



National Water Quality  
Monitoring Council  
Presents

# Volunteer Monitoring

Connecting volunteer data to the  
water quality portal

*July 1, 2019*



# Agenda

01

**About**  
the National Water  
Quality Monitoring  
Council & Volunteer  
Monitoring Workgroup

Our panelists will share information on  
the following topics: **Managing &  
Sharing Data, WQP: A Volunteer  
Story**, and **A Colorado Success  
Story**

**Presentations**

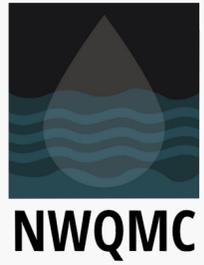
02

03

**Q&A**

At the end we'll have an opportunity to  
dive deeper in a brief Q&A Session





# Intros.



**John Dawes**

The Commons



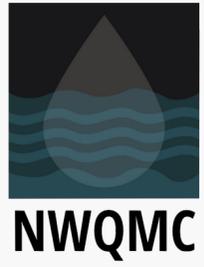
**Laura Shumway**

Environmental Protection Agency



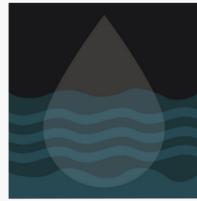
**Barb Horn**

Colorado Parks and Wildlife



# Our Collective Challenge





NWQMC

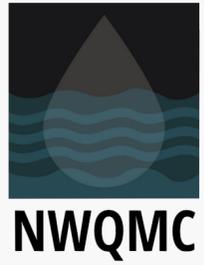




*ASSETS = DATAUSED > 1TIME = FOREVERSONG*



- the assets if:
- Available, accessible, usable, shared
  - Known Quality - Contains minimum necessary information to inform user of purpose, data objectives, methods, quality, extent
  - Format friendly - machine readable



# Organization Type



# Data Uses or Users



## Top Challenges for VM/CS

- Volunteer Recruitment or Retention
- Data Not Used
- Consistent Resources

## Top Agency Challenges for VM/CS

- Communication
- Beliefs – Experience
- Resources or Capacity



# Managing and Sharing Water Quality Data



**John Dawes**

The Commons



**Volunteer monitors  
hold the potential to  
connect millions of  
sites, thousands of  
readings, and  
countless stories to  
the public**





# Let's Be Honest

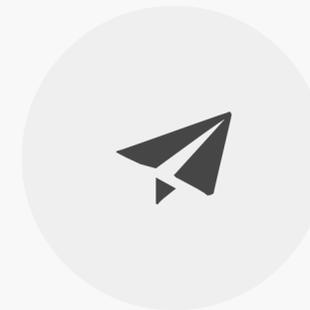
We've all been here many times before with our data!





# How We Define Machine Readable

Data in a data format that can be automatically read and processed by a computer, such as CSV, JSON, XML, etc. Machine-readable data must be structured data. Compare human-readable.





This data is machine readable and structured

2013-2017\_NonTidal\_Data\_Sheets\_Harbor\_Alert

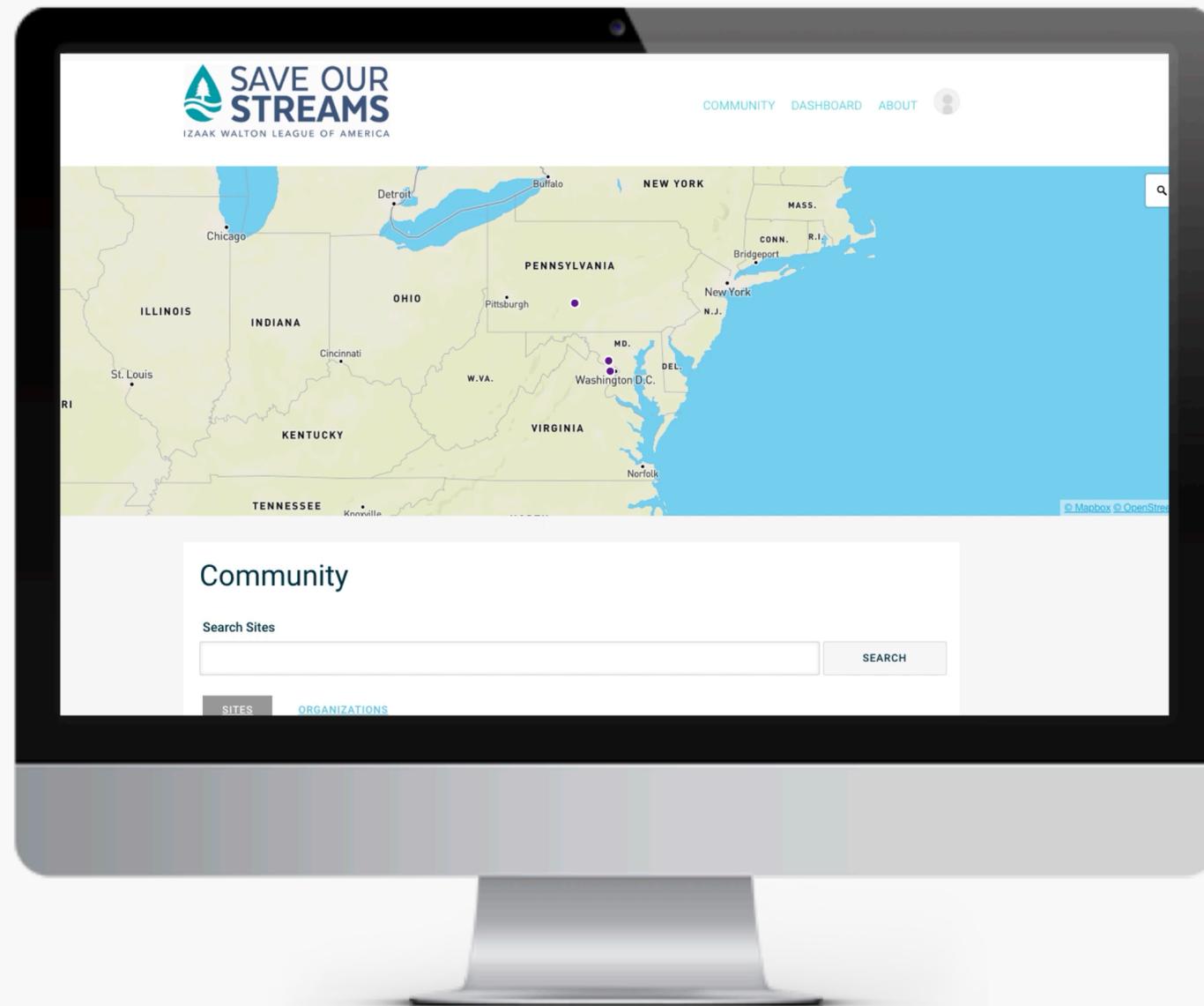
File Edit View Insert Format Data Tools Add-ons Help Last edit was on April 5

100% \$ % .0 .00 123 Calibri 11 B I S A

fx Station Code

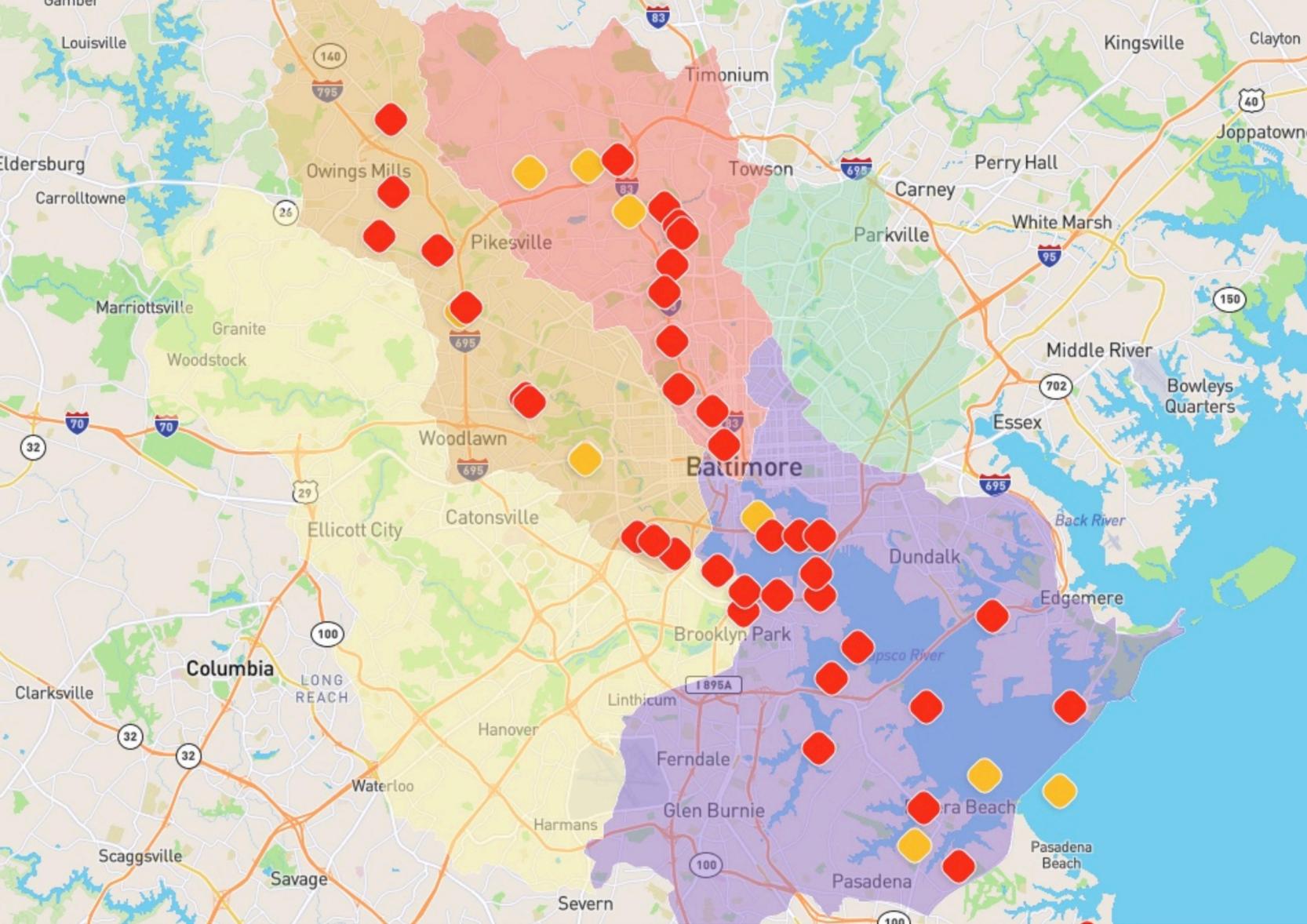
	A	B	C	D	E	F	
1	Station Code	Date	Nitrate/Nitrite (mg/L)	Total Nitrogen (mg/L)	Total Phosphorus (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Entero
2	BWB-GWN-46	4/9/2013	2.3	8.7	0	6.4	
3	BWB-GWN-46	4/23/2013	2.3	2.5	0	0.19	
4	BWB-GWN-46	5/14/2013	2.2	2.5	0	0.27	
5	BWB-GWN-46	6/4/2013	1.4	1.8	0	0.41	
6	BWB-GWN-46	6/18/2013	1.8	2	0	0.25	
7	BWB-GWN-46	7/16/2013	1.7	2.6	0.014	0.89	
8	BWB-GWN-46	8/20/2013	2.6	2.8	0.055	0.24	
9	BWB-GWN-46	9/10/2013	2.6	2.8	0	0.19	
10	BWB-GWN-46	9/24/2013	2	2.6	0.013	0.52	
11	BWB-GWN-46	10/8/2013	1.8	2.1	0	0.37	
12	BWB-GWN-46	10/22/2013	2.1	2.3	0	0.26	
13	BWB-GWN-46	11/5/2013	2.1	2.3	0	0.17	
14	BWB-GWN-46	11/19/2013	0.79	2.7	0.037	1.9	
15	BWB-GWN-46	4/8/2014	1.1	1.6	0	0.49	
16	BWB-GWN-46	5/13/2014	1.8	2.5	0	0.67	
17	BWB-GWN-46	6/10/2014	2.7	3	0	0.28	
18	BWB-GWN-46	7/8/2014	2.6	2.8	0	0.21	
19	BWB-GWN-46	8/28/2014	3	3.2	0	0.21	
20	BWB-GWN-46	10/28/2014	0	1.1	0	1.1	
21	BWB-GWN-46	11/18/2014	1.5	1.9	0.017	0.43	
22	BWB-GWN-46	12/11/2014	2	3.6	0	1.7	
23	BWB-GWN-46	1/21/2015	2.9	3.1	0	0.18	
24	BWB-GWN-46	2/10/2015	2.5	2.9	0	0.44	
25	BWB-GWN-46	3/17/2015	2.3	2.6	0	0.27	
26	BWB-GWN-46	4/30/2015	2.4	2.8	0.017	0.46	
27	BWB-GWN-46	5/26/2015	1.9	2.5	0	0.59	
28	BWB-GWN-46	6/23/2015	2	2.3	0	0.23	
29	BWB-GWN-46	7/14/2015	2.5	2.9	0	0.38	
30	BWB-GWN-46	8/11/2015	2.43	2.8	0	0.35	
31	BWB-GWN-46	9/9/2015	2.74	2.9	0	0.16	

