FLOOD RISK MANAGEMENT – PLANNING CENTER OF EXPERTISE (FRM-PCX)

FRM-PCX WEBINAR SERIES #1

PROBLEMS, OPPORTUNITIES, OBJECTIVES, AND CONSTRAINTS (POOC'S)
&
FUTURE WITHOUT-PROJECT CONDITIONS (FWOP)

Prepared/Presented by Jerry Fuentes and Nick Applegate

11 April 2019

"The views, opinions and findings contained in this report are those of the authors(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other official documentation."

US Army Corps of Engineers ®

U.S.ARMY

FRM-PCX – WE'RE HERE TO HELP!!!

…BUT WE NEED YOUR HELP TOO!

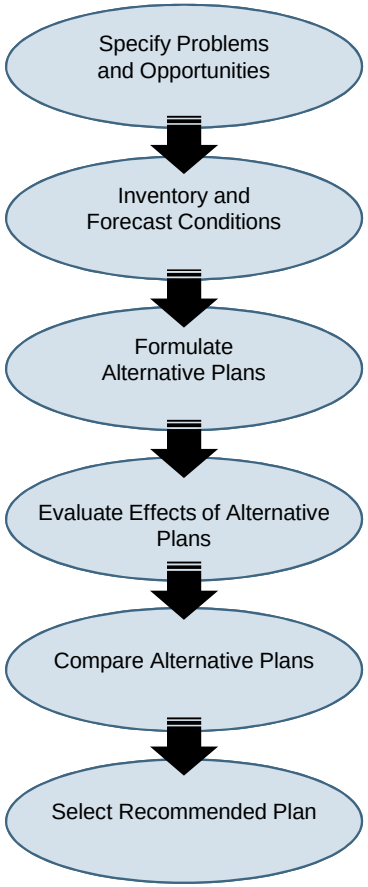
- **The Goal:**
  - Timely webinars on specific topics that can help you and your FRM study RIGHT NOW!
  - Provide individual presentations/training to teams on specific topics relevant for your FRM study
  - Provide individual support to teams to help work through specific FRM challenges

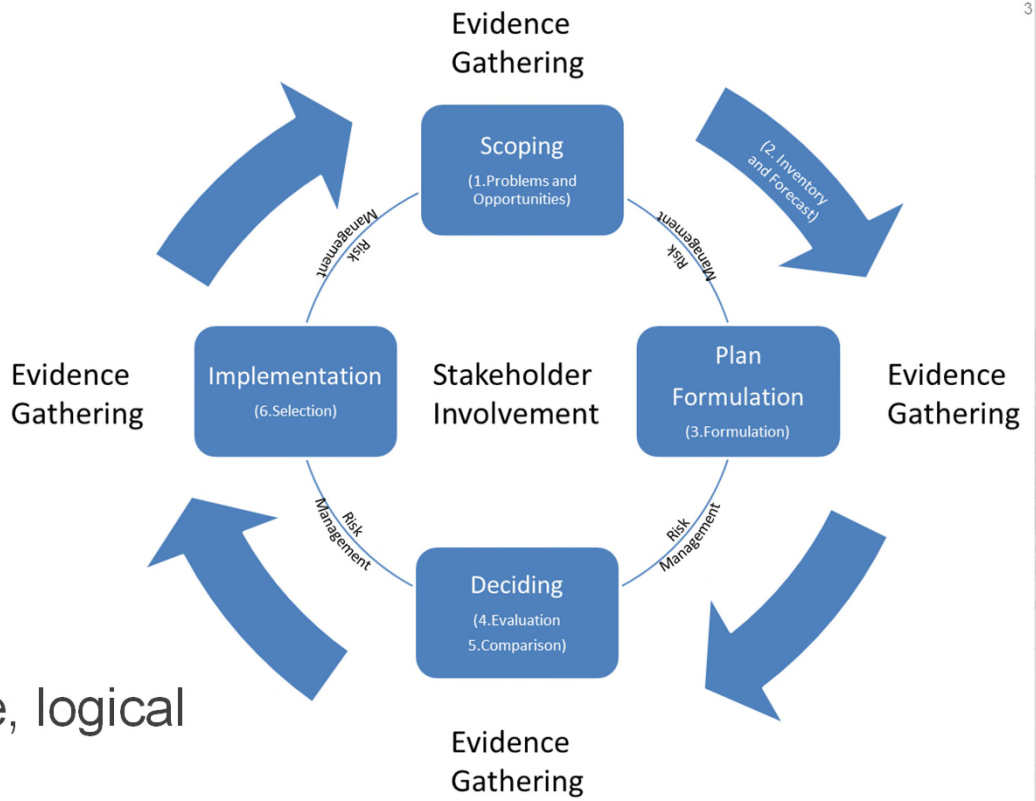
Nick Applegate, Nicholas.J.Applegate@usace.army.mil
Eric Thaut, Eric.W.Thaut@usace.army.mil

US Army Corps of Engineers ®

U.S.ARMY

THE PLANNING PROCESS



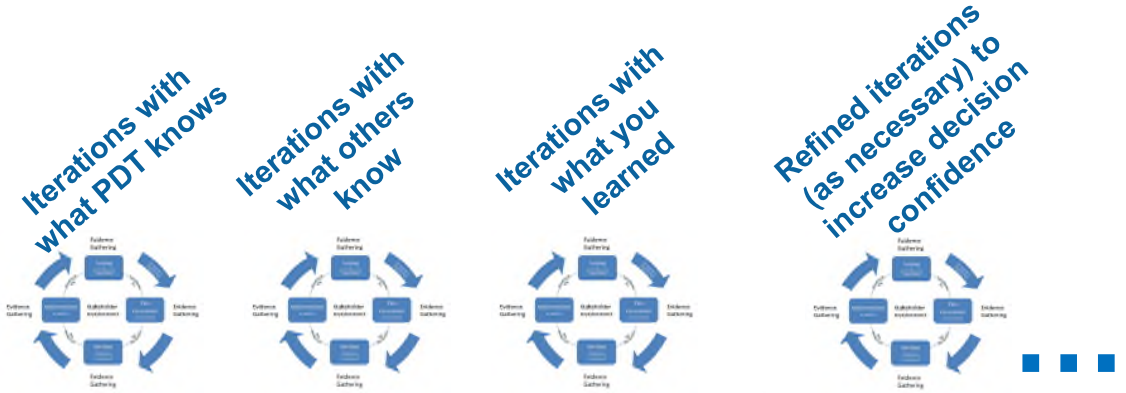


- Planning is an iterative, logical process
- Revisit previous steps as we learn
- Adjust as we move forward
- Conduct multiple iterations – as many as needed!

US Army Corps of Engineers ®

U.S.ARMY

ITERATE THE SIX-STEP PLANNING PROCESS AND GATHER EVIDENCE TO REDUCE UNCERTAINTY AND MANAGE RISK



There is no prescribed "correct number of total iterations," each study will be different!

>3 months $150k-$300k	>9 months >$900k	~ 6 months	~ 12 months	~ 6 months
Scoping	Alternative Evaluation & Analysis		Feasibility Analysis of Selected Plan	Washington-level Review

Alternatives Milestone

Tentatively Selected Plan Milestone

Agency Decision Milestone

Draft Report Released for Concurrent Review

District Final Report Transmittal to HQ

Chief's Report Signed

Key

Decision Milestone

Product Milestone

US Army Corps of Engineers ®

U.S.ARMY

WHAT DO YOU FIND TO BE THE MOST CHALLENGING IN FRM?

PROBLEMS

OPPORTUNITIES

OBJECTIVES

CONSTRAINTS

US Army Corps of Engineers ®

U.S.ARMY

PROBLEMS ARE IN THE EYES OF THE BEHOLDER

US Army Corps of Engineers ®

U.S.ARMY

PROBLEMS AND OPPORTUNITIES = RISK IDENTIFICATION

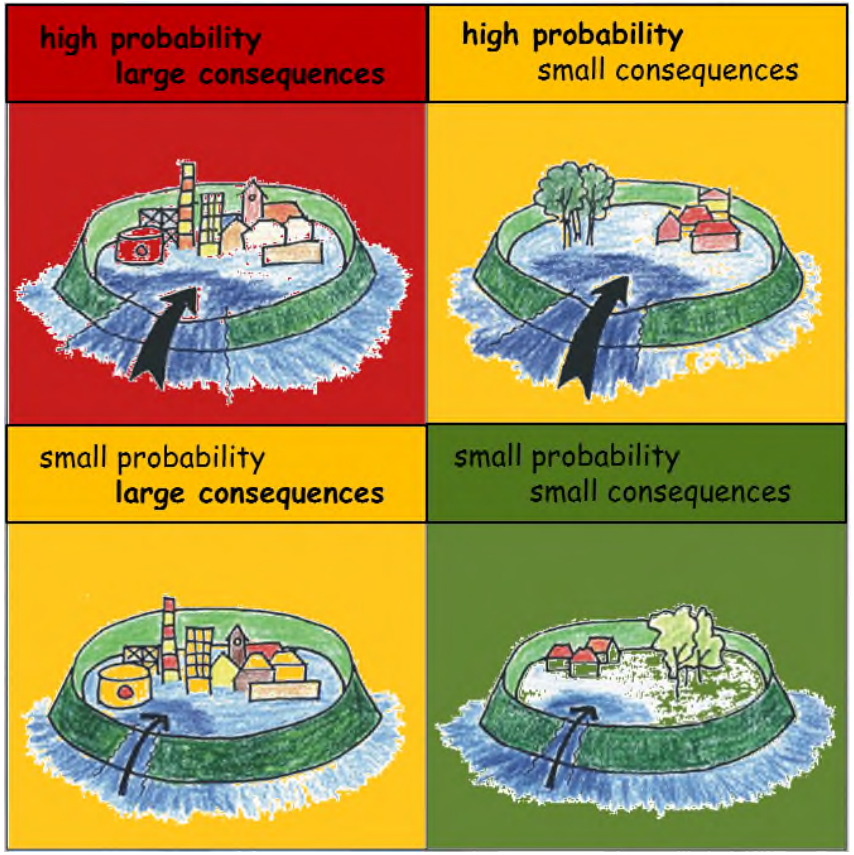
- There is an increased risk of **damage to property.**
- There is an increased risk to **loss of life.**

US Army Corps of Engineers ®

U.S.ARMY

PROBLEM DEFINITION

- Problem definition can be expanded to identify the nature, cause, location, dimensions, origin, time frame, and importance of the problem, as well as an indication of who considers this a problem.
- Generally negative and reflects current conditions
- Consider how problems may change over time



US Army Corps of Engineers ®

U.S.ARMY

PITFALLS TO AVOID IN PROBLEM DEFINITION

1. No focus--definition too vague or broad.
   - Example: There is a serious flooding problem in the watershed.

2. Focus is misdirected - definition is too narrow.
   - Example: How can we prevent flooding of the Hospital District?

3. Statement is assumption-driven.
   - Example: How can we prevent harmful human disturbances in the floodplain?

4. Statement is solution driven.
   - Example: Downtown Turkeyneck needs a higher levee.

US Army Corps of Engineers ®

U.S.ARMY

SO WHAT?

