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Risk-Informed Decision Making

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• Planning is changing
• Uncertainty = Risk
• Stepping up to Risk Management

- Changing world
- Changing values
- Planning's evolution
- Technology
- Economic pressure
- Public involvement
- Science & uncertainty
- Emergence of risk

Changing World

- Issues-new, riskier, complex, global
- Political transformations
- Competitive, interdependent, constantly changing
- Life is accelerated
- Change=>Uncertainty

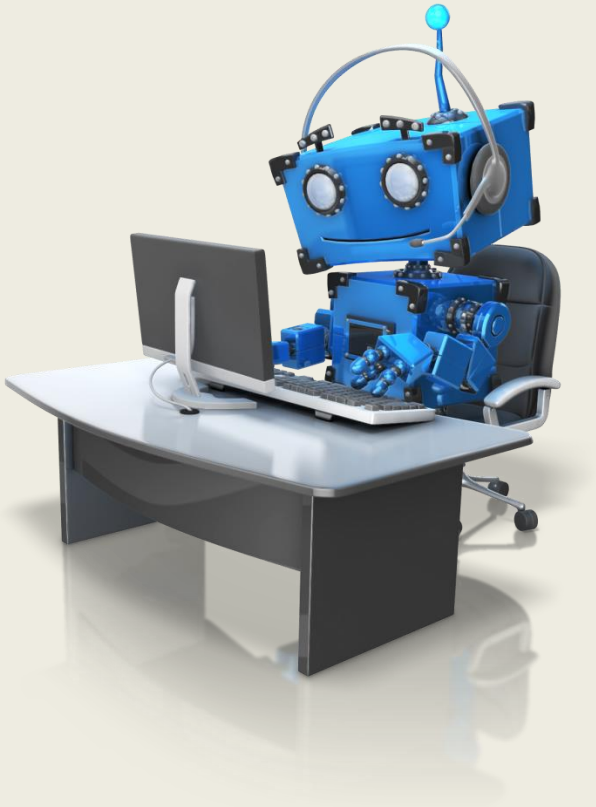
Changing Values

- Ecosystem health, public safety, social vulnerability, environmental service provision, development patterns, recreational, aesthetic, health impacts, cost effectiveness, civic engagement, institutional capacity building, environmental justice/equity, carbon & energy impacts, ecological footprint, vulnerability impacts
- Changing values=>Uncertainty

Planning Evolves

- Watershed, ecoregional, ecosystem management
- Return to multiobjective & mutipurpose
- Monetary & nonmonetary
- Aligning expectations
- Sustaining planning
  - Fewer career planners
- Evolution=>Uncertainty

Technology

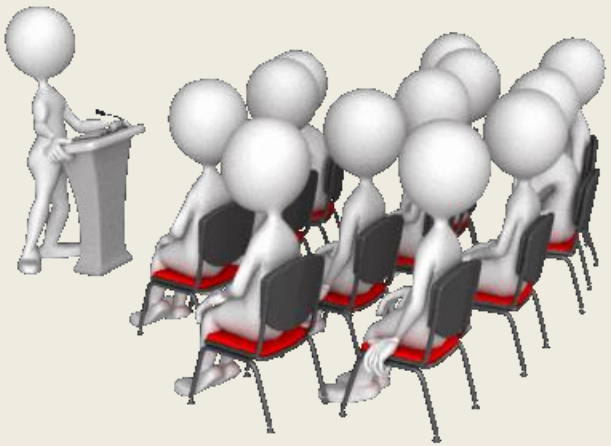


- More technology
- New technology - nanotech, genome, robotics, megadata, GIS, LIDAR, and on
- Technological change=>Uncertainty

Economic Pressure

- Aging infrastructure
- Few new starts
- New financing needed
- Organizations hitchhike on your study
- Less time & money
- Economic pressure=>Uncertainty

Public Involvement



- More stakeholders
- Expectation of meaningful involvement
- More collaboration
- Equity, efficiency, affordability, intense opposition are constants
- Public sentiment=>Uncertainty

Science & Uncertainty

- Science-based decisions
- Measurement importance
- Greater emphasis on uncertainty
- Data's shorter shelf life
- Future feels more uncertain

Emergence of Risk

- 1975 Rasmussen Report
- 1980 Benzene Case
- 1983 FDA contracts with NAS –Red Book
- 1983 EPA Uses Red Book
- 2006 Actions for Change
- Decision making under uncertainty

Risk-Informed Planning

- It is because of these changes that it is time to integrate risk analysis principles into the planning process
- Be intentional about uncertainty

In the old days,
before uncertainty,
we knew everything

Plan A costs $171,000,000

That levee will be there 1000 years from now

can float preconstructed

ents to the project site

EAD = $,000

Water quality effe
are negligible

W be on schedule

Plan B $209,000,000

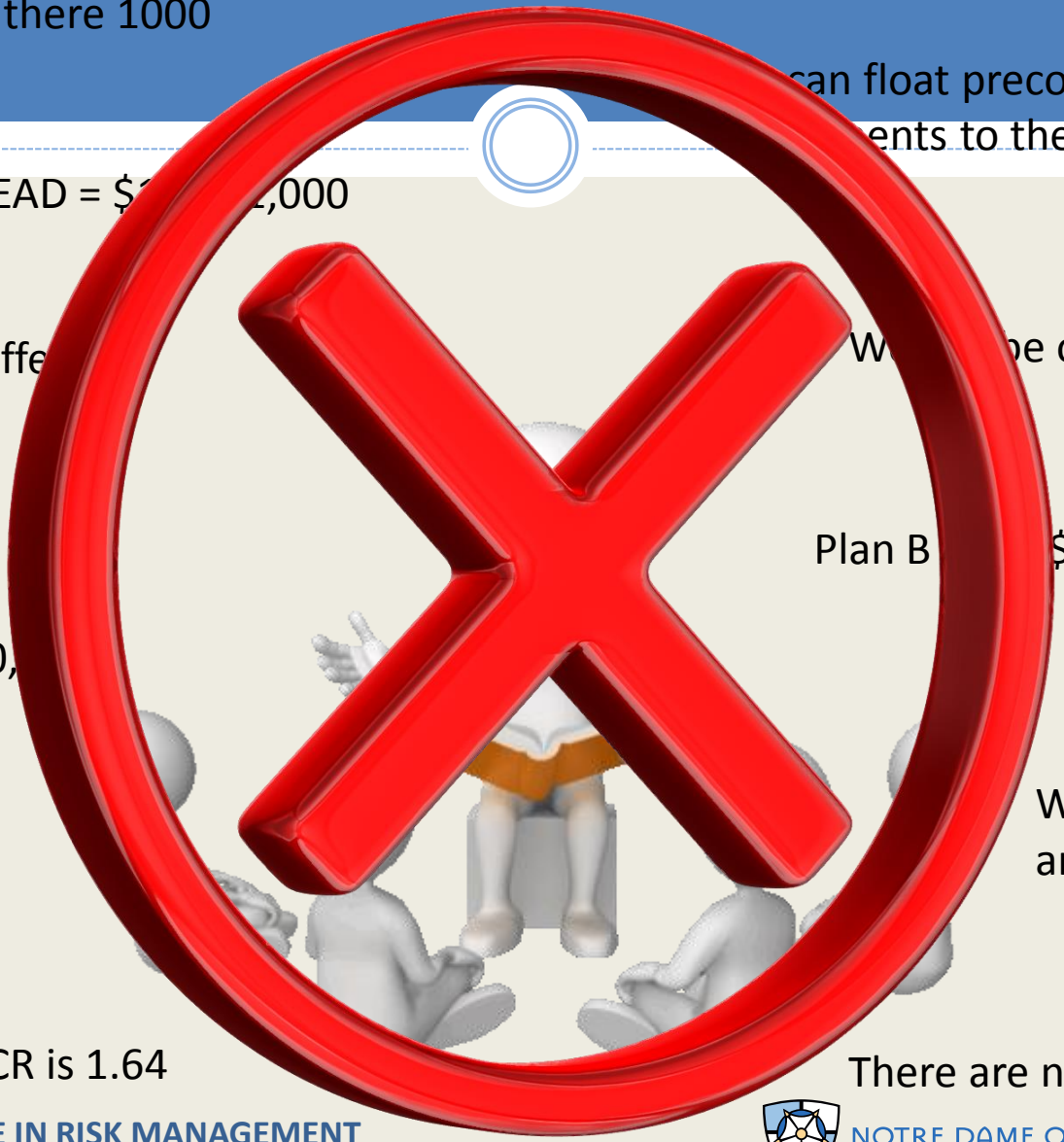
H&H will cost $200,

We will have costs July 17

We can get by with an EA

The BCR is 1.64

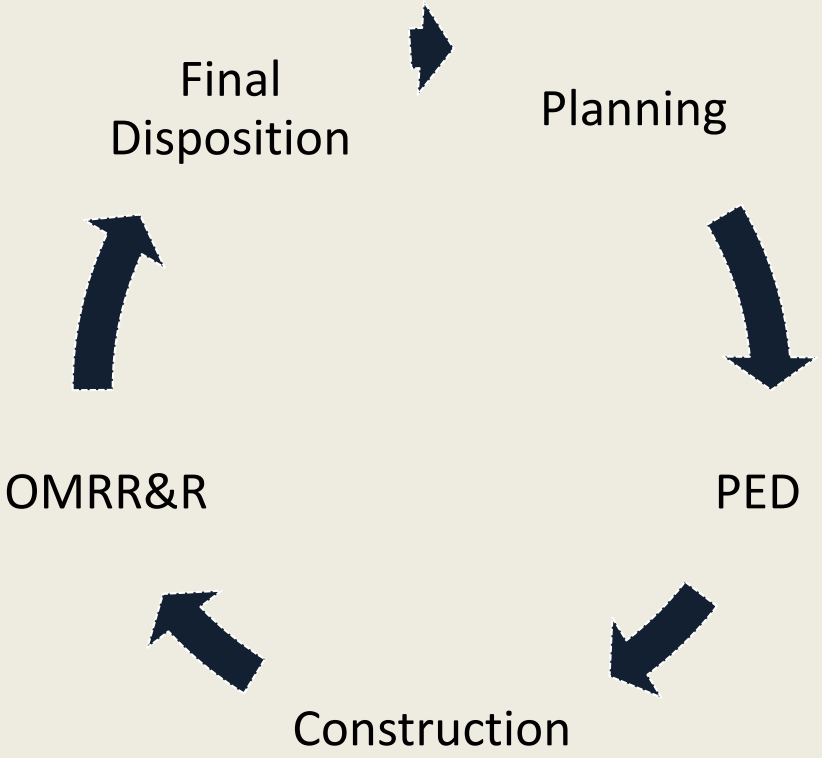
There are no HTRW



- That was never true
- We were often wrong
- Uncertainty has always been our reality

