

# Efficient and Secure Cloud Computing for UXO Classification and Project Management

**MR-201713**

**Dean Keiswetter**

**Acorn Science and Innovation, LLC**

**In-Progress Review Meeting**

**2/21/2018**



# MR-201713: Cloud Computing for UXO Classification

**Performers: AcornSI and Geosoft, Inc.**

## Technology Focus

- Detection, Classification and Remediation of Military Munitions

## Demonstration Site

- Former Lowry Bombing and Gunnery Range

## Demonstration Objectives

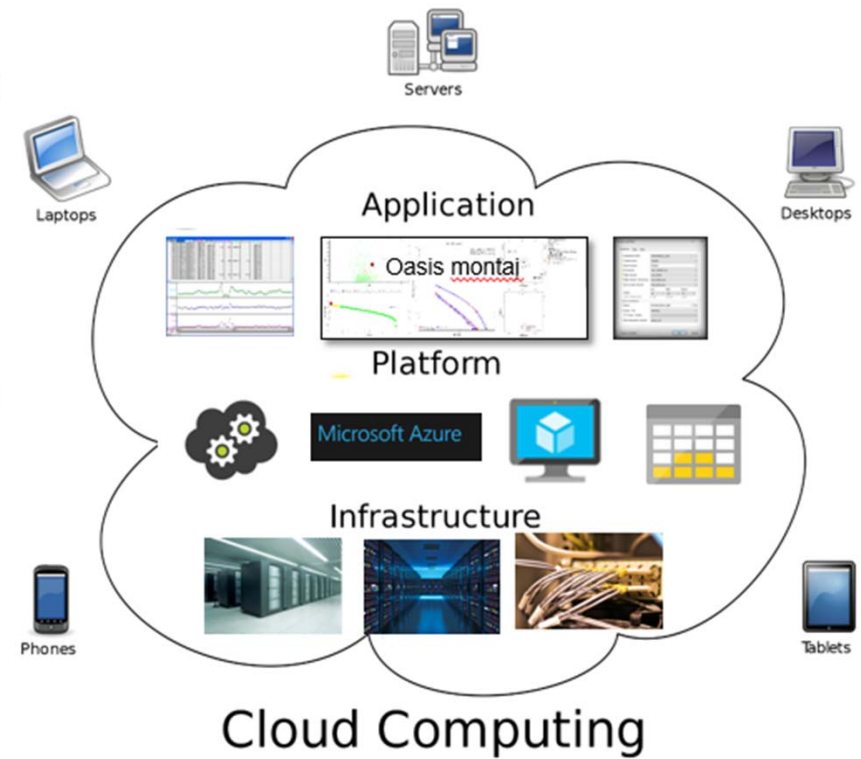
- *Develop and demonstrate Cloud based data analysis and classification capabilities*
- *Classification performance that matches PC-based UX-Analyze*

## Project Progress and Results

- *Cloud-based Workflow*
- *Cloud-based Architecture*
- *UX-Analyze Web Server*

## Implementation Outlook

- *Excellent*
- *Rick Grabowski offered Corps of Engineers support*

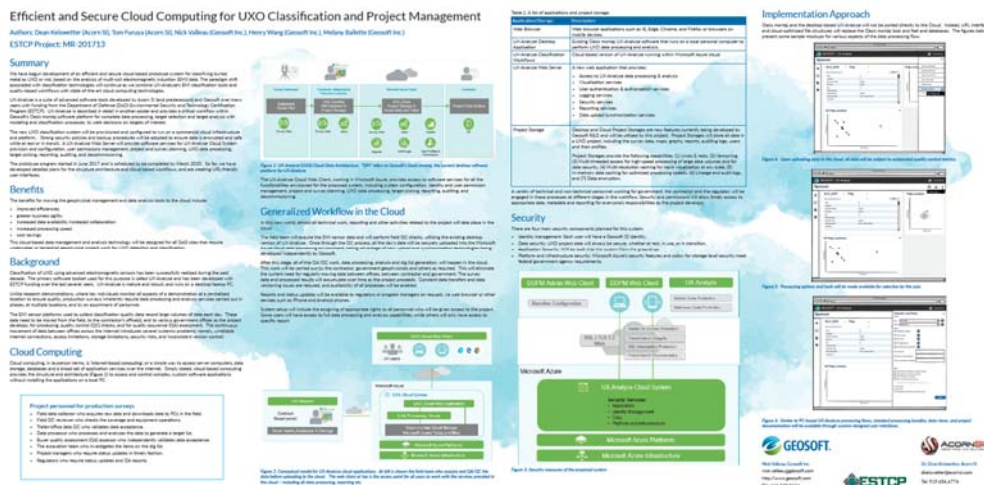


# Social Media Content

“A new ESTCP project begun 2017 is bringing advanced UXO classification to the cloud. [This exciting project](#) is expected to deliver enhanced data and project security, speed of processing and analysis, auditability, and many other benefits. Year one developments included data handling schemes, system architecture, user experience interfaces, interactive linking, and EM inversions.”

## Efficient and secure Cloud Computing for UXO Classification and Project Management

### [SERDP-ESTCP 2017 Symposium Poster](#)



**Efficient and Secure Cloud Computing for UXO Classification and Project Management**  
 Authors: Dean Kohnen (Acorn SI), Tom Farnas (Acorn SI), Nick Volz (Geosoft Inc.), Henry Wang (Geosoft Inc.), Andrew Sabotta (Geosoft Inc.)  
 ESTCP Project: MR 201713

**Summary**  
 This poster describes the development of an efficient and secure cloud-based prototype system for unexploded ordnance (UXO) classification and project management. The system is designed to be scalable, secure, and easy to use, and is expected to deliver enhanced data and project security, speed of processing and analysis, auditability, and many other benefits. Year one developments included data handling schemes, system architecture, user experience interfaces, interactive linking, and EM inversions.