US Army Corps of Engineers ®

U.S.ARMY

PROBLEMS - REAL EXAMPLES

Not so good:

- The XYZ River suffers from watershed level degradation and instability.
- Flooding downstream of the reservoirs on Bob's Bayou (Dam Surcharge Releases and from other non-impounded rainfall)
- Flooding Upstream of the reservoirs from impoundment of water above government owned land.

US Army Corps of Engineers ®

U.S.ARMY

PROBLEM STATEMENT BREAKDOWN

“The XYZ River suffers from watershed level degradation and instability”

1. What’s the problem here?

2. Management measures listed to solve this problem were:
    1. Channel widening
    2. Bank stabilization
    3. New levee
    4. Flood proofing of structures

US Army Corps of Engineers ®

U.S.ARMY

IMPROVED PROBLEM STATEMENT

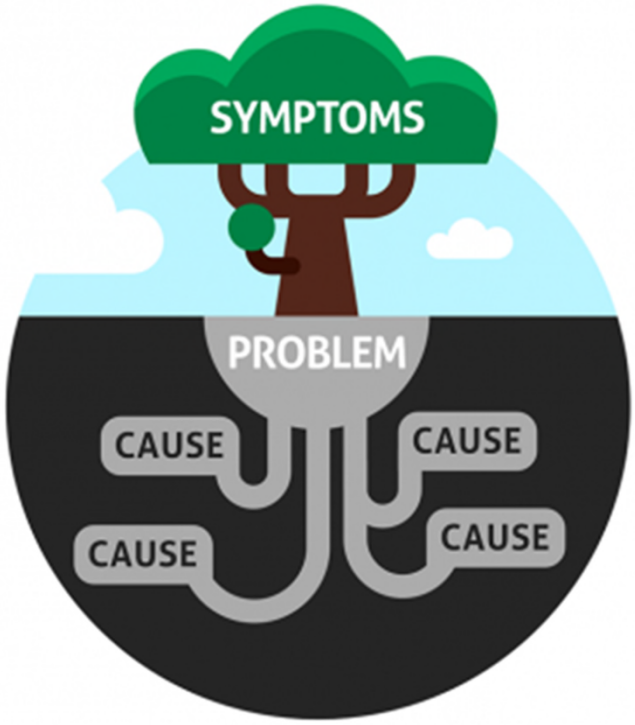
“The urban portions of Wonkaville are at risk of flooding from systemic erosion threatening the existing levees of the XYZ River resulting in extensive damage to residential and commercial property and increasing risk to life safety due to its deep floodplain.”

US Army Corps of Engineers ®

U.S.ARMY

CONCEPTUAL MODEL DEFINITION

- The activity of describing the physical and social world for the purposes of understanding and communication.

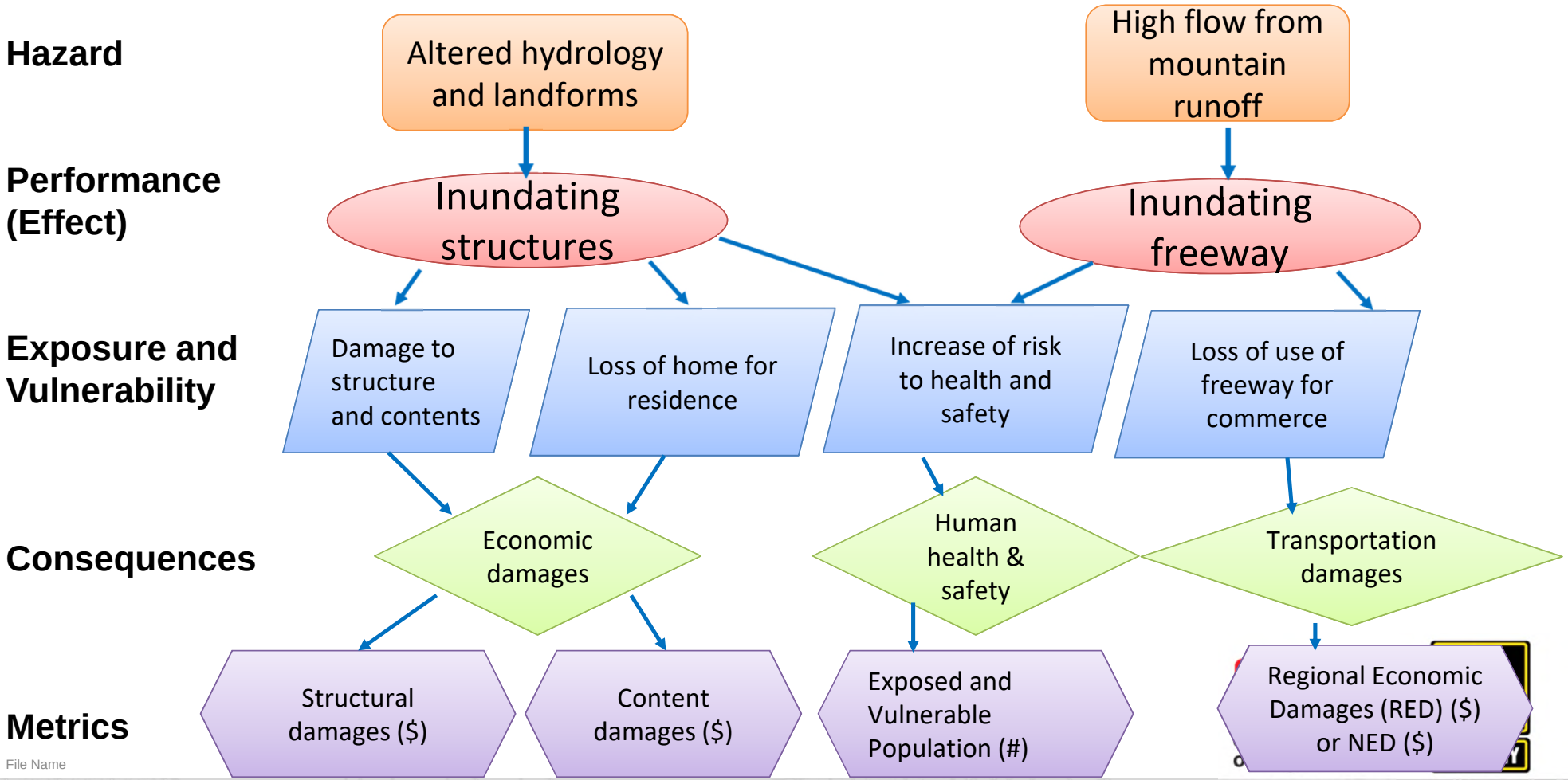


  - Enhances understanding of the representative system
  - Facilitates efficient communication of system details between stakeholders
  - Provides a point of reference for planners to study the system
  - Documents the system for future reference and provides a means for collaboration

US Army Corps of Engineers ®

U.S.ARMY

CONCEPTUAL FRM MODEL



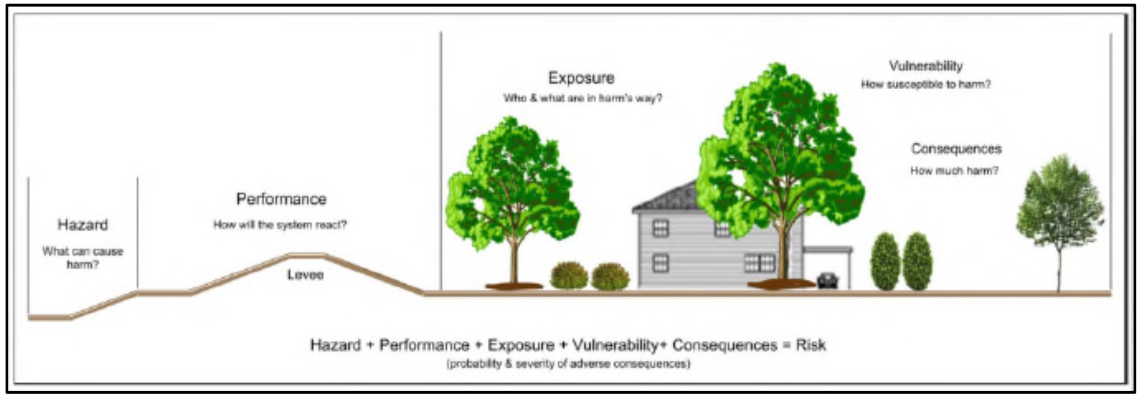
HOW DOES THIS HELP THE PDT?

