



Barb Horn
Water Resource Specialist
Colorado Parks & Wildlife

**STUDY DESIGN:
DEVELOPING A
MONITORING
PROGRAM THAT
DELIVERS RESULTS**
NWQMC CONFERENCE
2019

DANIELLE DONKERSLOOT
VM PROGRAM
CONSULTANT



Water Data Collaborative
Colorado River Watch



EPA's
National Advisory Council
for Environmental Policy
and Technology =
NACEPT COMMITTEE



barb.horn@state.co.us

MONITORING QUESTION:

Study Purpose	Data Uses or Decisions (Management Use or ?)	Data Users &	Information Product	Results Outcomes Impacts ROI

TOP CHALLENGES FOR VM/CS

1. Volunteer
Recruitment or
Retention
2. Data Not Used
3. Consistent
Resources

TOP AGENCY CHALLENGES WORKING WITH VM/CS

1. Communication
2. Beliefs –
Experience
3. Resources or
Capacity

A CLOSER LOOK AT THE PROBLEM

NOT RESOURCES

**Effective and Appropriate
Study Design or Monitoring Plan**

**Not generating, delivering or
communicating information**

No Evaluation

More

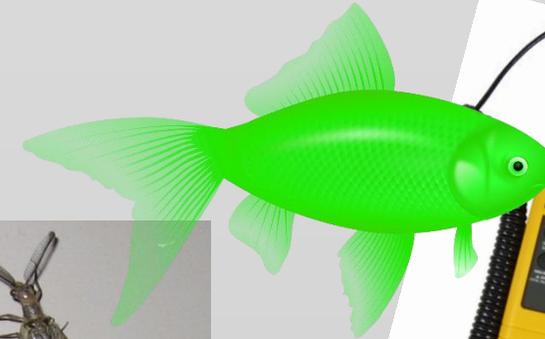
Alignment
Information

Difference
and Be

with Vision,
ion

Power –
n maker

ORGANIZATION TYPE

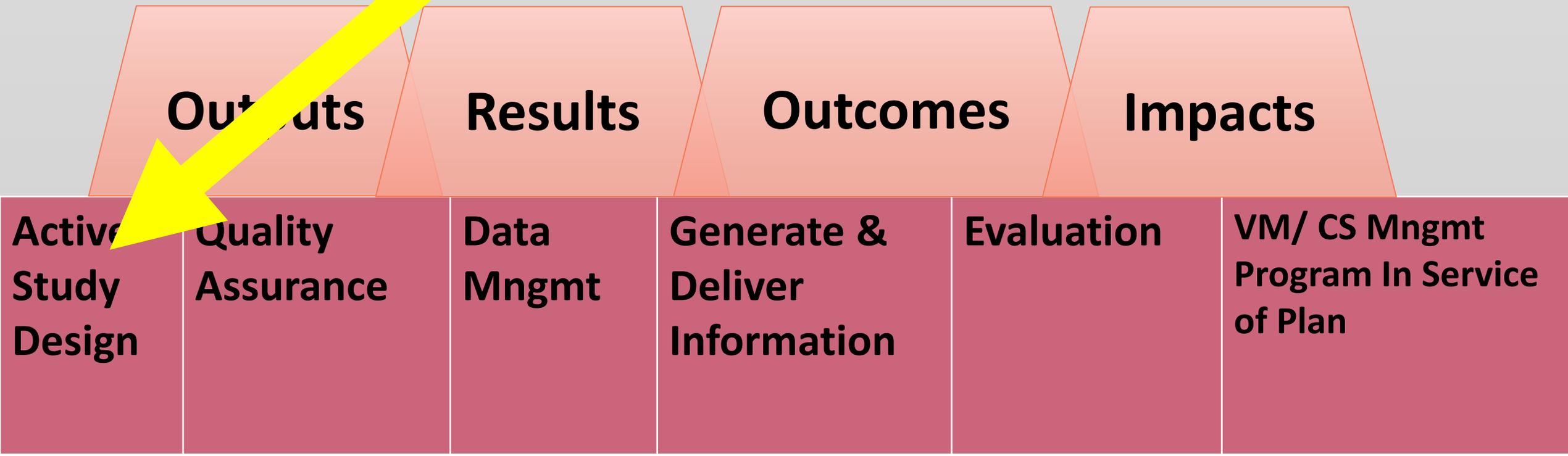


DATA USES OR USERS

EFFECTIVE MONITORING PROGRAMS

Produce Measurable, trackable or identifiable:

ESSENTIAL BUILDING BLOCKS



NOT ALL DESIGNS OR PLANS ARE EQUAL

DURATION

RIGOR

RESOURCES

QUALITY

COMPLEXITY

FORMALITY

SPIT BATH ASSESSMENT

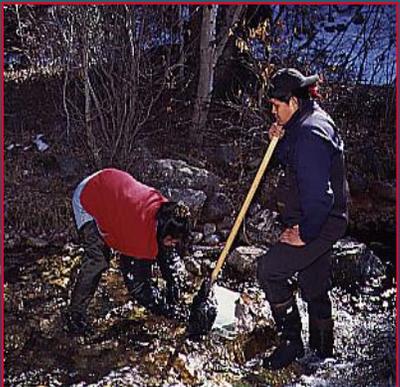
Monitoring Design

Have a ?

What Are
Your
Expectations



What Are
Current
Conditions?



How Do Current
Conditions
Compare with
Expectation?