+ Sheet1 Sheet2 Sheet3



## The Clean Water Hub

Want to coordinate new or existing monitoring sites, your agency or group, with federal data sources such as the WQA or your organization?



# Monitoring Program

33k readings across 49 sites for 7 years. Tier III Quality Assurance Project Plan

## Use Cases



- Advocacy
- Education/Outreach
- Research
- Regulatory

## Measured in the Field



- Conductivity & DO
- pH & Salinity
- Temperature & Turbidity
- Phycoerythrin & Secchi Depth

## Analyzed in the Lab



- Chlorophyll a
- Enterococcus
- Total Nitrogen
- Total Phosphorus





# Bacteria

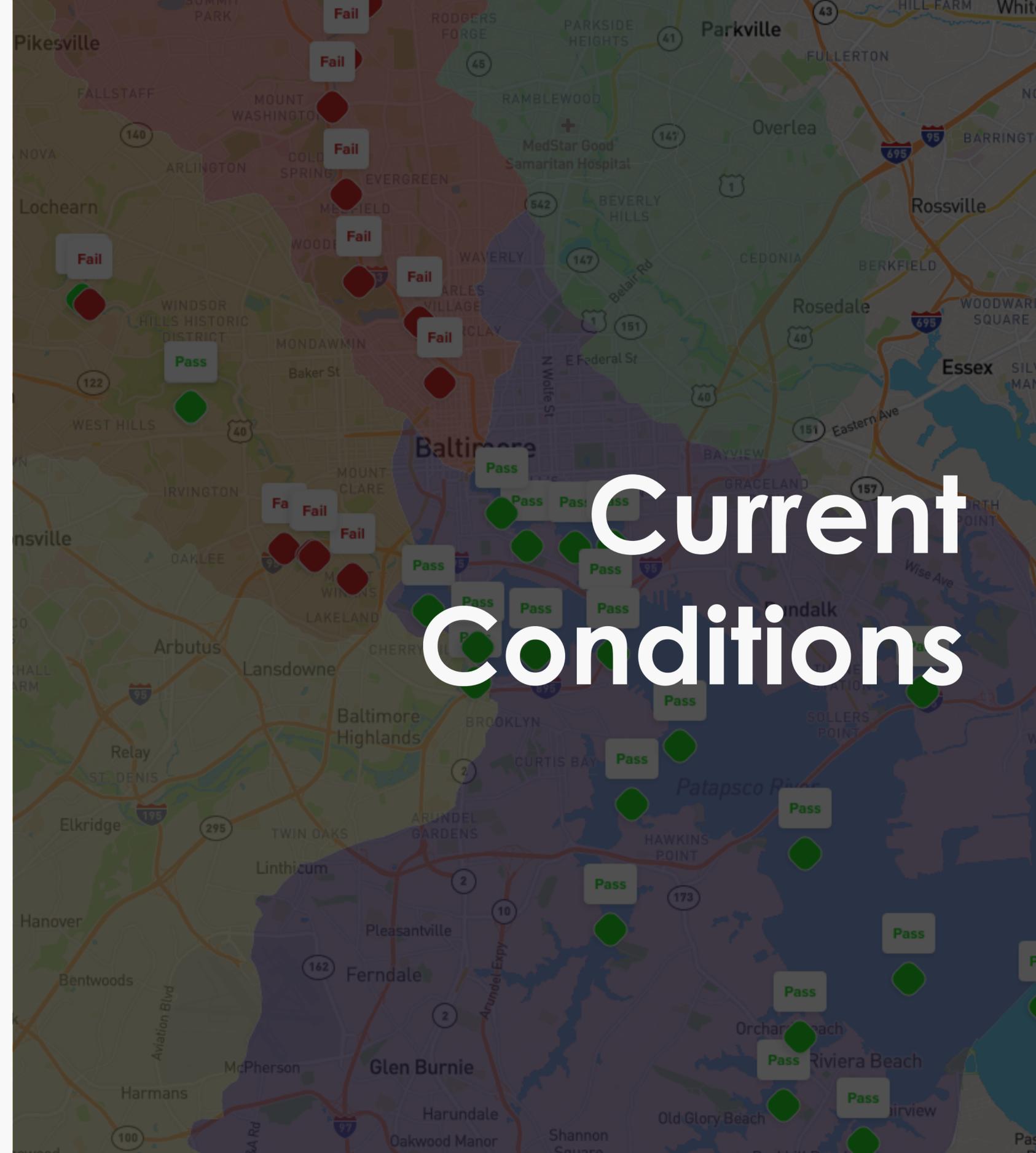
We continue to see improvements in Nontidal waterways

	2013	2014	2015	2016	2017	2018	
	18	29	20	20	60	58	Upper Gwynns A.
	27	57	20	0	60	67	Red Run
	27	29	20	0	60	67	Horsehead Branch
	20	29	20	0	75	67	Scotts Level Branch
	27	29	20	0	60	58	Upper Gwynns B.
	27	43	20	20	60	67	Middle Gwynns C.
	45	43	20	20	60	67	Middle Gwynns D.
	0	29	0	0	20	17	Powder Mill Run
	9	43	20	20	60	73	Dead Run
	9	29	0	25	67	83	Maidens Choice Run
	27	43	20	40	80	55	Lower Gwynns E.
	0	14	0	40	60	42	Lower Gwynns F.
	9	29	0	20	60	33	Lower Gwynns G.
	0	0	0	0	20	33	Gwynns Run
	55	57	0	0	50	100	Dipping Pond Run
	18	50	0	0	100	83	Deep Run
	9	29	0	0	60	67	Roland Run
	27	33	0	0	100	75	Upper Jones A.
	27	43	0	0	80	82	Upper Jones B.
	18	43	20	0	75	92	Ruxton Run
	36	43	0	20	75	91	Towson Run
	64	43	0	20	100	80	Lower Jones C.
	92	71	20	20	100	83	Lake Roland
	25	29	0	0	100	75	Western Run
	0	29	0	0	60	100	Stony Run
	25	14	0	0	80	75	Lower Jones D.
	17	14	20	0	60	92	Lower Jones E.

