M2S2 WEBINAR AGENDA

Data Usability Assessment (DUA) Concepts – Steve Stacy
- DUA Overview
- Planning for the DUA

MEC DUAs – Steve Stacy

MC DUAs – Melinda McClellan

Regulator Perspective on DUAs – Doug Maddox

DUA CONCEPTS

Steve Stacy
Geophysicist
Environmental and Munitions Center of Expertise
Huntsville Engineering and Support Center
25 June 2026

U.S. ARMY

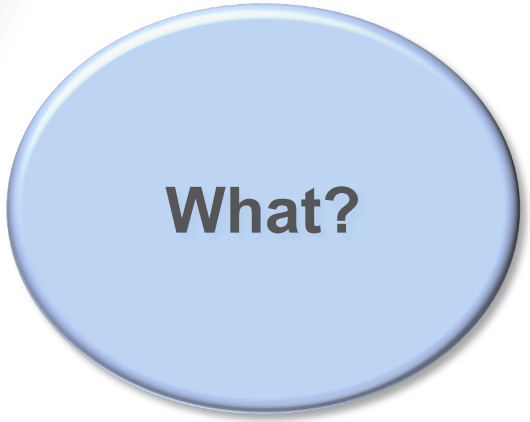
US Army Corps of Engineers®

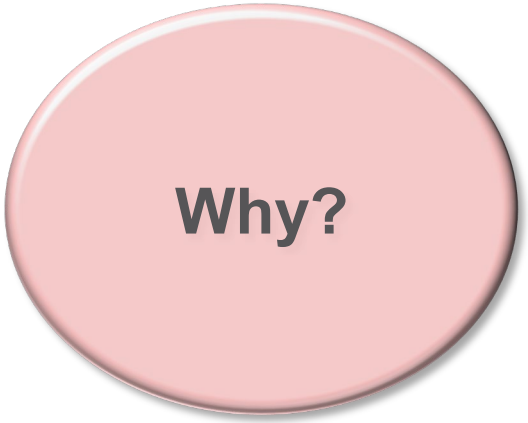
DUA OVERVIEW

U.S. ARMY

US Army Corps of Engineers®

DUA CONCEPTS





WHAT IS THE DUA?

Qualitative and quantitative evaluation to determine if the project data are of the right type, quality, and quantity to support the Measurement Performance Criteria (MPCs) and Data Quality Objectives (DQOs)

Retrospective review of the systematic planning process to evaluate whether:

- Underlying assumptions are supported
- Sources of uncertainty have been managed appropriately
- Data are representative of the population of interest
- Results can be used as intended with an acceptable level of confidence

Weight-of-Evidence Decision-Making

WEIGHT-OF-EVIDENCE APPROACH

Weight-of-evidence decision making is the process of **assembling, weighing, and evaluating** evidence to come to a scientifically defensible conclusion

- Used when scientific questions can only be answered using several lines of evidence, e.g., *risk assessment*
- Involves both quantitative and qualitative approaches

Weight-of-evidence consists of systematically weighing and evaluating evidence, leading to a conclusion best supported by ALL the evidence

- Considers data **relevance, strength** and **reliability**

Conceptual Site Model (CSM)

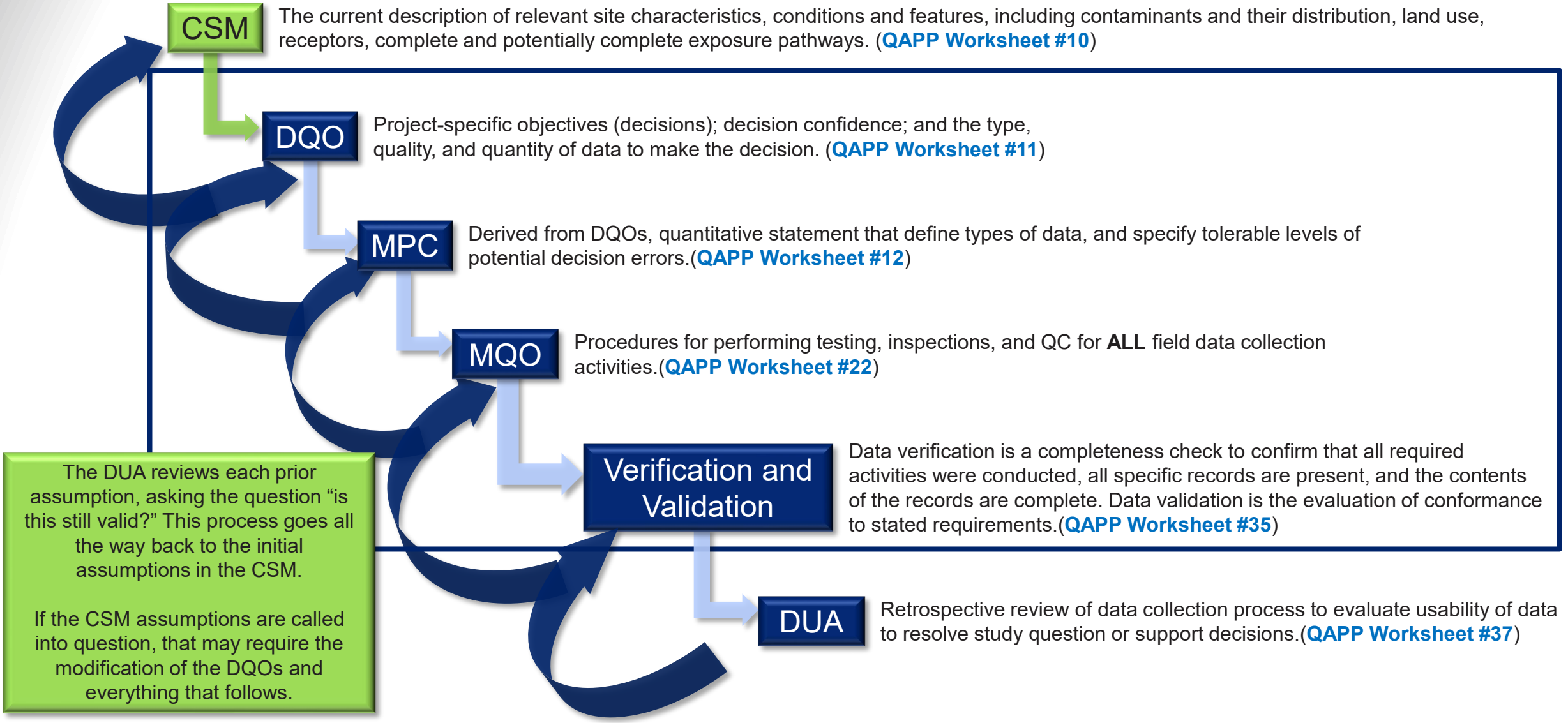
- Documents information and lines of evidence to support decision making

Data Usability Assessment (DUA)

- Evaluates evidence to reach project conclusions

FROM CSM TO DUA…AND BACK AGAIN

U.S. ARMY



WHY DO YOU NEED TO DO A DUA?

Sampling design primary objective:

- Collection of data that are scientifically valid and legally defensible to answer a specific set of questions.

After collecting data:

- The project team needs to evaluate whether the collected data, with potential changes in CSM and uncertainties, can still answer the principal study questions.

Why?

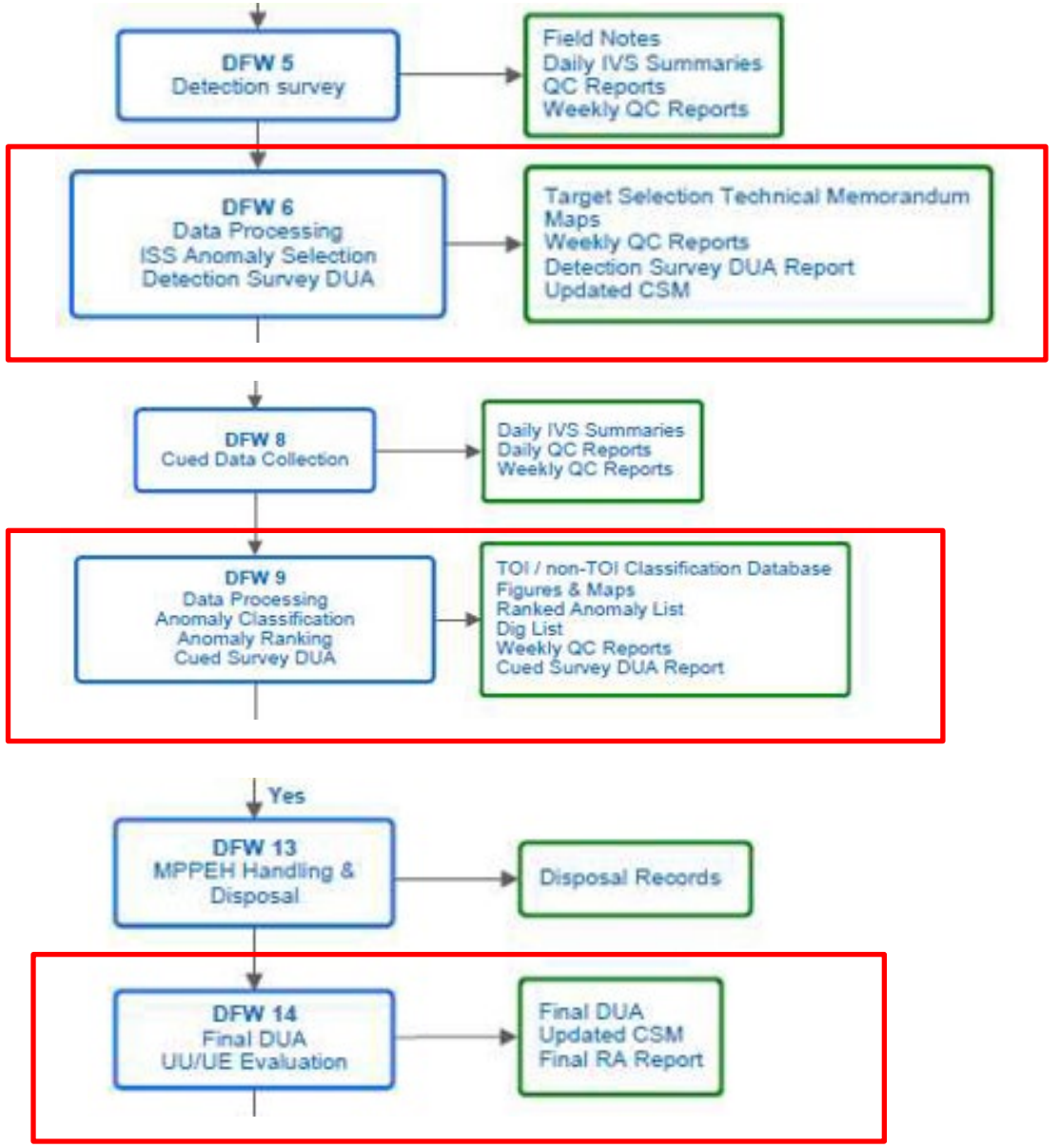
- In the absence of performing our due diligence (DUAs), we risk drawing the wrong conclusions, wasting resources, and worsening liabilities rather than reducing them.

