

IWR PLANNING SUITE II

PCoP WEBINAR SERIES

Laura Witherow (IWR) and Monique Savage (MVP)
26 July 2018



**US Army Corps
of Engineers®**



WEBINAR TOPICS

- Background to IWR Planning Suite II
 - Purpose
 - Guidance
 - What's new?
- Role in planning
- Model components
 - Plan Generator, Annualizer, Cost-effectiveness & Incremental Cost Analysis, Uncertainty, Multi-Criteria Decision Analysis (MCDA), Watershed Wizard
- Where can I get the software?
- Training resources & help



US Army Corps
of Engineers



USACE CERTIFIED VERSIONS

- Version 1.0.11.1 – Plan Generator and CE/ICA
- Version 2.0.6.1 – Added the Annualizer Module
- **Version 2.0.9 (Recommended!)** – Added MCDA, Uncertainty and Watershed Modules



US Army Corps
of Engineers.



WHAT EXPERIENCE DO YOU HAVE WITH IWR PLANNING SUITE?

I haven't used any version of the software.

I've used a previous version of the software.

I've used the latest version of the software.

PURPOSE OF IWR PLANNING SUITE II

- Assist with the formulation and comparison of alternative plans for Ecosystem Restoration and Mitigation Plans
- Cost effectiveness and incremental cost analyses (CE/ICA)
- Considering uncertainty of variables and its influence on CE/ICA analysis
- Calculation of:
 - Average annual National Ecosystem Restoration (NER) benefits
 - Average annual equivalent National Economic Development (NED) costs and benefits



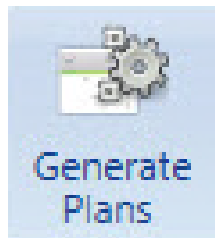
RELATED GUIDANCE

- ER 1105-2-100 (PGN)
 - Provides instruction for NED and NER methodology
 - Provides instruction to use CE/ICA in selecting NER plan and for all recommended mitigation plans
- ECO-PCX's Implementation Guidance for IWR Planning Suite II
 - Ongoing studies with TSP not scheduled by 31 May 2018 should migrate to latest version of the software.
 - Studies electing use of MCDA should engage the ECO-PCX to develop a strategy for appropriate and policy compliant use of the module.

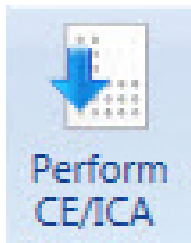


WHAT'S NEW?

Modules from Prior Versions



Plan Generation

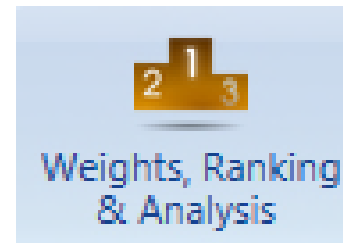


CE/ICA

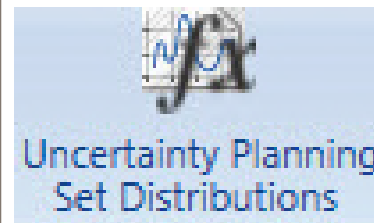


Annualizer

New Modules



Multi-Criteria
Decision Analysis
(MCDA)



Uncertainty



Watershed
Wizard

WHAT'S NEW – ROBUST DATABASE

- Previous versions limited the number of alternatives that could be generated necessitating work-arounds that introduced opportunities for errors.
- Just because you can generate 9,984 alternatives doesn't mean you should.
 - The software is a tool to help team make decisions not make decisions for them.
 - PDTs should think through screening and decision making criteria before using the software



US Army Corps
of Engineers



WHAT'S NEW – INTERFACE & USABILITY

IWR Planning Suite II

Home Generator Uncertainty MCDA Tools

Properties & Attributes Variable Sensitivity Planning Study

Generator Uncertainty MCDA Modules

Properties Constraints Delete Create New User-Entered Set

Perform CE/ICA Graphs & Reports Report Builder CE/ICA

Planning Sets

- **User-Entered Sets**
- **Generated Sets**
 - Generated Planning Set 1
 - Generated Planning Set 1 CEICA 1 (CEICA)
 - Generated Planning Set 2
 - Generated Planning Set 2 CEICA 1 (CEICA)
- Uncertainty Sets**
- Watershed Sets**

Planning Set Properties

Planning Set Information:

Name: Generated Planning Set 1 CEICA 1

Description: Planning set generated by Cost Effective/Incremental Cost Analysis

HUC: **Apply**

Plan Count: 60

Parent Set: Generated Planning Set 1

☐ Show plan-specific geographic information

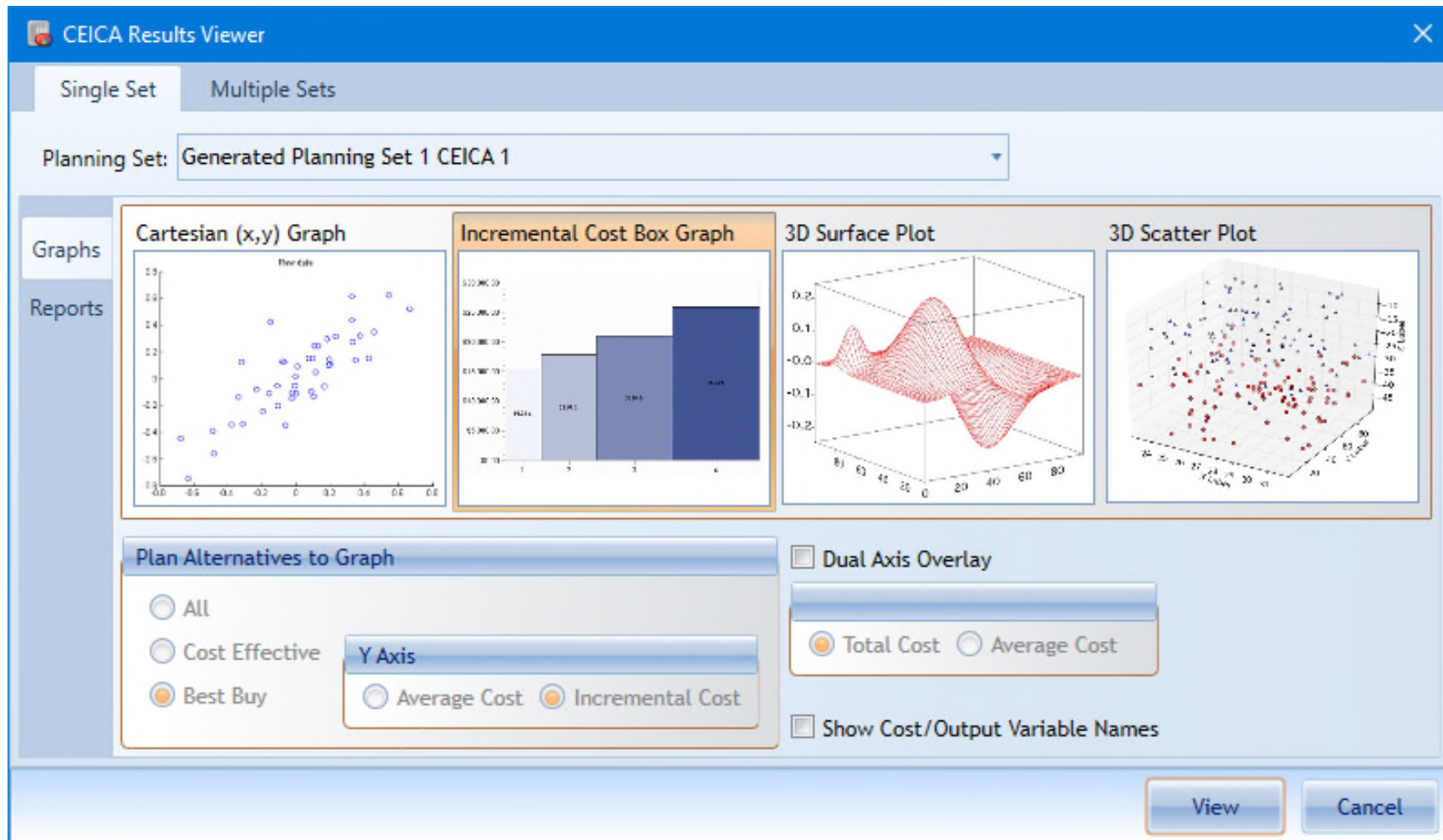
Plan	Plan Description	Cost	Output	Cost Effective
No Action Plan	Default No Action Plan	\$0.00	0	Best Buy
A1B0C0		\$970.00	1,900	Cost Effective
A2B0C0		\$1,000.00	1,920	Cost Effective
A0B1C0		\$145.00	60	Cost Effective
A0B2C0		\$750.00	625	Non-Cost Effective
A0B3C0		\$900.00	1,300	Non-Cost Effective
A1B1C0		\$1,115.00	1,960	Cost Effective
A2B1C0		\$1,145.00	1,980	Cost Effective
A1B2C0		\$1,720.00	2,525	Non-Cost Effective
A2B2C0		\$1,750.00	2,545	Non-Cost Effective
A1B3C0		\$1,870.00	3,200	Non-Cost Effective
A2B3C0		\$1,900.00	3,220	Non-Cost Effective
A0B0C1		\$300.00	250	Cost Effective
A0B0C2		\$560.00	1,400	Best Buy
A0B0C3		\$1,030.00	1,600	Non-Cost Effective
A0B0C4		\$1,200.00	2,000	Cost Effective
A1B0C1		\$1,270.00	2,150	Cost Effective
A2B0C1		\$1,300.00	2,170	Cost Effective
A1B0C2		\$1,530.00	3,300	Best Buy
A2B0C2		\$1,560.00	3,320	Cost Effective
A1B0C3		\$2,000.00	3,500	Cost Effective
A2B0C3		\$2,030.00	3,520	Cost Effective

Discard All Changes **Save Changes**

Planning Study Example [Generated Planning Set 1 CEICA 1]

