Psychological Barriers to Recognizing Risk

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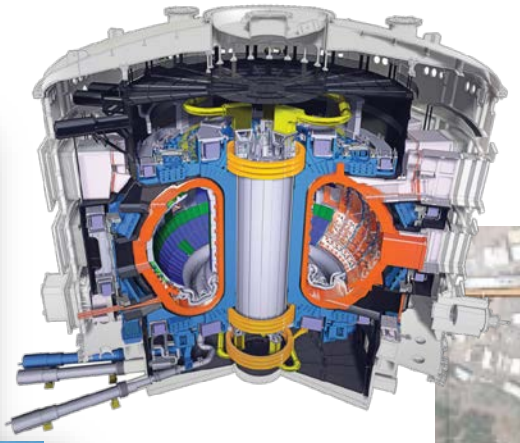
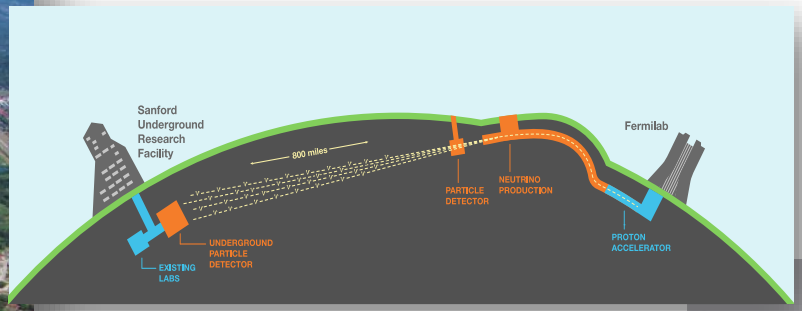
Introduction





Learning Objectives

- Choose appropriate levels of risk management
- Describe biases that can impact risk assessments
- Apply results of risk analysis appropriately

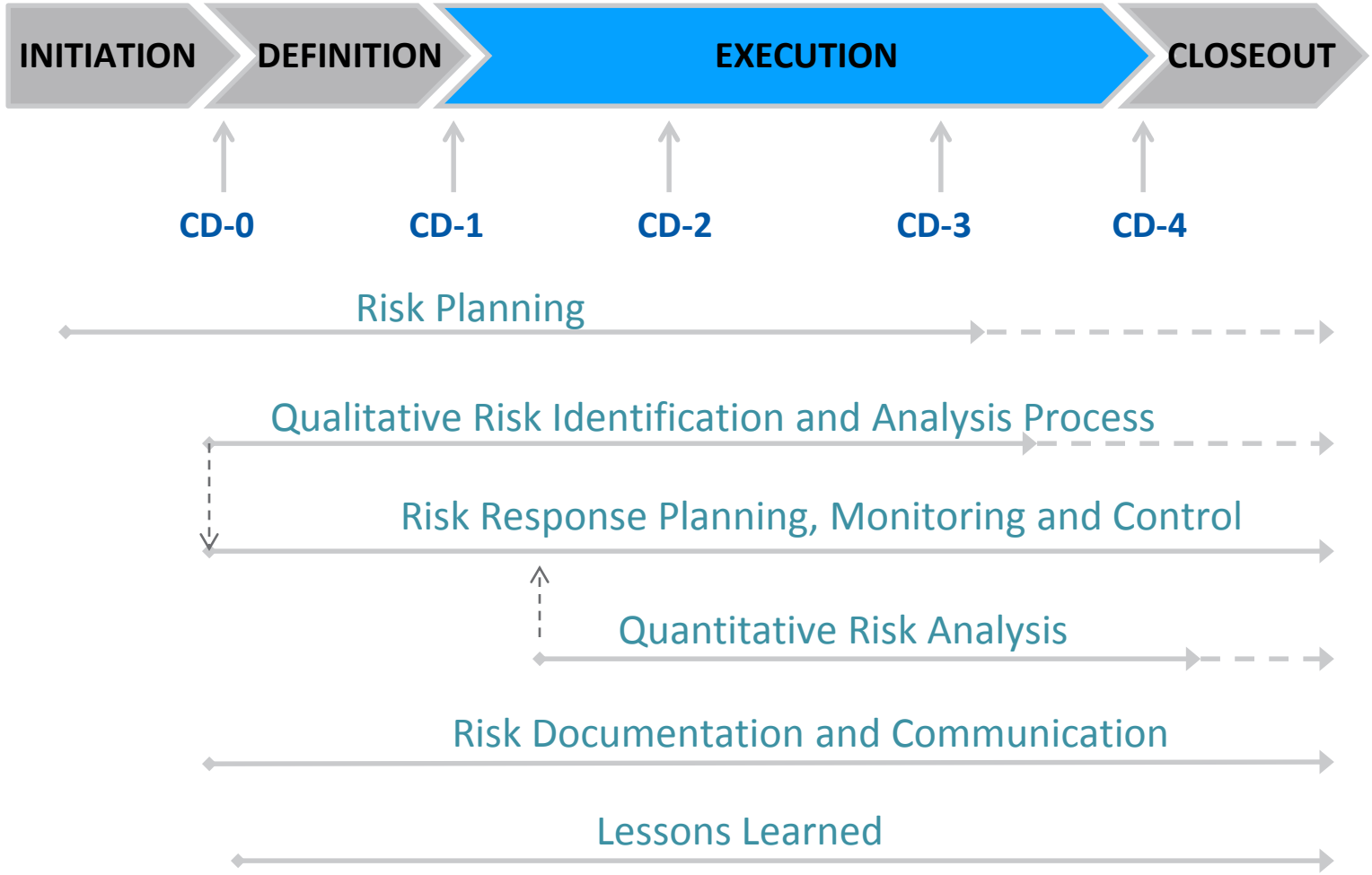
Risk Management Process

In a Nutshell

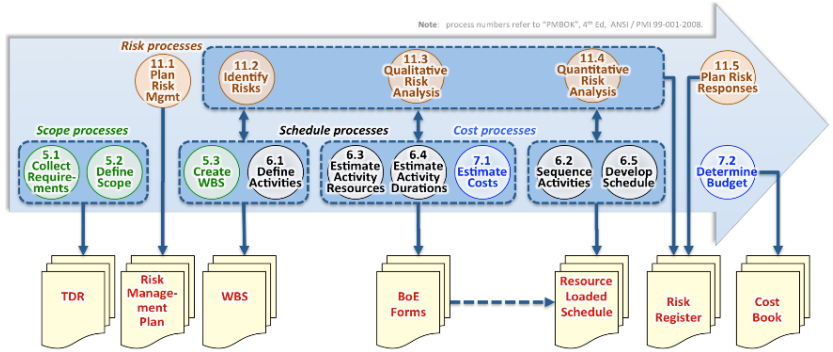
- Formal and structured process
- Anticipate and plan for potential problems and opportunities
- Better understand and control project outcomes