WHEN DO YOU PERFORM THE DUA?

DUA should occur throughout the project

Integrated into the DFWs where decision-making occurs

- When we need to confirm DQOs were achieved
- For each Delivery Unit (DU)
- At any point where data indicates that:
  - Data can't be collected as planned
  - Planning assumptions are no longer valid
  - MPCs can't be achieved
- Final DUA – one DUA to rule them all
  - Project-wide DUA at completion of fieldwork
  - Can attach DU-level DUAs



WHO SHOULD PARTICIPATE IN THE DUA?

Government	Contractor	Regulators	Landowners
• DoD Project Manager (PM) • DoD Technical Manager • Subject Matter Experts (e.g., Geophysicist, Chemist, Risk Assessor, OESS) • Project Quality Assurance (QA) Manager	• PM • Subject Matter Experts (e.g., Geophysicists, chemist, risk assessor) • Quality Control Personnel • Field Personnel	• State regulator • Federal regulator?	• Federal Land Manager? • Major landowners

U.S. ARMY

WHERE TO DOCUMENT DUA

Tables

Table 37.1 Data Usability Assessment for Detection/Classification

If relevant DQOs, MPCs, or MQOs for single-pass detection and classification data have changed, are changes documented?	Yes	FWV001 added MQOs for the APEX sensor, which was used for single-pass detection/classification surveys. FWV002 described: 1. a grid sampling approach for residential and farming areas where transect data collection is logistically challenging, 2. mag and dig transect plan for areas that are inaccessible to AGC sensors or where RTK fix is not reliable, 3. selecting sources for intrusive investigation along transects. FWV003 described: 1. changing the acceptable offset for seed predicted location from 0.25 meters to 0.38 meters, 2. changing the acceptable offset from recovered item location to predicted position from 0.25 meters to 0.38 meters. FWV007 changed the detection threshold MPC to describe thresholds based on detecting a 37mm projectile to a depth of 10 inches.

Memos

- **Step 2: Review the data verification/validation outputs and evaluate conformance to MPCs documented in Worksheet # 12.**

  Table 1 and **Table 2** below summarize the project specific measurement performance criteria (MPC) and measurement quality objectives (MQO), respectively, along with the inspection frequency and acceptance criteria and summarizes the results and states where the detailed results are documented. All project MQOs were met except for the incidents documented in the non-conformance reports (NCRs). Relevant project documents such as the Target Selection Memo and IVS Memos are included as **Appendix 1**. An Excel spreadsheet and Access database were used to track all project MQOs and were provided electronically on a grid specific basis. Two NCRs and corrective actions (CAs) related to dynamic MQO failures are summarized in **Table 3**. The submitted NCR reports are attached as **Appendix 2** for more details. The identified MQO failures did not have an impact on the usability of the dynamic data.

- **Step 3: Document data usability, update the CSM, apply decision rules, and draw conclusions.**

  Table 11-1 in the QAPP provides a summary of potentially hazardous munitions known or suspected to be present at Project 02 MRS and estimated detection depths. The MRS was previously used as a bombing target for 100-lb practice, demolition, and incendiary bombs. RI findings indicate MD were previously recovered at depths up to 48 inches (in) indicating the potential presence of MEC at that depth. None of the items in the CSM are in the DoD AGC Library, and only a few have reasonable surrogates that were used. Detection depths listed in the QAPP were estimated in UX-Analyze using an amplitude threshold of 0.35mV. If no reasonable surrogate was available, then the estimate was based on eight times the item diameter.

  The Target Selection Memo (**Appendix 1**) describes how threshold selections were made based on seven times the RMS for each individual grid in order to detect smaller items while staying above background noise. This resulted in amplitude thresholds ranging from 0.416 (Grid 04) to 0.669 (Grid 07) across the project site based on individual grid noise levels. Detection depths for the dynamic data are expected to be shallower than those estimated in the QAPP because higher thresholds were used. Background noise variability has the potential to skew anomaly density estimates because it results in different amplitude thresholds being used for each grid. It's possible that lower response items may be missed on grids with higher thresholds. Library matches were not performed on dynamic data.

  The dynamic MM2x2 data are of high enough quality to detect the items listed in the RI and are suitable to use to determine locations for the cued investigation. The CAs required did not impact the data usability (see **Appendix 2**). No update to the CSM is required.

All should be included in an appendix of the project report and summarized in the report text.

PLANNING FOR THE DUA

U.S. ARMY

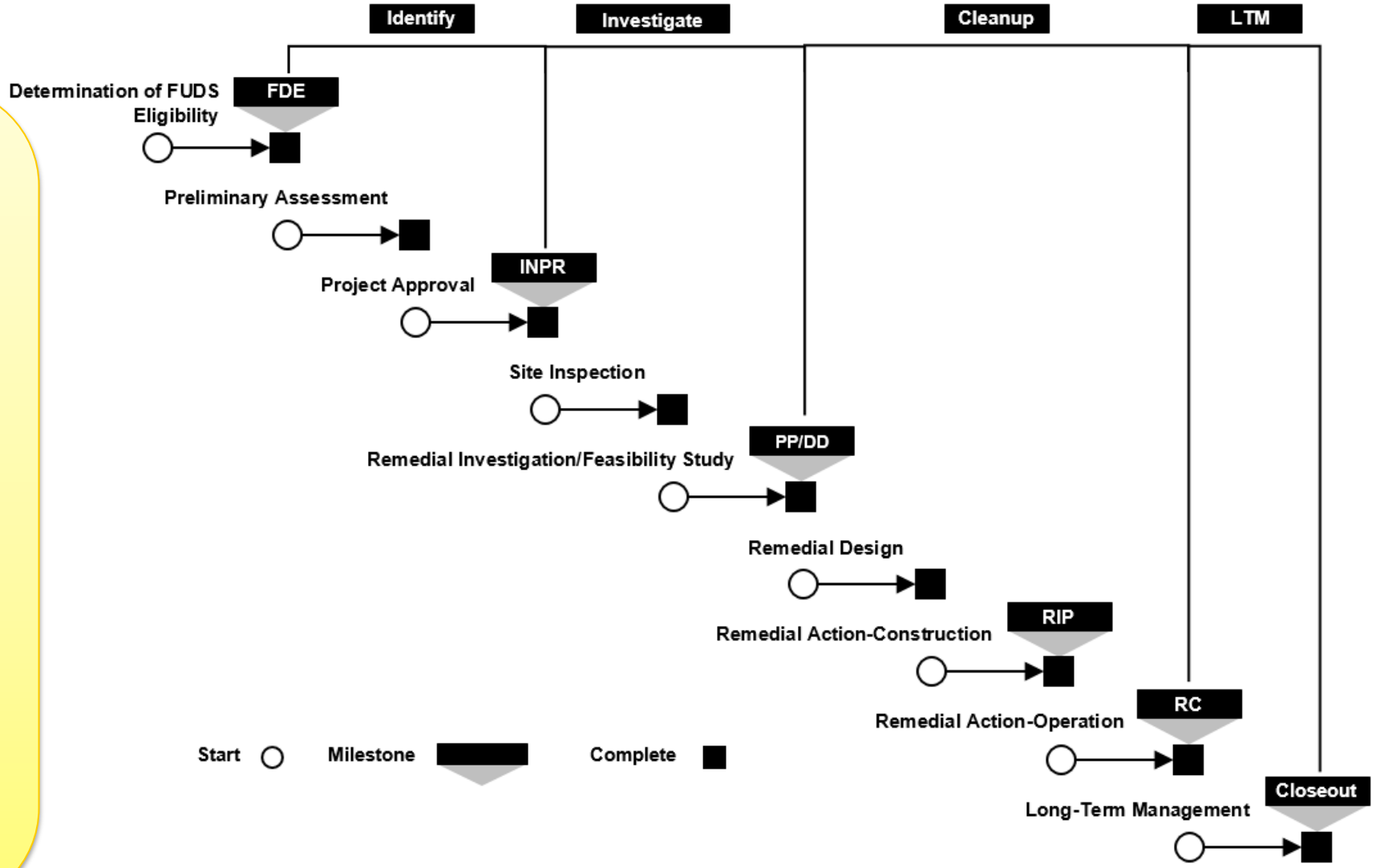
US Army Corps of Engineers®

FUDS PROCESS OVERVIEW

4 Broad categories of phases:

- Identification of eligible projects
- Investigation (SI through RI/FS, Proposed Plan and Record of Decision)
- Cleanup (remedy in ROD through complete)
- Long Term Management

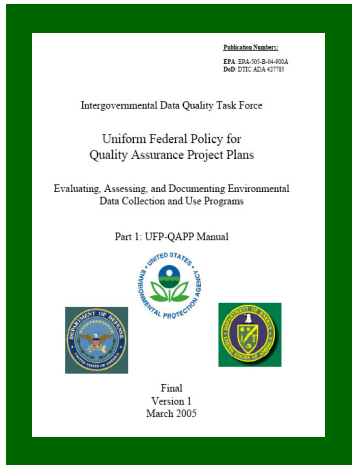
Ultimate goal is to achieve Response Complete and/or Site Closeout, and the DUA is a critical component to evaluating whether that goal is met.



