Applied Learning Environments

(and games, but **seriously** folks)

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ALEs Team

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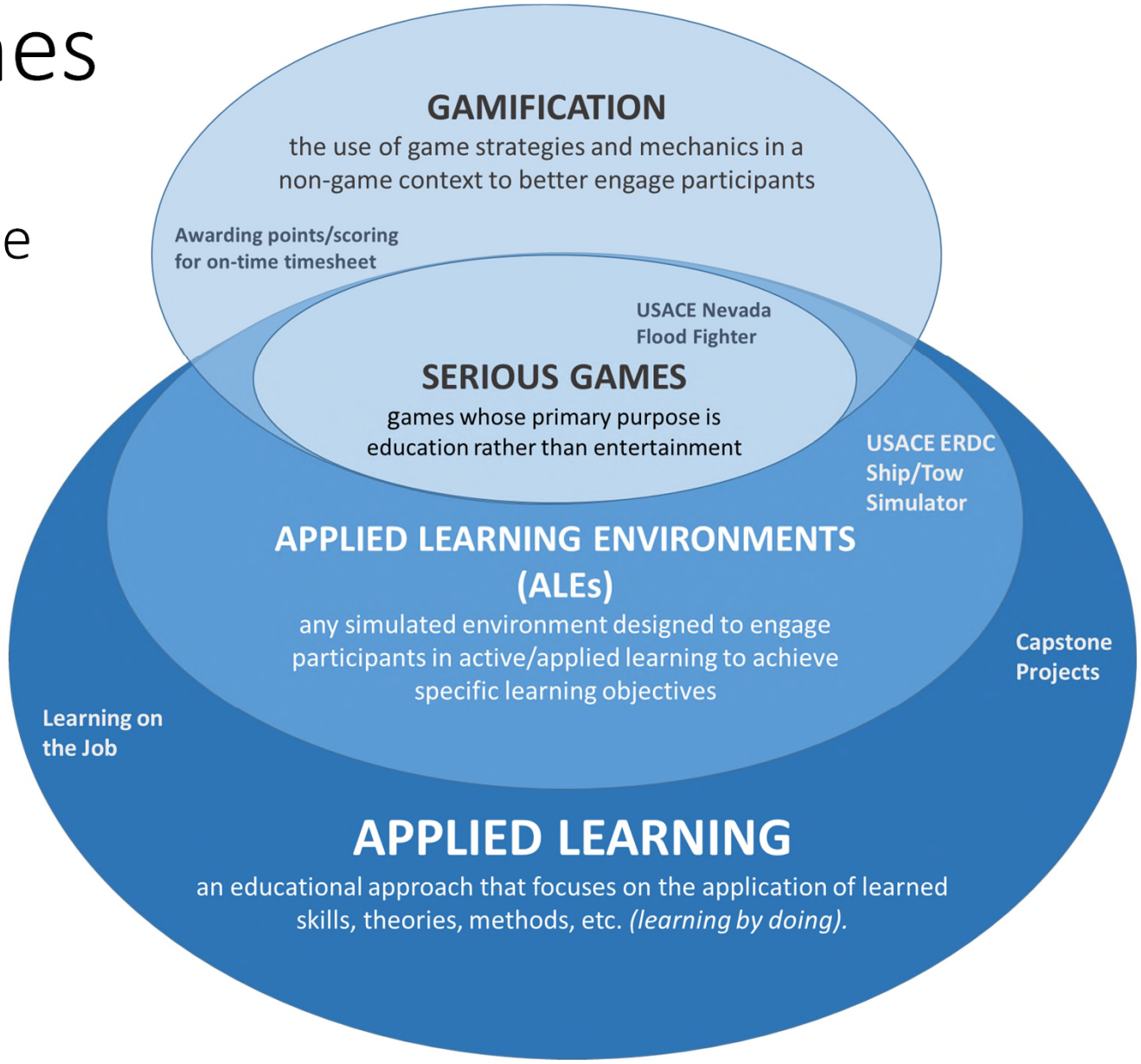
Reminder

- We’re ALL going to play the Lincoln Dam ALE in a few minutes
- To participate you need 15 small objects (pennies, paper clips, etc.) that you can hold in your hand!!!

ALEs and Serious Games

- Any game whose primary purpose is not purely entertainment.
- Started in the military but has become popular in planning, engineering, education, emergency management, healthcare industries, etc.

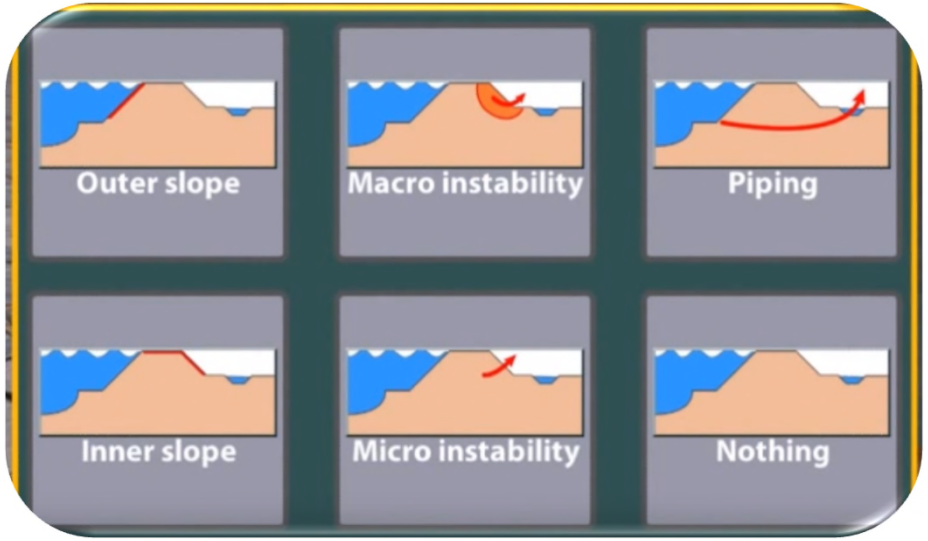


Serious Games in Water Resources Management

- Training
- Emergency Management
- Operations
- Outreach
- **Planning**

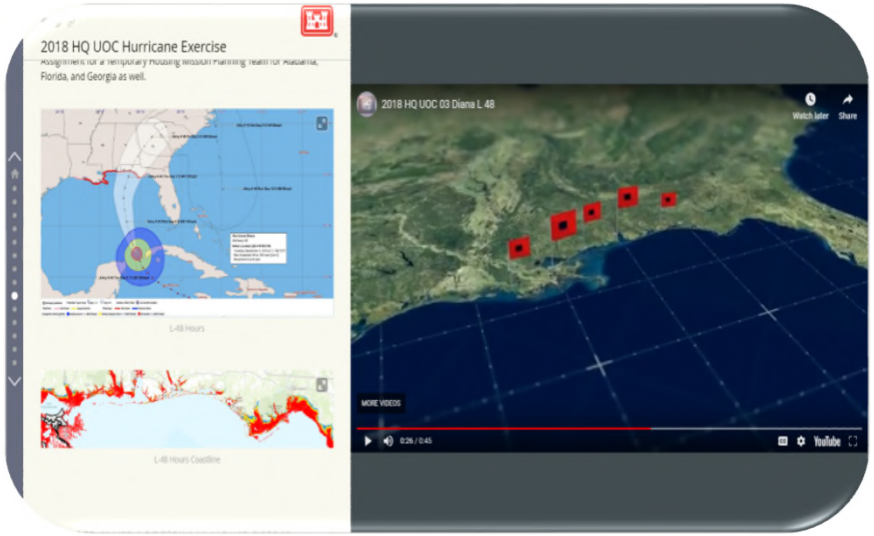
Training

Levee Patroller (Deltares)



