Value Engineering Study of USGS Continuous Water-Quality Monitor Data Collection and Processing

Kevin Richards (USGS) & Rob Ellison(YSI)

USGS Value Engineering Study

- Request for an objective group to evaluate processes and technologies to improve efficiencies without impacting data quality

- Group formed from within USGS and outside technology vendors with expertise in monitoring and lean enterprise

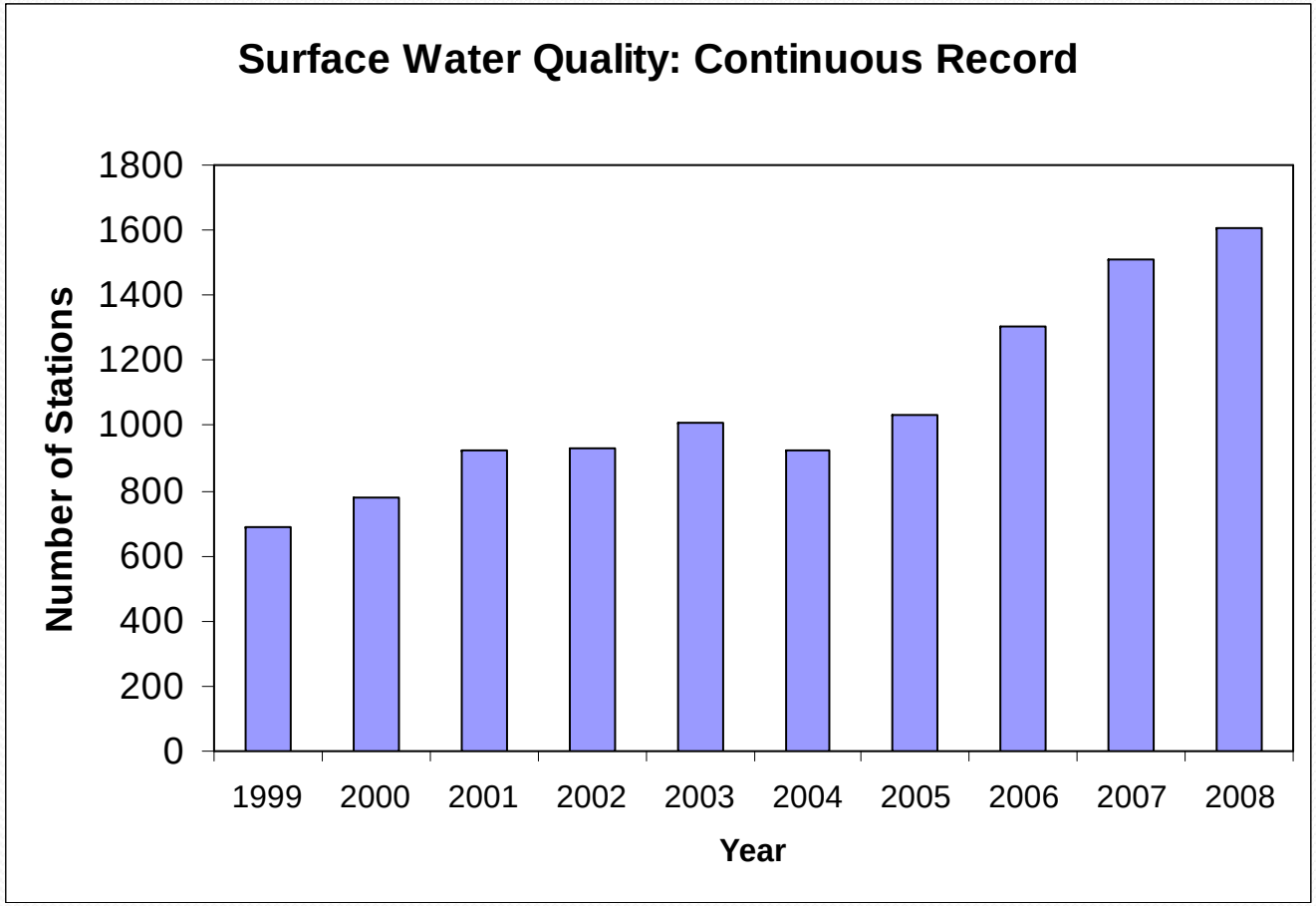
What is Value Engineering?