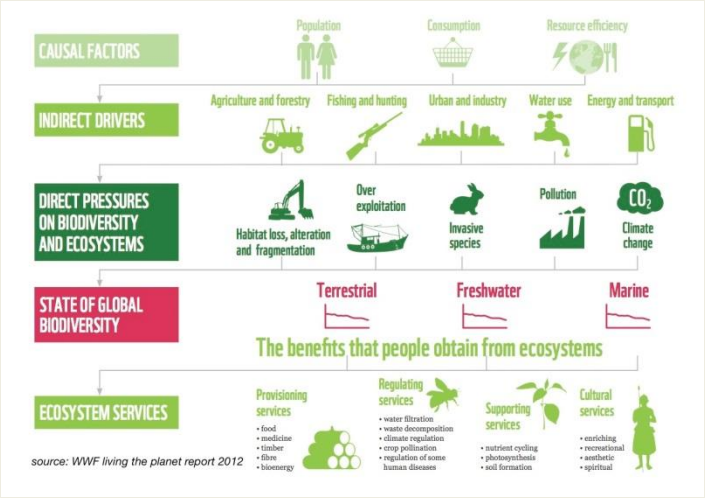
It is a fact of life.

Uncertainty Runs Throughout Project Life Cycle



And it gives rise to risks!

Risks in Community



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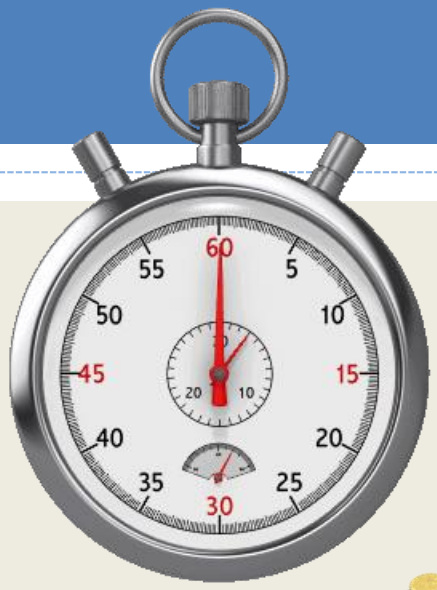
Study Risks



- Analytical error
- Study delays
- Study cost increase
- A poor planning decision

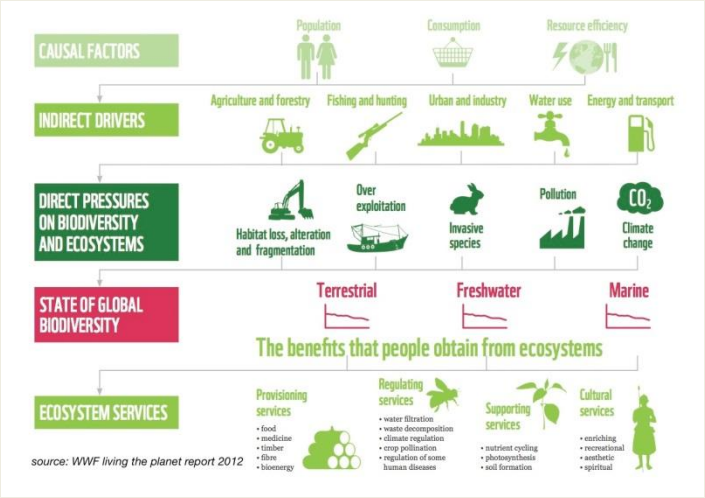
Implementation Risks

- Schedule
- Cost
- Construction
- Safety

Operation Risk

- OMRR&R costs
- Project performance
- Safety

Outcome Risks



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The only alternative to risk management is crisis management.

You Need A Process

- USACE needs an enterprise risk management model
- Manage risk throughout the project life cycle
- Continuous decision making under uncertainty

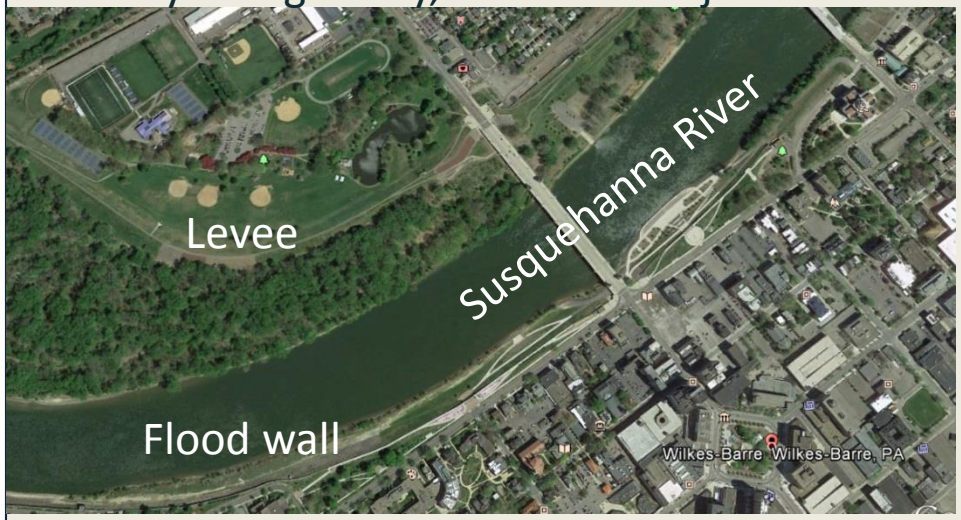
The goal is to use the data you have for the decisions you need to make. You don't need a project life's worth of data to make planning decisions. Neither do you need design data.

Use planning data for planning decisions; design data for design decisions, construction data for construction decisions and operation data for operations decisions.

Risk management is an ongoing process.

No Perfect Answers in Planning

Wyoming Valley, PA Levee Project

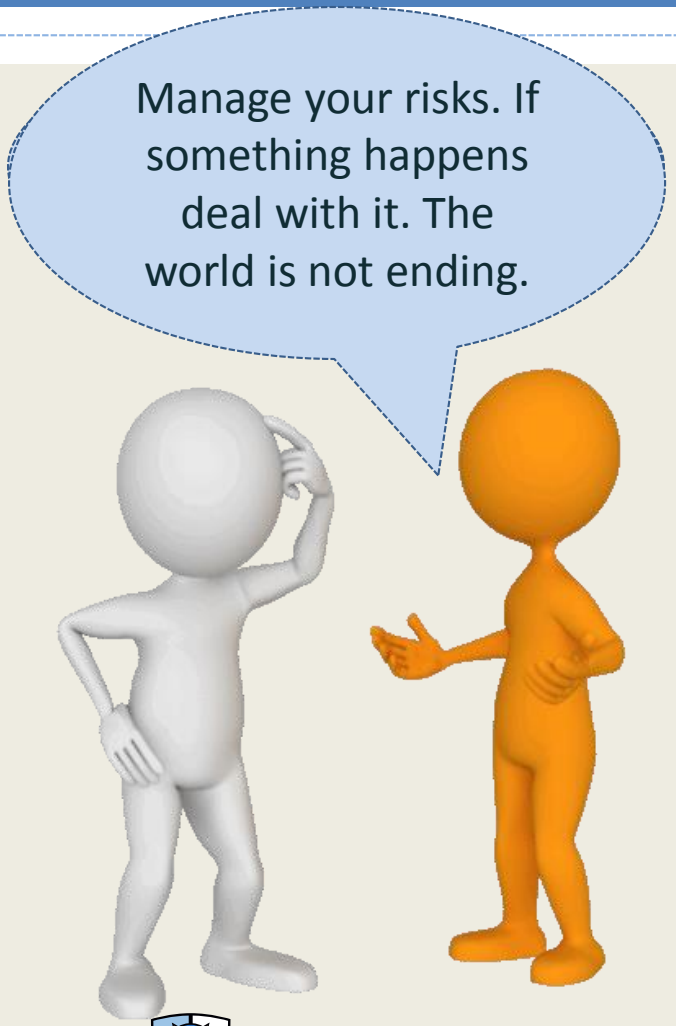


- Agnes overtopping not a failure
- Remedial work not a failure
- Levee raising not a failure
  - Cost estimated to be $145M was $250M