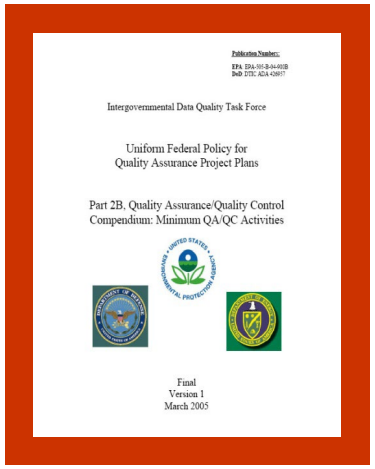
WHAT IS THE UFP-QAPP?

The Uniform Federal Policy for Quality Assurance Project Plans (the UFP-QAPP Manual) is a consensus document prepared by the Intergovernmental Data Quality Task Force (IDQTF). It is a work plan format that provides instructions for preparing Quality Assurance Project Plans (QAPPs) for any environmental data collection operation.

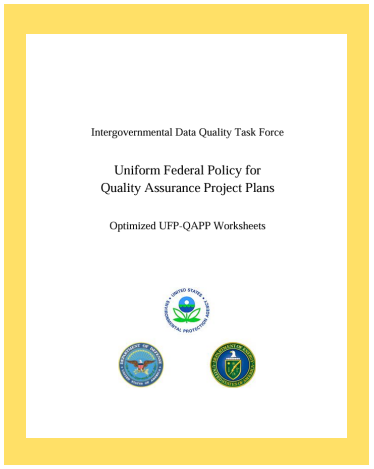
Though the UFP-QAPP Manual is a consensus policy document, it becomes mandatory for new QAPP development for any government department, agency, or program that voluntarily adopts the policy.



Manual



QA/QC Compendium



Optimized Worksheets

Example HTRW QAPP

MR-QAPP Toolkit: Modules 1 and 2

UFP-QAPP FORMAT

Team-Based process

Allows for ***graded approach***

Follows ***Systematic Planning Process (SPP)***

- Formal DQO Process (EPA QA/G-4) or other
- Describe Project Goals, Objectives, Questions/ Issues to be addressed
- Identify Project Schedule, Resources, Milestones, and any Applicable Requirements (e.g., Regulatory, Contractual)
- Match Data Collection and Analysis to Project Objectives
- Identify Collection and Analysis Requirements
- Describe the Generation, Evaluation, and Assessment of Collected Data

Source: IDQTF UFP QAPP Training

UFP-QAPP WORKSHEETS

U.S. ARMY

Chemicals

#1 & 2: Title and Approval Page
#3 & 5: Project Organization and QAPP Distribution
#4, 7 & 8: Personnel Qualifications and Sign-off Sheet
#6: Communication Pathways
#9: Project Planning Session Summary
#10: Conceptual Site Model
#11: Project/Data Quality Objectives

#12: Measurement Performance Criteria
#13: Secondary Data Uses and Limitations
#14/16: Project Tasks & Schedule
#15: Project Action Limits and Laboratory-Specific Detection/Quantitation Limits
#17: Sampling Design and Rationale
#18: Sampling Locations and Methods
#19 & 30: Sample Containers, Preservation, and Hold Times
#20: Field QC Summary
#21: Field SOPs
#22: Field Equipment Calibration, Maintenance, Testing, and Inspection
#23: Analytical SOP's
#24: Analytical Instrument Calibration
#25: Analytical Instrument and Equipment Maintenance, Testing, and Inspection
#26 & 27: Sample Handling, Custody, and Disposal

#28: Analytical Quality Control and Corrective Action
#29: Project Documents and Records
#31, 32 & 33: Assessments and Corrective Action

#34: Data Verification and Validation Inputs
#35: Data Verification Procedures
#36: Data Validation Procedures
#37: Data Usability Assessment

MEC

#1 & 2: Title and Approval Page
#3 & 5: Project Organization and QAPP Distribution
#4, 7 & 8: Personnel Qualifications and Sign-off Sheet
#6: Communication Pathways
#9: Project Planning Session Summary
#10: Conceptual Site Model
#11: Project/Data Quality Objectives

#12: Measurement Performance Criteria
#13: Secondary Data Uses and Limitations
#14/16: Project Tasks & Schedule

#17: Sampling Design and Rationale

#22: Field Equipment Calibration, Maintenance, Testing, and Inspection

#29: Project Documents and Records
#31, 32 & 33: Assessments and Corrective Action

#34: Data Verification and Validation Inputs
#35: Data Verification and Validation Procedures

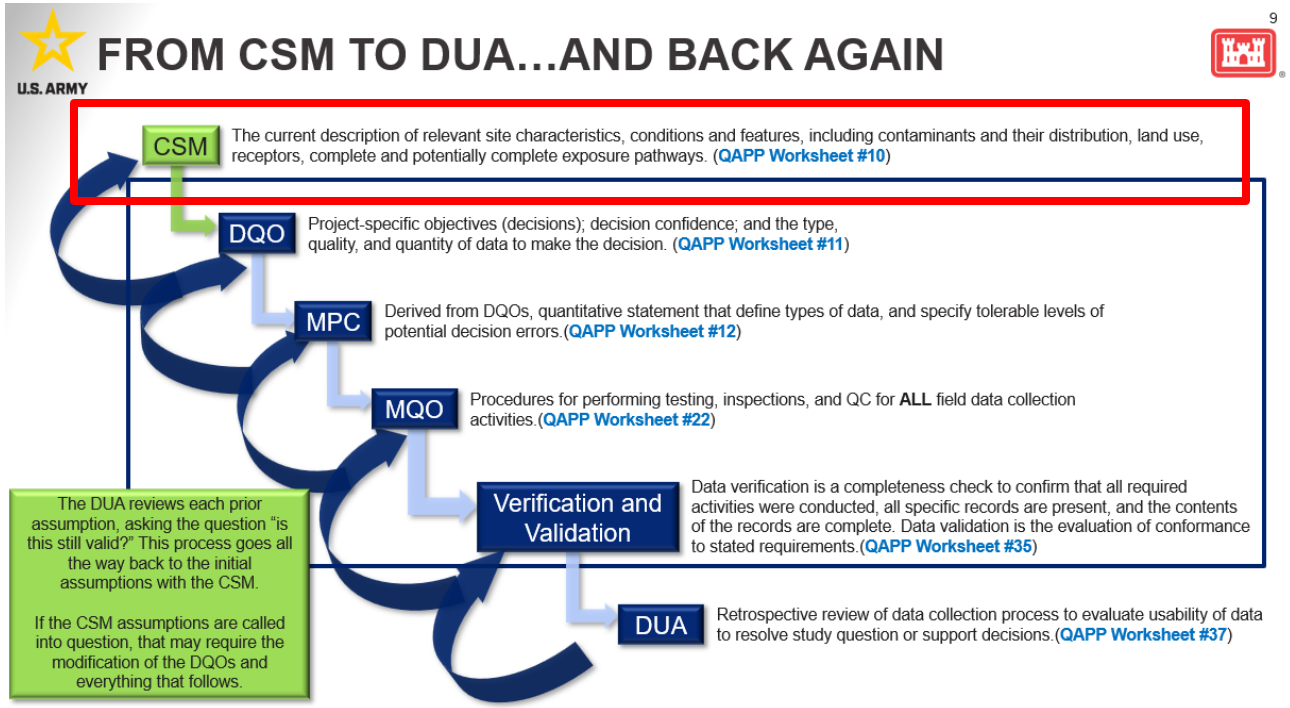
#37: Data Usability Assessment

WS #10

U.S. ARMY

Conceptual Site Model

- Narrative description supported by:
  - Maps, figures, graphics
  - Tables
- Present what we currently know
  - Background information
  - Site location and description
  - Historic use – before, during, and post-DoD use (to present)
  - Key physical aspects (e.g., site geology, hydrology, topography/terrain, climate, vegetation, T&E species, etc.)
- Contamination sources
  - Contaminants and affected media
- Current & anticipated future land use
  - Include ownership (but not PII) and zoning
- Exposure pathways
  - Receptors
  - Potentially complete exposure pathways
  - Identify initial fate and transport considerations