- A systematic method to improve the "value" of goods or products and services by using an examination of function.
- Value, as defined, is the ratio of function to cost.
- Value can therefore be increased by either improving the function or reducing the cost.

What is a Lean Enterprise System?

A business improvement system that **continuously** pursues the **elimination of waste** from every business process with the ultimate goal of providing World-Class quality, delivery and service to our customers at the lowest possible cost.

Growth of the Real-Time Continuous QW Monitoring within the USGS



Data from: http://1stop.usgs.gov/StationCounts/Graphics/ViewHistoricTotals.cfm?id=1A

Deliverables

- Reduce the cost of data and the number of times data is 'touched'
- Identify opportunities to adopt new technologies
- Provide the USGS with the evaluation process in order to independently conduct future value engineering activities.

Typical USGS field technician.

Team Charter

USGS Value Engineering Charter

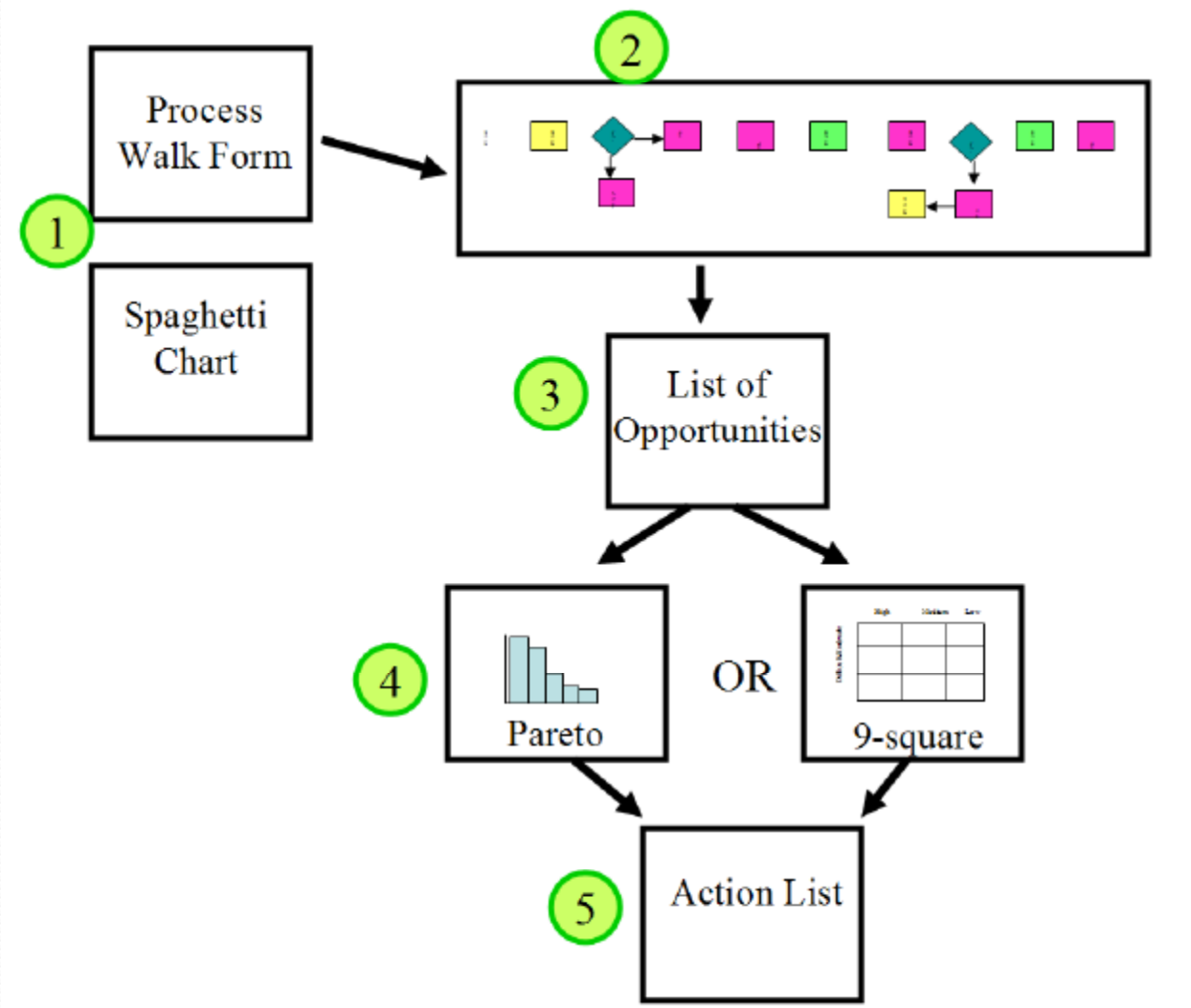
General Info

Event Title	Value Engineering Study of USGS Continuous Water-Quality Monitors' Data Collection and Processing		
Project Location	Nationwide	Executive Sponsor	ICWP
Team Leader	Rob Ellison	Facilitator(s)	Doug Glysson
Event Start Date/Time	1/6/09 12:00 AM	Event End Date	7/6/09 12:00 AM
Event/Project Type	Project		

Core Event Info

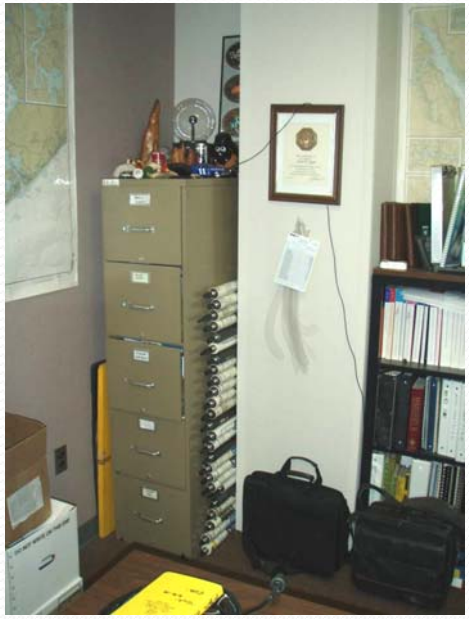
Program Overview:	The USGS has expressed interest in having outside groups with an expertise in water quality monitoring technologies and the processes of collecting and processing environmental data to conduct a value engineering study. The primary goals of the project are to: • Identify opportunities to adopt new technologies to make the USGS more efficient and/or competitive in securing serviescontracts • Reduce the cost of data by identifying waste and areas of improved efficiency in the USGS current process for collecting water quality data using field instrumentation and autosamplers. An additional outcome will be to provide the USGS with the evaluation process used in the study so that it can be used in the future to continuously evaluate and improve their water quality collection process. The study will encompass two visits to USGS field offices to evaluate their current process. Each visit will take 3-4 days and be conducted by the team listed in the charter. The result will be a report with recommendation of new technologies and changes to existing processes that will result in improved efficiencies and competiveness as well as the process evaluation system.
Scope:	From: The preparation for and the collection of water quality data by the USGS. Includes all activities involved in the deployment, maintenance and servicing of field equipment including spot sampling, continuous monitoring and auto samplers. Also includes the collection of data and the data processing. To: Storage of validated data in NWIS database. NOTE: Project activities will focus on activities that are directly involved in the use of water quality monitoring equipment and data.