Continuous DM Under Uncertainty

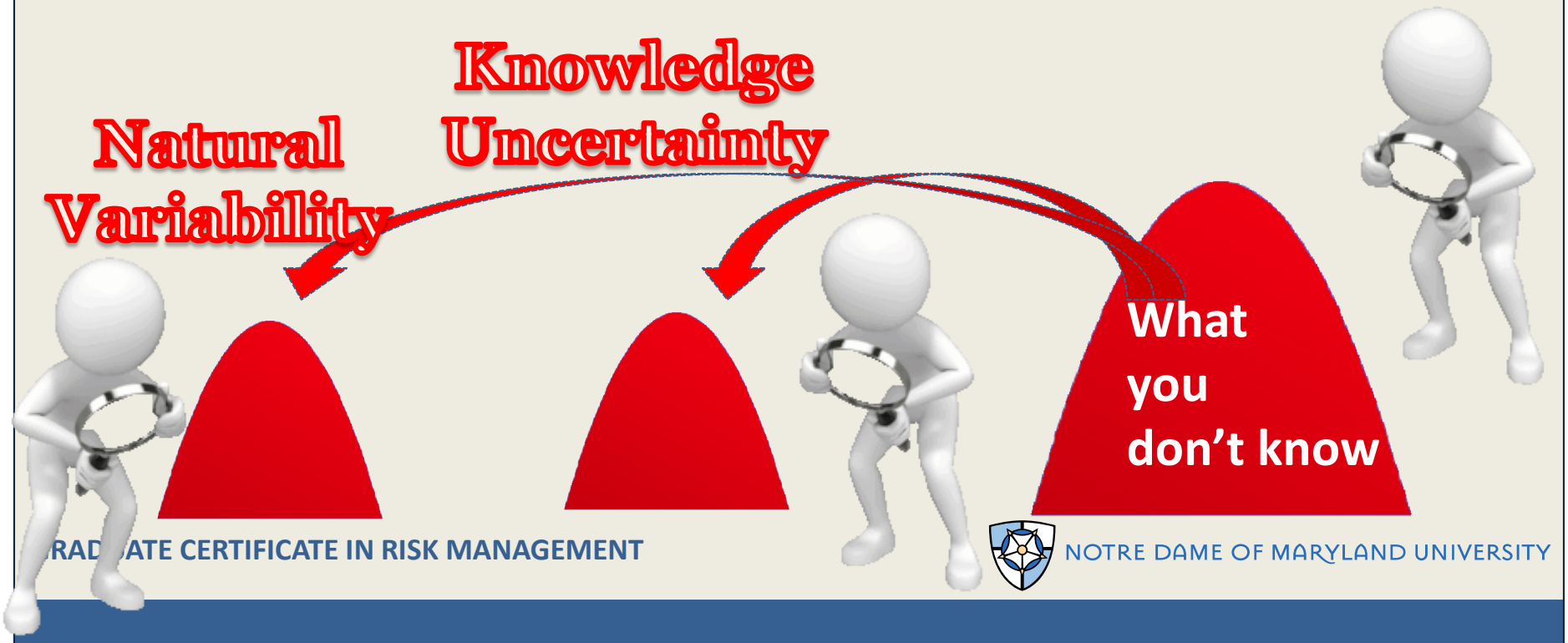
It's the Same in Planning

- Using parametric costs
- Assuming no HTRW
- Per unit benefit estimates
- Using existing WQ data



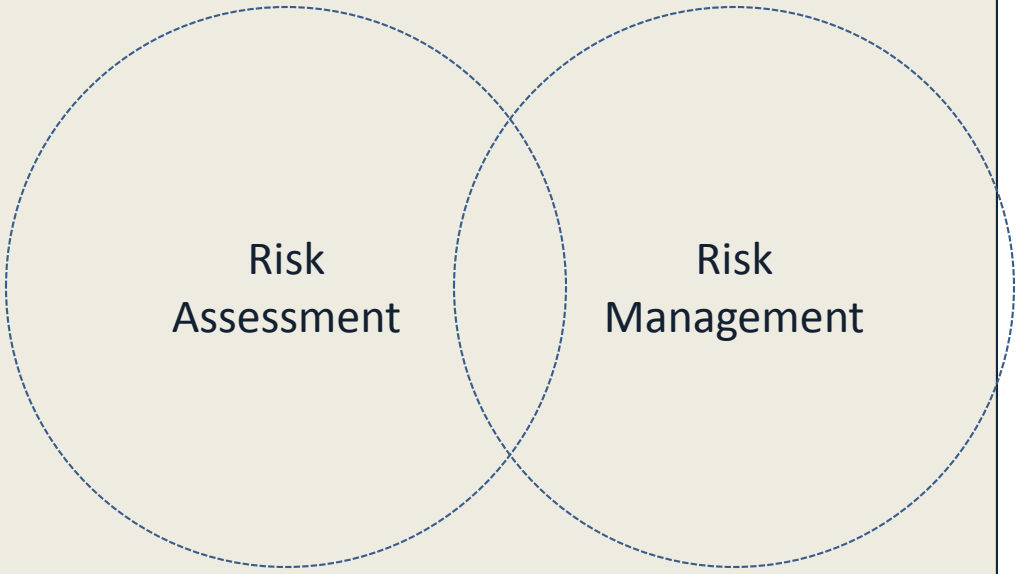
Pay Attention to Uncertainty

You Can't Make It Go Away. Deal With It.



Risk Informed Decision Making

- Assessors estimate and convey significance of uncertainty
- Managers take it explicitly into account in decision making



Risk Informed Decision Making

- Assessors e
  and convey
  significance
  uncertainty
- Managers ta e
  explicitly into a unt
  in decision m

Now, we are being intentional in how we analyze and consider the effects of uncertainty.

Assessmen agement

Risk and Planning

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Transition to Risk Management Not Easy

Food Safety CoP

Traditional Performance Inspectio
Criteria

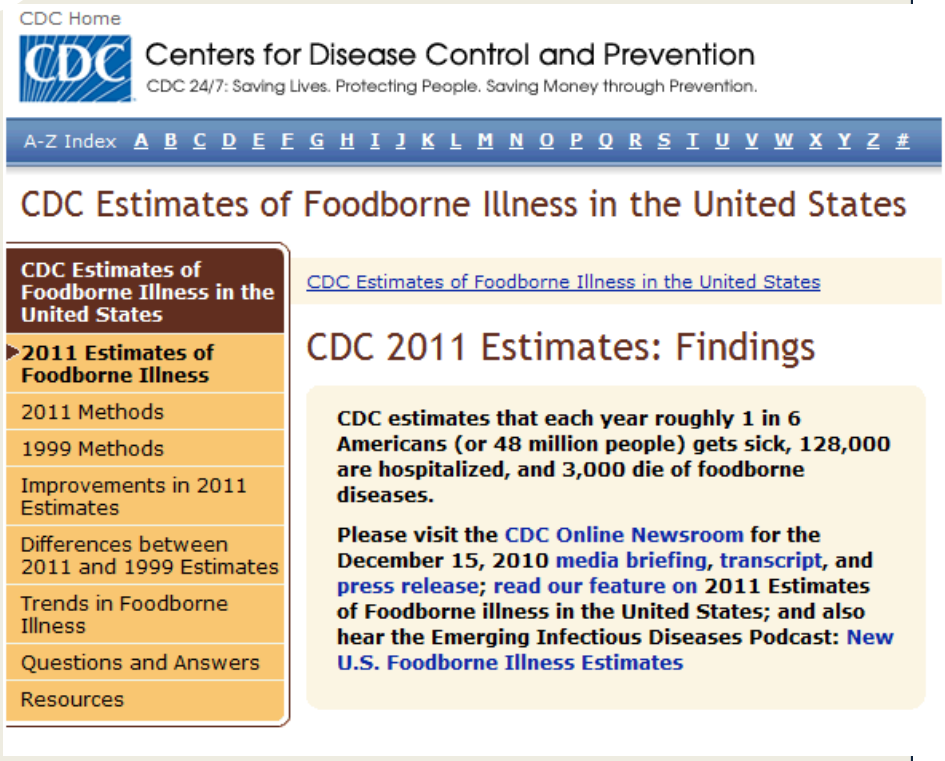
- Poultry cooked to minimu
  165°F
- Shellfish fr
  h fo
- Who
  140°F
- Milk p
  sec
- Food co safety criteria A_w < 0.95 & pH < 5.5 for Lm
- 5 log reduction of *E. coli* O157:H7 in juice

n solve

Whatever happens must be all right if you:
1. Follow the guidance.
2. Look for problems.