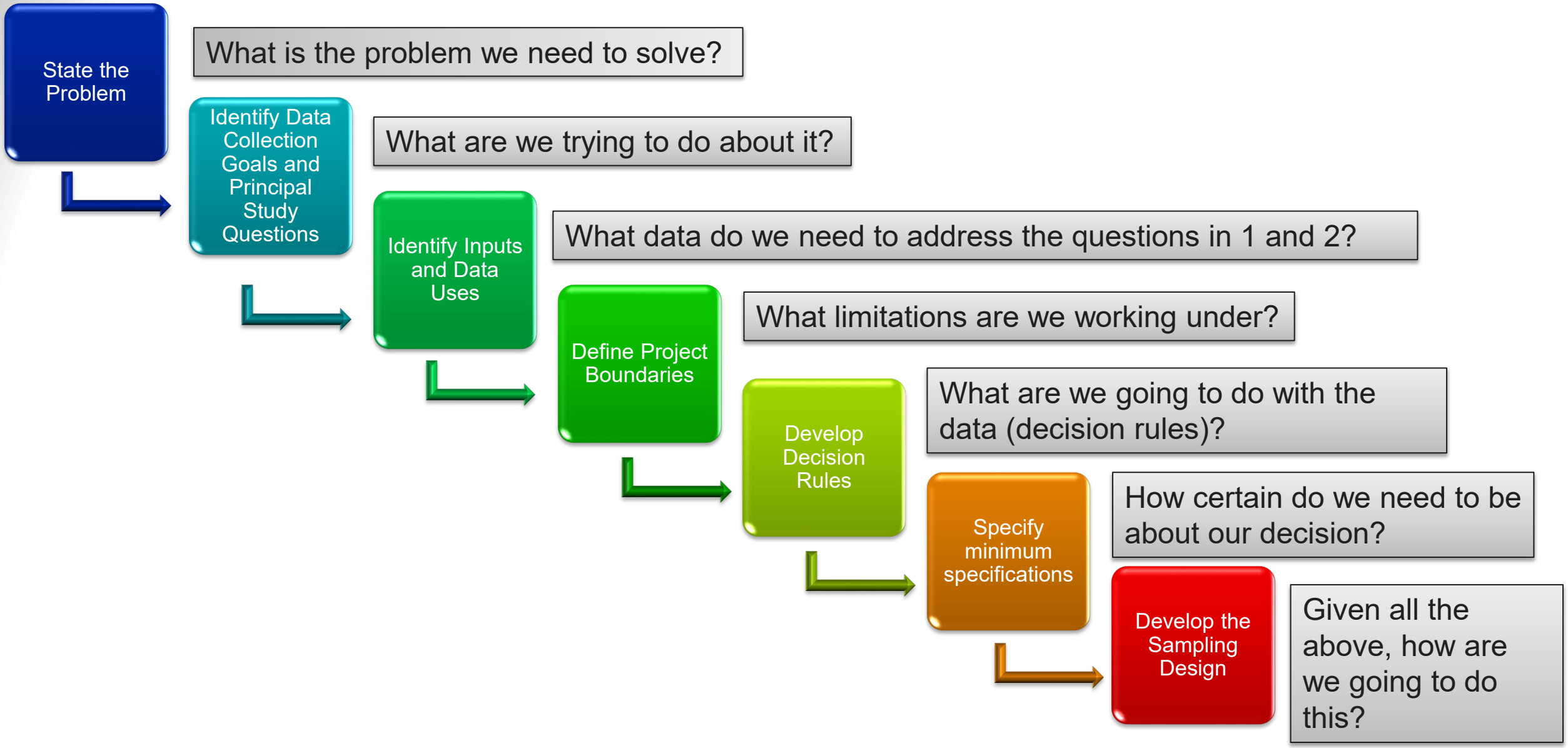


DUA Considerations

- What are the data gaps?
  - Data gaps inform the problem statement and principal study questions.
- CSM is a living document, it continually updates
- DUA must evaluate the implications of CSM changes on the ability to meet the DQOs (*e.g.*, we may need to modify the principal study questions and/or decision rules)

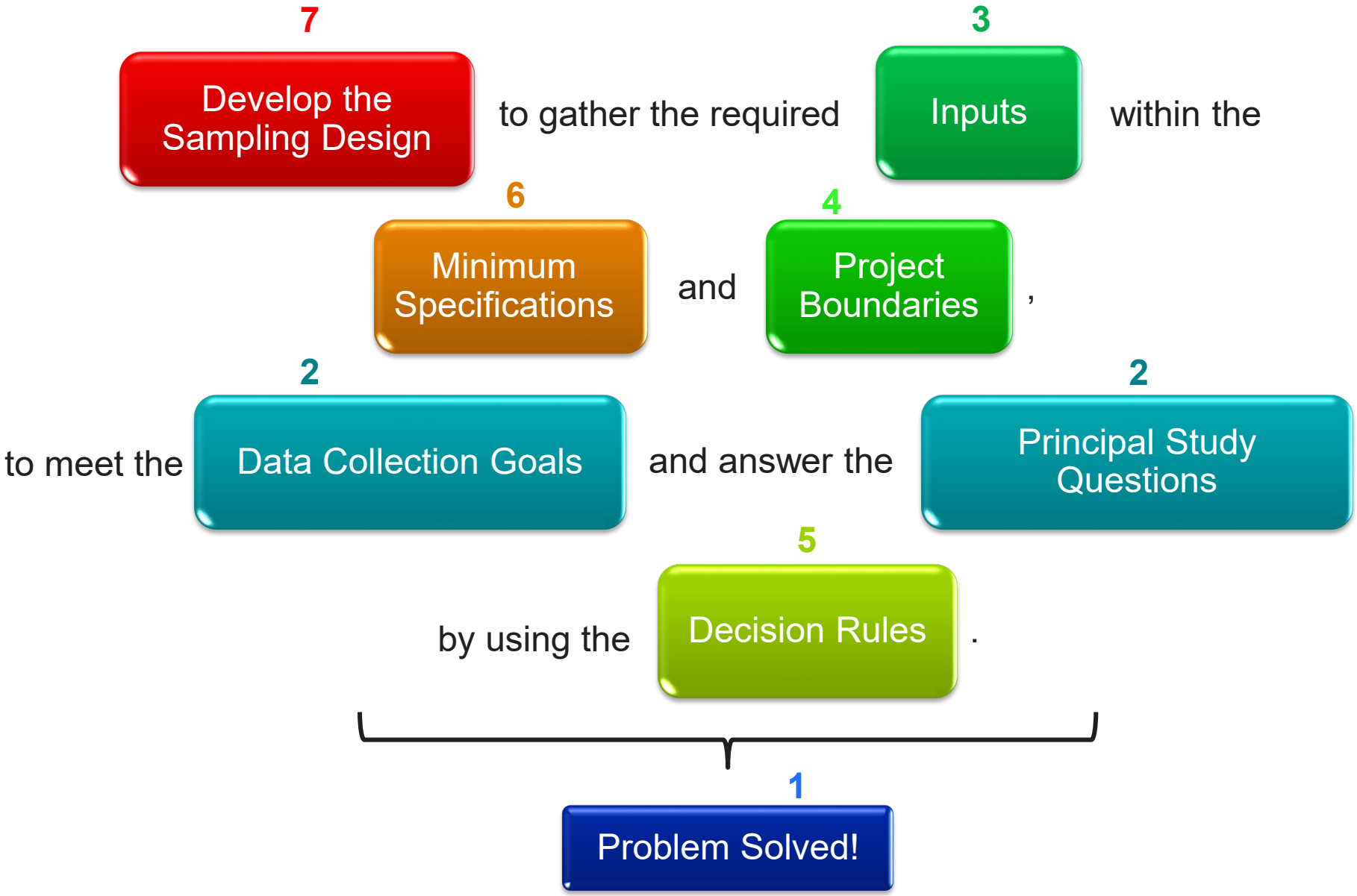
U.S. ARMY

WS #11 – THE 7 STEP DQO PROCESS



U.S. ARMY

RETHINKING THE PROCESS



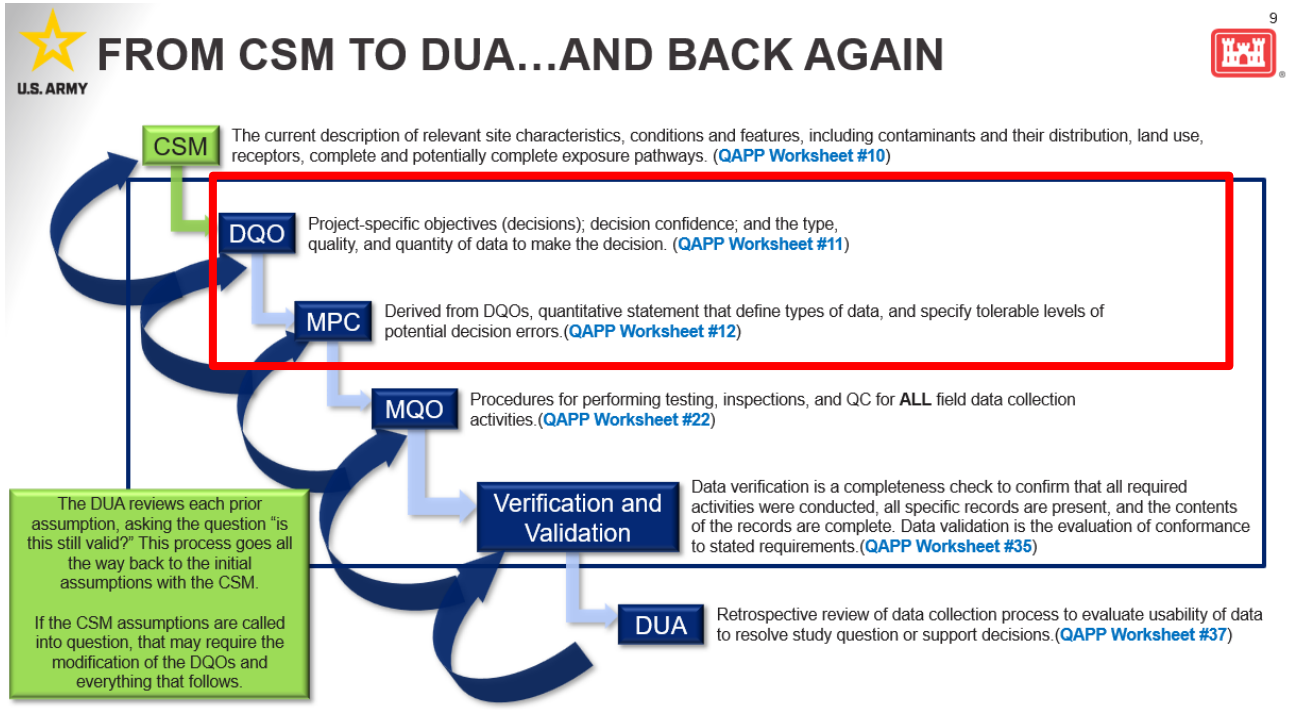
QAPP WS 12

U.S. ARMY

Measurement Performance Criteria (MPCs)