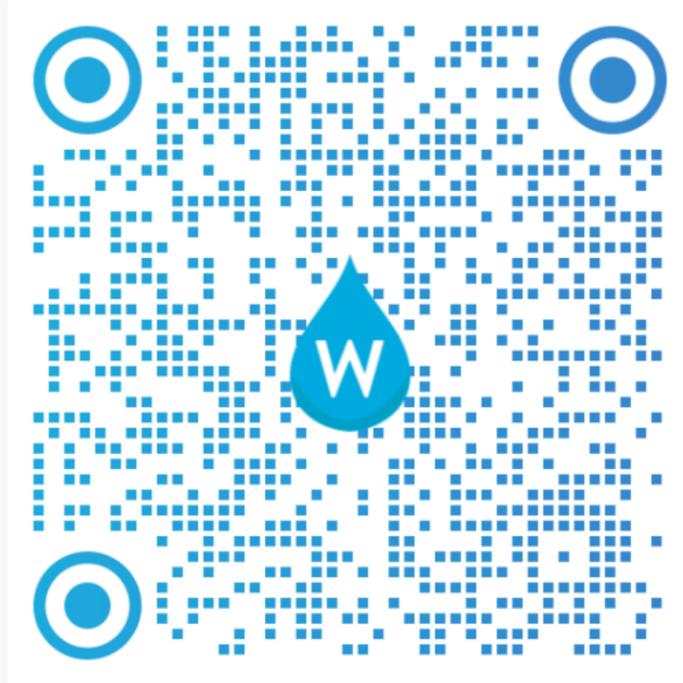


Explore the Map

Scan the QR Code to view  
our current conditions map



# Current Conditions



Explore the Map

Scan the QR Code to view  
our current conditions map



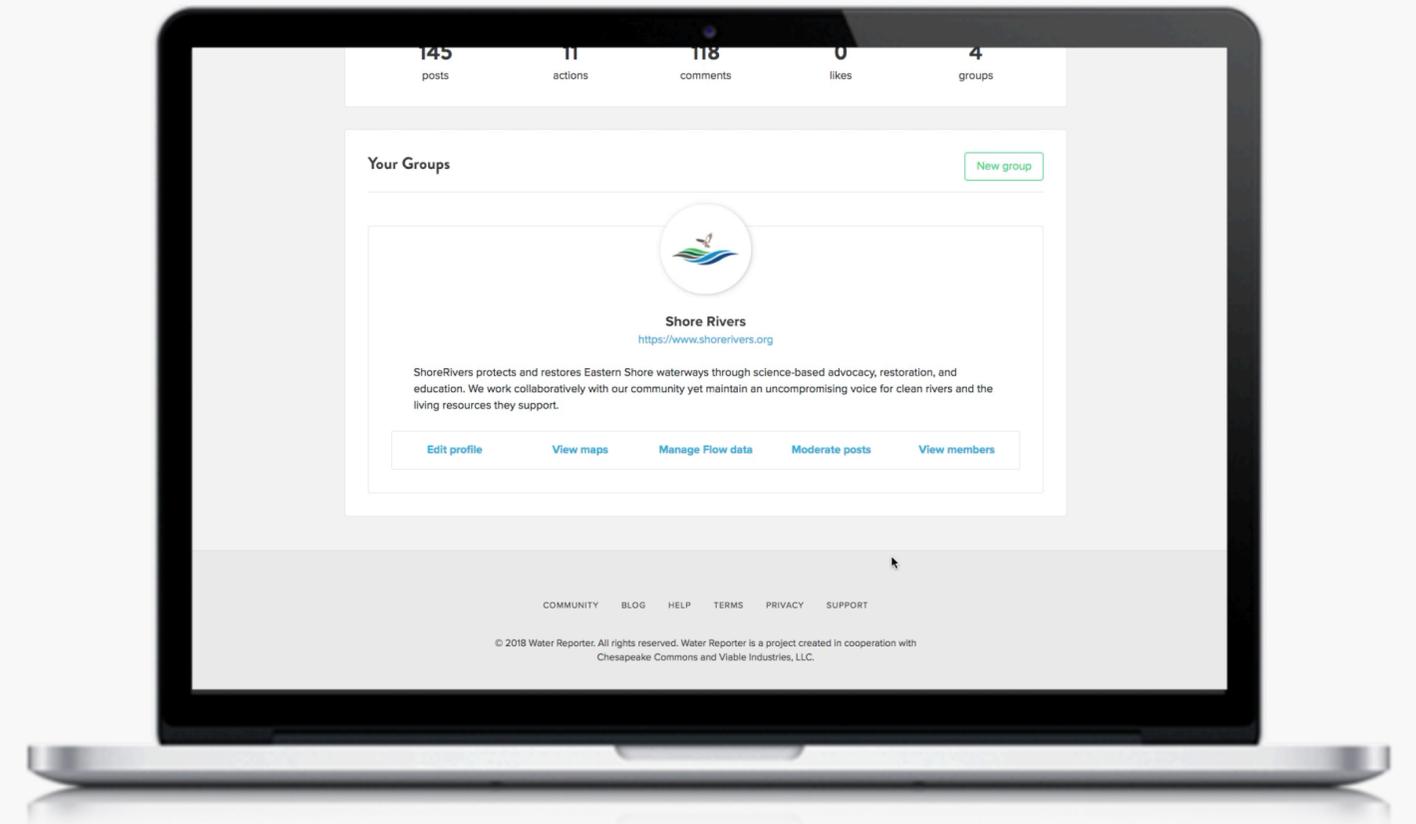
# 2018 Report Card



# Water Reporter Data Sources

## #03

Configure an interactive map in your website





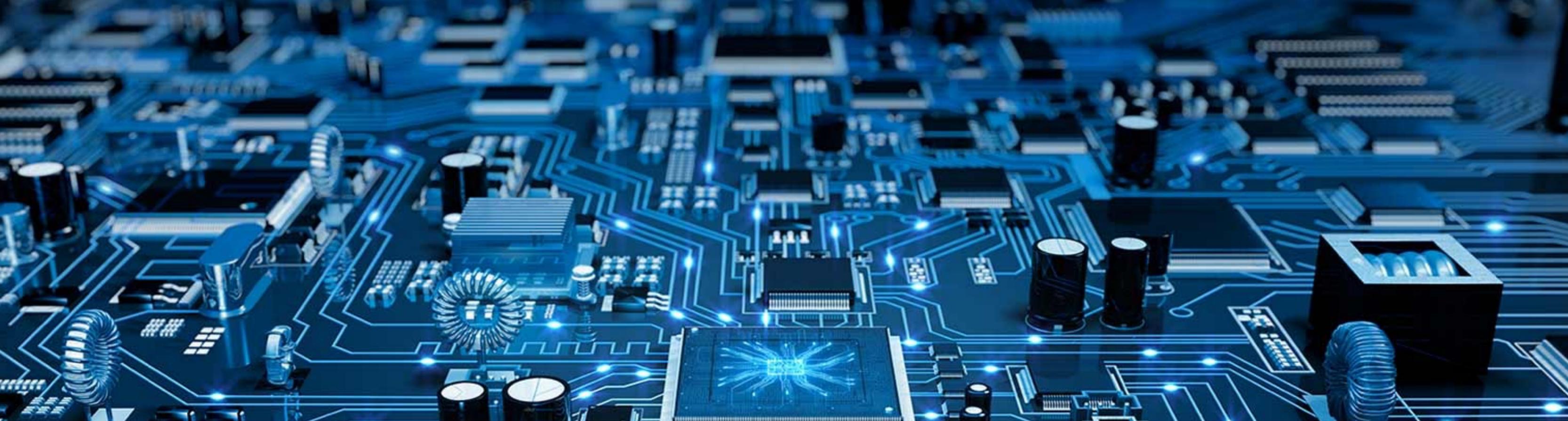
# Help Center and Material Production

Empowering users with chat support, helpful, searchable documentation, and marketing materials.

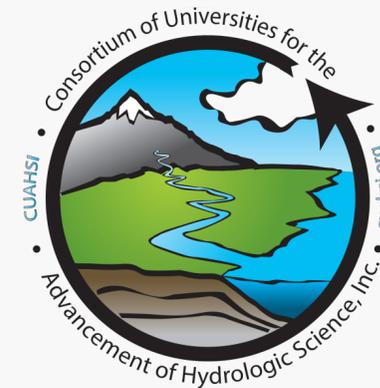
The screenshot displays the Water Reporter Help Center interface. At the top, there is a header with the 'WATER REPORTER' logo and a 'Go to Water Reporter' link. Below the header is a search bar with the placeholder text 'Search for articles...'. The main content area features four article collections, each with an icon, a title, a description, and the number of articles in the collection, all written by Erin Hofmann:

- Basic Users Guide to Water Reporter**: Everything a basic user needs to know to use Water Reporter. 11 articles in this collection.
- Set up for Organizations**: 7 articles in this collection.
- Subscription Account Features**: Administrators of subscription accounts can tap into the premium features to further use Water Reporter in their outreach and data gathering efforts. 21 articles in this collection.
- Best Practices**: Tips for getting the most out of your Water Reporter subscription. 2 articles in this collection.

On the right side, there is a chat widget with a 'Hi there' greeting and a 'New conversation' button. Below the chat widget is a 'Find an answer yourself' section with another search bar. At the bottom right of the chat widget, it says 'We run on Intercom'.



Internet  
of Water



**Empower users to create data that  
is searchable and discoverable**



# Water Quality Exchange and Water Quality Portal



**Laura Shumway**

The EPA



# Definitions

- WQX – the way the data gets into the WQP
  - A format that is the same for everyone who wants to share data. E.g. DO = Dissolved Oxygen (DO)
- STORET – The old way to download data submitted through WQX. STORET is now retired and the WQP is where you get the data instead
- WQP – All the data from WQX (including old STORET), NWIS (USGS), & STEWARDS (USDA)
- WQX Web – web interface that allows you to submit to the portal by uploading excel, .csv, or .txt files.
- Node – submitting to WQX using coded files (.xml)



# Standards

Efficient and clear way for humans & computers to communicate

Makes reusing information easier

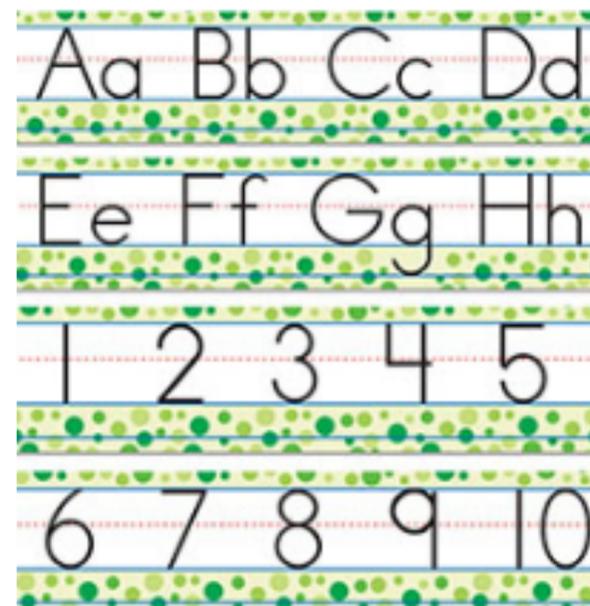
Information is more valuable than it's original purpose

### APA website citation:

Leahey, A., Kellman, A., & Rovi. (n.d.). *Beyoncé*. Retrieved April 20, 2016, from <http://www.billboard.com/artist/281569/beyonce/biography>

Rodney, S. (2016, February 11). *The myth of Beyoncé and pop cultural liberation*. Retrieved April 20, 2016, from <http://hyperallergic.com/275164/the-myth-of-beyonce-and-pop-cultural-liberation/>

Length	Weight	Volume
1 km = 1,000 m	1 kg = 1,000 g	1 kL = 1,000 L
1 m = .001 km	1 g = .001 kg	1 L = .001 kL
1 m = 100 cm	1 g = 100 cg	1 L = 100 cL
1 cm = .01 m	1 cg = .01 g	1 cL = .01 L
1 m = 1,000 mm	1 g = 1,000 mg	1 L = 1,000 mL
1 mm = .001 m	1 mg = .001 g	1 mL = .001 L



Jane, it's your lucky day.