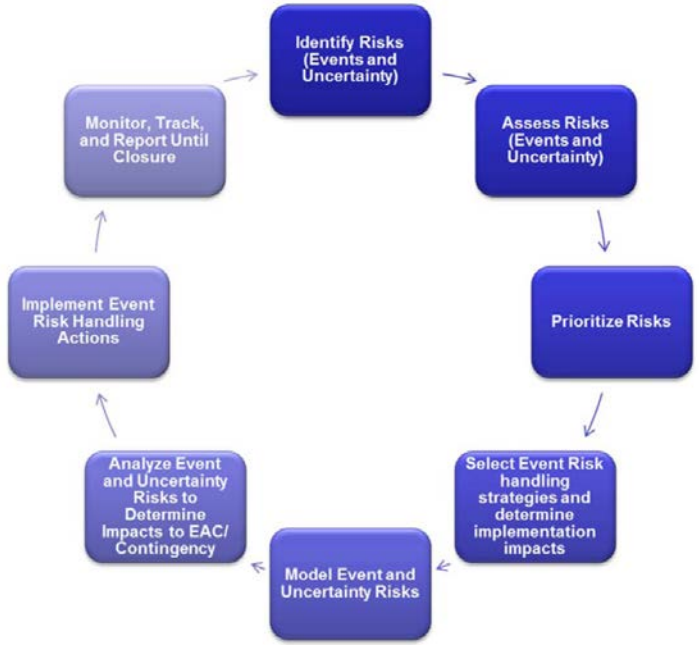
Risk is an uncertain event that, if it occurs, has a negative effect on a project objective