- *"Project-level Criteria"*
- *Minimum performance* specifications that the project must meet to ensure collected data will satisfy the DQOs documented in Steps 1-5 on Worksheet #11
- Expressed in terms of "data quality indicators"
- Criteria against which the intermediate and final data usability assessments (DUAs) will be conducted

Accuracy, Representativeness, Completeness, Comparability, Sensitivity



DUA Considerations

- If these are not met, there are significant impacts to the ability to use the data.
- Stricter in RA than RI due to the decisions that need to be made

QAPP WS #17

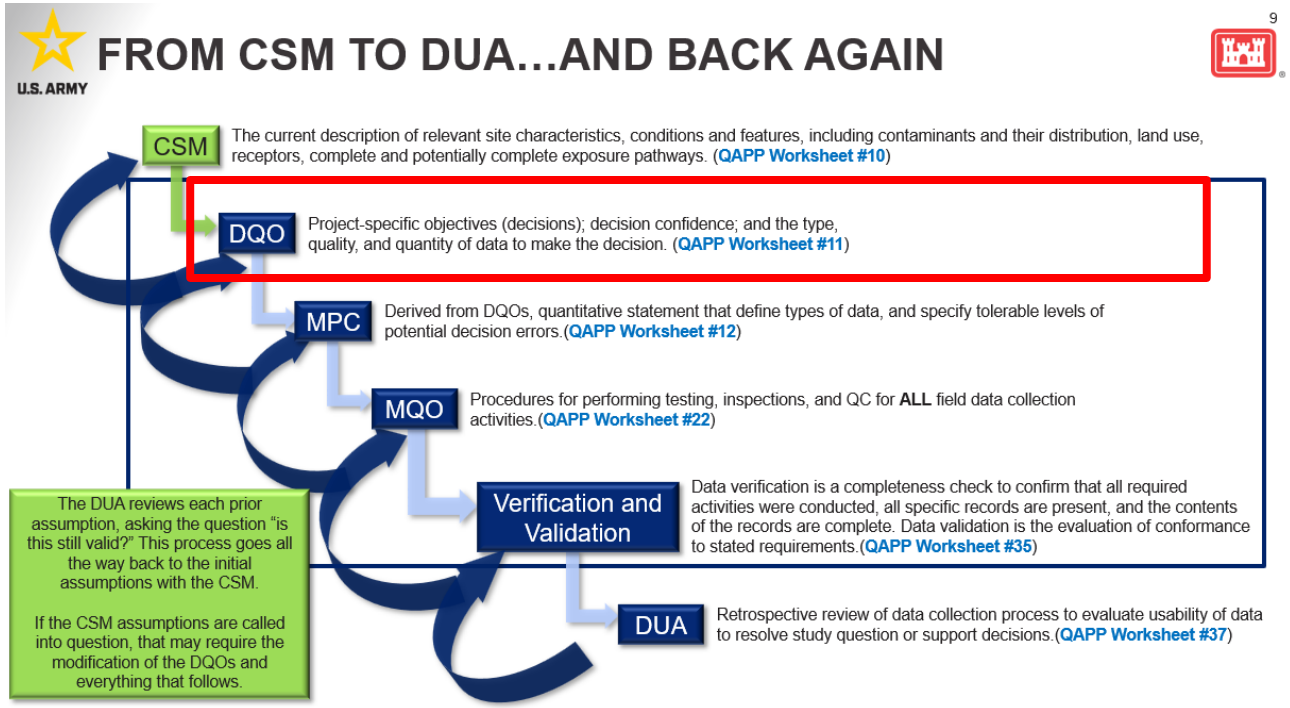
U.S. ARMY

Sampling Design and Workflow

Worksheet #17 should include:

- A map showing physical boundaries for each site
- Concise descriptions for each activity, including documents and deliverables, addressing each data need
- Contingencies in the event field conditions affecting the sampling design are different than expected
- A work flow diagram, including activities and decision points

Decision points at which DoD, regulator, and stakeholder interface will occur should be agreed upon during SPP Meetings



DUA Considerations

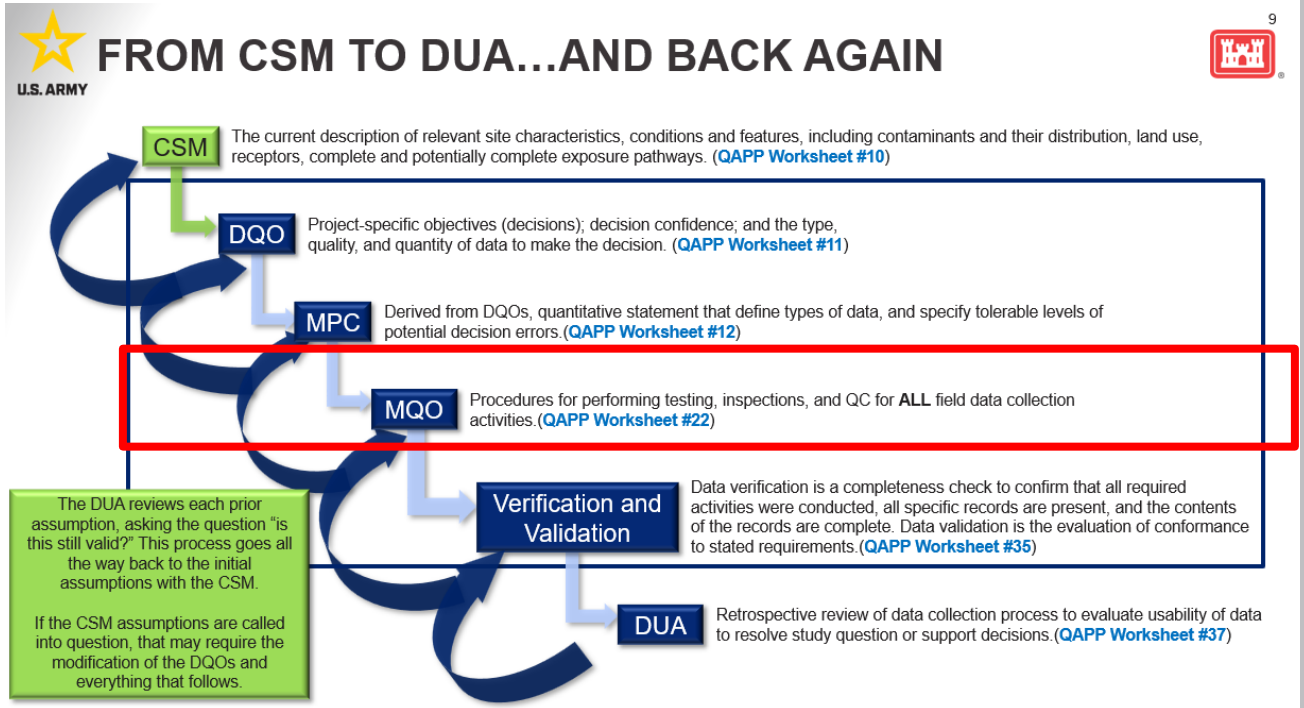
- Changes to the sampling design during execution need to evaluate whether the revised approach meets the requirements of DQO steps 1-6
- If the sampling design cannot be implemented, can the project still answer the principal study questions?

QAPP WS #22

U.S. ARMY

Measurement Quality Objectives

- Document procedures and acceptance criteria to control and document measurement uncertainty during the data collection process
- Triggers root-cause analysis and corrective action for *nonconformances (i.e.,* results outside acceptance criteria)
- Provides opportunities to correct problems before they can have an impact on project objectives



DUA Considerations

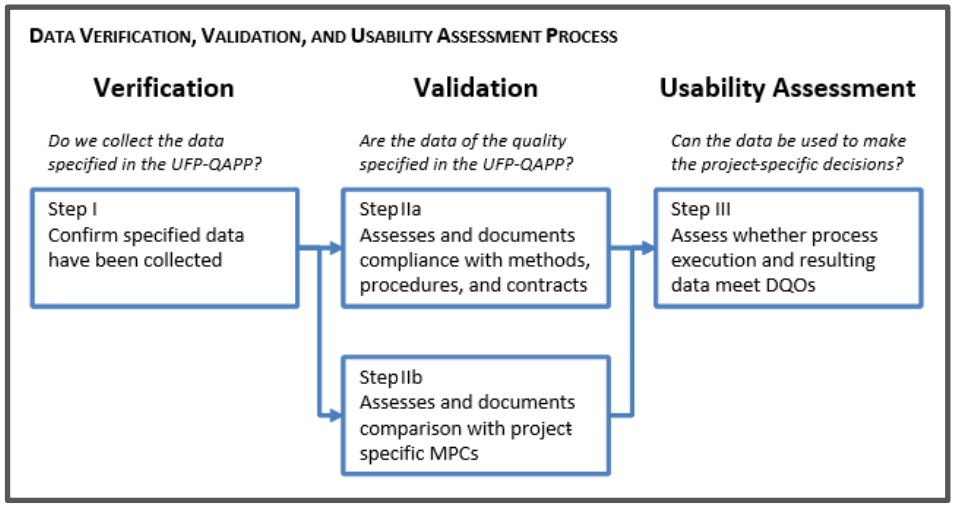
- During project execution, failures to meet MQO acceptance criteria require root cause analysis and corrective action.
- During the DUA, the project team must evaluate whether those corrective actions were effective in preventing recurrence.

