

The Triad Approach



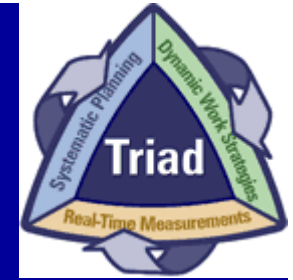
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Overview



- What is Triad?
- Decision making w/in Triad framework
- Advantages/Challenges
- Successful applications
- Resources

Background – Traditional Practices and Policies



- Rigid project plans relying heavily on fixed laboratory methods
- Cleanups requiring multiple mobilizations
- Slow and expensive process

Triad = EPA initiative to improve traditional process

Basic Principles of Triad

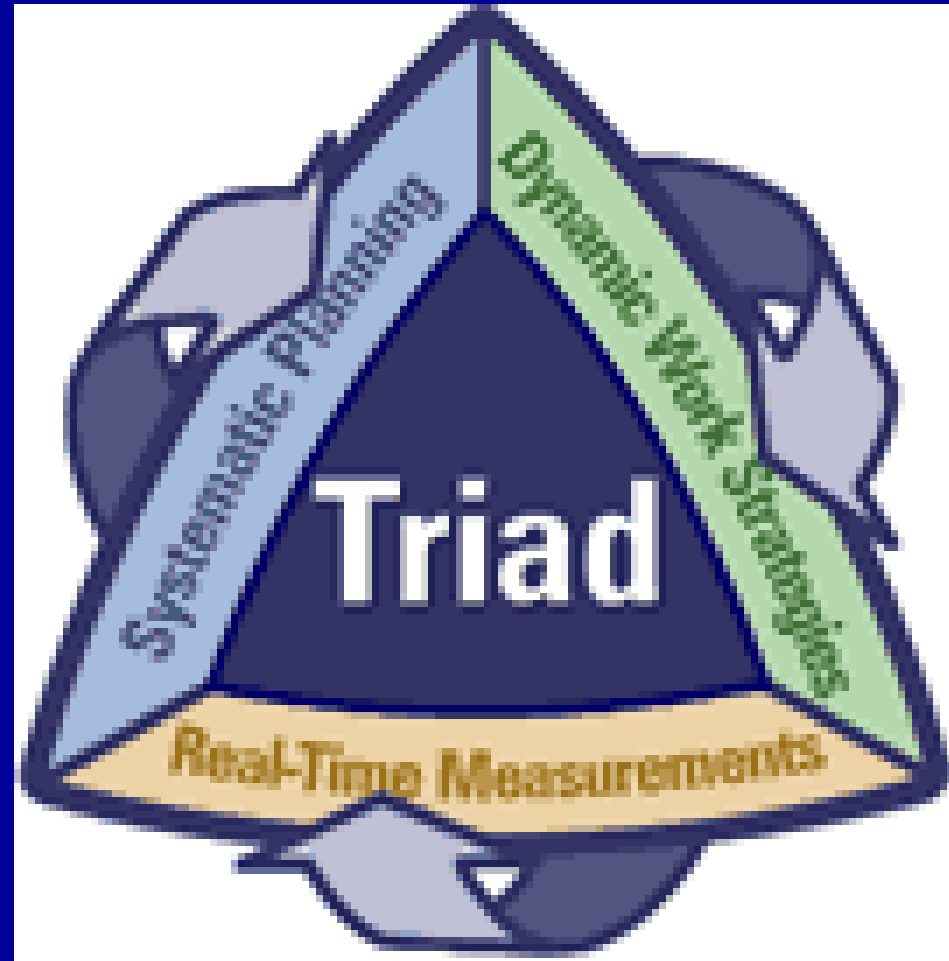


- Minimize data uncertainty through quality data representativeness
- Use dynamic strategies and project specific planning to maximize resources for more effective clean-ups

Elements of Triad



- Systematic Project Planning
- Dynamic Work Strategies
- Real-Time Measurement Technologies



Systematic Project Planning



- Collaborate with all stakeholders to set project goals
- Develop Conceptual Site Model (CSM)
- Form multi-disciplinary decision teams (including regulatory personnel)
- Build trust

Dynamic Work Strategies



- Build sampling strategies around field measurement technologies
- Plan/allow flexibility for decision making in the field with the ultimate goal of minimizing uncertainty
- Constantly change and update the conceptual site model