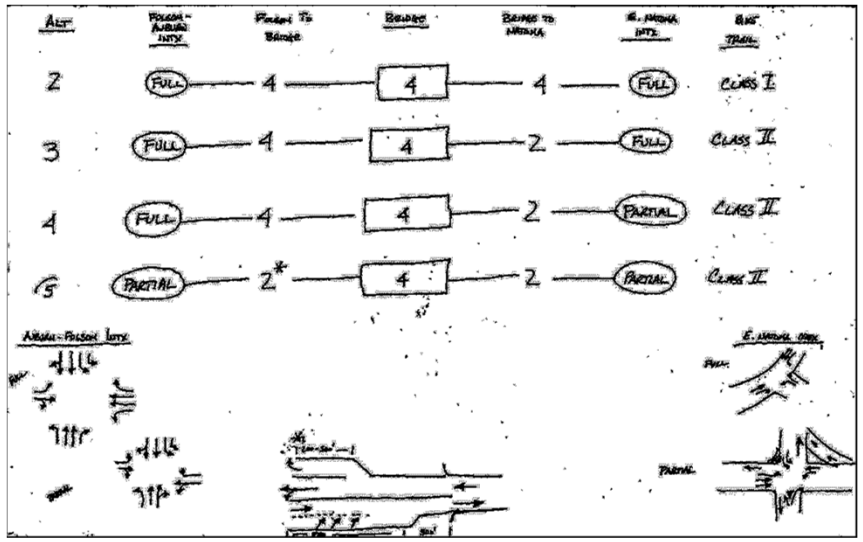
- Provides clear path from problem to effects
- Helps identify metrics critical to evaluation
- Provides clear documentation on problem ID and helps with formulation and evaluation strategies
- Identifies potential opportunities

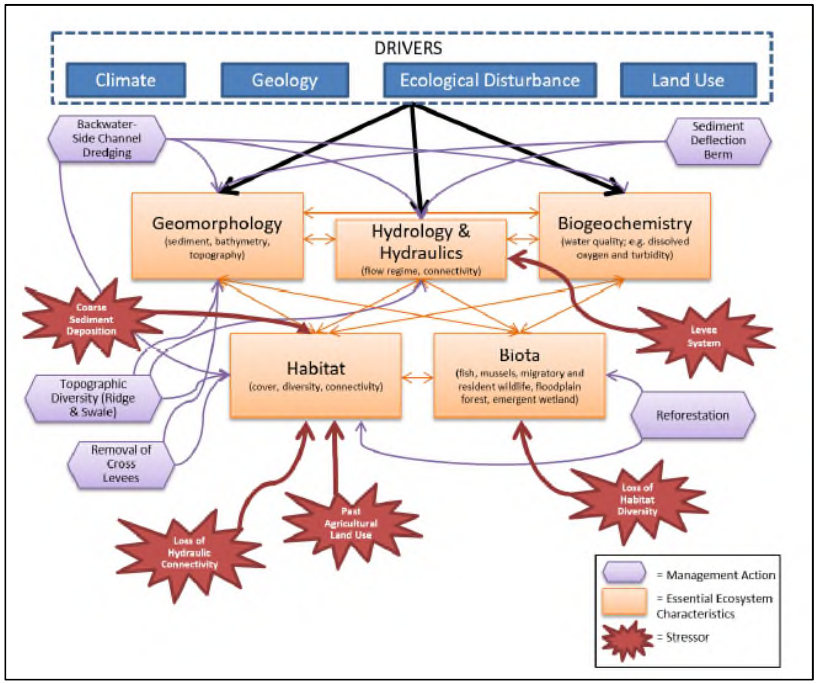
US Army Corps of Engineers ®

U.S.ARMY

SOME ADDITIONAL CONSIDERATIONS







US Army Corps of Engineers ®

U.S.ARMY

SUMMARY OF PROBLEM STATEMENTS

- Clear problem statements lead to better solutions
- Perceive/characterize problems as risks
- Better understanding of the system makes for better problem statements
- Avoid being too broad, too narrow, basing them on assumptions, or including solutions.
- Use photos or graphics to illustrate the problem.

US Army Corps of Engineers ®

U.S.ARMY

OPPORTUNITIES

- A favorable juncture of circumstances; a good chance for advancement or progress
- May also be additional ideas, not related to the problems
- Typical opportunities in FRM are:
  - Additional recreation
  - Improved water quality
  - Incidental ecosystem restoration
  - Integration with other Federal, State and local initiatives.

US Army Corps of Engineers ®

U.S.ARMY

OPPORTUNITIES ARE NOT THE REVERSE OF PROBLEMS!

Problem:

“There is catastrophic flooding in Turkeyneck, OK”

Opportunity:

“We can reduce flooding in Turkeyneck, OK”

US Army Corps of Engineers ®

U.S.ARMY

OBJECTIVES AND OUR PROBLEM STATEMENTS

- Objectives should be flexible, measurable, attainable, and congruent
- Objectives refine our problem statements into achievable actions. But they should not be a specific action!
- It is acceptable to solve only a part of the problem – so our objectives should make that clear.
- Use the formula – Include the subject, effect, location, timing, and duration in objective statements

EXAMPLES

Not so good:

- Optimize the reservoir operations
- Optimize/improve/safely convey detained water

Good:

- Reduce the risk of flooding in the study area as measured by the reduction in EAD, the exposed/vulnerable population, life safety concerns and availability of evacuation routes.
- Reduce the impacts to critical infrastructure in the study area measured by the reduction in damages and availability of emergency facilities during flood events
- Encourage wise use of the flood plain measured by the strength of the Floodplain Management plan.

US Army Corps of Engineers ®

U.S.ARMY

POP QUIZ ON OBJECTIVES

- **Do all identified problems need to have corresponding objectives?**

YES	NO

- **Can our study be single purpose but at the same time be multi-objective?**

YES	NO

US Army Corps of Engineers ®

U.S.ARMY

CONSTRAINTS

A constraint is basically a restriction that limits the extent of the planning process.

US Army Corps of Engineers ®

U.S.ARMY

CONSTRAINTS - REAL EXAMPLES

Not so good:

- Local economic constraints preclude alternatives with extensive O&M requirements.
- Project must be technically feasible, economically justified and environmentally acceptable.
- Project must not induce additional upstream or downstream damages

Good:

- Plans must not violate the Federal Aviation Administration (FAA) restrictions regarding increased risk of bird strikes associated with providing additional bird habitat in the area of the Lockjaw Regional Airport.
- Avoid or minimize impacts to the habitat of the endangered Pallid Seersucker in the Wonka River over the fifty year period of analysis

US Army Corps of Engineers ®

U.S.ARMY

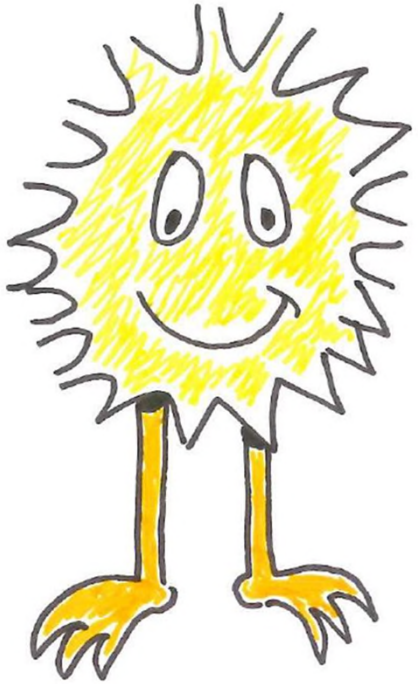
AND NOW THIS PAUSE…

- **If it precludes us from identifying the NED Plan, it's probably NOT a constraint!**

US Army Corps of Engineers ®

U.S.ARMY

SUMMARY OF THE POOC'S



- Problem definition should state the nature, cause, location, dimensions, origin, time frame, and importance of the problem, as well as an indication of who considers this a problem.
- Review and revise problem statements throughout the study as you accumulate data.
- Look for opportunities not related to your problems.
- Don't overly constrain your plan formulation. Keep the NED in mind.

US Army Corps of Engineers ®

U.S.ARMY

QUESTIONS ON POOC'S?

- We'll pause for about 5 minutes to answer any questions on the POOC's.

US Army Corps of Engineers ®

U.S.ARMY

FUTURE WITHOUT-PROJECT CONDITIONS (FWOP)

