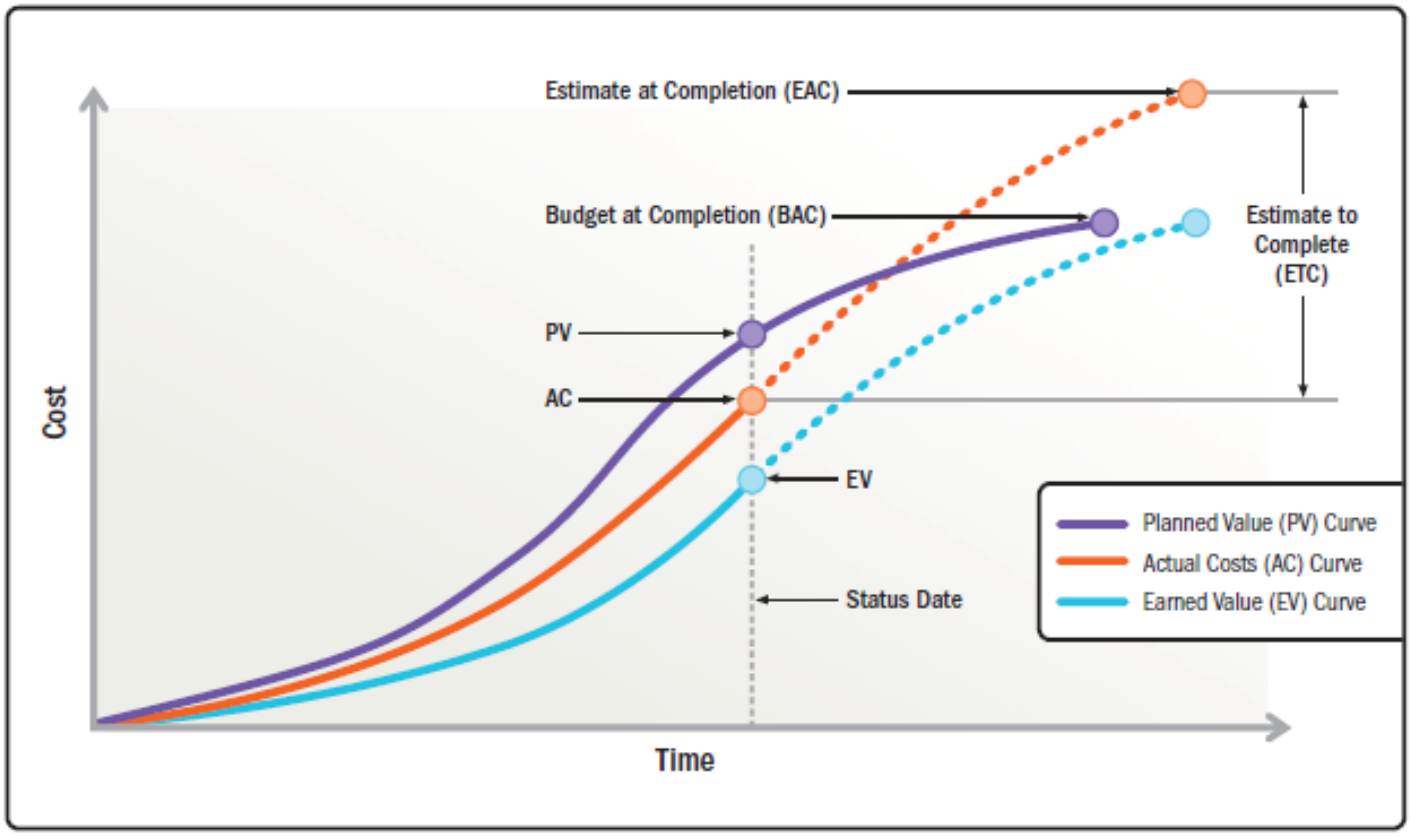


Figure 2-26. Forecast of Estimate at Completion and Estimate to Complete

Measurement performance domain – What to measure: Forecasts

- **Quantitative forecasts** seek to use **past information** to estimate the future and include:

STEPS 8-11: Project future performance– Estimated cost at completion (EAC)

- **Calculate range of EACs and compare to available funding**

While plenty of **EACs** can be generated from the **EVM data**, **each EAC** is calculated with a **generic index based formula**, similar to:

EAC = ACWP (cumulative) + (BAC – BCWP (cumulative)) / efficiency index

performance to date when estimating the cost of the remaining work.

But how to select efficiency index?

STEPS 8-11: Project future performance– Estimated cost at completion (EAC)

- **Calculate range of EACs and compare to available funding**
  - Best predictive EAC efficiency factors by program completion status

EAC efficiency factor		Percent complete Early: 0%–40%	Middle: 20%–80%	Late: 60%–100%	Comment
CPI x SPI	Cumulative	x	x		Usually produces the highest EAC
	6-month average		x	x	A variation of this formula (CPI_6 x SPI), also proven accurate[a]
SPI	Cumulative	x			Assumes schedule will affect cost also but is more accurate early in the program than later
Regression		x			Using CPI that decreases within 10% of its stable value can be a good predictor of final costs and should be studied further
Weighted		x		x	Weights cost and schedule based on .x(CPI) + .x(SPI); statistically the most accurate, especially when using 50% CPI x 50% SPI [a]

Source: Industry.

[a]According to DOD comments based on the work of David S. Christensen.

STEPS 8-11: Analyze performance – Estimated cost at completion (EAC)

- **Determine if the contractor's EAC is feasible**
  - ***EAC (K) = Committed costs (F) + Non-committed costs invoiced (H) + ETC (J)***

Committed Cost Worksheet

	A	B	C	D	E	F	G	H	I	J	K	L
1									Total		Total	
2									Committed		Estimated	
3								Non-	and Non-	Estimated	Cost	Variance
4					Total		Committed	Committed	Committed	Cost	at	Over /
5			Original	Change	Estimate	Committed	Costs	Costs	Costs	To	Completion	(Under)
6	Code	Description	Estimate	Orders	(C + D)	Costs	Invoiced	Invoiced	(F + H)	Complete	(I + J)	(K - E)
7					—				—		—	—
8					—				—		—	—
9			—	—	—	—	—	—	—	—	—	—

STEPS 8-11: Analyze performance – Estimated cost at completion (EAC)

PMI

- **Estimate at completion (EAC).** EAC is the expected total cost or time of a control account, work package, or project when the defined scope of work will be completed.

The equation for EAC is the current cost or time spent plus the estimate to complete (ETC):

$EAC_c = AC + ETC_c$

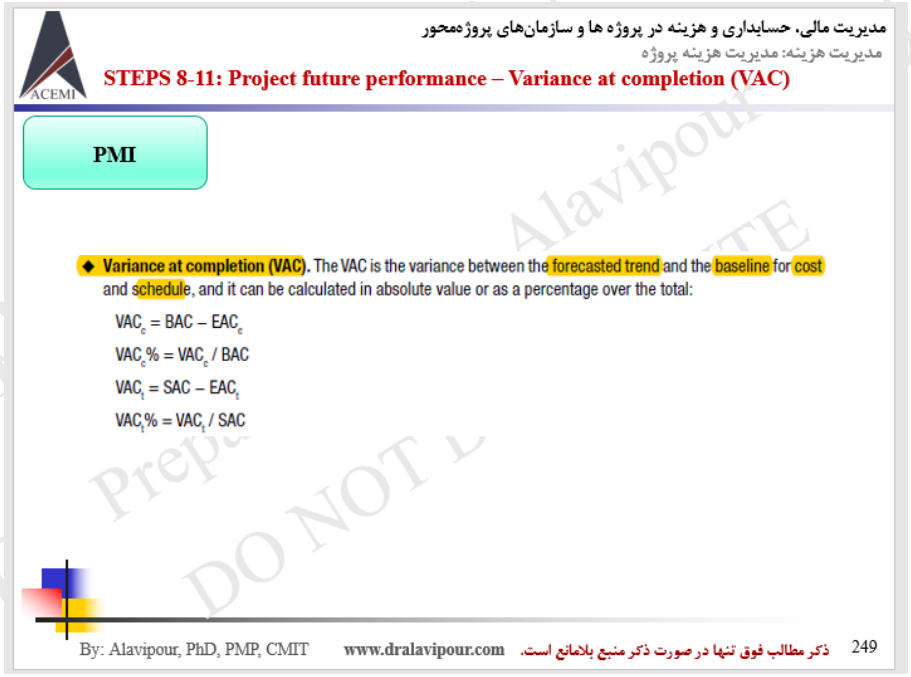
$EAC_t = AT + ETC_t$

When the independent estimate is used for ETC_t, then EAC is often referred to as an independent estimate at completion (IEAC).

Different approaches to estimate the cost and time remaining can be used.

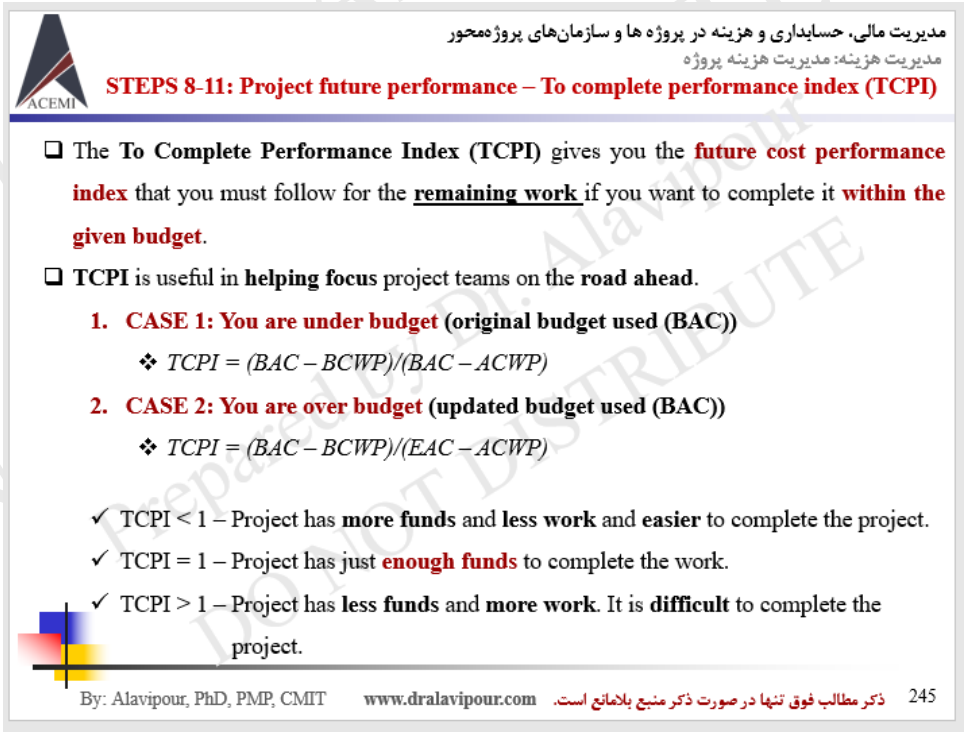
Measurement performance domain – What to measure: Forecasts

- **Quantitative forecasts** seek to use **past information** to estimate the future and include:
  - **Variance at completion (VAC).** An earned value management measure that forecasts the **amount of budget deficit or surplus**. It is expressed as the difference between the budget at completion (BAC) and the estimate at completion (EAC).



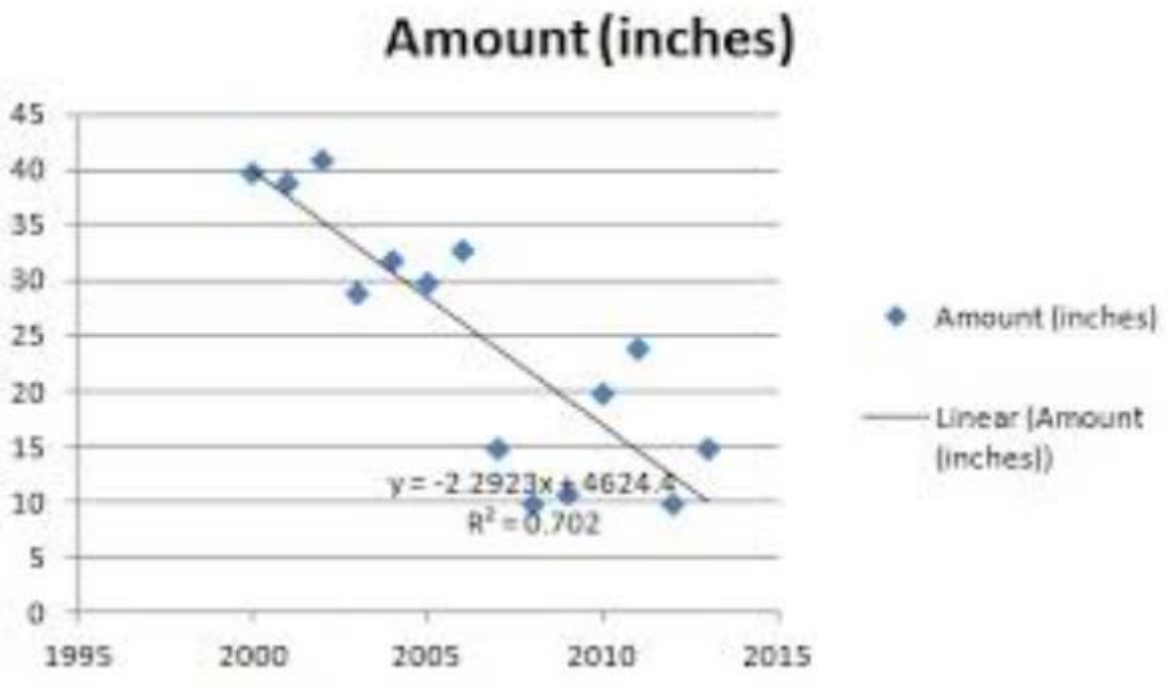
Measurement performance domain – What to measure: Forecasts

- **Quantitative forecasts** seek to use **past information** to estimate the future and include:
  - **To-complete performance index (TCPI).** An earned value management measure that estimates the cost performance required to meet a specified management goal. TCPI is expressed as the ratio of the cost to finish the outstanding work to the remaining budget.