v2.0.9.1 7/20/2018

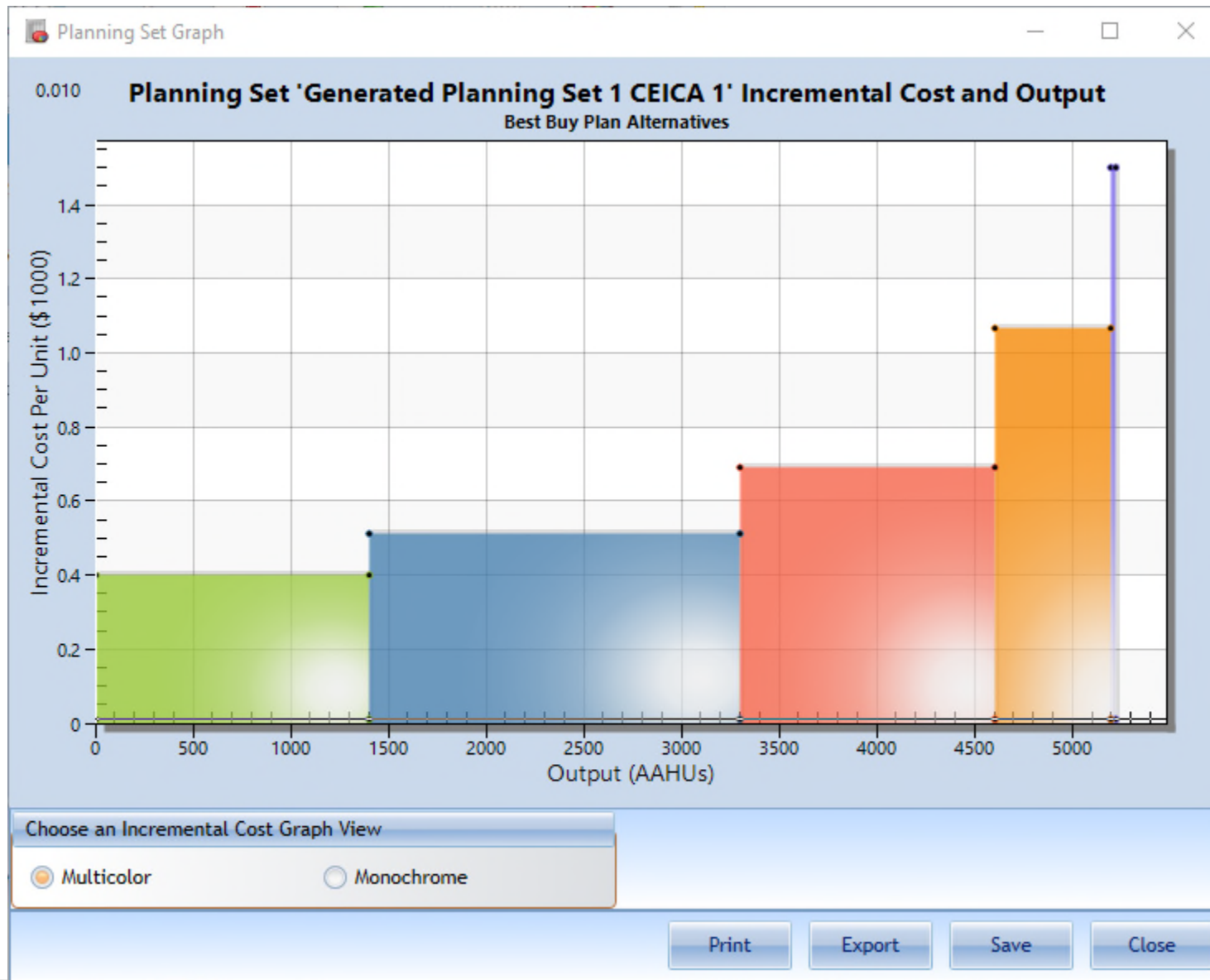
WHAT'S NEW – GRAPHING PACKAGE



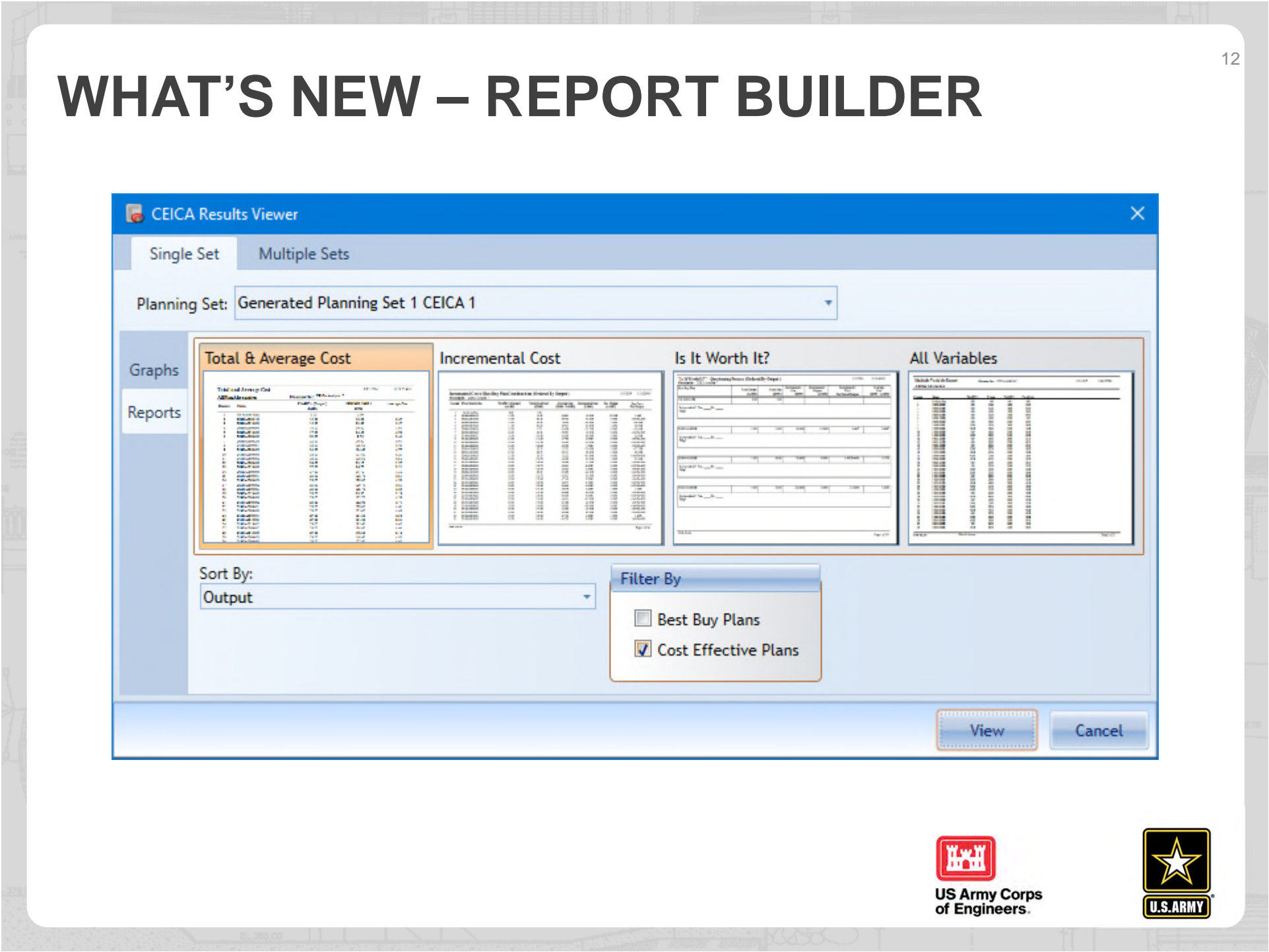
US Army Corps
of Engineers



WHAT'S NEW – GRAPHING PACKAGE



WHAT'S NEW – REPORT BUILDER



WHAT'S NEW – REPORT BUILDER

Total and Average Cost			7/20/2018	1:24:57PM	
Cost Effective Plan Alternatives		Planning Set: Generated Planning Set 1 CEICA 1			
Count	Name	Action Alternatives	Output (AAHUs)	Cost (\$1000)	Average Cost
1	No Action Plan		0.00	0.00	0.00
2	A0B1C0	B1	60.00	145.00	2.42
3	A0B0C1	C1	250.00	300.00	1.20
4	A0B1C1	B1C1	310.00	445.00	1.44
5	A0B0C2	C2	1,400.00	560.00	0.40
6	A0B1C2	B1C2	1,460.00	705.00	0.48
7	A1B0C0	A1	1,900.00	970.00	0.51
8	A2B0C0	A2	1,920.00	1,000.00	0.52
9	A1B1C0	A1B1	1,960.00	1,115.00	0.57
10	A2B1C0	A2B1	1,980.00	1,145.00	0.58
11	A0B0C4	C4	2,000.00	1,200.00	0.60
12	A1B0C1	A1C1	2,150.00	1,270.00	0.59
13	A2B0C1	A2C1	2,170.00	1,300.00	0.60
14	A1B1C1	A1B1C1	2,210.00	1,415.00	0.64
15	A2B1C1	A2B1C1	2,230.00	1,445.00	0.65
16	A0B3C2	B3C2	2,700.00	1,460.00	0.54
17	A1B0C2	A1C2	3,300.00	1,530.00	0.46