Impairment

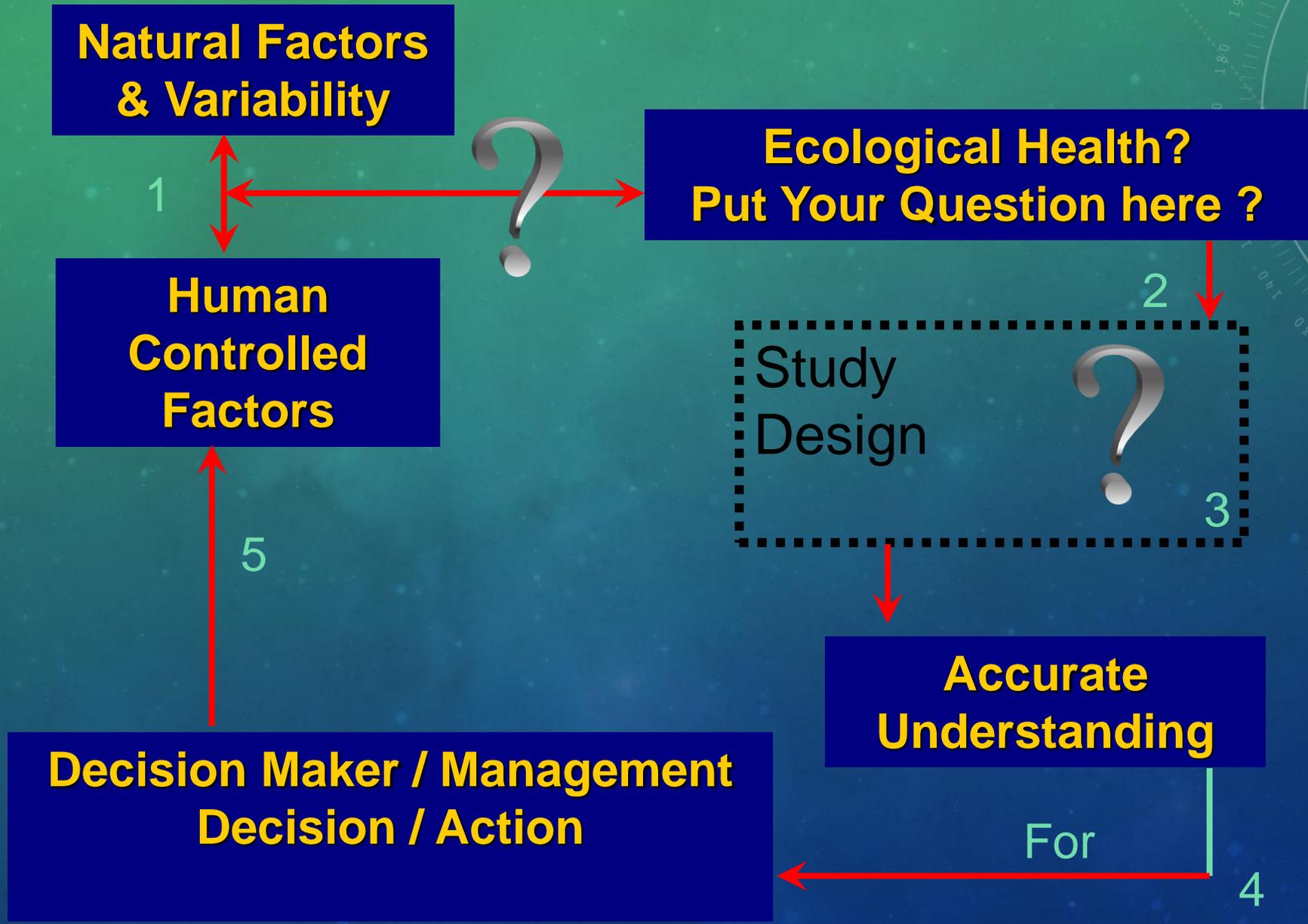


Restoration

High Quality



Protection



WHAT IS “HEALTHY”?

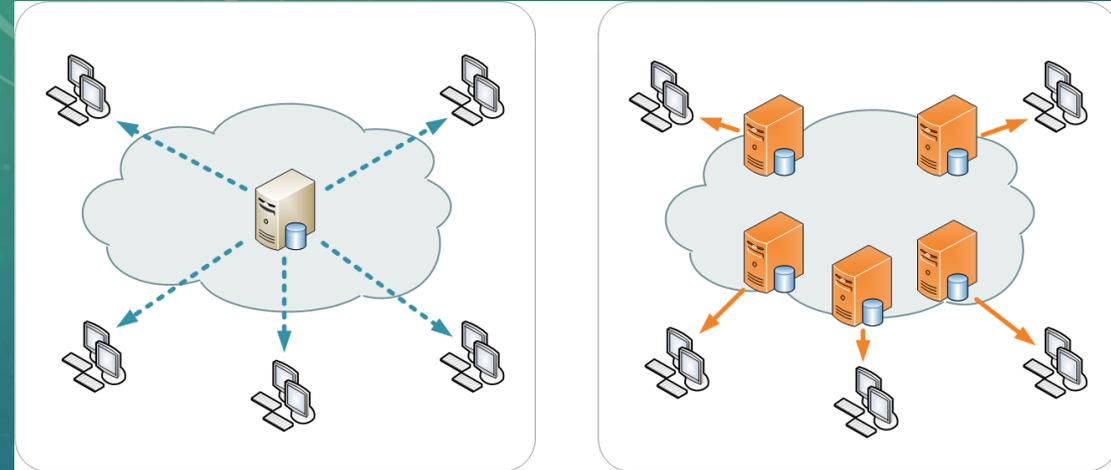


What is “Restore”?

What is “Impaired”?

What is natural or possible?

AT BEST ADHOC.....



BIRTH OF VM PROGRAM:



**GOOD
STUFF
HAPPENS**

=



Each Monitoring ?

Continuum of Study Purposes

Condition /Trend – Impact – Effectiveness – Use Support

Continuum of Uses or Management Decisions

Education – Inquiry – Advocacy – Planning – Regulatory - Legal

Continuum of Users

Youth, Adults, Farmers, Managers, Districts, Local G, State G, Fed G

Continuum of ROI's

Behavior Change-Uses M-Regulation-Policy-Health-Economy

Data
Pathway

Or
Information
Blue Print

Info needs &
Products

Evaluation

**MONITORING
QUESTION 1:**

		I	II	III
Study Purpose(s)				
A. Condition and Trend Investigation				
B. Impact Investigation	Non Point Source			
	Point Source			
C. Effectiveness Investigation				
D. Use Support Investigation				

**MONITORING
QUESTION 1:**

**Are Rivers
Healthy?**

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**MONITORING
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**Are Rivers
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A. Condition and Trend Investigation 1.??? 2.???				
B. Impact Investigati on	Non Point Source			
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D. Use Support Investigation				

= USERS = DECISION MAKERS

- You, neighborhood
- Board
- Landowner, water user
- government official (any level)
- focused group of individuals
- ALL or ANYONE!

RESULTS - OUTCOMES – IMPACTS YOU WANT TO SEE:



- Because you answered that monitoring question
- Specific to these data users/decisions/management uses and users

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Behavior Change-Uses Met-Regulation-Policy-Health-Economy