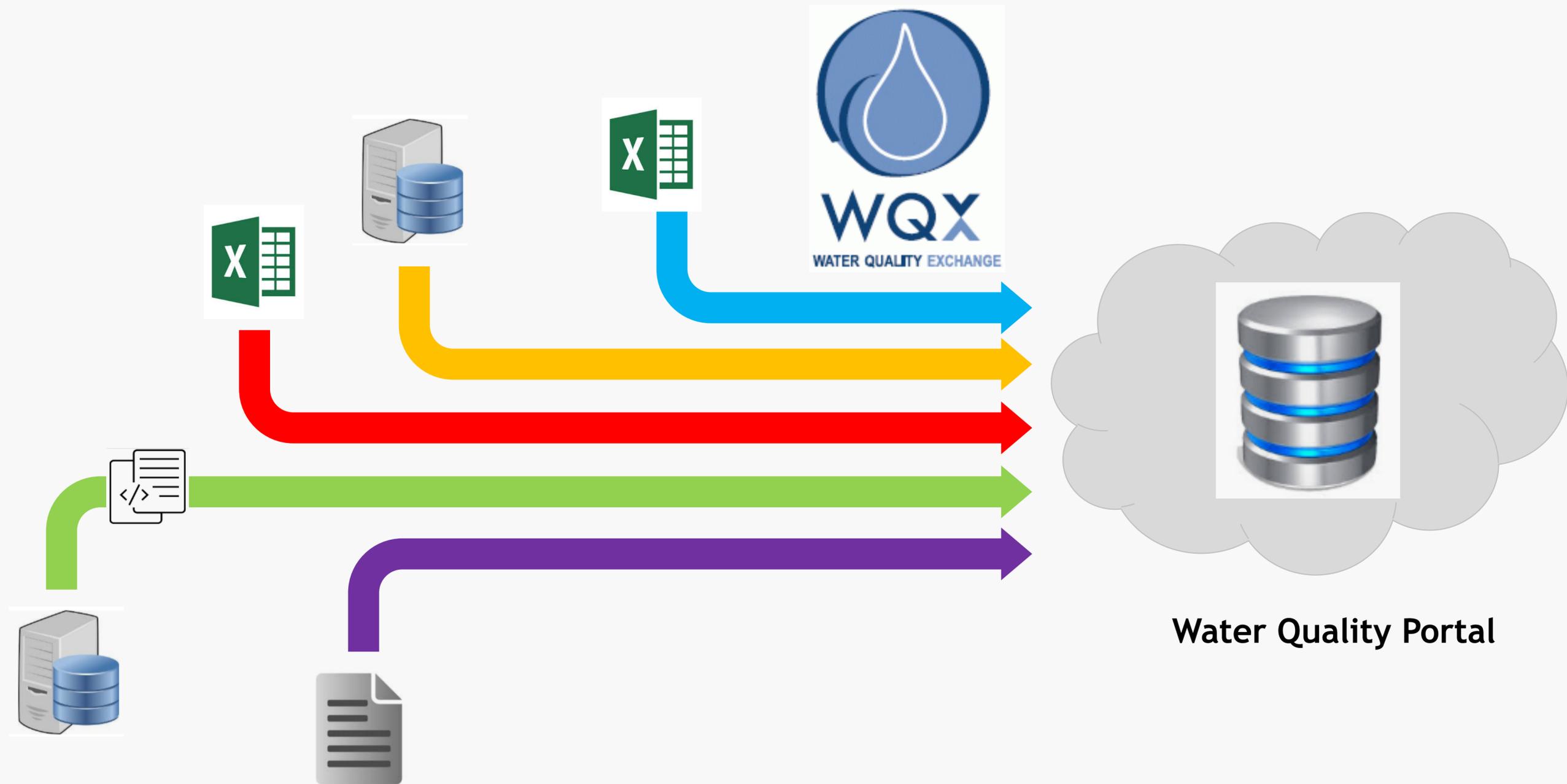
Jane McGillicuddy  
125 Clover Lane  
Boston, MA 02111



USPS  
MARKETING MAIL  
U. S. POSTAGE  
PAID  
PERMIT NO. 1



# WQX & WQP





# WQX Web

Generated Values (not in your import file):

Entity	Element	Default Value	Format
Organization	Organization ID	{none}	

Columns (in your import file):

Column	Entity	Element	Default Value	Format	Translations
A	Activity Project	Project ID	{none}		0
B	Activity	Monitoring Location ID	{none}		0
C	Activity	Activity ID			0
D	Activity	Activity Type	{none}		0
E	Activity	Activity Media Name	{none}		0
F	Activity	Activity Start Date		MM/DD/YYYY	0
G	Activity	Activity Start Time		HH:MM:SS PM	0
H	Activity	Activity Start Time Zone	{none}		0
I	Activity	Activity Top Depth/Height Measure			0
J	Activity	Activity Top Depth/Height Unit	{none}		0
K	Activity	Sample Collection Method ID	{none}		0
L	Activity	Sample Collection Equipment Name			
M	Activity	Sample Collection Equipment Com			
N	Result	Data Logger Line			
O	Result	Characteristic Name			
P	Result	Method Speciation	TEMPLATE_PCHEM		
Q	Result	Result Detection Condition	ML-06		
R	Result	Result Value	TEMPLATE_PCHEM		
S	Result	Result Unit	ML-06		
T	Result	Result Qualifier	TEMPLATE_PCHEM		
U	Result	Result Sample Fraction	ML-06		
V	Result	Result Status ID	TEMPLATE_PCHEM		
W	Result	Statistical Base Code	ML-06		
X	Result	Result Value Type	TEMPLATE_PCHEM		
Y	Result	Result Analytical Method ID	ML-01		

- WQX web resources <https://www.epa.gov/waterdata/water-quality-data-wqx>
  - Sign up for account
  - Download template and data rules
  - Find FAQs

Project ID	Monitoring Location ID	Activity ID	Activity Type	Activity Media Name	Activity Start Date	Activity Start Time
TEMPLATE_PCHEM	ML-06	ML-06:20170301:1433:SR:	Sample-Routine	Water	3/1/2017	14:33
TEMPLATE_PCHEM	ML-06	ML-06:20170301:1433:SR:	Sample-Routine	Water	3/1/2017	14:33
TEMPLATE_PCHEM	ML-06	ML-06:20170301:1433:SR:	Sample-Routine	Water	3/1/2017	14:33
TEMPLATE_PCHEM	ML-06	ML-06:20170301:1433:SR:	Sample-Routine	Water	3/1/2017	14:33
TEMPLATE_PCHEM	ML-06	ML-06:20170301:1433:FM:	Field Msr/Obs	Water	3/1/2017	14:33
TEMPLATE_PCHEM	ML-06	ML-06:20170301:1433:SR:	Sample-Routine	Water	3/1/2017	14:33
TEMPLATE_PCHEM	ML-06	ML-06:20170301:1433:SR:	Sample-Routine	Water	3/1/2017	14:33
TEMPLATE_PCHEM	ML-06	ML-06:20170301:1433:SR:	Sample-Routine	Water	3/1/2017	14:33
TEMPLATE_PCHEM	ML-01	ML-01:20170303:1001:FM:	Field Msr/Obs	Water	3/3/2017	10:01
TEMPLATE_PCHEM	ML-01	ML-01:20170303:1001:FM:	Field Msr/Obs	Water	3/3/2017	10:01
TEMPLATE_PCHEM	ML-01	ML-01:20170303:1001:FM:	Field Msr/Obs	Water	3/3/2017	10:01
TEMPLATE_PCHEM	ML-01	ML-01:20170303:1001:FM:	Field Msr/Obs	Water	3/3/2017	10:01
TEMPLATE_PCHEM	ML-03	ML-03:20170308:1100:SR:	Sample-Routine	Water	3/8/2017	11:00
TEMPLATE_PCHEM	ML-03	ML-03:20170308:1100:SR:	Sample-Routine	Water	3/8/2017	11:00
TEMPLATE_PCHEM	ML-03	ML-03:20170308:1100:SR:	Sample-Routine	Water	3/8/2017	11:00
TEMPLATE_PCHEM	ML-03	ML-03:20170308:1100:SR:	Sample-Routine	Water	3/8/2017	11:00
TEMPLATE_PCHEM	ML-03	ML-03:20170308:1100:SR:	Sample-Routine	Water	3/8/2017	11:00



# Water Quality Portal

- Currently **62** volunteer groups from **8** states with data in the WQP
- Success Story
  - Trained Region 2 volunteer monitoring groups remotely and in-person (NY & NJ)
    - The state of NJ uses the volunteer data for the IR
- Data Visualization
  - How's my Waterway 2.0
  - Data Discovery tool: <https://www.epa.gov/waterdata/water-quality-portal-data-discovery-toolWQX>
- Questions: [wqx@epa.gov](mailto:wqx@epa.gov)



# Colorado River Watch



**Barb Horn**

Colorado Parks and Wildlife



**Colorado River Watch  
20 Years!**



# Colorado River Watch

Real People Doing Real Science for a Real Purpose

- Started in 1989
- Serves 140 groups, 500 stations/yr
- 7-field & 26 metals-total & dissolved monthly, 7-nut 2/yr, bugs/phys hab 1/yr How's my Waterway 2.0
- Largest contributor of volunteer readings in the portal

