

Managing Superfund Field Data

Joe Schaefer
Environmental Response Team



| Protecti

24th NARPM Training Program

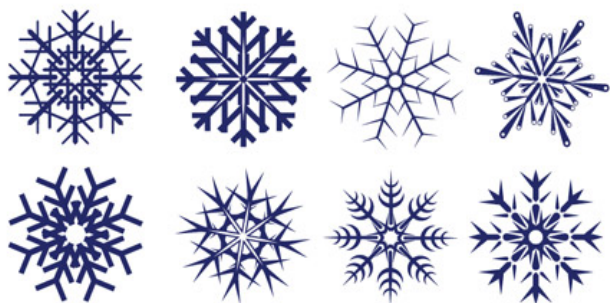
Objective: Improve the Information Currency of Superfund

- ◆ Translate the work that happens on your site to readily accessible information
- ◆ Move from being a report driven program to a data driven program



Objective: Common Approach to Data Management

- ◆ Design around flexible tools that can accommodate different types of work
- ◆ Leverage work done by others
- ◆ Better use of resources
- ◆ Improve the overall program's capabilities



VS.



Objective: Active Data Management

- ◆ Data management happens as soon as information is generated
- ◆ The closer the data is managed to the work, the higher the quality
- ◆ Data management practices should be supporting the process, not a parallel task

Challenge: Report Culture

- ◆ Reports are excellent ways to document decisions and recommendations
- ◆ Not the best medium to transfer the data contained within



Challenge: Sites Last Along Time

- ◆ Horizon for Remedial Superfund sites far exceeds normal life spans for data management tools and technical stands
- ◆ Information needs, decisions required evolve over time impacting what data is collected and how its used
- ◆ Difficult for one site to maintain a consistent group of technical personnel for the lifespan of the project



Challenge: Site Transition

- ◆ Removal to Remedial
 - What work has already been done that I can use
- ◆ Contractor to Contractor
 - Who was the data? How can it be transferred?
- ◆ RPM to RPM
 - “Welcome to the site, here is a room full of reports for you to read!”

Approach: Data As A Deliverable

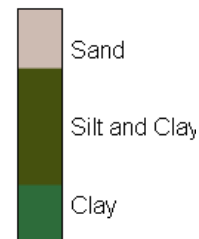
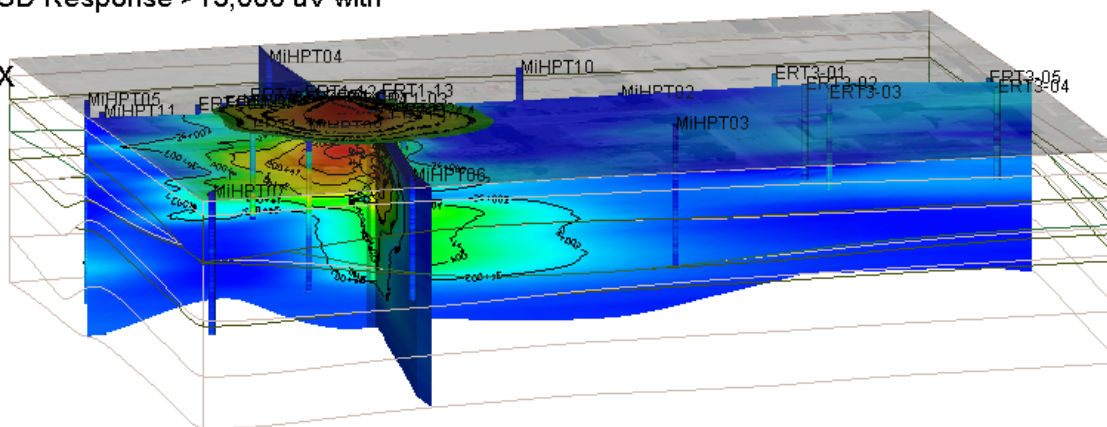
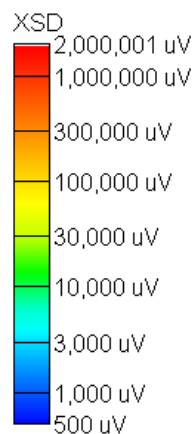
- ◆ EPA should own the information, not just the interpretation
- ◆ In order to get data, you have to ask for it
 - Contract requirements
 - Administrative orders
 - Interagency Agreements
 - Grants
- ◆ Be as specific as you can
 - What data do you need?
 - How should it be delivered?
 - How often should it be delivered?
- ◆ Requirement for participation in the site

Benefit: Rapid Visualization

Delmar Public Supply Well
Delmar, MD
Working HRSC CSM - June 16, 2016
Day 3 and Historic MiHPT Data



2D Maximum of Kriged XSD Response >15,000 uV with
Kriged XSD Fences
Vertical Exaggeration = 2X



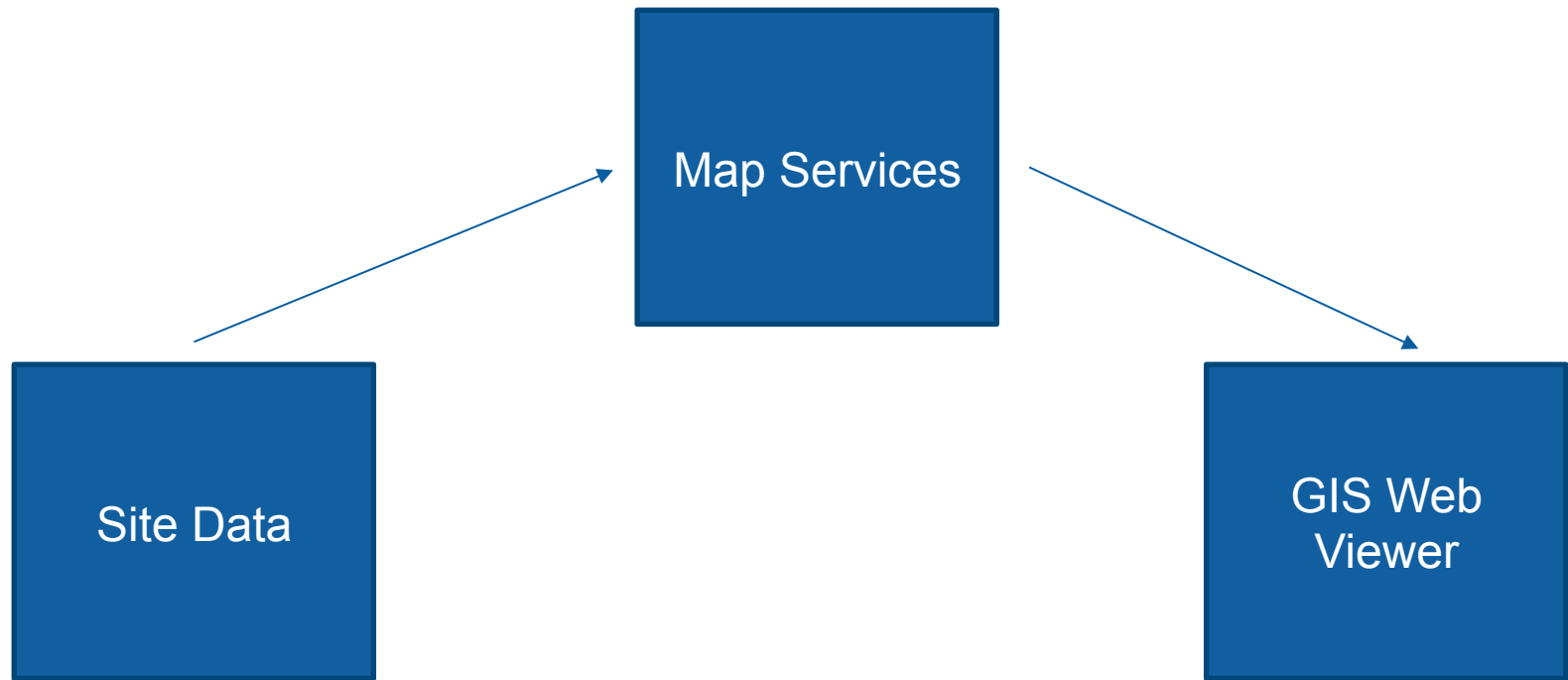
NOTES:
MIP-XSD data were baseline corrected to a common value.
ERT1-02 was omitted from kriging due to proximity to MIHPT-01.