Measurement performance domain – What to measure: Forecasts

- **Quantitative forecasts** seek to use **past information** to estimate the future and include:
  - ▶ **Regression analysis.** An **analytical method** where a series of input variables are examined in relation to their corresponding output results in order to develop a **mathematical or statistical relationship**. The relationship can be used to infer future performance.



Measurement performance domain – What to measure: Forecasts

- **Quantitative forecasts** seek to use **past information** to estimate the future and include:
  - **Throughput analysis.** This **analytical method** assesses the number of items being completed in a fixed time frame. Project teams that use **adaptive practices** use throughput metrics such as features complete vs. features remaining, velocity, and story points to evaluate their progress and estimate **likely completion dates**. Using duration estimates and burn rates of stable project teams can help verify and update cost estimates.

$$\text{Equation 1: PPC\%} = \frac{\text{Total Number of Activities Completed}}{\text{Total Number of Activities Promised}} \times 100$$

Actual Cost: $100,000

Earned Value: $125,000

AC/EV: $100,000 / $125,000 = .8

A burn rate lower than 1 means the project is currently under budget.

ACEMI

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Measurement performance domain – Presenting information

- For information to be **useful**, it has to be timely, accessible, easy to absorb and digest, and presented.
- **Visual displays with graphics** can help stakeholders absorb and make sense of information.
  1. Dashboards
  2. Information radiators
  3. Visual controls

Measurement performance domain – Presenting information: Dashboards

- A **common way** of showing large quantities of information on metrics.
- Generally **collect information electronically** and generate **charts that depict status**.
- Often, dashboards offer **high-level summaries of data** and allow **drill-down analysis** into contributing data.
- Dashboards often include information displayed as **stoplight charts** (also known as RAG charts where **RAG is an abbreviation for red-amber-green**), bar charts, pie charts, and control charts.
  - A **text explanation** can be used for any measures that are **outside the established thresholds.**

Measurement performance domain – Presenting information: Dashboards

Organization Project Name						
Project Name and High-Level Description						
Exec Sponsor:			PM:			
Start Date:		End Date:		Report Period:		
Status:	Schedule	Resources	Budget			

Key Activities	Recent Accomplishments	Upcoming Key Deliverables	Status
Activity #1			Concern
Activity #2			On Track
Activity #3			Issue

On Track	Complete	Concern	Issue	On Hold	Canceled	Not Started

Current Key Risks – Threats and opportunities; Mitigation	Current Key Issues – Description

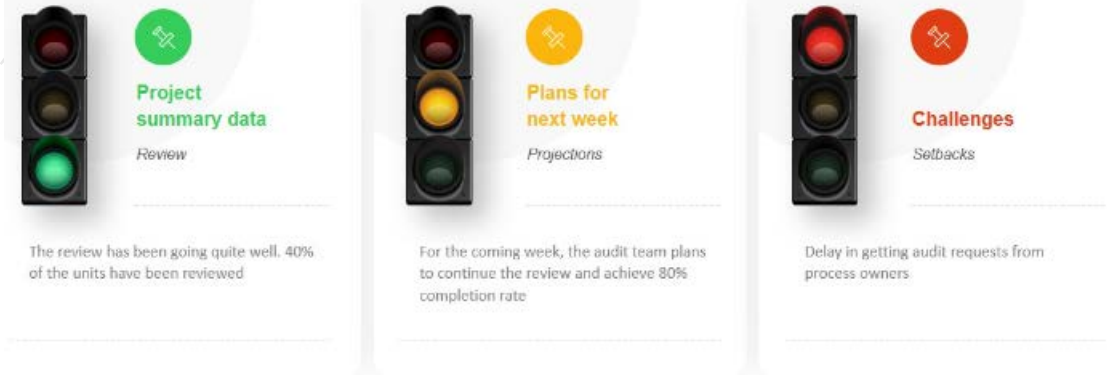
Figure 2-27. Dashboard Example

Measurement performance domain – Presenting information: Dashboards

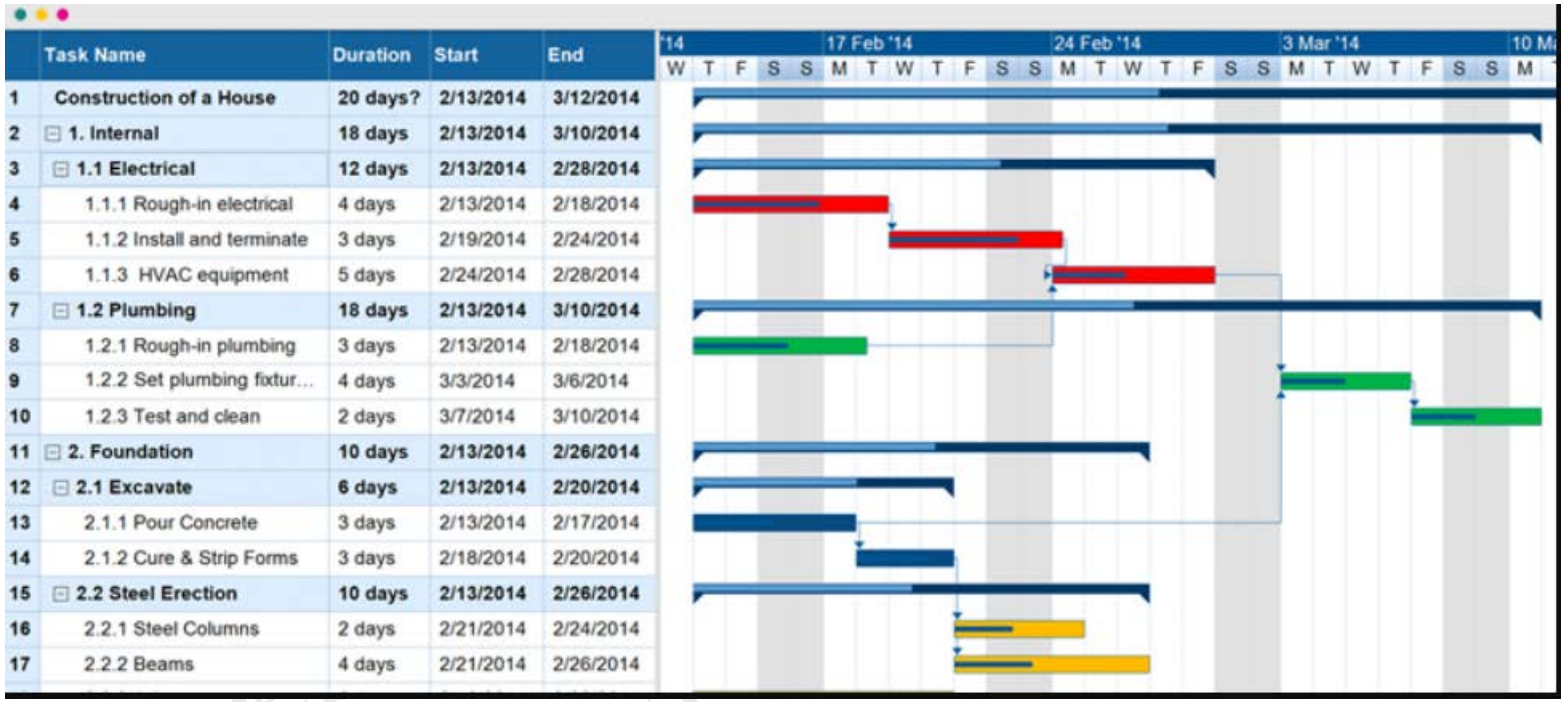
STOPLIGHT CHARTS

Milestone	January	February	March	April
Requirement Gathering				
Development				
User Acceptance Testing				
Pilot				
Approval				
Release				
Operations and Maintenance				

STOPLIGHT CHARTS



Measurement performance domain – Presenting information: Dashboards



	Task Name	Duration	Start	End
1	Construction of a House	20 days?	2/13/2014	3/12/2014
2	1. Internal	18 days	2/13/2014	3/10/2014
3	1.1 Electrical	12 days	2/13/2014	2/28/2014
4	1.1.1 Rough-in electrical	4 days	2/13/2014	2/18/2014
5	1.1.2 Install and terminate	3 days	2/19/2014	2/24/2014
6	1.1.3 HVAC equipment	5 days	2/24/2014	2/28/2014
7	1.2 Plumbing	18 days	2/13/2014	3/10/2014
8	1.2.1 Rough-in plumbing	3 days	2/13/2014	2/18/2014
9	1.2.2 Set plumbing fixtur...	4 days	3/3/2014	3/6/2014
10	1.2.3 Test and clean	2 days	3/7/2014	3/10/2014
11	2. Foundation	10 days	2/13/2014	2/26/2014
12	2.1 Excavate	6 days	2/13/2014	2/20/2014
13	2.1.1 Pour Concrete	3 days	2/13/2014	2/17/2014
14	2.1.2 Cure & Strip Forms	3 days	2/18/2014	2/20/2014
15	2.2 Steel Erection	10 days	2/13/2014	2/26/2014
16	2.2.1 Steel Columns	2 days	2/21/2014	2/24/2014
17	2.2.2 Beams	4 days	2/21/2014	2/26/2014

Measurement performance domain – Presenting information: Information radiators

- **Information radiators**, also known as big visible charts (BVCs), are visible, **physical displays** that provide information to the **rest of the organization**, enabling **timely knowledge sharing**.

- They are **posted in a place** where people can **see the information easily**, rather than having information in a **scheduling or reporting tool.**

- **BVCs** should be easy to update, and they should be updated frequently.

- They are often **"low tech and high touch"** in that they are **manually maintained** rather than **electronically** generated.

Measurement performance domain – Presenting information: Information radiators

Mostly used in agile software development

- Burndwon vs. burnup charts

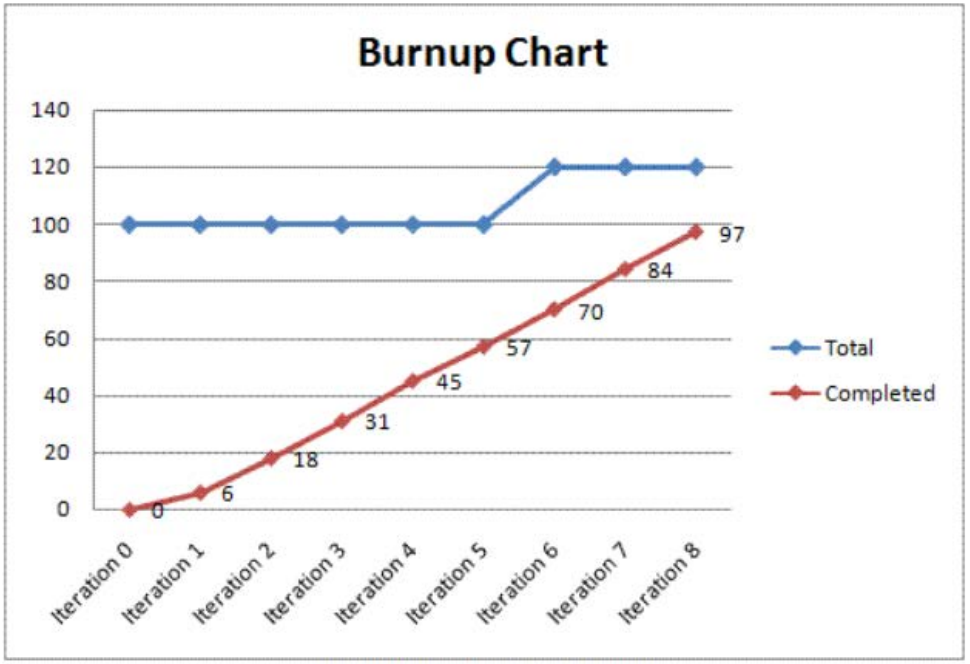
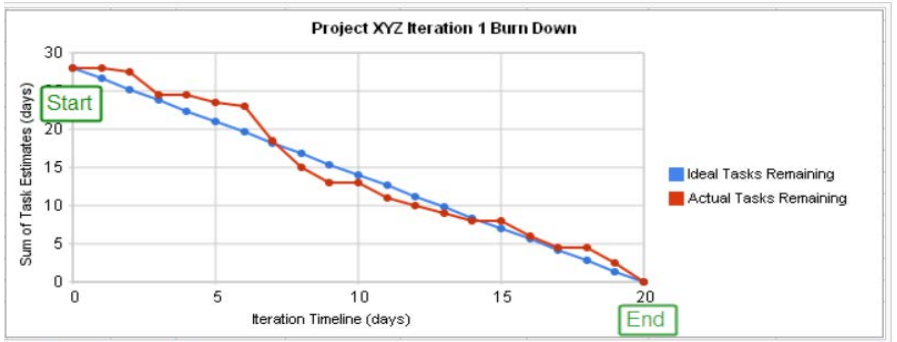


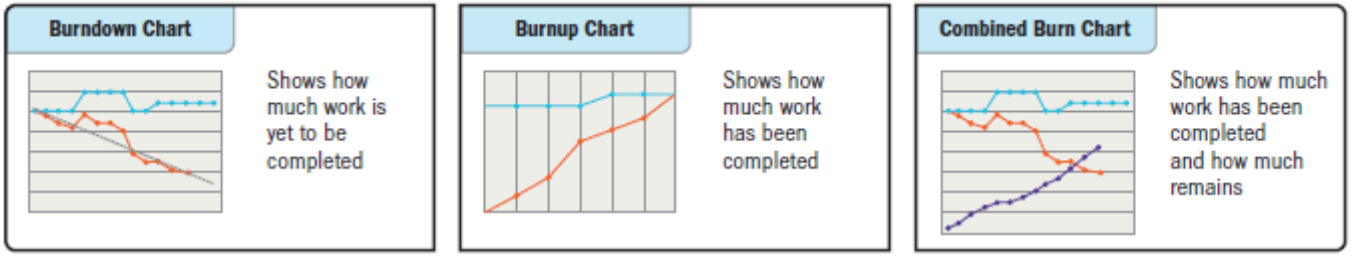
Image from pm.stackexchange.com



A project burn down chart

Measurement performance domain – Presenting information: Information radiators

- Figure 2-28 shows an information radiator associated with work completed, work remaining, and risks.