Emergency Management

Table-Top Exercises (USACE)



Operations

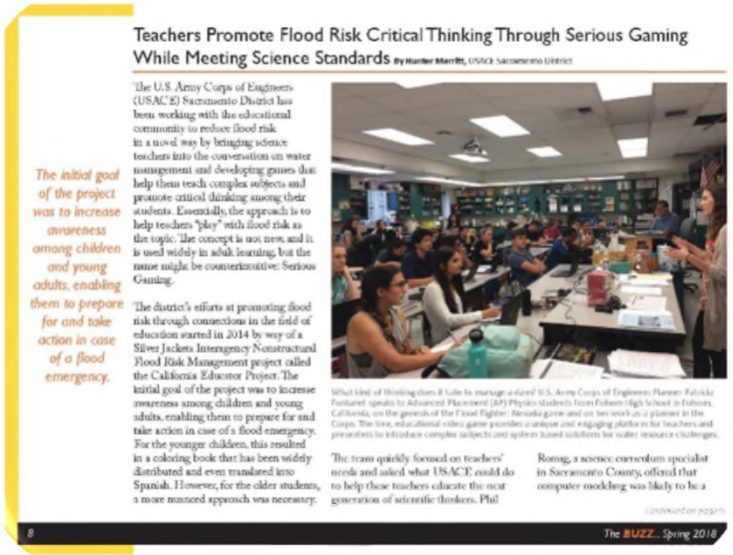

Lock Operation Simulator
US Army Corps of Engineers
Click the downstream gatehouse to lock a small boat
Click the upstream gatehouse to lock a large towboat
VALVES CLOSED
VALVES OPEN
LAND WALL VALVE
TRASH BUBBLERS
CLOSED
OPEN
PUMP DELIVERY
RIVER WALL VALVE
TRAFFIC SIGNALS
GATE CLOSED
GATE OPEN
WINCH


Simulation Tow Game

Outreach

"Be smarter than the weather"
(NOAA Young Meteorologist Program)

Pack Your Emergency Kit



Teachers Promote Flood Risk Critical Thinking Through Serious Gaming While Meeting Science Standards

The initial goal of the project was to increase awareness among children and young adults, enabling them to prepare for and take action in case of a flood emergency.

The U.S. Army Corps of Engineers (USACE) Sacramento District has been working with the educational community to reduce flood risk in a novel way by bringing science teachers into the conversation on water management and developing games that help them teach complex subjects and promote critical thinking among their students. Essentially, the approach is to help teachers "play" with flood risk as the topic. The concept is not new, and it is used widely in adult learning, but the name might be counterintuitive: Serious Gaming.

The district's efforts at promoting flood risk through connections in the field of education started in 2014 by way of a Silver Jackets Interagency Nonstructural Flood Risk Management project called the California Educator Project. The initial goal of the project was to increase awareness among children and young adults, enabling them to prepare for and take action in case of a flood emergency. For the younger children, this resulted in a coloring book that has been widely distributed and even translated into Spanish. However, for the older students, a more nuanced approach was necessary.

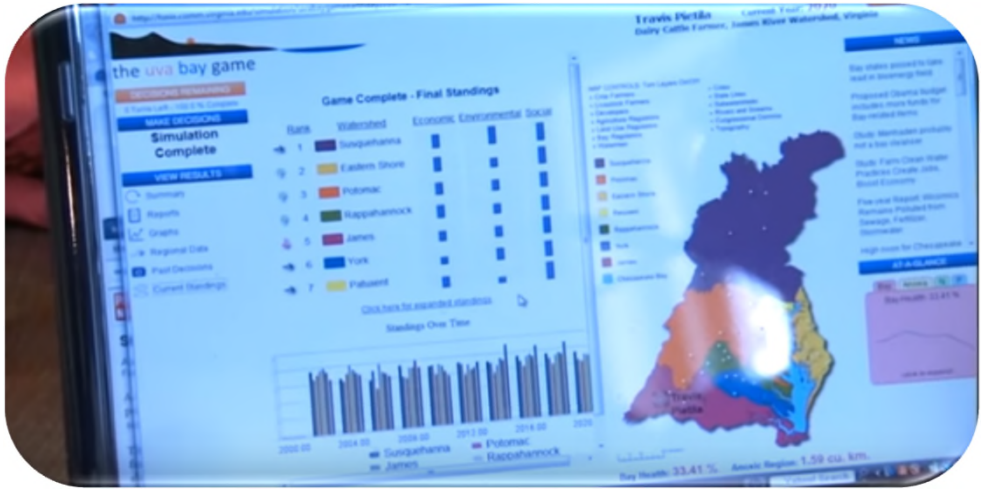
The team quickly focused on teachers' needs and asked what USACE could do to help these teachers educate the next generation of scientific thinkers. Phil Romig, a science curriculum specialist in Sacramento County, offered that computer modeling was likely to be a

continued on page 9

Planning

Rules of Water

Sustainable Delta

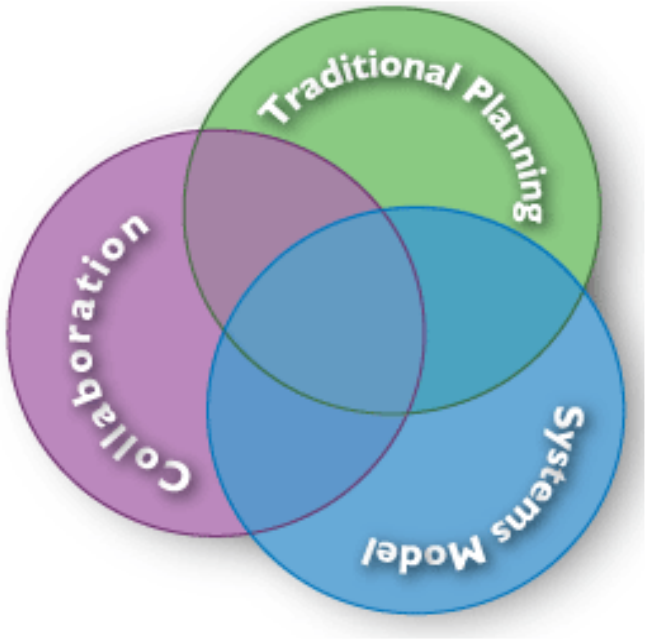


UVA Bay Game

Multi-Hazard Tournament

What is a Multi-Hazard Tournament (MHT)?

- A condensed, accelerated version of Shared Vision Planning that couples serious gaming with collaborative decision-making for planning for multiple hazards (e.g. flood, drought, water quality, sea level rise, etc.)