That Was Not Working

- Each year ~ 1 in 6 Americans get sick
  - 48,000,000 people
- 128,000 are hospitalized
- 3,000 die



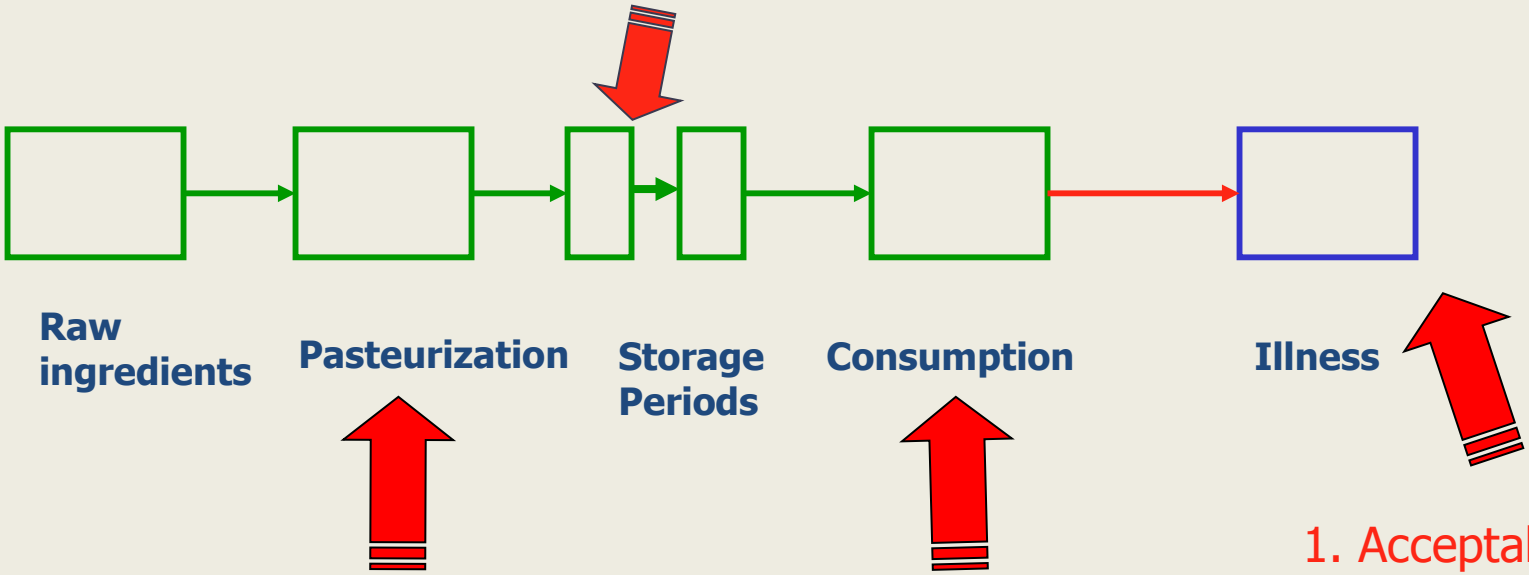
The Key

Risk Analysis

- Focus on desirable outcomes not rules
- Prevent problems don't solve them
- Free people to achieve outcomes

FSO: Freedom From Procedures

3. Microbiological criteria (est. by R. assessment) (cfu/g)



4. Performance criteria (logs inactivation) Rather than process criteria

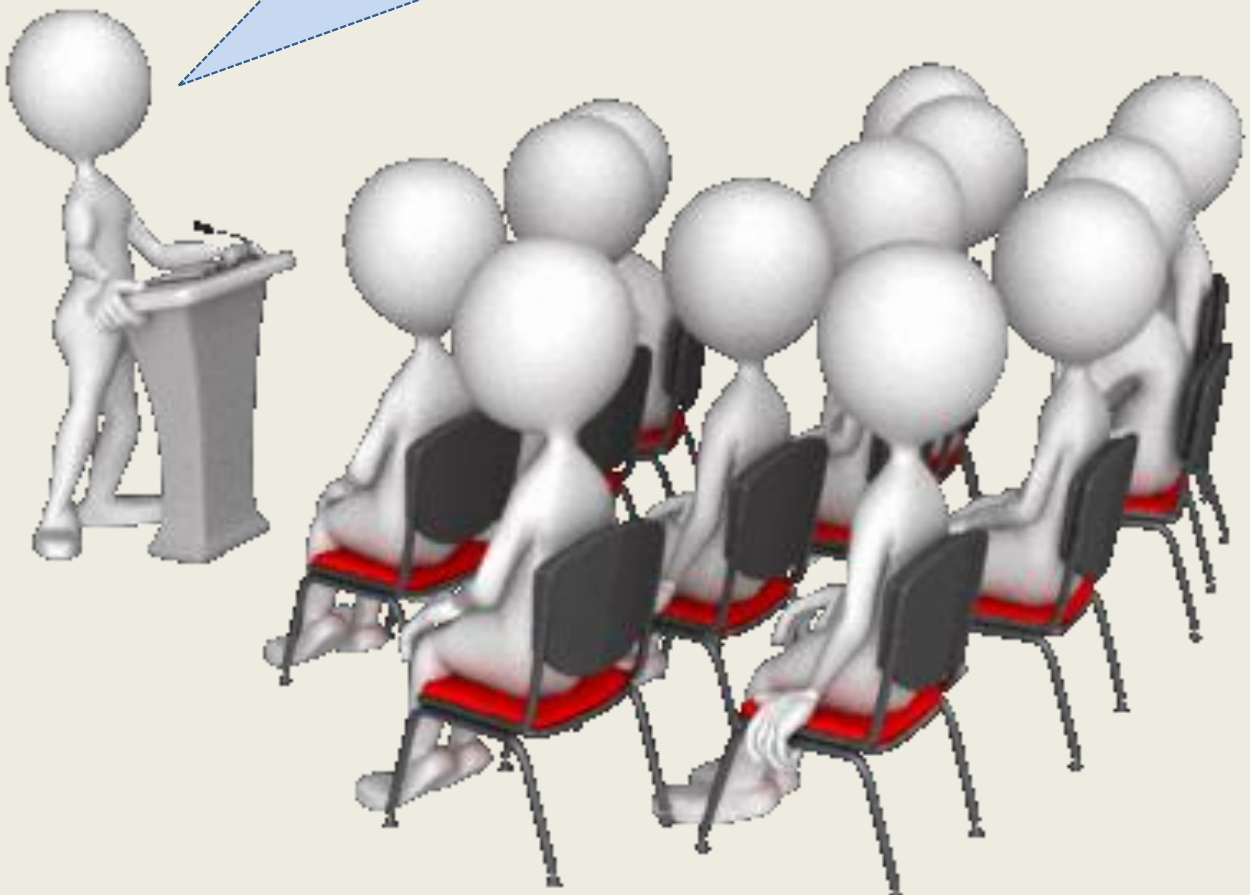
2. Food safety objective (cfu/g)
Est. at pt. of consumption

1. Acceptable level of protection (cases/yr)

Agencies Struggle

- APHIS-wants pest risk management textbook
- FSIS-RM to get out in front of the process
- CFSAN-used failure and success stories to define RM process

Risk management is outcome oriented decision making and those decisions are made under uncertainty.



USACE's Traditional Performance Criteria

US Army Corps of Engineers

Search Publications

USACE PUBLICATIONS ARMY PUBLICATIONS RELATED PUBLICATIO

HOME > USACE PUBLICATIONS > ENGINEER REGULATIONS

Engineer Regulations

Search

Pub Number	Proponent	Title
ER 1-1-11	CEMP-CE	Progress, Schedules, and Network Analysis Systems
ER 1-1-25	CERM-MP, DAEN-RMM-P	Command Visits
ER 1-2-2	CECW-PL	Water Resources Policies and Authorities Substantive Congressional Contacts (RCS: CECW-P-21)
ER 5-1-9	CERM-M	Assignment and Transfer of Project Responsibilities
ER 5-1-10	CECW-CE	Corps-wide Area of Work Responsibility
ER 5-1-11	CECW-CB	U.S. Army Corps of Engineers Business Process
ER 5-1-13	CERM-P	U.S. Army Corps of Engineers Policy on Regional Business Centers (RBCs)
ER 5-1-14	CERM	Resource Management - USACE Quality Management System
ER 5-1-15	CESI-P	Strategic Management
ER 5-1-16	CEMP-CN	Management Capacity Development - International
ER 10-1-5	CERM-MO	Mississippi River Commission
ER 10-1-8	CERM-MO	U.S. Army Engineer Waterways Experiment Station
ER 10-1-11	CERM-OO	U.S. Army Engineer Housing Support Center
ER 10-1-16	CERM-O	U.S. Army Coastal Engineering Research Board
ER 10-1-22	CERM-M	U.S. Army Engineering and Support Center, Huntsville