QAPP WS #34

U.S. ARMY

Data Verification & Validation Inputs

- Describe which data needs to be
  - Verified? (*i.e.*, do we have it?)
  - Validated? (*i.e.*, is it of adequate quality?)
- List this for records included on WS #29
  - Ones *impacting project decisions*
    - *Is absence, or poor quality, of these data going to adversely impact the decision?*



34.1 VERIFICATION AND VALIDATION INPUTS FOR MEC-RELATED TASKS

Description	Verification (completeness)	Validation (conformance to specifications)	Usability (achievement of DQOs and MPCs)
Field Records			
UXOSO Logbook	X		Uses output from previous steps
Daily Status Reports	X		
Daily QC Report	X	X	
Weekly Geophysical QC Report	X		
Team Leader Logbook(s)	X		
Field Change Request Form	X		
RCA/Nonconformance Reports (NCRs)	X		
Photograph Log	X		
Transect/Grid Status Sheet	X		
AC Sensor Assembly Checklist	X		
Seed Tracking Log *(firewalled)*	X	X	
Site-specific TOI Library	X	X	
DGM QC Deliverable (1)	X	X	
DGM Data Deliverable (2)	X	X	
Supporting Classification Images	X		
Reacquisition Results	X	X	
Intrusive Investigation Results	X	X	
Anomaly Resolution Results	X	X	
DD Form 1348-1A	X	X	
Demolition Summary Sheet	X	X	
MDAS disposal	X	X	
Explosives usage	X	X	
Demolition Shot Record	X	X	
Production Area QC Seeding Report *(firewalled)*	X	X	Uses output from previous steps
IVS Technical Memoranda	X		
Target Selection Technical Memorandum	X		
DUA for Dynamic Data	X		
Background Location Report	X	X	
Final Ranked Dig List	X	X	
DUA for Cued Data	X		
Analysis Verification Report	X	X	
Validation Report	X	X	

(1) DGM QC deliverable includes an Access database used to track IVS, Function Test and other MQO results.
(2) DGM data deliverable includes raw and processed data files; target files; Access database used to track processing, site-specific munitions library.

All inputs should be verified, but not everything requires validation

DUA Considerations

- Critical to plan what data/memos are going to be generated and evaluated to make decisions
- Tied to DQOs (e.g., Step 3 – information inputs, Step 7, sampling design, etc.)

WS #35 (AND WS #36 FOR CHEMICALS)

Data verification and validation procedures:

- Tells us HOW we need to evaluate data and records for the DUA
- Evaluate records included on WS #29
  - Records that impact project decisions
  - Is absence, or poor quality, of these data going to adversely impact the decision?

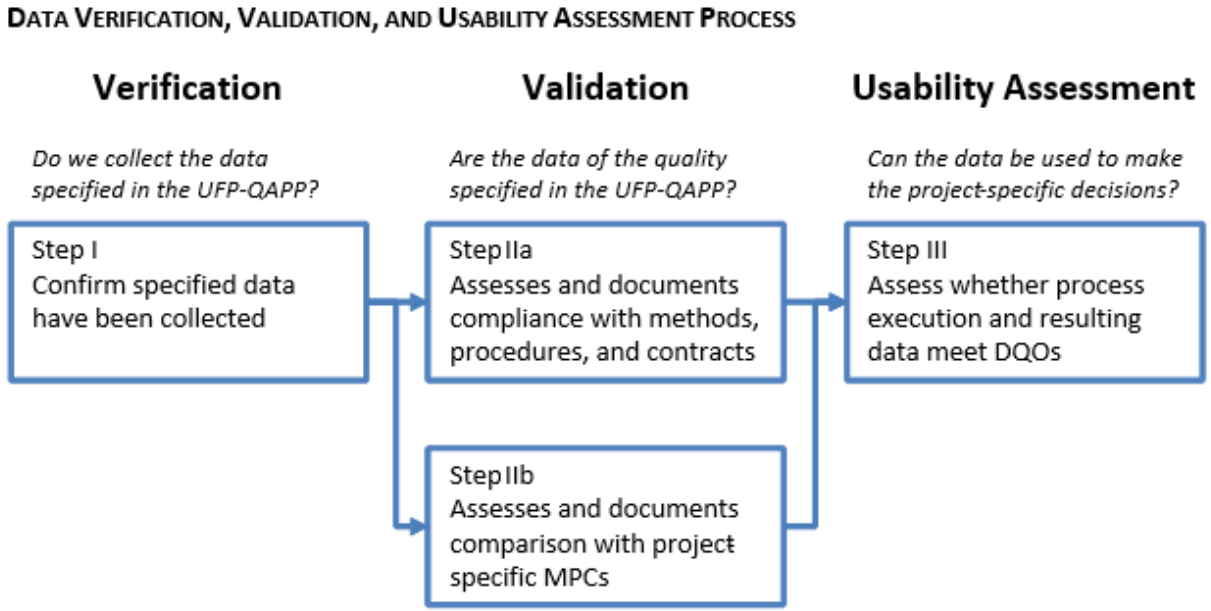
Verification should confirm

- Required activities were conducted
- Specified records are present
- Contents of records are complete

Validation should confirm

- Data meets MPCs/MQOs, or otherwise justify why they are valid

List responsible person!



QAPP WS #37

U.S. ARMY

Data Usability Assessment

- Data Usability Assessment is performed after data collection activities
  - Systematic evaluation of data to confirm data are of right type, quantity, and quality to satisfy MPCs and DQOs
  - Performed by key members of team via document review
  - Uses data verification and validation outputs
  - Involves qualitative & quantitative data evaluation
  - Retrospective review of the systematic planning process to evaluate whether:
    - Underlying assumptions are supported
    - Sources of uncertainty have been managed appropriately
    - Data are representative of the population of interest
    - Results can be used as intended with an acceptable level of confidence

Are project data of the right type, quality, and quantity to support project decisions?

If not, evaluate impact to DQOs and modify QAPP as needed to answer principal study questions

RESOURCES

U.S. ARMY

UFP-QAPP

https://www.epa.gov/fedfac/optimized-uniform-federal-policy-quality-assurance-project-plans-worksheets
https://www.epa.gov/fedfac/uniform-federal-policy-quality-assurance-project-plans-training-materials

Munitions Response (MR)-QAPP (MEC projects only)

https://www.denix.osd.mil/mmrp/

U.S. ARMY

QUESTIONS?

HOW DO YOU PERFORM A MEC DATA USABILITY ASSESSMENT?