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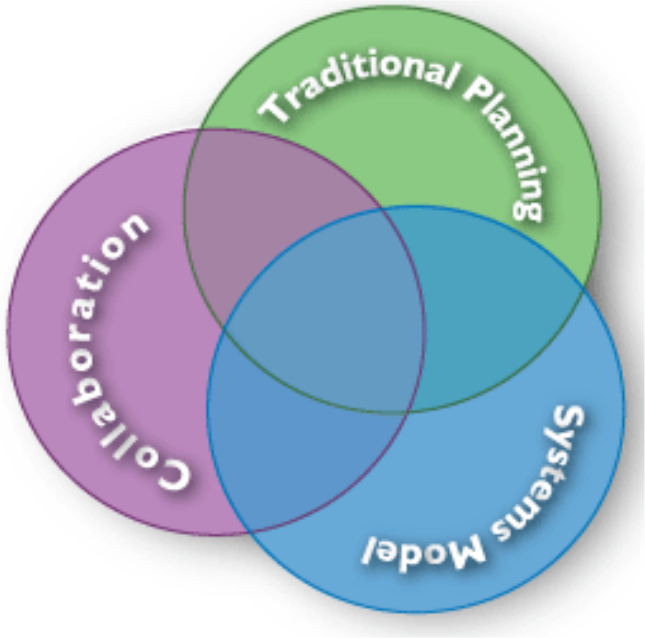
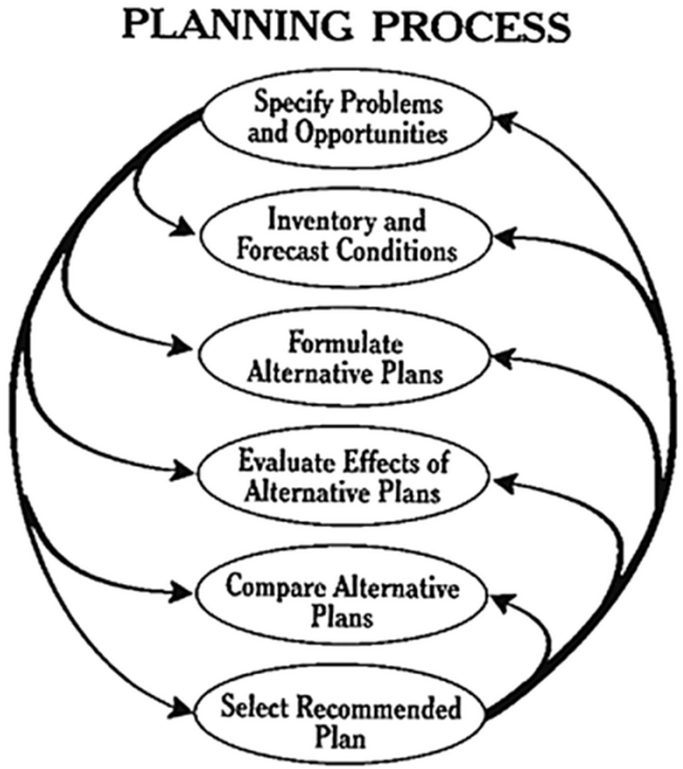


How do you plan a MHT?

- Follow the 6-step planning process, integrating stakeholder engagement throughout.

- The "tournament" itself typically includes steps 3-6, emphasizing the iterative component of the planning process.



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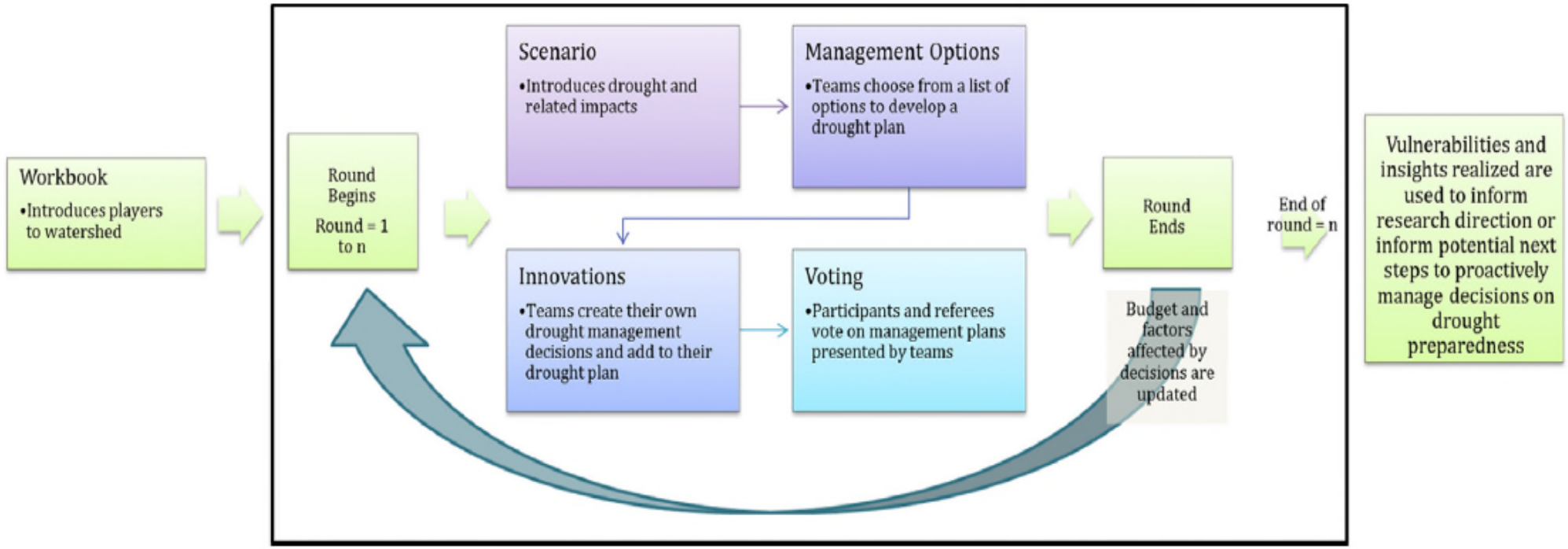
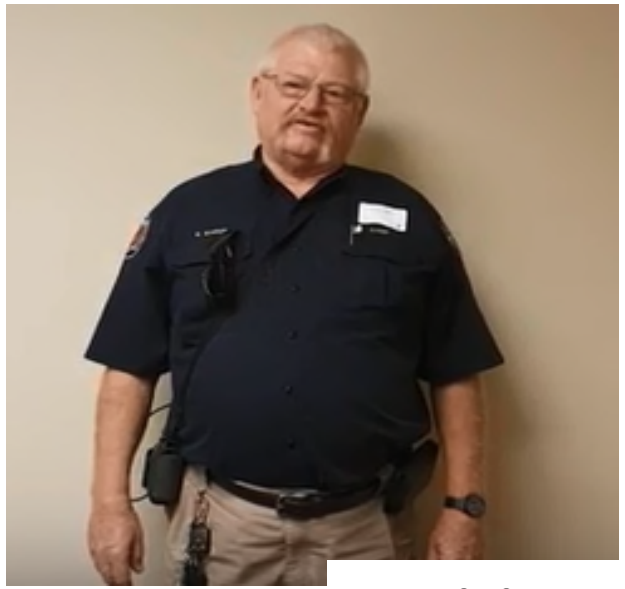
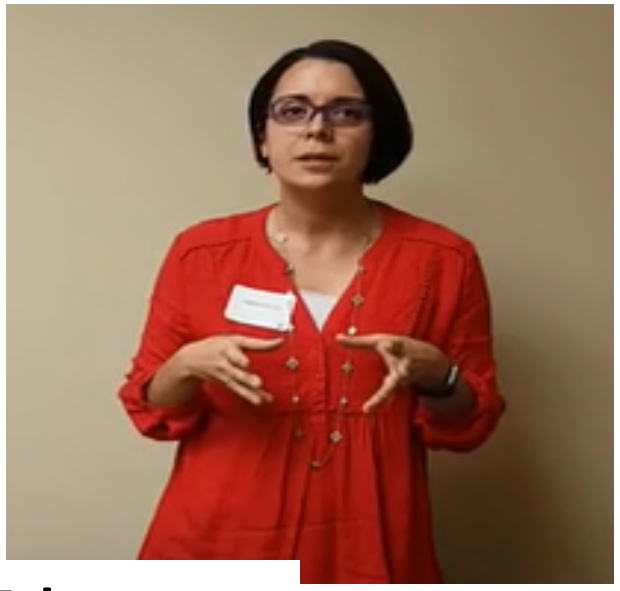