Real-Time Measurement Technologies

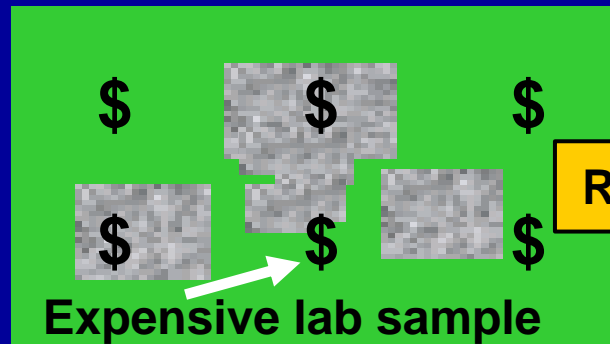


- Numerous established and emerging technologies
- Speed up decision making process
- Potential to reduce cost
 - More data points
 - Fewer mobilizations
- Supplemental to, not replacement for, fixed lab samples

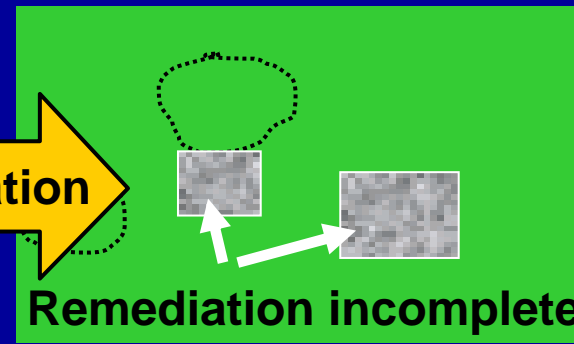
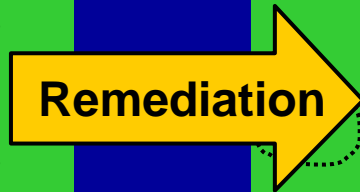
Triad Remediation Outcome



Current



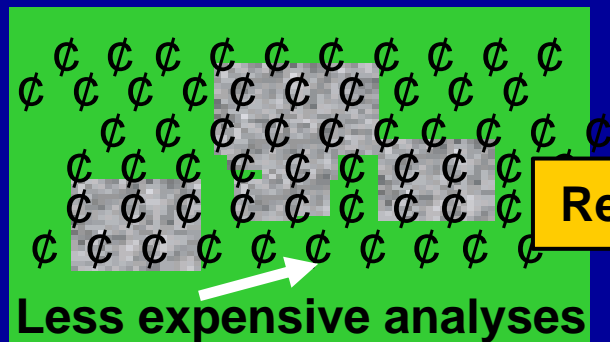
Incomplete site
characterization



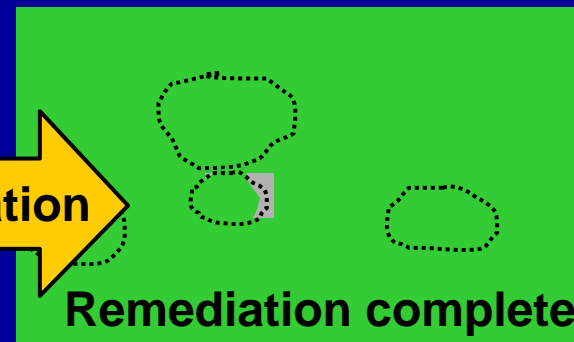
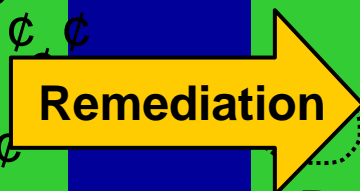
Additional characterization
and remediation needed

High
Project
Decision
Uncertainty

Triad



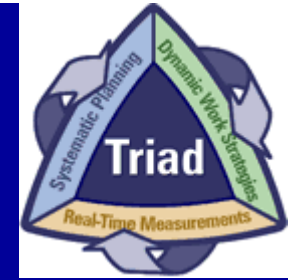
Complete site
characterization



Site restoration completed to a
higher level of quality in one effort

Low
Project
Decision
Uncertainty

Advantages/Challenges



- Advantages

- Lower life-cycle costs
- Better investigation quality
- Faster
- Greater confidence in decision making
- Improved communication
- More effective clean-ups

