

# Wrap-Up & Questions

Deana M. Crumbling, M.S.  
Technology Innovation Program  
U.S. Environmental Protection Agency  
Washington, D.C. USA  
(703) 603-0643  
[crumbling.deana@epa.gov](mailto:crumbling.deana@epa.gov)

Triad Training, EPA National Site Assessment Symposium  
San Diego, June 28, 2004

# What is Triad?

A multi-party effort to integrate **proven** technical strategies into a holistic framework that incorporates advancing science, technology and project management experience

Why?

To improve the cost-effectiveness and confidence of project outcomes.

# What 3 Mechanisms Does Triad Use to Manage Decision Uncertainty?

- 1) Project-specific Conceptual Models
- 2) A 2<sup>nd</sup>-Generation Data Quality Model
- 3) Modern Tools & Work Strategies

# Which Triad Element is the Most Important?



**Systematic  
Project  
Planning**



**Dynamic  
Work  
Strategy**

**Real-time Measurement  
Technologies**

# What is the Relationship between the CSM and Contaminant Populations?

- The CSM should represent site populations at the scale(s) required to make decisions
  - How many populations?
  - How much heterogeneity?
- **Representative samples**
  - Detect populations of interest
  - Help define the boundaries of distinct populations
  - Taken from known populations to determine characteristics of interest

# How Do Uncontrolled Sampling Variables Lead to Decision Errors?

“Sampling error” occurs when

- **accurate** analytical results on samples from **one** population are extrapolated to represent a **different** population
- A CSM that delineates macro & micro populations of interest is your best defense against sampling error.
- The CSM tells you how to extrapolate results correctly

# Avoid Confusion over Representativeness

- Beware! This concept is used ambiguously
- You can avoid confusion by being specific:
  - “...collect data representative of \_\_\_\_\_” [the goal or intended decision such as CSM development, exposure estimation, remedial design]
  - “...collect data representative of \_\_\_\_\_” [the intended metric, such as an average; provide area/volume to average over]
- If you can't fill in the blank...

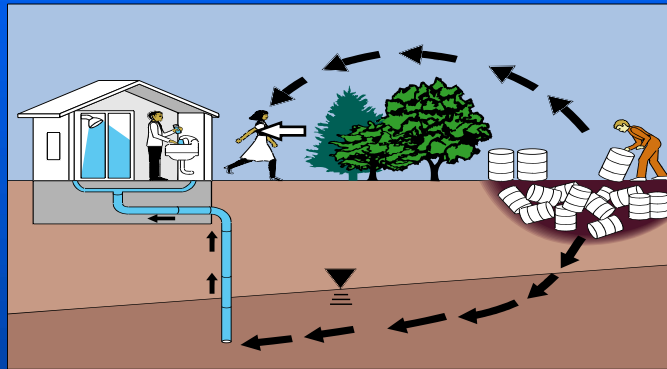
**you are not ready to collect data !!**

# Sampling Plans Flow from High-Level Goals

Lack of clarity here

Reuse Plans, Goals, Outcomes

CSM



+

**Decisions:**

- Exposure risk?
- Cleanup goals
- Data (type, quality)
- Tolerable uncertainty

...means lack of clarity here

...which means no foundation for agreement here

Determine

...or here

**Approaches to:**

- Assessment
- Investigation
- Cleanup Design, Implementation
- Closeout, Long-Term Operations and Maintenance

**Tools for:**

- Sampling, Analysis, Interpretation
- Cleanup/Remediation
  - Containment
  - Cleanup
  - Controls
- Monitoring, Maintenance



# Methods Applicability Studies = Demonstrations of Method Applicability

- In Triad projects, a good methods applicability study will kill a lot of birds with 1 stone
- Can mean the difference between success & failure for a field program
  - An ounce of prevention...

# How Do You Recognize a Triad Project?

- **Social capital:** trust is earned
- Clear project goals are negotiated
- Sources of **decision uncertainty** acknowledged
- Multidisciplinary team
- **Plan** the touchdown before you take off
- **Efficiency** emphasized

# When is it NOT a Triad Project?

- The value of **social capital** is ignored
- Sources of **decision uncertainty** are ignored
  - **CSM** missing / not project- & site-specific / untested
  - **Sampling variability** uncontrolled
  - Data quality not tied to data use
- Data are collected before understanding...
  - ...how the data will be used
  - ...what uncertainties to control
  - ...what QC will help control decisions uncertainty
- When a Triad label is used as a marketing ploy for the same-old-same-old!

# Misconceptions Quiz

## Explain why these are not true

- Triad requires identifying every molecule of contamination
- Any project using a dynamic work strategy is a Triad project
- Any project using some field analytics is a Triad project
- Real-time technologies = field analytics
- Triad turns governmental functions over to the contractor

# Misleading Terminology



**Why?**



**Triad decision  
confidence gives  
you that warm,  
fuzzy feeling!**

# The Diffusion of Innovation

“At first people refuse to believe that a strange new thing can be done, then they begin to hope it can be done—then it is done and all the world wonders why it was not done centuries ago.”

—Francis Hodges Burnett