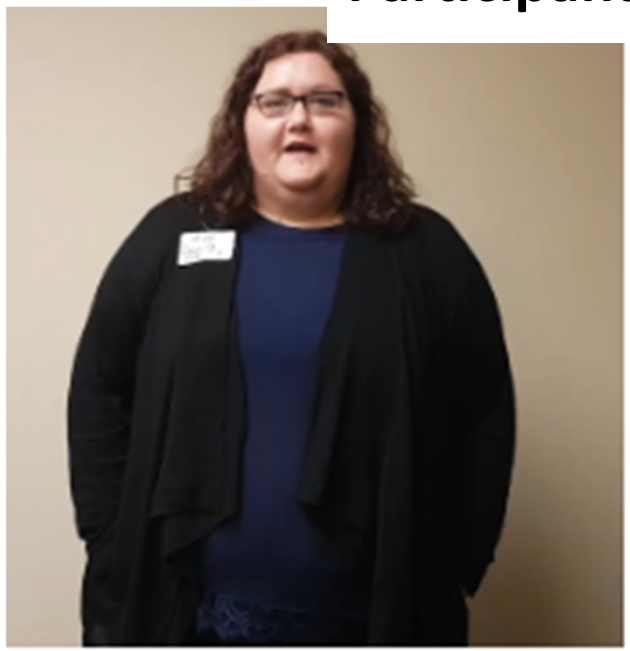
Fig. 2. The IDT Process. The IDT is an iterative process that uses a game format to arrive at an informed decision on next steps for proactive drought management and research.

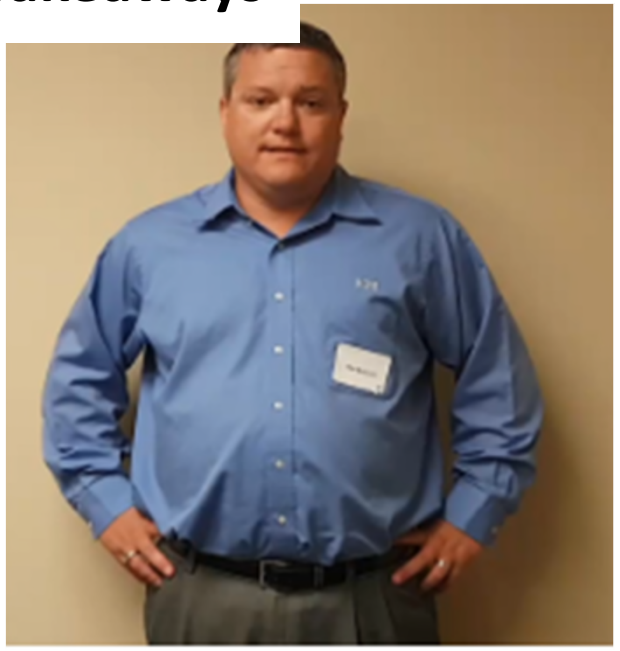
Overview: Multi-Hazard Tournament





Participant Takeaways



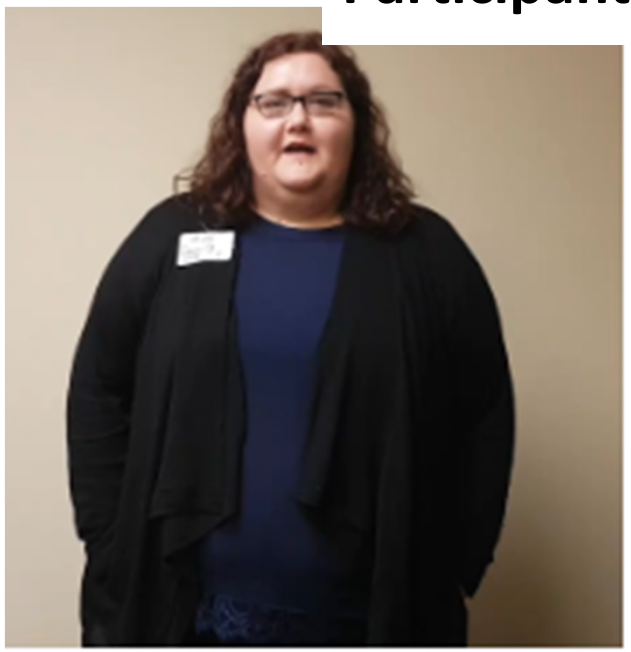


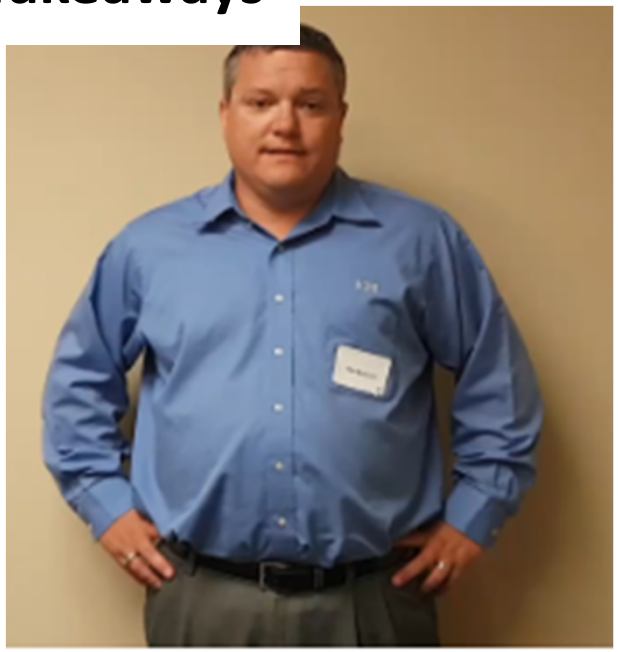
Why is a MHT useful?