**Benefits**  
 The benefits for moving the geospatial management and data analysis tasks to the cloud include:  
 1. Increased efficiency  
 2. Greater security  
 3. Improved collaboration  
 4. Cost savings  
 5. Scalability  
 6. Flexibility  
 7. Improved data management and analysis capabilities  
 8. Improved project management and reporting capabilities

**Background**  
 The UXO classification and project management system has been developed to meet the needs of the US Department of Defense (DoD) and its contractors. The system is designed to be scalable, secure, and easy to use, and is expected to deliver enhanced data and project security, speed of processing and analysis, auditability, and many other benefits. Year one developments included data handling schemes, system architecture, user experience interfaces, interactive linking, and EM inversions.

**Cloud Computing**  
 Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort.

**Implementation Approach**  
 The implementation approach for the cloud-based UXO classification and project management system is based on a multi-tier architecture. The system is designed to be scalable, secure, and easy to use, and is expected to deliver enhanced data and project security, speed of processing and analysis, auditability, and many other benefits. Year one developments included data handling schemes, system architecture, user experience interfaces, interactive linking, and EM inversions.

**Generalized Workflow in the Cloud**  
 The generalized workflow in the cloud is designed to be scalable, secure, and easy to use, and is expected to deliver enhanced data and project security, speed of processing and analysis, auditability, and many other benefits. Year one developments included data handling schemes, system architecture, user experience interfaces, interactive linking, and EM inversions.

**Security**  
 The security of the cloud-based UXO classification and project management system is based on a multi-tier architecture. The system is designed to be scalable, secure, and easy to use, and is expected to deliver enhanced data and project security, speed of processing and analysis, auditability, and many other benefits. Year one developments included data handling schemes, system architecture, user experience interfaces, interactive linking, and EM inversions.

**Microsoft Azure**  
 The Microsoft Azure cloud platform is used for the implementation of the cloud-based UXO classification and project management system. The system is designed to be scalable, secure, and easy to use, and is expected to deliver enhanced data and project security, speed of processing and analysis, auditability, and many other benefits. Year one developments included data handling schemes, system architecture, user experience interfaces, interactive linking, and EM inversions.

**Geosoft and AcornSI**  
 Geosoft and AcornSI are the primary partners in the development of the cloud-based UXO classification and project management system. The system is designed to be scalable, secure, and easy to use, and is expected to deliver enhanced data and project security, speed of processing and analysis, auditability, and many other benefits. Year one developments included data handling schemes, system architecture, user experience interfaces, interactive linking, and EM inversions.

## Geosoft and AcornSI move UXO classification to the cloud

September 28, 2017 | Geosoft News



Geosoft is partnering with Acorn Science and Innovation to create a cloud-based technology solution for unexploded ordnance classification projects. The 3-year project, funded by the US Department of Defense's Environmental Security Technology Certification Program, will deliver a cloud prototype for classifying buried metal as either UXO or non-hazardous clutter based on the analysis of electromagnetic induction data.



[READ MORE](#)

<http://www.geosoft.com/news/geosoft-and-acornsi-move-uxo-classification-cloud>

## Project Team



- Dean Keiswetter, Ph.D.
- Tom Furuya
- Bruce Barrow, Ph.D.



- Nick Valleau
- Hossein Madjidi
- Sameh Mora
- Melany Bailette
- Tara Marshall
- Darren Mortimer
- Rina Hartmann
- QA testers (2)

## Problem Statement

This project addresses the detection, classification, and remediation of military munitions.

- ◆ It is highly relevant and important, given the 2017 DoD Policy that declares Advanced Geophysical Classification technologies the default technology for MMR responses.

The current approach is to utilize PC-based, UX-Analyze software. Limitations of PC-based solutions include:

- ◆ compartmentalized security
- ◆ compartmentalized collaboration and communication
- ◆ compartmentalized version control, activity logging, and auditing
- ◆ local IT requirements
- ◆ local and limited processing speed

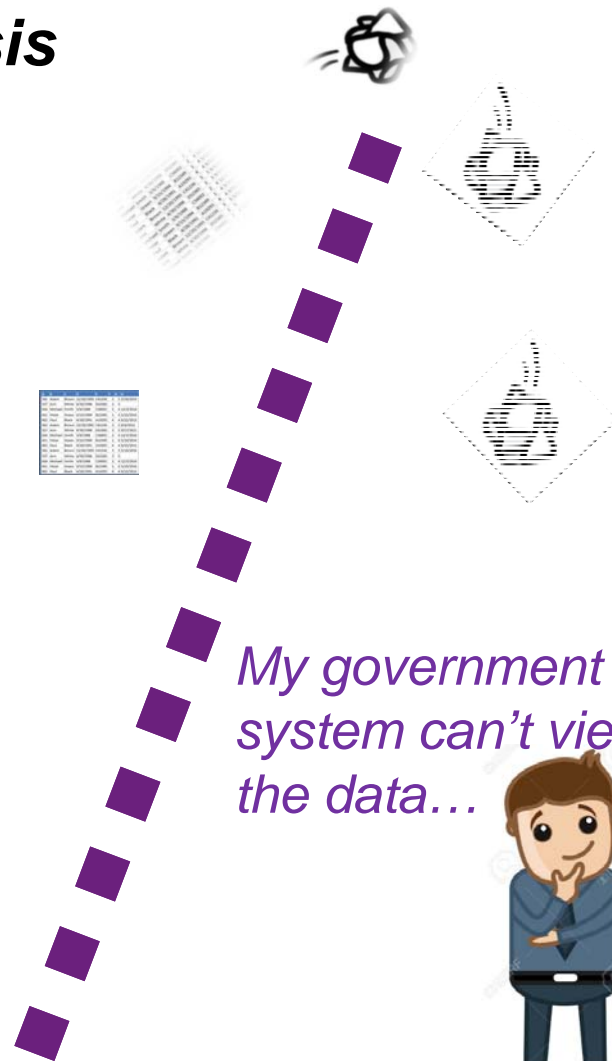
# Problem Statement (over simplified)