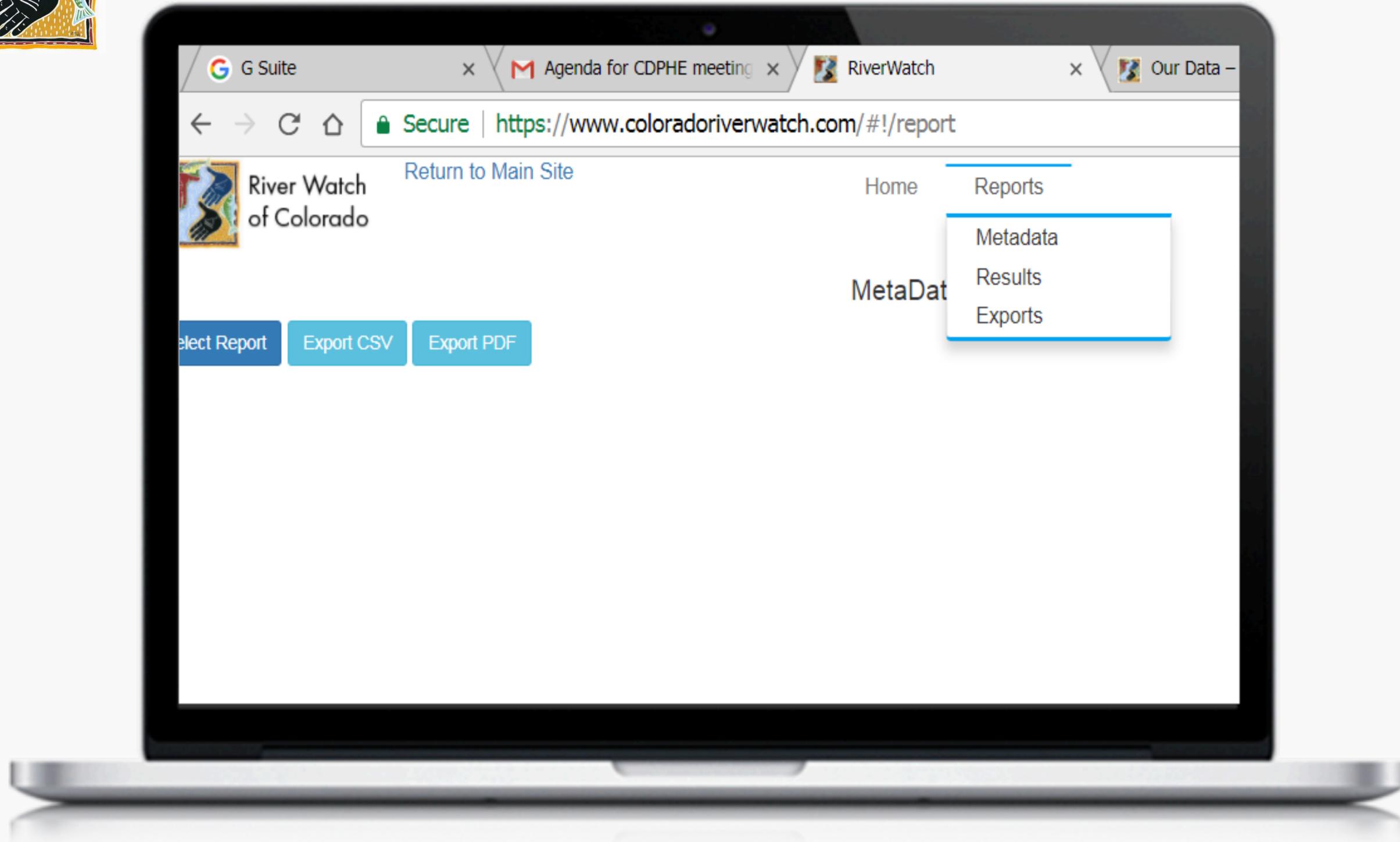
**Goals: Generate quality data for CWA & Provide a hands-on experience with rivers**



# Colorado River Watch

Real People Doing Real Science for a Real Purpose

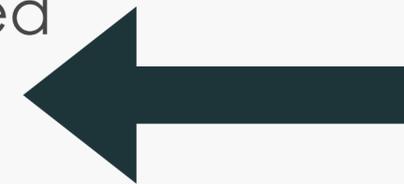
- 1989 pre-desktop computer
- Used National WQ Portal Schema to design application
- Added Functions - organization, equipment & meta data pieces





# All the fields in station for further sorting

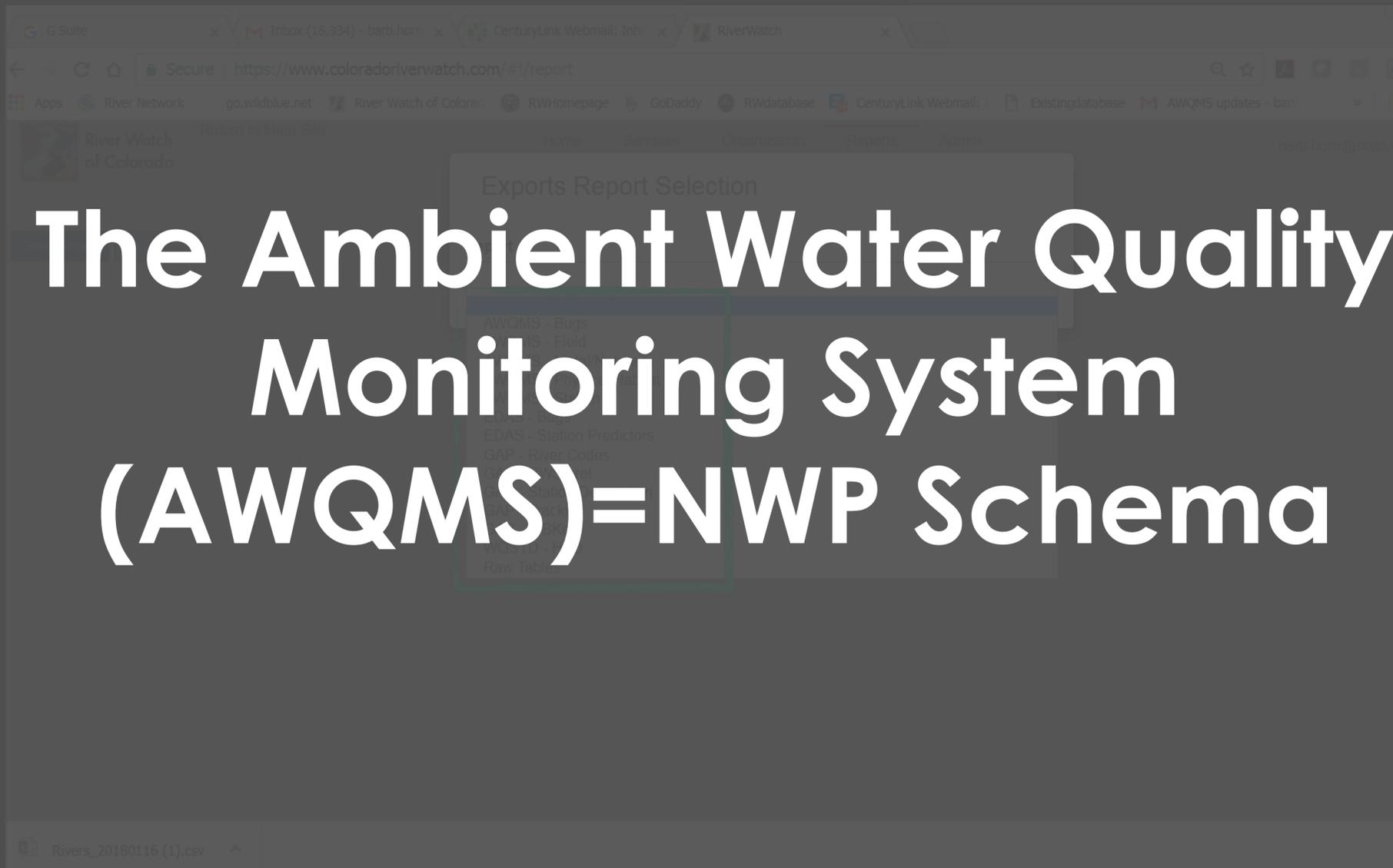
- Water Body ID (WQCC)
- Water Code (CPW)
- Driving Description
- Station Type
- Aquatic Index
- RW Watershed
- Quadi
- Township
- Range
- Section
- Quarter Section
- Grid
- Sta Quad (Topo map)
- WQCC Sub WS
- Hydro Unit (8 and 12 but..)
- Ecoregion
- Elevation
- Watershed
- Long/Lat
- Utmx /y
- County
- State
- Nearest City
- Region
- USGS/State Engineer Gauge