Reference	Risk Description	Date	Likelihood	Impact	Risk Rating	Response	Owner
1	The main supplier cannot deliver on time because of other commercial commitments	03/21	Likely	High	High	Include financial penalties in contract; build contingency into the schedule; monitor contractor performance	Annie
2	The lead time for the leased line exceeds 90 days	03/21	Unlikely	Medium	Medium	Order leased line earlier than necessary; incur additional rental fees	Jim
3	Release of the new system is delayed because user acceptance testing commences after the planned start	03/21	Very likely	High	High	Employ temporary staff to free up resources for testing; revise project schedule	Mark
4	There is insufficient capacity to create additional database instances for data migration and testing	04/18	Very unlikely	Medium	Low	Prioritize projects; temporarily remove alternative development instance	Jim

Risk Log

Mostly used in agile software development

Figure 2-28. Information Radiator

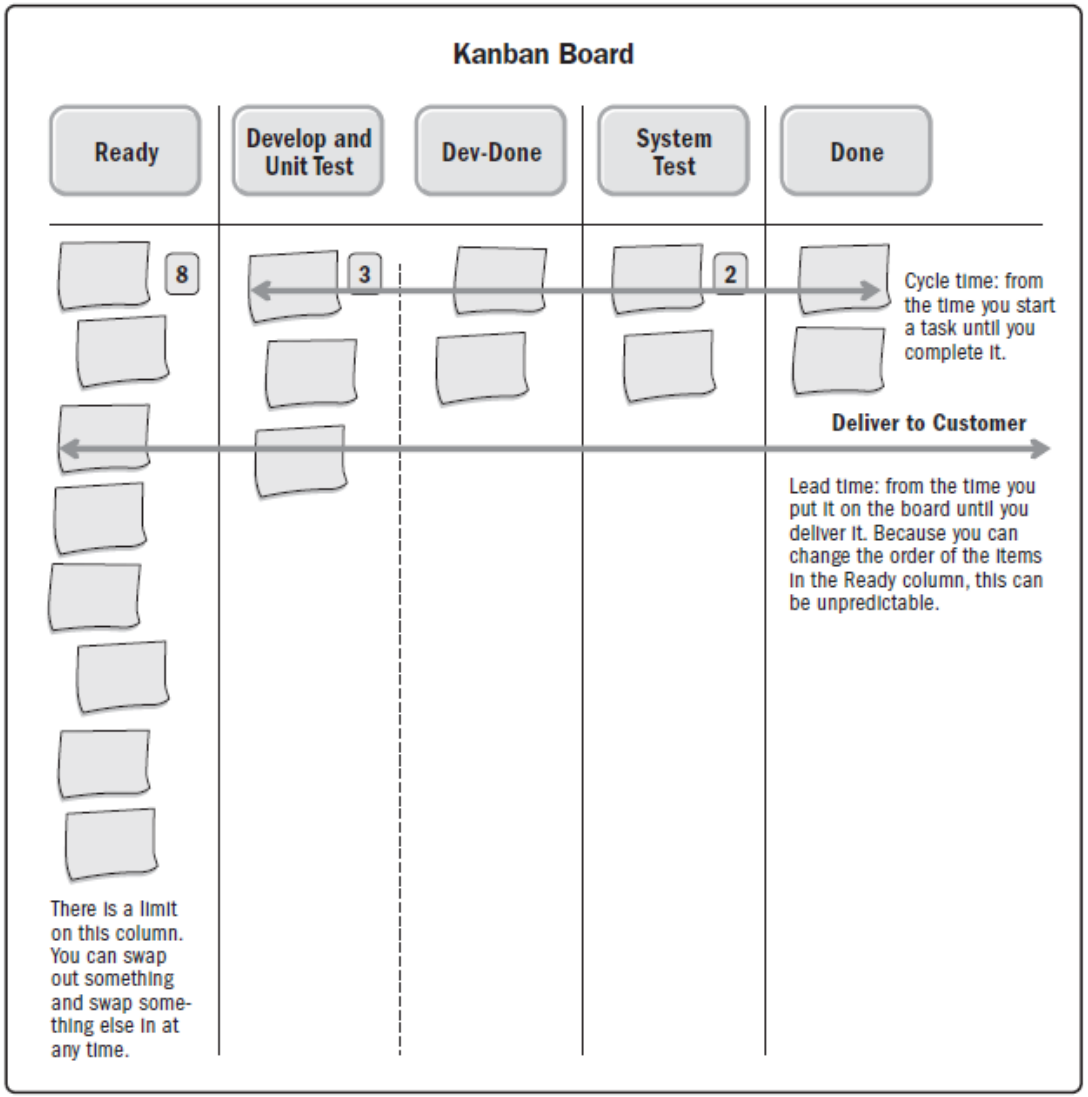
Measurement performance domain – Presenting information: Visual controls

- Lean environments
- To compare actual against expected performance
- Can be present for all levels of information from business value delivered to tasks that have started.

Measurement performance domain – Presenting information: Visual controls

- Task boards or Kanban board

You learned how to develop and use this in construction projects



Measurement performance domain – Presenting information: Visual controls

- Burn charts

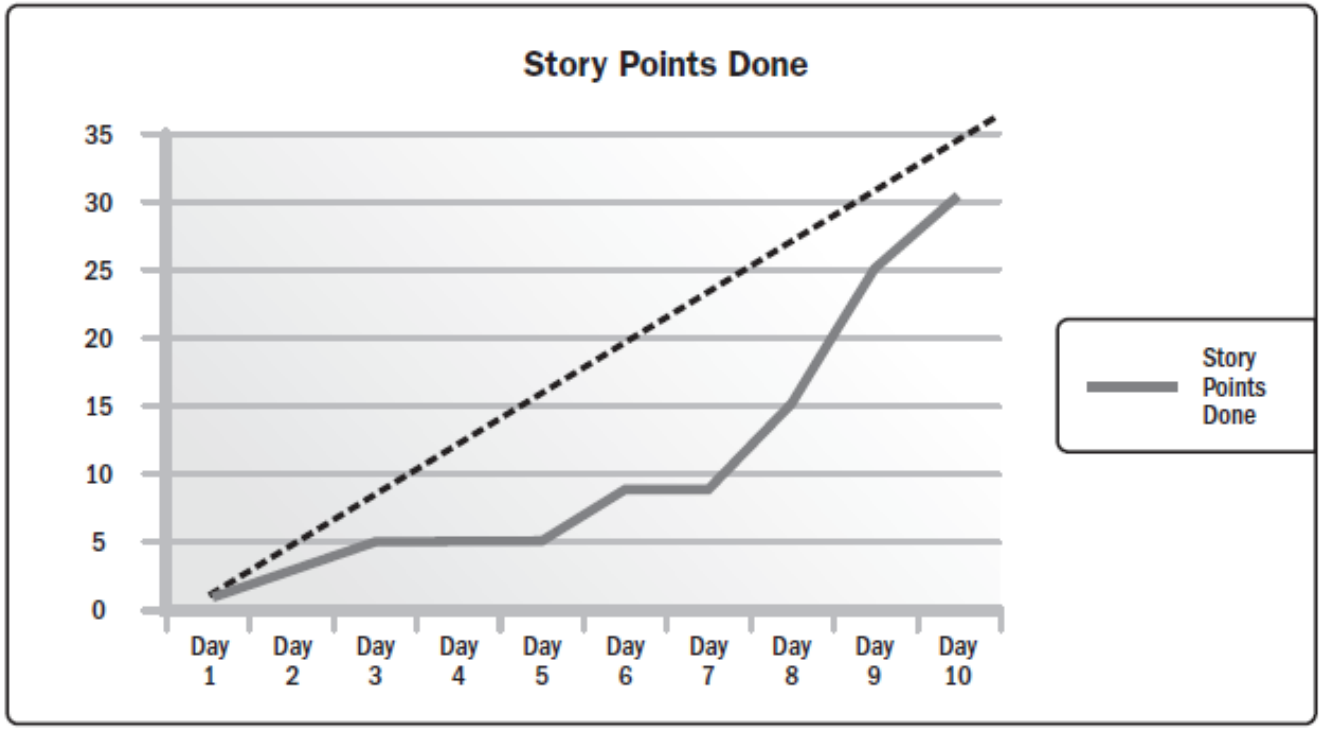


Figure 2-30. Burnup Chart

Measurement performance domain – Presenting information: Visual controls

- Other types of charts
  - **Impediment list** that shows
    - Description of the impediment to getting work done,
    - Severity, and
    - Actions being taken to resolve the impediment

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Measurement performance domain – Measurement pitfalls

- **Project measures** help the project team meet the **project objectives**.
  - However, there are **some pitfalls** associated with measurement
    1. Hawthorne effect
    2. Vanity metric
    3. Demoralization
    4. Misusing the metrics
    5. Confirmation bias
    6. Correlation versus causation

Measurement performance domain – Measurement pitfalls

- **Project measures** help the project team meet the **project objectives**.
  - However, there are **some pitfalls** associated with measurement
    - **Hawthorne effect.** The Hawthorne effect states that the very act of measuring something influences behavior. Therefore, take care in establishing metrics. For example, measuring only a project team's output of deliverables can encourage the project team to focus on creating a large volume of deliverables rather than focusing on deliverables that would provide higher customer satisfaction.

Measurement performance domain – Measurement pitfalls

- **Project measures** help the project team meet the **project objectives**.
  - However, there are **some pitfalls** associated with measurement

    - **Vanity metric.** A vanity metric is a measure that shows data but does not provide useful information for making decisions. Measuring pageviews of a website is not as useful as measuring the number of new viewers.

Measurement performance domain – Measurement pitfalls

- **Project measures** help the project team meet the **project objectives**.
  - However, there are **some pitfalls** associated with measurement
    - **Demoralization.** If measures and goals are set that are not achievable, project team morale may fall as they continuously fail to meet targets. Setting stretch goals and aspirational measures is acceptable, but people also want to see their hard work recognized. Unrealistic or unachievable goals can be counterproductive.

Measurement performance domain – Measurement pitfalls

- **Project measures** help the project team meet the **project objectives**.
  - However, there are **some pitfalls** associated with measurement
    - **Misusing the metrics.** Regardless of the metrics used to measure performance, there is the opportunity for people to distort the measurements or focus on the wrong thing. Examples include:
      - Focusing on less important metrics rather than the metrics that matter most,
      - Focusing on performing well for the short-term measures at the expense of long-term metrics, and
      - Working on out-of-sequence activities that are easy to accomplish in order to improve performance indicators.

Measurement performance domain – Measurement pitfalls

- **Project measures** help the project team meet the **project objectives**.
  - However, there are **some pitfalls** associated with measurement
    - **Confirmation bias.** As human beings, we tend to look for and see information that supports our preexisting point of view. This can lead us to false interpretations of data.

Measurement performance domain – Measurement pitfalls

- **Project measures** help the project team meet the **project objectives**.
  - However, there are **some pitfalls** associated with measurement
    - **Correlation versus causation.** A common mistake in interpreting measurement data is confusing the correlation of two variables with the idea that one causes the other. For example, seeing projects that are behind schedule and over budget might infer that projects that are over budget cause schedule issues. This is not true, nor is it true that projects that are behind schedule cause budget overruns. Instead, there are likely other correlating factors that are not being considered, such as skill in estimating, the ability to manage change, and actively managing risk.

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Measurement performance domain – Troubleshooting performance

- Part of **measurement** is having agreed to plans for measures that are **outside the threshold ranges.**
- The **degree of variance** will depend on **stakeholder risk tolerances**.