New awareness of tools that can help guide the planning and management of flood events or drainage system issues

-Fire Chief

Participant Takeaways





Why is a MHT useful?

It provides a platform through which we can:

1. Educate potential partners and build relationships with *and between* stakeholders

New awareness of tools that can help guide the planning and management of flood events or drainage system issues

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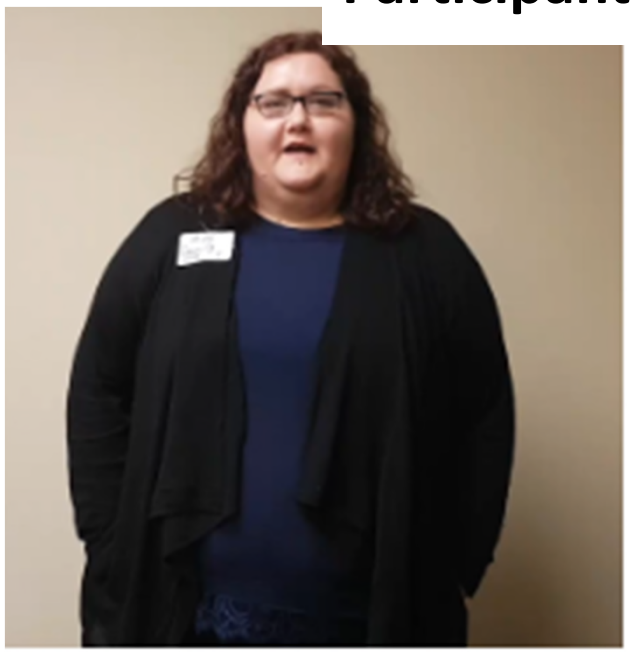


Better understand the recommendations within the watershed master plans; Tool to bring the ones who will be implementing measures to the table.

- HDR Contractor

Why is a MHT useful?

It provides a platform through which we can:

1. Educate potential partners and build relationships with *and between* stakeholders

2. Test and utilize developed tools

New awareness of tools that can help guide the planning and management of flood events or drainage system issues

-Fire Chief

Participant Takeaways

Better understanding of the decision points and cost-benefit analysis considerations. Using available information to weigh different options to pursue

- GIS Analyst for Water Authority

Better understand the recommendations within the watershed master plans; Tool to bring the ones who will be implementing measures to the table.

- HDR Contractor

Why is a MHT useful?

It provides a platform through which we can:

1. Educate potential partners and build relationships with *and between* stakeholders
2. Test and utilize developed tools
3. Elicit values and priorities from participants

Participant Takeaways

New awareness of tools that can help guide the planning and management of flood events or drainage system issues

-Fire Chief

Allows participants to think about current versus future needs given all the uncertainty

- Ecosystem Planning and Restoration City Staff

Better understanding of the decision points and cost-benefit analysis considerations. Using available information to weigh different options to pursue

- GIS Analyst for Water Authority

Better understand the recommendations within the watershed master plans; Tool to bring the ones who will be implementing measures to the table.

- HDR Contractor

Why is a MHT useful?

It provides a platform through which we can:

1. Educate potential partners and build relationships with *and between* stakeholders
2. Test and utilize developed tools
3. Elicit values and priorities from participants
4. Identify future investments & operations

Relationship Building – Social Learning – Planning – Decision Making

Benefits

- Facilitates Active, Engaging and Experiential Learning (Study versus Play)
- Tests New Ideas in a Safe to Fail Environment
- Creates Common Understanding and Cooperation
- Promotes Fun (*but still miserable enough to be work appropriate* ☺)

Lincoln Dam Set Up (a Lite ALE)

- Your going to make water resource management decisions for Lincoln Dam
- Your hand represents Lincoln Dam
- The pennies represent units of water
- Put 3 pennies in Lincoln Dam – this is water in the dam (for Water Supply)
- Put 12 pennies in front of you – this is space left empty (for Flood Risk Reduction)
- Therefore the capacity of Lincoln dam is 12 + 3 = 15 pennies (units of water)

Lincoln Dam

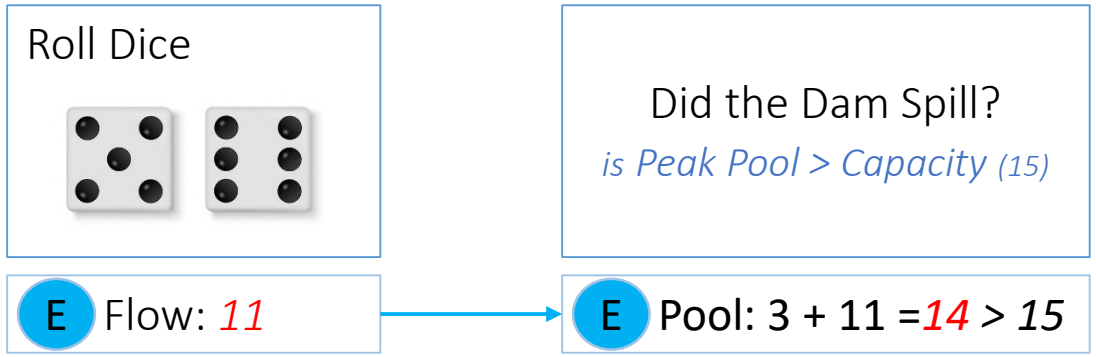
- In each round we will roll the dice
- The # on the dice represents inflow into Lincoln Dam (2 to 12 penny units of flow)
- If the amount in Lincoln Dam + the inflow > 15 the dam spills and you lose
- If the dam didn't spill you decide how much flow to retain at the dam (for WS)
- Your goal is to maximize water supply ***without*** your dam spilling