U.S. ARMY

US Army Corps of Engineers®

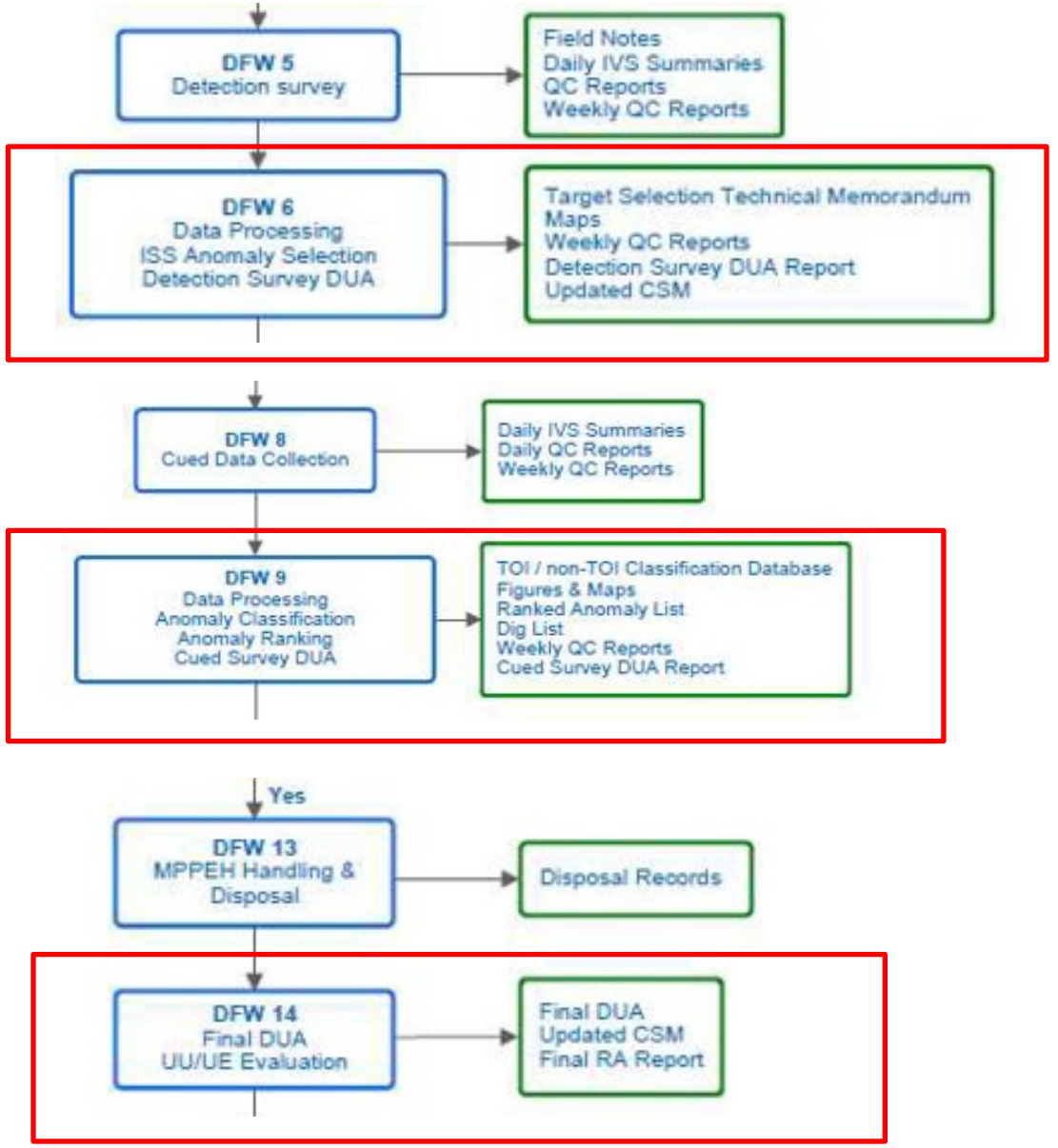
U.S. ARMY

WHEN DO YOU PERFORM THE DUA?

DUA should occur throughout the project

Integrated into the DFWs where decision-making occurs

- ❖ For each Decision Unit
  - Detection Survey
  - Cued Survey
- ❖ At any point where data indicates that:
  - Data can't be collected as planned
  - Planning assumptions are no longer valid
  - MPCs can't be achieved
- ❖ Final DUA – one DUA to rule them all
  - Project-wide DUA at completion of fieldwork
  - Is NOT just for intrusive results
  - Can attach DU-level DUAs



DUA REVIEW

U.S. ARMY

When do we do DUAs for an RI?

- ❖ Conclusion of preliminary characterization
- ❖ Detailed characterization
  - Each DFW where we make decisions
    - Dynamic detection
    - Conclusion of AGC
    - After intrusive investigation
  - Repeat above for each DU, if needed
- ❖ Final DUA

When do we do DUAs for an RA?

- ❖Each DFW where we make decisions.
  When using AGC:
  - Dynamic Detection
  - Conclusion of AGC analysis
  - After intrusive investigation
- ❖Repeat above for each DU, if needed
- ❖Final DUA

What did we forget?

At any point where data indicates that:

- ❖ Data cannot be collected as planned
- ❖ Planning assumptions are no longer valid
- ❖ MPCs can’t be achieved

WHO SHOULD PARTICIPATE IN THE MEC DUA?

Government	Contractor	Regulators	Landowners
• DoD Project Manager (PM) • DoD Technical Manager • Project Geophysicist • Project Quality Assurance (QA) Manager • OESS	• PM • Project Geophysicist • Quality Control (QC) Geophysicist • Field Geophysicist (Lead) • UXO Technician	• State regulator • Federal regulator?	• Federal Land Manager? • Major landowners

U.S. ARMY

MEC DUA PROCESS

Four steps in the DUA process

- Step 1 – Review objectives and sampling design
  - The first step is a review of the overall validity of the data collection plan.
- Step 2 – Review data
  - The second step drills down to examine the data itself.
- Step 3 – Document usability and draw conclusions
  - The third step gets to the heart of the question of data usability.
- Step 4 – Lessons learned and recommendations
  - What lessons were learned in this phase of work and how should those lessons be applied moving forward?

Step 1	**Review the project's objectives and sampling design** Review the data quality objectives. *Are underlying assumptions valid?* Review the sampling design as implemented for consistency with stated objectives. *Were VSP input parameters representative of actual site conditions? Were sources of uncertainty accounted for and appropriately managed?* Summarize any deviations from the planned sampling design and describe their impacts on the data quality objectives.
Step 2	**Review the data verification/validation outputs and evaluate conformance to MPCs documented on Worksheet #12** Review the Data Verification/Validation reports and supporting data, if necessary (e.g., daily/weekly QC reports, assessment reports, and corrective action reports.) *Was the RCA/CA effective? Evaluate the implications of unacceptable QC results.* Evaluate conformance to MPCs documented on Worksheet #12. Evaluate data completeness. *Were all data inputs satisfied? Identify data gaps.*
Step 3	**Document data usability, update the CSM, apply decision rules, and draw conclusions** Assess the performance of the sampling design and identify any limitations on data use. *Considering the implications of any deviations and data gaps, can the data be used as intended? Are the data sufficient to answer the study questions?* Update the conceptual site model, apply decision rules, and document conclusions.
Step 4	**Document lessons learned and make recommendations** Summarize lessons learned and make recommendations for changes to DQOs or the sampling design for the next phase of investigation or future investigations. Prepare the data usability summary report.

MR-QAPP Toolkit: Module 1 and Module 2
https://www.denix.osd.mil/mmrp/

STEP 1: REVIEW OBJECTIVES & SAMPLING DESIGN

U.S. ARMY

DUA Step 1
Review Objectives & Sampling Design

DUA Step 2
Review Data

DUA Step 3
Document Usability & Draw Conclusions

DUA Step 4
Lessons Learned & Recommendations

Review the Data Quality Objectives (DQOs)

- Are underlying assumptions valid?
  - This includes confirming the Conceptual Site Model

Were the project boundaries appropriate?

Review the sampling design as implemented for consistency with stated objectives

- Were sources of uncertainty accounted for and appropriately managed?

Summarize any deviations from the planned sampling design and describe their impacts on the DQOs.

Key Assumptions:

- Remedial Investigation
  - Background and elevated anomaly density
  - Munitions types
  - Military use
- Remedial Action
  - Munitions types
  - Depth of detection
  - Background noise
  - Land use

DUA STEP 1

U.S. ARMY

DUA Step 1
Review Objectives & Sampling Design

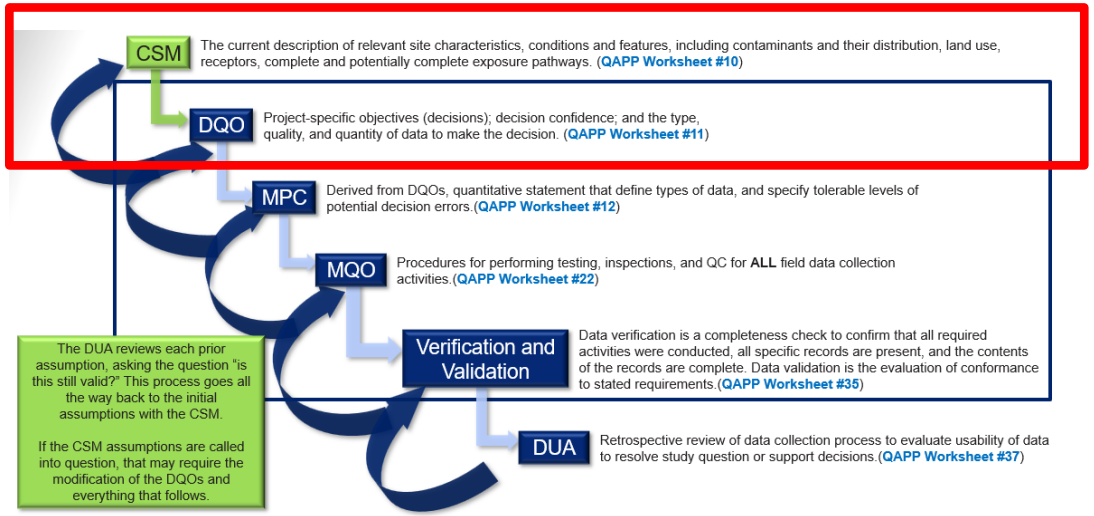
DUA Step 2
Review Data

DUA Step 3
Document Usability & Draw Conclusions

DUA Step 4
Lessons Learned & Recommendations

Some MEC characterization questions to consider

- Were any new types of munitions found?
  - If they are smaller than the smallest anticipated munition, was the transect sampling design small enough to detect a target area for the new smallest munition?
- If we couldn't access the entire site (e.g., < 100% ROE, steep terrain, etc.) what uncertainties do we have in the results?
- Does a High Use Area (HUA) extend to the MRS boundary (and likely go outside the MRS)?
- Is there uncertainty in the transect spacing and/or what the critical density is?
  - Does the HUA boundary account for that uncertainty?



DUA STEP 2: REVIEW DATA

U.S. ARMY

DUA Step 1 Review Objectives & Sampling Design	**DUA Step 2 Review Data**	DUA Step 3 Document Usability & Draw Conclusions	DUA Step 4 Lessons Learned & Recommendations

Review the data verification/validation reports and supporting data

- Daily/weekly QC reports
- Assessment reports
- Corrective action reports
- Data verification/validation reports

Evaluate the implications of unacceptable QC Results

- For non-conformances, were Root Cause Analysis/Corrective action (RCA/CA) effective?
- Evaluate the implications of unacceptable QC results

Evaluate conformance to Measurement Performance Criteria (MPCs)

- If MPCs were not met, what is the impact to answering the principal study questions?