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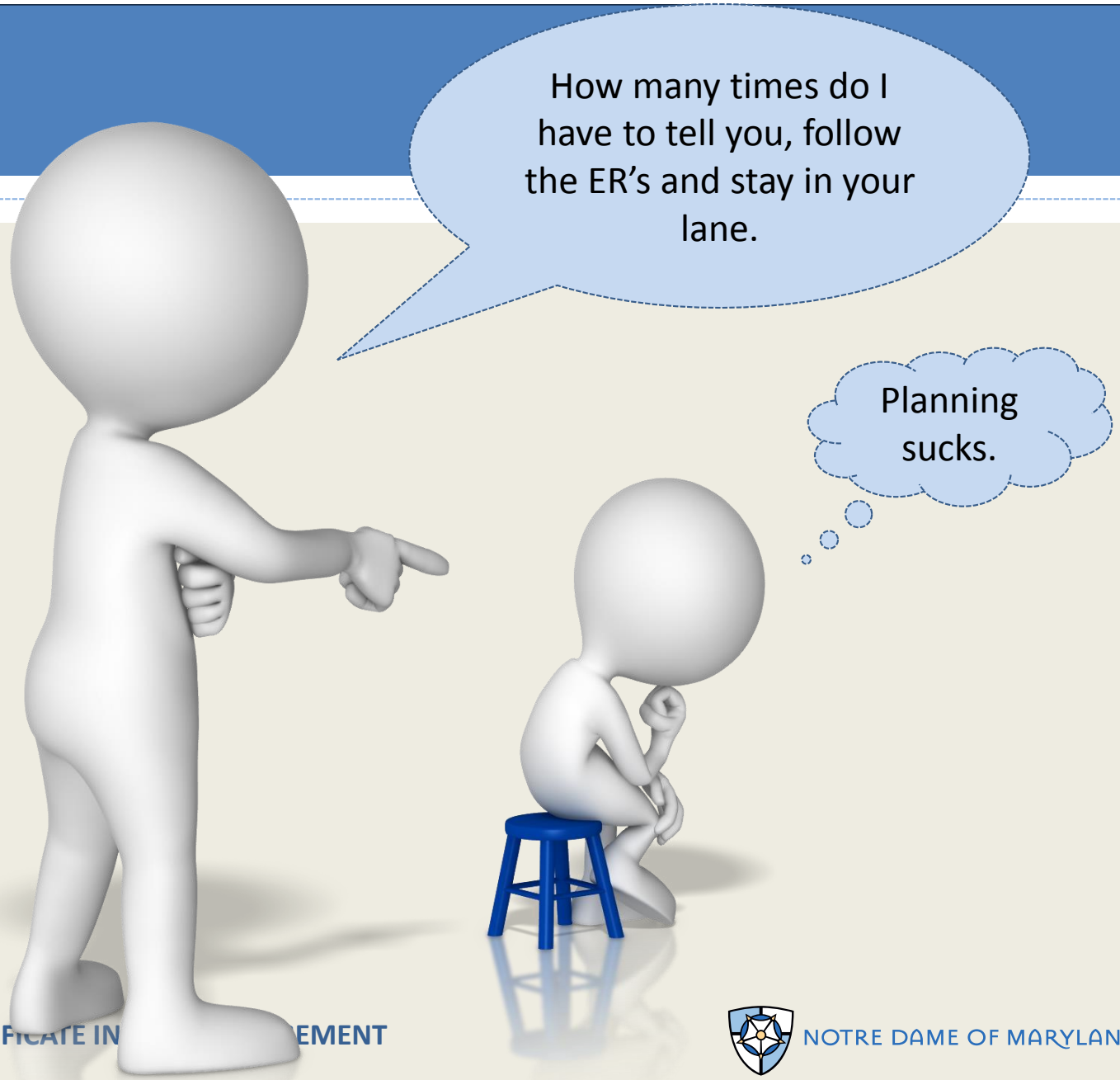
Avoid the ad hoc assemblage of requirements and control measures, e.g.,

291 Engineering Regulations!


How many times do I have to tell you, follow the ER's and stay in your lane.
Planning sucks.

Outcomes

- Lives lost
- Flood damages
- Navigation disruptions
- Reallocation studies
- Dam Safety
- Levee Safety

- Dam removal
- CERP
- Ecosystem restoration
- Cost estimating
- Project-based budgeting
- ANS

Risk-Informed Planning

- Can set planners free!
  - Less guidance
  - More creativity
  - More innovation
  - Assume more risk
  - Better outcomes!

Risk Management

- Objectives Focused
- Predictive Indicators
- Foresight
- Strategic
- Creates and captures value

Traditional

- Event Focused
- Post-action Response
- After-thought
- Transactional
- Protects Value

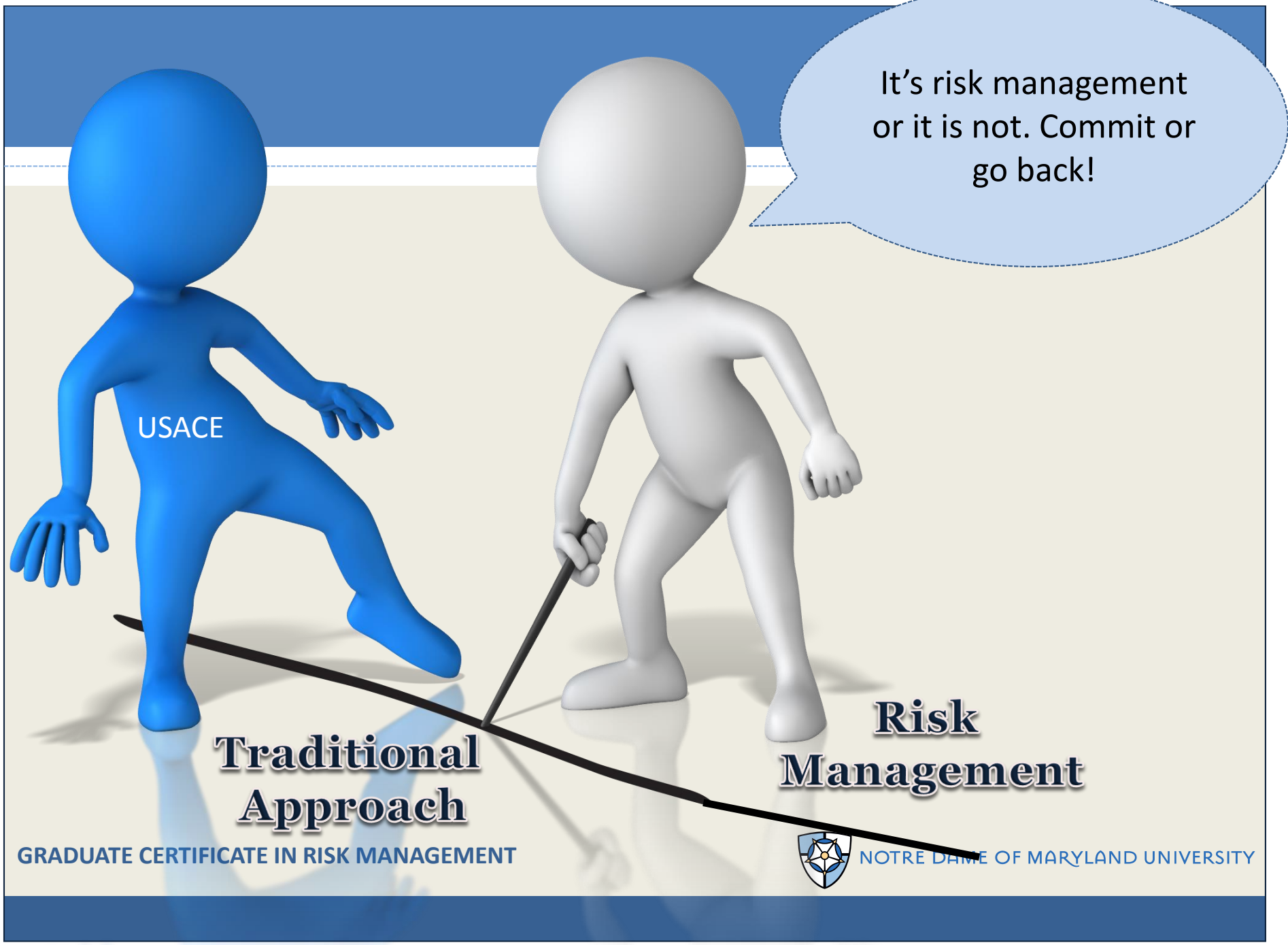
Source: Andre LeDuc, University of Oregon

RISK MANAGEMENT

- Protect life, health & safety
- Energize the economy
- Reduce risk from disasters

TRADITION

- Stay in your lane
- Follow the guidance
- Whatever happens must be okay



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USACE Transition Challenge

To Risk Management

From Project Building

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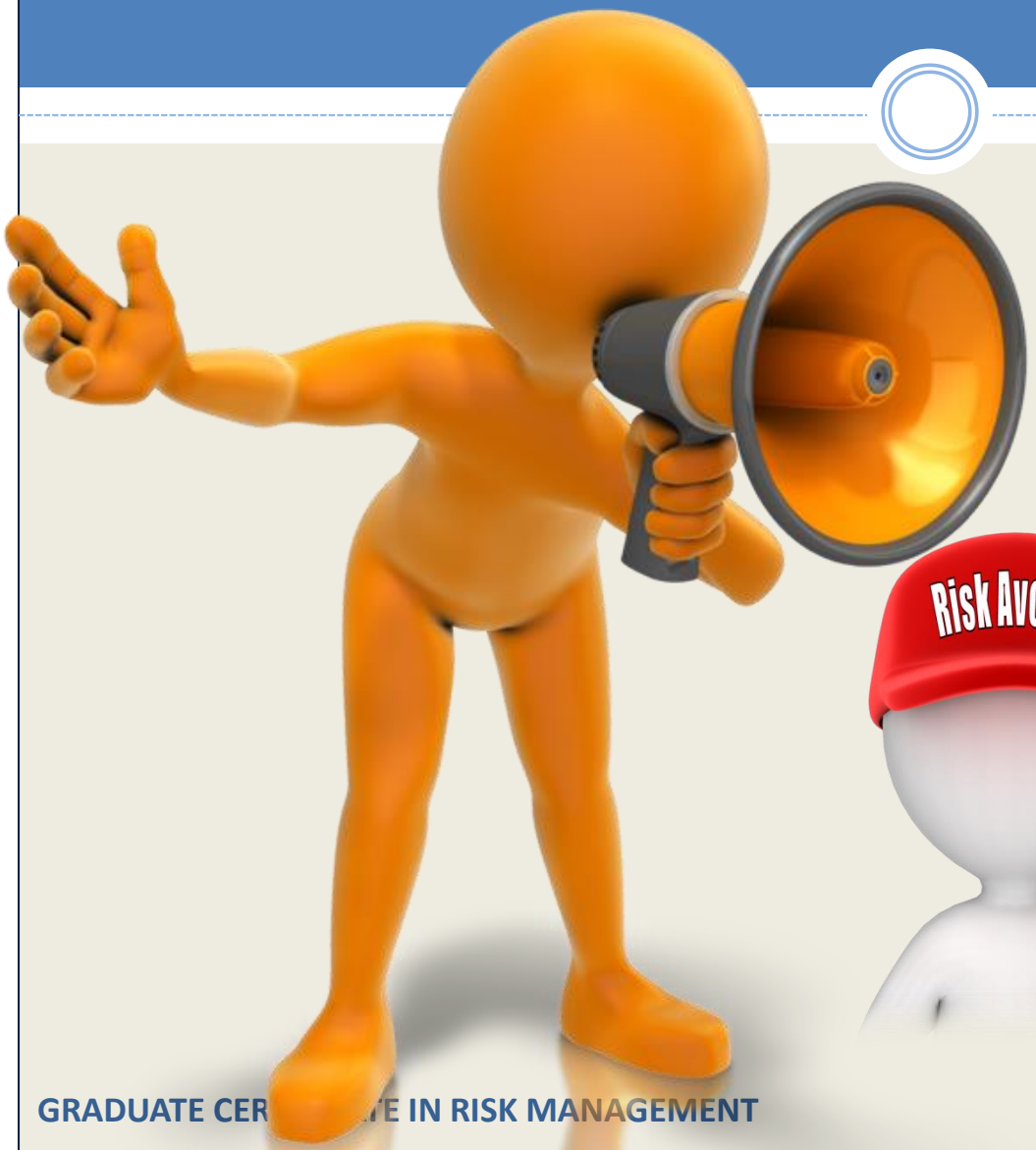
Risk Management Agency