18	A2B0C2	A2C2	3,320.00	1,560.00	0.47
19	A1B1C2	A1B1C2	3,360.00	1,675.00	0.50
20	A2B1C2	A2B1C2	3,380.00	1,705.00	0.50
21	A1B0C3	A1C3	3,500.00	2,000.00	0.57
22	A2B0C3	A2C3	3,520.00	2,030.00	0.58
23	A1B1C3	A1B1C3	3,560.00	2,145.00	0.60
24	A1B0C4	A1C4	3,900.00	2,170.00	0.56
25	A2B0C4	A2C4	3,920.00	2,200.00	0.56
26	A1B2C2	A1B2C2	3,925.00	2,280.00	0.58
27	A2B2C2	A2B2C2	3,945.00	2,310.00	0.59
28	A1B1C4	A1B1C4	3,960.00	2,315.00	0.58
29	A2B1C4	A2B1C4	3,980.00	2,345.00	0.59

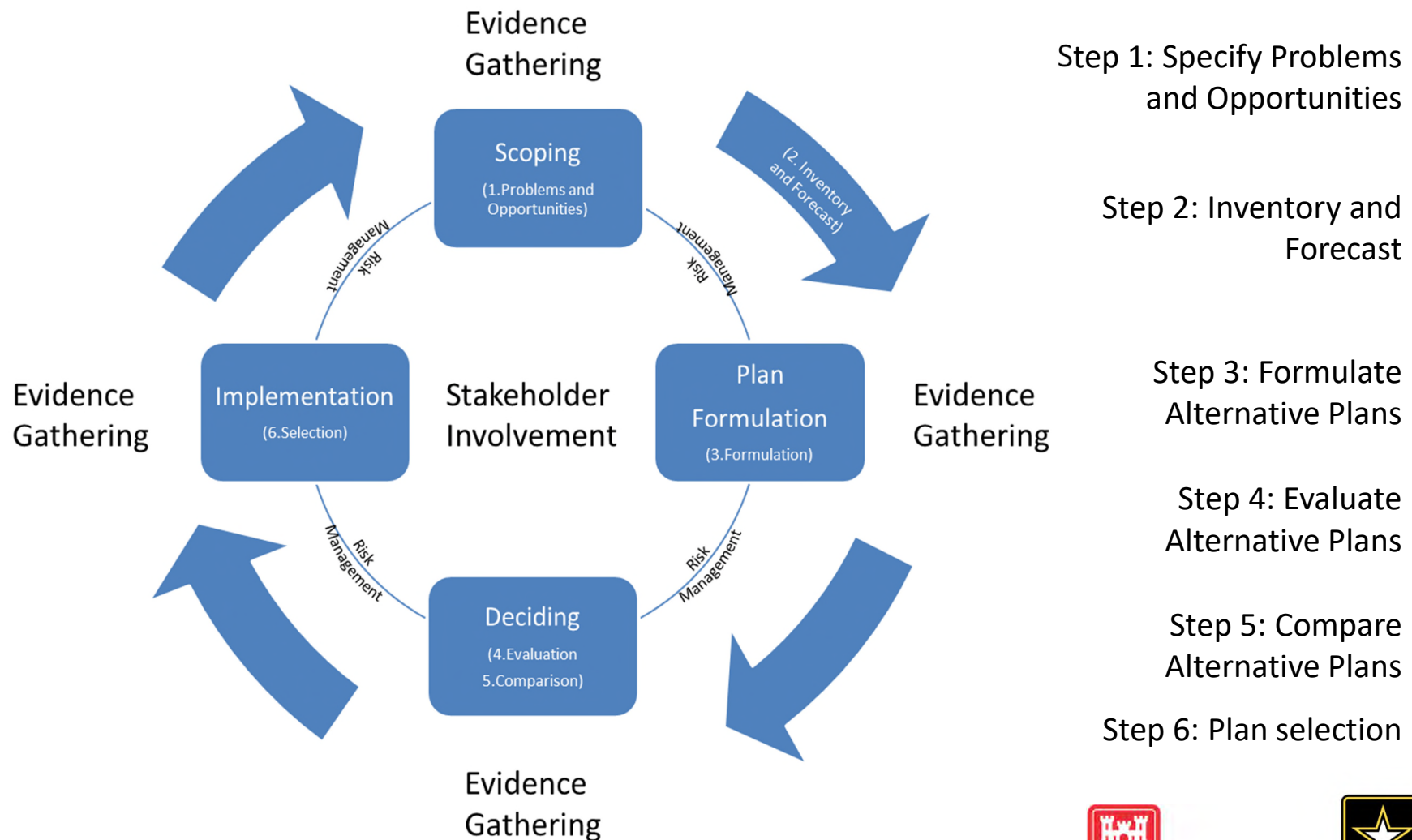
IWR Planning Suite

* Plan Of Interest

Page 1 of 2



IWR PLANNING SUITE'S ROLE IN THE PLAN FORMULATION PROCESS



IWR PLANNING SUITE'S ROLE IN THE PLAN FORMULATION PROCESS

- IWR Planning Suite should be used as a tool to support plan formulation process.
 - Ecosystem Restoration (NER)
 - Mitigation
- Need to employ well-specified planning objectives in concert with plan generation
- Recommend starting with alternatives, or at least suites of management measures, that work together within a reach/area/sub-basin to meet planning objectives