**Minimum versus = Asset**



# The Ambient Water Quality Monitoring System (AWQMS)=NWP Schema

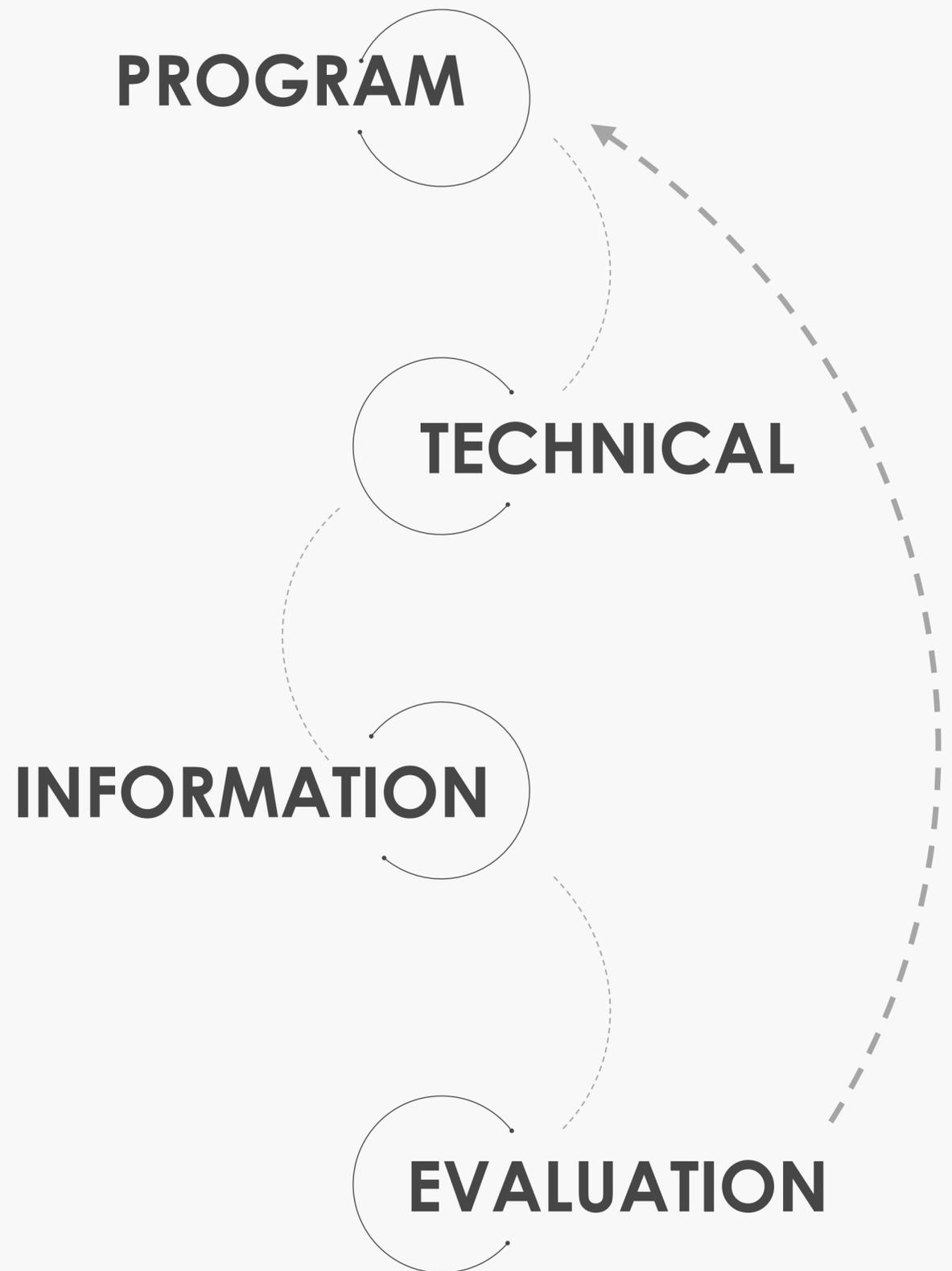




	A	B	C	D	E	F	G	H	I	J
1	StationNumber	StationName	Event	SampleNumber	SampleDate	SampleTime	TypeCode	Watershed	River	Organization
2	85	Abv Conf La Plata	85.091	85201701061015	01/06/2017	10:15	00	SP	Long Hollow Cr	DOW
3	85	Abv Conf La Plata	85.092	85201704050945	04/05/2017	09:45	00	SP	Long Hollow Cr	DOW
4	85	Abv Conf La Plata	85.093	85201705030800	05/03/2017	08:00	00	SP	Long Hollow Cr	DOW
5	85	Abv Conf La Plata	85.094	85201706041700	06/04/2017	17:00	00	SP	Long Hollow Cr	DOW
6	85	Abv Conf La Plata	85.095	85201707031000	07/03/2017	10:00	00	SP	Long Hollow Cr	DOW
7	85	Abv Conf La Plata	85.096	85201708220959	08/22/2017	09:59	00	SP	Long Hollow Cr	DOW
8	85	Abv Conf La Plata	85.097	85201709061230	09/06/2017	12:30	00	SP	Long Hollow Cr	DOW
9	604	Abv Long Hollow Res	604.014	604201701061000	01/06/2017	10:00	00	SP	Long Hollow Cr	DOW
10	604	Abv Long Hollow Res	604.015	604201702060845	02/06/2017	08:45	00	SP	Long Hollow Cr	DOW
11	604	Abv Long Hollow Res	604.016	604201703020830	03/02/2017	08:30	00	SP	Long Hollow Cr	DOW
12	604	Abv Long Hollow Res	604.017	604201704050845	04/05/2017	08:45	00	SP	Long Hollow Cr	DOW
13	604	Abv Long Hollow Res	604.018	604201705030715	05/03/2017	07:15	00	SP	Long Hollow Cr	DOW
14	604	Abv Long Hollow Res	604.019	604201706041600	06/04/2017	16:00	00	SP	Long Hollow Cr	DOW
15	604	Abv Long Hollow Res	604.020	604201707030900	07/03/2017	09:00	00	SP	Long Hollow Cr	DOW
16	604	Abv Long Hollow Res	604.021	604201708220900	08/22/2017	09:00	00	SP	Long Hollow Cr	DOW
17	604	Abv Long Hollow Res	604.022	604201709061130	09/06/2017	11:30	00	SP	Long Hollow Cr	DOW
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										

Ready | ChemicalResults | ChemicalQualifiers | + | - | 100%





Study Designer  
informeding Player

- Commit
- Identify info needs &
- Align purpose, use, users with
- Desired Results, Outcomes and Impacts