Approach: Data Should Facilitate Communication

- ◆ More rapid responsiveness to HQ request, FOIAs, and QFRs
- ◆ More rapid responsiveness to the public and communities
- ◆ Faster access to raw data for generating reports, graphics, maps, briefings, etc.
- ◆ Path to getting there is to incorporate products into your workflow that rely

GIS Web Viewers

- ◆ EPA GIS community has an approach for how data should be made available and consumed using current technologies
- ◆ Don't spend your resources trail blazing, spend it optimizing and enhancing



GIS Web Viewers



Profile | Notices | Images | Documents | PoI/SitReps | Contacts | Links | Map | Admin | Logout

Region 8 Response – Ash Coulee ER

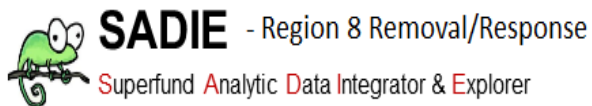
- Site Features
 - Release Site
 - Sample Locations
 - Radio Repeater
 - Leading Edge to Furthest Visual Oil
 - Confluences
 - Control Point Types
 - Creek Mile from Release
 - Recovered Oil Storage
 - Reach Progress
 - Burn Progress
 - Cold Flush Progress
 - Belle Fourche Pipeline
 - County Roads
 - Public Parcels
 - Water
- Site Images
- Monitoring Data
- USDA Water
- USDA Soil

Basemaps

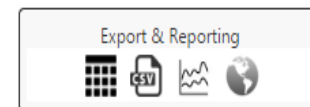
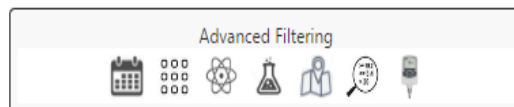
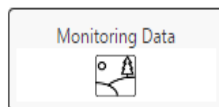
Sample Locations	
Location	B1229-02
Latitude	47.108639
Longitude	-103.385696
Matrix	W
geodata	Point
SADIE Link	Click to View Full Results
UniqueID	3810

Zoom to

GIS Viewer -> Data on the Web



Project: 108712 - Ash Coulee Incident



Records returned: 224

Validation	Date	Matrix	Sample Type	Analyte	Analysis	Location	Total/Dissolved	Sample Number	Result	Units	Qualifier	MDL	Reporting Limit	Sample Depth
All	All	All	All	All	All	B1229-02	All							
Level II Verified	12/29/2016 9:45:00 AM	Water	Field Sample	Antimony	M	B1229-02	T	BND1229BF002	0.16	ug/L	UJ	0.16	2.5	
Level II Verified	12/29/2016 9:45:00 AM	Water	Field Sample	Arsenic	M	B1229-02	T	BND1229BF002	2.1	ug/L	J	0.46	2.5	
Level II Verified	12/29/2016 9:45:00 AM	Water	Field Sample	Barium	M	B1229-02	T	BND1229BF002	119	ug/L	J	0.096	1.5	
Level II Verified	12/29/2016 9:45:00 AM	Water	Field Sample	Beryllium	M	B1229-02	T	BND1229BF002	0.32	ug/L	J	0.15	1	
Level II Verified	12/29/2016 9:45:00 AM	Water	Field Sample	Cadmium	M	B1229-02	T	BND1229BF002	0.12	ug/L	J	0.064	0.4	
Level II Verified	12/29/2016 9:45:00 AM	Water	Field Sample	Chromium	M	B1229-02	T	BND1229BF002	1.1	ug/L	J	0.7	2.5	
Level II Verified	12/29/2016 9:45:00 AM	Water	Field Sample	Cobalt	M	B1229-02	T	BND1229BF002	2.1	ug/L	J	0.11	2.5	
Level II Verified	12/29/2016 9:45:00 AM	Water	Field Sample	Copper	M	B1229-02	T	BND1229BF002	3.9	ug/L	J	2	5	
Level II Verified	12/29/2016 9:45:00 AM	Water	Field Sample	Lead	M	B1229-02	T	BND1229BF002	1.8	ug/L	J	0.058	0.5	
Level II Verified	12/29/2016 9:45:00 AM	Water	Field Sample	Mercury	M	B1229-02	T	BND1229BF002	0.05	ug/L	J	0.031	0.2	
Level II Verified	12/29/2016 9:45:00 AM	Water	Field Sample	Molybdenum	M	B1229-02	T	BND1229BF002	6.6	ug/L	J	0.32	2.5	
Level II Verified	12/29/2016 9:45:00 AM	Water	Field Sample	Nickel	M	B1229-02	T	BND1229BF002	7.3	ug/L	J	0.5	2.5	
Level II Verified	12/29/2016 9:45:00 AM	Water	Field Sample	Selenium	M	B1229-02	T	BND1229BF002	2.3	ug/L	J	0.65	2.5	

Common Operating Picture

- ◆ Sites are complex organisms
 - Federal
 - State
 - Tribal
 - Local
 - PRP
- ◆ Build a bigger silo!
- ◆ Have a way to interact with all the information
- ◆ Enable your data to live past the decisions
 - Action levels can change

Story Map

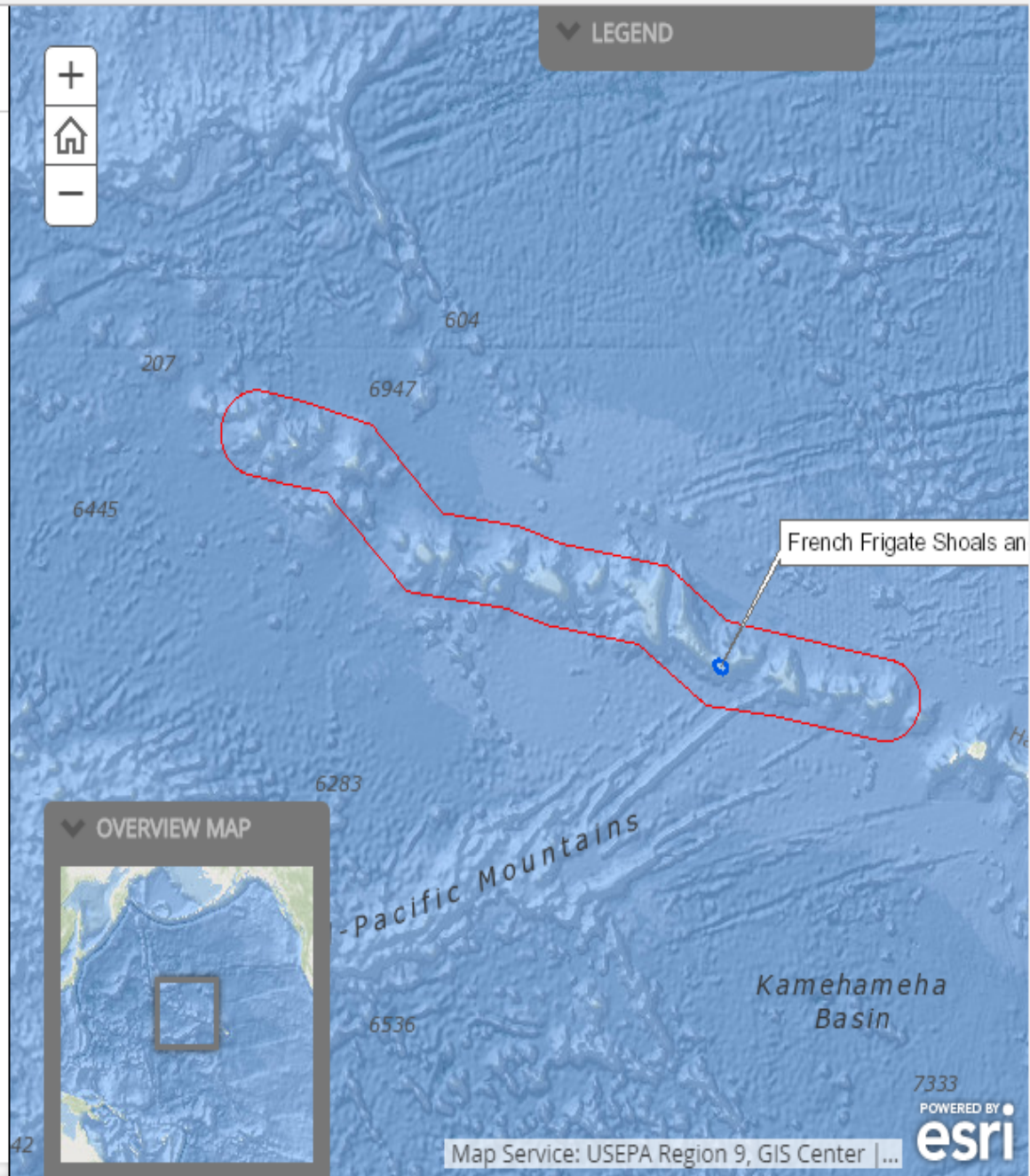
- ◆ GIS Viewer as the backbone
- ◆ Functionality to enable a curated navigation of that data
- ◆ Enhanced ability to add context, narrative
- ◆ Controlled view of what layers, extent are visible at any given point
- ◆ Allow for automation of content updates
- ◆ Clear delineations of who is responsible for which sections of content
- ◆ Really, really, good looking presentation.