US Army Corps
of Engineers



IWR PLANNING SUITE'S ROLE IN THE PLAN FORMULATION PROCESS

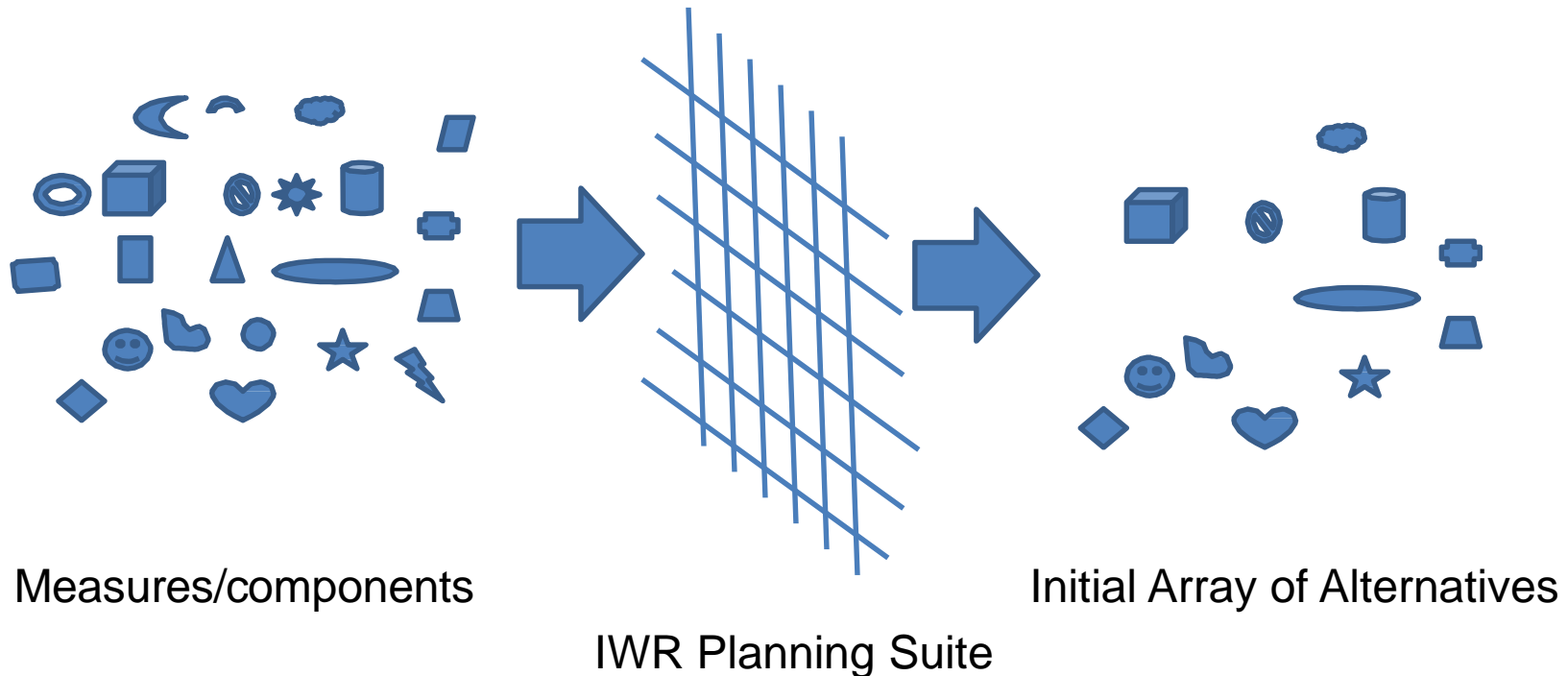
- There are two methods for analyzing alternatives in IWR Planning Suite:
 - Input pre-formulated alternatives
 - Input management measures and define relationships in order to generate alternatives
- Software can and should be used to optimize fully formulated alternatives