Data
Pathway

Or
Information
Blue Print

Info needs &
Products

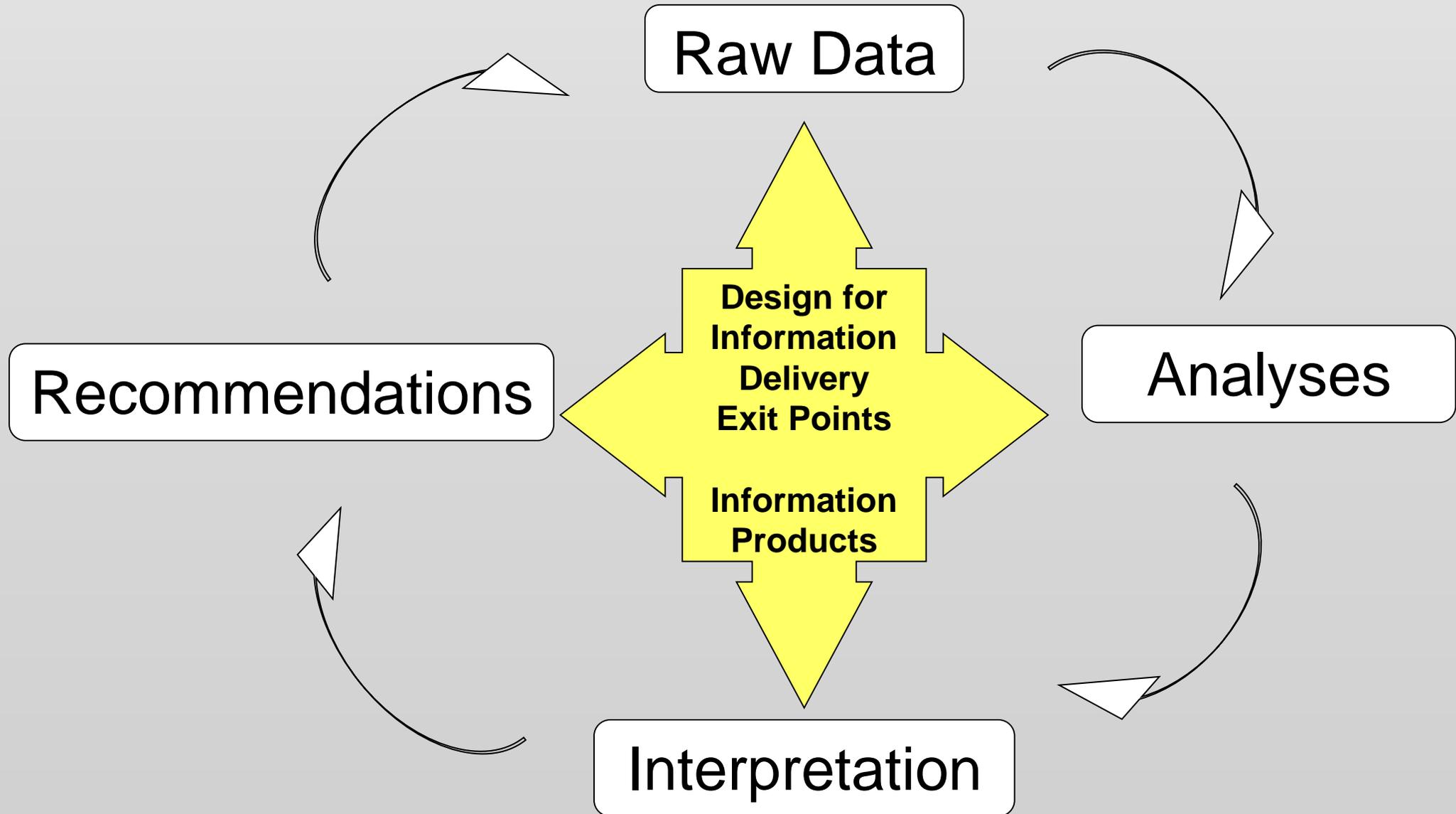
Evaluation

Information Needs of Decision Maker

**Monitoring question: AII, User = State Health (II), Decision Condition (A),
? Are uses being met in Pretty Stream below Happy Town**

?	Item	Design Element
What	Decision will they make? Key processes, natural/political?	Technical
What	Key Indicators needed, in what media?	Technical
What	Where do they need it from (key locations, political, historical, etc.)?	Technical
What	Benchmarks and references they use, criteria, metrics, indexes, statistics, etc.?	Technical Information
What	What frequency/duration (length of record) does information need to be?	Technical
What	How "good" does it have to be (peer reviewed, certain methods, etc.) be?	Technical
What	Methods are they using, need you to use, field/lab	Technical
What	What acceptance/performance criteria do they use?	Technical
What	Information needs to be included besides data or information, meta data?	People
What	Will you deliver, raw data, analyzed, interpreted, conclusions, recommendations, where will you exit?	Information
How	Do they need you to analyze, interpret, conclude or recommend	Information
How	Is the decision made? Process, formal, legal, rigorous, opportunities	People
How	Do they need the information, format?	Information
How	Will it be delivered, mail, meeting, hearing, orally, etc.?	Information
When	Is the decision made?	People
When	Do they need the data or information at what frequency?	Information
Who	Will deliver the data and then evaluate if decision was made and role of information?	Information

IDENTIFY INFO NEEDS, INFORMATION PRODUCTS & DELIVERY..



Each Monitoring ?

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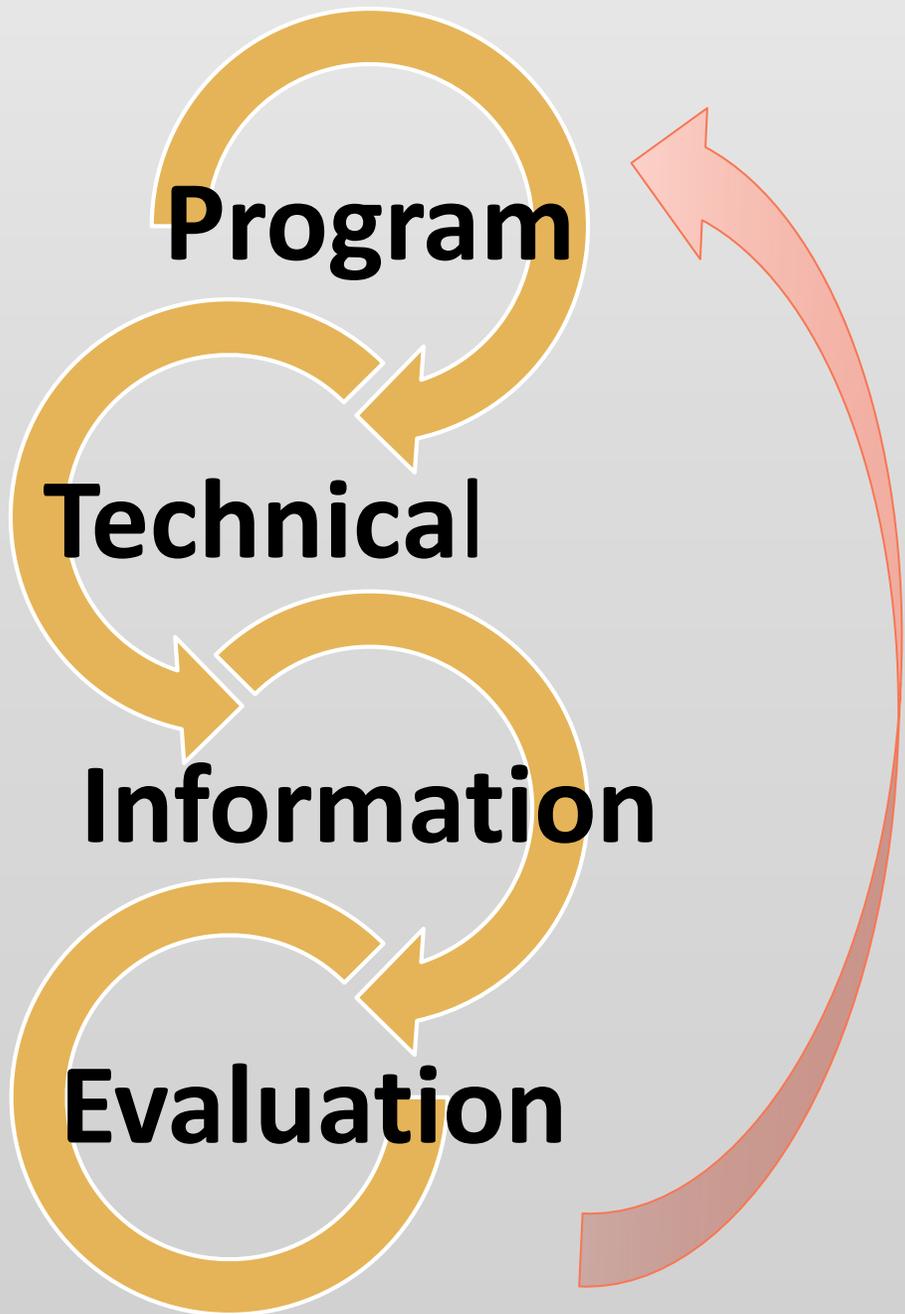
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Blue Print