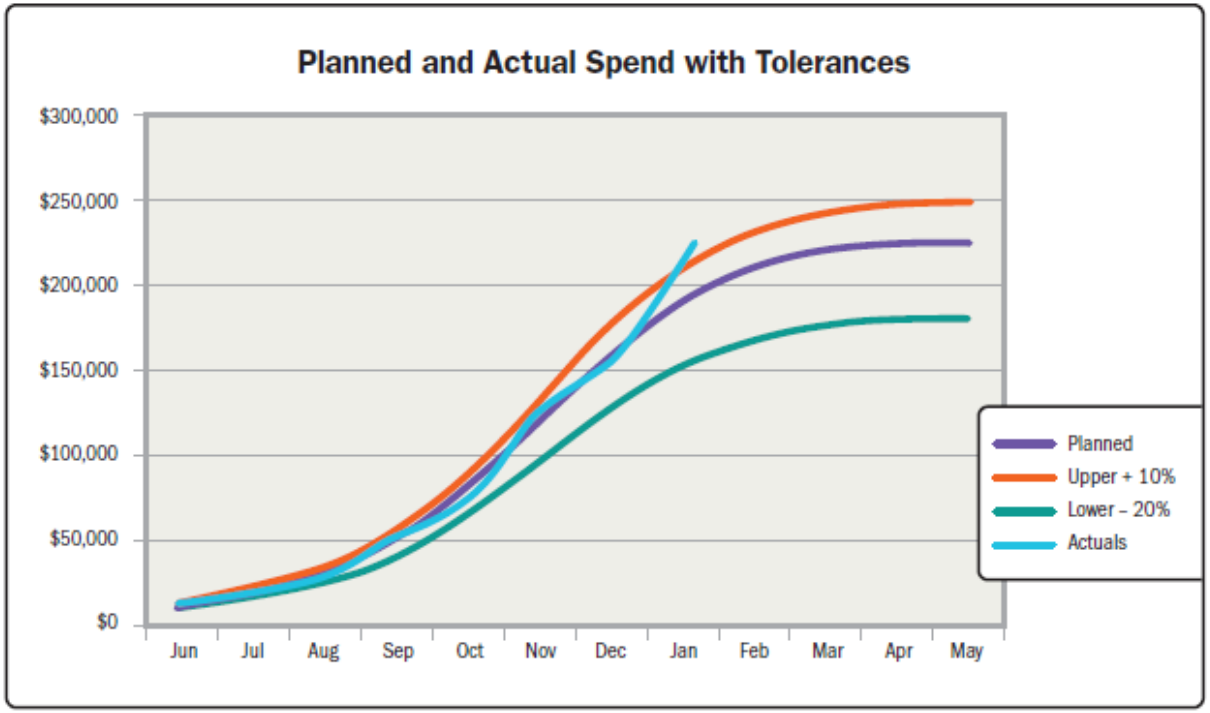

Figure 2-31. Planned and Actual Spend Rates

Measurement performance domain – Troubleshooting performance

Ideally, project teams should not wait until a threshold has been breached before taking action.

If a breach can be forecasted via a trend or new information, the project team can be proactive in addressing the expected variance.

Remember ACEMI courses?

Measurement performance domain

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Measurement performance domain – Growing and improving

- The **intent** in measuring and displaying data is to **learn and improve**.
- To **optimize** project performance and efficiency, **only measure and report information** that will:
  - Allow the project team to learn,
  - Facilitate a decision,
  - Improve some aspect of the product or project performance,
  - Help avoid an issue, and
  - Prevent performance deterioration.

- Applied appropriately, measurements facilitate the project team's ability to generate **business value** and achieve the **project objectives** and **performance targets**.

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Measurement performance domain – Interactions with other performance domains

- The **Measurement Performance Domain** **interacts** with the Planning, Project Work, and Delivery Performance Domains as plans form the basis for comparing the deliveries to plan.

- The **Measurement Performance Domain** can **support** the activities that are part of the Planning Performance Domain by presenting **up-to-date information** so that **lessons learned** can reflect favorable or unfavorable information for **updating plans**.

- The **Team and Stakeholder Performance Domains** interact as project team members **develop the plans and create the deliverables** and deliveries that are measured.

Measurement performance domain – Interactions with other performance domains

- **Responding to changes** caused by uncertain events that have occurred includes **updating measurements** that have been impacted **due to the change**.

- Activities in the **Uncertainty Performance Domain**, such as **identifying risks and opportunities**, can be initiated based on performance measurements.

- Part of the project work is **working with the project team and other stakeholders** to establish the metrics, gather the data, analyze the data, make decisions, and report on project status.

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  2. **What to measure**
  3. **Presenting information**
  4. **Measurement pitfalls**
  5. **Troubleshooting performance**
  6. **Growing and improving**
  7. **Interactions with other performance domains**
  8. **Checking results**

Measurement performance domain – Checking results

Table 2-9. Checking Outcomes—Measurement Performance Domain

Outcome	Check
A reliable understanding of the status of the project	Audit measurements and reports demonstrate if data is reliable.
Actionable data to facilitate decision making	Measurements indicate whether the project is performing as expected or if there are variances.
Timely and appropriate actions to keep project performance on track	Measurements provide leading indicators and/or current status leads to timely decisions and actions.
Achieving targets and generating business value by making informed and timely decisions based on reliable forecasts and evaluations	Reviewing past forecasts and current performance demonstrates if previous forecasts reflect the present accurately. Comparing the actual performance to the planned performance and evaluating business documents will show the likelihood of achieving intended value from the project.

A Guide To the Project Management Body of Knowledge

(Domain 8: Uncertainty Performance Domain)

Uncertainty performance domain

Uncertainty performance domain

UNCERTAINTY PERFORMANCE DOMAIN

The Uncertainty Performance Domain addresses activities and functions associated with risk and uncertainty.

Effective execution of this performance domain results in the following desired outcomes:

- An awareness of the environment in which projects occur, including, but not limited to, the technical, social, political, market, and economic environments.
- Proactively exploring and responding to uncertainty.
- An awareness of the interdependence of multiple variables on the project.
- The capacity to anticipate threats and opportunities and understand the consequences of issues.
- Project delivery with little or no negative impact from unforeseen events or conditions.
- Opportunities are realized to improve project performance and outcomes.
- Cost and schedule reserves are utilized effectively to maintain alignment with project objectives.

Uncertainty performance domain

The following definitions are relevant to the Uncertainty Performance Domain:

Uncertainty. A lack of understanding and awareness of issues, events, paths to follow, or solutions to pursue.

Ambiguity. A state of being unclear, having difficulty in identifying the cause of events, or having multiple options from which to choose.

Complexity. A characteristic of a program or project or its environment that is difficult to manage due to human behavior, system behavior, and ambiguity.

Volatility. The possibility for rapid and unpredictable change.

Risk. An uncertain event or condition that, if it occurs, has a positive or negative effect on one or more project objectives.

Uncertainty performance domain

Uncertainty in the broadest sense is a state of not knowing or unpredictability. There are many nuances to uncertainty, such as:

- Risk associated with not knowing future events,
- Ambiguity associated with not being aware of current or future conditions, and
- Complexity associated with dynamic systems having unpredictable outcomes.

Schedule uncertainty and risk

- The terms **risk** and **uncertainty** are often used **interchangeably**, **but** they have **distinct definitions** in program risk analysis.
  1. ***Risk*** refers to decision-making situations under which **all potential outcomes** and their **likelihood of occurrences** are **known** to the decision-maker.
  2. ***Uncertainty*** refers to situations under which **either** the **outcomes** **and/or** their **probabilities of occurrences** are **unknown** or **little** to the decision-maker.

Stated another way, risk and its outcomes can be quantified in some definite way, while uncertainty cannot be defined because of ambiguity.

Definitions of risk and uncertainty vary across organizations, government agencies, and even fields of study. For example, some organizations consider risk as only the unfavorable outcome of an uncertain event.

Uncertainty performance domain

- **Aspects of the environment** that contribute to project **uncertainty** include, but are not limited to:
  - **Economic factors** such as volatility in prices, availability of resources, ability to borrow funds, and inflation/deflation;
  - **Technical considerations** such as new or emerging technology, complexity associated with systems, and interfaces;
  - **Legal or legislative** constraints or requirements;
  - **Physical environment** as it pertains to safety, weather, and working conditions;
  - **Ambiguity** associated with current or future conditions;
  - **Social** and **market** influences shaped by opinion and media; and,
  - **Political** influences, either external or internal to the organization.

Uncertainty performance domain

- We will talk about the following in this section:
  1. **General uncertainty**
  2. **Ambiguity**
  3. **Complexity**
  4. **Volatility**
  5. **Risk**
  6. **Interactions with other performance domains**
  7. **Checking results**

Uncertainty performance domain

- We will talk about the following in this section:
  1. General uncertainty
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  3. Complexity
  4. Volatility
  5. Risk
  6. Interactions with other performance domains
  7. Checking results

Uncertainty performance domain – General uncertainty

Uncertainty is associated with change; as the pace of change increases, uncertainty increases proportionally; the more turbulent the environment, the greater the uncertainty. Typically, ongoing operation or business as usual (BAU) generates little or no uncertainty whereas change has high uncertainty (see Exhibit 1).

Exhibit 1. Uncertainty relationship with business portfolio of actions

Uncertainty performance domain – General uncertainty

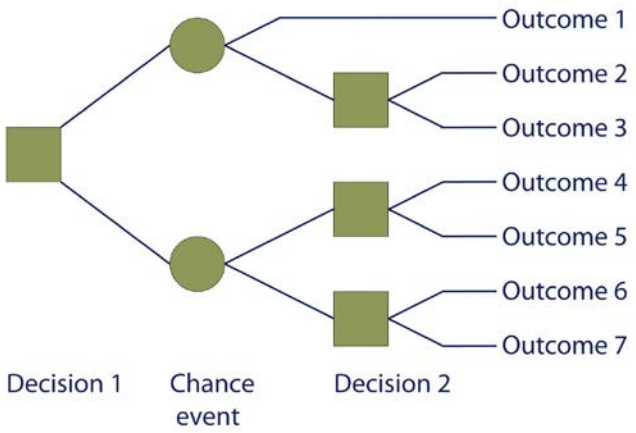
- Together, the set of opportunities and threats comprise the set of project risks
- There are several options for **responding to uncertainty**:
  1. Gather information
  2. Prepare for multiple outcomes
  3. Set-based design
  4. Build in resilience

Uncertainty performance domain – General uncertainty

- Together, the set of opportunities and threats comprise the set of project risks
- There are several options for **responding to uncertainty**:
  - **Gather information.** Sometimes uncertainty can be reduced by finding out more information, such as conducting research, engaging experts, or performing a market analysis. It is also important to recognize when further information collection and analysis exceed the benefit of having the additional information.

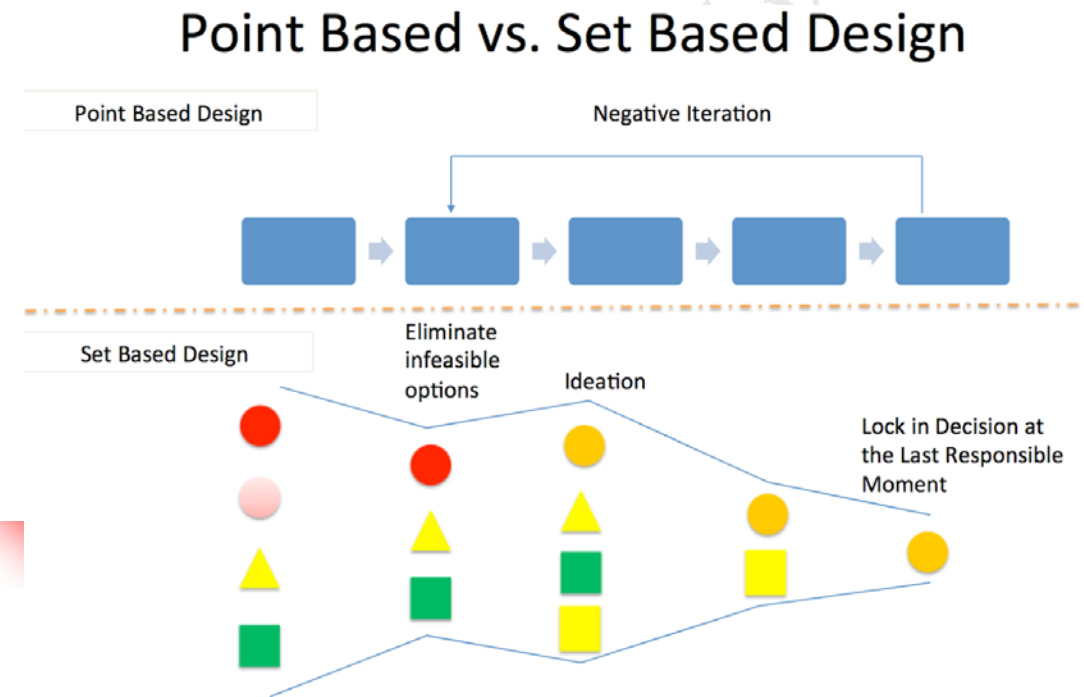
Uncertainty performance domain – General uncertainty

- Together, the set of opportunities and threats comprise the set of project risks
- There are several options for **responding to uncertainty**:
  - **Prepare for multiple outcomes.** In situations where there are only a few possible outcomes from an area of uncertainty, the project team can prepare for each of those outcomes. This entails having a primary solution available, as well as having backup or contingency plans in case the initial solution is not viable or effective. Where there is a large set of potential outcomes, the project team can categorize and assess the potential causes to estimate their likelihood of occurrence. This allows the project team to identify the most likely potential outcomes on which to focus.