## *PC-based Analysis*

...process local,  
provide snapshots  
of progress



**Contractor**



*My government  
system can't view  
the data...*



**State/Fed  
Regulator**

*Why am I not  
updated?*

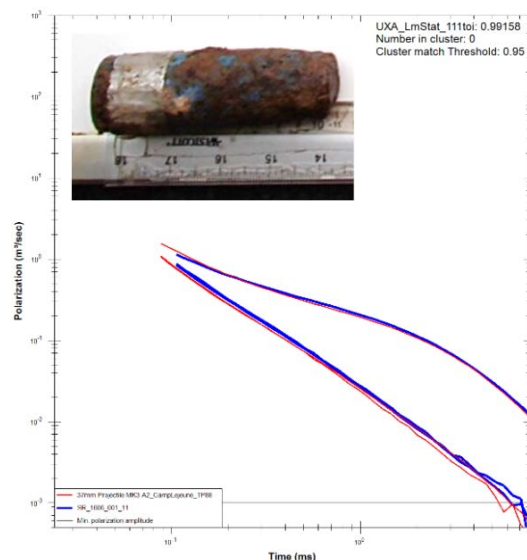
*Have they validated  
the sensor yet?*

**Government  
Buyers**



# Technical Objective

Our objective is to develop and demonstrate an effective, efficient, and secure cloud computing technology for classifying buried metal as UXO or not, based on the analysis of multi-coil electromagnetic induction (EMI) data.



+

## Cloud Computing Characteristics

- *On-demand self service*
- *Ubiquitous network access*
- *Location-independent*
- *Rapid elasticity*
- *Pay per use*

# Technical Approach

Leverage commercial cloud infrastructure and platforms with UX-Analyze work flows, processes, and solvers

## Cloud Technology

- Strong security policies and backup procedures
- Data is encrypted and safe while at rest or in transit
- Efficient data transfer and storage containers

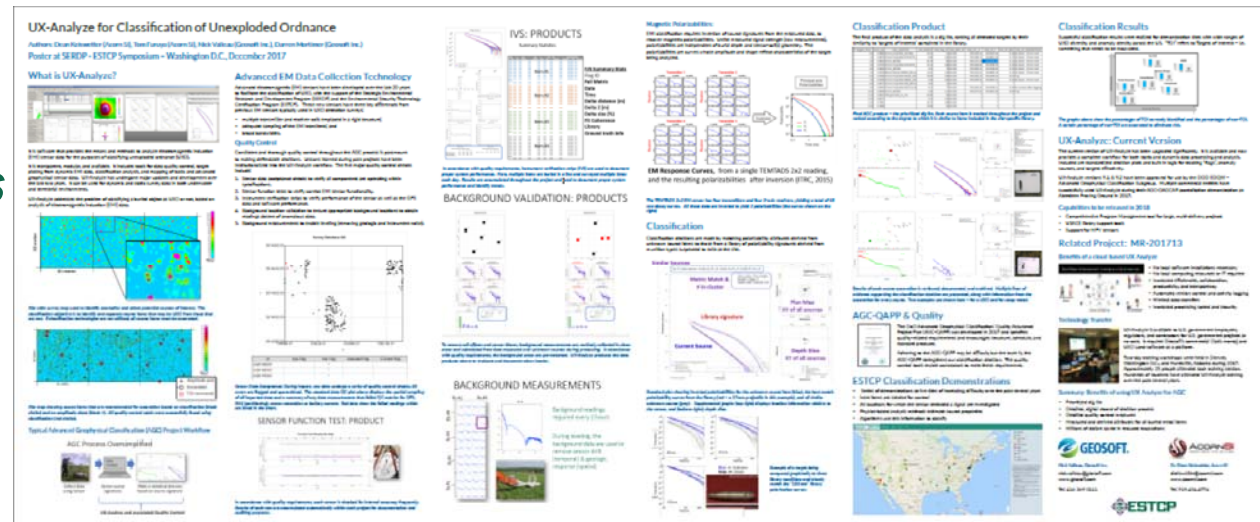
## UX-Analyze

- Mature solvers and classification logic
- Efficient user workflows and processing schemes
- Proven track record
- Strong user base



# Technical Approach

*UX-Analyze is a suite of advanced software tools developed by Acorn SI and Geosoft over many years with funding from ESTCP*



*Over 350 individuals(45 firms) have participated in 2-day, data-analysis workshops*