Info needs &
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Evaluation

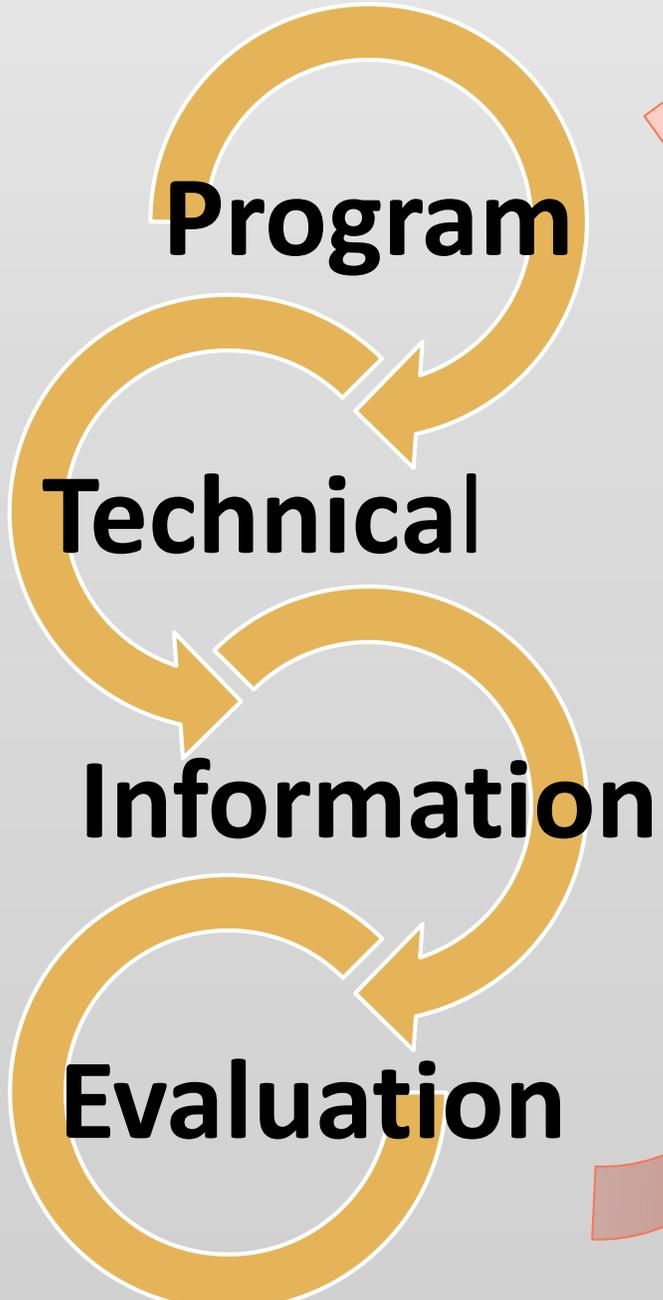
LEARNING OBJECTIVES

- 1) How to align monitoring purpose, management uses, data users, information needs and products to produce ROI.
- 2) Role of Study Design to go from asking Monitoring ? to measurable results, outcome, impacts (ROI)
- 3) Four Key Designs Areas
- 4) Role of data management and information products in ROI.
- 5) Role of Program AND ROI evaluation
- 6) Role of VM in Implementation and key elements of VM Program Management



**Study Design or
Monitoring Plan**

PLANNED DESIGNS THAT
COVER ESSENTIAL
BUILDING BLOCKS

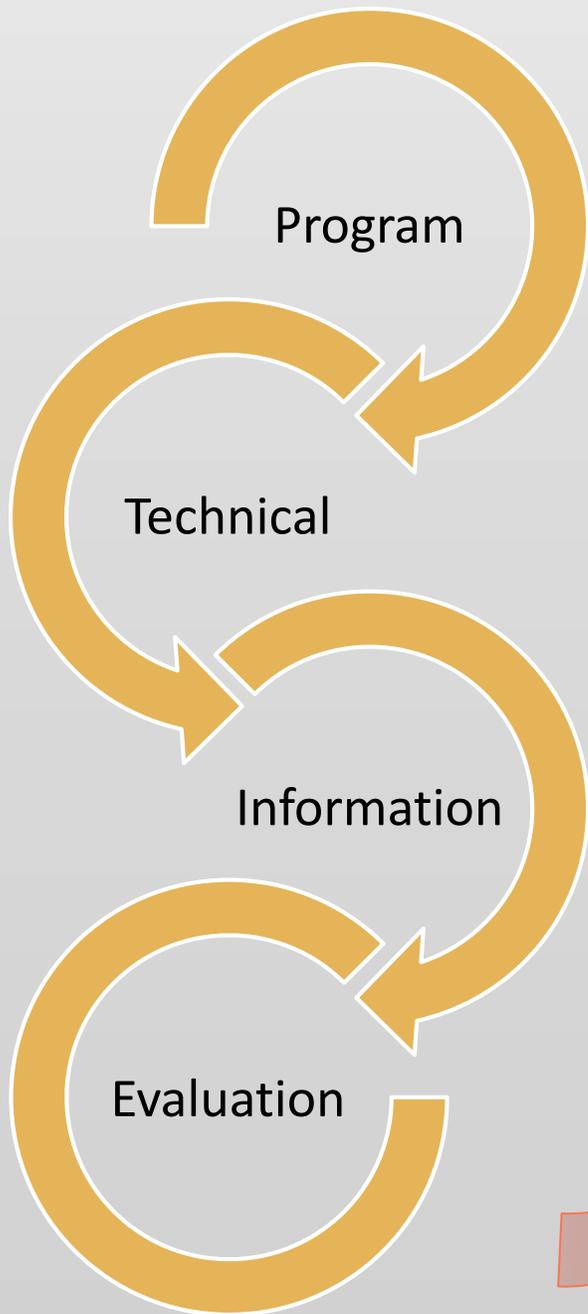


Who, Why & Info Needs =
DRIVER

What, When, Where, Data
Quality & Management

Data to Info Via Analysis,
Interpretation, Reporting &
Communication

Will it Work How will You
Know?



Program Design - The Who and Why

1. Shared Vision and Outcomes

1a Impact, Results and Value Alignment

1b. Who Needs to be Involved and Role

1c. Volunteer Management Program

2. Scope and Inventory

2a. Geographic and Waterbody

2b. Existing Data, Gaps and New Data Needs

2c. ID Threats and Opportunities to waterbodies

2d. Policies, Legislation & Regulation to Consider

2e. Water and Land Uses (historic, current, cultural)

2f. Benchmarks, standards and criteria (formal or informal)

Volunteer Monitoring Program should be designed to serve data objectives not visa versa

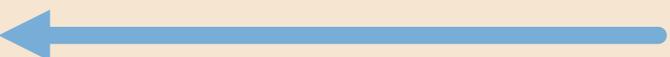
Program Design - The Who and Why Continued...