US Army Corps of Engineers ®

U.S.ARMY

FWOP CONCEPTS IN RISK INFORMED PLANNING

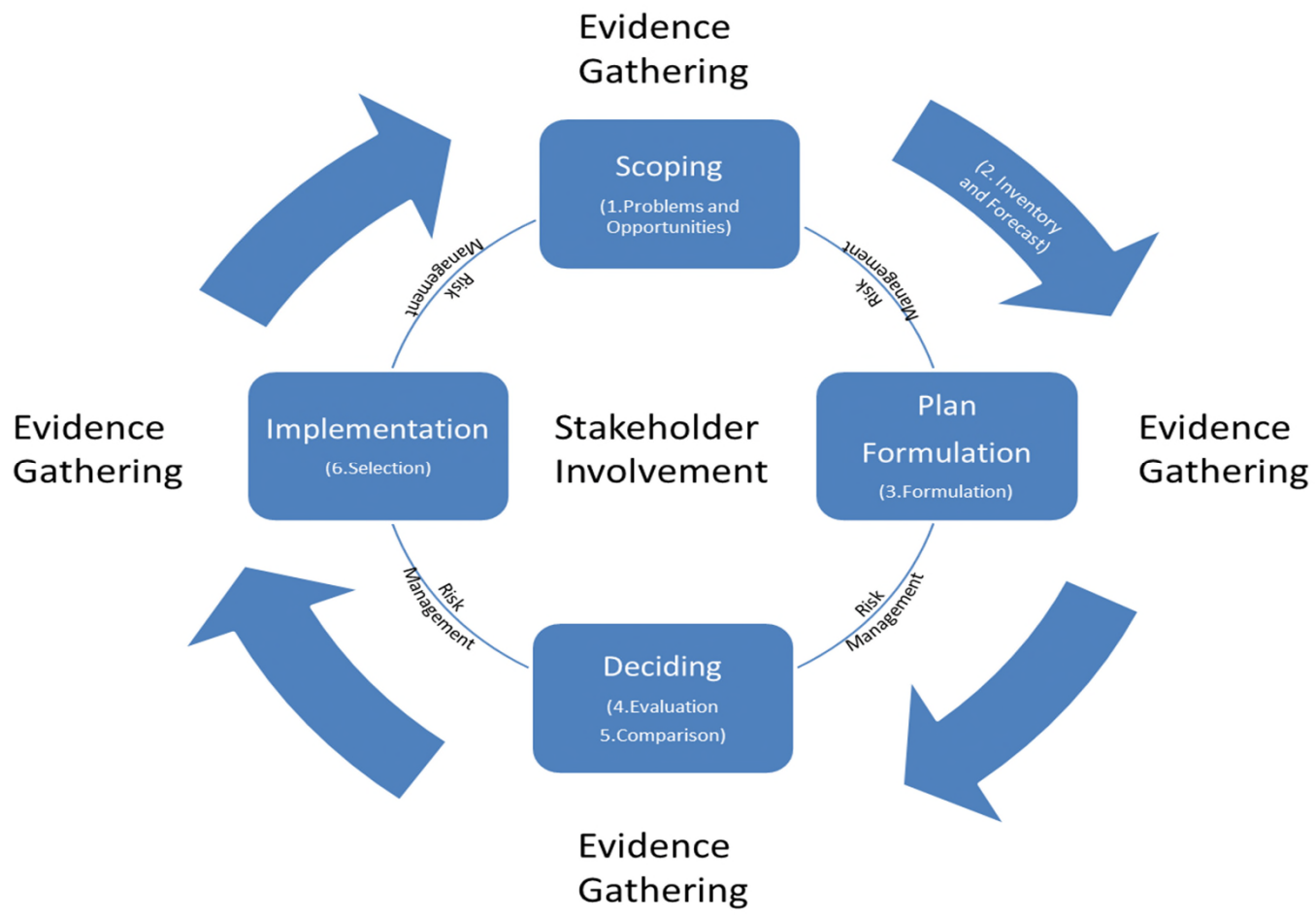
- What is the FWOP?
  - How the study area (and related FRM problems) will change over time without any Federal Action
  - Basis of comparison for all alternative plans
- Evidence gathering and forecasting
  - Describing scenarios
  - Data gathering
    - Determining appropriate level of detail
  - Comparison analysis
    - Developing appropriate analytical tools

"How's my end of year looking?"

US Army Corps of Engineers ®

U.S.ARMY

WHEN DO WE DEVELOP THE FWOP?

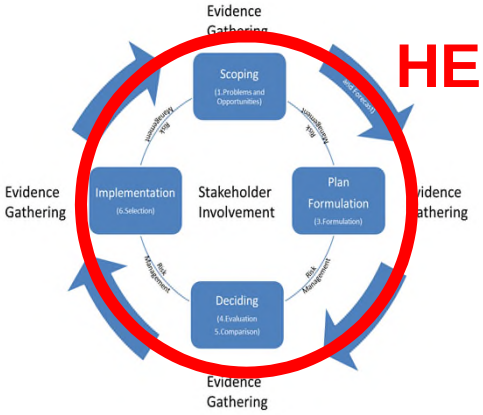


US Army Corps of Engineers ®

U.S.ARMY

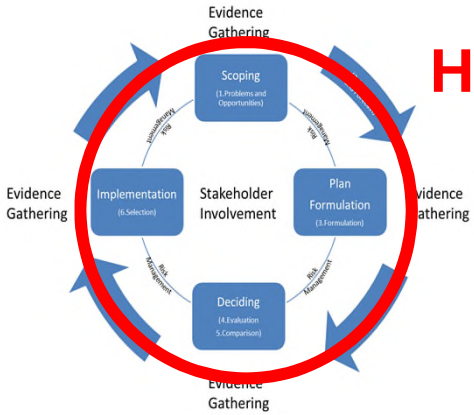
…OR MAYBE A BETTER WAY TO THINK ABOUT WHEN WE DEVELOP/REFINE FWOP…

1st ITERATION



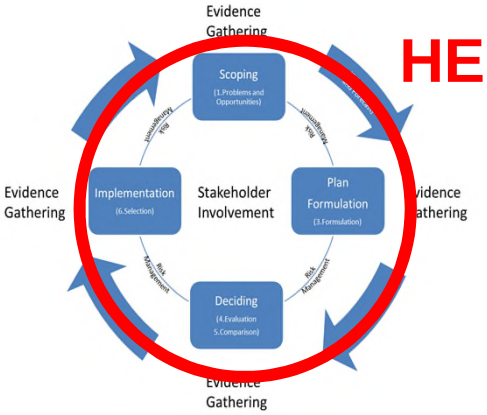
HERE

2ND ITERATION



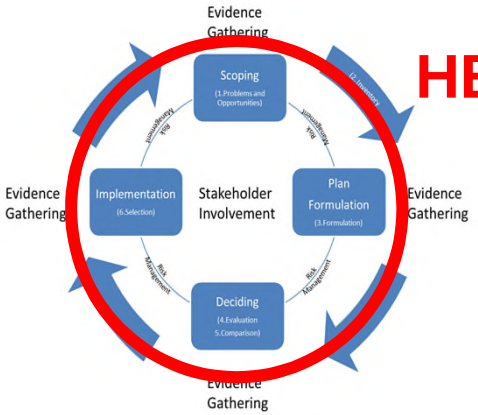
HERE

3RD ITERATION



HERE

4TH ITERATION…AND BEYOND

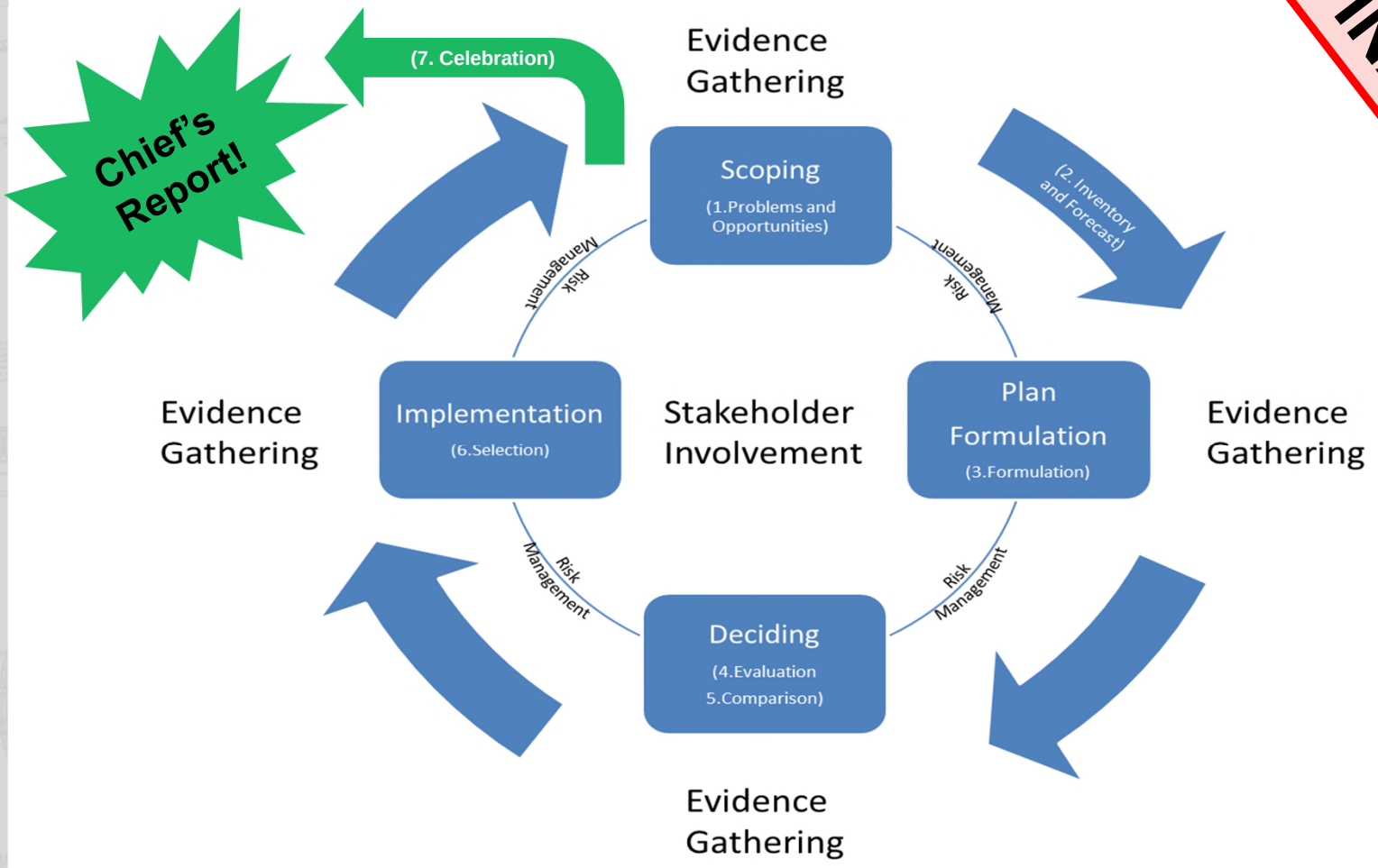


HERE

US Army Corps of Engineers ®

U.S.ARMY

WHEN DO WE DEVELOP THE FWOP?



FINAL ITERATION!