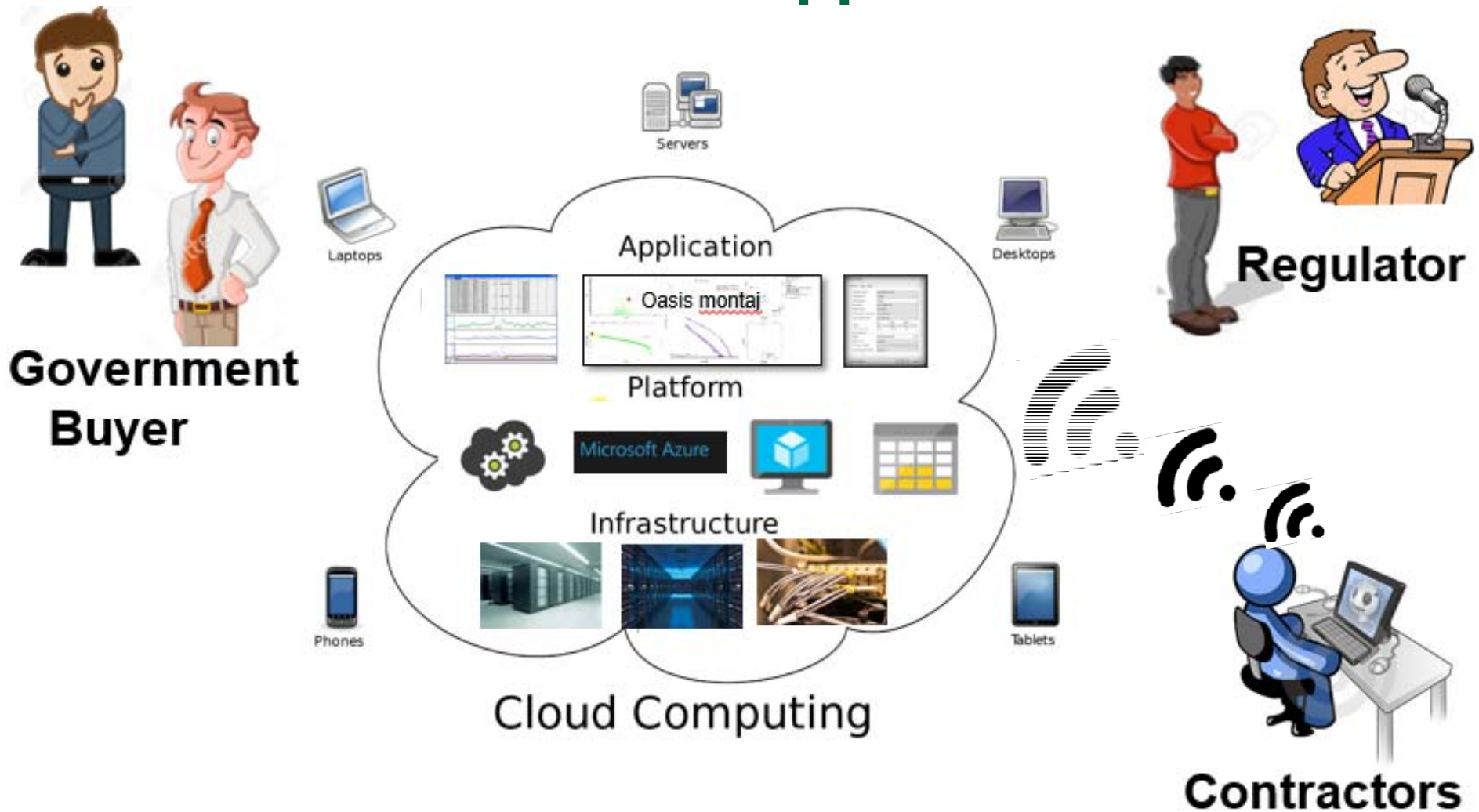
*Multiple commercial firms have successfully used UX-Analyze during AGC-DAGCAP accreditation demonstrations*

# Technical Approach

## UX-Analyze: Workflow & QC

- High level bundles to guide data analysis
- Institutionalized QC measures and products
  - Sensor function tests
  - Instrument verification strips (IVS)
  - Check every sensor stream for quality
  - Background location validation
  - Background measurements

# Technical Approach



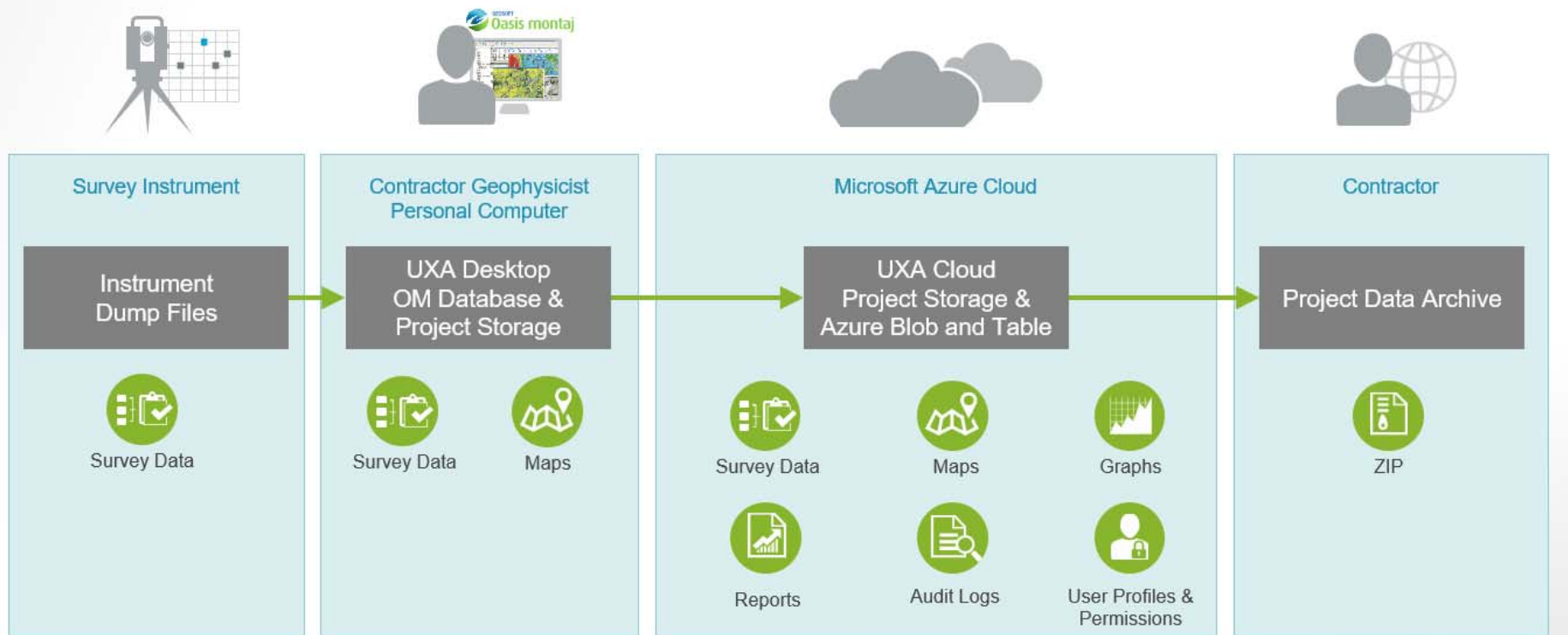
***Cloud-based analysis***

# Technical Progress

TASK	DESCRIPTION	Year 1				Year 2				Year 3		
		Jun-Aug '17	Sep-Nov '17	Dec-Feb '18	Mar-May '18	Jun-Aug '18	Sep-Nov '18	Dec-Feb '19	Mar-May '19	Jun-Aug '19	Sep-Nov '19	Dec-Feb '20
1	Plans											
1a	Cloud-based Workflow											
1b	Cloud Structure Architecture											
2	Development											
2a	Project Storage Container											
2b	UX-Analyze Web Server											
2c	UX-Analyze Enhancements (Option 1)											
3	Demonstration											
4	Management											