Strategic Objectives supported	• Reduce the cost of water quality data to the USGS • Reduce the cost of data to the customer • Develop more competitive services
Event Objectives/Metrics:	• Reduce the number of times data is 'touched' from 'X' to 'Y' prior to publication in NWIS • Reduce the cost to maintain a continuous water quality station by 20% or more • Reduce the time to service (maintenance/calibration) continuous water quality monitoring equipment by 20% or more • Reduce the time to adopt new technologies by X%
Deliverables:	• Provide a road map for the rapid adoption of new technologies • Improve USGS SOPs for the collection of water quality data • Provide an Action Plan and an Implementation Plan • Deliver periodic updates on final report development • Provide a process that can be used by all USGS Field Offices to assess and improve the process of water quality data collection
Boundaries:	In scope: Any activity directly involved in the preparation, installation and servicing of equipment used to collect field water quality data and steps to QC and distribute the data. This includes the use of autosamplers in the field. Out of scope: Not included is the analysis of field samples in the laboratory and issues specific to a particular USGS office or center that do not have a direct impact on data quality.
Pre-Work:	Prior to each field trip the team will perform pre-work to prepare for a visit to a specific USGS site. The pre-work will involve the following: • Assign a contact at the field office to support the team and assign specific tasks to team members for the site visit. (DONE) • Provide Team with an overview of the monitoring activities being conducted at the field office (parameters, continuous or sampling, number of stations, temporal and spatial resolution, specific sensors being used, number and roles of staff, telemetry systems). http://nrtwq.usgs.gov/ks • Prepare timing and resources to ensure there is enough time for complete Process Walks on Day 1 and 2 (DONE) • Receive the applicable SOPs in use. http://pubs.usgs.gov/tm/2006/tm1D3/ and http://water.usgs.gov/owq/FieldManual/ • Develop an agenda for the visit. (DONE) • Provide team with examples of new technologies that have been recently adopted by the USGS including information on the adoption process and timing (DOUG GLYSSON or KEVIN RICHARDS) • Ensure there are 2 USGS Team Members dedicated to the project for all 4 days (DONE)
Site Visit Agenda:	• DAY 1: NC Site Visit Review (Process Map, 9 Square, Action Plan), KS Action Plan, Roles & Responsabilities, • DAY 2: Drive to Wichita, Process Walk - Field Prep, Field Visit, Post Field Activities • DAY 3: Process Walk - Data Handling, Drive to Lawrence, Field Visit Reviw and Data Organization, Break into Teams - Report Development • DAY 4: Teams - Report Development