Hawaiian Islands National Wildlife Refuge: Tern Island



Tern Island is part of the atoll known as French Frigate Shoals (FFS) and is located 490 nautical miles northwest of Honolulu,

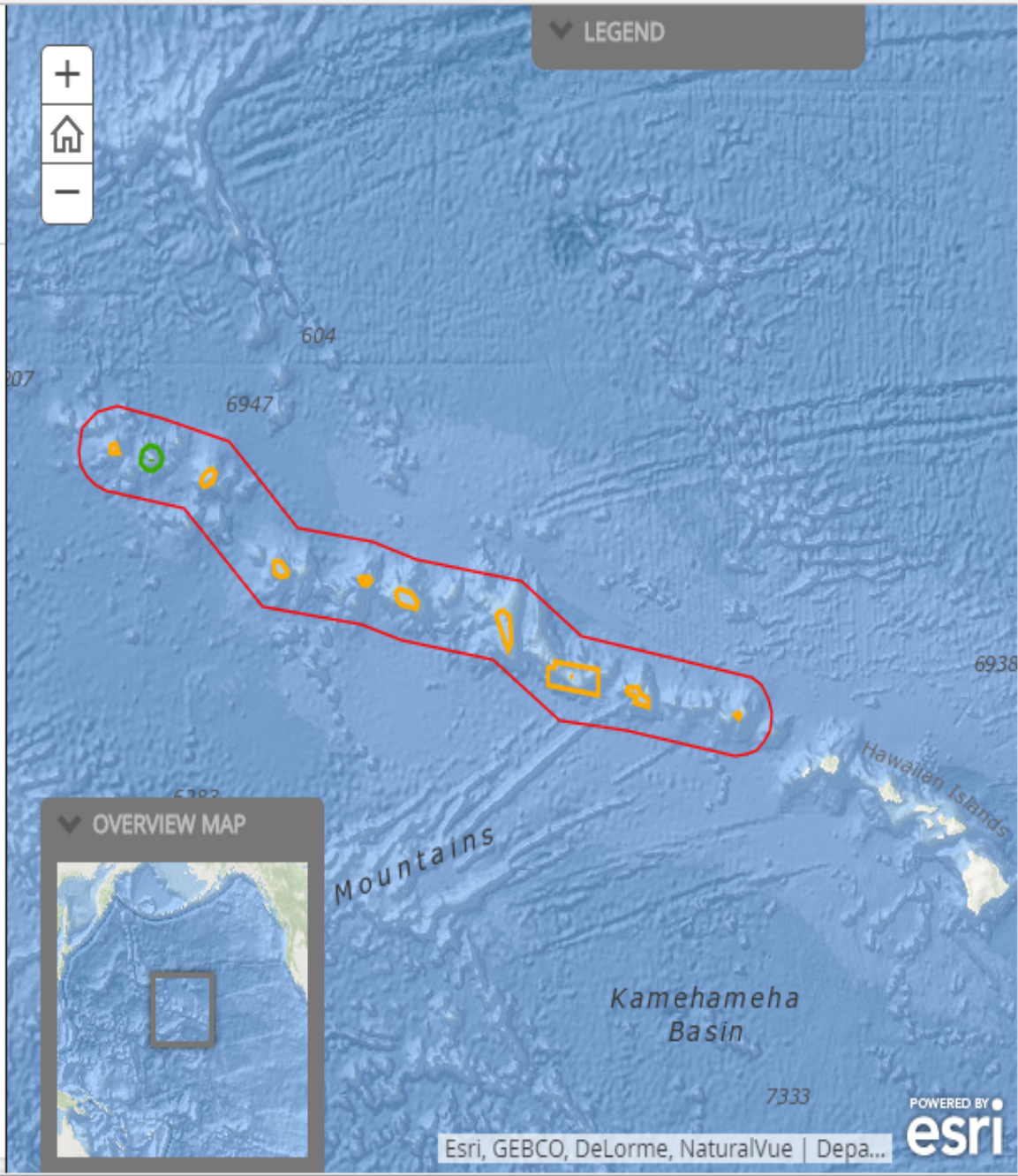




Hawaiian Islands National Wildlife Refuge: Tern Island

Physical Environment

The Hawaiian Island chain, consisting of both the Main Hawaiian Islands (MHI) and the NWHI, is the most isolated place in the world, approximately 2,400 miles from the closest continent. FFS is about 490 nautical miles (560 miles) northwest of Honolulu. Because of this remoteness, species evolved undisturbed over thousands of years, creating endemic flora and fauna. Endemism is when a species occurs naturally in only one particular area. Areas of high endemism are considered biodiversity hotspots and Hawaii has the highest percentage of endemism for warm-water fishes in the world, about 24% (NOAA 2013a)





Hawaiian Islands National Wildlife Refuge: Tern Island

Physical Environment - Climate and Sea Level Rise

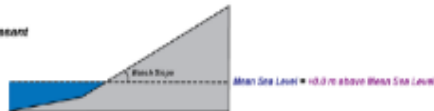
Ocean temperature is an important physical factor that influences coral reefs and other marine ecosystems in the NWHI. FFS ocean surface temperature typically stays between 23.3 and 27.5 degrees Celsius.

$$\text{Total Water Level} = \text{Mean Sea Level} + \text{Sea-level Rise} + \text{Set-Up} + \text{Run-Up} = \text{Limit of Inundation}$$

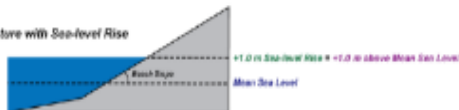
Set-Up = a rise in sea level above the mean sea level induced by the initial point of inundating produced by onshore gradient in wind stress. Run-Up = maximum vertical extent that surge-driven waves reaches above the water level (mean sea level + set-up)

1) GIS-based Passive "Bathtub" Models

Present

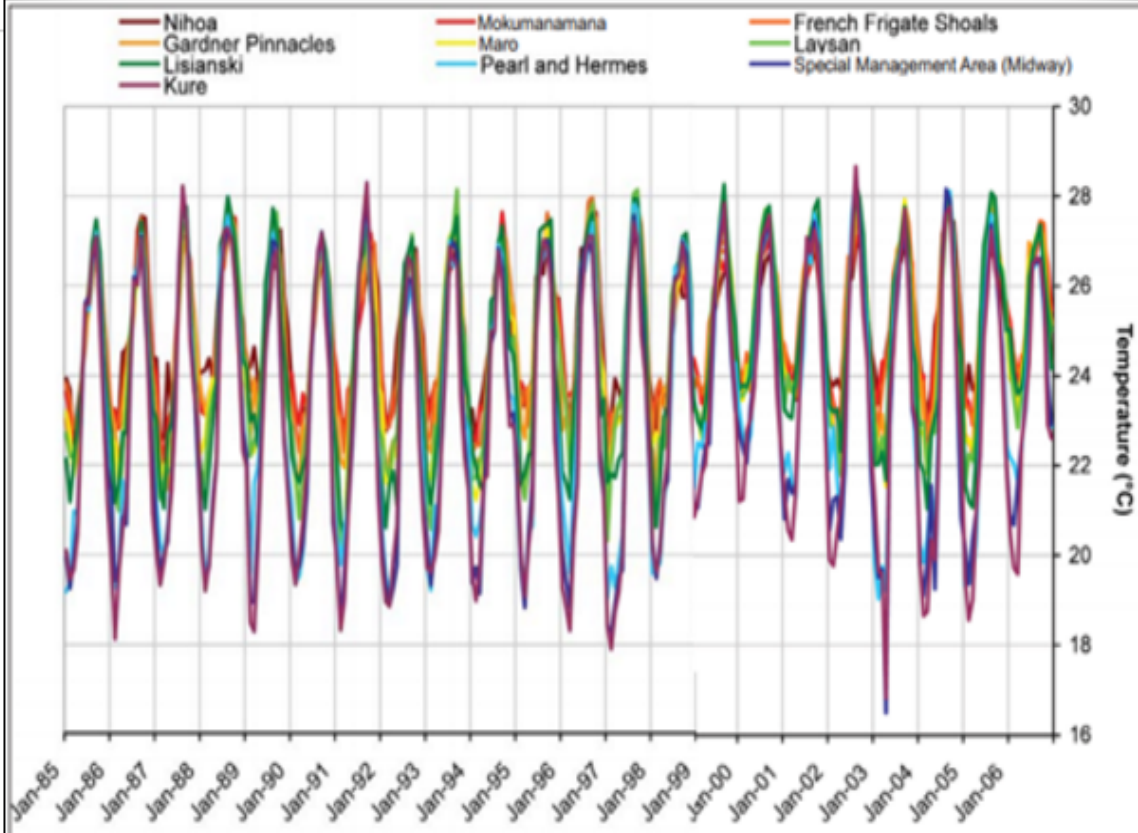


Future with Sea-level Rise



2) Dynamic Model that Includes Wave-driven Set-up and Run-up

Present

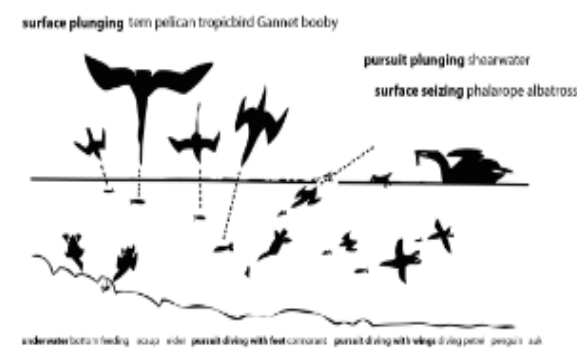
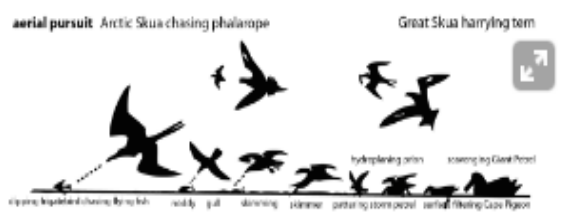




Hawaiian Islands National Wildlife Refuge: Tern Island

Biological Environment

- Birds



Seabird Feeding Strategies (Ashmole, 1971)