### Continuum of Study Purpose



Condition /Trend – Impact – Effectiveness – Use Support

### Continuum of Uses / Mgmt



Education – Inquiry – Advocacy – Planning – Regulatory

### Continuum of Users

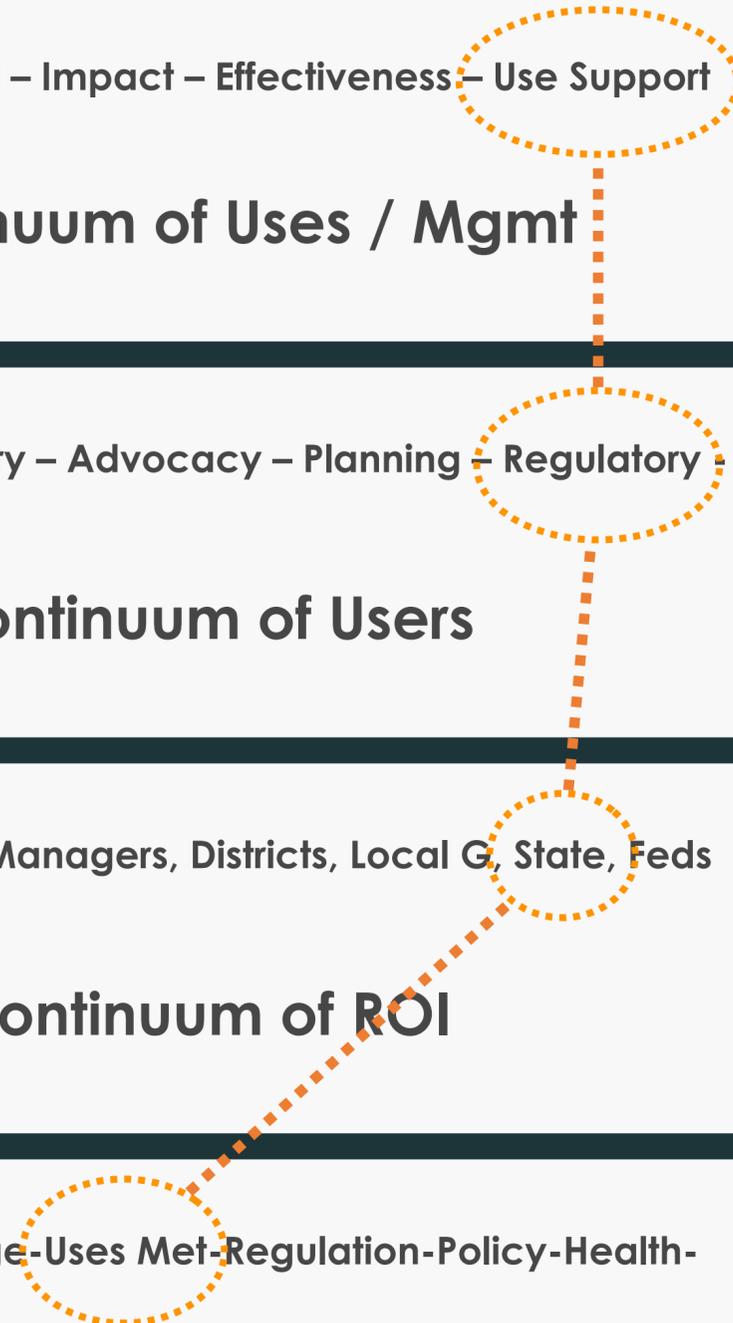


Youth, Farmers, Managers, Districts, Local G, State, Feds

### Continuum of ROI



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

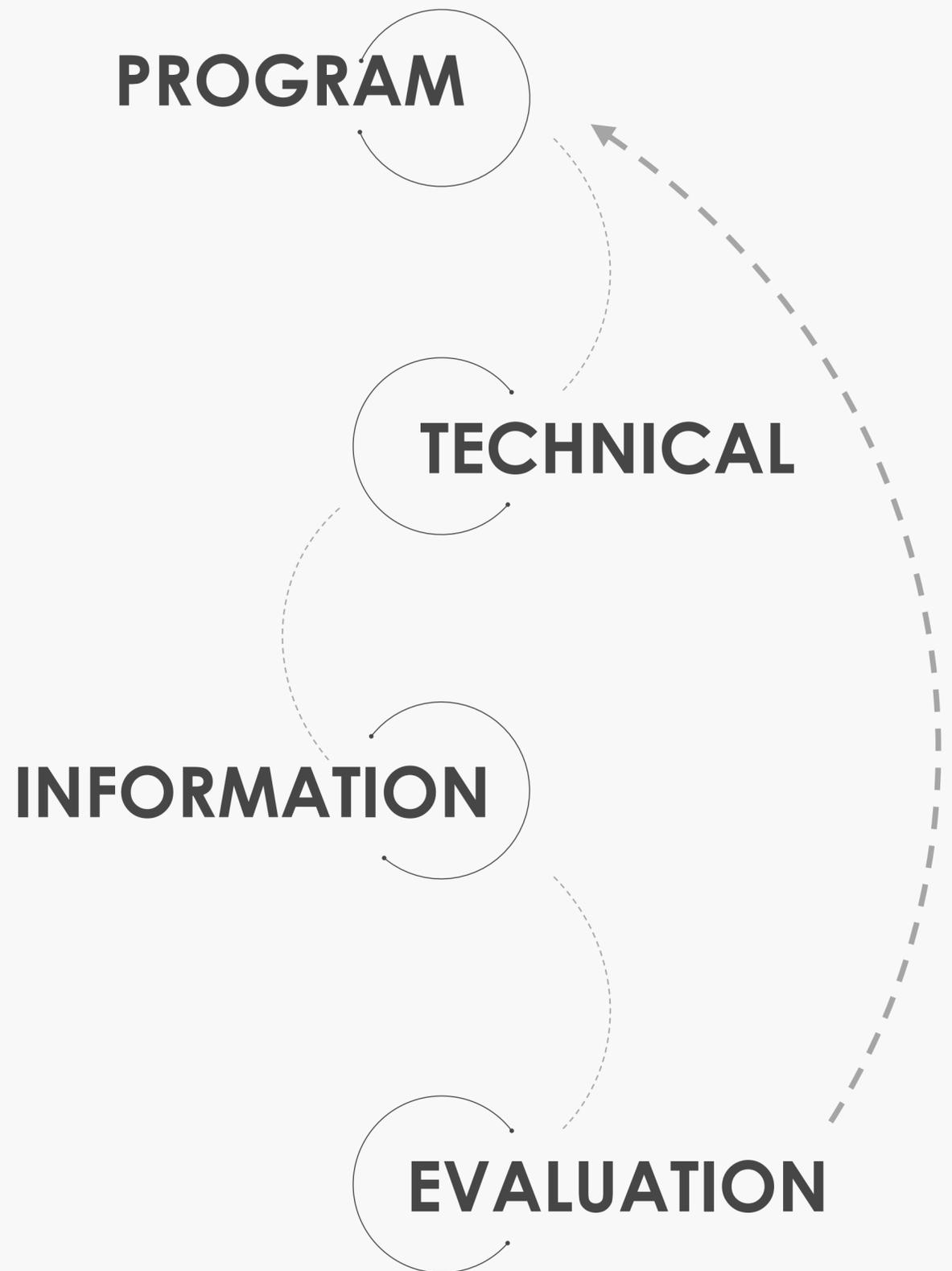


Each monitoring event has a data pathway or info. blueprint

Info needs and products

Evaluation



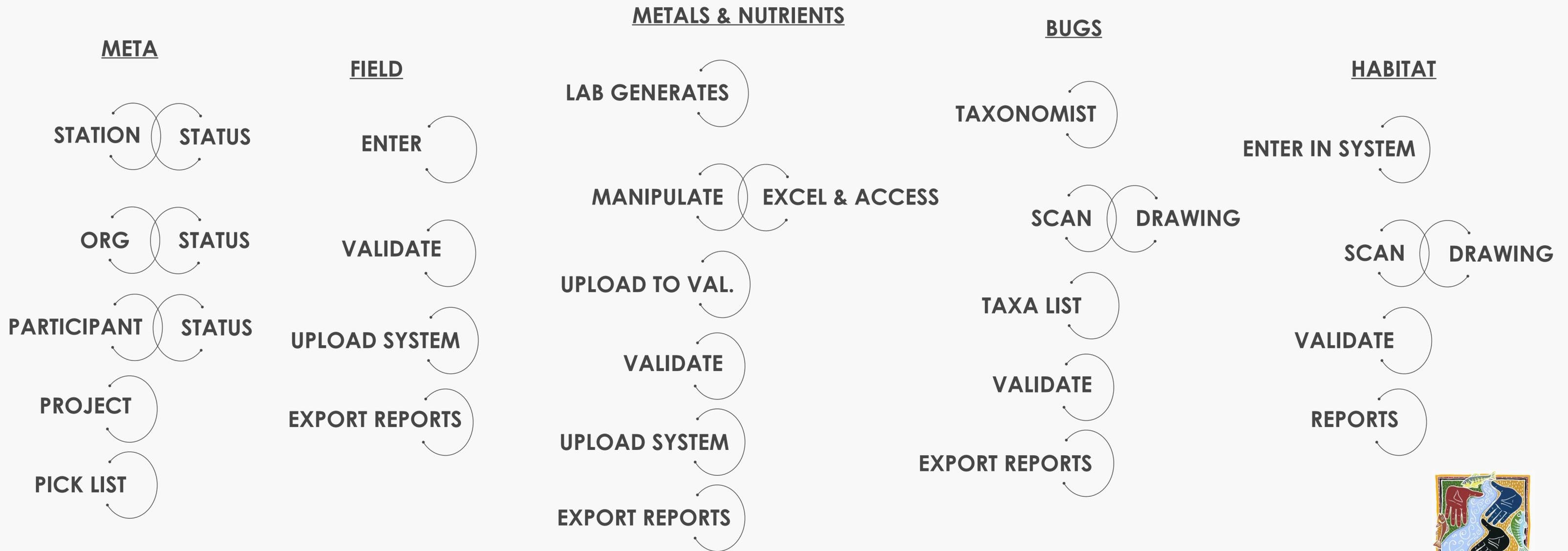


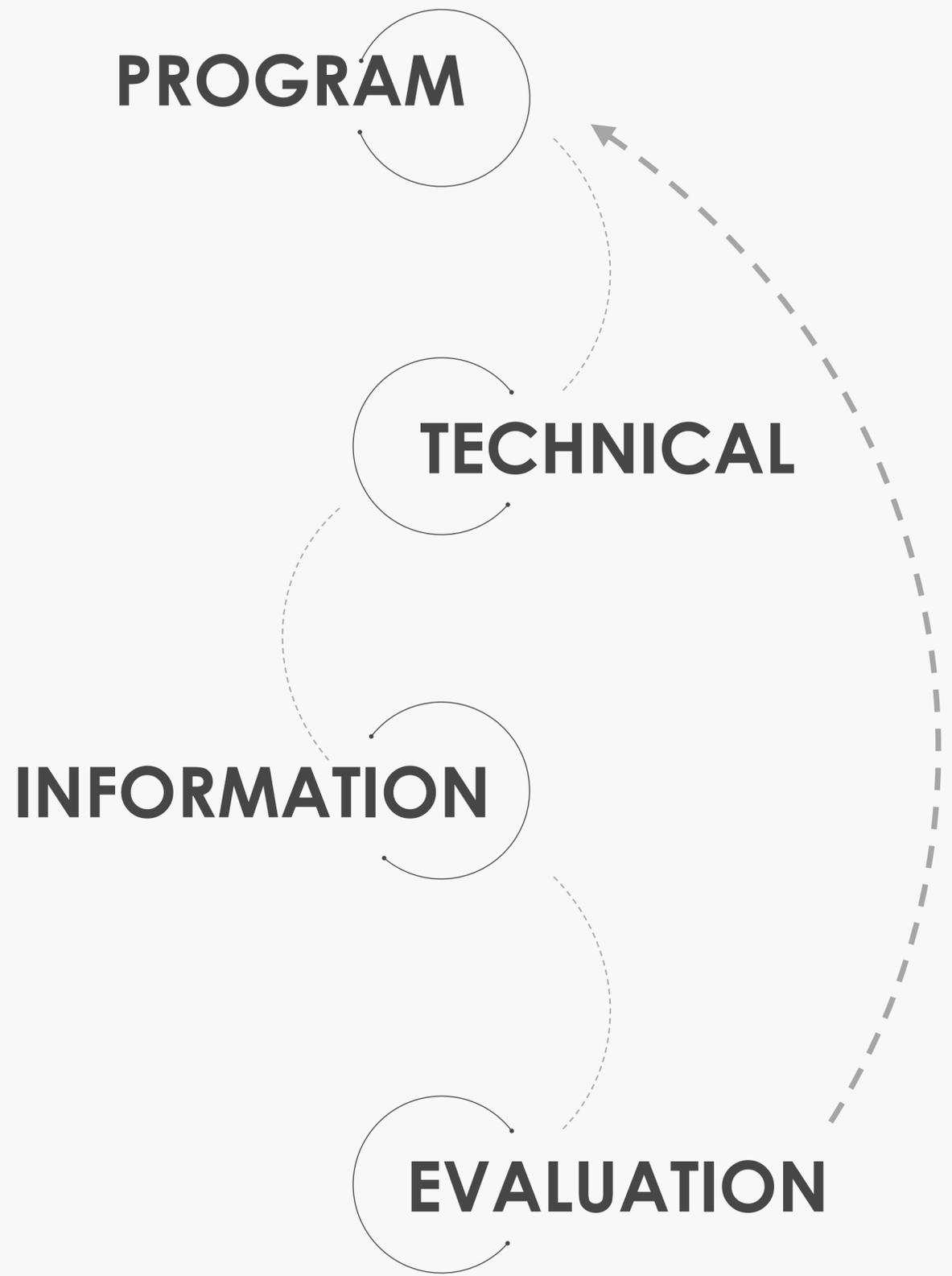
What, when, where,  
data quality & MGMT

- Inventory info generating
- Map workflow
- Manage raw data to verified



# INVENTORY WHAT YOU ARE GENERATING, PATH TO REPO, AND INFO PRODUCTS





Data to Info Via Analysis,  
Interpretation, Reporting,  
and Communication

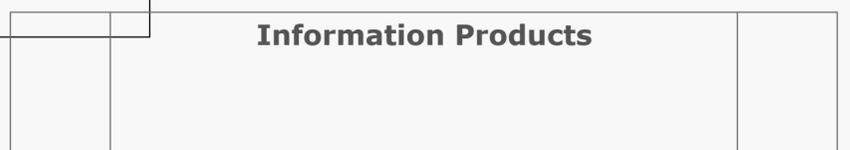
- Manage data for information products



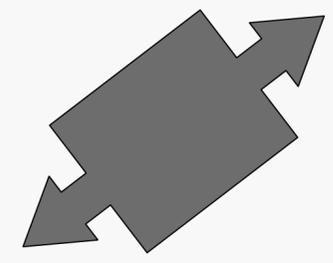
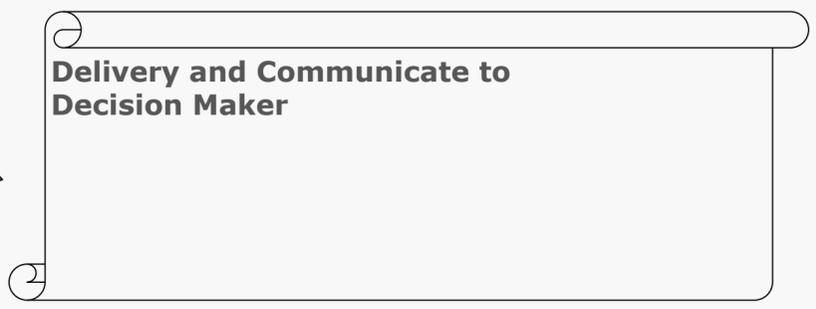
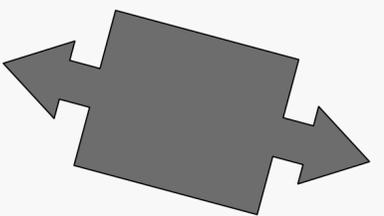
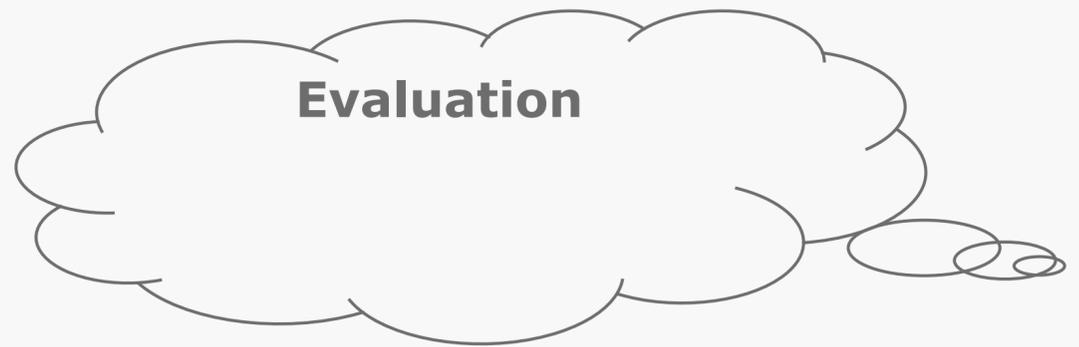
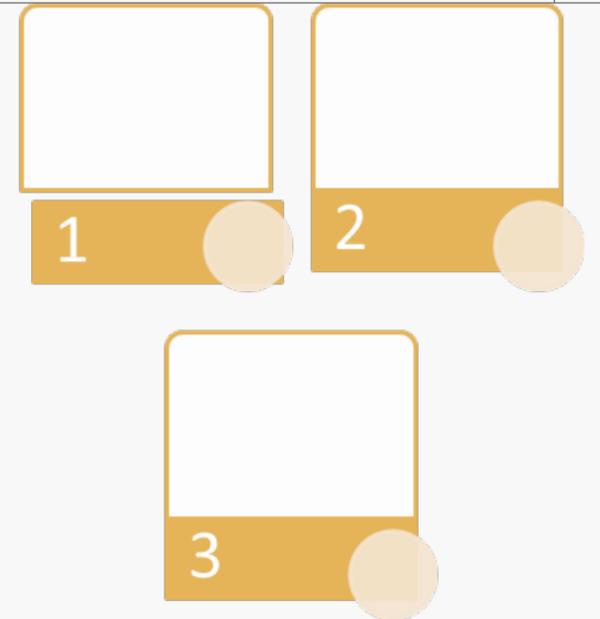