3. Monitoring **Reasons, Uses or Purposes**

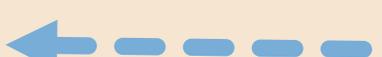
3a. Role in meeting Vision, Outcomes, Organization Objectives

3b. Monitoring Questions

3c. Study Purpose 

3c. Data Uses, Decisions, Management Uses 

3d. Targeted **Data Users / Decision Makers** and Decisions 

3e. **Identify Information Needs of Decision Makers -Data Quality** 

3f. Summarize – Information Blue Print, Logic Model

4. Capacity and Prioritization Check

4a. Budget and Capacity Assessment

4b. Scalability

4c. Summarize, Document & Communicate (Blue Print, Logic Model)

Technical Design - The What, When, Where, Data Quality & Management

5. What Monitor

5a. Waterbody type

5b. Activity Media

5c. Methods and Equipment to meet Data Quality Objectives

6. Where Monitor

7. When Monitor

8. **How fulfill Data Quality Objectives (SOP, QAPP)**

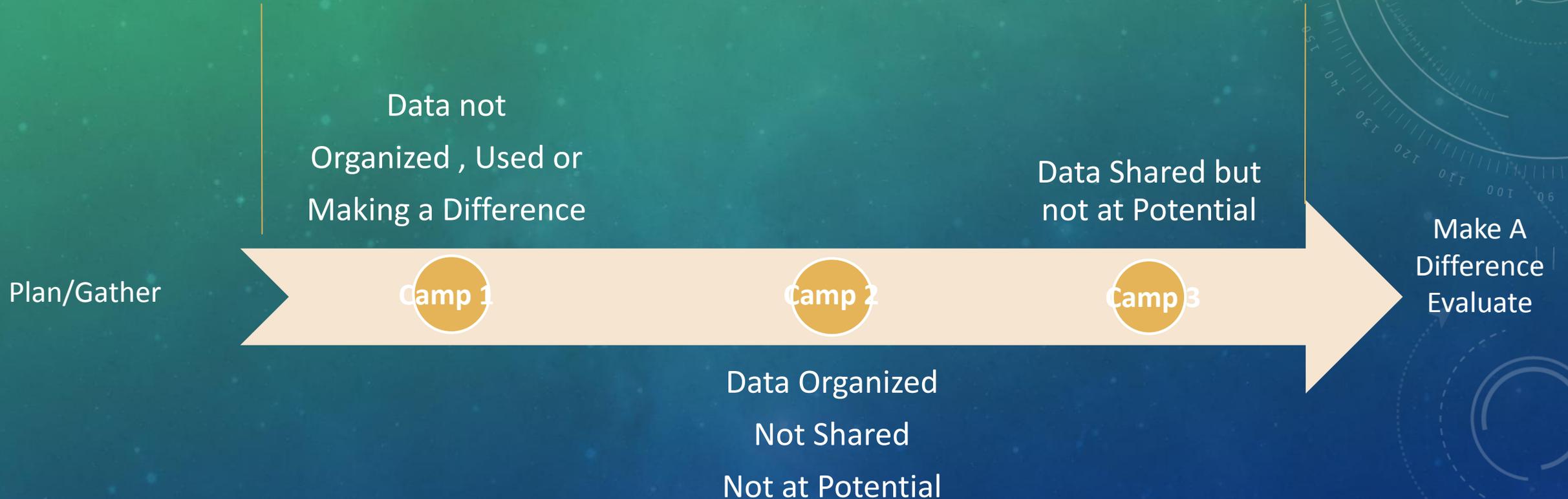
9. Who is Collecting, Processing and Analyzing

10. Access, Transportation & Safety

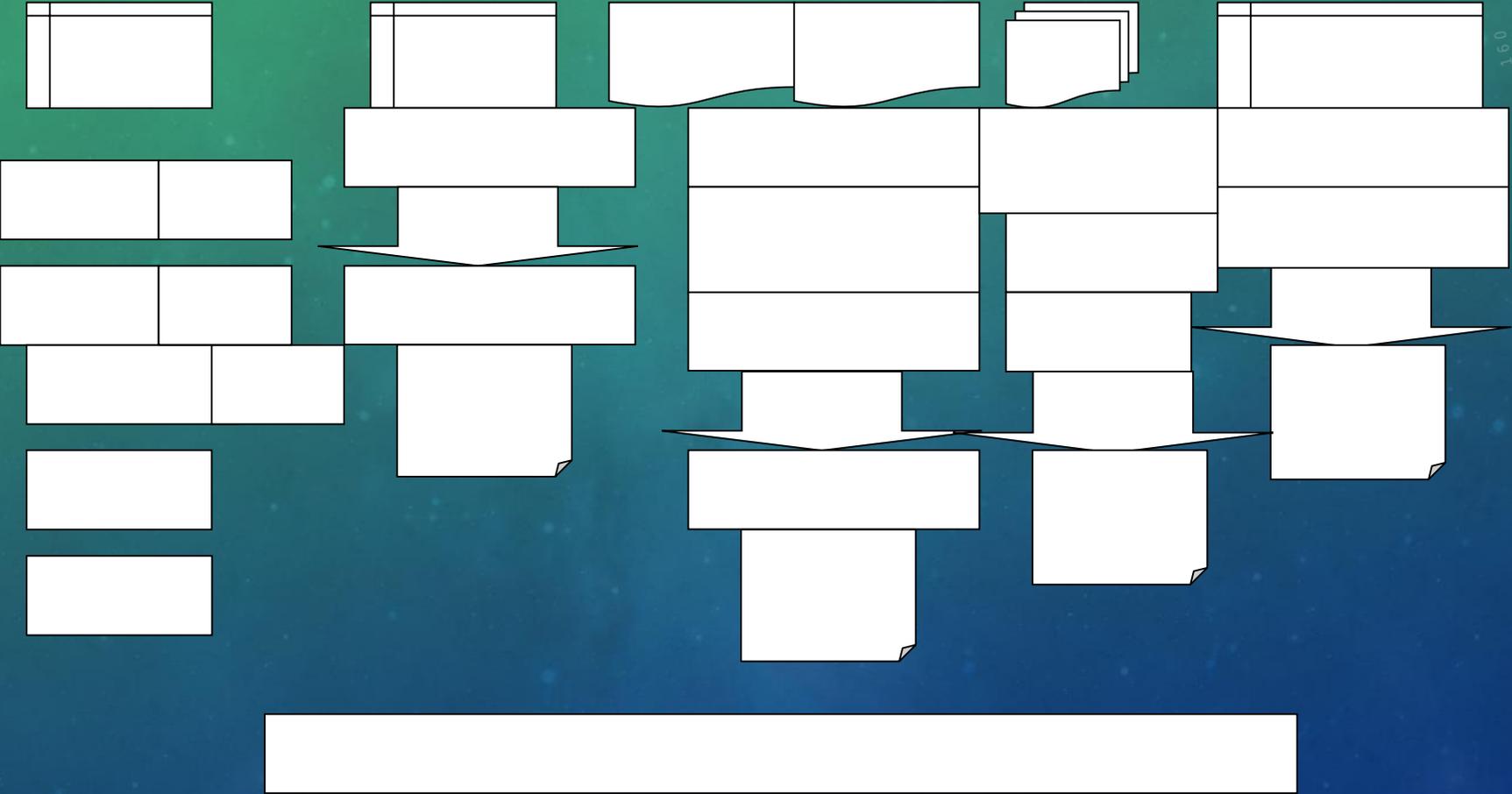
11. **Manage Raw Data to Verified Data (Data Management Plan)**

12. Capacity and Prioritization Check (Budget, Scalability, Document &

DATA READINESS: READY TO CREATE INFORMATION PRODUCTS



INVENTORY EVERY INDICATOR



Information Design - Data to Information through Analyses, Interpretation, Reporting & Communicating