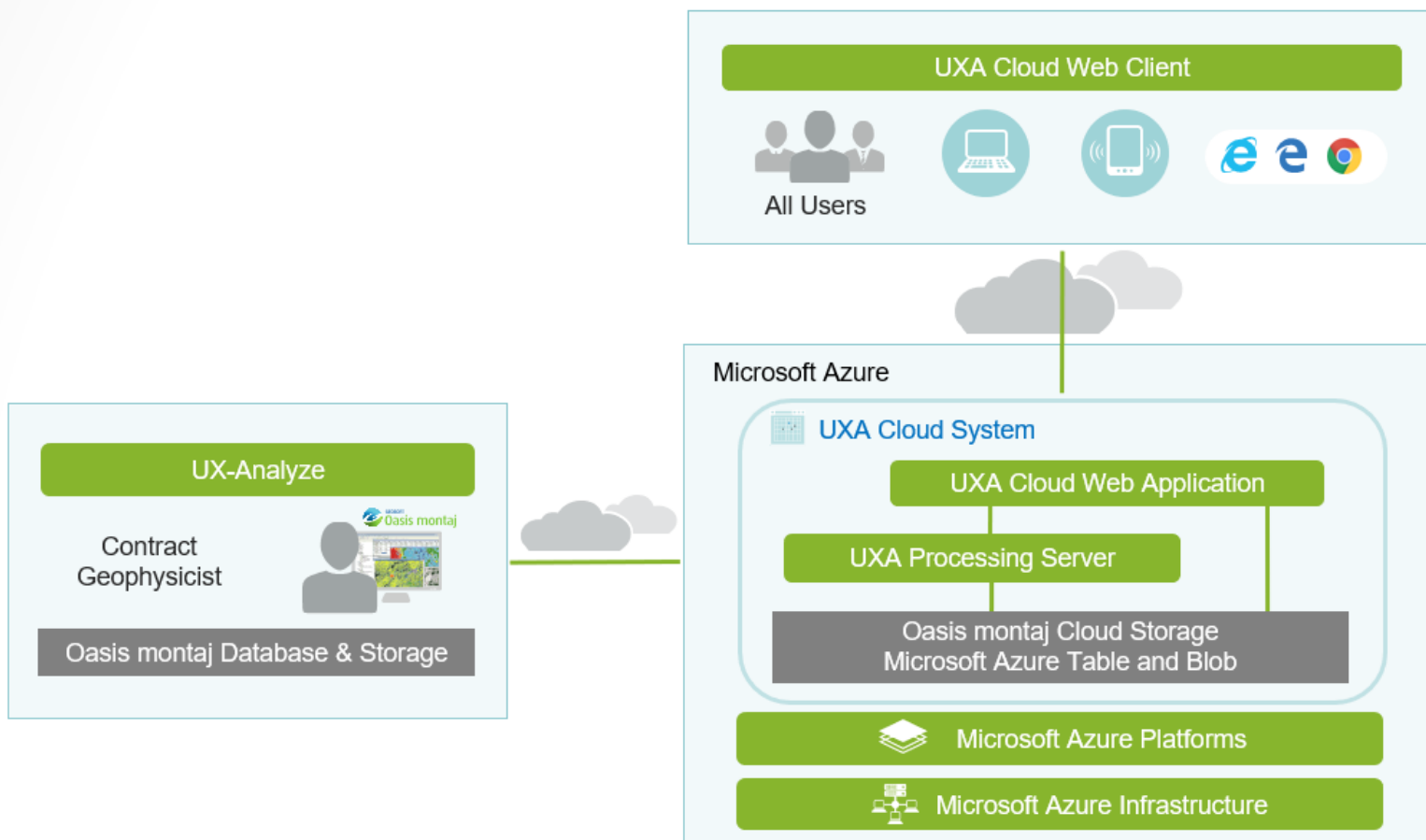
# Technical Progress

## UXA Data Architecture



# Technical Progress

## UXA Cloud Applications



# Technical Progress

## Summary of accomplishment to date...

Data Transfer GX: from Desktop OM to Cloud

Graphical Look and Feel (cards, forms, etc.)

System behavior and user notifications during events

Workflow for Cued Data (Classify and Rank)