Lean Enterprise System



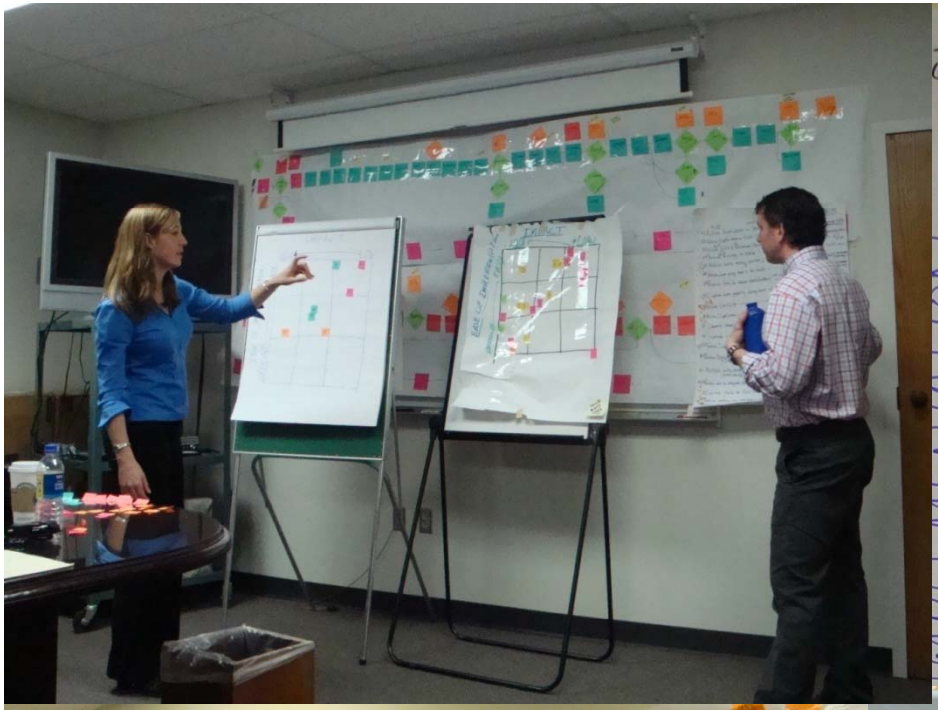
North Carolina site visit

- Estuary site—2 sondes deployed at each site (top and bottom)
- Main parameters: DO, specific conductance and temperature
- Included use of a lean "concepts" tool (spaghetti diagram) and focus center specific activities such as technologies and processes
- One person responsible for data entry