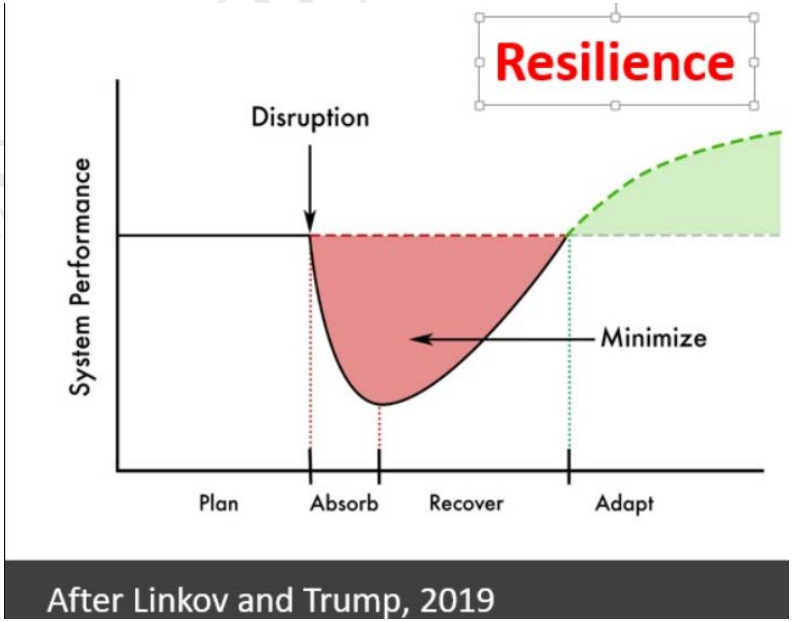
Uncertainty performance domain – General uncertainty

- Together, the set of opportunities and threats comprise the set of project risks
- There are several options for **responding to uncertainty**:
  - **Set-based design.** Multiple designs or alternatives can be investigated early in the project to reduce uncertainty. This allows the project team to look at trade-offs, such as time versus cost, quality versus cost, risk versus schedule, or schedule versus quality. The intention is to explore options so the project team can learn from working with the various alternatives. Ineffective or suboptimal alternatives are discarded throughout the process.



Uncertainty performance domain – General uncertainty

- Together, the set of opportunities and threats comprise the set of project risks
- There are several options for **responding to uncertainty**:
  - **Build in resilience.** Resilience is the ability to adapt and respond quickly to unexpected changes. Resilience applies to both project team members and organizational processes. If the initial approach to product design or a prototype is not effective, the project team and the organization need to be able to learn, adapt, and respond quickly.



After Linkov and Trump, 2019

Uncertainty performance domain

- We will talk about the following in this section:
  1. General uncertainty
  2. Ambiguity
  3. Complexity
  4. Volatility
  5. Risk
  6. Interactions with other performance domains
  7. Checking results

Uncertainty performance domain – Ambiguity

Exhibit 1. Uncertainty relationship with business portfolio of actions

Uncertainty performance domain – Ambiguity

- There are **two categories** of ambiguity:
  1. Conceptual ambiguity
  2. Situational ambiguity

Uncertainty performance domain – Ambiguity

- **Conceptual ambiguity—**

  the **lack of effective understanding—**

  occurs when people **use similar terms** or arguments in **different ways**.

- *For example, the statement, "The schedule was reported on track last week," is not clear.*

  1. It isn't clear whether the schedule was on track last week or whether it was reported on last week.
  2. In addition, there could be some question as to what "on track" means.
     - Ambiguity of this type can be reduced by formally establishing common rules and definitions of terms, such as what does "on track" mean.

Uncertainty performance domain – Ambiguity

- **Situational ambiguity** surfaces when **more than one outcome** is possible.
  - Having **multiple options to solve** a problem is a form of situational ambiguity.
- **Solutions** for exploration of ambiguity include progressive elaboration, experimentation, and the use of prototypes.

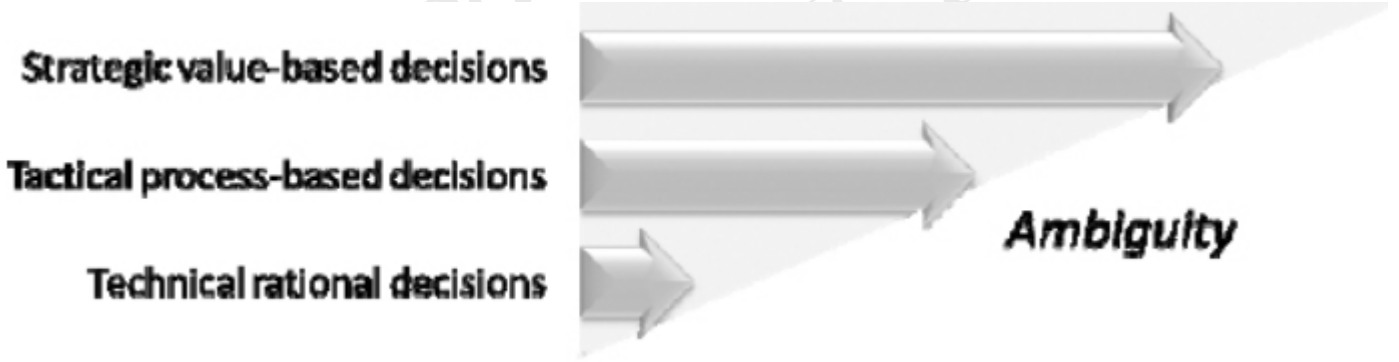
▶ **Progressive elaboration.** This is the **iterative process** of increasing the level of detail in a project management plan as greater amounts of information and **more accurate estimates** become available.

▶ **Experiments.** A well-designed series of experiments can help identify **cause-and-effect relationships** or, at least, can reduce the amount of ambiguity.

▶ **Prototypes.** Prototypes can help **distinguish** the relationships between **different variables.**

Uncertainty performance domain – Ambiguity

Exhibit 1. Uncertainty relationship with business portfolio of actions



Uncertainty performance domain – Ambiguity

Exhibit 3. Uncertainty and ambiguity variation over time

We have now seen that uncertainty is linked to a lack of accurate information and can be resolved with rational decision making whereas ambiguity is the product of complexity, which increases the potential choices and can only be resolved with value-based decision making. We will now examine how the combination of uncertainty and ambiguity affects the behavior of the decision makers.

Uncertainty performance domain – Ambiguity

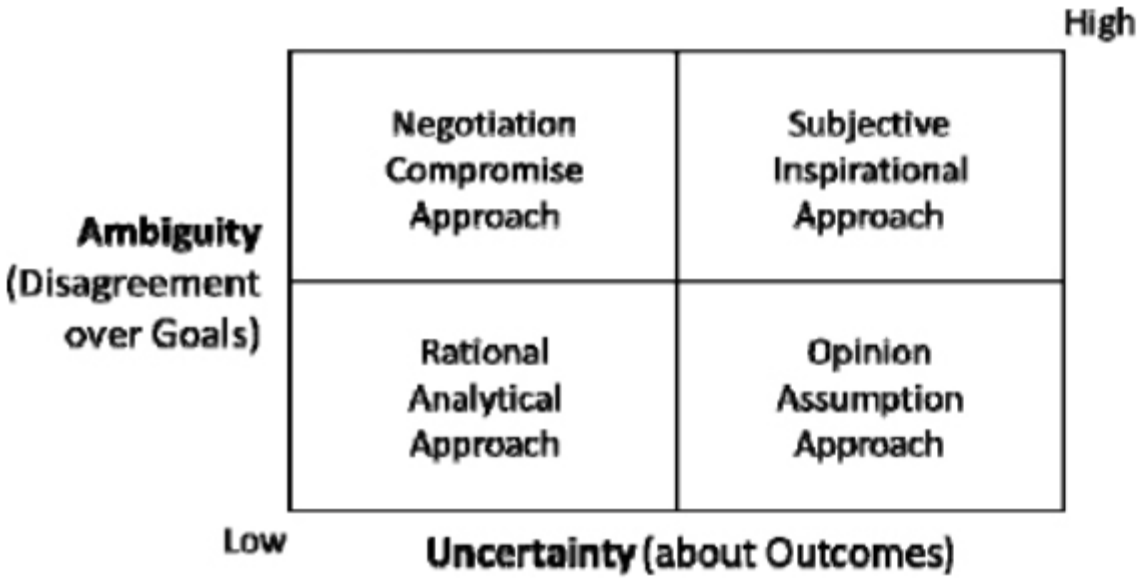


Exhibit 4. Choice of approach to decision making (Adapted from Earl & Hopwood, 1980)

https://www.pmi.org/learning/library/ambiguity-management-new-frontier-6285

Uncertainty performance domain

- We will talk about the following in this section:
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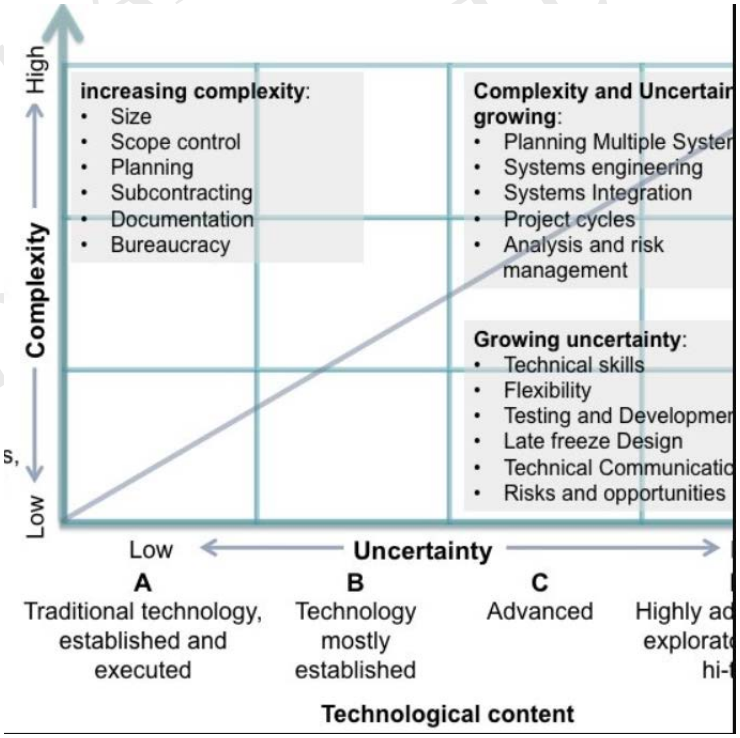
  6. Interactions with other performance domains
  7. Checking results

Uncertainty performance domain – Complexity

- The **effect of complexity** is that there is **no way of making accurate predictions** about the **likelihood** of any potential outcome or even of knowing what outcomes might emerge.
- There are **numerous ways to work** with complexity;
  1. System-based
  2. Reframing
  3. Process-based



Uncertainty performance domain – Complexity: System-based

- The **effect of complexity** is that there is **no way of making accurate predictions** about the **likelihood** of any potential outcome or even of knowing what outcomes might emerge.

Examples of working with complexity that is systems based include:

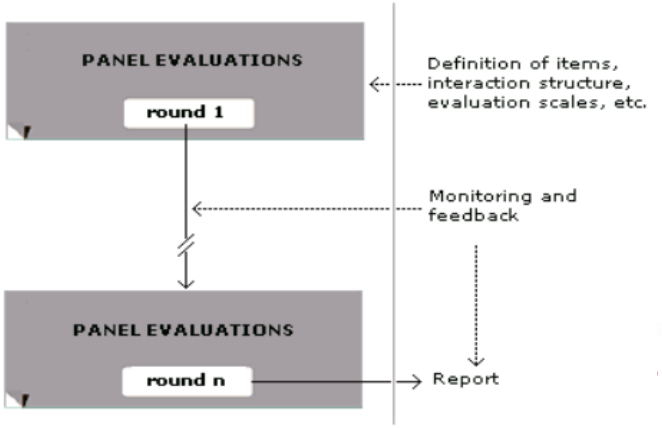
- **Decoupling.** Decoupling entails disconnecting parts of the system to both simplify the system and reduce the number of connected variables. Determining how a piece of a system works on its own reduces the overall size of the problem.
- **Simulation.** There may be similar though unrelated scenarios that can be used to simulate components of a system. A project to build a new airport that includes an area with shopping and restaurants can learn about consumer buying habits by seeking out analogous information on shopping malls and entertainment establishments.

Uncertainty performance domain – Complexity: Reframing

- The **effect of complexity** is that there is **no way of making accurate predictions** about the **likelihood** of any potential outcome or even of knowing what outcomes might emerge.

Examples of working with complexity that entail reframing are:

- **Diversity.** Complex systems require viewing the system from diverse perspectives. This can include brainstorming with the project team to open up divergent ways of seeing the system. It can also include Delphi-like processes to move from divergent to convergent thinking.
- **Balance.** Balancing the type of data used rather than only using forecasting data or data that report on the past or lagging indicators provides a broader perspective. This can include using elements whose variations are likely to counteract each other's potential negative effects.



Uncertainty performance domain – Complexity: Reframing

- The **effect of complexity** is that there is **no way of making accurate predictions** about the **likelihood** of any potential outcome or even of knowing what outcomes might emerge.