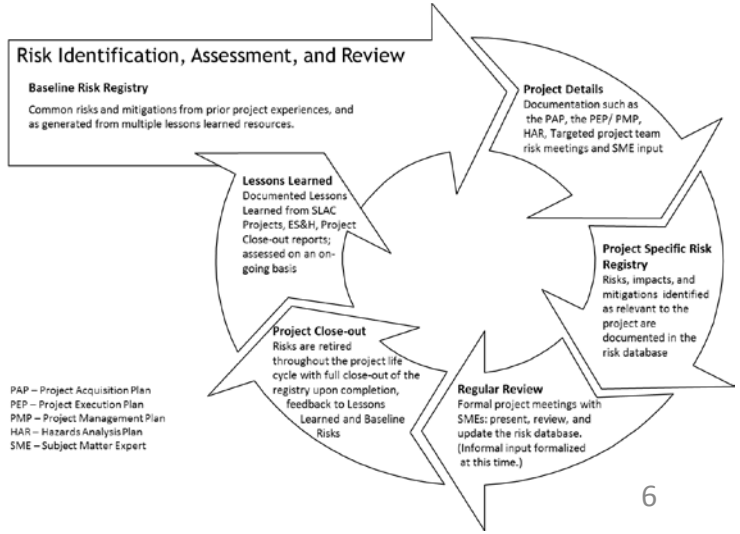
DOE Risk Management Process



DOE Risk Management Process Examples

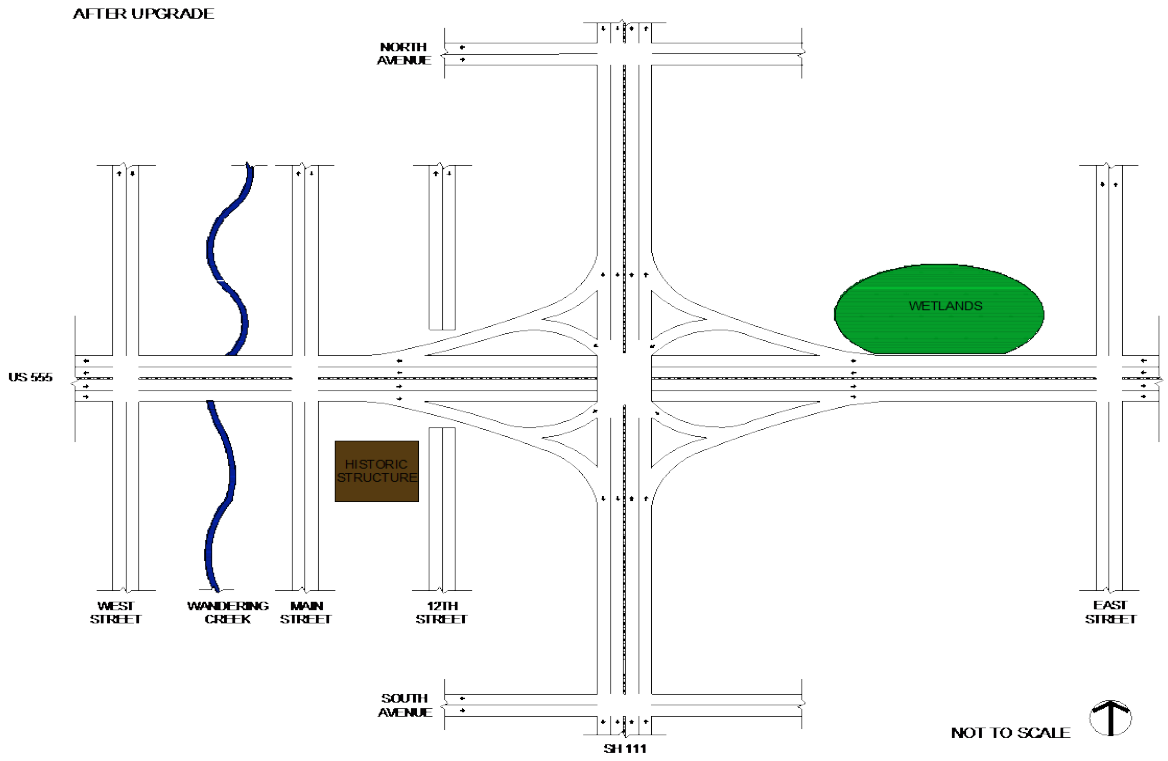




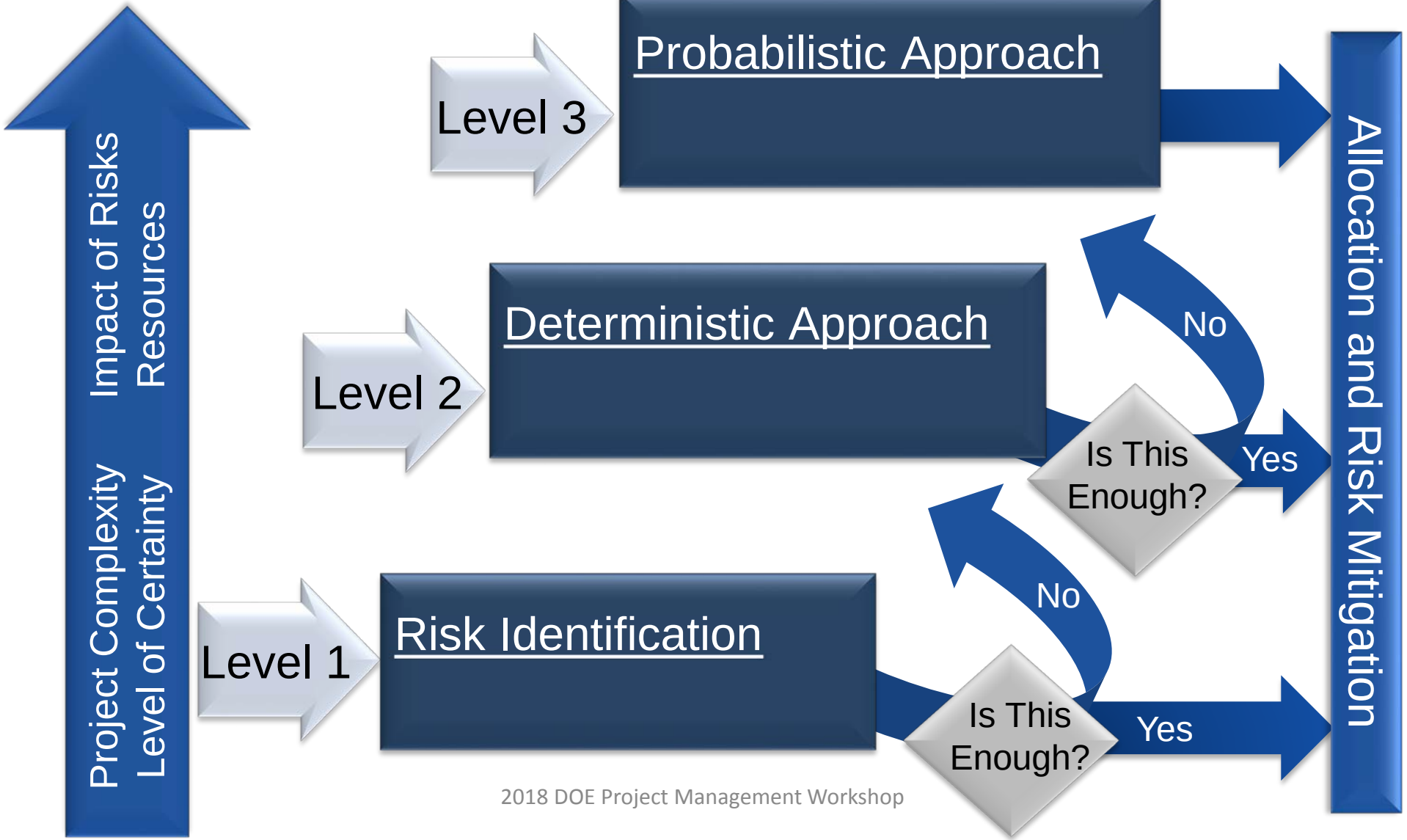


Appropriate Levels of Risk Management

Probabilistic Risk Management in Design and Construction Projects Construction Industry Institute (RT 280)



Appropriate Levels of Risk Management



Appropriate Levels of Risk Management

LEVEL 1 - RISK IDENTIFICATION

Item	Status	Date Identified	Brief Risk Description	Detailed Risk Description	CII Project Phases	Category of Impact
Manual	*Drop Down*	*(M*				
1	Active	0				
2	Active	0				
3	Active	0				
4	Active	0				
5	Active	0				

LEVEL 2 - DETERMINISTIC

Item #	Brief Risk Description	Category of Impact	Pre-Mitigated Risk Ranking			
			Most Likely Impact	Most Likely Probability	*Risk Mean Value (Dollars)*	*Overall Risk Ranking*
Auto						
1						
2						
3						
4						
5						

LEVEL 3 - PROBABILISTIC

Item #	Brief Risk Description	Category of Impact	Cost (Dollars)			Schedule (Days)		