Kansas Site visit

- Freshwater systems – Rivers, Lakes, Reservoirs, Groundwater
- Large real-time network with focus on turbidity and surrogates
- Focus on data processing



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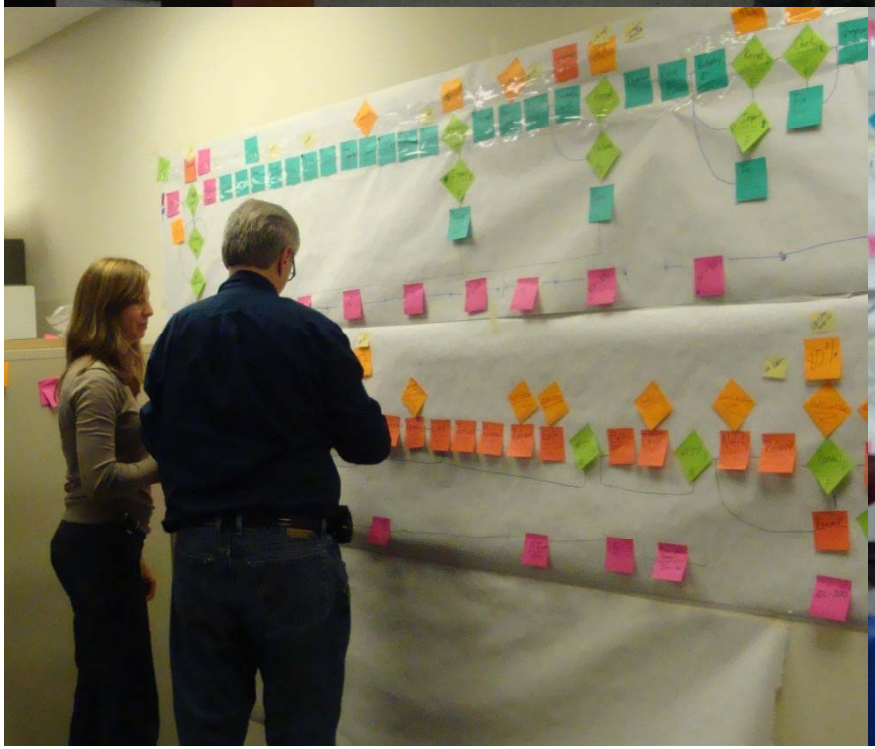
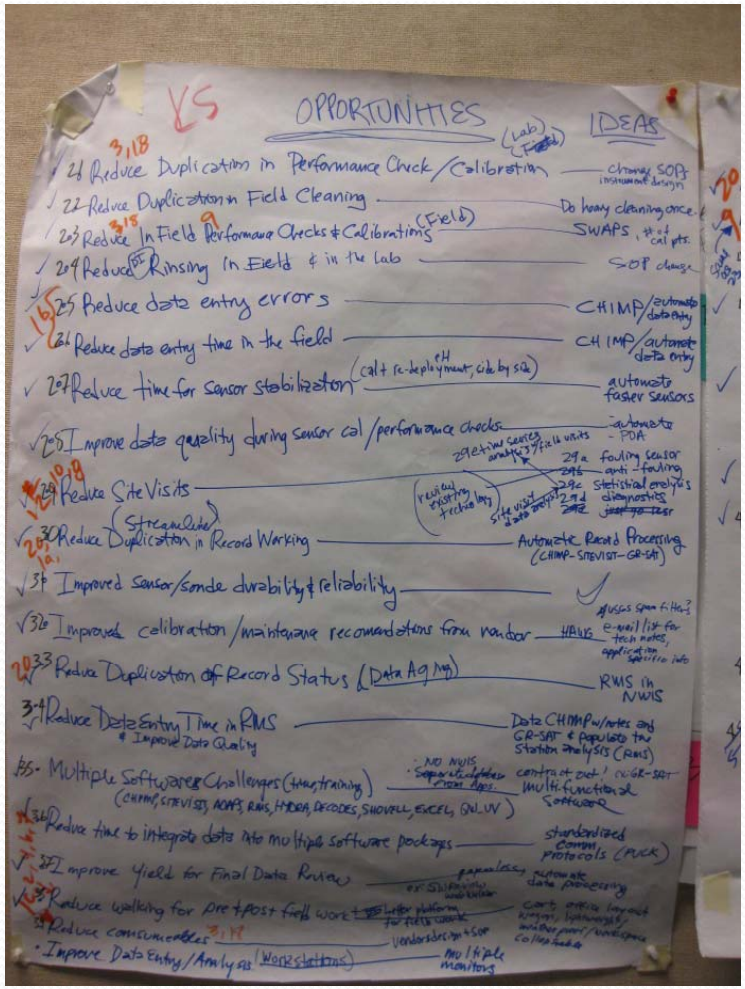
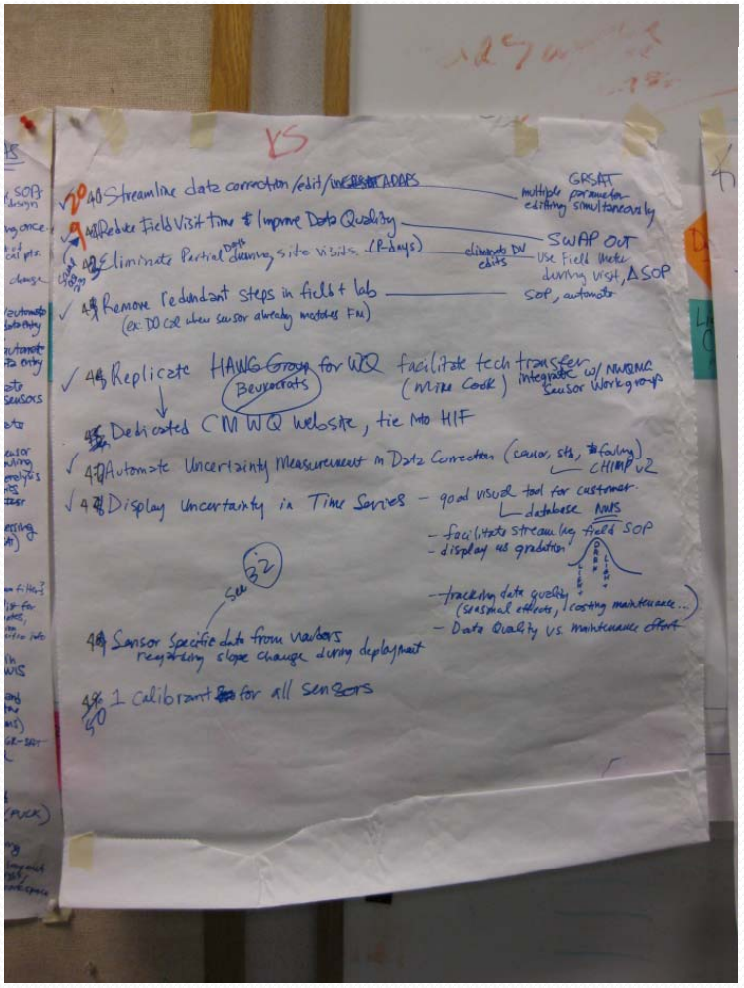
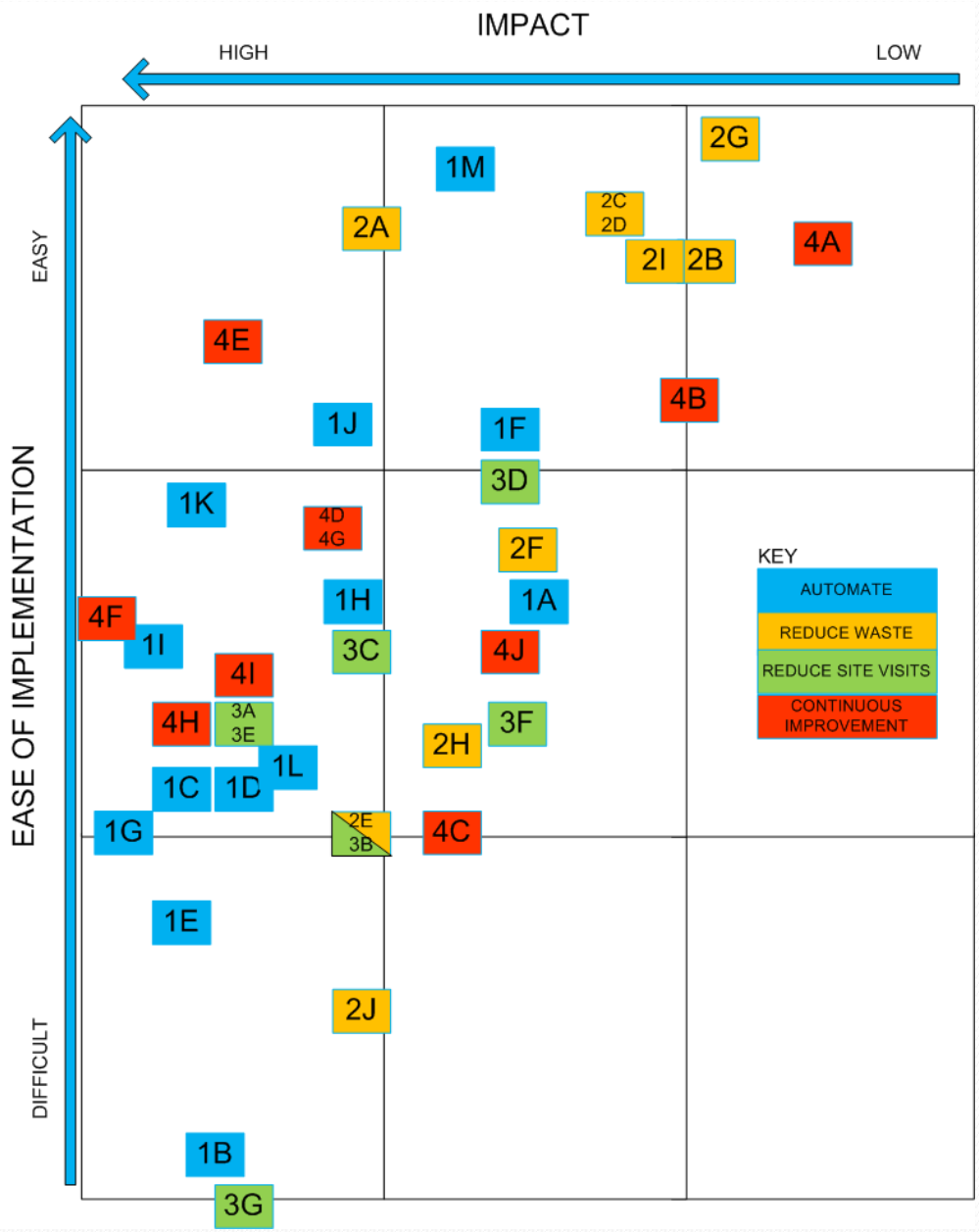