Seabirds can be divided into four

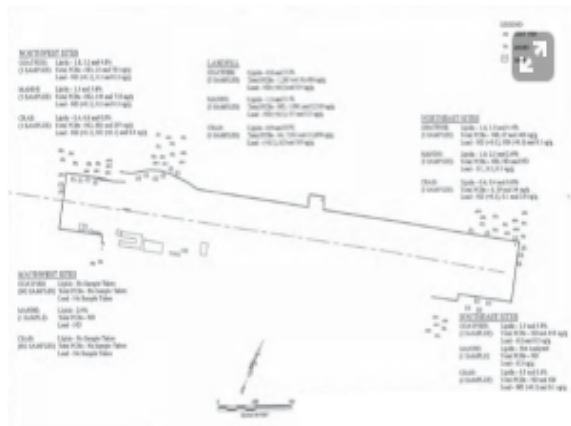




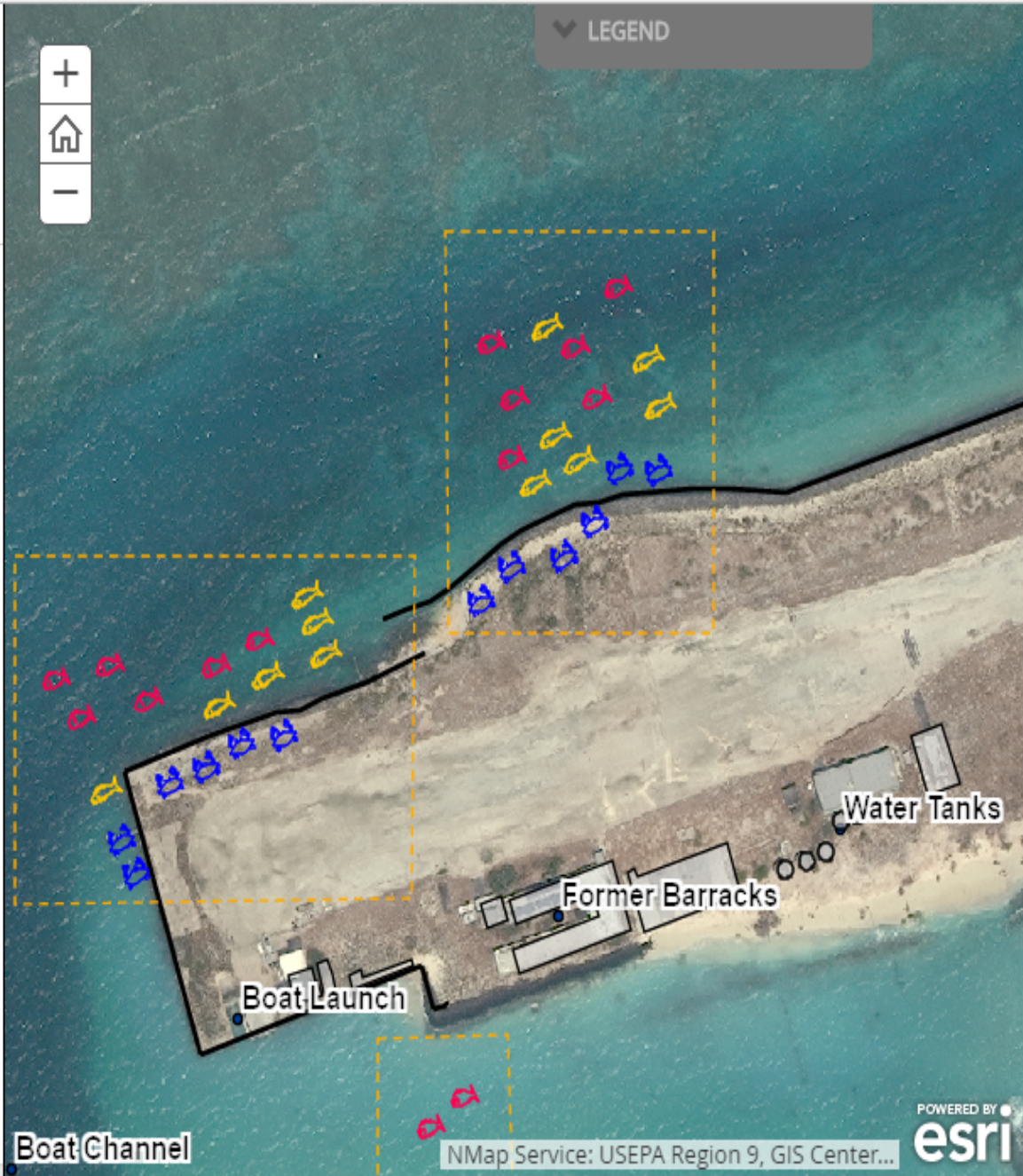
Hawaiian Islands National Wildlife Refuge: Tern Island

1999 Marine Tissue Analysis

Thirty-two (32) marine biota tissue samples were collected from the area directly offshore from the landfill and from the northeastern, northwestern, southeastern, and southwestern corners of Tern Island.



Approximate Location of Biota Samples Collected for



Data is More Than Samples!

- ◆ Boundaries
- ◆ Photos
- ◆ Videos

Data Management Plans

Plans, Plans, Plans

- ◆ Workplans
- ◆ Sampling Plans
- ◆ Quality Assurance Plans
- ◆ What plan tells us what to do with our data?

Data Management Plan!!!

- ◆ Approach to data management
 - Types of data you are dealing with
 - Tools being used to collect, manage and display it
- ◆ Requirements
 - Specifics on what things need to be documented and how they should be described
- ◆ How you are going to use your data
 - Standardized reports
 - GIS viewers
 - Models

Regional Data Management Plan

- ◆ 1. What are your typical data streams and deliverables?
- ◆ 2. What are the best practices to manage those data streams and generate those deliverables?
- ◆ 3. How will the data and deliverables be QA'd?
- ◆ 4. What resources are required?
- ◆ 5. What is the data flow?

Site Specific Data Management Plan

- ◆ Shorter (hopefully) Document
- ◆ References the Regional Plan
- ◆ Identifies deviations, additions or modifications
- ◆ Specific names and organizations responsible for managing the data
- ◆ Site specific procedures/checklists/SOPs



Site-Specific Data Management Plan

Project Name:		TDD Number/ Site ID:	
Author:		Company:	
Date Initiated:	Click here to enter a date.	Last Updated:	Click here to enter a date.

This data management plan (DMP) is intended to provide guidance for data collection by field personnel and subsequent data management activities. The data collection and management practices presented in this plan are designed to ensure data integrity and consistency for all data collection personnel and from operational period to the next. This document is intended to be used in conjunction with a Region wide data management plan and only includes the details specific to the site. There may be appendices.

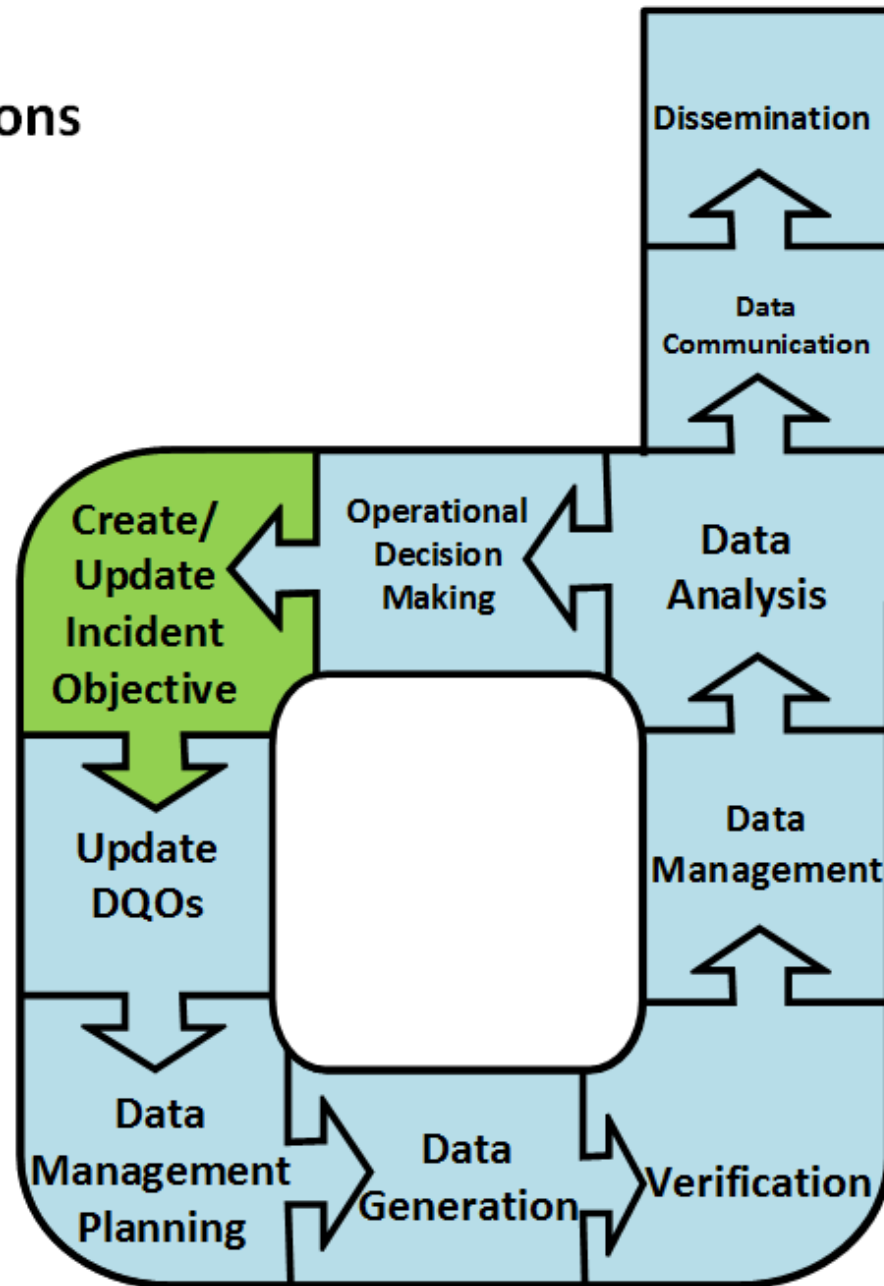
Data Processing

The following table outlines the specific requirements for various data types being collected during the project.