13. **Identify Information Products Needed** by Targeted Decision Makers

14. Data Analyses & Summary

15. Interpretation, Conclusions & Recommendations

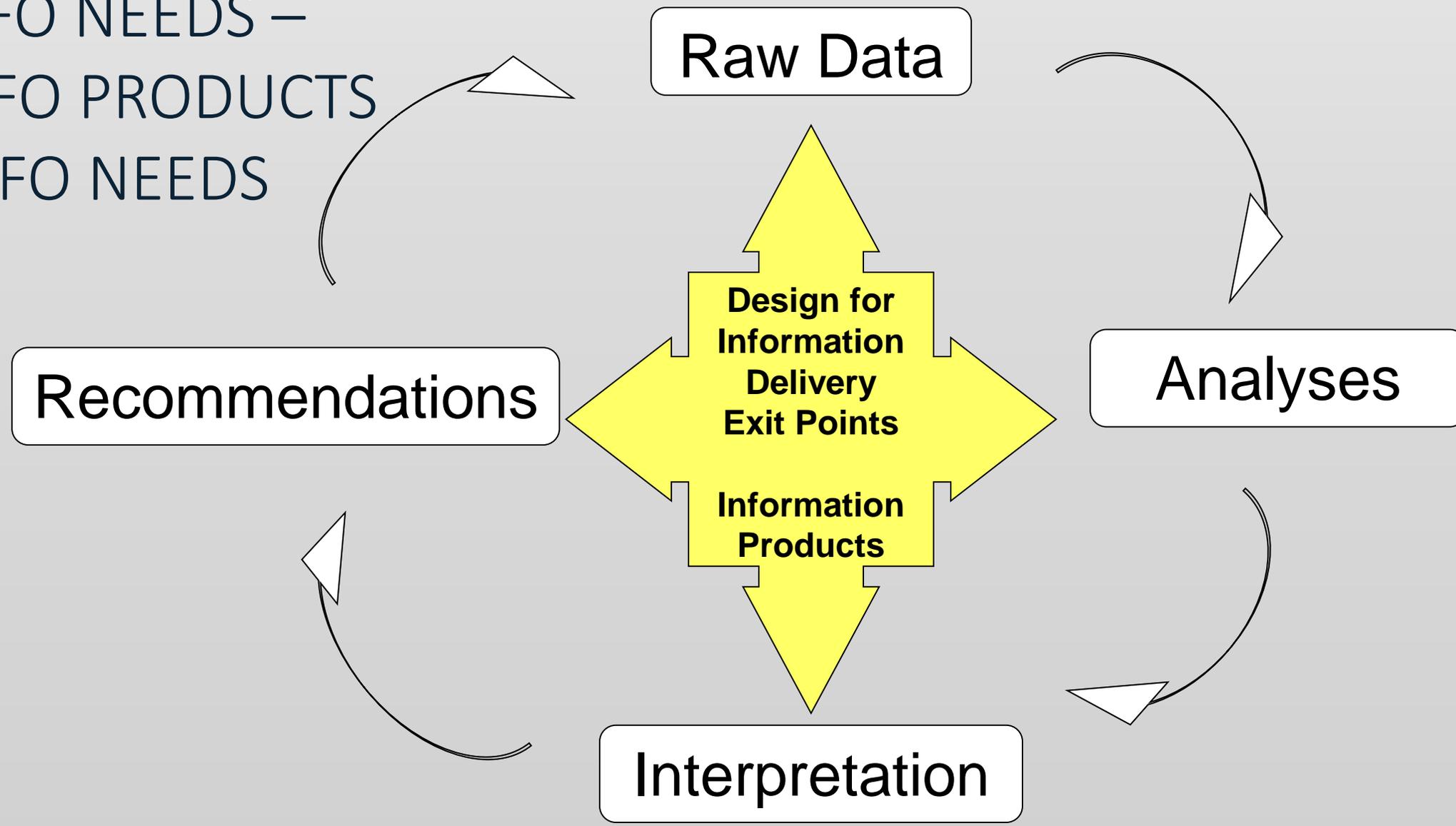
16. **Communication and Delivery** (Communication Plan)

17. **Data Management of Information Products** (Data Management Plan)

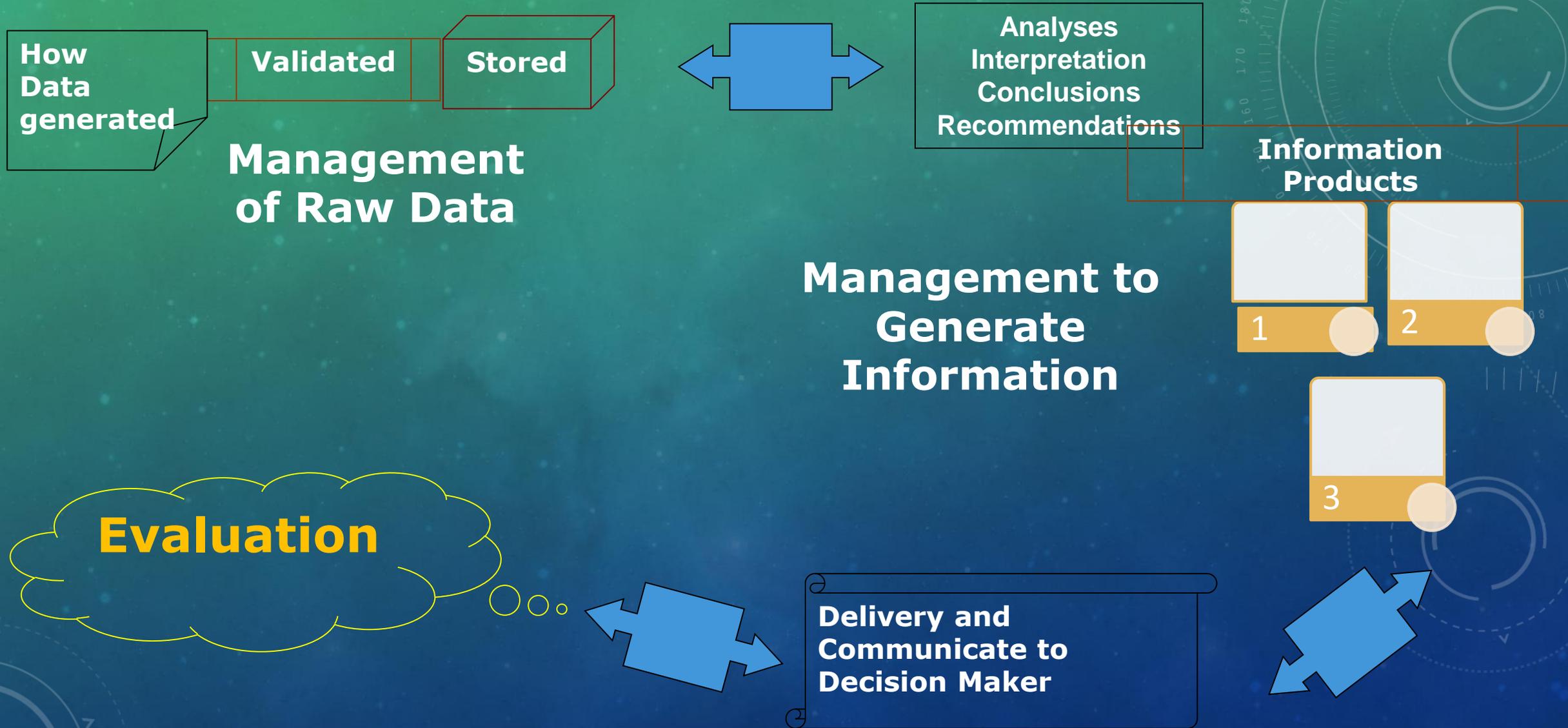
18. **Who** and Support

19. Capacity and Prioritization Check (Budget, Scalability, Document & Communicate)

IDENTIFY INFO NEEDS –
DEVELOP INFO PRODUCTS
TO SERVE INFO NEEDS



MAP DATA PATH FOR EVERY INDICATOR



ASSETS =

DATA U

ME = FOR



erty

come assets n.