US Army Corps of Engineers ®

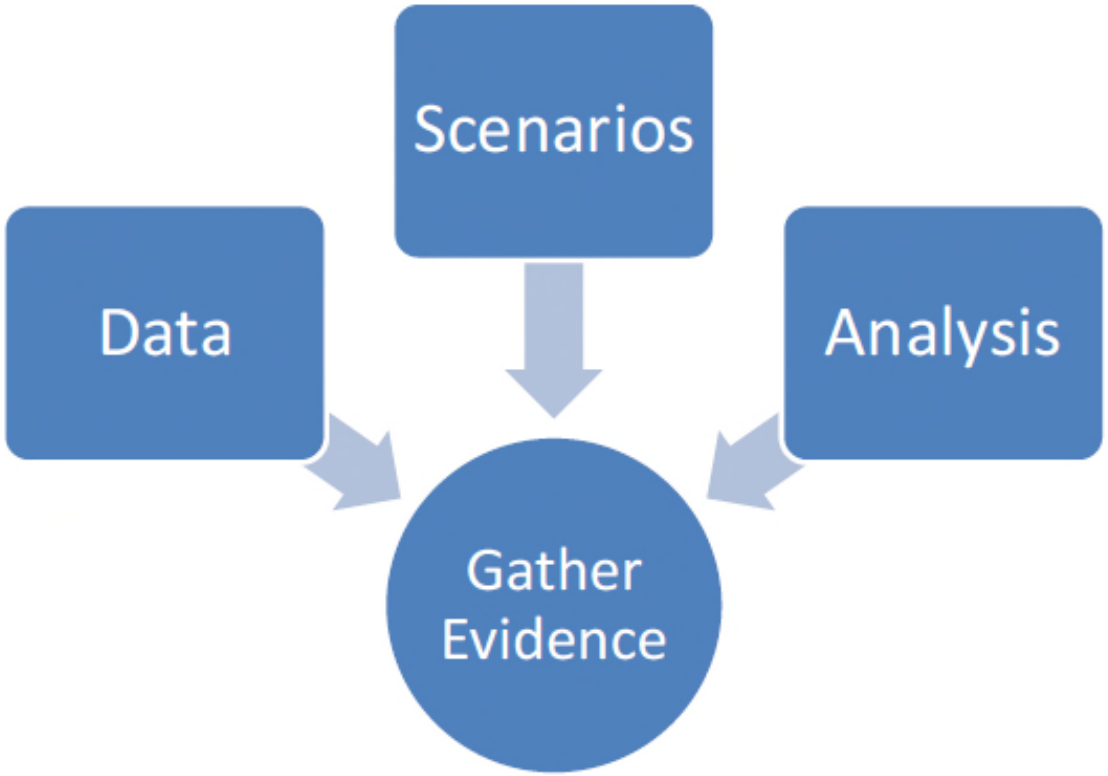
U.S.ARMY

EVIDENCE GATHERING

1. Scenarios
   - Describe historic, existing and future conditions
   - Based on assumptions of how uncertainties manifest

2. Data gathering
   - Type of data needed
   - How much is enough?

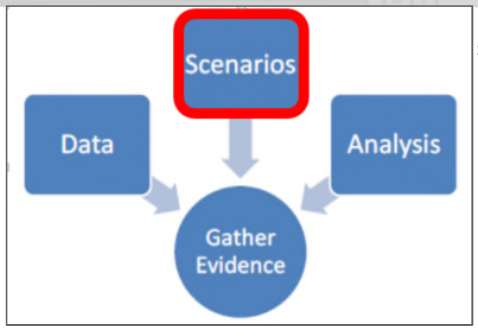
3. Analysis of evidence
   - Quantifying the scenario(s)
   - Accounting for uncertainty



US Army Corps of Engineers ®

U.S.ARMY

HISTORIC AND EXISTING SCENARIOS



➢ Why Historic?

- ➢ Better understand trends and problems of the system
- ➢ Helps to inform future scenario development
- ➢ Helps explain significance of your project

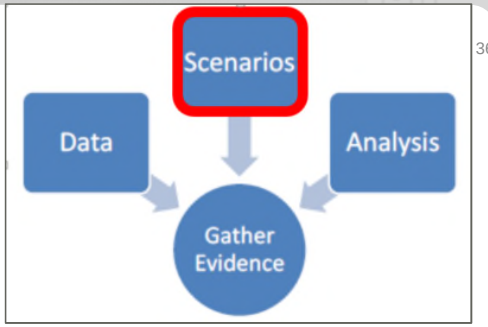
➢ Why Existing?

- ➢ Verifiable!
- ➢ Better describe and confirm problems and opportunities
- ➢ Identify and reduce critical uncertainties
- ➢ Make comparisons to with- and without-project scenarios
- ➢ Helps explain significance of your project
- ➢ Make risk-informed decisions!

US Army Corps of Engineers ®

U.S.ARMY

FUTURE WITHOUT-PROJECT CONDITION SCENARIO(S)



- Single most important scenario!
  - Basis of comparison for alternatives
- Primarily a qualitative effort for initial iterations
  - Identify data gaps and where to focus gathering additional data for quantitative analysis

- Assumptions – trends, actions by others
  - Will FRM problems get worse or better without Federal action?
- May have more than one future without project scenario
  - Examples – sea level rise, inland hydrology analysis

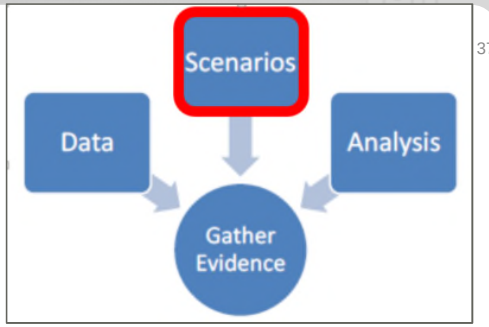
US Army Corps of Engineers ®

U.S.ARMY

FORECASTING

- What is a forecast?
  - Potential future reality
  - Period of Analysis vs. Project Life
- Why do we forecast?
  - Anticipate future conditions
  - Understand benefits of the project
  - Identify & adapt to uncertainties
- Uncertainty
  - Always a part of forecasting
  - Embrace it!

- **Typical forecasts in FRM**:
  - Hydrology
  - Hydraulics
  - Climate Change
  - Sea Level Change
  - Structure value
  - Regional economics
  - Population Growth
  - Exposed/Vulnerable Population
  - Local Development Plans
  - Land Use Changes
  - Habitat
  - Water supply
  - Infiltration
  - State/local actions

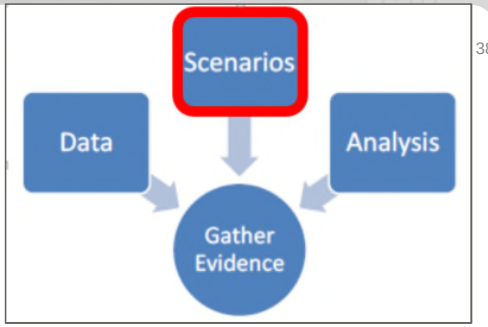


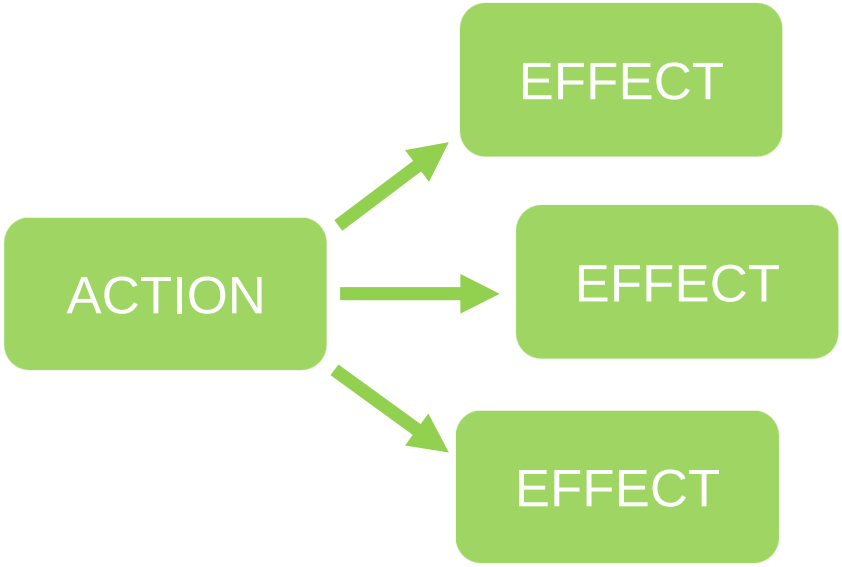
US Army Corps of Engineers ®

U.S.ARMY

FUTURE WITH PROJECT SCENARIO(S)

- Most likely future condition if a plan of action is taken
  - Hydrology, Hydraulics, Economics, Geotech, Environmental
  - Will existing agricultural land be developed?
  - How will the regional economy be affected?
  - Will there be downstream or upstream impacts?
  - What is the residual risk?
- Purpose of the with-condition scenario is provide the narrative for evaluating the plan's effects
- Different with-condition for each plan
- Account for uncertainty in the with condition scenarios
- Document assumptions along the way and TELL YOUR STORY!