			Best Case	*Most Likely*	*Worst Case*	*Best Case*	*Most Likely*	*Worst Case*
Auto								
1	Historic							
2	Change in an							
3	Replac Wan							
4	Additi m							
5	Delay in re							

RISK MANAGEMENT

Item #	Brief Risk Description	Response Action/Strategy	Deterministic: Post-Mitigated Risk Ranking			
			Most Likely Impact	Most Likely Probability	*Risk Mean Value + Cost of Mitigation*	*Overall Risk Ranking*
			Qualitative Value	*Qualitative Value*		
Auto	*Auto*	*Drop Down*	*Drop Down*	*Drop Down*	*Auto*	*Auto*
1	Historic Site Approval	Accept	Medium	Medium	$657,000	Med
2	Change in pavement section and/or type	Mitigate	Low	Low	$90,000	Low
3	Replace culvert over Wandering Creek	Transfer	Very Low	Low	$0	Low
4	Additional wetland mitigation	Mitigate	Low	Very Low	$22,500	Low
5	Delay in request for proposal	Accept	Medium	Low	$328,500	Med

Appropriate Levels of Risk Management

Appropriate Levels of Risk Management

Level 1

Risk Identification:

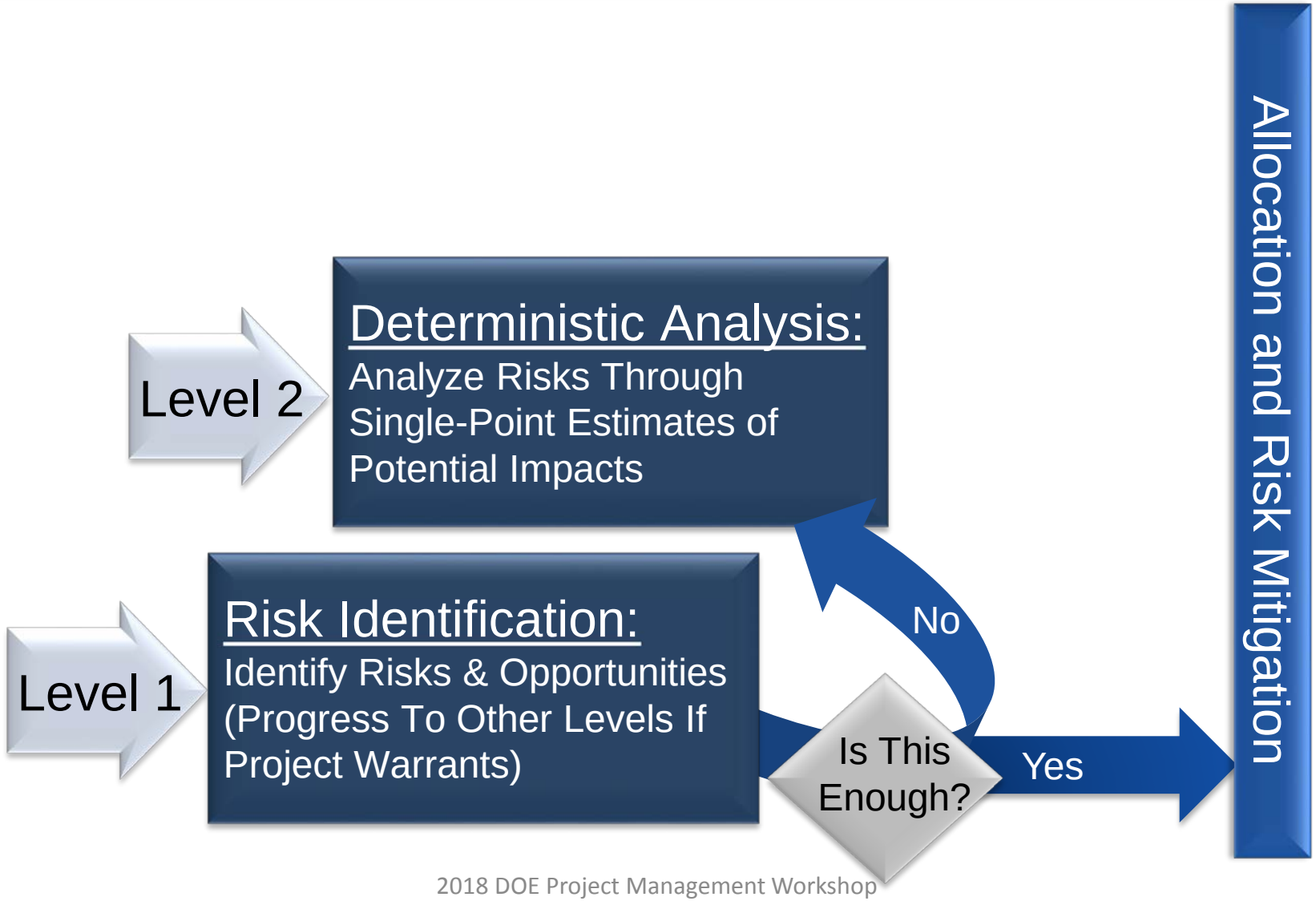
Identify Risks & Opportunities (Progress To Other Levels If Project Warrants)