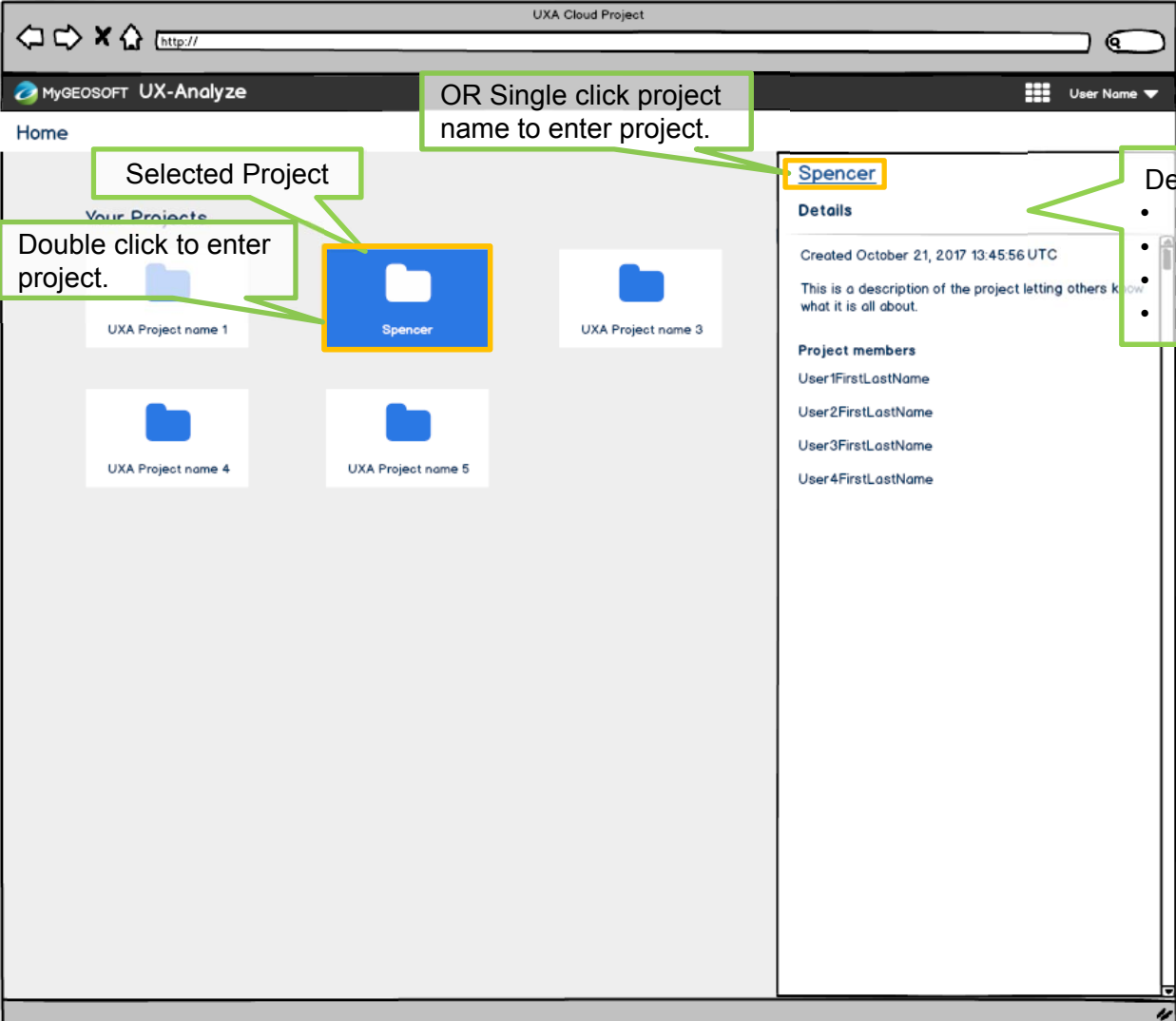
Graphical displays for a variety of cards

Linking tool between data displays

User Interactive Capability

Inversions + OM math (size and decay calculations)

# Technical Progress



The screenshot displays the MyGEOSOFT UX-Analyze web application interface. The browser title is "UXA Cloud Project". The page header includes the MyGEOSOFT UX-Analyze logo and a user profile dropdown labeled "User Name". The main content area is titled "Home" and "Your Projects". Five project folders are visible: "UXA Project name 1", "UXA Project name 2" (labeled "Spencer"), "UXA Project name 3", "UXA Project name 4", and "UXA Project name 5". The "Spencer" folder is highlighted with a yellow border. A callout box points to it with the text "Selected Project". Another callout box points to the "Spencer" text with the text "OR Single click project name to enter project.". A third callout box points to the "Spencer" folder with the text "Double click to enter project.". On the right side, a details panel for the "Spencer" project is shown. It includes a "Details" section with the creation date "Created October 21, 2017 13:45:56 UTC" and a description. Below this is a "Project members" section with four user names: "User1FirstLastName", "User2FirstLastName", "User3FirstLastName", and "User4FirstLastName". A callout box points to the details panel with the text "Details of selected project:" and a bulleted list: "• project name", "• project creation date", "• project description", and "• project members".

UXA Cloud Project

MyGEOSOFT UX-Analyze

Home

Your Projects

UXA Project name 1

UXA Project name 2  
Spencer

UXA Project name 3

UXA Project name 4

UXA Project name 5

OR Single click project name to enter project.

Selected Project

Double click to enter project.

Spencer

Details of selected project:

- project name
- project creation date
- project description
- project members

Details

Created October 21, 2017 13:45:56 UTC

This is a description of the project letting others know what it is all about.