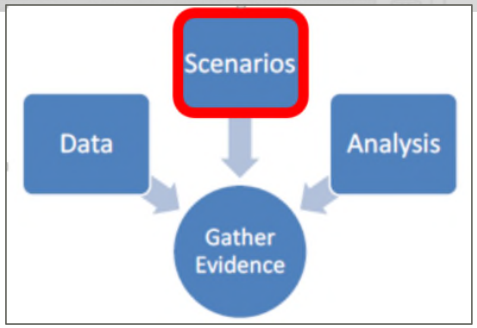




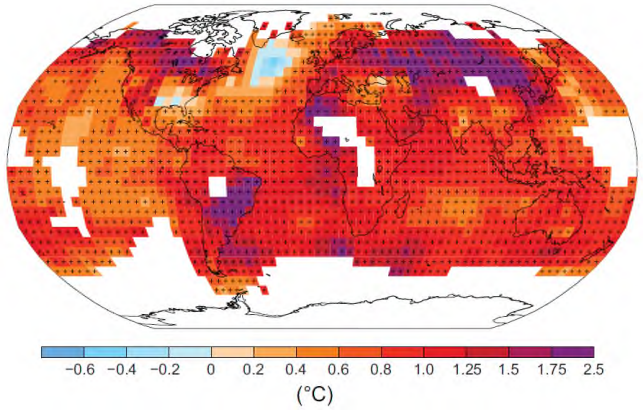
US Army Corps of Engineers ®

U.S.ARMY

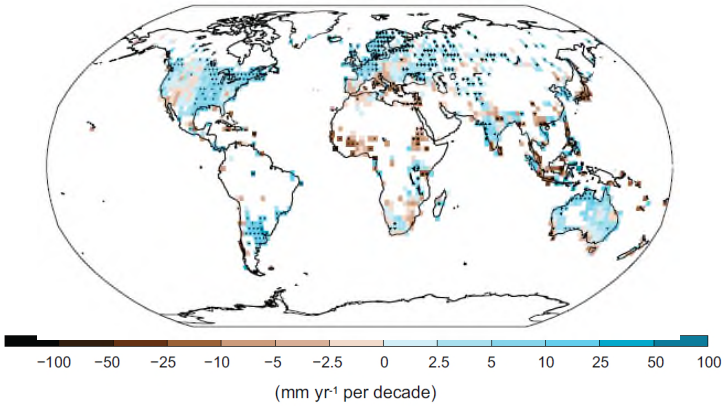
FUTURE CONSIDERATIONS – CLIMATE AND SEA LEVEL CHANGE

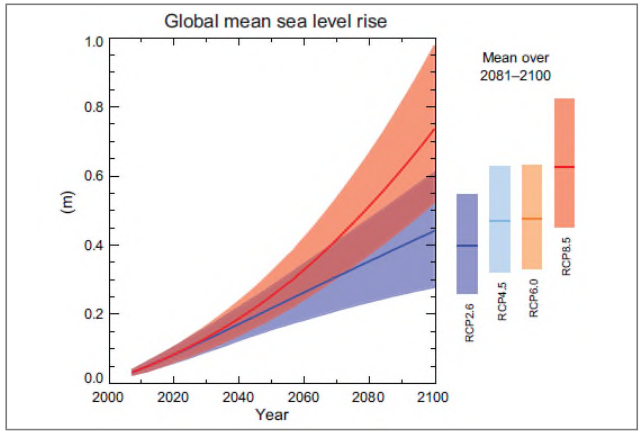


Observed change in surface temperature
1901 - 2012



Observed change in annual precipitation over land
1901 - 2010





Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC 2013)

- Ocean levels and pH
- Temperature patterns
- Precipitation patterns
- Weather patterns
- Storms

- https://www.usace.army.mil/corpsclimate/

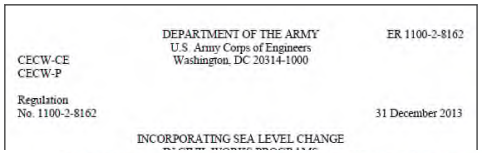
US Army Corps of Engineers ®

U.S.ARMY

PLANNING WITH UNCERTAINTY – SEA LEVEL CHANGE

Sea Level Change

ER1100-2-8162



DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
Washington, DC 20314-1000

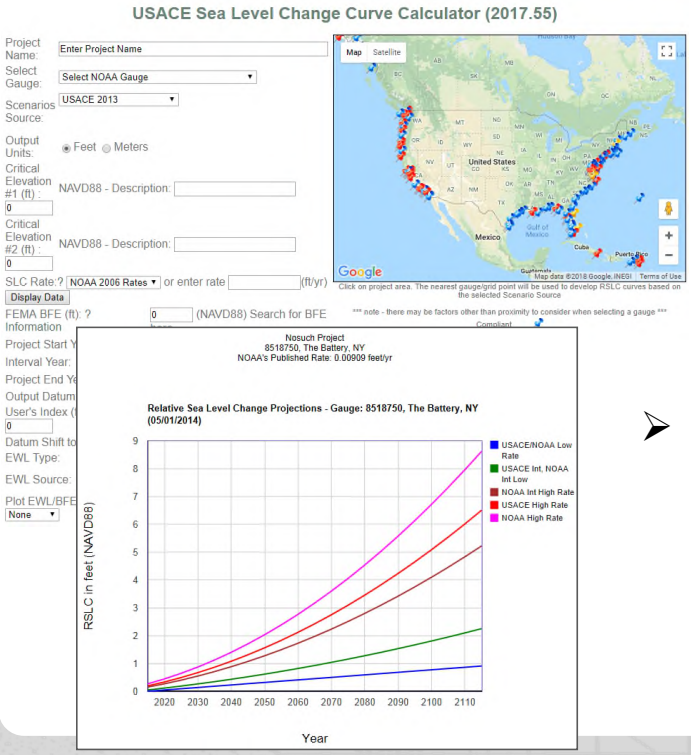
CECW-CE
CECW-P

ER 1100-2-8162

Regulation
No. 1100-2-8162

31 December 2013

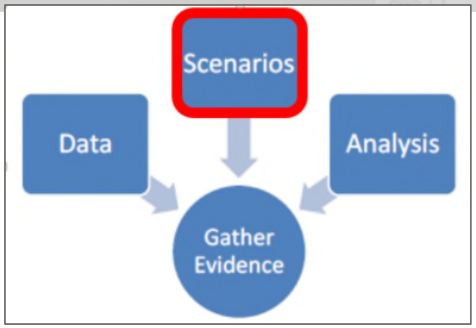
INCORPORATING SEA LEVEL CHANGE



Requirements:

- If SLC is applicable for your study area:
  - Evaluate all Alts vs. all three USACE SLC scenarios

    OR
  - Formulate under one SLC scenario, with sensitivity for the others



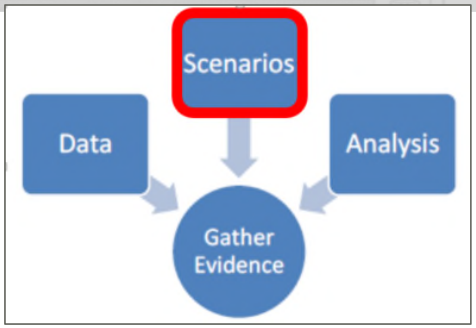
- The Goal:
  - Bracket uncertainty
  - Show robustness and adaptive capacity
  - Document assumptions, methods and results

- USACE Tools!:
  - https://www.usace.army.mil/corpsclimate/Public_Tools_Dev_by_USACE/sea_level_change/

US Army Corps of Engineers ®

U.S.ARMY

PLANNING WITH UNCERTAINTY – INLAND CLIMATE CHANGE



Inland Hydrology
ECB 2018-14

ENGINEERING AND CONSTRUCTION BULLETIN

US Army Corps of Engineers

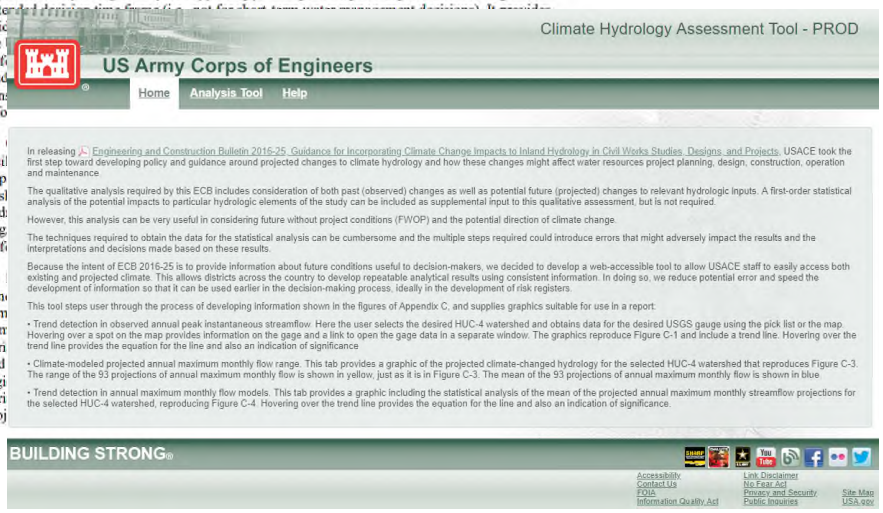
No. 2018-14 **Issuing Office:** CECW-EC **Issued:** 10 Sep 18 **Expires:** 10 Sep 20

SUBJECT: Guidance for Incorporating Climate Change Impacts to Inland Hydrology in Civil Works Studies, Designs, and Projects.

CATEGORY: Guidance.

1. **References.** See Attachment D.

2. **Purpose.** This Engineering and Construction Bulletin (ECB) reissues and updates the policy in ECB 2016-25 (reference a), Guidance for Incorporating Climate Change Impacts to Inland Hydrology in Civil Works Studies, Designs, and Projects. This ECB is effective immediately and applies to all hydrologic analyses supporting planning and engineering decisions having an



Requirements:

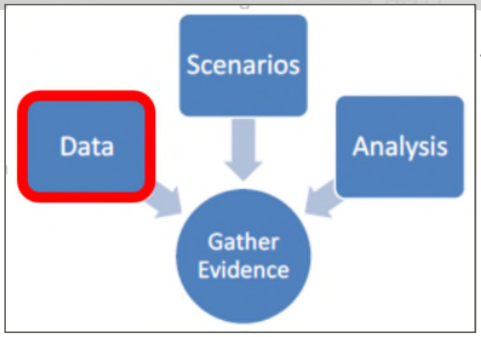
- Qualitative (using USACE tools) assessment of potential project vulnerabilities
- If Climate Change will be incorporated into FWOP baseline, prior approval from CP&R CoP required.