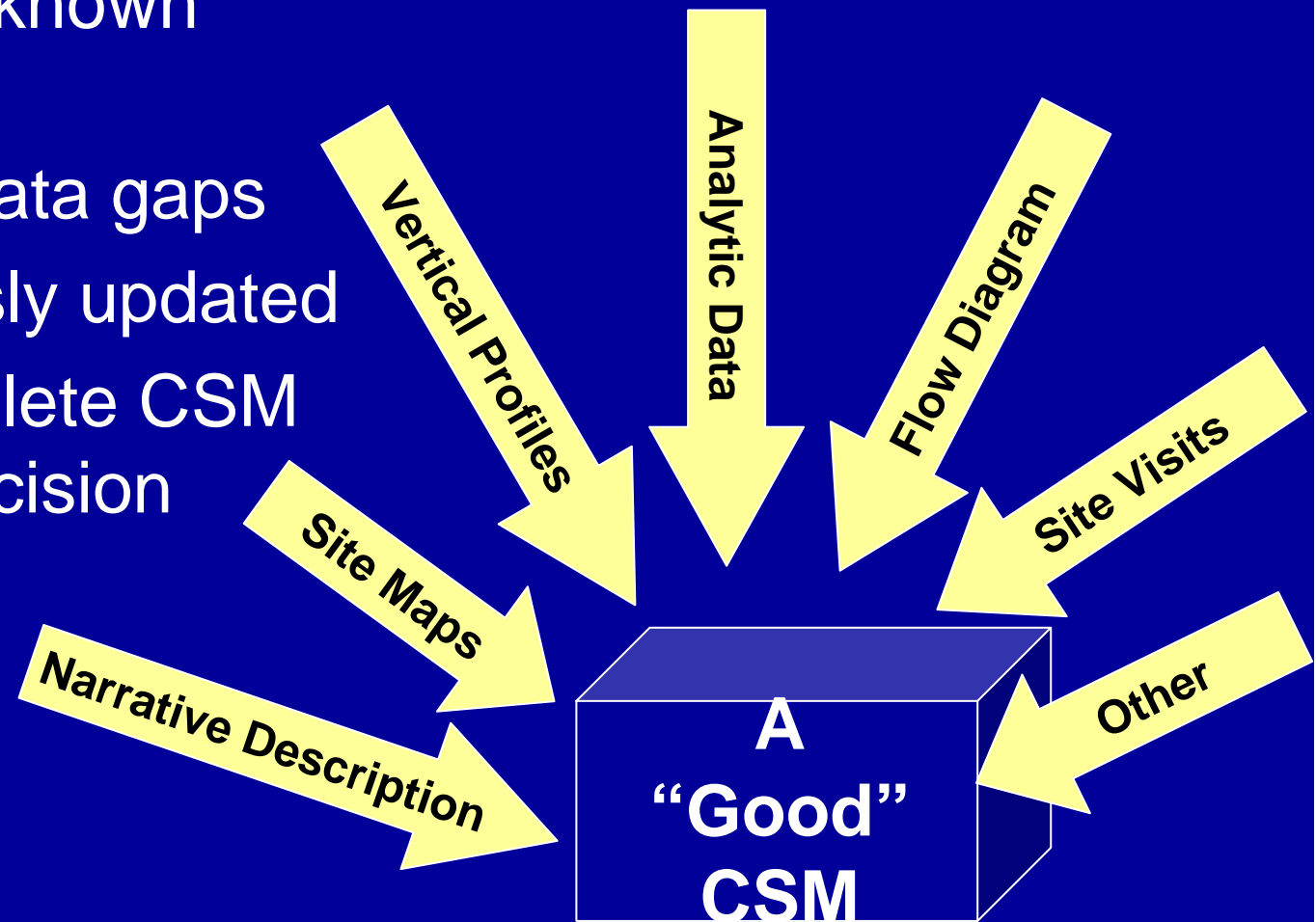
- Challenges

- Higher up-front costs
- Change in approach = learning curve
- Overcoming negative bias towards field-generated data

Conceptual Site Model (CSM)



- Organizes known information
- Identifies data gaps
- Continuously updated
- More complete CSM = better decision making