Examples of working with complexity that is process based include:

- **Iterate.** Build iteratively or incrementally. Add features one at a time. After each iteration, identify what worked, what did not work, customer reaction, and what the project team learned.
- **Engage.** Build in opportunities to get stakeholder engagement. This reduces the number of assumptions and builds learning and engagement into the process.
- **Fail safe.** For elements of a system that are critical, build in redundancy or elements that can provide a graceful degradation of functionality in the event of a critical component failure.

Uncertainty performance domain

- We will talk about the following in this section:
  1. General uncertainty
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  5. Risk
  6. Interactions with other performance domains
  7. Checking results

Uncertainty performance domain – Volatility

- **Volatility** exists in an environment that is subject to rapid and unpredictable change.
- Volatility can occur **when** there are ongoing **fluctuations** in available skill sets or materials.
- Volatility usually impacts cost and schedule.
- Alternatives analysis and use of cost or schedule reserve **address volatility**.

Uncertainty performance domain – Volatility

- **Alternatives analysis.** Finding and evaluating alternatives, such as looking at different ways to meet an objective, such as using a different mix of skills, resequencing work, or outsourcing work. Alternatives analysis may include identifying the variables to be considered in evaluating options, and the relative importance or weight of each variable.
- **Reserve.** Cost reserve can be used to cover budget overruns due to price volatility. In some circumstances, schedule reserve can be used to address delays due to volatility associated with resource availability.

Uncertainty performance domain

- We will talk about the following in this section:
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Uncertainty performance domain – Risk

- Project team members should **proactively identify risks** throughout the project to avoid or minimize the impacts of **threats** and trigger or maximize the impacts of **opportunities**.
- The project team needs to know what **level of risk exposure is acceptable** in pursuit of the project objectives.
- This is defined by **measurable risk thresholds** that reflect the risk appetite and attitude of the organization and project stakeholders.
- **Thresholds** are typically **stated and communicated** to the project team and reflected in the definitions of risk impact levels for the project.

Uncertainty performance domain – Risk

The Relationship Between Risk Tolerance and Risk Appetite

For Swanepoel, risk tolerance is the level of risk that an organization can accept **per individual risk**, whereas risk appetite is the **total risk that the organization can bear in a given risk profile**, usually expressed in aggregate. Risk tolerance is related to the **acceptance of the outcomes of a risk** should they occur, and having the right resources and controls in place to absorb or "tolerate" the given risk, expressed in qualitative and/or quantitative risk criteria. On the other hand, risk appetite is related to the **longer term strategy of what needs to be achieved** and the resources available to achieve it, expressed in quantitative criteria.

Uncertainty performance domain – Risk: Risk appetite

The degree of uncertainty an organization or individual is willing to accept in anticipation of a reward. PMBOK ver 6.

Risk appetite is the total exposed amount that an organization wishes to undertake on the basis of risk-return trade-offs for one or more desired and expected outcomes. RIMS

Uncertainty performance domain – Risk tolerance

Risk tolerance is the identified range of acceptable outcomes

Key is "sensitivity that is willing to accept"

Example:

Suppose you are requesting for a project and pitching in an estimate of approximately 500,000 USD. While you are bidding, an organization member informs you that you are not permitted to bid more than the 5% of this amount. Subsequently, 5% will be your tolerance limit.

"

Risk tolerance is a range and is usually expressed as a percentage below and above the planned value – either project budget or schedule.

"

Uncertainty performance domain – Risk

According to PMBOK 6th Edition:

"

Risk threshold is the degree of exposure which risks are addressed and below which risks might be acknowledged.

"

Key is "amount beyond which not want to tolerate"

Threshold. A predetermined value of a measurable project variable that represents a limit that requires action to be taken if it is reached. PMBOK ver 6.

Example:

You are thinking to bid an agreement. The worth of the contract is estimated to be 200,000 USD. In the middle of the process, you are told that your organization is encountering some financial problems and they are unable to go beyond 5,000 USD, in addition to 200,000 USD. In this situation, your threshold for the project comes out to be 5,000 USD.

Uncertainty performance domain – Risk

Risk Appetite vs Risk Tolerance vs Risk Threshold

- Risk appetite is the amount of risk that an organization is willing to take in order to meet its strategic goals. It shows the organization's hunger to take risks depending on the reward. In practice, it is not possible to quantify hunger. Therefore you can grade the Risk appetite of an organization from low to high.
- Risk tolerance is the willingness of an organization to accept or avoid risk. It can be described as an acceptable variance percentage.
- Risk threshold the amount beyond which an organization does not want to tolerate the risk. It can be described as an acceptable value (or a quantified limit).

Uncertainty performance domain – Risk

Risk Attitude

Risk attitude is a function of *risk appetite, risk tolerance and risk threshold.* This holds true for a person or stakeholders and organization both. The risk attitude of an organization or stakeholders is typically calculated in measurable units. Every company has people with different attitudes about risk. This is how the organization or an individual **perceives risk.**

Source: 5 Risk Tolerance Considerations for Project Managers

"

Risk attitude is the organization's or individuals' view/perspective of the perceived qualitative and quantitative value that may be gained in comparison to the related potential loss or losses. RIMS

"

Uncertainty performance domain – Risk

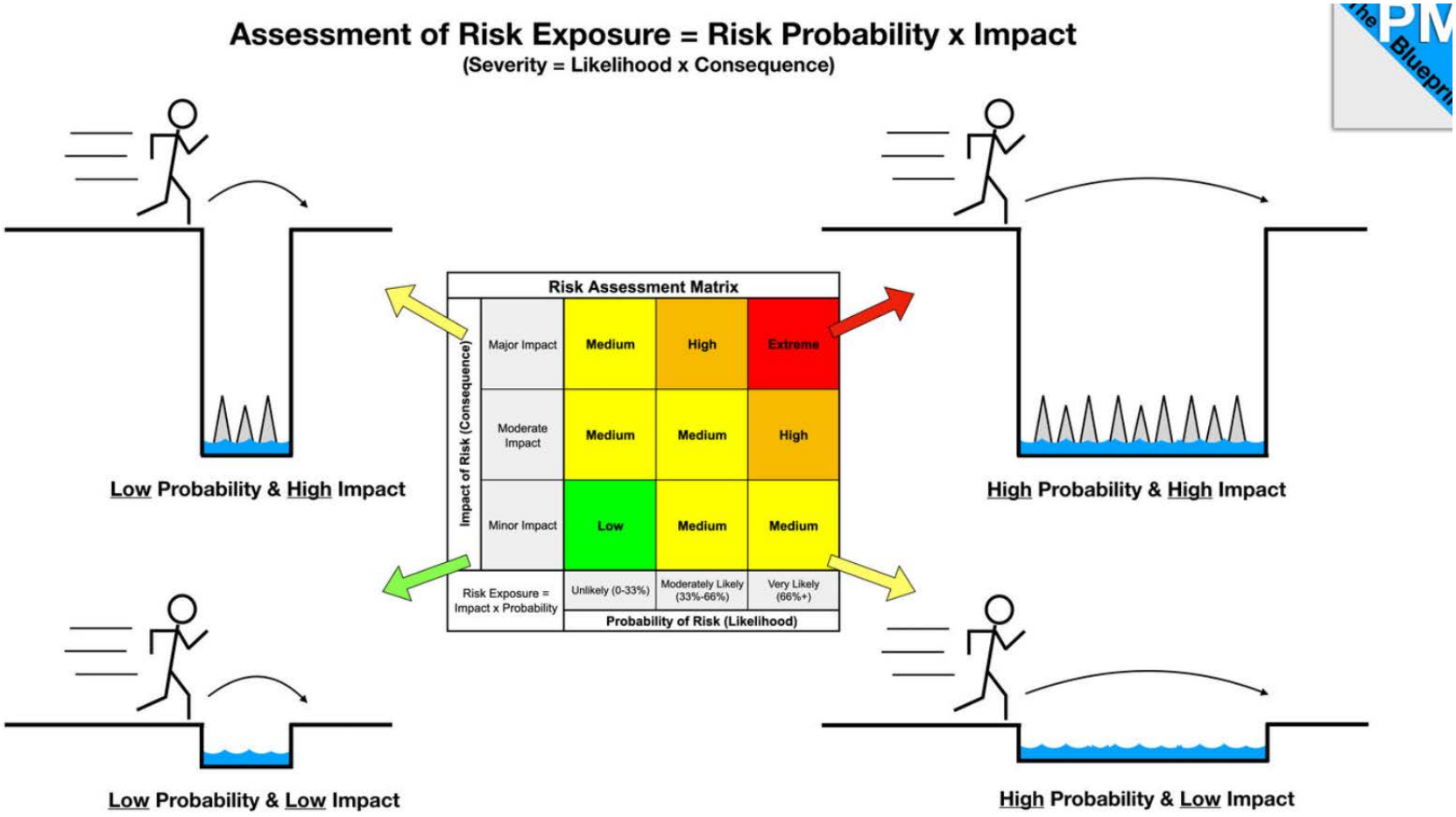
Overall Project Risk

Overall project risk is the effect of uncertainty on the project as a whole, arising from all sources of uncertainty. This includes individual risks and the exposure to the implications of variation in project outcome, both positive and negative. Overall risk is often a function of complexity, ambiguity, and volatility. Responses to overall project risk are the same as for individual threats and opportunities, though responses are applied to the overall project rather than to a specific event. If the overall risk on the project is too high, the organization may choose to cancel the project.

Uncertainty performance domain – Risk: Threats

- Five alternative strategies may be considered for dealing with threats, as follows:
  - **Avoid.** Threat avoidance is when the project team acts to eliminate the threat or protect the project from its impact.
  - **Escalate.** Escalation is appropriate when the project team or the project sponsor agrees that a threat is outside the scope of the project or that the proposed response would exceed the project manager's authority.
  - **Transfer.** Transfer involves shifting ownership of a threat to a third party to manage the risk and to bear the impact if the threat occurs.
  - **Mitigate.** In threat mitigation, action is taken to reduce the probability of occurrence and/or impact of a threat. Early mitigation action is often more effective than trying to repair the damage after the threat has occurred.
  - **Accept.** Threat acceptance acknowledges the existence of a threat, but no proactive action is planned. Actively accepting a risk can include developing a contingency plan that would be triggered if the event occurred; or it can include passive acceptance, which means doing nothing.

Uncertainty performance domain – Risk: Threats



Uncertainty performance domain – Risk: Threats

		Jan			Feb			Mar			Apr		
ID	Short Risk Name	Impact	Probability	Severity	Impact	Probability	Severity	Impact	Probability	Severity	Impact	Probability	Severity
1	Permits obtained	3	3	9	3	2	6	3	0	0	3	0	0
2	Site not ready in time	2	2	4	2	0	0	2	0	0	2	0	0
3	Early road thaw	3	2	6	3	1	3	2	1	2	3	0	0
4	Production reserve	2	2	4	2	3	6	2	2	4	2	1	2
5	Pump capacity	3	1	3	3	2	6	3	3	9	3	3	9