- The Goal:
  - To consider and incorporate uncertain climate change impacts in hydrologic studies
  - Document assumptions, methods and results
  - USACE Tools!:
    - https://www.usace.army.mil/corpsclimate/Public_Tools_Dev_by_USACE/Climate-Impacted_Hydrology/

US Army Corps of Engineers ®

U.S.ARMY

INSTRUMENTAL VS. RELEVANT UNCERTAINTY



- **Instrumental uncertainty** refers to things that could affect the decision
  - We want to focus time and budget on increasing level of detail to reduce instrumental uncertainty

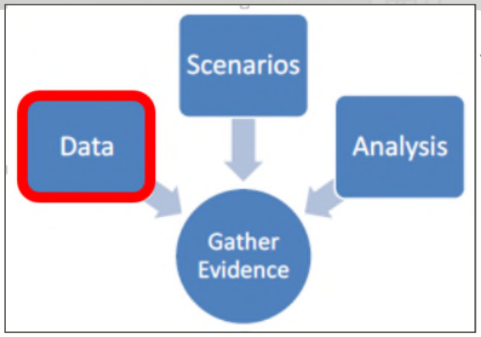
- **Relevant uncertainty** refers to things people may care about but will not change the decision
  - Reducing relevant uncertainty can feel essential to some

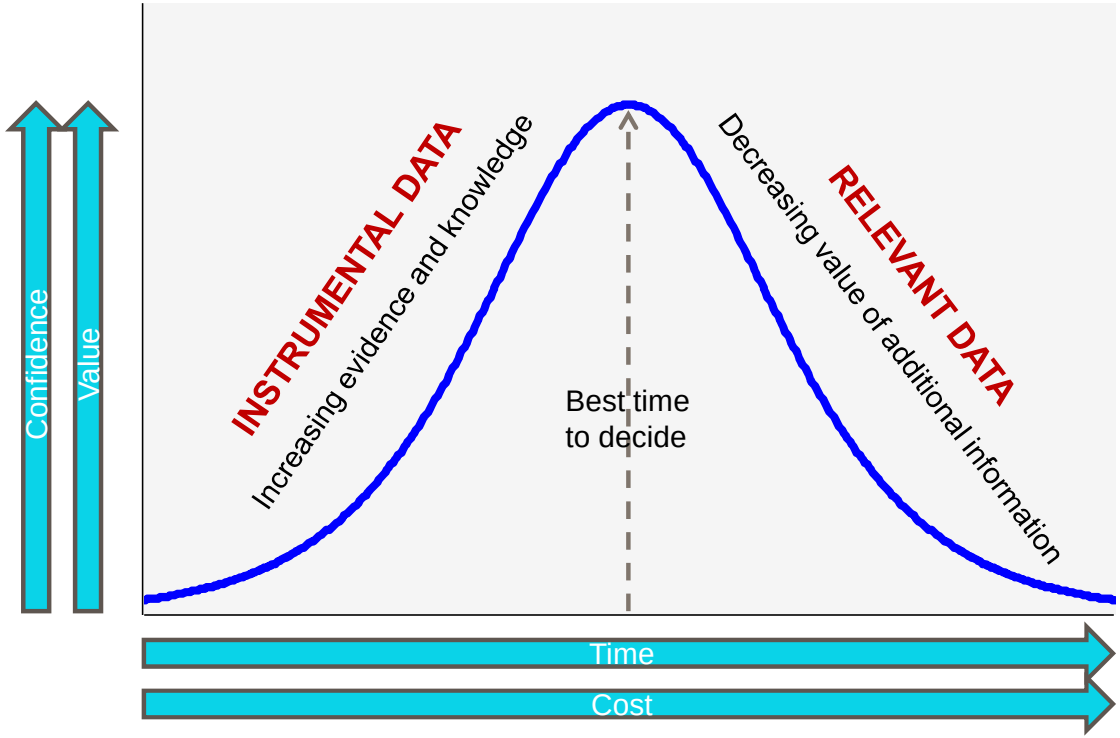
- We should utilize the **Risk Register** to help determine instrumental vs. relevant uncertainty

US Army Corps of Engineers ®

U.S.ARMY

REDUCING UNCERTAINTY STRATEGICALLY



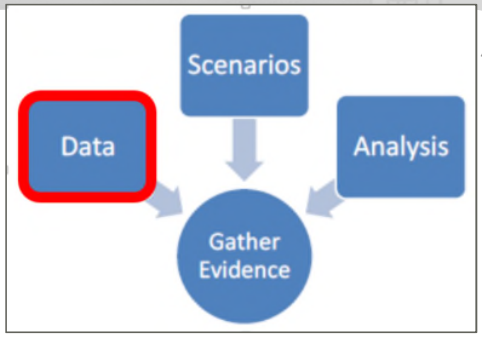


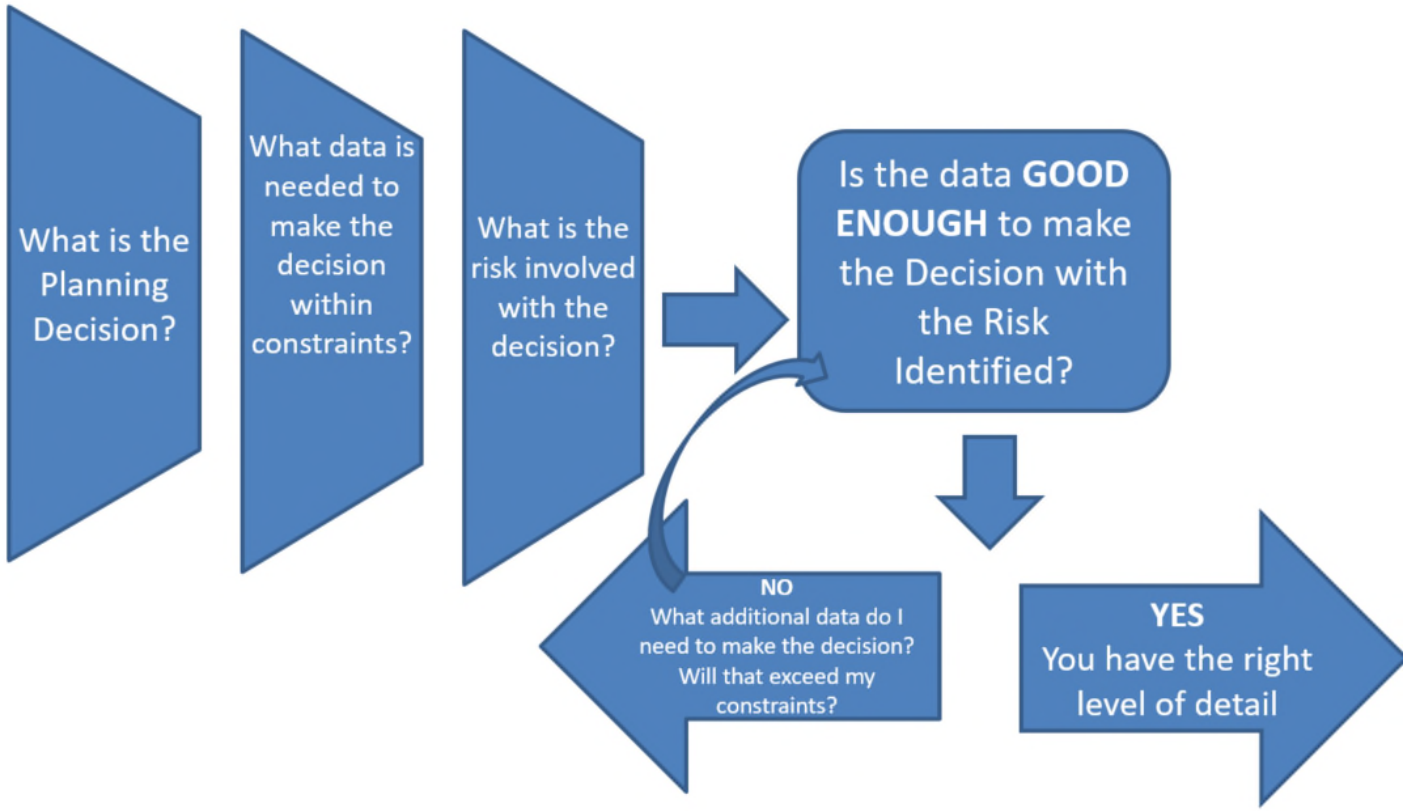
- **Challenge of balancing time, effort, and expense of more evidence to reduce uncertainty vs. risks of making decisions**

US Army Corps of Engineers ®

U.S.ARMY

APPROPRIATE LEVEL OF DETAIL?





US Army Corps of Engineers ®

U.S.ARMY

EXAMPLE – FRM LEVEL OF DETAIL

- Current Planning Phase: *1st iteration* of the FWOP and formulation of alternatives for AMM.
- Relevant existing information: Existing topography is 15 years old and accurate within ±3 feet.
- Level of Detail Decision: Do we need to begin development of a more refined topography for the floodplain modeling to support future analysis of FWOP baseline economic damages.

- **Does this have the potential to be instrumental uncertainty?**

YES	NO

- **Do we have enough information to make this decision at this phase?**

YES	NO

US Army Corps of Engineers ®

U.S.ARMY

EXAMPLE (NEXT ITERATION) – FRM LEVEL OF DETAIL

- Current Planning Phase: *2nd iteration* of the FWOP and formulation of alternatives for AMM.
- Relevant existing information: Existing topography is 15 years old and accurate within ±3 feet.
- Level of Detail Decision: Do we need to begin development of a more refined topography for the floodplain modeling to support future analysis of FWOP baseline economic damages.
  - H&H estimates that urban flooding would be anywhere from 1-2 feet for frequent events and 4-7 feet for infrequent events
  - 20,000 structures in the floodplain, built slab on grade
  - It will cost $100k and 6 months to refine the topography
  - Farming activity has altered some ground elevations near town ± 1-2 feet within the last 15 years.

- **Is this instrumental uncertainty?**

YES **NO**

- **Do we have enough information to make this decision now?**

YES **NO**

US Army Corps of Engineers ®

U.S.ARMY

EXAMPLE (ALTERNATE UNIVERSE) – FRM LEVEL OF DETAIL

- Current Planning Phase: *2nd iteration* of the FWOP and formulation of alternatives for AMM.
- Relevant existing information: Existing topography is 15 years old and accurate within ±3 feet.
- Level of Detail Decision: Do we need to begin development of a more refined topography for the floodplain modeling to support future analysis of FWOP baseline economic damages.
  - H&H estimates that urban flooding would be anywhere from **12-15 feet** for frequent events and **20-25 feet** for infrequent events
  - **The flood of record was 10 years ago with average depths of 24 feet.**
  - 20,000 structures in the floodplain, built slab on grade
  - It will cost $100k and 6 months to refine the topography
  - Farming activity has altered some ground elevations near town ± 1-2 feet within the last 15 years.