Conceptual Site Model



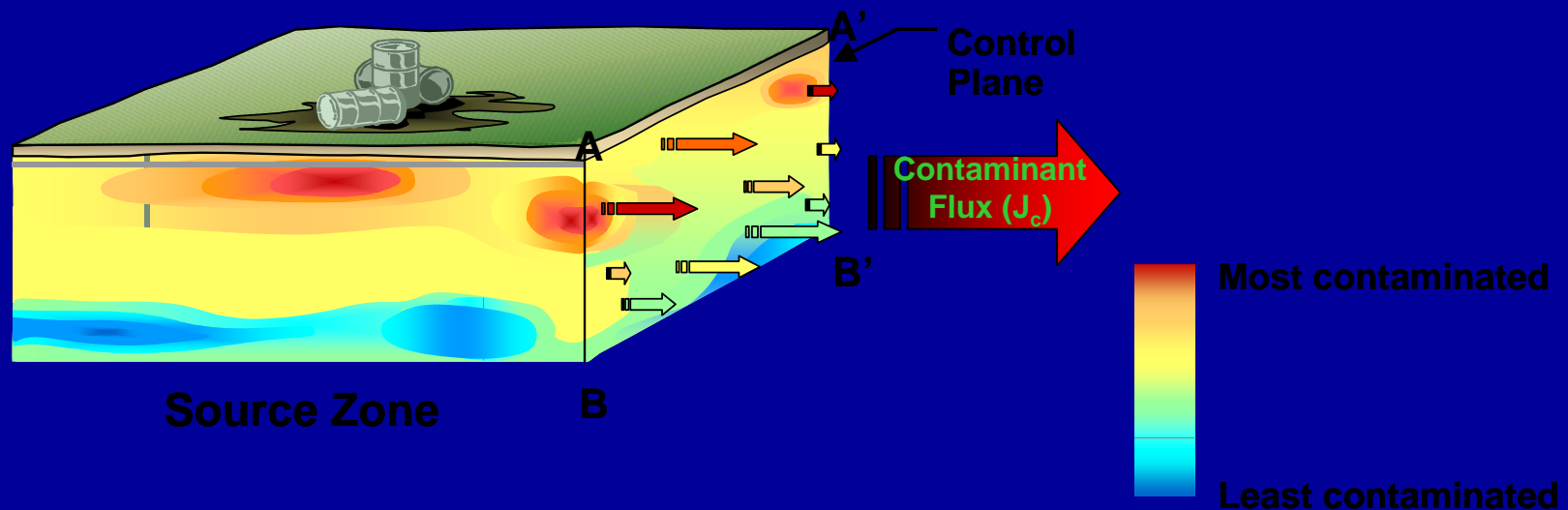
- Growing number of field analytical data collection options
 - Chemical distribution
 - MIP, LIF, FFD, UVOST, GeoVIS, ConeSipper, Waterloo^{APS} Profiler
 - Hydrologic parameter distribution
 - High-res piezocone, hydraulic profiling tool



Conceptual Site Model



- Technology developments will continue to improve CSM capabilities
 - Modeling software coupled with improved real-time data collection tools



Triad Decision Making – Key Factors



- Multi-Disciplinary Technical Teams
- Appropriate scientific/technical expertise involved throughout project
- Appropriate QA/QC Strategies
- Flexible Contracting
- Communication – stakeholder participation