Appropriate Levels of Risk Management

LEVEL 1 - RISK IDENTIFICATION

Item	Status	Date Identified	Brief Risk Description	Detailed Risk Description	CII Project Phases	Category of Impact
Manual	*Drop Down*	*Manual (MM/DD/YY)*	*Manual*	*Manual*	*Drop Down*	*Drop Down*
1	Active	09/15/11	Historic Site Approval	On-site structures may be eligible for Historic Register causing project delay.	Front-End Planning	Schedule
2	Active	09/15/11	Change in pavement section and/or type	Traffic studies may result in a change in pavement section and/or type resulting in a project cost increase.	Detail Engineering	Cost
3	Active	09/15/11	Replace culvert over Wandering Creek	If required by the hydraulic study, the culvert at Wandering Creek may need to be replaced resulting in a project cost increase.	Front-End Planning	Cost
4	Active	09/15/11	Additional wetland mitigation	Widening to the north will impact a 10- to 15-foot-wide strip of existing Class III wetlands along the east half of the upgrade, causing an increase in project cost.	Detail Engineering	Cost
5	Active	09/15/11	Delay in request for proposal	The city may not meet its RFP development schedule, resulting in a project delay.	Procurement	Schedule

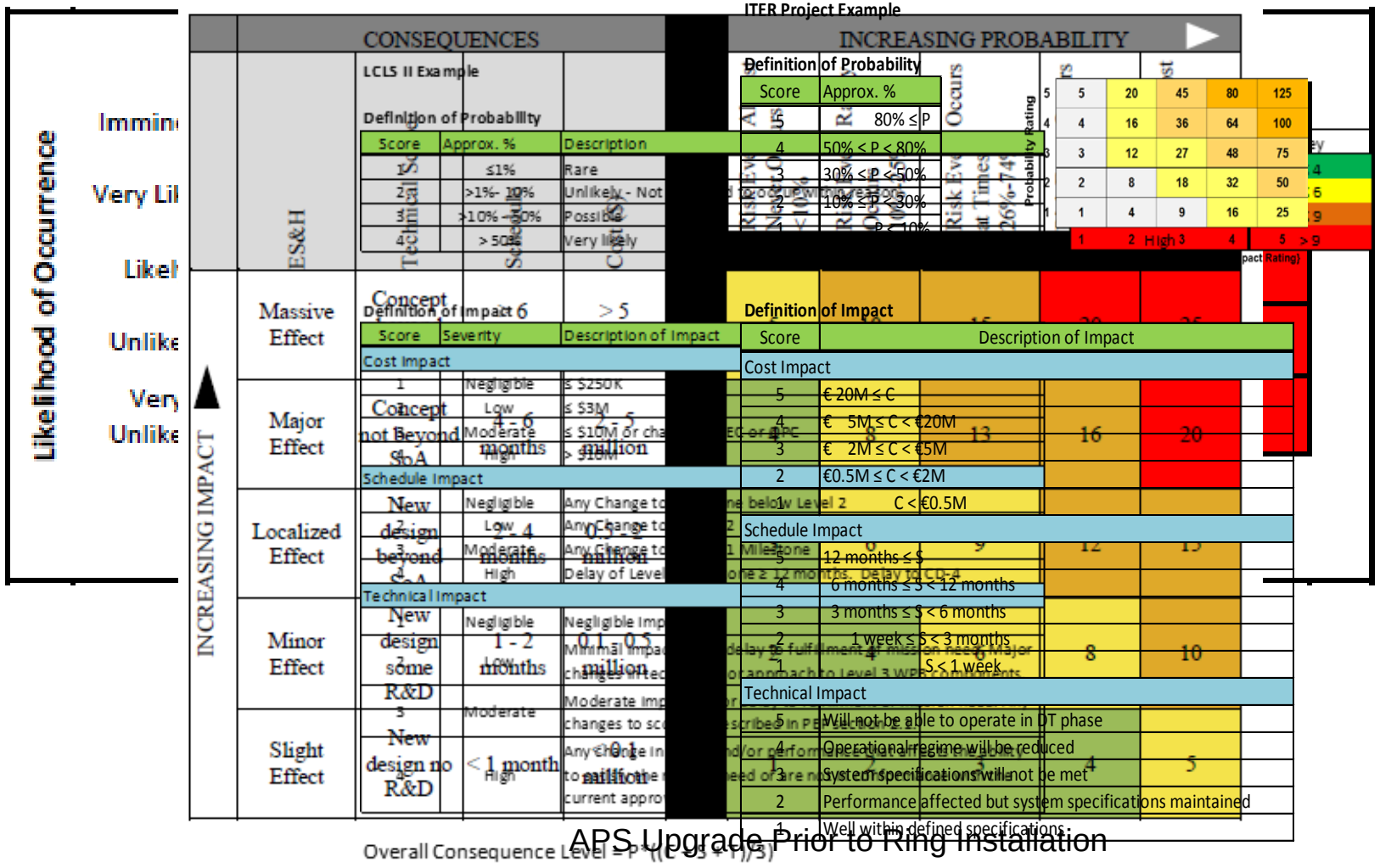
Appropriate Levels of Risk Management



Appropriate Levels of Risk Management

LEVEL 2 - DETERMINISTIC						
Item #	Brief Risk Description	Category of Impact	Pre-Mitigated Risk Ranking			
			Most Likely Impact	Most Likely Probability	*Risk Mean Value (Dollars)*	*Overall Risk Ranking*
			Qualitative Value	*Qualitative Value*		
Auto	*Auto*	*Auto*	*Drop Down (Selection Required)*	*Drop Down (Selection Required)*	*Auto*	*Auto*
1	Historic Site Approval	Schedule	Medium	Medium	$657,000	Med
2	Change in pavement section and/or type	Cost	High	Low	$540,000	Med
3	Replace culvert over Wandering Creek	Cost	High	High	$1,620,000	High
4	Additional wetland mitigation	Cost	Medium	Very Low	$67,500	Low
5	Delay in request for proposal	Schedule	Medium	Low	$328,500	Med

Appropriate Levels of Risk Management



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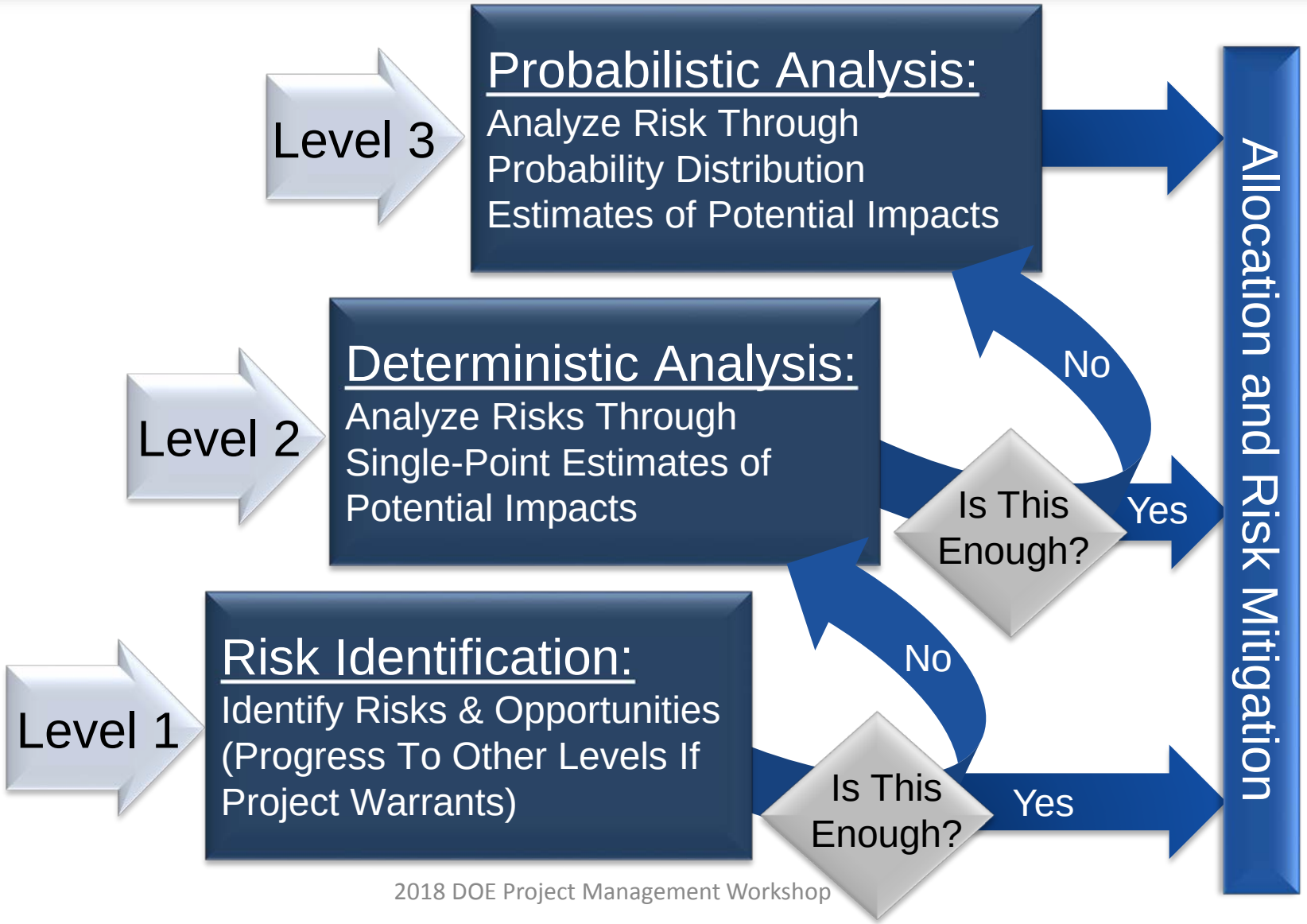
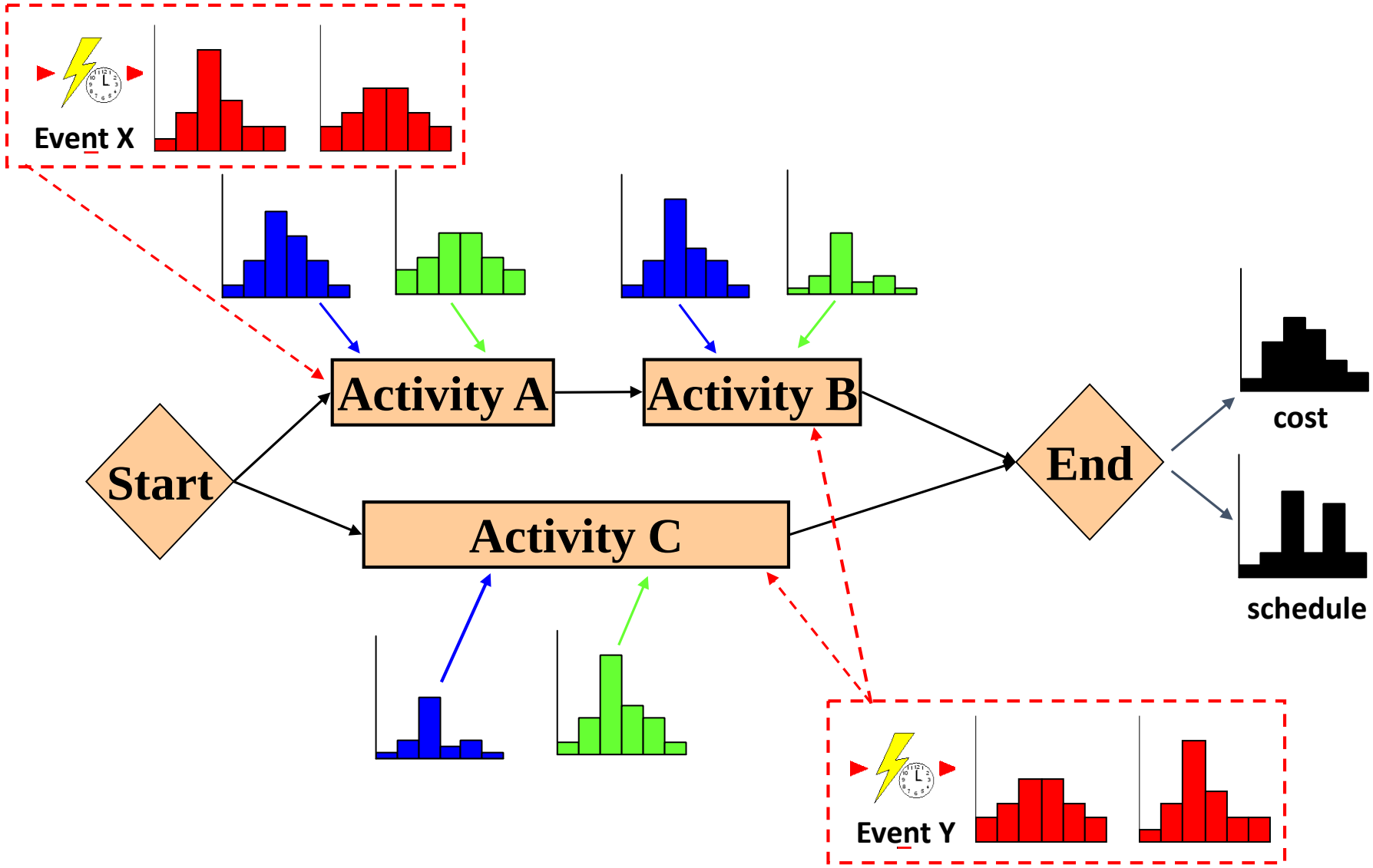