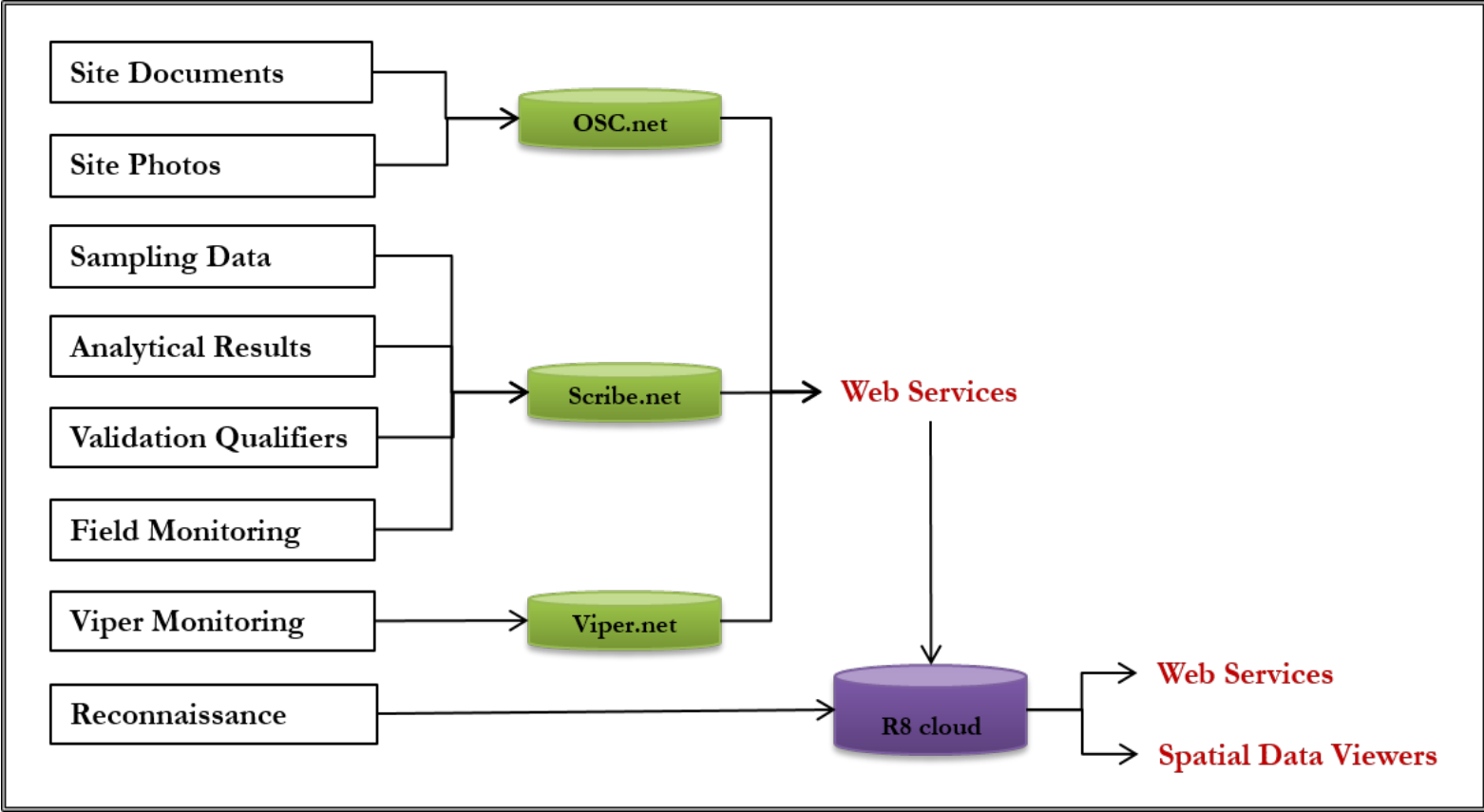
	Data Input	Data Stream	Data Source	Site Specific Data Elements	Site Specific Verification	Site Specific SOP
1						
2						
3						
4						
5						

	Reporting Task	Data Inputs	Data Transformation SOP	Deliverable Format(s)	Frequency
1					
2					
3					
4					
5					

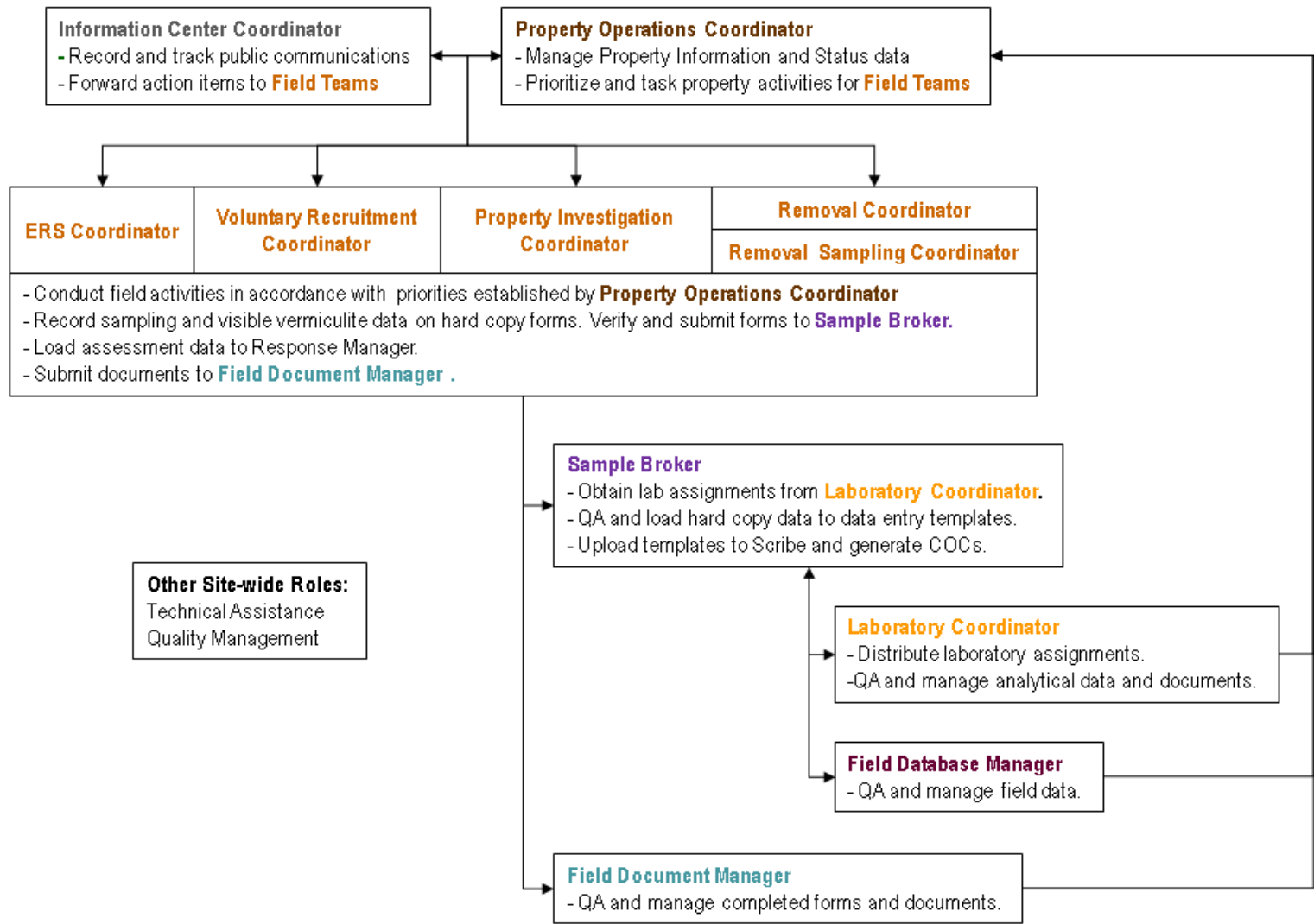
Flowchart of Data Functions



Data Workflow



Roles & Responsibility



Data Elements & Valid Values

- ◆ Core of your site specific plan
- ◆ What data you need & what it needs to look like
- ◆ Enforce consistency
- ◆ Develop feedback loops from your data users to your data managers
- ◆ Implement methods to enforce the data requirements established by the site



Standard Procedures

- ◆ Consistency requires discipline & documentation
- ◆ Any processes or task that can be documented related to how data is collected, stored, or analyzed should be
- ◆ Checklists are a huge help

Data Storage

- ◆ Where is the data?
- ◆ Who is in charge of it?
- ◆ How does it get there?
- ◆ How often is it updated?
- ◆ How can other people access it?

