Integration of FIRO and Water Control Plans

2022 FIRO Workshop

La Jolla, CA

August 3, 2022

Panel Participants

- Rob Hartman – Adaptive WCM Concepts
- Joe Forbis – Fundamentals of Integrating FIRO into WCMs
- Jenny Fromm – Yuba-Feather WCM Update
- Nick Malasavage – Lake Mendocino WCM Update
- Chris Delaney – Decision Support Tools Needed for FIRO Integration

With expert panel facilitation by Elissa Yeates!

Adaptive WCP Concepts

2022 FIRO Workshop

Rob Hartman

RKH Consulting Services

Definitions

- USACE Terms defined in ER-1110-2-240
- Water Control Manual
  - Describes the physical project, the hydrologic regime, available data, authorized purposes, background information and the Water Control Plan
  - Updates have been a challenge due to USACE resource limitations
- Water Control Plan
  - Describes the process for release and storage of water to achieve the authorized purposes of the project
  - Resides within the Water Control Manual

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Traditional vs. FIRO Water Control Plans

Traditional WCPs

- Use observations
- Engineered to meet project objectives when presented with a design event (SPF)
- Assume nothing about the future
- Must always be ready for “the big one”

FIRO WCPs

- Use observations
- Appropriately use skill in forecasts
- Engineered to meet project objectives and improve selected outcomes
- Potentially better ready for “the big one” when forecast

The Challenge of FIRO Water Control Plans

- Forecasts are uncertain and uncertainty increases with lead time
- Demonstrating effectiveness and robustness
  - Limited representative forecast history with limited extreme events
    - Much shorter than the observed period of record
  - Forecast skill is not stationary (improves with time)
    - Reliance on hindcasts that approximate operational forecasts
- Creates a new pressure on reservoir operators
  - New risk – reward paradigm
  - Operator incentives need to be considered and addressed

The Opportunity of FIRO Water Control Plans

Since forecast skill is likely to improve over time…

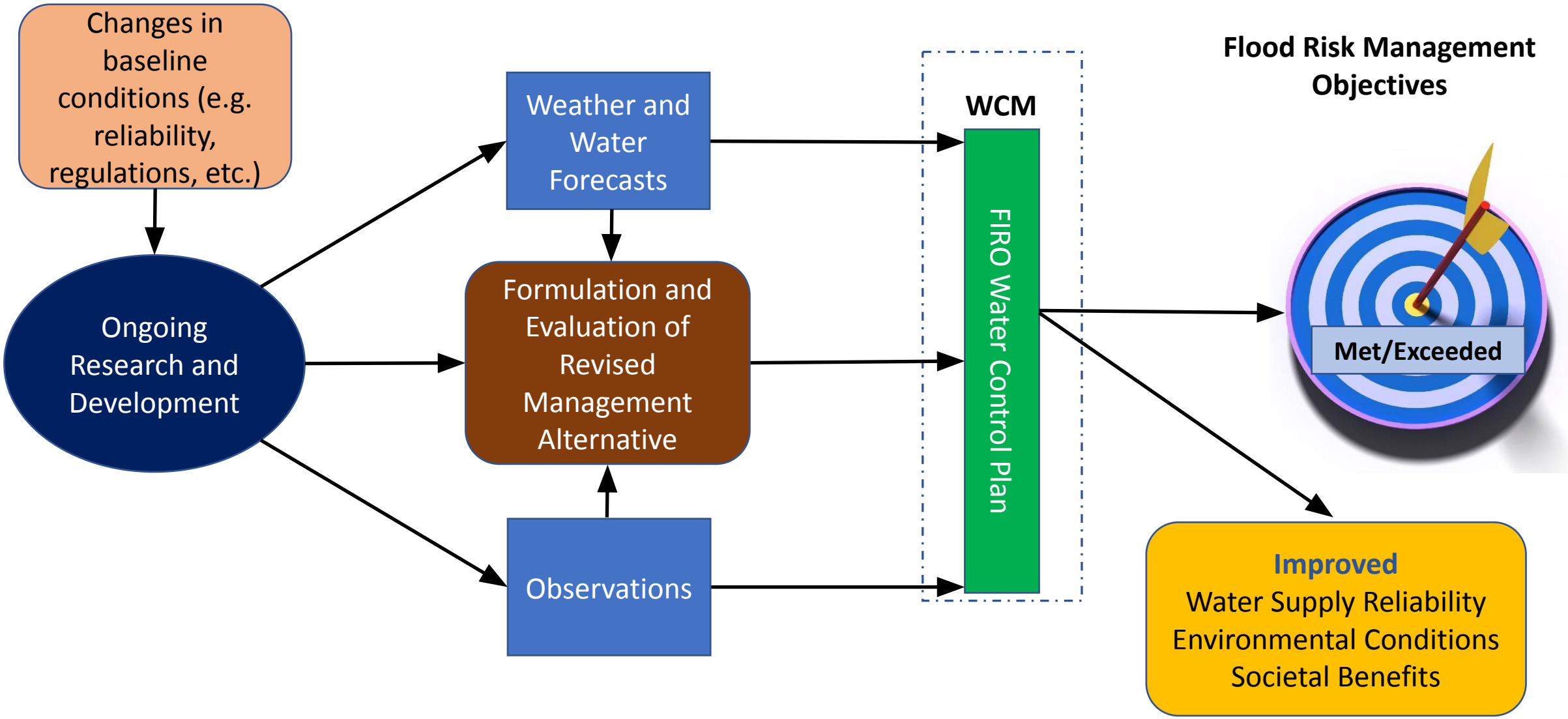
Can we devise a water control plan that NATURALLY leverages demonstrated improvements in forecast skill…