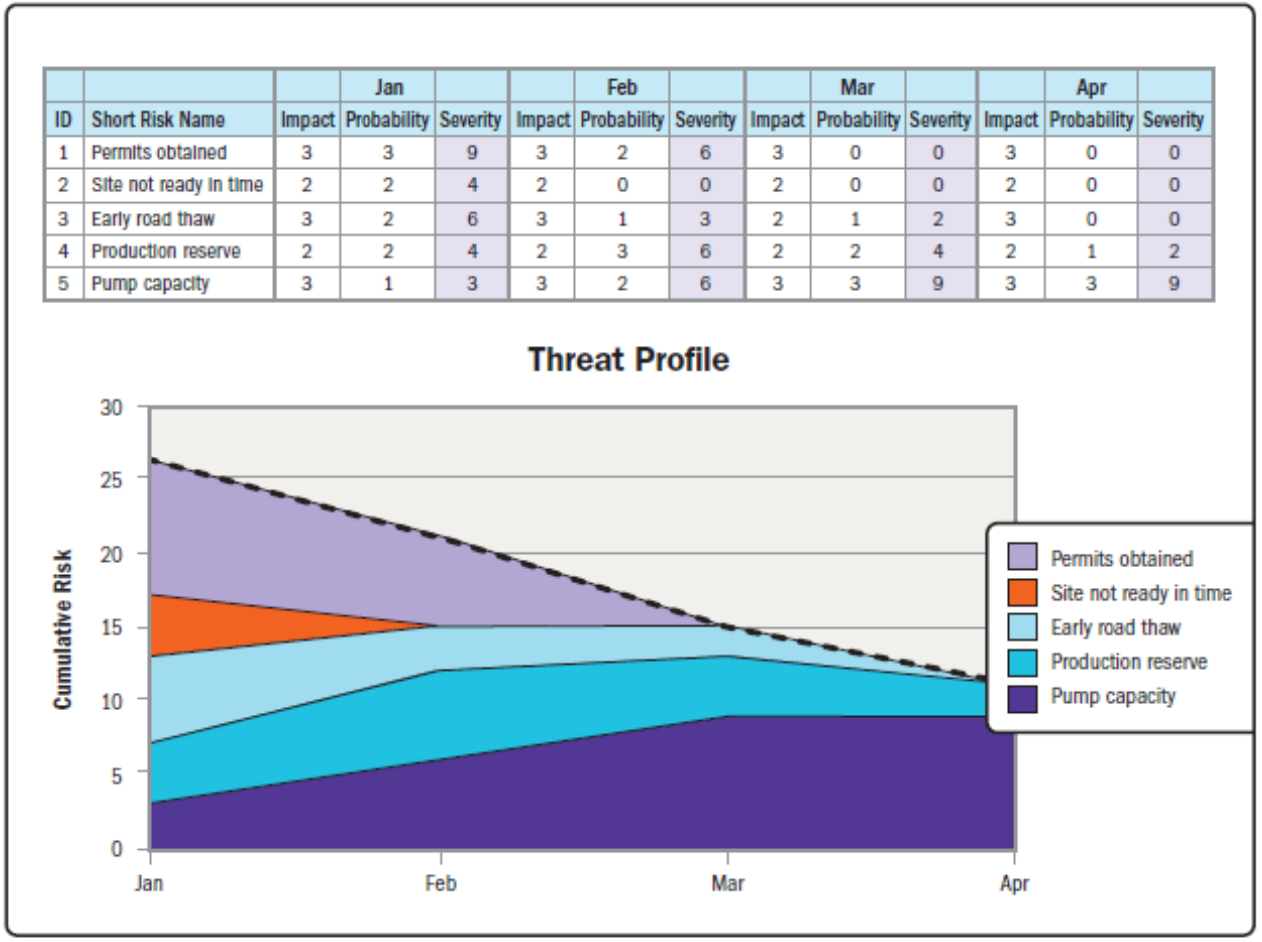


Figure 2-33. Risk Reduction over Time

Uncertainty performance domain – Risk: Opportunities

- An example of an opportunity could be a **time and materials-based subcontractor** who **finishes work early**, resulting in **lower costs and schedule savings**.
- Five alternative strategies may be considered for dealing with opportunities, as follows:
  - **Exploit.** A response strategy whereby the project team acts to ensure that an opportunity occurs.
  - **Escalate.** As with threats, this opportunity response strategy is used when the project team or the project sponsor agrees that an opportunity is outside the scope of the project or that the proposed response would exceed the project manager's authority.
  - **Share.** Opportunity sharing involves allocating ownership of an opportunity to a third party who is best able to capture the benefit of that opportunity.
  - **Enhance.** In opportunity enhancement, the project team acts to increase the probability of occurrence or impact of an opportunity. Early enhancement action is often more effective than trying to improve the opportunity after it has occurred.
  - **Accept.** As with threats, accepting an opportunity acknowledges its existence but no proactive action is planned.

Uncertainty performance domain – Risk

- Once a **set of risk responses** has been developed, it should be reviewed to see whether the **planned responses** have added **any secondary risks**.
  - The review should also assess the **residual risk** that will remain once the response actions have been carried out.
- Response planning should be **repeated until residual risk** is **compatible** with the organization's risk appetite.

Uncertainty performance domain – Risk

Taking an economic view of work prioritization allows the team to prioritize threat avoidance and reduction activities.

Comparing the expected monetary value (EMV) of a risk to the anticipated return on investment (ROI) of a deliverable or feature allows the project manager to have conversations with sponsors or product owners about where and when to incorporate risks responses into the planned work (see Figure 2-34).

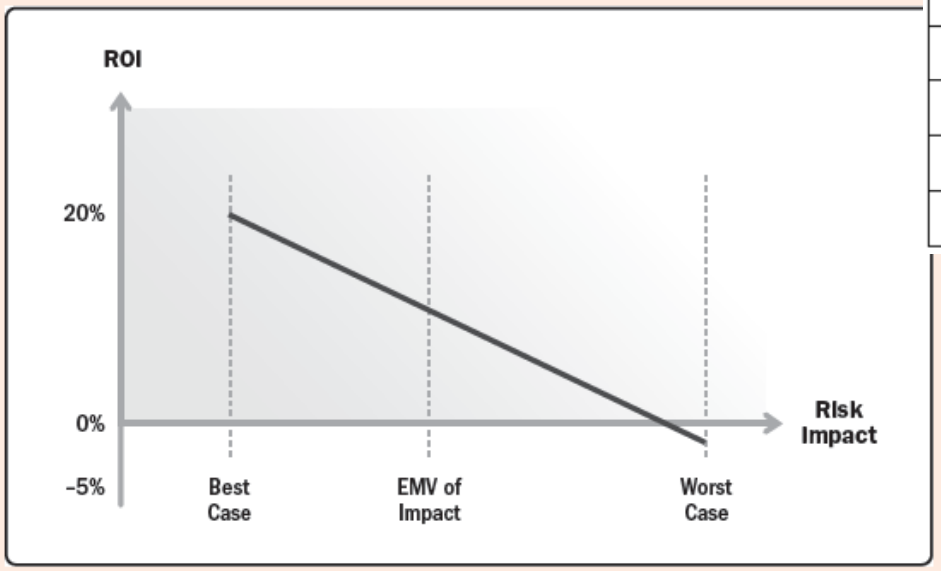


Figure 2-34. Risk-Adjusted ROI Curve

Risk	Probability	Impact (USD)	EMV (Probability * Impact)
1	10%	-4,000	-400
2	30%	-1,000	-300
3	25%	2,000	500
4	60%	-1,500	-900
		-4,500	**-1,100**

Uncertainty performance domain – Risk: Management and contingency reserve

- Reserve is an amount of **time or budget set aside** to account for handling risks.
- Contingency reserve is set aside to address **identified risks** should they occur.
- Management reserve is a budget category used for **unknown events** such as unplanned, in-scope work.

Uncertainty performance domain – Risk: Risk review

- **Daily standup meetings** can be used in any project and are a source for identifying potential threats and opportunities.
  1. **Reports of blockers or impediments** could become threats if they continue to delay progress.
  2. **Reports of progress and breakthroughs** might point toward opportunities to be further leveraged and shared.
- Addressing risk at **weekly status meetings** ensures that risk management remains relevant.

These meetings can be used to

identify new risks as well as identify changes to existing risks.

Uncertainty performance domain – Risk: Risk review

- **Retrospectives and lessons learned meetings** can be used

  to identify threats to performance, project team cohesion, etc., and to seek improvements.

- They can also help identify practices to try **different ways** to exploit and enhance opportunities.

Uncertainty performance domain

- We will talk about the following in this section:
  1. General uncertainty
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  4. Volatility
  5. Risk
  6. Interactions with other performance domains
  7. Checking results

Uncertainty performance domain – Interactions with other performance domains

- The **Uncertainty Performance Domain** interacts with the Planning, Project Work, Delivery, and Measurement Performance Domains from the product or deliverable perspective.
  - As planning is conducted, activities to reduce uncertainty and risks can be built into the plans.
  - These are carried out in the Delivery Performance Domain.
  - Measurements can indicate if the risk level is **changing over time**.

- Project team members and other stakeholders are the main sources of information **regarding uncertainty**.

Uncertainty performance domain – Interactions with other performance domains

- The choice of life cycle and development approach impact **how uncertainty** will be addressed.
  1. On a predictive project where the **scope is relatively stable**,
     reserve in the schedule and budget can be used to **respond to risks**.
  2. On a project using an adaptive approach where the requirements are **likely to evolve** and where there may be **ambiguity around how systems will interact or how stakeholders will react**,
     the project team can **adjust plans** to reflect evolving understanding or use reserves to offset the impacts of realized risks.

Uncertainty performance domain

- We will talk about the following in this section:
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Uncertainty performance domain – Checking results

Table 2-10. Checking Outcomes—Uncertainty Performance Domain

Outcome	Check
An awareness of the environment in which projects occur, including, but not limited to, the technical, social, political, market, and economic environments	The team incorporates environmental considerations when evaluating uncertainty, risks, and responses.
Proactively exploring and responding to uncertainty	Risk responses are aligned with the prioritization of project constraints, such as budget, schedule, and performance.
An awareness of the interdependence of multiple variables on the project	Actions to address complexity, ambiguity, and volatility are appropriate for the project.
The capacity to anticipate threats and opportunities and understand the consequences of issues	Systems for identifying, capturing, and responding to risk are appropriately robust.
Project delivery with little or no negative impact from unforeseen events or conditions	Scheduled delivery dates are met, and the budget performance is within the variance threshold.
Realized opportunities to improve project performance and outcomes	Teams use established mechanisms to identify and leverage opportunities.
Cost and schedule reserves used effectively to maintain alignment with project objectives	Teams take steps to proactively prevent threats, thereby limiting use of cost or schedule reserve.

(Domain 8: Uncertainty Performance Domain)

Construction Extension to the PMBOK Guide

(Project Risk Management)

Project risk management in construction

Most of the material on project risk management in the *PMBOK® Guide* and in the *Practice Standard for Project Risk Management* [5] is applicable to risk management for construction projects. This section of the *Construction Extension* presents additional considerations and guidelines for managing construction project risks.

What are the factors common to construction industry that result in risk?

Project risk management in construction

Every construction project, regardless of its size and complexity, continually faces a variety of uncertain situations due to factors common to the construction industry, such as:

- Long duration and aggressive schedules;
- Changing environment and the dynamic nature of the workplace;
- Complex technical processes;
- Open locations highly exposed to environmental agents;
- Unskilled workforce;
- Material shortages;
- Different organizations actively involved in the construction project with different goals, interests, and expectations;
- Many works being of public interest;
- Change in material prices; and
- Regulatory requirements.

Project risk management in construction

Let's see

1. **Project risk management planning**
2. **Project risk management monitoring and controlling**

Project risk management planning

- We will talk about the following in this section:
  1. Bidding and contract documents
  2. Organizational methods
  3. Budgeting
  4. Scoring and interpretation
  5. Project risk management planning under collaborative construction project arrangements
  6. Project risk management planning in public-private-partnership (PPP)
  7. Project risk management planning in international projects
  8. Risk identification in construction projects
  9. Qualitative risk analysis in construction projects
  10. Quantitative risk analysis in construction projects
  11. Plan risk responses in construction projects
  12. Insurance in construction projects

Project risk management planning

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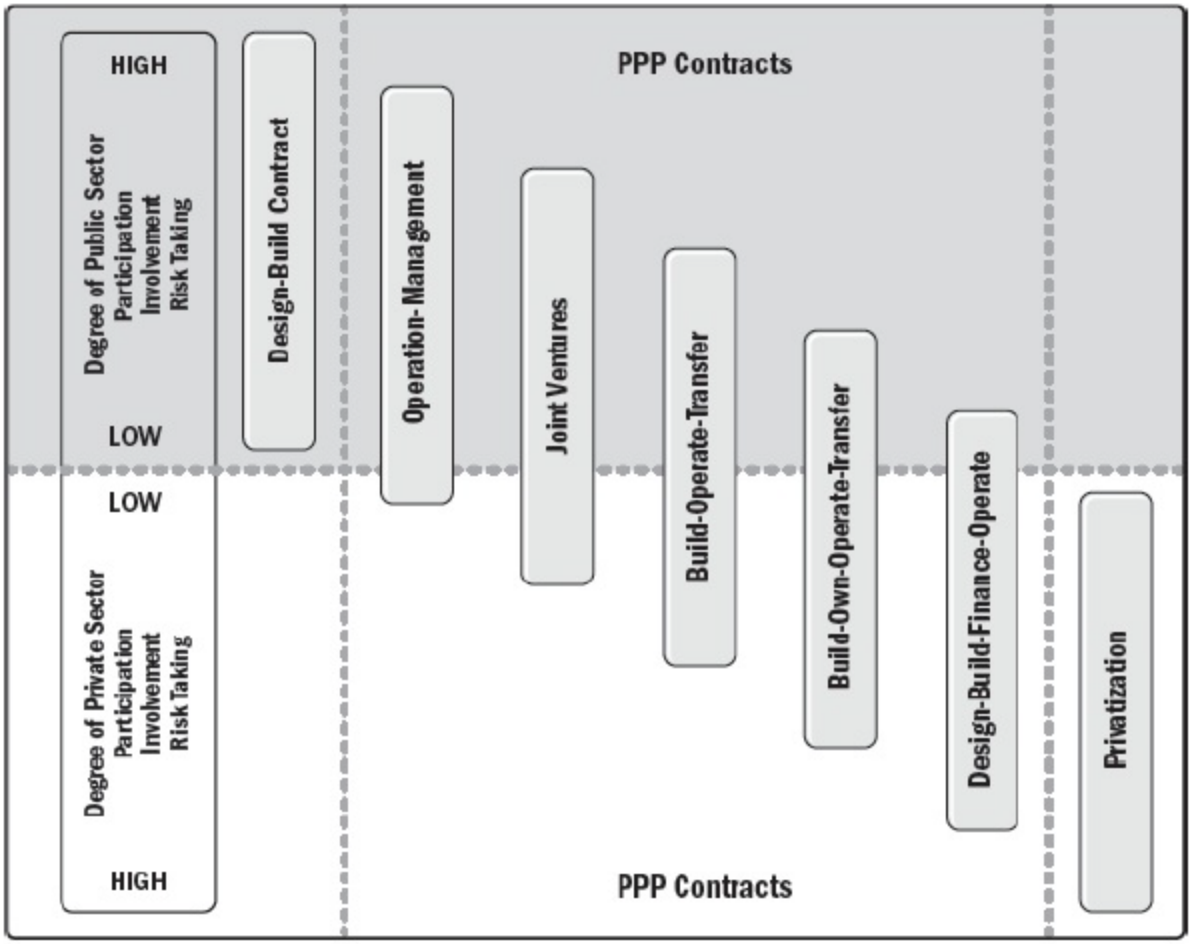
Project risk management planning - PPP

Project risks are transferred to the party best able to manage them at the lowest cost on an agreed-upon basis, taking public interest into account.