Compile opportunities from process maps





9-Square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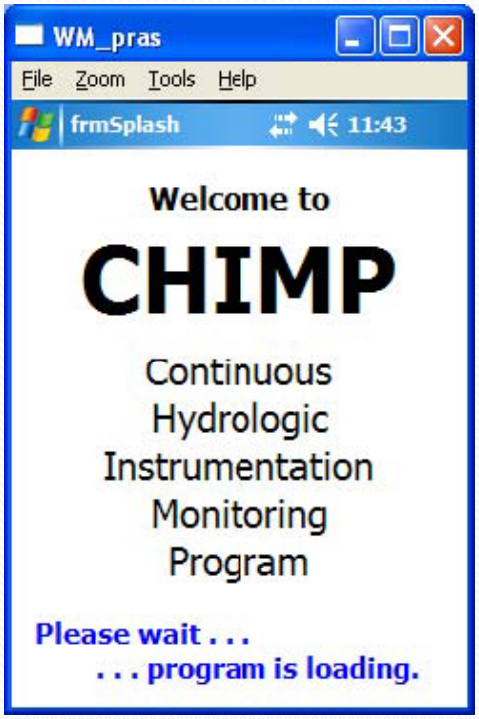
2J
1B
3G
KEY
AUTOMATE
REDUCE WASTE
REDUCE SITE VISITS
CONTINUOUS IMPROVEMENT