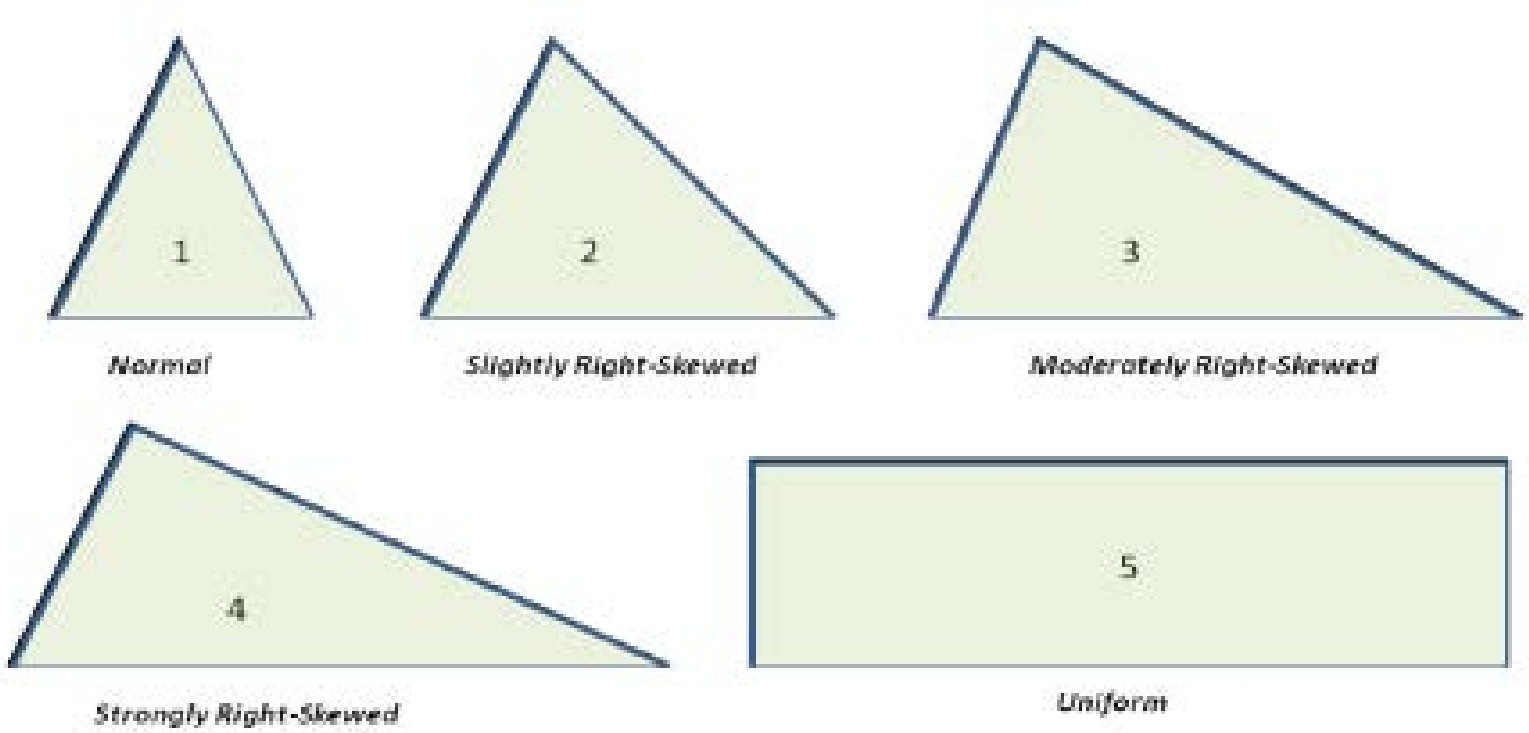
Appropriate Levels of Risk Management

LEVEL 3 - PROBABILISTIC								
Item #	**Brief Risk Description**	**Category of Impact**	**Cost (Dollars)**			**Schedule (Days)**		
			Best Case	*Most Likely*	*Worst Case*	*Best Case*	*Most Likely*	*Worst Case*
Auto	*Auto*	*Auto*	*Manual*	*Auto (Manual Override)*	*Manual*	*Manual*	*Auto (Manual Override)*	*Manual*
1	Historic Site Approval	Schedule	-	-	-	40	82	120
2	Change in pavement section and/or type	Cost	$250,000	$540,000	$750,000	-	-	-
3	Replace culvert over Wandering Creek	Cost	$950,000	$1,620,000	$1,800,000	-	-	-
4	Additional wetland mitigation	Cost	$40,000	$67,500	$90,000	-	-	-
5	Delay in request for proposal	Schedule	-	-	-	50	82	90