Lincoln Dam

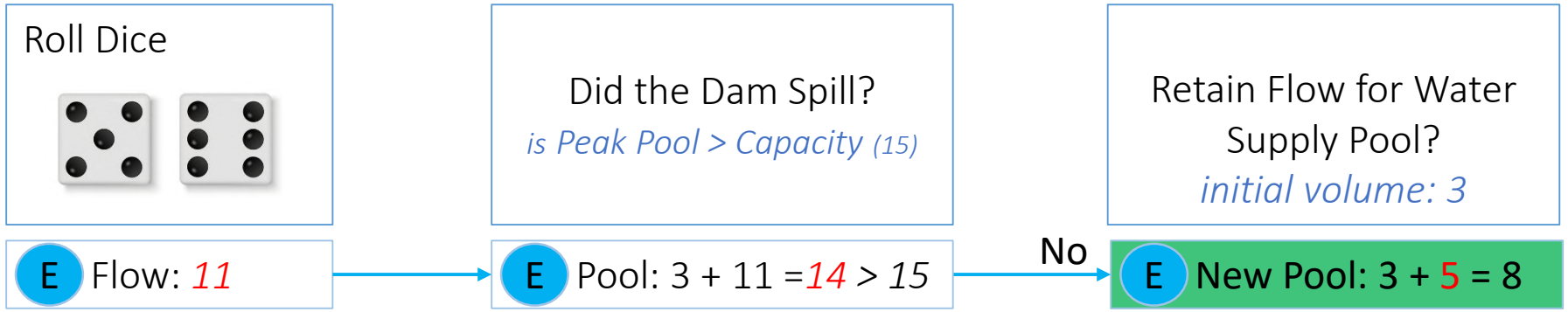
Roll Dice

E Flow: *11*

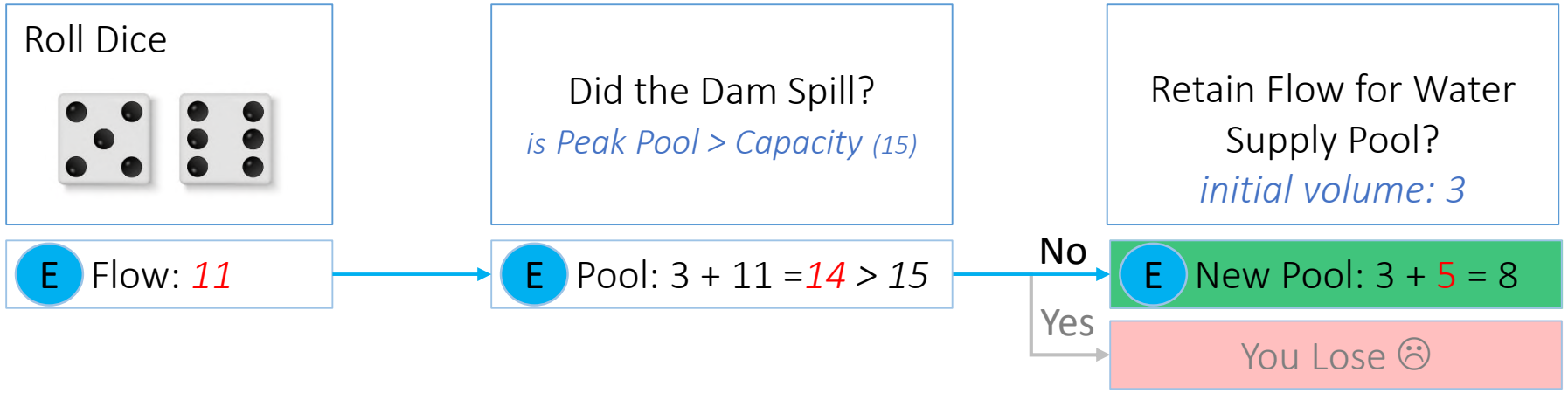
Lincoln Dam


Roll Dice
Did the Dam Spill?
is Peak Pool > Capacity (15)
E Flow: 11
E Pool: 3 + 11 =14 > 15

Lincoln Dam


Roll Dice
Did the Dam Spill?
is Peak Pool > Capacity (15)
Retain Flow for Water Supply Pool?
initial volume: 3
E Flow: 11
E Pool: 3 + 11 =14 > 15
No
E New Pool: 3 + 5 = 8

Lincoln Dam


Roll Dice
E Flow: 11
Did the Dam Spill?
is Peak Pool > Capacity (15)
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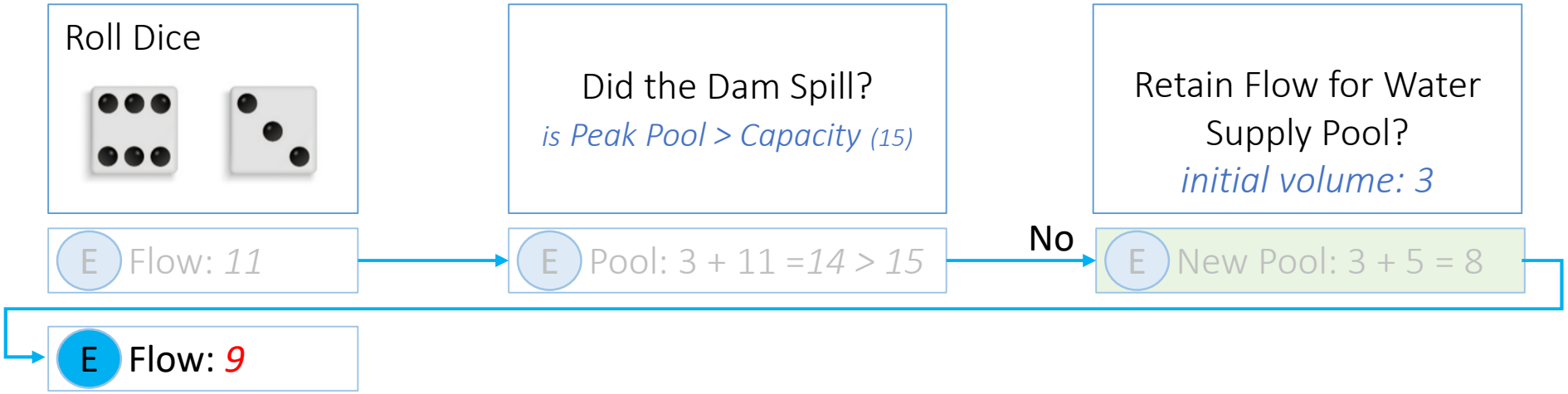
No
Yes
Retain Flow for Water Supply Pool?
initial volume: 3
E New Pool: 3 + 5 = 8
You Lose ☹

Lincoln Dam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initial volume: 3
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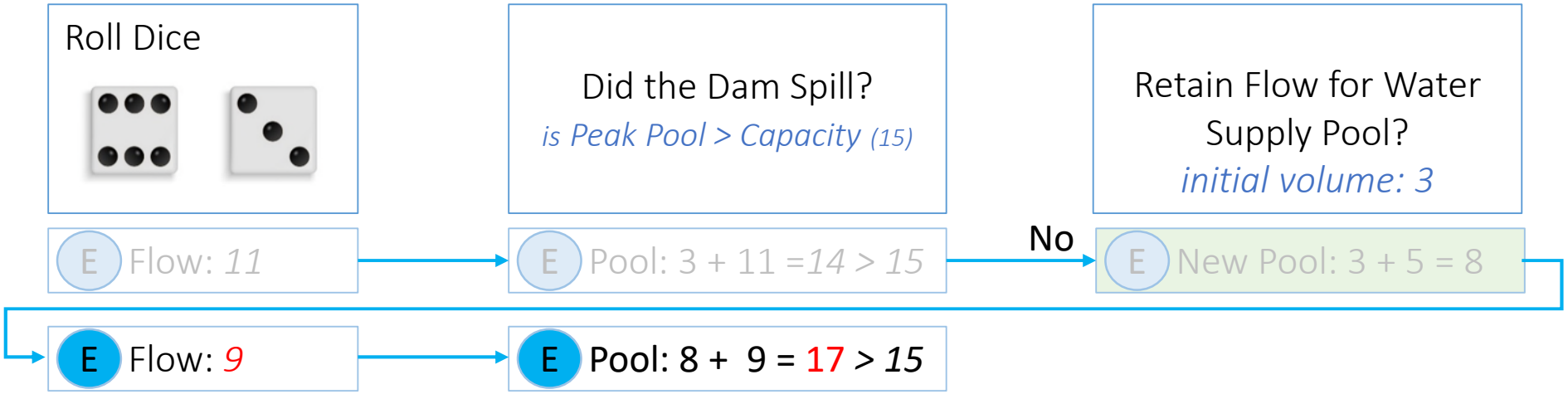
E Pool: 3 + 11 =14 > 15
No
E New Pool: 3 + 5 = 8
E Flow: 9