Data Reporting

- ◆ How are you going to use the data?
- ◆ Feedback loop needs to exist to inform the project on what data needs to be collected

New Sites

- ◆ Prepare
 - Data deliverables required under support contracts
 - Train, train, train
- ◆ Assess
 - What problems are you trying to solve
 - What information do they need in order to solve it
- ◆ Plan
 - Document what you need to do
 - Document the steps you need to take
- ◆ Execute
 - Get the proper resources, organization and workflow together to put your plan into action
- ◆ Re-Assess
 - Develop a feedback process where stakeholders are communicating regularly to adjust the plan as the site evolves

Existing Sites

◆ Needs Assessment

- Decisions you need to make it?
- Information you need to make them?

◆ Current Operations Assessment

- Who is generating data on your site?
- What approaches are they using?
- Where is the data being stored?
- When is the data being shared?
- Why is the data being collected?
- How is the data being managed?

◆ Develop The Plan

- Training on new tools/processes you need implemented
- Awareness of the requirements

◆ Execute!

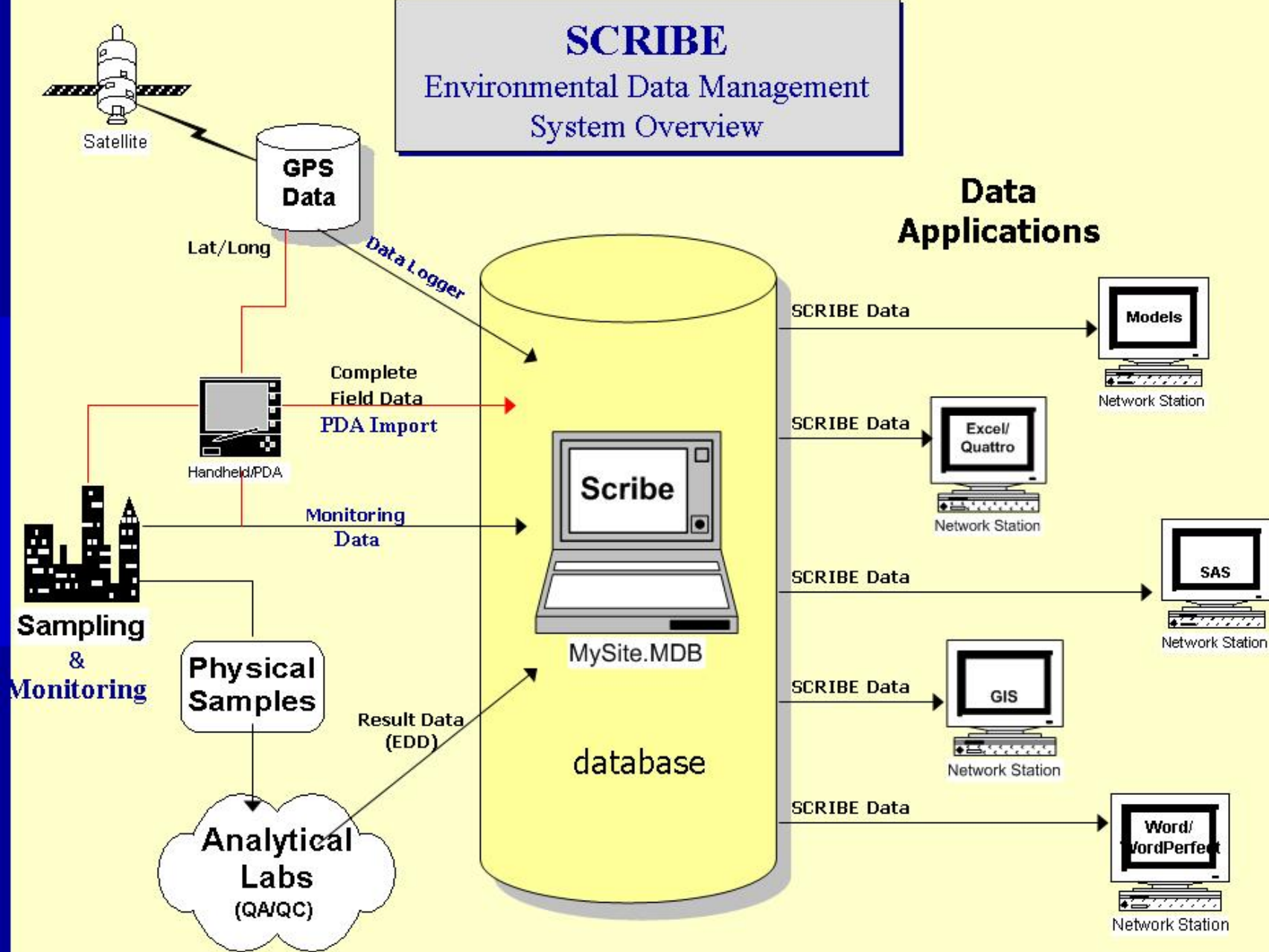
- Coordination is key

Field Data Management Tools

- ◆ Tools won't save you!
- ◆ Process and planning most critical part
- ◆ Flexibility in the tools you choose is important
- ◆ Expand the scope of your data management process to include key site partners
- ◆ Toolset being used should be able to accommodate those groups both in data submission and data access

SCRIBE

Environmental Data Management System Overview

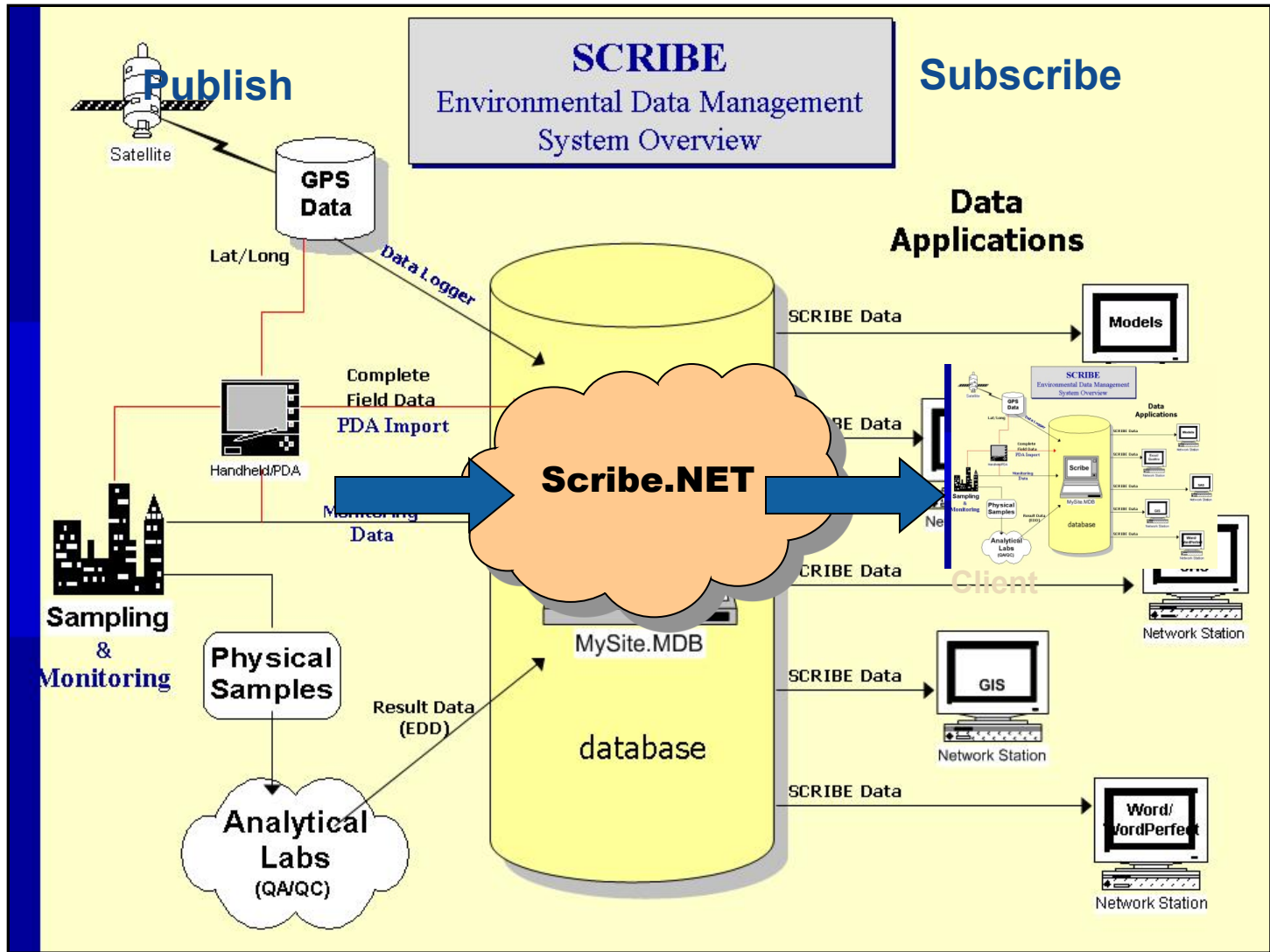


Scribe Feature: Auditor

- ◆ Scribe doesn't enforce valid values
- ◆ Users can develop rules to apply against their Scribe database
- ◆ Basic Mode
 - Required fields
 - Valid values
- ◆ Beast Mode
 - Quality Control checks
 - Different valid values based on sample date