Evaluate data completeness

- Were all data inputs satisfied? Identify data gaps and summarize their impact on the DQOs

WS#35 - DOCUMENTS YOU MIGHT LOOK AT

Requirements/Specifications:

- Prior project documents (*e.g.,* SI, Record of Decision)
- Quality Assurance Project Plan
- Government and Contractor Seed Plans
- Quality Assurance Surveillance Plan
- Standard Operating Procedures (SOPs)

Project Records:

- Site Preparation Technical Memorandum
- IVS Technical Memorandum
- Target Selection Technical Memorandum
- Ranked anomaly list
- DU-level DUAs
- Anomaly resolution report
- Revised CSM
- Site-specific target of interest (TOI) library

WS #35 - DOCUMENTS YOU MIGHT LOOK AT

U.S. ARMY

Data Verification/Validation Reports and supporting documentation:

- Weekly QC reports
- Project QC database
- Corrective action reports
- Assessment reports
- Seeding plans and seed reports
- Instrument verification strip (IVS) memoranda

Table 29-1: Minimum Required Documents and Records [Examples are based on MRS A1]

Document/Record	Completion/ Update Frequency	Format/ Storage Location/ Archive Requirements
Conceptual site model		
Final project-specific MR-QAPP		
Standard operating procedures		
Site-specific TOI library		
QC seeding plan and firewall plan		
Surveyor reports		

PDT ENGAGE – STEP 2

U.S. ARMY

DUA Step 1 Review Objectives & Sampling Design	**DUA Step 2 Review Data**	DUA Step 3 Document Usability & Draw Conclusions	DUA Step 4 Lessons Learned & Recommendations

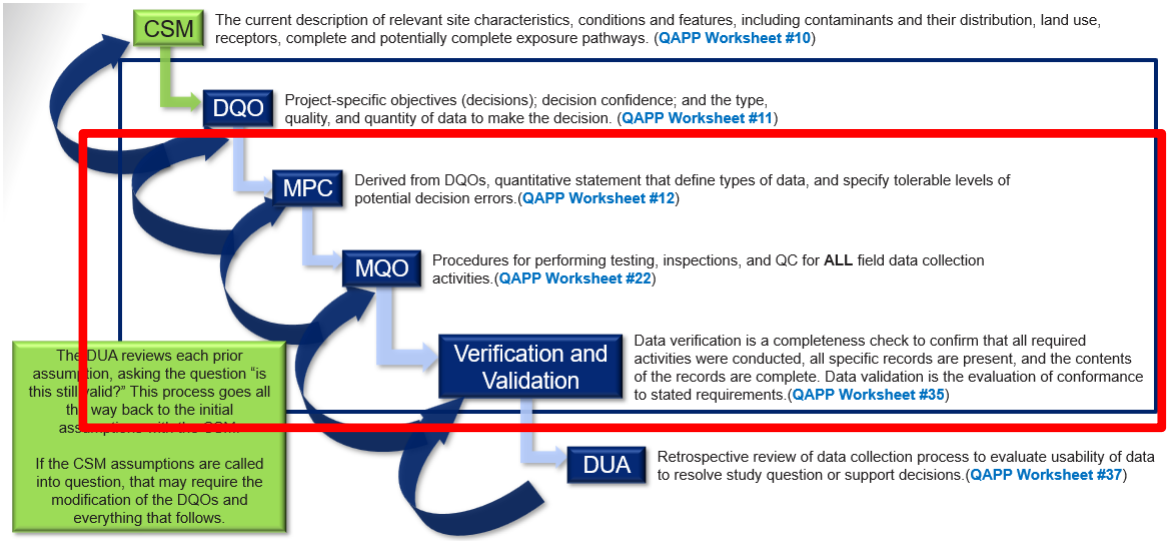
What?

❖Data Verification

- What are the implications if not all required data/documentation were collected?
  - Field logbook is incomplete?
  - Missing data?

❖Data Validation

- Were MQOs met after implementing corrective actions for non-conformances?
- What happens if MPCs are not met?
  - For RA, did we implement the remedy?
- Identify data gaps and summarize their impact on the DQOs



DATA VERIFICATION EXAMPLE

U.S. ARMY

Did the team record the nature of metallic sources for all targets that were dug?

a

Anomaly/Target Quantities Amplitude Response Anomalies Detected	16,202
Advanced Detection Analysis Targets (Potential TOI Identified for Cued Analysis)	7,035
Total Targets Identified for Dig List Can't Analyze Potential TOI Calibration, Threshold Verification and Validation Digs	**553** (104) (418) (31)
Total Dig Records in Database (more than one item found at one target resulted in multiple records for an investigated location)	**1,456**
Munitions Debris (note that some of the individual records indicate multiple pieces of frag)	(1,223)
QC or QA Seed	(14)
Other Debris (Primarily Scrap Metal)	(62)
Small Arms	(36)
No Contact	(36)
Other (shared with adjacent anomaly)	(4)
UXO	(1)

Answer: Maybe. Need to verify at least one entry for each target.

b

Anomaly/Target Quantities Amplitude Response Anomalies Detected	16,202
Advanced Detection Analysis Targets (Potential TOI Identified for Cued Analysis)	7,035
Total Targets Identified for Dig List Can't Analyze Potential TOI Calibration, Threshold Verification and Validation Digs	**2753** (2104) (418) (231)
Total Dig Records in Database (more than one item found within a 0.4 meter radius resulted in multiple records for an investigated location)	**1,456**
Munitions Debris (note that some of the individual records indicate multiple pieces of frag)	(1,223)
QC or QA Seed	(94)
Other Debris (Primarily Scrap Metal)	(62)
Small Arms	(36)
No Contact	(36)
Other (shared with adjacent anomaly)	(4)
UXO	(38)

Answer: No. Need to do a root cause analysis and evaluate implications.

STEP 3: DOCUMENT USABILITY & DRAW CONCLUSIONS

U.S. ARMY

DUA Step 1
Review Objectives & Sampling Design

DUA Step 2
Review Data

DUA Step 3
Document Usability & Draw Conclusions

DUA Step 4
Lessons Learned & Recommendations

Determine if the data can be used as intended:

- Consider the implications of any deviations and corrective actions.
- Assess the performance of the sampling design and identify any limitations on data use.
- Are the data sufficient to proceed to the next phase of the project?

Update the conceptual site model, apply decision rules, and document conclusions

Table D-1: Summary of non-conformances, root causes, and corrective action

Non-conforming MQO	Root cause	Corrective action implemented?
Missed seed (small ISO80) in EM61 detection survey	Buried deeper than specified	N/A – Not a valid seed. Removed from consideration
EM61 swapped out battery and did not do a function test	Operators failed to follow SOP	Recollected data Retrained staff Added to daily brief
Data gaps in EM61 survey	Gullies	Infilled with handheld EM61 data collection that met detection requirements

PDT ENGAGE – STEP 3

U.S. ARMY

DUA Step 1 Review Objectives & Sampling Design	DUA Step 2 Review Data	DUA Step 3 Document Usability & Draw Conclusions	DUA Step 4 Lessons Learned & Recommendations

What?

- Was the contractor able to collect data in all the places required?
  - If there are areas inaccessible to technology X, could data be collected with technology Y?
    - If technology Y has lower quality, what are the implications to the decisions we need to make?
  - If data couldn't be collected at all in some areas, what are the implications (e.g., we could have missed an HUA, we may not have bound an HUA we found, etc.)?
- Do we have enough information to proceed to the next phase?
  - Do we have adequate land use information to perform a risk assessment?
  - Do we have adequate anomaly densities to estimate costs?

STEP 4: LESSONS LEARNED & RECOMMENDATIONS

U.S. ARMY

DUA Step 1 Review Objectives & Sampling Design	DUA Step 2 Review Data	DUA Step 3 Document Usability & Draw Conclusions	DUA Step 4 Lessons Learned & Recommendations

Summarize lessons learned and recommendations

- Make recommendations for future delivery units or subsequent CERCLA phases
  - DQOs
  - Sampling design

NOTE: this is an important step, but is often neglected

Prepare the data usability summary report

PDT ENGAGE – STEP 4

U.S. ARMY

DUA Step 1
Review Objectives & Sampling Design

DUA Step 2
Review Data

DUA Step 3
Document Usability & Draw Conclusions

DUA Step 4
Lessons Learned & Recommendations

What?

- Are there lessons learned included in the DUA?
- Were new types of munitions identified that need to be included in the CSM in future Definable Features of Work (DFWs)/phases?
- Did the team identify areas of the site where terrain and/or vegetation limited the use of some to all technology?

KEY TAKEAWAYS

U.S. ARMY

Involve the full PDT and regulator Perform DUAs

- For each Decision Unit
- For each DFW where decisions are made
- Pause if
  - Data can't be collected as planned
  - Planning assumptions are no longer valid
  - MPCs can't be achieved
- Final DUA – one DUA to rule them all

Evaluate CSM, MQO, MPC changes and their implications

- Were RFP and QAPP assumptions correct?

Evaluate RCAs and whether CAs were effective

Include Step 4

- What did we learn that should be applied to future CERCLA phases?
- What did we learn in DU1 that we should apply to DU 2, 3, etc.?
- What did we learn in the detection phase that should be applied to cued phase?
- What root causes require corrective actions to propagate through the entire project and/or future phases and what are the ramifications of those root causes?

Evaluate all elements in the "critical path to success"

Remember: The DUA reviews each prior assumption, asking the question "is this still valid?" This process goes all the way back to the initial assumptions with the CSM. If the CSM assumptions are called into question, that may require modification of the DQOs and everything that follows.

U.S. ARMY

QUESTIONS?