Project members

User1FirstLastName


User2FirstLastName

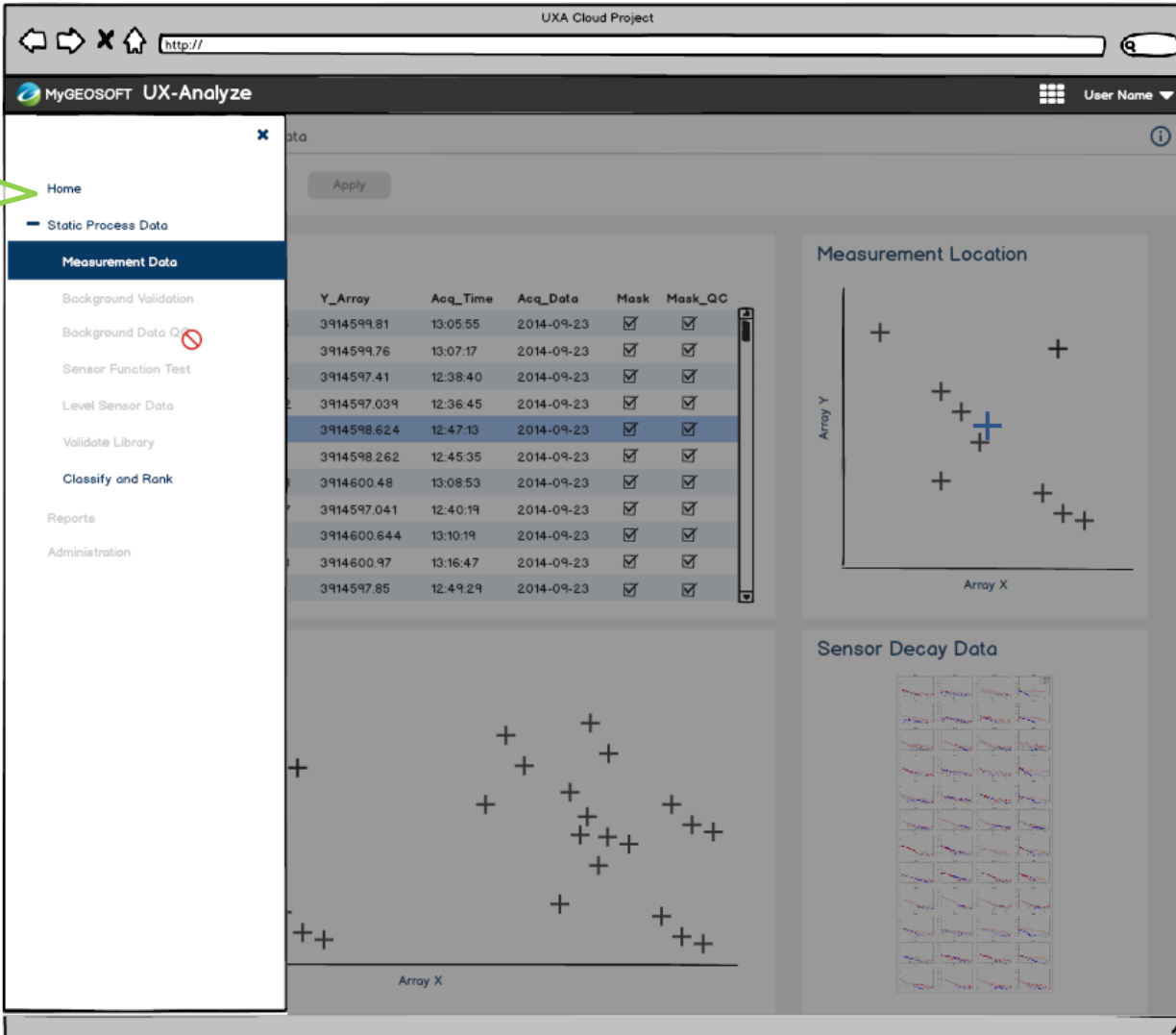
User3FirstLastName

User4FirstLastName



# Technical Progress

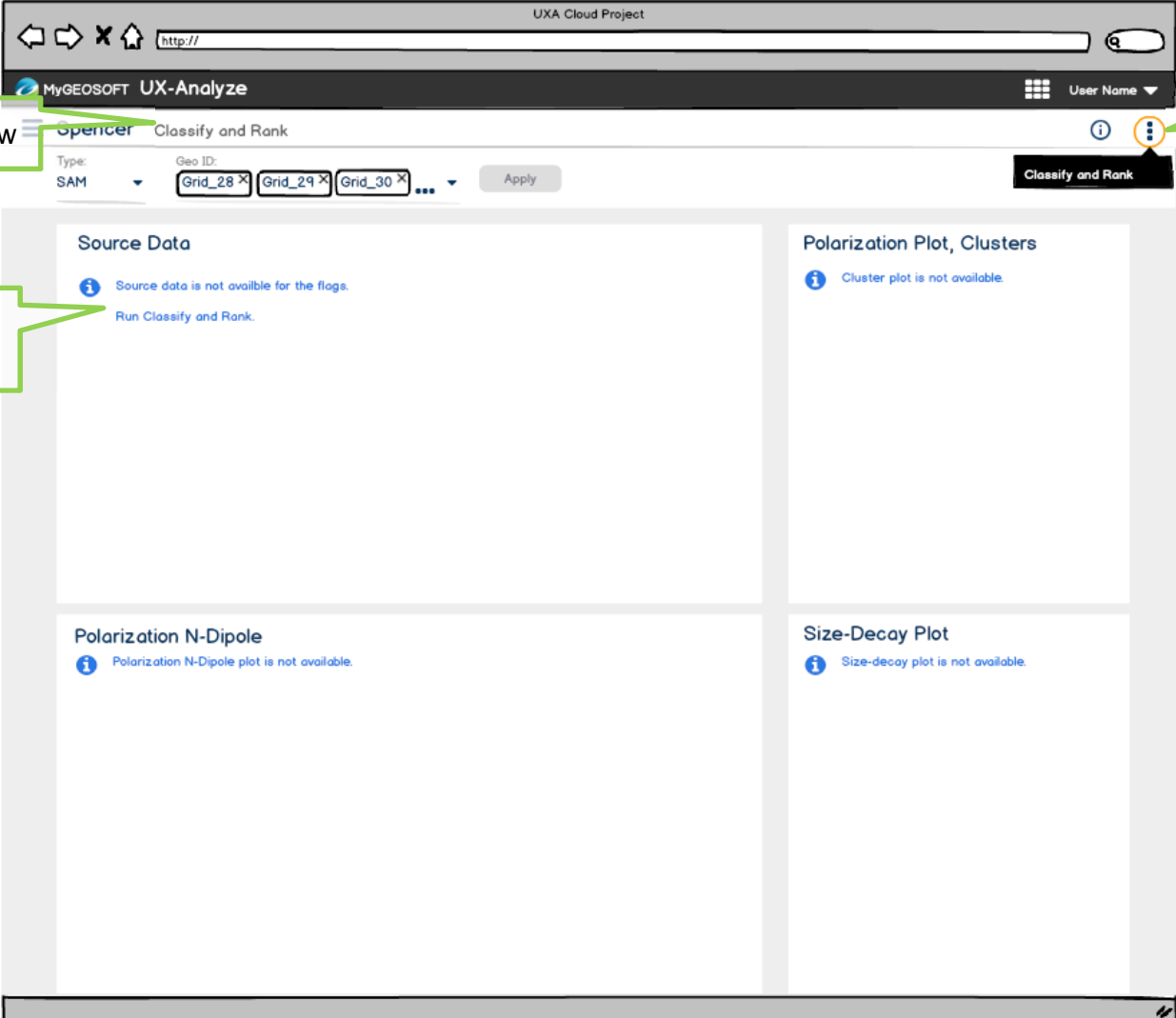
Navigation, appears after clicking icon 



The screenshot displays the MyGEOUSOFT UX-Analyze web application interface. The browser title is "UXA Cloud Project". The application header includes "MyGEOUSOFT UX-Analyze" and a "User Name" dropdown. A navigation menu is open on the left, listing options such as Home, Static Process Data, Measurement Data, Background Validation, Sensor Function Test, Level Sensor Data, Validate Library, Classify and Rank, Reports, and Administration. The main content area features a table of measurement data and two scatter plots. The table has columns for Y\_Array, Acq\_Time, Acq\_Data, Mask, and Mask\_QC. The top scatter plot is titled "Measurement Location" and shows data points as '+' symbols on a coordinate system with 'Array Y' and 'Array X' axes. The bottom scatter plot also shows '+' symbols on a similar coordinate system. The bottom right corner of the interface displays "Sensor Decay Data" as a grid of small line graphs.