Lincoln Dam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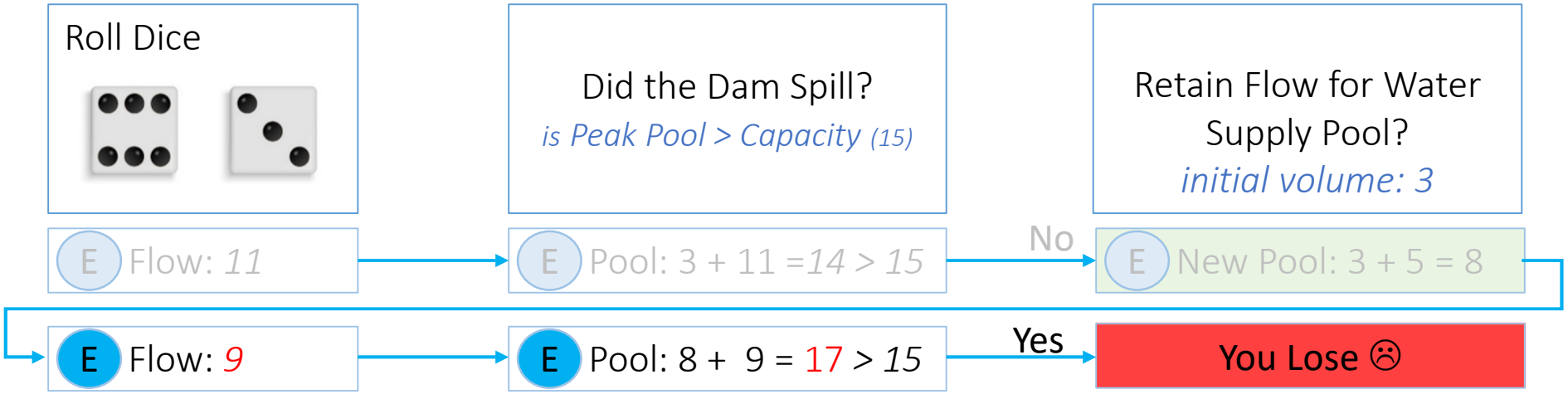
E Pool: 3 + 11 =14 > 15
No
E New Pool: 3 + 5 = 8
E Flow: 9
E Pool: 8 + 9 = 17 > 15

Lincoln Dam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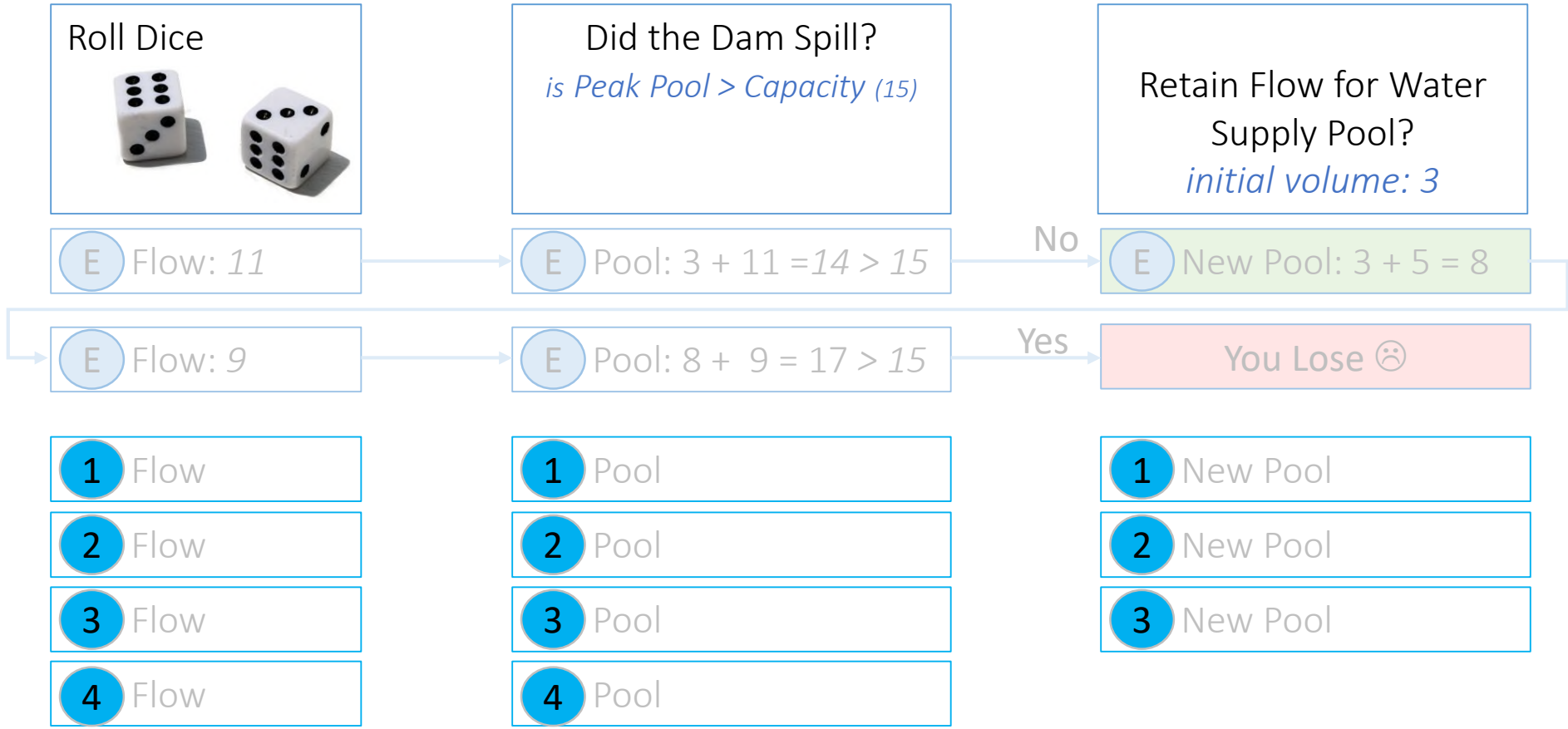
E Pool: 8 + 9 = 17 > 15
Yes
You Lose ☹

Lincoln Dam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No
E New Pool: 3 + 5 = 8
E Flow: 9
E Pool: 8 + 9 = 17 > 15
Yes
You Lose ☹
1 Flow
2 Flow
3 Flow
4 Flow
1 Pool
2 Pool
3 Pool
4 Pool
1 New Pool
2 New Pool
3 New Pool

Lincoln Dam Discussion

- Let the game serve as the first iteration of your model
- What is realistic/unrealistic about the game (e.g. does your model need improvement)?
- Does the game represent your interests (e.g. objectives, metrics, tradeoffs)?
- What did you learn from the game (e.g. knowledge, perspectives or empathy gained)?
- How did you play the game, what would you do differently in real life (e.g. scenario discovery)?