- **Is this instrumental uncertainty?**

YES	NO

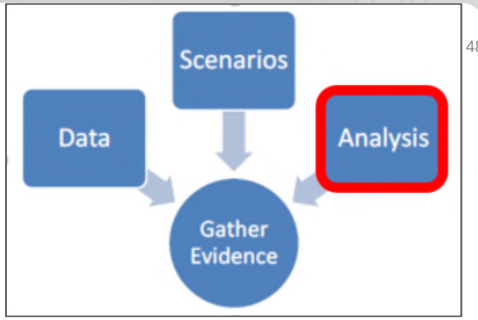
- **Do we have enough information to make this decision now?**

YES	NO

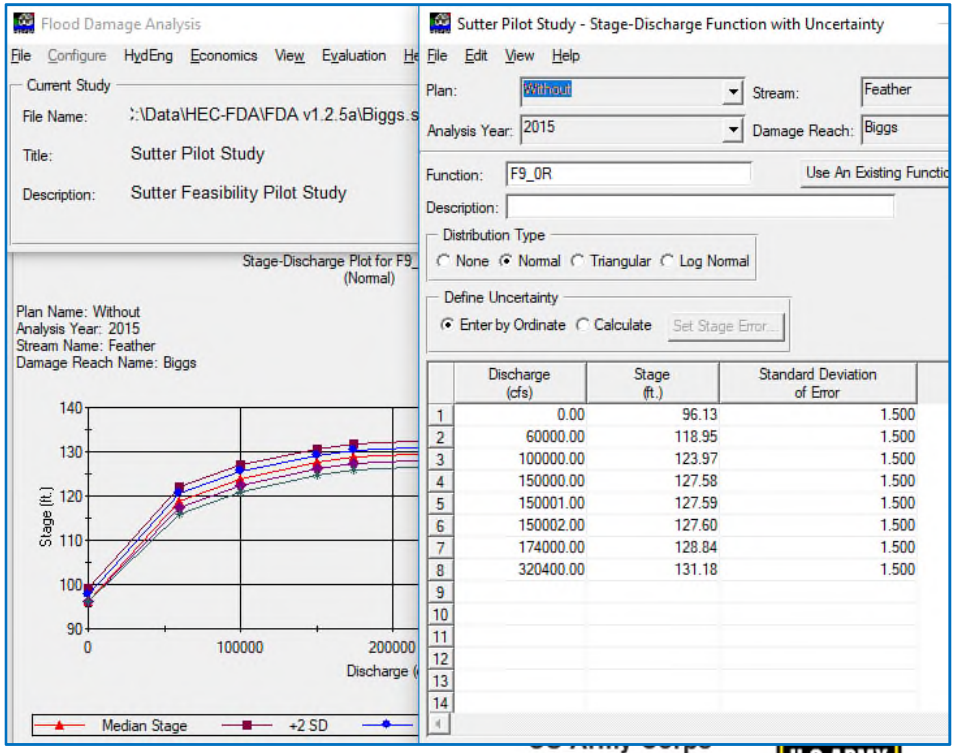
US Army Corps of Engineers ®

U.S.ARMY

ANALYSIS – BUILDING APPROPRIATE ANALYTICAL TOOLS FOR RISK INFORMED PLANNING

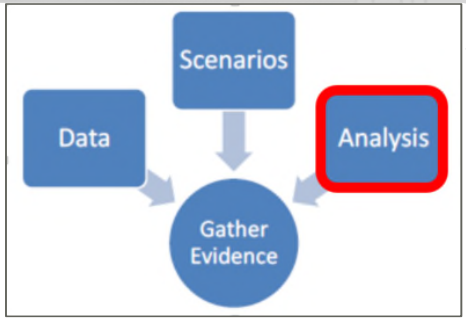


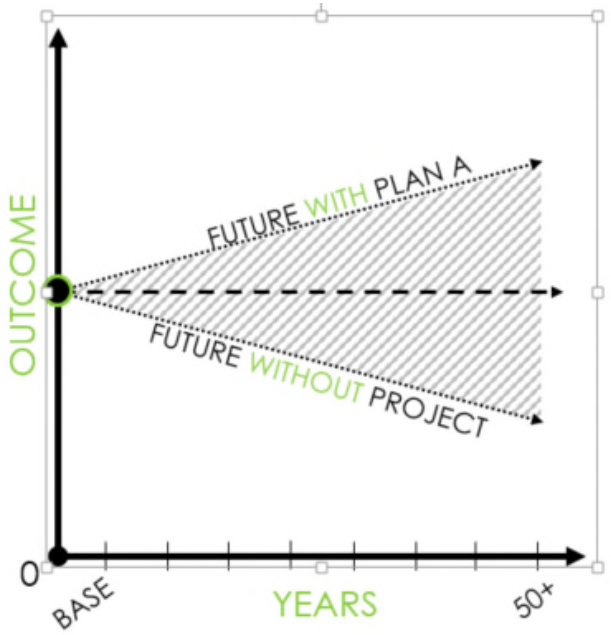
- For Risk Informed Planning we want to use analytical strategies and tools that are:
  - Quick and efficient!
  - At an appropriate level of complexity for the decisions being made
  - Scalable depending on the decisions being made
  - Flexible and adaptable to reflect potential alternatives
    - Begin with the end in mind!
- Simplifying assumptions, professional judgment and sensitivity analysis are your friends!
  - Just validate them as you move forward



COMPARISON ANALYSIS

- Comparison of without and with condition scenarios
- Essence of the evaluation process
- Effectiveness of a plan is observed through scenario analysis
- Scenario comparisons = highlight differences that matter to the decision
- **Best practice = metrics should reflect objectives and decision criteria!**





Plan	Annual Damages	Annual Benefits	Annual Costs	Net Benefits	BCR	Life Safety	Other
Future Without Project	$2,000	--	--	--	--		
Future With-Project 1	$1,300	$700	$350	$350	2.0		
Future With-Project 2	$500	$1,500	$1,000	$500	1.5		
Future With-Project 3	$350	$1,650	$1,500	$150	1.1		

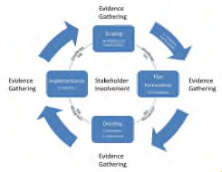
US Army Corps of Engineers ®

U.S.ARMY

ITERATIONS OF THE FWOP (DATA GATHERING EXAMPLES IN FRM)

EACH ITERATION INCLUDES ALL 6 STEPS…

What the PDT knows



- **Planning**: Recent floods? Past studies in the area? Any PL 84-99 actions? Trends in the area?
- **Economics**: Census data # of structures and population growth trends. Damageable property range? Available LST inventory data from HAZUS? Historical damages?
- **H&H**: Available floodplain maps (FEMA) and flood insurance studies. Available topography. Obvious flow constrictions?
- **Geotech**: Available LST results? Recent levee failures? PL 84-99 actions? Will levee performance worsen over time?
- **Environmental**: Existing NEPA/CEQA docs or BiOps for past studies in the area? General Plans/Local Baseline docs?

Adding what others know

- **Planning**: Planned sponsor activities in the study area? Land use predictions? Development plans? Possible LPP? Can we refine the study area? SLC impacts? Site visits with locals for all disciplines.
- **Economics**: Local development plans? Geospatial assessor data? Critical infrastructure and key inventory? Economic Impact Area delineation discussions w/ H&H/Geotech/Planning. Risk drivers? Risk assessment methodology?
- **H&H**: More detailed topo? Upstream watershed urbanizing? Gage data? Assess different possibilities for flood initiation. Existing levee breach location possible flood impacts? What/where is likely to cause the worst flooding?
- **Geotech**: Local levee performance data? Flood fighting? Identify levee reaches? Locations for borings? Failure modes?
- **Environmental.**: Site visits/preliminary biological surveys with resource agencies? ESA Recovery Plans?

Adding what we've learned gathering instrumental data

- **Planning**: Refine study area. Climate and SLC impacts? Develop detailed writeup of all FWOP assumptions.
- **Economics**: Analytical analysis. Refine inventory (field work). Develop and run econ analysis. Estimate FWOP damage ranges. Benefit-Cost frontier curve. Evaluate SLC scenarios. Refine risk drivers.
- **H&H**: Analytical analysis. Frequency analysis (gage data). HMS model development? Peak flows and hydrograph assessment. HEC-RAS model for stage driven reaches. Simple 2-d model for floodplain development/refinements.
- **Geotech**: Evaluate new levee data (i.e. borings). Work with Econ/H&H to identify reaches and evaluation methodology. Develop levee performance curves for Econ analysis.
- **Environmental**: GIS or field survey inventory of habitat? Resource agency database search for past occurrences of listed species? Water quality conditions?

…ADDITIONAL ITERATIONS AS NECESSARY!!!

SUMMARY OF KEY FWOP CONCEPTS

- Evidence gathering - discern the truth and reduce instrumental uncertainty to support planning decisions
  - Describing scenarios
  - Data gathering
  - Comparison analysis
- FWOP condition is the single most important scenario
- Appropriate level of detail – should be sufficient to make the next decision
  - Use Risk Register!
  - Iterate early and often!
- Develop/use analytical tools that are efficient, adaptable and scalable to the decision being made.

US Army Corps of Engineers ®

U.S.ARMY

QUESTIONS / FEEDBACK?

- Was this helpful?
- Too much information for one webinar?
- Recommendations for improvement?

Type questions in the chat box.
We will answer as many as time allows.

This webinar will be posted to the Planning Community Toolbox:
http://www.corpsplanning.us

FRM-PCX POC's:

- **Eric Thaut**, *Deputy Director*
- **Nick Applegate**, *National Tech Specialist (Economic and Risk Analysis)*
- Regional Managers:
  - **Karen Miller** *(LRD/NAD)*
  - **Michelle Kniep** *(MVD/SAD)*
  - **Charyl Barrow** *(NWD/POD)*
  - **Sara Schultz** *(SPD/SWD)*