Without going through a rigorous and expensive WCM update?

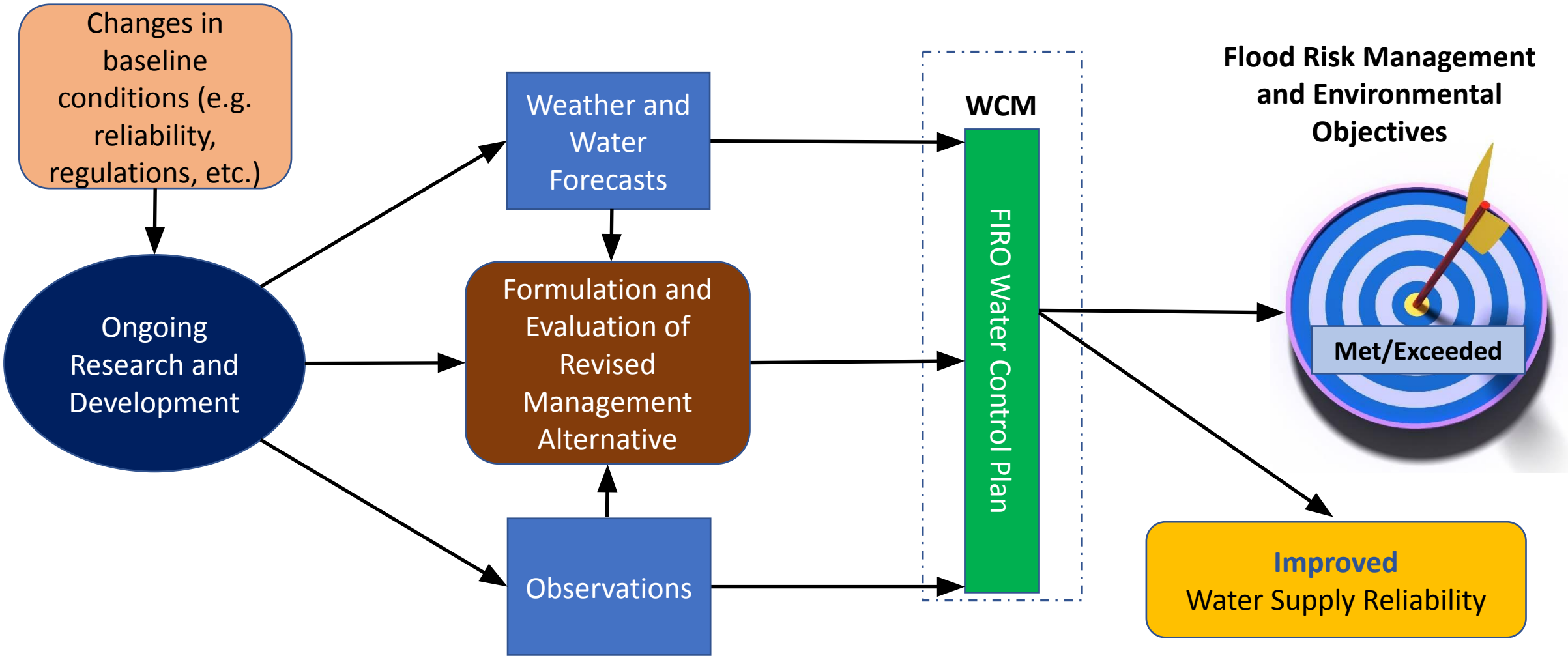
Maybe

But we'll need to be clever

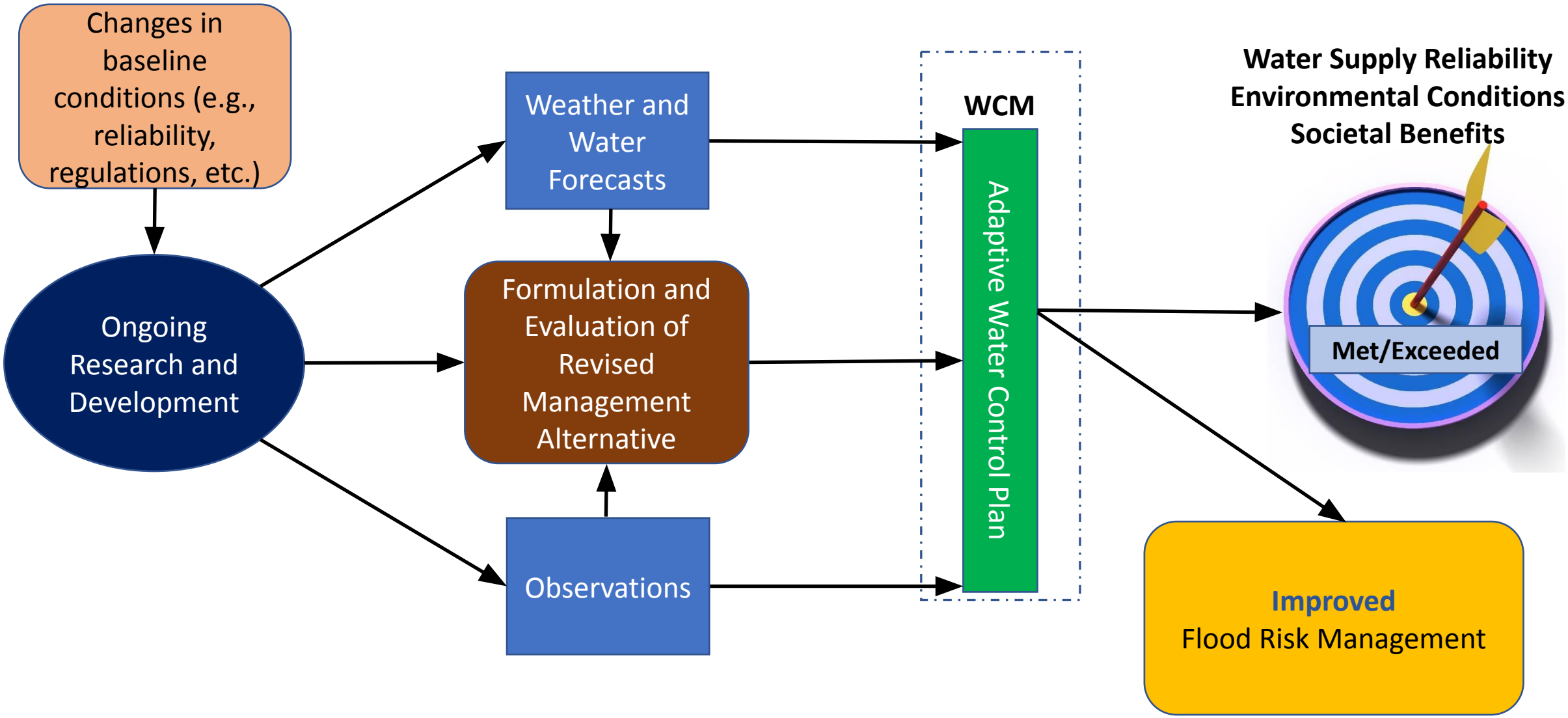
FIRO Model for Adaptive Water Control Manuals



FIRO Model for Adaptive Water Control Manuals



FIRO Model for Adaptive Water Control Manuals



Adaptive WCP Definition

A Water Control Plan (WCP) that allows for an adaptable and bounded variable flood control pool (VFCP). The magnitude of the VFCP is defined by the demonstrated streamflow forecast skill, operational constraints, and procedures that leverage that skill to maintain or enhance defined flood risk management objectives for the project. The process and procedure for reevaluating and updating the VFCP is described in the WCM.

VFCP is now called “FIRO Space”

Limits are Important

- Avoid issues with
  - Authorized purposes
  - Re-allocation studies
  - Water rights
  - Flood risk management objectives
  - Uncertainty and the comfort of approving officials

- Avoid excessive/unnecessary NEPA/CEQA compliance and costs

FIRO Process for Adaptive WCMs

- Concept originated with Lake Mendocino effort
- Working the process with Prado and Yuba-Feather projects
- Formed FIRO 2.0 team (non-project specific) lead by USACE

Thank you