ALEs Team

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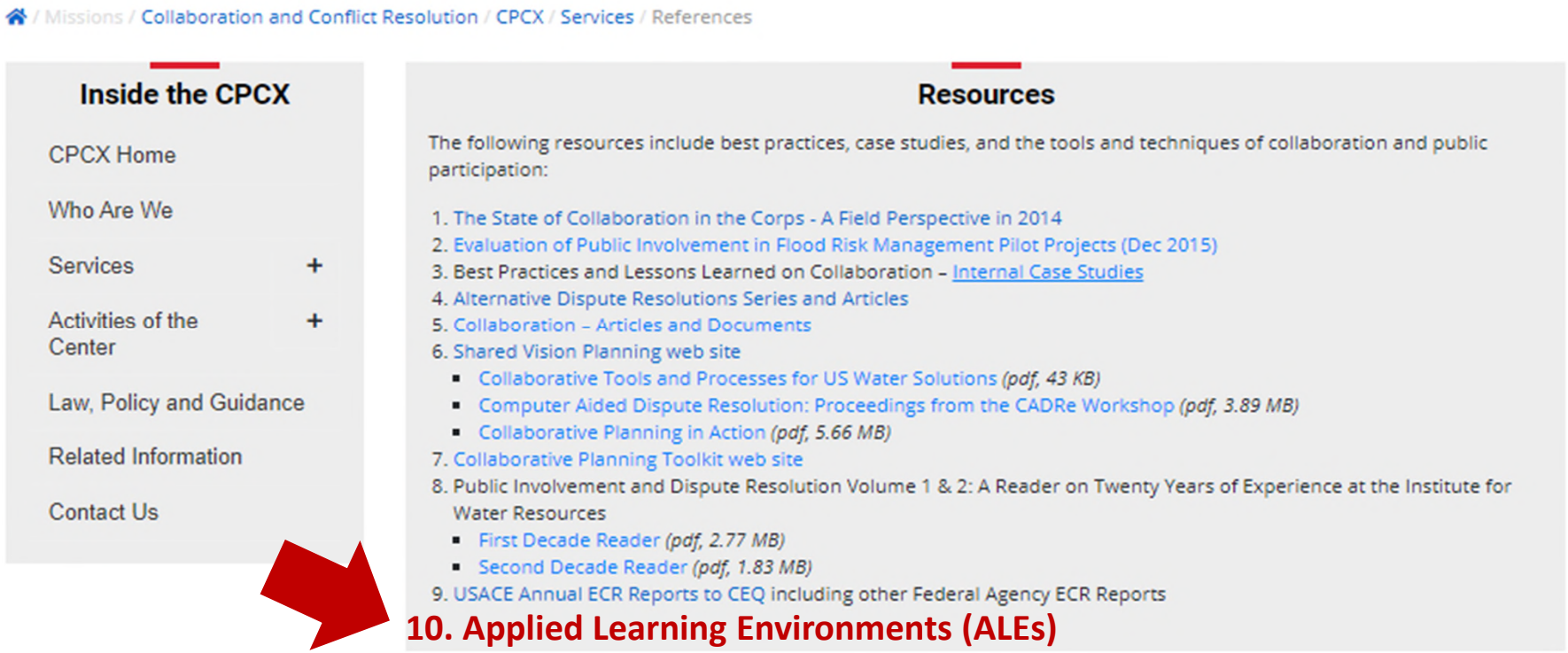
ALEs Portal (Under Construction)

https://www.iwr.usace.army.mil/Missions/Collaboration-and-Conflict-Resolution/CPCX/Services/References/

- Access through Collaboration and Public Participation (CPCX) Community of Practice Website



ALEs Portal (Under Construction)

DEFINITIONS

- An **ALE** is any simulated environment designed to engage participants in active/applied learning to achieve specific learning objectives.
- **Applied Learning** is an educational approach that focuses on the application of learned skills, theories, methods, etc. *(learning by doing)*
- **Serious Games** are a type of ALE, and are games whose primary purpose is education rather than entertainment.
- **Gamification:** the use of game strategies and mechanics in a non-game context to better engage participants (e.g., keeping score and awarding points for tasks such as filling out your timesheet or completing annual training).

ALEs Portal (Under Construction)

ALEs in Water Management (Quick Links)

- Training
  - USACE ERDC Simulation-bAsed VEhicle Control Training (SAVE-CT) (hyperlinked to https://www.erdc.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/476653/simulation-based-vehicle-control-training-save-ct/)
  - Deltares Levee Patroller (hyperlinked to https://www.deltares.nl/en/software/levee-patroller/)
- Emergency Management
  - USACE Emergency Preparedness Table-Top Exercises (hyperlinked to http://simsuite.maps.arcgis.com/apps/MinimalGallery/index.html?appid=94857808f85f472fbbff0f16cebcbd04)
  - UNICEF Play It Safe Emergency Response Simulation Game (hyperlinked to https://www.frogdesign.com/portfolio/unicef-emergency-response-simulation-game)
  - Koshland Science Museum's 'Extreme Event' (hyperlinked to https://labx.org/extreme-event/materials/#video-tutorials)

ALEs Portal (Under Construction)

ALEs in Water Management (Quick Links)

- Operations
  - USACE SWL Lock Operation Simulator (hyperlink to https://www.swl.usace.army.mil/Missions/Navigation/Lock-Simulator/)
  - Simulation Tow Game (hyperlink to https://www.erdc.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/476712/erdc-shiptow-simulator/)
- Planning
  - USACE Multi-Hazard Tournament (Manual and Checklist coming soon!)
  - USACE 'Rules of Water (ROW)'
  - USACE River Basin Balancer Game (hyperlinked to https://www.nwd.usace.army.mil/Basin-Balancer/)
  - Deltares Sustainable Delta (hyperlinked to https://www.deltares.nl/en/software/sustainable-delta-game/)
  - Deltares Port of the Future (hyperlinked to https://www.deltares.nl/en/software/port-of-the-future-serious-game/)

ALEs Portal (Under Construction)

Additional Resources

- ALEs Overview (will hyperlink to factsheet)
- ALEs presentation (will link to ppt)
- Other collaborative and productivity tools (hyperlink to https://planning.erdc.dren.mil/toolbox/tools.cfm?Id=310&Option=Collaboration%20and%20Productivity%20Tools)
- Deltares Serious Gaming Program (hyperlinked to https://www.deltares.nl/en/software-solutions/deltares-serious-game-portal/)

ALEs Portal (Under Construction)

ALEs Decision Tree (*under construction)*

The purpose of this decision tree is to serve as a guide to determine if an ALE would be helpful to your mission, what relevant ALEs exist, and how these existing ALEs can be used to achieve specific objectives.

Select Your Mission Area:

- Training (will hyperlink to “training” page)
- Emergency Management (will hyperlink to “EM” page)
- Operations (will hyperlink to “operations” page)
- Planning (will hyperlink to “planning” page)
- Outreach (will hyperlink to “outreach” page)

Where are we going?

- Multi-Hazard Tournament 2020 Pilots
- Rules of Water 2020 Pilots Please
- Reimbursable Facilitation (Phone a friend)
- ALEs and SVP Training Course 2021
- Checklist and Decision Tree Coming Soon
- Collaborative Modeling Game 2021 Pilots