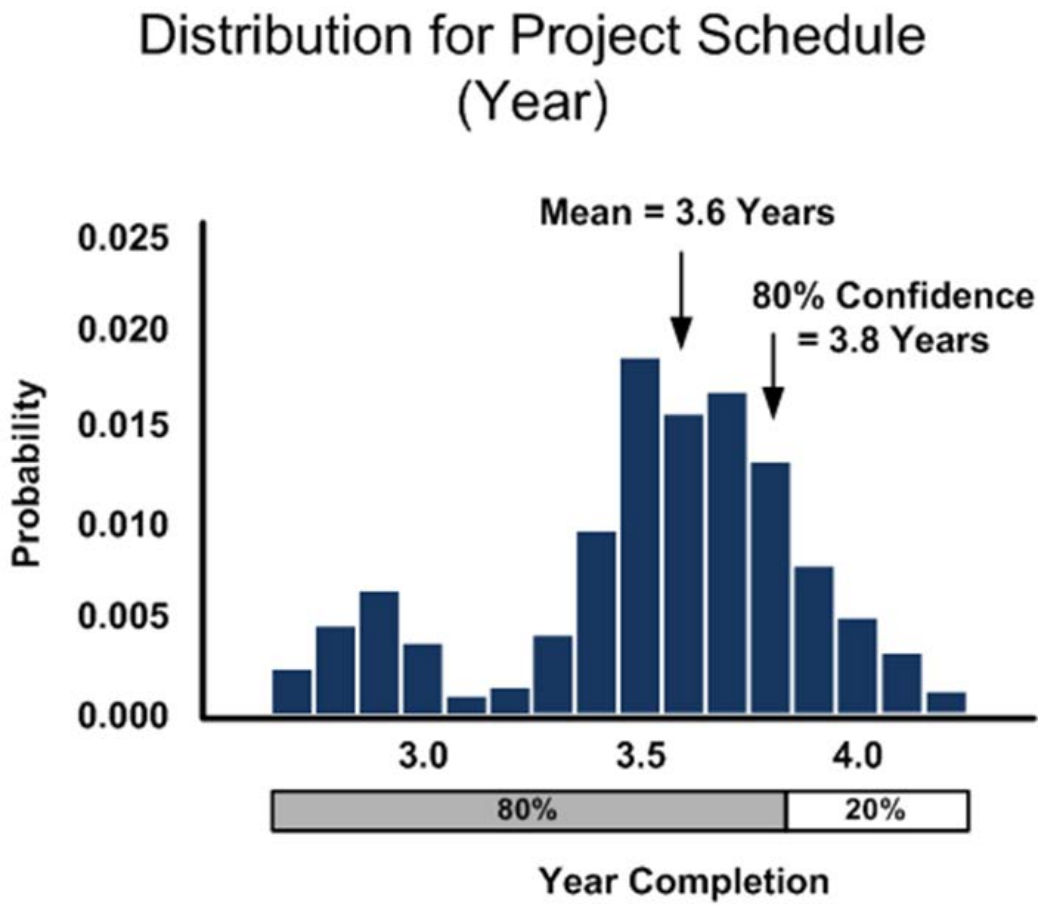
Appropriate Levels of Risk Management

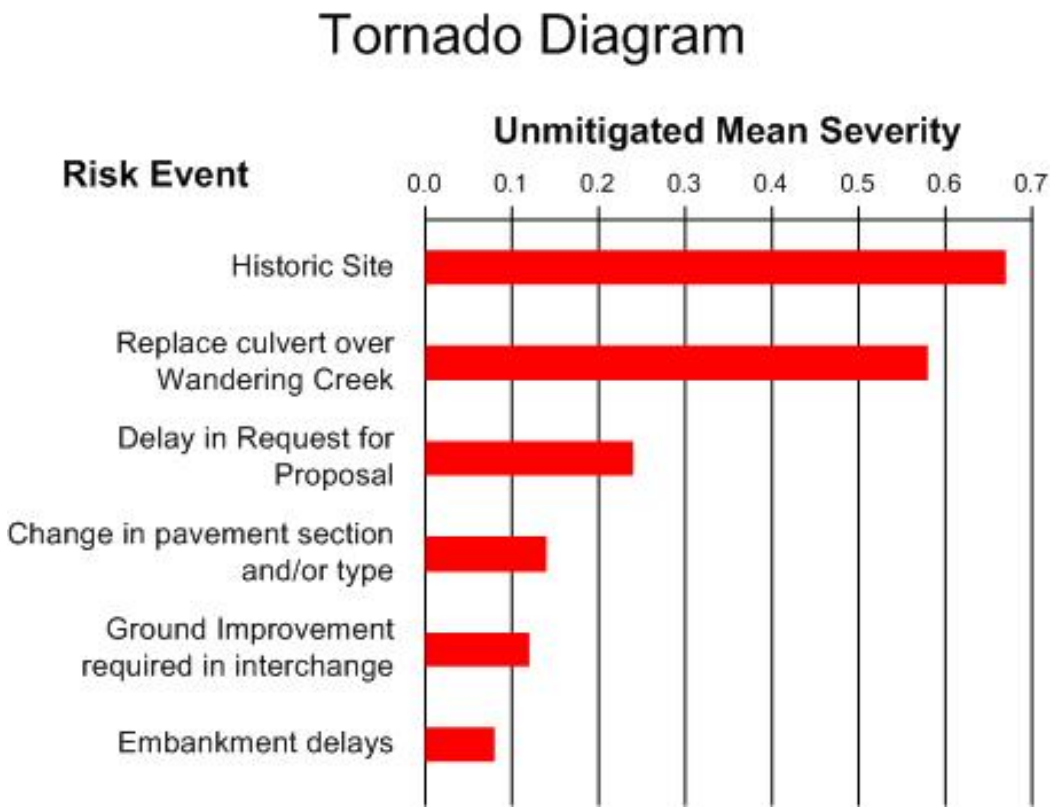


Appropriate Levels of Risk Management



Appropriate Levels of Risk Management





Learning Objectives

✓ Choose appropriate levels of risk management

- Describe biases that can impact risk assessments
- Apply results of risk analysis appropriately

Biases that Can Impact Risk Assessments

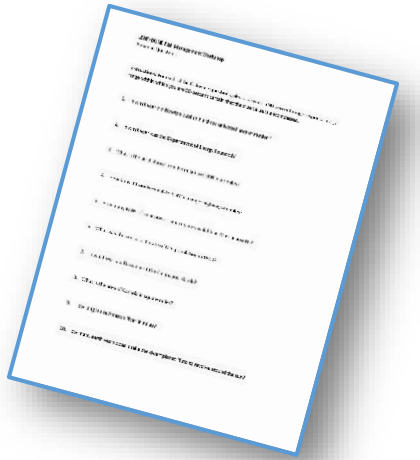
Risk Assessments

- One-of-a-kind projects rely on subjective risk assessments
- To make good assessments we must be aware of our biases
  - Estimating uncertainty
  - Representativeness
  - Availability

Biases that Can Impact Risk Assessments

A General Knowledge Exam

- I will distribute an exam of 10 questions
- Please answer each question using a RANGE of values (not a single value)
- Select the RANGE such that you are 90% certain that the correct answer lies with your specified RANGE



Biases that Can Impact Risk Assessments

What did Capen find?