- The goal is to assume risk judiciously, mitigate it when possible, and prepare yourselves to respond effectively and efficiently when necessary

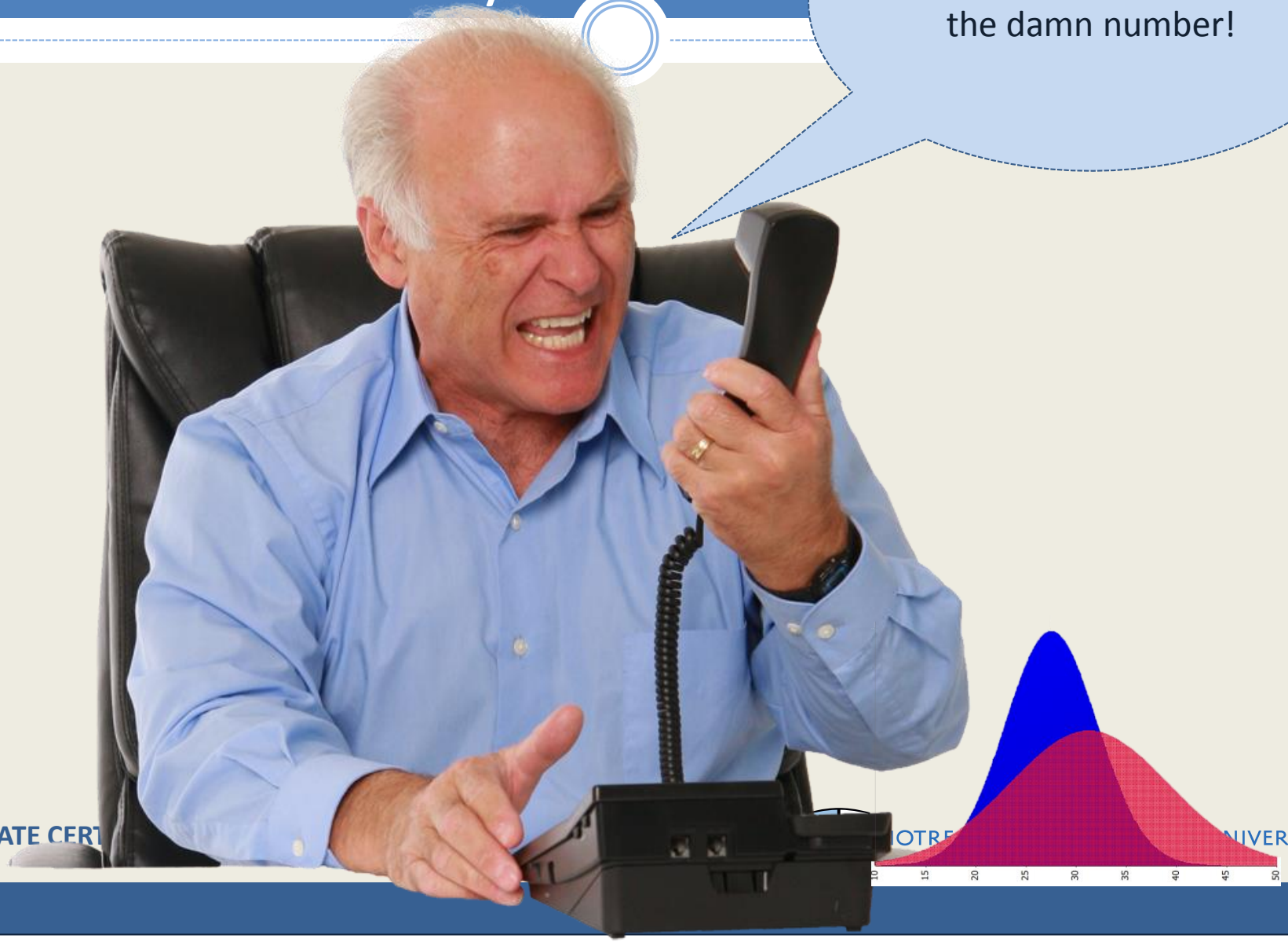

But what does it really mean?



You must both take and avoid risks!

Decision making must evolve.

Decision Making Under Uncertainty



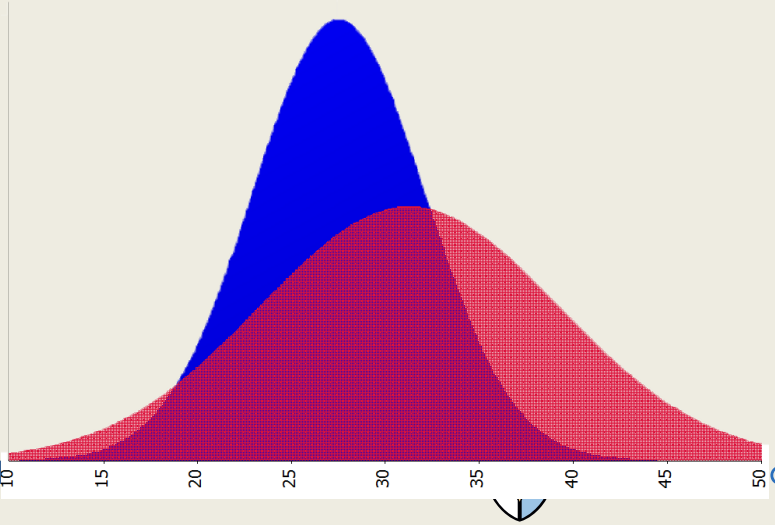
Poor boss, he does not understand. There is no such thing as the number. There is too much uncertainty.

We need to use all the good information we generated in our risk assessment to make risk-informed decisions.

This is going to frustrate people for awhile.

Help The Decision Maker

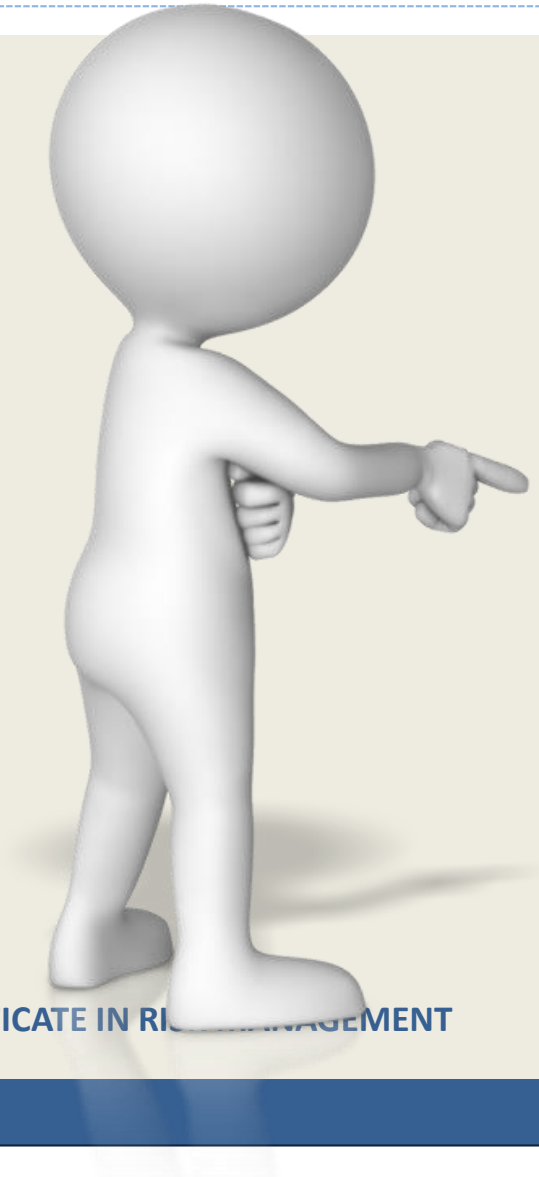
- Develop and use risk information to aid decisions made under uncertainty



New Decision Metrics

- Life safety risk
  - Number of lives at risk, social vulnerability
- Economic risk
  - Net economic benefits, financial risks
- Engineering risk and reliability
  - PUP
  - Fragility curves