US Army Corps
of Engineers



IWR PLANNING SUITE'S ROLE IN THE PLAN FORMULATION PROCESS

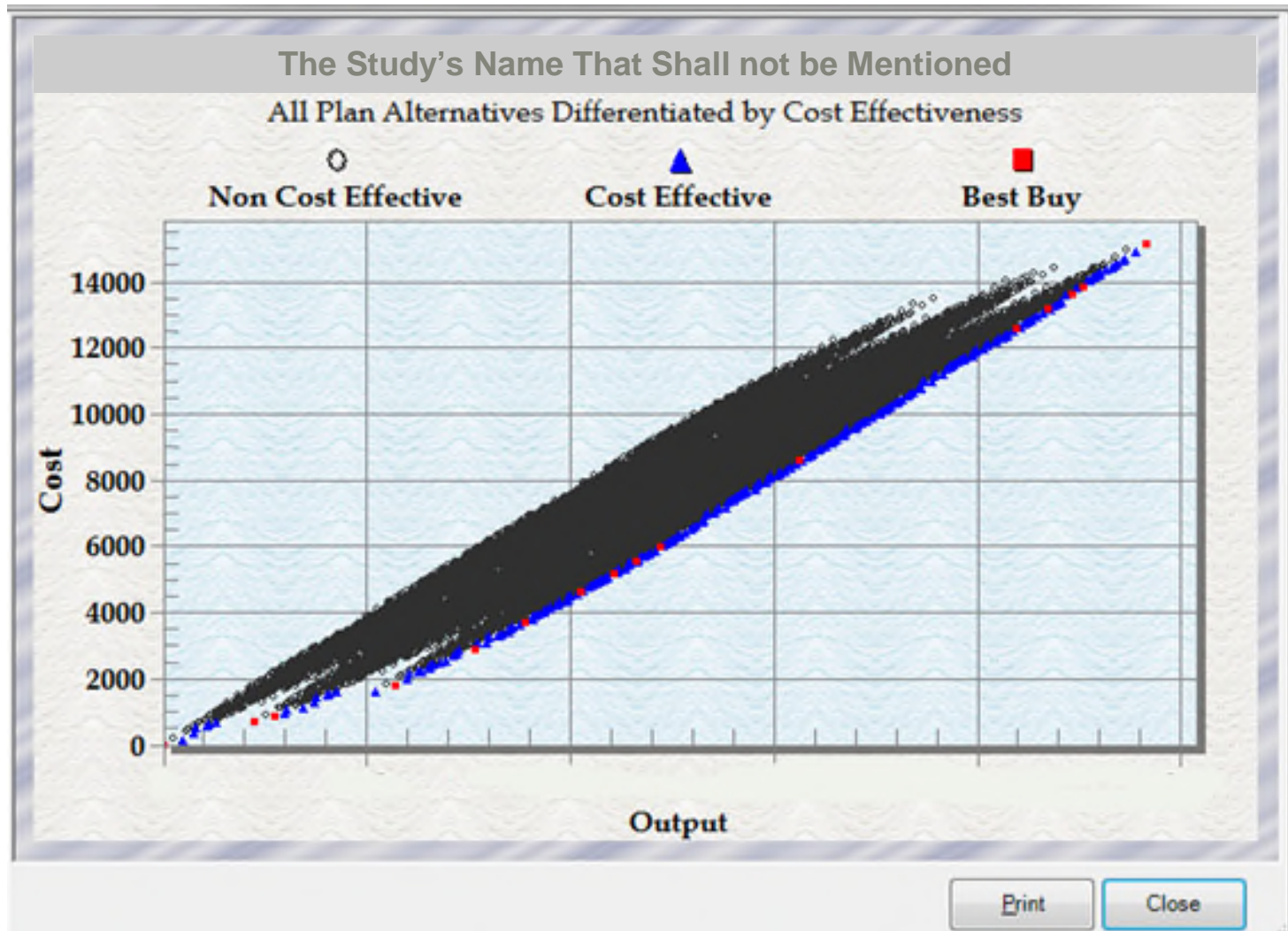


- Plan Formulation Strategies can help teams structure their measures **before** utilizing the Planning Suite Software.

IWR PLANNING SUITE'S ROLE IN THE PLAN FORMULATION PROCESS

18

So we can avoid this...



MODEL COMPONENTS



US Army Corps
of Engineers.



PLAN GENERATOR

- Generates all possible combinations of solutions and determine the effects associated with each combination.
 - Unit costs/benefits are assumed additive by default.
 - Relationships can be modified or overridden by user.
- Each plan is based on solutions and their relationships to one another.
 - Solutions (type of activity or structure)
 - Number of scales for each solution (magnitude of activity or size of structure)
 - Unit cost, unit output, other variables
 - Solution relationships (combinability or dependency)



US Army Corps
of Engineers



PLAN GENERATOR

Solutions & Scales

Solution	Code	# Scales
A	A	2
B	B	1
C	C	1

Move Up
Move Down

Add New Reapply Name

Scaled Solution Effects on Variables

Code	Scale	Name	Cost	Output
A	0	No Action	\$0.00	0
A	1	A1		
A	2	A2		
B	0	No Action		
B	1	B1		
C	0	No Action		
C	1	C1		

Plan	Cost	Output
A0B0C1	\$7.00	80
A0B1C0	\$5.00	100
A1B0C0	\$4.00	200
A1B0C1	\$11.00	280
A1B1C0	\$9.00	300
A2B0C0	\$10.00	450
A2B0C1	\$17.00	530
A2B1C0	\$15.00	550
No Action Plan	\$0.00	0

Solution Relationships

Relationship Type: ☒ Combinability ☐ Dependency ☐ No solutions are combinable

Solution: A B C

Is Not Combinable With: ☐ A ☒ C

Edit Mode: ☒ Create New Relationship ☐ Edit Existing Relationship

Create

Solution: C

Is Not Combinable With: Relationship

OK Cancel

ANNUALIZER

- Interpolates NER benefits over the period of analysis
- Annualizes NED benefits and project costs
- Estimates:
 - Average annual equivalent NED costs and benefits
 - Net present values
 - Average annual NER outputs
- The only USACE certified tool for annualizing NER outputs.
- Helps users understand the timing of expected returns on investment.



US Army Corps
of Engineers



ANNUALIZER

Annualization Calculator

Annualization Set: Annualization Set 1 [Create / Manage](#)

Initial Terms

Base Year: 2013 Discount Rate %: 3.75%
 Period of Analysis (years): 50 Capital Recovery Factor: 0.044574

Cost | NED Benefits | NER Outputs

Initial Cost Details

Total Initial Cost - \$294,343.00

Construction	Real Estate	Pre-construction Monitoring	PED	Other			
\$230,579.00	+	\$14,019.00	+	\$8,624.00	+	\$24,460.00	
					+	\$16,661.00	
						=	\$294,343.00

Total Investment Cost - \$297,068.91

Total Initial Cost		IDC			
\$294,343.00	+	\$2,725.91	=	\$297,068.91	

Initial Investment

Total Investment Cost	PV Factor	Present Value
\$297,068.91	1.0	\$297,068.91

Cost Annualizer

Year	Total Future Costs	PV Factor	Present Value
2014	\$2,640.00	0.929017	\$2,452.61
2015	\$2,640.00	0.895438	\$2,363.96
2016	\$2,640.00	0.863073	\$2,278.51

Net Totals

Total Cost:	Present Value:	Average Annual Equivalent Cost:
\$538,928.91	\$401,993.03	\$17,918.52

[Export Table To Excel](#) [View & Print Report](#) [Save](#) [Close](#)



CE/ICA

- Identifies the least cost solution for each possible level of output
- Compares monetary costs and non-monetary outputs (AAHUs)
- Required for all mitigation and ecosystem restoration projects
- Does not give you a single correct answer, but helps you to better understand and compare your alternatives