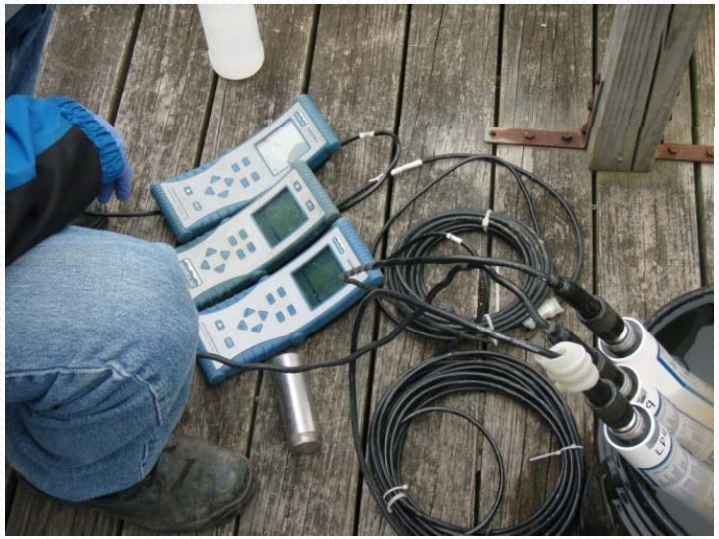
Results & Opportunities

Automate data entry and processing

- Streamline data entry
- Automate data collection and analysis
- Consolidate functionalities of multiple software programs into one solution
- Improve yield in data processing
- Automate processes
- Go paperless



Reduce Wastes



Reduce consumables

- Testing and protocol modifications

Extend life of monitoring equipment

- Highlights: Develop application-specific processes, vendor cooperation

Reduce time needed to generate data

- Highlights: Streamline processes, implement CHIMP, institute field meter swap-outs, utilize wireless devices and remote communications

Field Visits

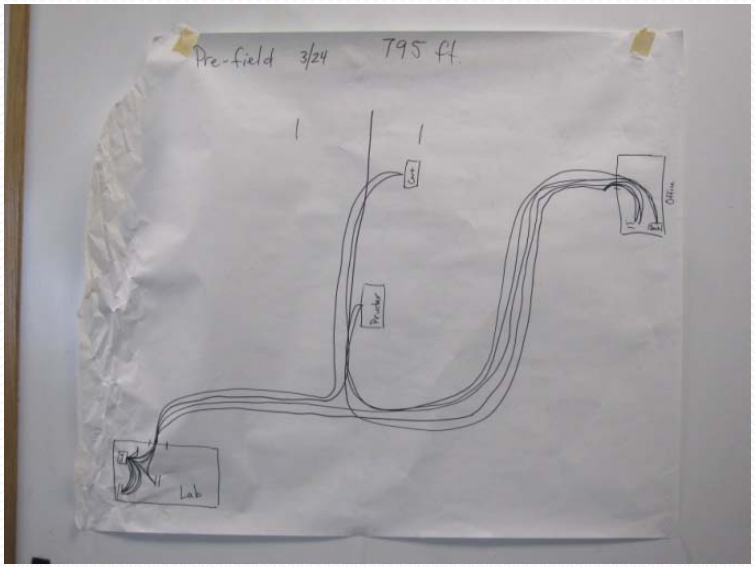
Reduce Frequency of Visits to Field Sites

- Improved antifouling technologies
- Evaluate field monitor swap out system
- Adopt telemetry systems and remotely monitor diagnostics (two-way communication)

Continuous Improvement

Continuous Improvement

- Streamline work centers via 5S Process (Sort, Streamline, Shine, Standardize, Sustain)
- Form Sensor Workgroup
- Streamline technology evaluation and adoption
- Streamline protocol updates



Pre-deployment work flow (squiggle diagram)

Thanks to all the VE Team Members:

- Rob Mooney—In-Situ
- Jim Mull—In-Situ
- Cristina Windsor—In-Situ
- Mike Cook—YSI
- Rob Ellison - YSI
- Mike Lizotte—YSI
- Kevin Richards—USGS

Thank You

QUESTIONS?

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