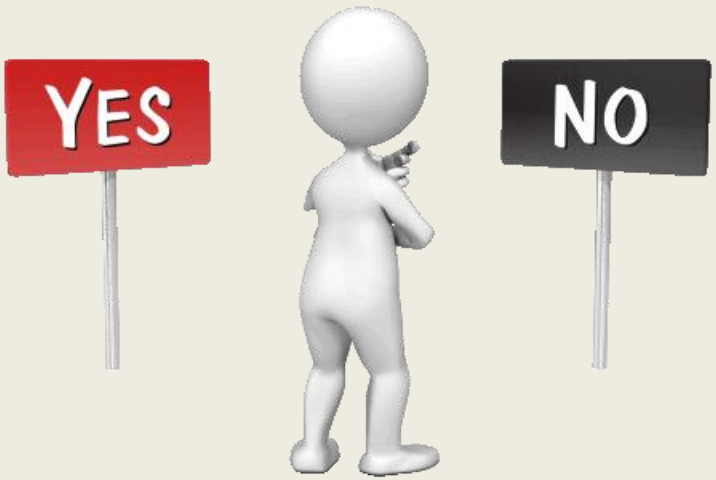
New Risk Metrics



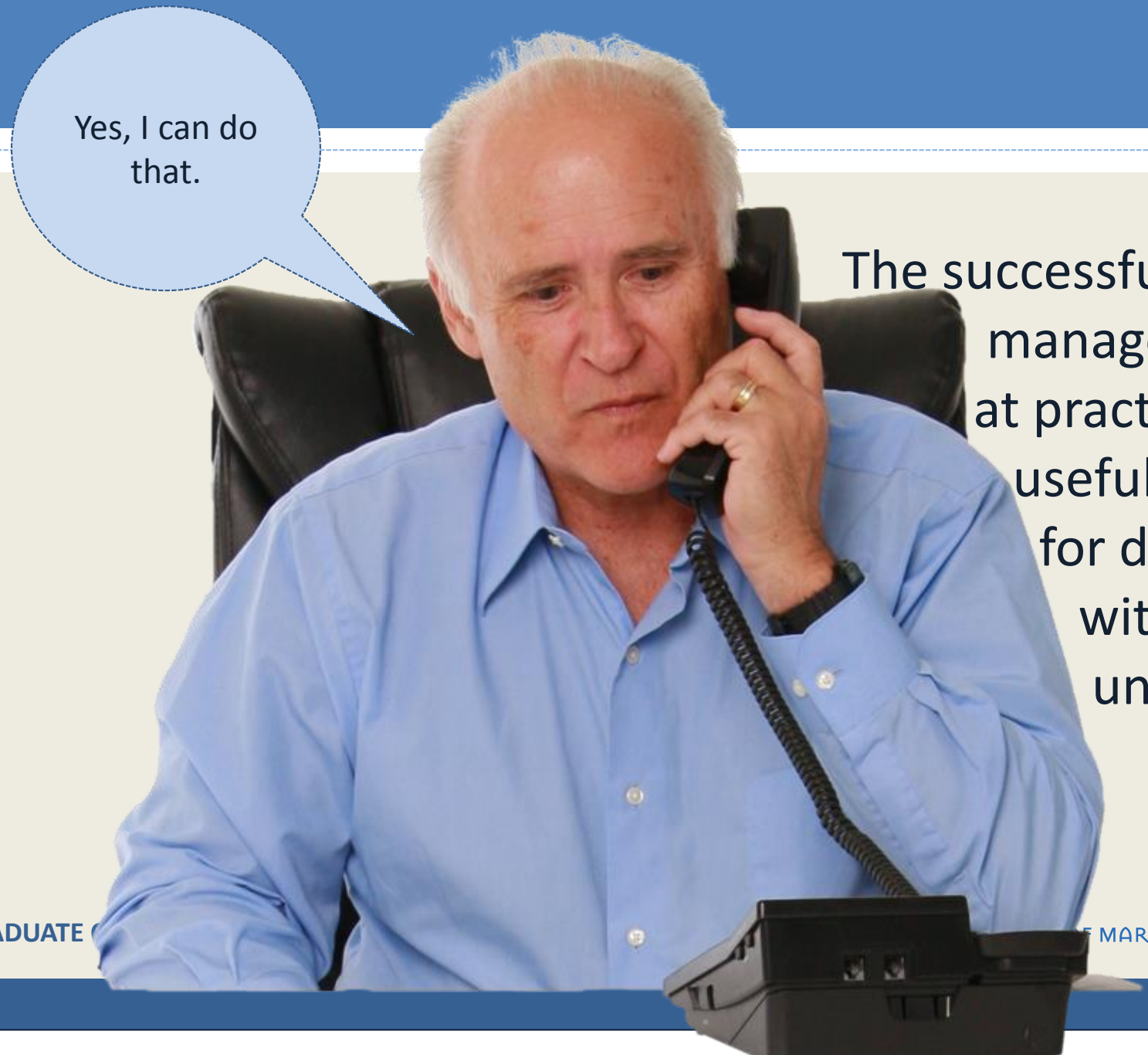
- Residual risk
- New risk
- Transformed risk
- Transferred risk
- New metrics
  - DSAC Class I - V
  - LSAC Class I - V
  - Partitioned risk


What am I supposed to do with these new metrics?

Make Decisions!



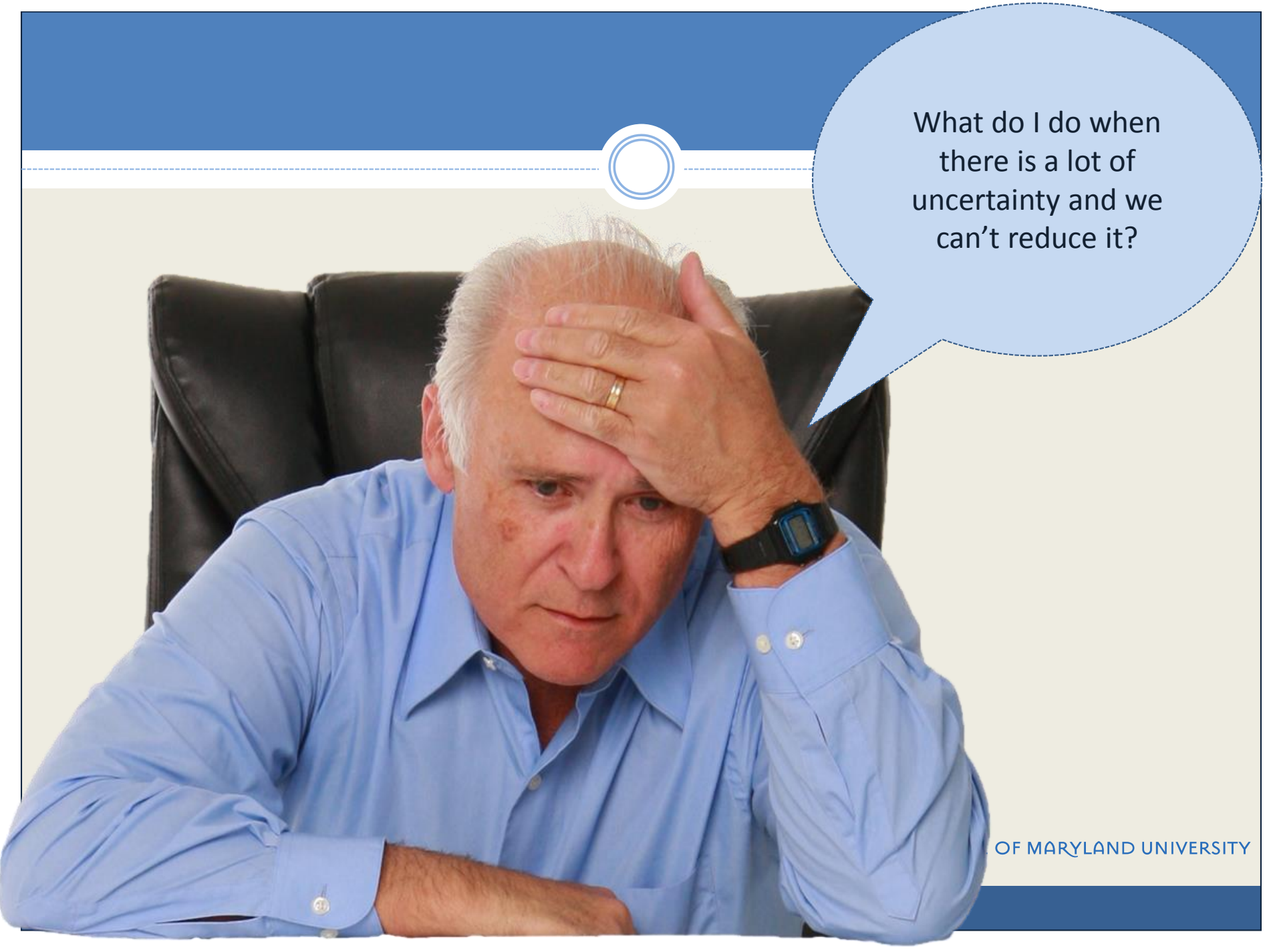
- How much detail is enough for now?
- What level of risk is tolerable?
- How will we manage risks to limit undesirable outcomes in planning studies?