Scribe.NET

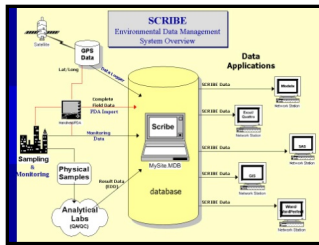
- ◆ Data Publishing-Subscribe Service
- ◆ Allows Scribe data to be managed locally but still feed remote users and enterprise systems
- ◆ Maintains ownership of data and provides an audit history
- ◆ Remote backup of site data



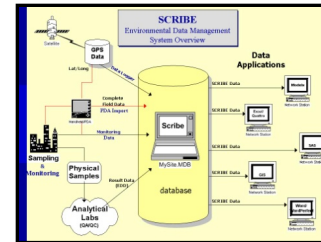
Publish

Multiple-Project
Publication Model

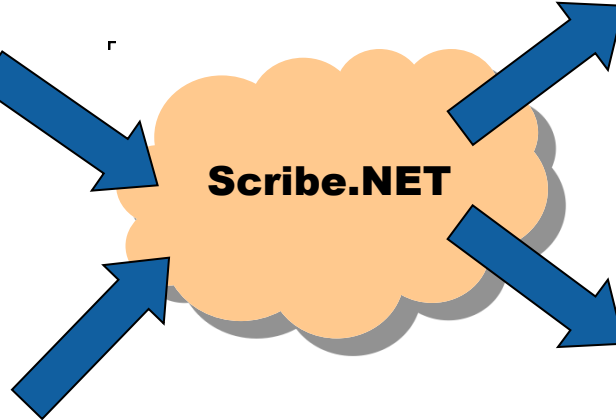
Subscribe



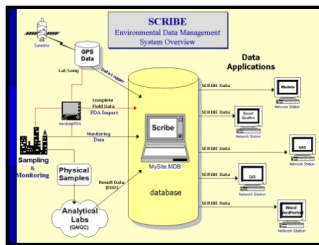
Sampling



Client



Enterprise

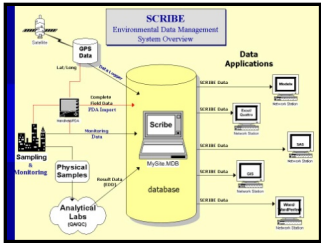


Analytical

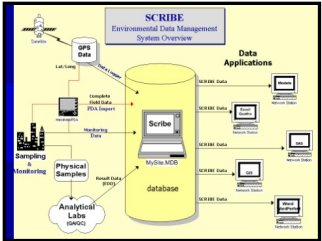
Publish

Multiple-Project
Publication Model

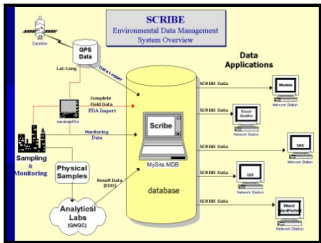
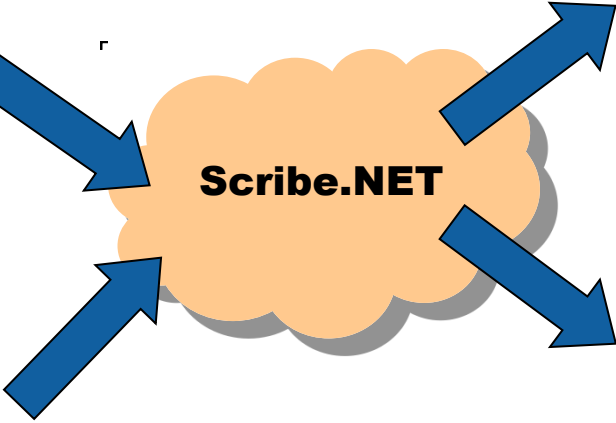
Subscribe



EPA



Client



PRP



Enterprise

Libby, Montana

- ◆ Started with a custom solution, cost of that rapidly outgrew the budget
- ◆ Standardized the site on nationally available tools
- ◆ Developed requirements and a site specific data management plan
- ◆ Migrated historic data
- ◆ Coordination, coordination, coordination

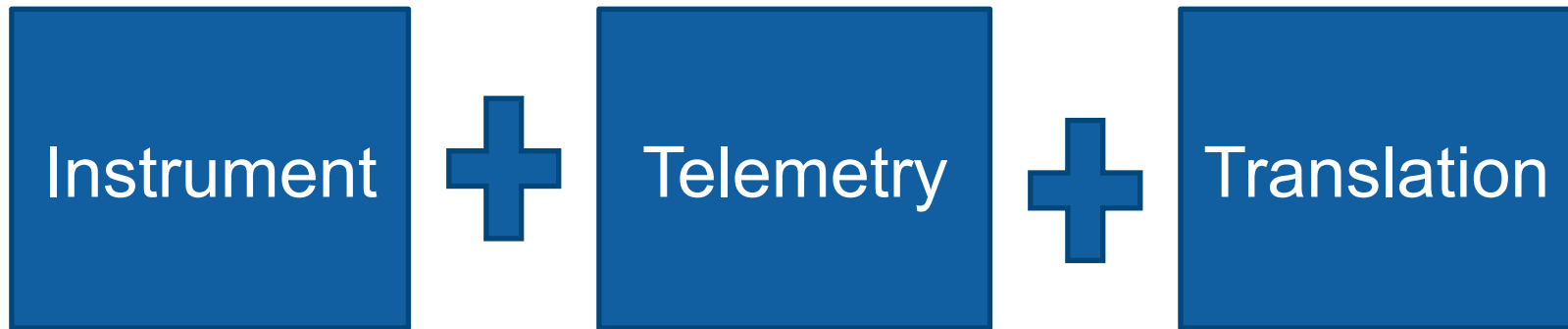


Sensor Data Challenges for Superfund

- ◆ Volume of data
- ◆ Real-time does not always mean “real-time”
- ◆ Raw data does not correspond to our human health benchmarks
- ◆ Time required to acquire, store, transform and re-format for dissemination

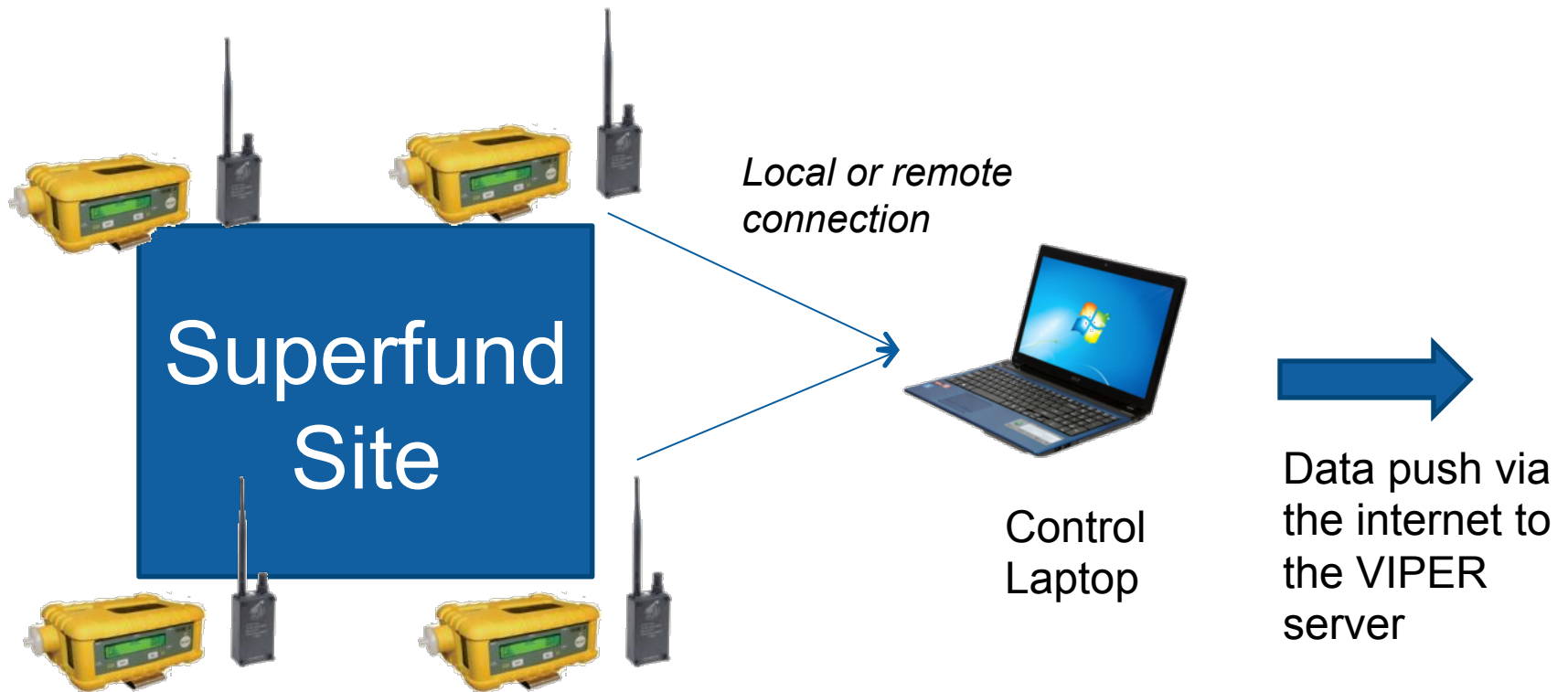
Addressing the Challenges: VIPER

- ◆ ERT developed and launched VIPER in 2011
- ◆ VIPER was built to
 - Handle the unique volume & frequency inherent to sensor data
 - Utilize federal data standards
 - Require no core system modification for new sensor types
 - Provide monitoring data in real-time
 - Processes data for comparison to human health benchmarks
 - Can immediately determine exceedances of health-based benchmarks and notify users of the exceedances



= VIPER!