- A large number of technical people have little idea of what to do with uncertainty
- Having no good quantitative idea of uncertainty, there is an almost universal tendency to underestimate it
- People tend to be prouder of their answers than they should be
- Even when people are told that ranges tend to be small, they cannot guess large

Biases that Can Impact Risk Assessments

Representativeness

True or False

"People with a Ph.D. are more likely to read the New York Times than persons with only a high school education"

Biases that Can Impact Risk Assessments

Representativeness

There is a woman sitting next to you in the cafe who is reading the *New York Times*…

Which is likely true:

a) She has a Ph.D.

b) She doesn't have a college degree

Base Case Frequency

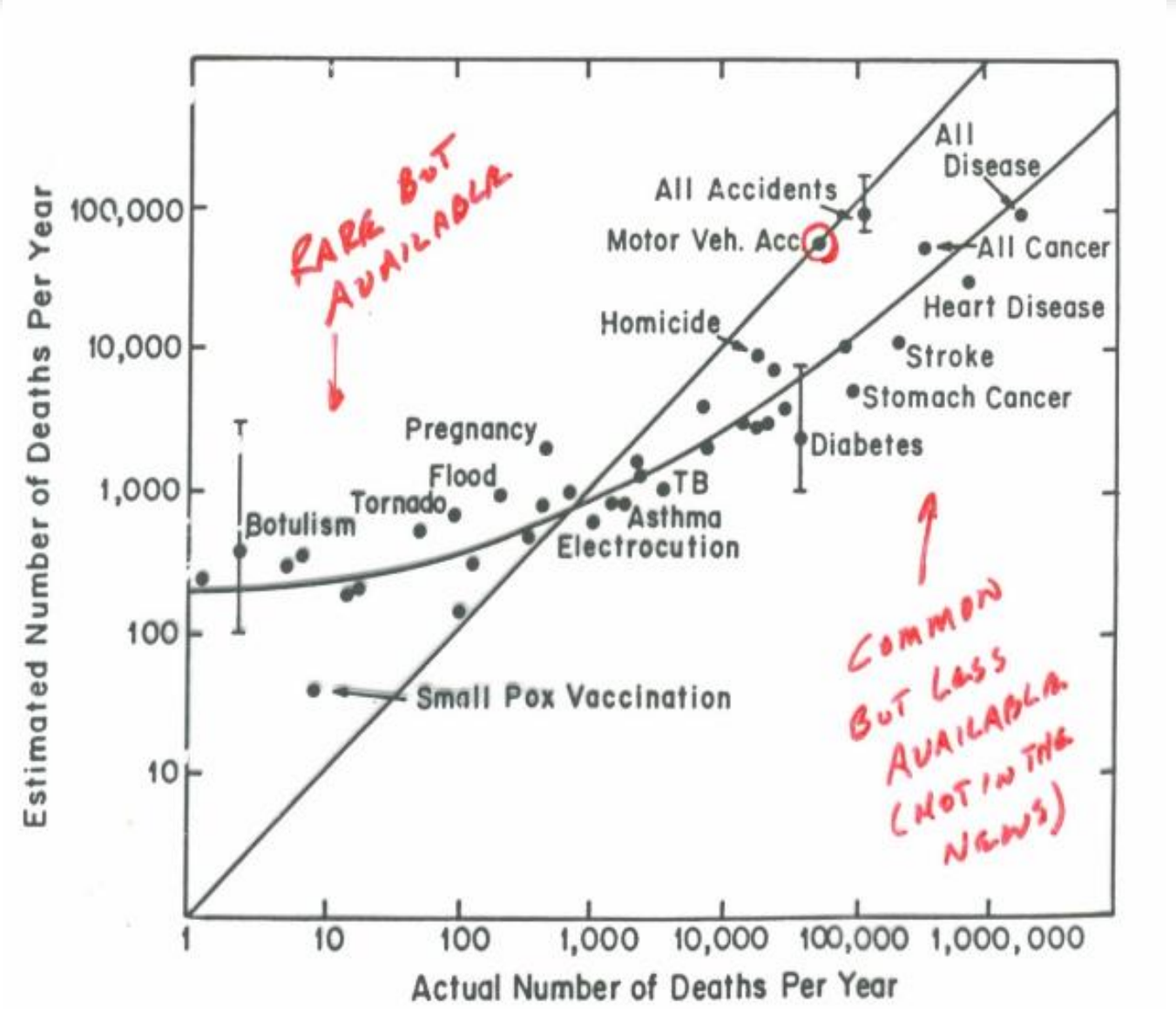
Biases that Can Impact Risk Assessments

Availability

- Human judgment tends to over-estimate rare events that are more available or memorable

- and under-estimate rare events that are less available or memorable

Biases that Can Impact Risk Assessments



Biases that Can Impact Risk Assessments

Availability – *another example*

- How many seven letter words in the English language contain an "n" in the sixth position?

_ _ _ _ _ n _

How many words _____

Biases that Can Impact Risk Assessments

Availability – *another example*

- How many seven letter words in the English language contain an "n" in the sixth position?

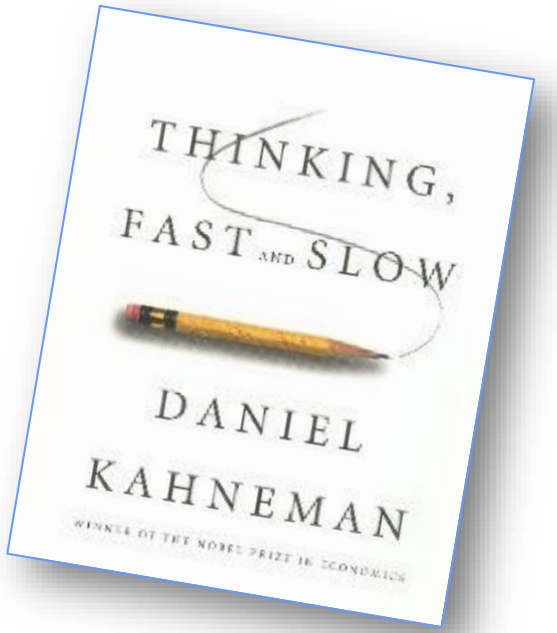
_ _ _ _ _ i n g

How many words _____

Biases that Can Impact Risk Assessments

Risk Assessments

- Estimating Uncertainty
  - Almanac Quiz
- Representativeness
  - Ignoring base case frequencies
- Availability
  - _ _ _ _ ing



Learning Objectives

- ✓ Choose appropriate levels of risk management
- ✓ Describe biases that can impact risk assessments
- Apply results of risk analysis appropriately

Appropriate Application of Risk Analysis

- Use appropriate “levels” of risk analysis
- Be cognizant of biases when making assessments
- Focus on the relative impact of risks
- Be cautious of applying Monte Carlo results for contingency without a thorough management assessment
- Create a risk management process that is appropriate for decisions being made

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