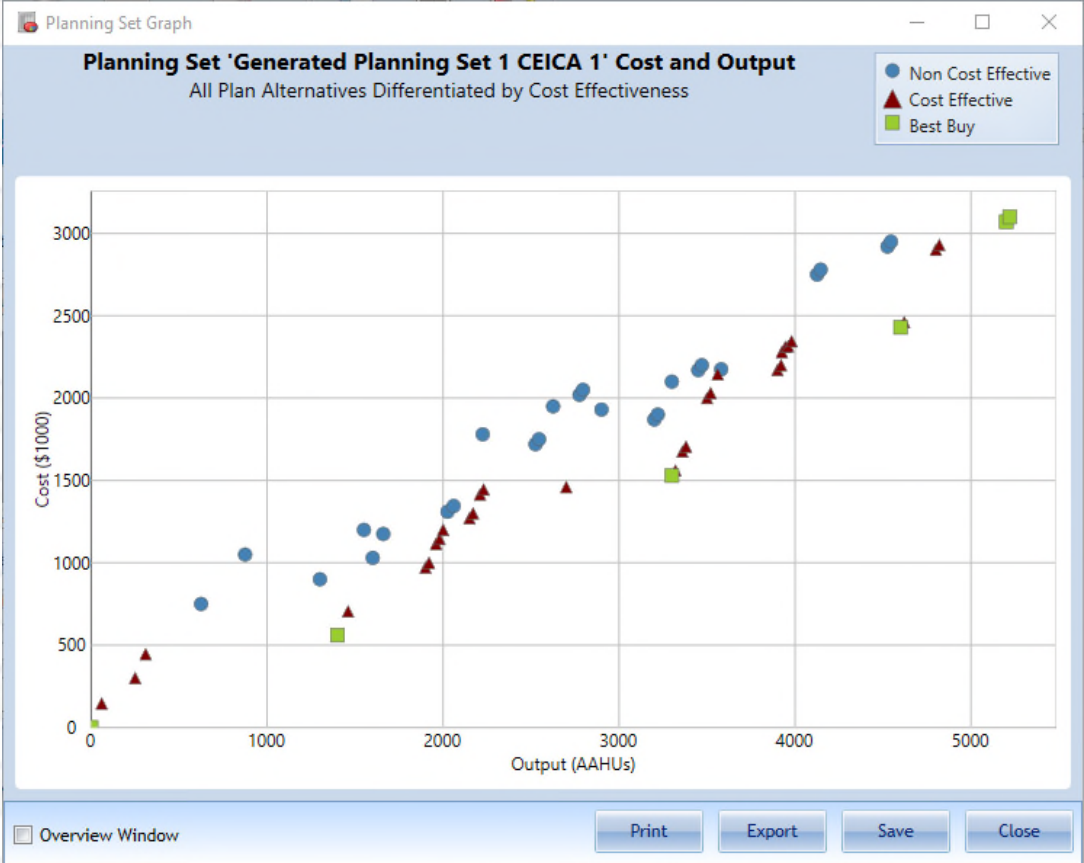


US Army Corps
of Engineers



CE/ICA

Plan	Cost	Output	Cost Effective
No Action Plan	\$0.00	0	Best Buy
A1B0C0	\$970.00	1,900	Cost Effective
A2B0C0	\$1,000.00	1,920	Cost Effective
A0B1C0	\$145.00	60	Cost Effective
A0B2C0	\$750.00	625	Non-Cost Effective
A0B3C0	\$900.00	1,300	Non-Cost Effective
A1B1C0	\$1,115.00	1,960	Cost Effective
A2B1C0	\$1,145.00	1,980	Cost Effective
A1B2C0	\$1,720.00	2,525	Non-Cost Effective
A2B2C0	\$1,750.00	2,545	Non-Cost Effective
A1B3C0	\$1,870.00	3,200	Non-Cost Effective
A2B3C0	\$1,900.00	3,220	Non-Cost Effective
A0B0C1	\$300.00	250	Cost Effective
A0B0C2	\$560.00	1,400	Best Buy
A0B0C3	\$1,030.00	1,600	Non-Cost Effective
A0B0C4	\$1,200.00	2,000	Cost Effective
A1B0C1	\$1,270.00	2,150	Cost Effective
A2B0C1	\$1,300.00	2,170	Cost Effective
A1B0C2	\$1,530.00	3,300	Best Buy
A2B0C2	\$1,560.00	3,320	Cost Effective
A1B0C3	\$2,000.00	3,500	Cost Effective
A2B0C3	\$2,030.00	3,520	Cost Effective



US Army Corps
of Engineers.



UNCERTAINTY

- Users can provide additional information relating to variability/uncertainty surrounding the costs and outputs of each solution.
- Users can assign a probability distribution that best represents the range of uncertainty around each variable for a given plan.
- The resulting set of information used in decision making is more robust and risk-informed.



US Army Corps
of Engineers.



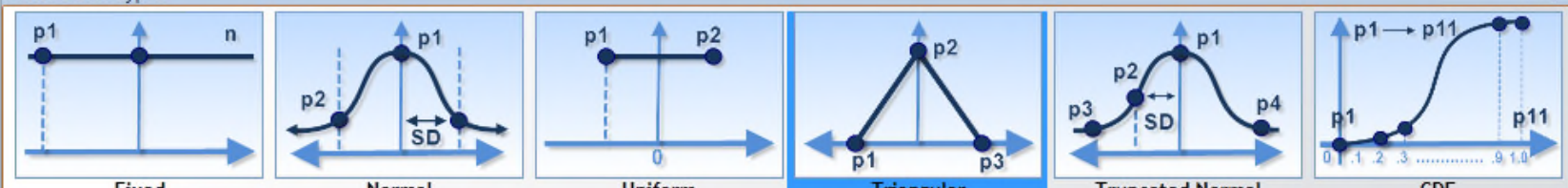
UNCERTAINTY

Uncertainty Planning Set Distributions

Name:

Distributions Variable Profile Tolerance Rules Correlation Matrix

Distribution Types



The triangular distribution is defined by P1, a minimum returned value, P2, the most likely value, and P3, the maximum returned value.

* Binary variables are restricted to a Fixed Distribution of either 0 or 1.