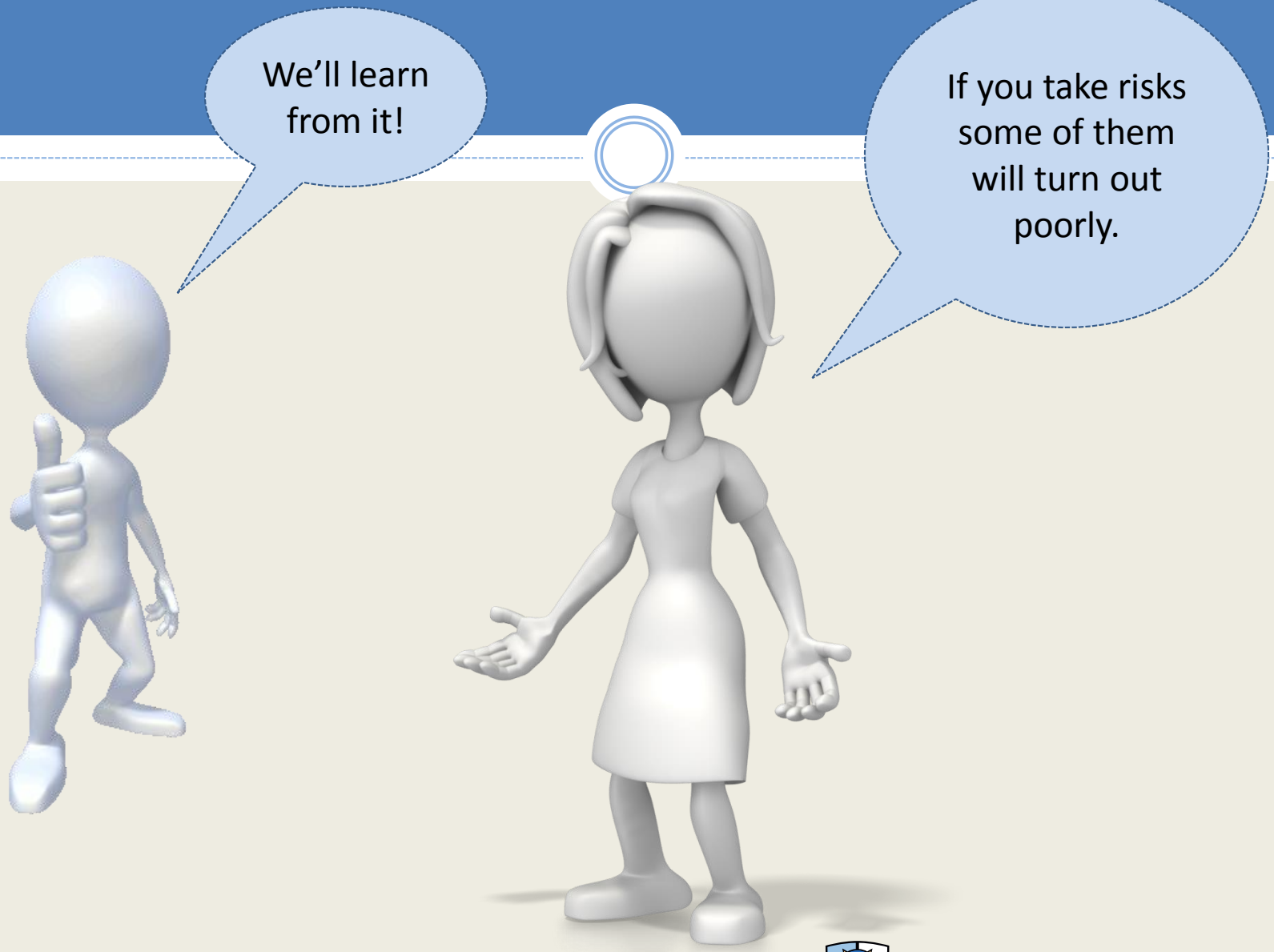
The successful risk manager arrives at practical and useful solutions for dealing with uncertainty

Risk Narratives

- We need to tell vivid and honest stories
- Proclaim uncertainty
- How do we convey what a levee overtopping would mean?


What do I do when there is a lot of uncertainty and we can’t reduce it?

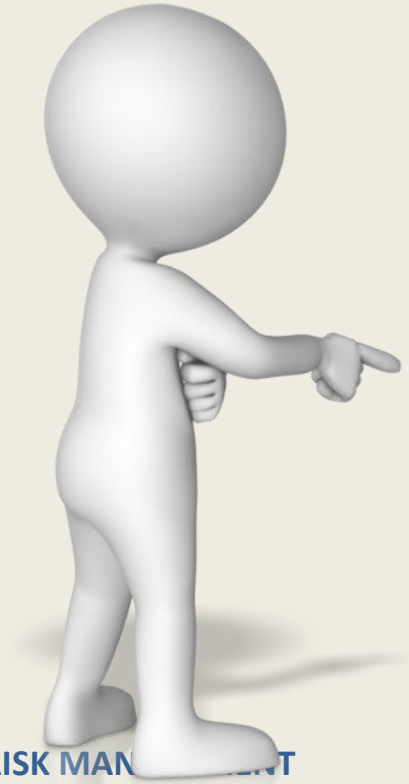

Live with it and don't punish responsible risk taking.


We'll learn from it!
If you take risks some of them will turn out poorly.


Let's
summarize.

Take Away 1

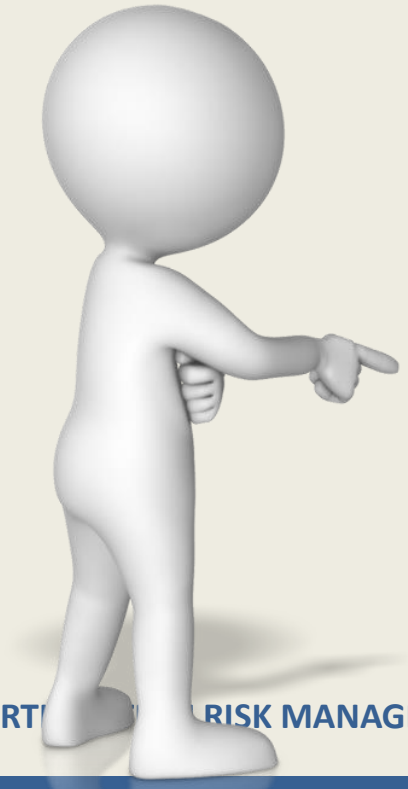
- Planning has changed so USACE should change the way it plans



Risk-informed planning

Take Away 2

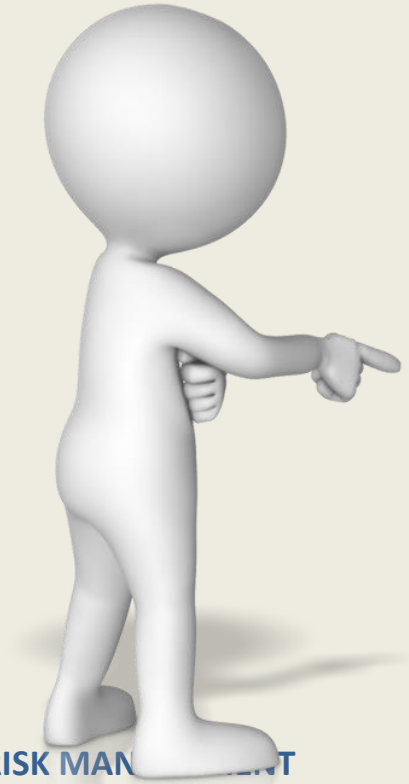
- Uncertainty has always been there, it is time to deal with it



Risk assessors and risk managers must both address uncertainty in their work

Take Away 3

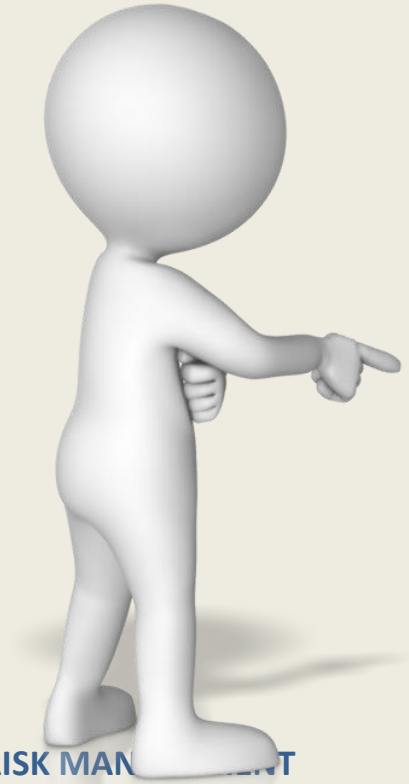
- You are either doing risk management or you're doing something else



Commit to strategic risk management

Take Away 4

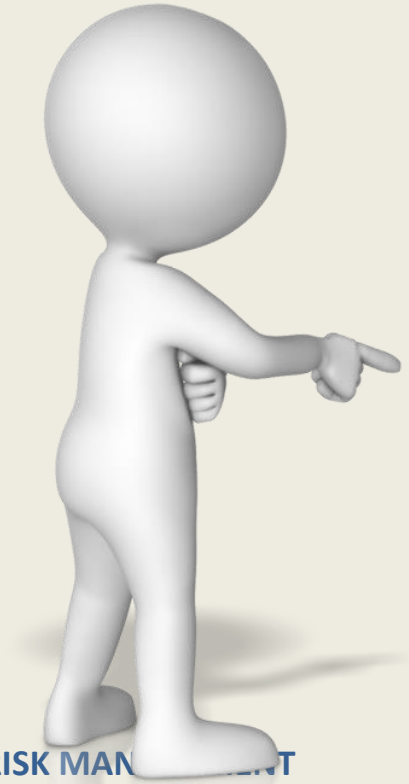
- Risk managers balance risk taking and avoiding risk to achieve goals



You must take some risks to move forward

Take Away 5

- The USACE has the opportunity to become the Nation's risk management leader



Adopt an enterprise risk management model

Thank you.

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