Decision Support Programs



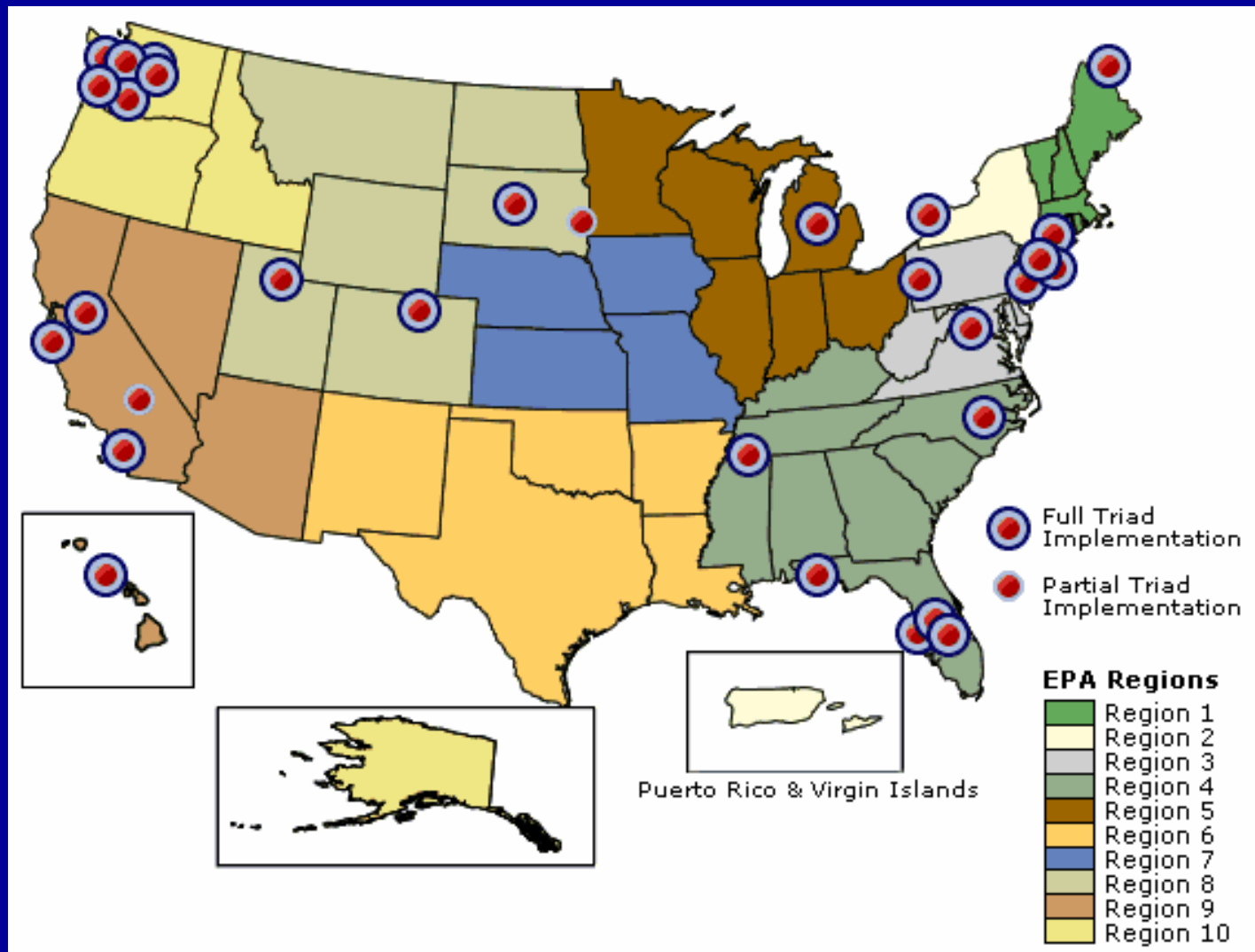
- Publicly available EPA-sponsored software
 - Spatial Analysis Decision Assistance (SADA)
 - tools for visualization,
 - geospatial analysis,
 - statistical analysis,
 - human health risk assessment,
 - cost/benefit analysis,
 - sampling design,
 - and decision analysis.
 - Many others

Challenges



- Technical
 - Acceptance of field analytical methods for on-site decision making
 - QA/QC of field methods, legal defensibility
 - Geologic restrictions to use of real time data collection tools
- Institutional barriers
 - Bureaucracies slow to change

Triad use to date - 2008



Triad Successes



- Large clean-up sites, extensive range of pollutants
- Sites involving numerous agencies and interested parties requiring expedited decision making
- Small scale state-funded agricultural contaminant clean-ups (WI)

Additional Resources



- <http://www.triadcentral.org/>
 - Triad Resource Center
- <http://www.itrcweb.org/gd.asp>
 - ITRC Triad guidance documents available for free download
- <http://clu-in.org/>
 - EPA Technology Innovation Program. Free online trainings. Search archives for “Triad.”
- <http://www.umass.edu/tei/conferences/presentations.html>
 - Presentations from Triad Conference at University of Massachusetts Amherst

References



- *Technical and Regulatory Guidance for the Triad Approach: A New Paradigm for Environmental Project Management*, ITRC Dec 2003
- *Triad Implementation Guide*, ITRC May 2007
- *Triad – Beyond Characterization to Long Term Monitoring of Groundwater Plumes*, Kram/Gustafson, Clu-in Webinar Workshop, Sept 2008
- *Using the Triad Approach to Streamline Brownfields Site Assessment and Cleanup*, EPA June 2003

Additional credit and thanks to

- Members of the ITRC Sampling, Characterization and Monitoring Team
- Deana Crumbling, USEPA

Triad “take-home” messages



- Real-time data saves time and lowers life-cycle costs
- More robust data sets provide greater decision certainty
- Greater decision certainty leads to more effective cleanups
- Collaborative systematic planning improves communication and public relations

Thank You

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