1. Can be found

le, disc

minin

, data

friend

mation to inform user of

s, qua





20+
YEARS

Evaluation Design- Will it Work and How Will I know?

20. **Final Study Design**, Task and Timeline, Budget, Capacity and Scalability, **Sub Documents**

21. **How answer Monitoring Questions?**

22. **Evaluation of Effectiveness, Plan & Implementation**

23. **How Capture and Document Success, Changes & Story**

24. **Communication of Plan**, Results, Outputs, Outcomes, Impact & What needs to be done

25. Acknowledgement

LEARNING OBJECTIVES

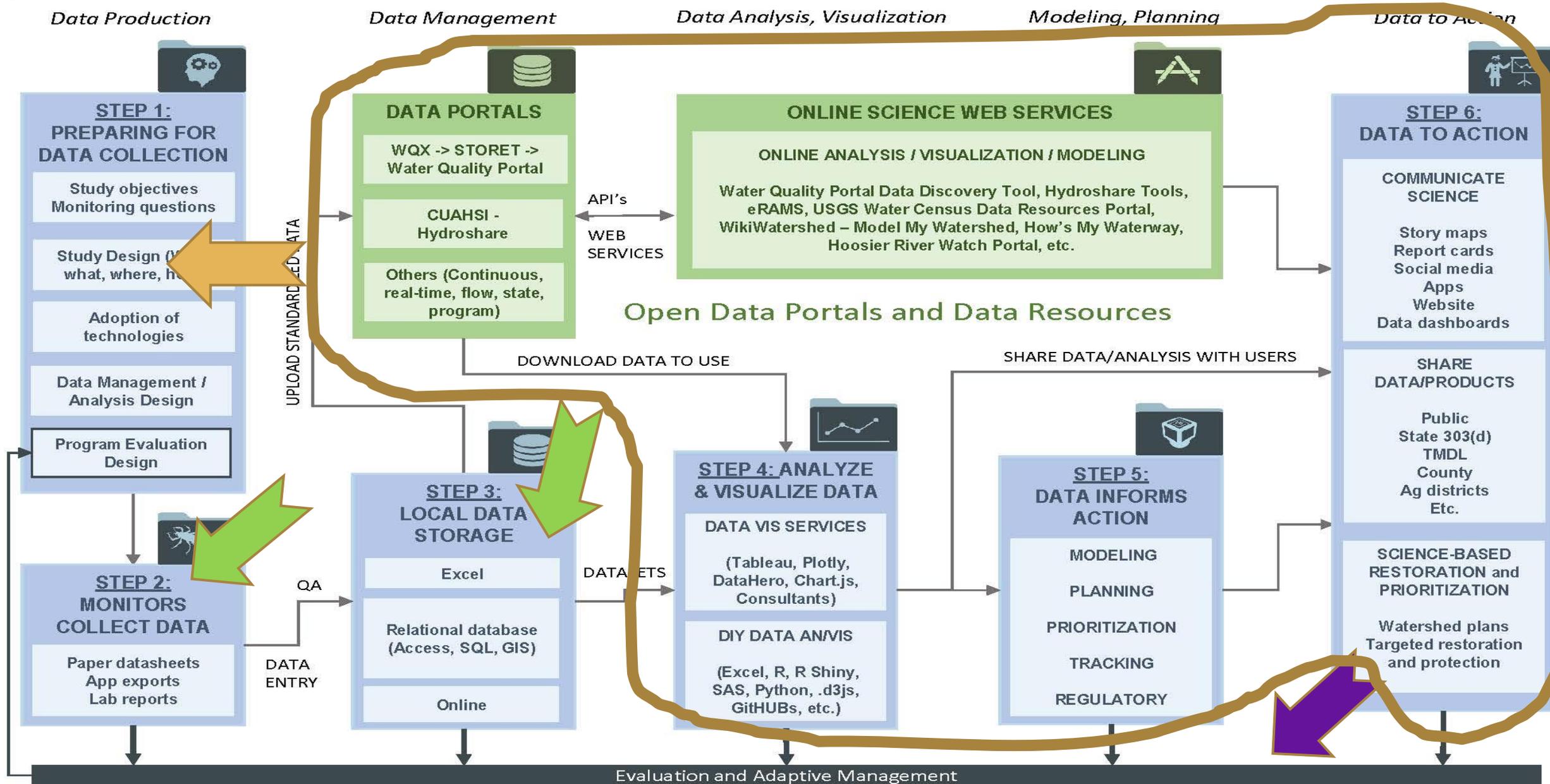
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IMPLEMENTATION VS PLANNING

www.waterdatacollaborative.org

The Water Data Collaborative seeks to expand the Internet of Water's (IoW) activities to include the proactive engagement of citizen science non-governmental organizations (NGOs) with the IoW community, to facilitate seamless integration of their data into the IoW technical framework, and to maximize the potential for their data to be included in public policy and community decision-making.

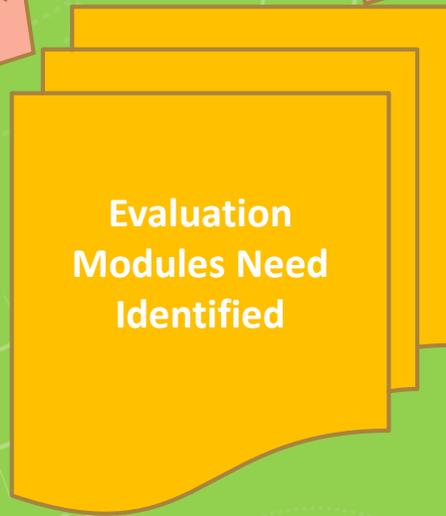
A Citizen Water Science Framework: *Powered with Open Data and Technologies*