Workflow



Web view



Deployments (130)

Unassigned Runs (2)

Admin

Help

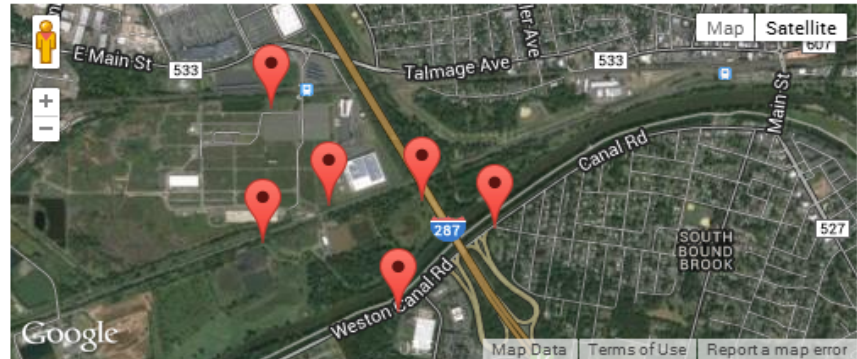
R02 American Cyanamid Site Deployment [\[Edit\]](#)

All Times Eastern, DST Observed

Start: 1/23/2014

End:

Description:



AreaRAE(s):

~	Instrument ID	Connection	Location	VOC	VOC 15-Min TWA	Received
	(.109) AreaRAE * EPA Location 3 PRP Location I2	OK	40.5552210, -74.5506540	0.0 ppm	0.000000 ppm	3/19/2014 2:59 PM
	(.115) AreaRAE * EPA Location 4 PRP Location I3	OK	40.5554270, -74.5459520	0.3 ppm	0.201444 ppm	3/19/2014 2:59 PM
	(.28) AreaRAE * EPA Location 6 Behind Ballpark	OK	40.5591460, -74.5535940	0.0 ppm	0.000000 ppm	3/19/2014 2:59 PM
	(.42) AreaRAE * EPA Location 5 PRP Location I1	OK	40.5537540, -74.5540280	0.0 ppm	0.000000 ppm	3/19/2014 2:59 PM
	(.76) AreaRAE * EPA Location 2 Pumping Station	OK	40.5509280, -74.5471480	0.0 ppm	0.000000 ppm	3/19/2014 2:59 PM
	(.97) AreaRAE * EPA Location 1 Residential	OK	40.5543300, -74.5422390	0.0 ppm	0.000000 ppm	3/19/2014 2:59 PM

Benefit: Real-Time Decision Making

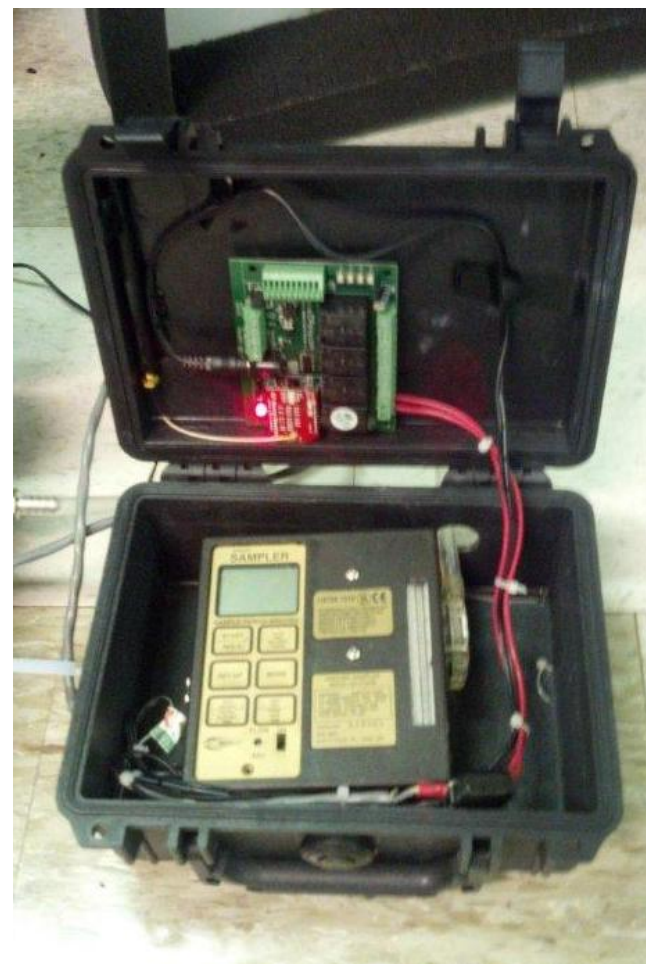
- ◆ Collect real-time data and actually use it in real-time
- ◆ Ability to receive data in real-time from PRPs and site partners allows EPA to have full situational awareness of all sensor data
- ◆ The monitors in VIPER allow an OSC or RPM to evaluate data in a way that matches DQOs without the need for any data post-processing. Examples:
 - If dust levels exceed X at the fenceline for a period of 10 minutes, notify the PRP to stop work
 - Notify the local fire chief immediately if there is break through detected in the exhaust stack

Benefit: Data Storage

- ◆ All sensor data for a site can be sorted in VIPER, eliminating need for data reduction or averaging.
- ◆ Once instruments are connected, VIPER handles the acquisition and storage. No contractor LOE for managing the database.
- ◆ Complete datasets are immediately available for FOIA requests or any other records needs

Capability: Remote Sampling

- ◆ WiFi enabled switches can trigger a pump for the collection of a sample
- ◆ Opportunity to automatically trigger sampling based on readings recorded by VIPER-ized monitoring instruments
 - If the stack has a reading $> X$, start the collection of 24 hour samples at the fenceline



Benefit: Building Public Confidence

- ◆ EPA routinely deploys monitoring instruments to show the public we are taking necessary precautions to monitor exposure during cleanup operations.
- ◆ VIPER allows EPA OSCs or RPMs to show they have a real-time feed of data from those instruments. Any exceedance results in immediate notification so they can take action.

AMCO

- ◆ Worked with RPM to deploy monitoring network during in-situ thermal treatment
- ◆ Adjusted air monitoring approach to utilize higher resolution, lower frequency approach
- ◆ Able to continue to use existing platform by providing vendor technical specifications for the data format

R09 AMCO Deployment [\[Edit\]](#)

All Times Pacific, DST Observed

Start: 8/10/2016

End:

Description: Connection Status 15 & 90 Minutes on MultiRAE, 45 & 90 Minutes on Met1 and 90 Minutes & 2Hours on NOAA. Connection status e-mail to hoppe.michael@epa.gov and manheimer.kelly@epa.gov. Instrument Sensor TWAs, Alarms and notifications also enabled.



Met One(s):

Instrument ID	Connection	Location	AlarmFlags	A8	A7	SR	AT	WD	WS	RAIN	RH	BP	Received	
13011 Met One *	OK # [Edit]	37.8049550, -122.2957400	0 bits	0	0.05 V	0.447 V	5 W/M2	50.2 C	49.9 Deg	7.7 m/s	0 IN	88 %	30.08 Hg	2/13/2017 6:56 AM

MultiRAE(s):

Instrument ID	Connection	Location	VOC	15m TWA VOC	Received
1971 MultiRAE * Glass Company Loft	OK # [Edit]	37.8025960, -122.2946840	2450.0 ppb	2,450.07778 ppb	2/13/2017 6:56 AM

NOAA NWS Observations(s):

Instrument ID	NOAA NWS Station ID
130011 NOAA NWS Observations	KOAK

AMCO Chemical Superfund Site

Indoor Air Monitoring

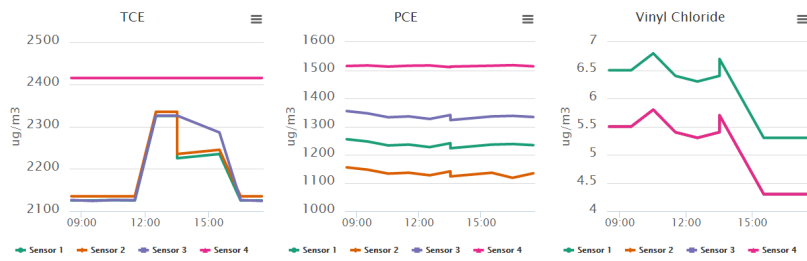
24-Hour Monitoring

The interactive graph below represents the daily VOC (volatile organic compounds) sensor readings from the AMCO Chemical Superfund Site in Oakland, California. Each sensor records readings for TCE (trichloroethylene), PCE (tetrachloroethylene), and Vinyl Chloride. Results from all indoor air monitoring sensors are displayed below according to variable.

For more information on the clean up process, visit the [EPA OSC](#) website.

Hover over any line on the graph to see the exact time and value of the sensor reading. Click on any item in the legend below to add or remove that sensor's data from the graph.

January 27, 2017



* Indicates that Alarm Notifications have been Enabled
Indicates that Connection Status Notifications have been Enabled

Questions?

◆ Joe Schaefer

- Environmental Response Team, OSRTI/OLEM
- Schaefer.joe@epa.gov
- 609-865-8111

◆ ERT Software Support

- ertsupport@epa.gov
- 1-800-999-6990