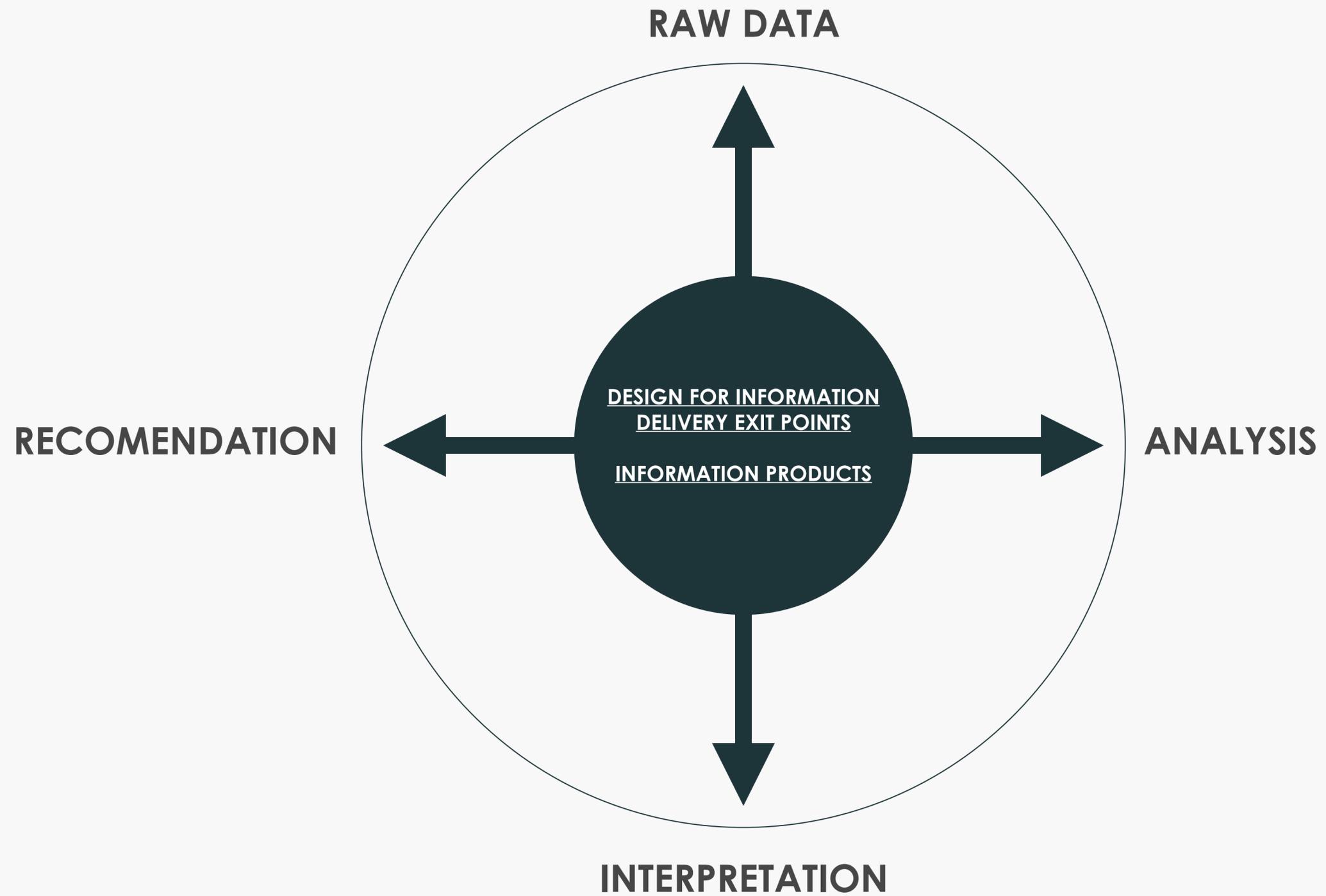
**Management of Raw Data**

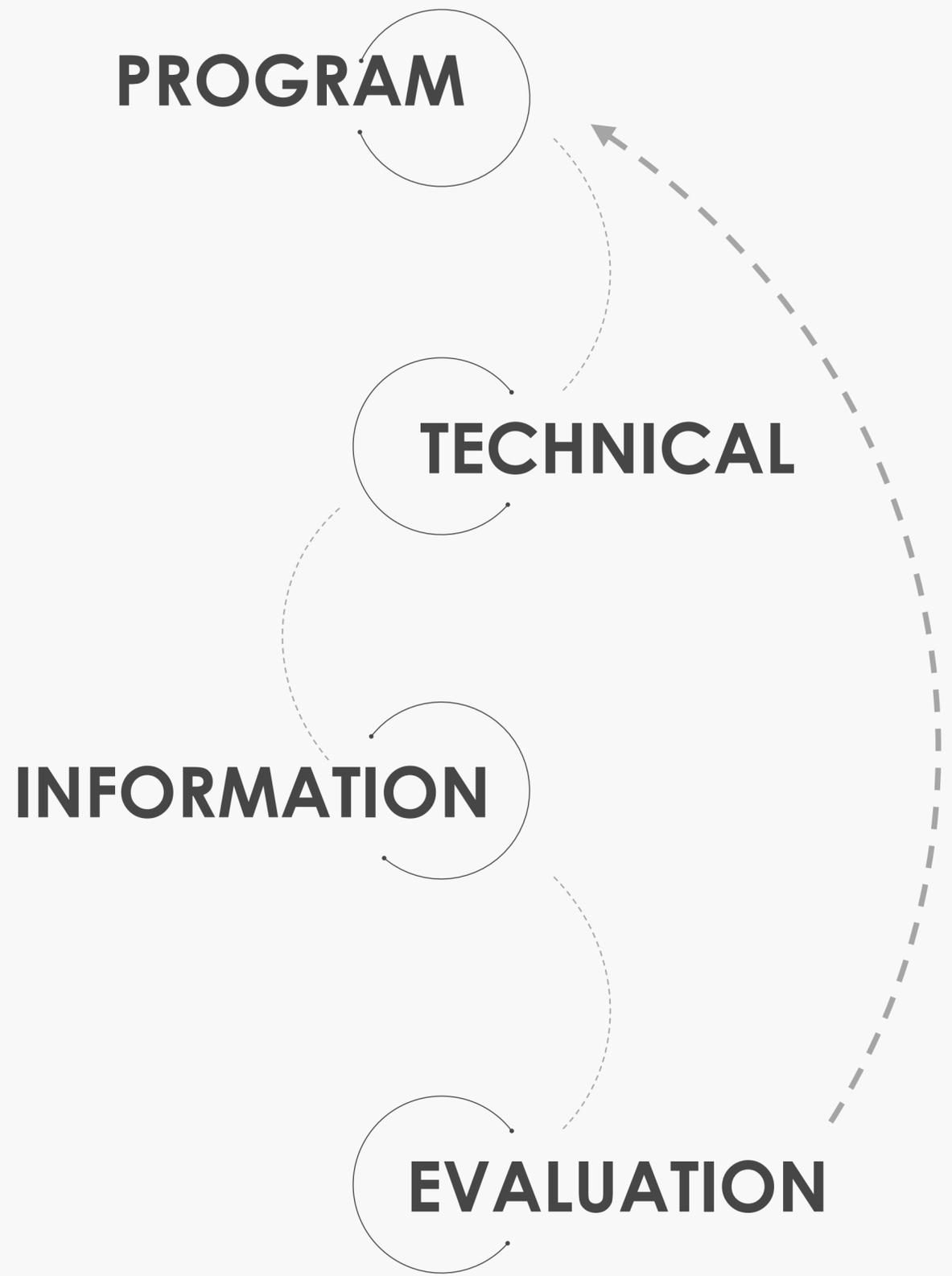
**Relationships/BMP's**



**Management to Generate Information**







- Data Quality
- Data Management
- Data Delivery
- Overall Program for ROI's = Measurable Results

Will it work? How Will You Know?





# Asset = Will You Create Your Forever Song?

- Valued Property
- Data sets become assets if:
  - Can be found - Available, accessible, discoverable, shared
  - Known Quality - Contains minimum necessary information to inform user of purpose, data objectives, methods, quality, extent
  - Format friendly - machine readable



## National Water Quality Monitoring Council

<https://acwi.gov/monitoring/vm/resources.html>

## US Volunteer Monitoring Network

<http://volunteermonitoring.org>

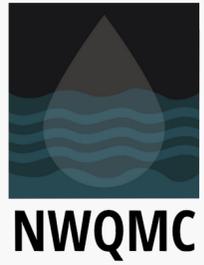


## Listservs

***The EPA volunteer monitoring listserve:*** To subscribe, send a blank email message to [volmonitor-subscribe@lists.epa.gov](mailto:volmonitor-subscribe@lists.epa.gov)

***The extension listserve:*** <https://list.uvm.edu/cgi-bin/wa?SUBED1=EXTVOLMONNETWORK&A=1>

***Citizen Science Association:*** <http://citizenscience.org/elist/>



# Q&A



**John Dawes**

The Commons



**Laura Shumway**

Environmental Protection Agency



**Barb Horn**

Colorado Parks and Wildlife

A serene landscape featuring a calm body of water, likely a lake or a wide river, surrounded by dense green forests. The water reflects the surrounding trees and the sky. In the foreground, there are tall, thin grasses. The overall atmosphere is peaceful and natural. The text "Thank You!" is centered over the image in a large, black, sans-serif font.

Thank You!