Plan	Variable	Variable Type	Distribution Type	P1	P2	P3	P4	P5	P6	P7	P8
No Action Plan	Cost	Currency	Fixed	\$0.00							
A1B0	Cost	Currency	Triangular	\$50.00	\$100.00	\$150.00					
A2B0	Cost	Currency	Triangular	\$50.00	\$130.00	\$150.00					

Plan	Plan Description	Cost (Mean)	Output (Mean)	SponsorSupport (Mean)	NumberUtilityCrossings (Mean)	#CE	#BB	#Near CE (Input)	#Near CE (Output)	#Near CE
No Action Plan	Default No Action Plan	\$0.00	0	<input type="checkbox"/>	0	100	100	100	100	100
A1B0		\$99.73	2.457	<input type="checkbox"/>	1	52	0	53	52	52
A2B0		\$108.85	5.133	<input checked="" type="checkbox"/>	1	70	5	71	70	70
A3B0		\$142.96	7.354	<input type="checkbox"/>	2	52	8	55	54	54
A0B1		\$144.79	6.038	<input checked="" type="checkbox"/>	1	37	4	41	37	37
A0B2		\$258.06	12.085	<input checked="" type="checkbox"/>	3	30	14	31	31	30
A1B1		\$260.77	13.013	<input checked="" type="checkbox"/>	2	30	22	30	30	30
A2B1		\$176.16	9.339	<input checked="" type="checkbox"/>	2	48	15	49	48	48
A3B1		\$155.16	5.503	<input checked="" type="checkbox"/>	3	34	3	36	34	34
A1B2		\$244.39	20.849	<input checked="" type="checkbox"/>	4	71	62	72	73	72
A2B2		\$333.89	6.992	<input checked="" type="checkbox"/>	4	2	0	2	2	2
A3B2		\$259.05	11.37	<input checked="" type="checkbox"/>	5	25	13	26	25	25

MCDA

- Weight the criteria and choose the appropriate ranking and normalization methods.
- Create and save multiple weighting scenarios
- Helps the decision maker balance criteria (i.e., acres of wetland restored, jobs created) against a given set of solutions
- The process can be used to measure qualitative units such as socioeconomic factors or cultural resources with a user defined or a commonly accepted scale.
- Decision makers often use more than one criteria for decision making. MCDA provides a context for stakeholders to voice their opinions and potentially come to a consensus around decisions.



US Army Corps
of Engineers



MCDA

Multi-Criteria Decision Analysis

Planning Sets: Planning Set 1 (Generated) MCDA Scenario: MCDA Scenario 1 [Create/Manage](#)

Ranking Weights

Rank Method

☒ Weighted Scoring ☐ Outranking ☐ Efficient Frontier ☐ Compromise Programming

Criterion	Weight	Min/Max
Cost	1	Minimized
Output	1	Maximized
SponsorSupport	3	Maximized
NumberUtilityCrossings	1	Minimized

Normalization Method

[Discard All Changes](#) [Perform MCDA](#) [New Planning Set](#)

Plan	Plan Description	Cost	Output	SponsorSupport	NumberUtilityCrossings	Rank	Score
A1B0		\$100.00	3	<input type="checkbox"/>	1	10	0.347
A2B0		\$130.00	5	<input checked="" type="checkbox"/>	1	3	0.599
A3B0		\$145.00	8	<input type="checkbox"/>	2	11	0.334
A0B1		\$135.00	2	<input checked="" type="checkbox"/>	1	5	0.556
A0B2		\$270.00	8	<input checked="" type="checkbox"/>	3	7	0.442
A1B1		\$250.00	3	<input checked="" type="checkbox"/>	2	8	0.436
A2B1		\$160.00	5	<input checked="" type="checkbox"/>	2	1	0.783
A3B1		\$100.00	7	<input checked="" type="checkbox"/>	3	4	0.565
A1B2		\$300.00	15	<input checked="" type="checkbox"/>	4	6	0.467
A2B2		\$310.00	9	<input checked="" type="checkbox"/>	4	2	0.632
A3B2		\$215.00	10	<input checked="" type="checkbox"/>	5	9	0.428

WATERSHED ANALYSIS

- The Watershed Wizard allows the user to complete a watershed analysis based on multiple calculations.
- Leads the user through a series of steps in which they can define locations, relationships, and additive effects between proposed plans in order to generate a set of plans to represent the scenario.
- The user can define one plan per site, more than one plan per site, or generate plans for each site based on their selections.
- Provides a more transparent framework for formulating multiple solutions and scales across multiple locations
- Users can then run CE/ICA on the generated watershed planning sets



WATERSHED ANALYSIS

Watershed Wizard

Do you want to:

☐ a) Enter one plan per site

☐ b) Enter more than one plan per site

☐ c) Generate plans for each site

Watershed Study Name:

Watershed Study Description:

☐ d) Open an existing unfinished Watershed Study

<< Back Next >>

Watershed Locations and Plans

Locations: ☒ Use special characters for location code

Location Name	Code	# Plans	Description	Latitude	Longitude
Location A	Ã	1			
Location B	Æ	2			
Location C	Ç	2			

Add New Reapply Name

Plans for each Location:

Location Code	Plan #	Plan Name	Plan Description	Cost	Output
Ã	0	No Action		\$0.00	0
Æ	0	No Action		\$0.00	0
Ç	0	No Action		\$0.00	0
Ã		Location A	Plan 1, Loc. A	\$100.00	300
		Location B	Plan 1, Loc. B	\$120.00	400
		Location C	Plan 1, Loc. C	\$130.00	500
		Location C	Plan 2, Loc. C	\$180.00	600
		Location B	Plan 2, Loc. B	\$140.00	425

OK Close

Generate Planning Set

Planning Set Name:

Description:

☐ Remove inefficient plans during plan generation

Advanced Options

Exclude Locations

☐ Location A

☐ Location B

☐ Location C

Generate Cancel



US Army Corps
of Engineers



DOWNLOADING THE SOFTWARE

1. Make sure all previous versions of the IWR Planning Suite software have been uninstalled from your computer.
2. Request software from USACE App Portal.
 - “IWR Planning Suite 2.0.9 - April 30 2018”
3. Should install automatically within 24 hours of submitting your request.

Step-by-step instructions are available in the IWR Planning Assistance Library.

(<https://publibrary.planusace.us/#/series/IWR%20Planning%20Suite>)



TRAINING RESOURCES & HELP

- Links to the software, certification memo, and other related resources can be found at <http://www.iwr.usace.army.mil/Missions/Economics/IWR-Planning-Suite/>.
- Training materials that highlight IWR Planning Suite's capabilities, improvements and case study applications are available online at the [IWR Planning Assistance Library](#).
- Customized or study-specific training is also available upon request.
 - Contact Laura Witherow (Laura.A.Witherow@usace.army.mil)



US Army Corps
of Engineers



Questions?

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>



**US Army Corps
of Engineers®**