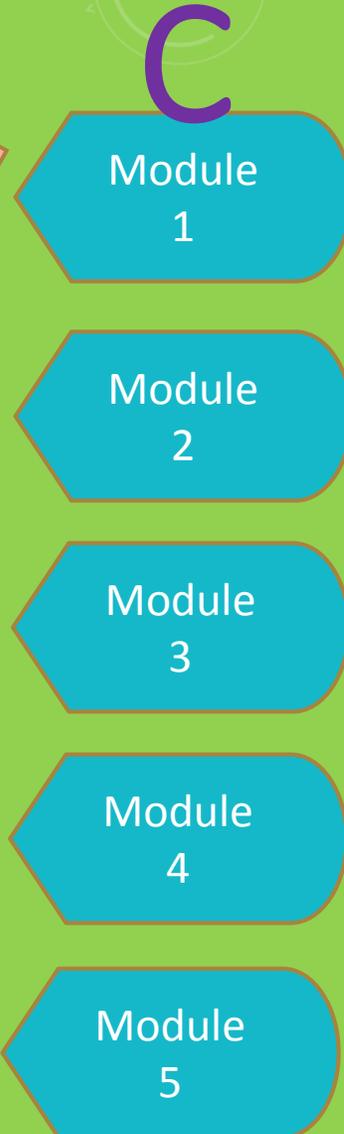
SERVICE TRAINING PLATFORM



A
USER ENTERS
SYSTEM



B



D



E

Cog and Wheel Analogy

Initiated total documented Monitoring Design

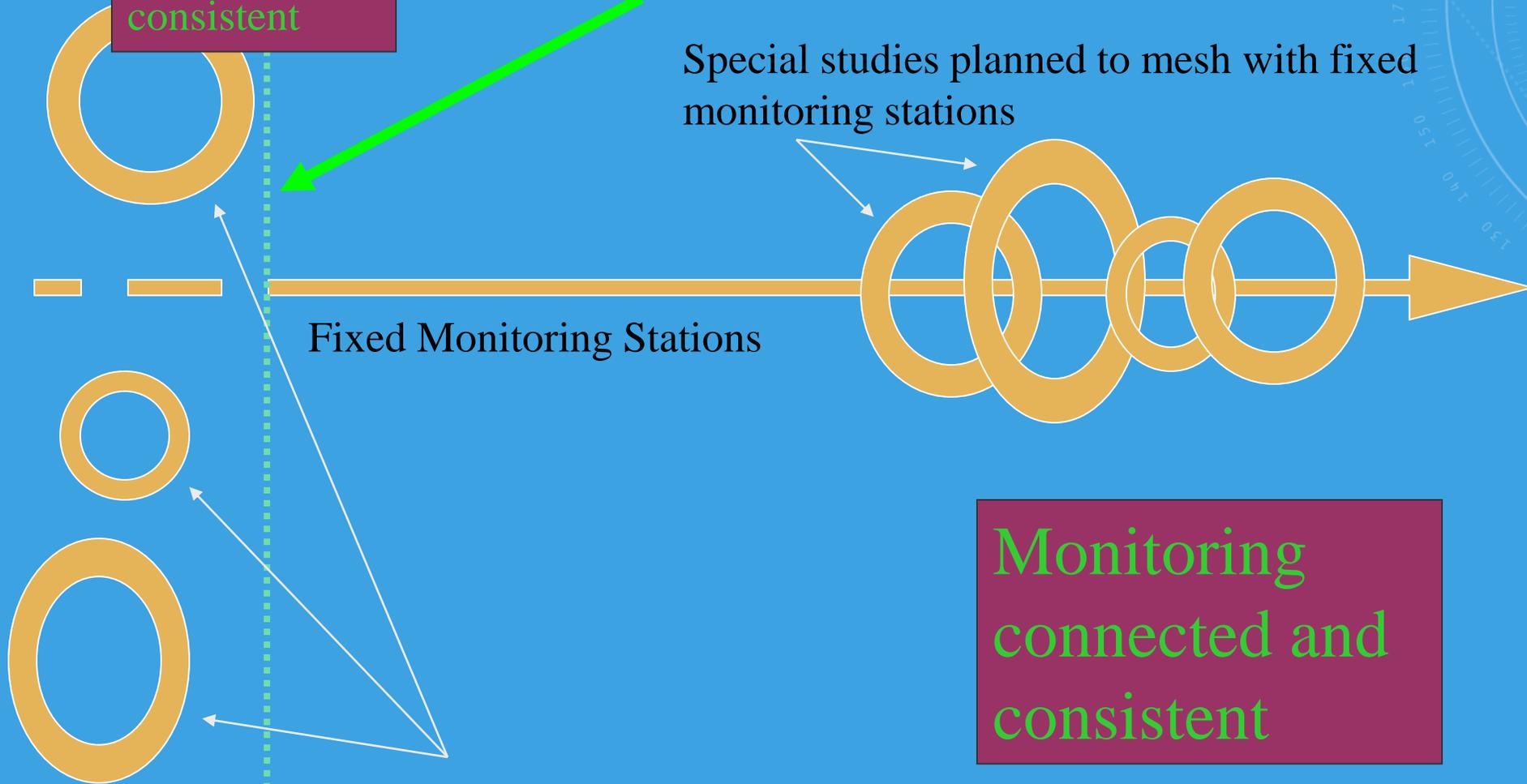
Monitoring
NOT
connected and
consistent

Special studies planned to mesh with fixed monitoring stations

Fixed Monitoring Stations

Monitoring
connected and
consistent

Previous special studies not connected to fixed monitoring stations



**MONITORING
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D. Use Support Investigation				

Waterbody and Station	AI Cond/Trend Self	AII Cond/Trend Health Dept	CII-a Effect Self	CII-b Effect SCD	CI Effect School
Blue Cr, sta 54	X	X	X	X	X
Blue Cr, sta 55	X	X	X	X	X
Jones Cr, Sta 32			X	X	X
Jones Cr, Abv Plant			X	X	X

Indicator	AI Cond/Trend Self	AII Cond/Trend Health Dept	CII-a Effect Self	CII-b Effect SCD	CI Effect School
Diss Oxygen	X	X	X	X	X
Temper ature	X	X		X	X
Ecoli			X	X	X
Phys hab			X	X	X
Bugs	X	X	X	X	X
Etc.					

How need Info	AI Cond/Trend Self	AII Cond/Trend Health Dept	CII-a Effect Self	CII-b Effect SCD	CI Effect School
305(b) format, timeline	X	X	X		
Grant Report	X		X	X	
Layman Report	X		X		X
Raw Data	X	X	X		
Analyzed Data	X		X	X	X

Benchmark	AI Cond/Trend Self	AII Cond/Trend Health Dept	CII-a Effect Self	CII-b Effect SCD	CI Effect School
Reference Cite 14	X	X	X	X	X
State DO Standard	X	X	X	X	X
Sediment standard	X	?	X	X Mod	
Bug IBI	X	X	X	X	X
ETC.					

Assessment Type	Source of Data	Use of data Monitoring Reason	Data Use(r) (Target Decision Maker / Decision Make/ Info needs)	Monitoring ?'s
AI	US	Condition/Trend	Watershed Association	1.Is Blue Cr meeting all perceived uses, recreation too, not recog by state? 2.If not, nature of problem, W's
AII	US	Condition/Trend	Dept of Health 305(b) report	1.Is Blue Cr meeting its 2 uses according to CWA? 2.If not, nature of problem, W's
CII-a	US	Effectiveness Evaluation	Watershed Association-recent Demonstration storm water BMP	1. Pre-project load/conditions? 2. Did project reduce sediment load from area X, if not why not? 3. Cost effective BMP?
CII-b	Soil Conservation District	Effectiveness Evaluation	State Non Point Source Team for Sediment BMP's implemented, Grant Source	1. Pre-project load/conditions? 2. Did project reduce sediment load from area X, if not why not?
CI	US	Effectiveness Evaluation	Local Schools to help reduce storm water pollutants	1. Their role in storm water sediment reduction, use as case study
ETC.				

RESOURCES AND QUESTIONS

- Detailed Program Evaluation
- Resources List
- Webinars
- Barb.horn@state.co.us

970.382.6667

THANK YOU!