Figure 11-1 shows commonly used PPP contract types. PPP lies between a full public sector provision design-build contract and a full private sector participation privatization. Private sector risk taking increases from left to right in the figure.



Project risk management planning

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Project risk management planning – International

The proposed classification of potential risks is described in Appendix X3. In addition to the most common causes of risks in construction projects, international projects bear additional potential sources of risks, including but not limited to:

- Custom procedures, import duties, and import and export restrictions;
- Cultural and religious practices effects on working patterns, cultural differences, and language barriers;
- Time zone and legal working days differences between site and central office;
- Local labor union practices;
- Local weather patterns (e.g., monsoon season);
- Local regulations;
- Safety and security concerns (e.g., terrorism);
- Constraints on employment of expatriate staff and/or work visa procedures;
- Regulated professional services granted to locals, government pressures to use local suppliers, and investment requirements involving the use of local employees; and
- Currency convertibility (exchange rate fluctuations) and/or restrictions on repatriation of funds.

Project risk management planning

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Project risk management planning – Risk identification

Identifying risks is an iterative process. Construction projects develop and evolve through successive project phases. Previously identified risks may change and new risks may appear throughout the project life cycle.

Risks can be classified according to many different approaches, among other options commonly used as classification systems:

- Depending upon the source, within or outside the organization (e.g., internal and external risks);
- According to the type of project (e.g., local or international project);
- Depending on the parties who will be responsible for managing the risks or the different agents involved in the whole construction process;
- Following the work breakdown structure;
- According to the sources of risk; and
- According to the project life cycle, or phase.

Project risk management planning – Risk identification

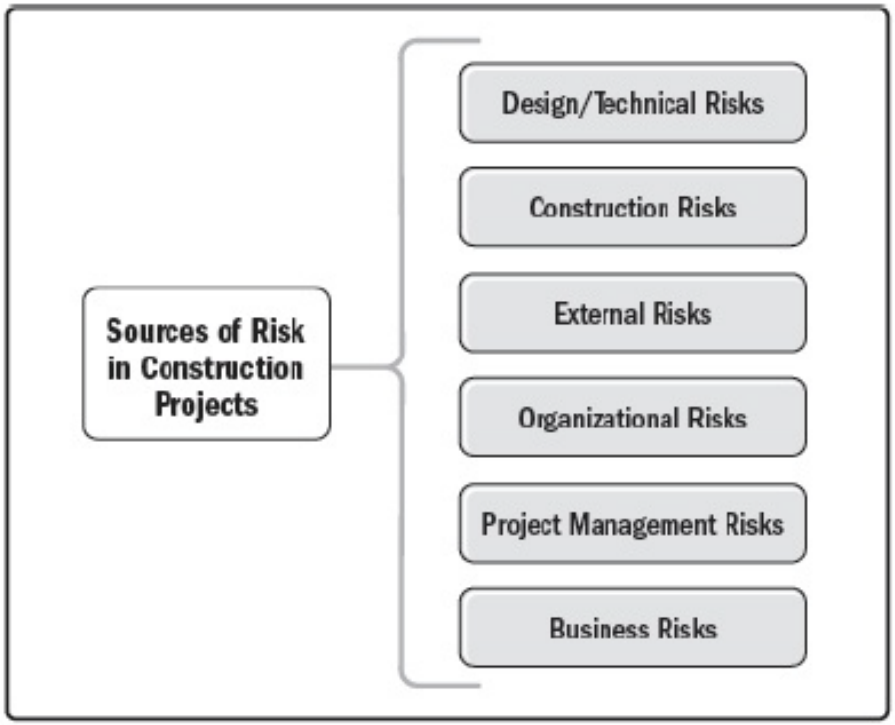

Figure 11-2. Example of Generic Categorization by Sources of Risks

Project risk management planning

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Project risk management planning – Insurance

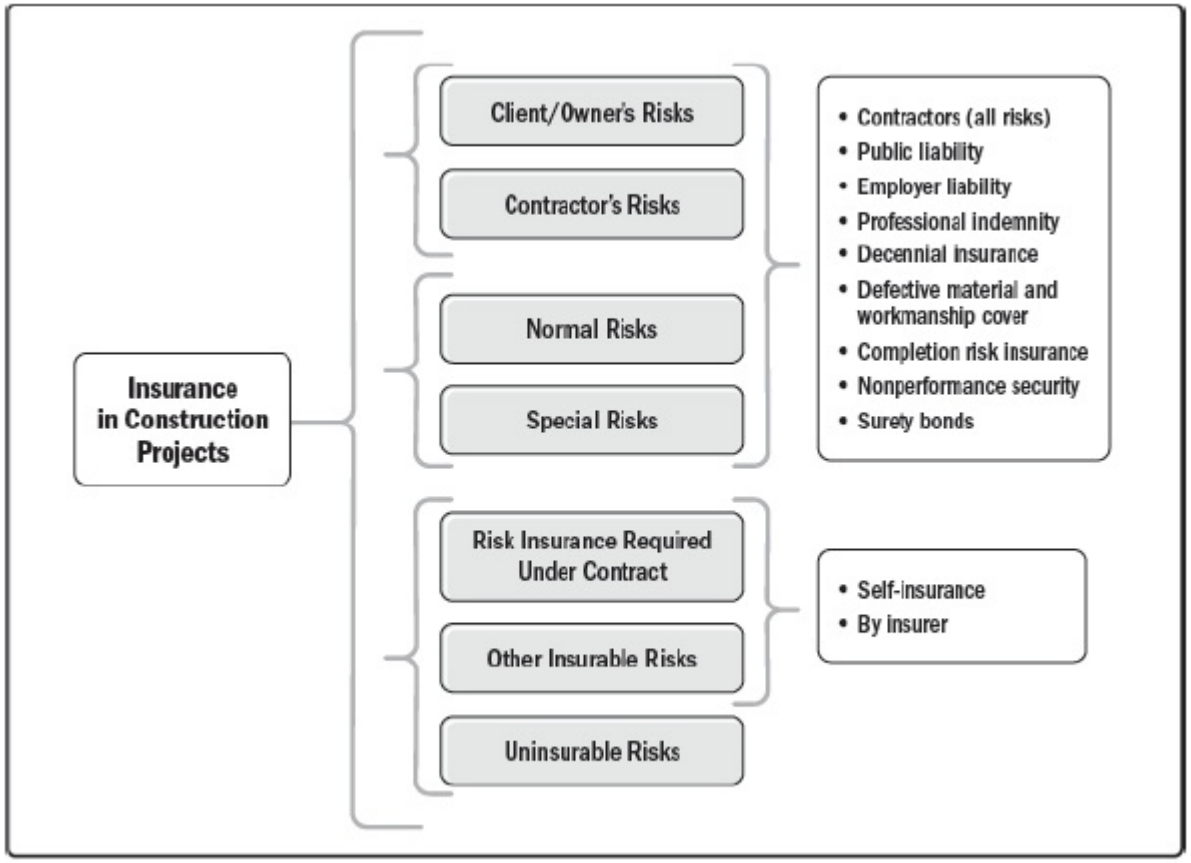

Figure 11-3. Types of Insurance Used in Construction Projects

Project risk management planning – Insurance

Some of the most common insurance practices are listed below. For further description with considerations for local variations according to regulations, jurisdictional legislation, and specific local designation refer to the Glossary.

- Construction all risks insurance, contractor's all risk (CAR), erection all risks (EAR), contract works insurance, builder's risk insurance, and general liability (GL) insurance;
- Insurance coverage for construction defects and defects liability bond;
- Civil liability insurance, public liability insurance, and employer's liability insurance;
- Industrial special risk and business interruption insurance;
- Wrap-up insurance policies: owner- and contractor-controlled insurance programs (OCIP and CCIP);
- Professional indemnity insurance and professional liability insurance;
- Integrated project insurance;
- Latent defects insurance and inherent defects insurance (IDI);
- Collateral warranty;
- Surety bonds including performance, payment and bid bonds, contract bond, contract performance guarantee, tender bond, and retention bond;
- Decennial insurance;
- Joint venture coverage and insuring design-build risks; and
- Advanced loss of profits, delayed completion cover, and delay in start-up cover (DSU).

Project risk management monitoring and controlling

Risk management is a dynamic process. Risk identification, analysis, response planning, and risk monitoring and controlling should be a proactive process performed continually along the project life cycle, particularly for large construction projects or those in dynamic environments. As the project evolves, project risks may change, the probability and impact of identified risks may change, new triggers may emerge, identified risks may disappear, secondary and residual risks may arise, and new risks may emerge. The risk register should be periodically reviewed, identified risks should be reassessed, project risk information should be updated, and the effectiveness of risk response actions and control measures should be monitored and evaluated.

Communication with project stakeholders is important in order to periodically assess the acceptable level of risk on the project. Standard templates for risk status reports may be a helpful tool for project risk reporting.

مدیریت پروژه بر اساس PMBOK به همراه الحاقیه ساخت

(ویرایش هفتم)

بخش پنجم:

متناسبت‌سازی (Tailoring)

ارائه دهندگان:

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What we will learn?

- Overview
- Why tailor?
- What to tailor?
- The tailoring process
- Tailoring the performance domains
- Diagnostics
- Summary

Overview

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Introduction

- Tailoring is the **deliberate adaptation** of the project management approach, governance, and processes

  to make them **more suitable** for the given environment and the work at hand.

In a project environment, tailoring considers the development approach, processes, project life cycle, deliverables, and choice of people with whom to engage. The tailoring process is driven by the guiding project management principles in *The Standard for Project Management* [1], organizational values, and organizational culture.

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Introduction

The alternative to tailoring is using an unmodified framework or methodology. There are many methodologies available that provide descriptions of processes, phases, methods, artifacts, and templates to be used in projects. These methodologies and their components are not customized to the organizational context.

Most of these methodologies have clear instructions stating they should not be applied rigorously but should be subject to a process of tailoring to determine which elements are most useful given the particular type, size, and complexity of the project. Some inexperienced practitioners try to apply the methodology verbatim without regard to project size, complexity, duration, or organizational context.

Why Tailor?

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Why?

The structure used to deliver projects can be extensive or minimal, rigorous or lightweight, robust or simple. There is no single approach that can be applied to all projects all of the time. Instead, tailoring should reflect the size, duration, and complexity of each individual project and should be adapted to the industry, organizational culture, and level of project management maturity of the organization.

What To Tailor?

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What?

- Project aspects that can be tailored include:
  1. **Life cycle and development approach selection**
  2. **Processes**
  3. **Engagement**
  4. **Tools, and**
  5. **Methods and artifacts**

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Life cycle and development approach selection

- Deciding on a **life cycle** and the **phases** of the life cycle is an example of tailoring.
- Additional tailoring can be done **when selecting** the development and delivery approach for the project.
  - Some large projects may use a **combination** of development and delivery approaches simultaneously.
    - ✓ *For instance, building a **new data center** could involve*

      *(a) the use of **predictive approaches** for **the physical building construction and finishing** and*

      *(b) an **iterative approach** for **understanding and establishing the computing capabilities** required.*

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Processes

- **Process tailoring** for the selected life cycle and development approach includes **determining which portions or elements** should be:
  - *Added,* to bring required rigor, coverage, or address unique product or operating environment conditions, etc. (e.g., adding independent inspections for safety-critical projects);
  - *Modified,* to better suit the project or project team requirements (e.g., modifying the format of project documents to accommodate project team members with vision limitations);
  - *Removed,* to reduce cost or effort since it is no longer required or is not economical for the value it adds (e.g., removing the creation of meeting minutes for a small, colocated project team with good communications);
  - *Blended,* to bring additional benefits or value by mixing or combining elements (e.g., adding appreciative inquiry methods from organizational management to the lessons learned meetings of predictive project management to help foster better collaboration); and
  - *Aligned,* to harmonize elements so there is consistent definition, understanding, and application (e.g., many disciplines have standards and practices associated with risk management that are sufficiently different from each other that would need to be aligned). For example, on multidisciplinary project teams, different disciplines may have specific elements, such as their own language, tools, and practices related to the same area of focus.

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Engagement

- **Tailoring engagement** for the **people involved** in the project includes:
  - **People.** This entails evaluating the skills and capabilities of the project leadership and the project team; then selecting who should be involved and in what capacities based on the project type and operating conditions. For example, on a challenging or time-constrained project, assigning very experienced project team members is more logical than using inexperienced project team members.
  - **Empowerment.** Empowerment involves choosing which responsibilities and forms of local decision making should be deferred to the project team. Some environments and team member capabilities support high levels of empowerment. In other situations, less empowerment with more supervision and direction might be preferable.
  - **Integration.** Project teams can include contributors from contracted entities, channel partners, and other external entities in addition to staff from inside the sponsoring organization. Tailoring considers how to create one project team from a diverse collection of contributors to facilitate optimal project team performance and realization of project outcomes.

Tools

- **Selecting the tools** (e.g., software or equipment) the project team will use for the project is a **form of tailoring**.
- Often, the project team has the **best insight into the most suitable tools** for the situation,

  but those choices might need tempering based on the **associated costs**.
- Additionally, organizational leaders can **impose constraints** that the project team **cannot change**.

Methods and artifacts

- Tailoring the documents, templates, and other artifacts

  that will be **used on the project** helps to make sure the **artifacts are appropriate** for the project and the organization.

The Tailoring Process

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