Y_Array	Acq_Time	Acq_Data	Mask	Mask_QC
3914599.81	13:05:55	2014-09-23	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3914599.76	13:07:17	2014-09-23	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3914597.41	12:38:40	2014-09-23	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3914597.039	12:36:45	2014-09-23	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3914598.624	12:47:13	2014-09-23	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3914598.262	12:45:35	2014-09-23	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3914600.48	13:08:53	2014-09-23	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3914597.041	12:40:19	2014-09-23	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3914600.644	13:10:19	2014-09-23	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3914600.97	13:16:47	2014-09-23	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3914597.85	12:49:29	2014-09-23	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

# Technical Progress



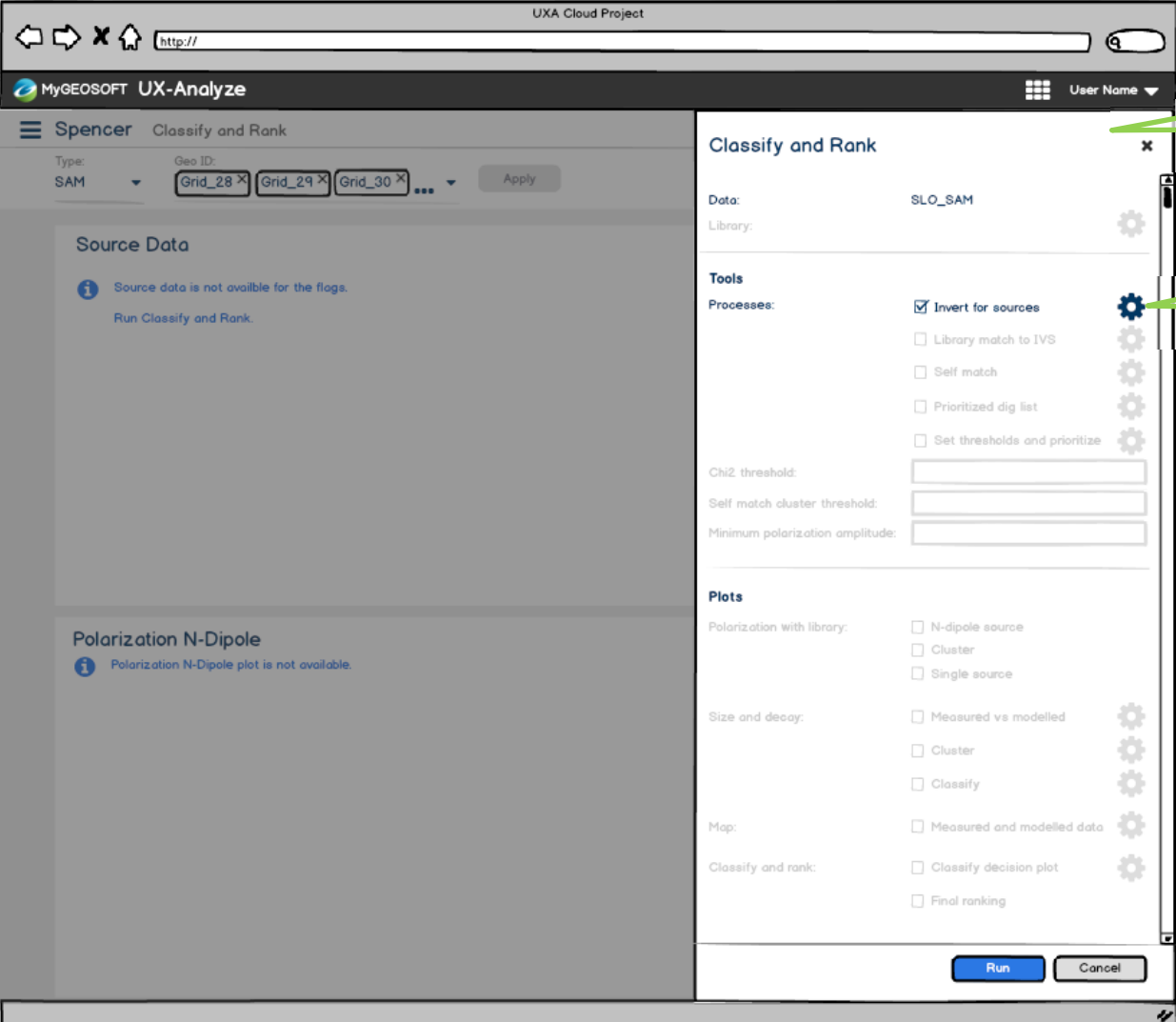
The screenshot shows the UX-Analyze web application interface. The browser address bar displays "http://". The application header includes "MyGEO SOFT UX-Analyze" and a user profile "User Name". The main content area is titled "Spencer Classify and Rank" and features a "Type" dropdown set to "SAM" and a "Geo ID" field containing "Grid\_28", "Grid\_29", and "Grid\_30". An "Apply" button is visible. A "Classify and Rank" button is located in the top right corner of the main area. The interface is divided into four panels, each displaying an information message:

- Source Data:** "Source data is not available for the flags. Run Classify and Rank."
- Polarization Plot, Clusters:** "Cluster plot is not available."
- Polarization N-Dipole:** "Polarization N-Dipole plot is not available."
- Size-Decay Plot:** "Size-decay plot is not available."

Four callout boxes provide additional context:

- Classify and Rank view:** Points to the "Classify and Rank" button.
- Process Classify and Rank:** Points to the "Apply" button.
- Information messages appear on cards with no data:** Points to the information icons in the four panels.
- Process Classify and Rank:** Points to the "Classify and Rank" button.

# Technical Progress

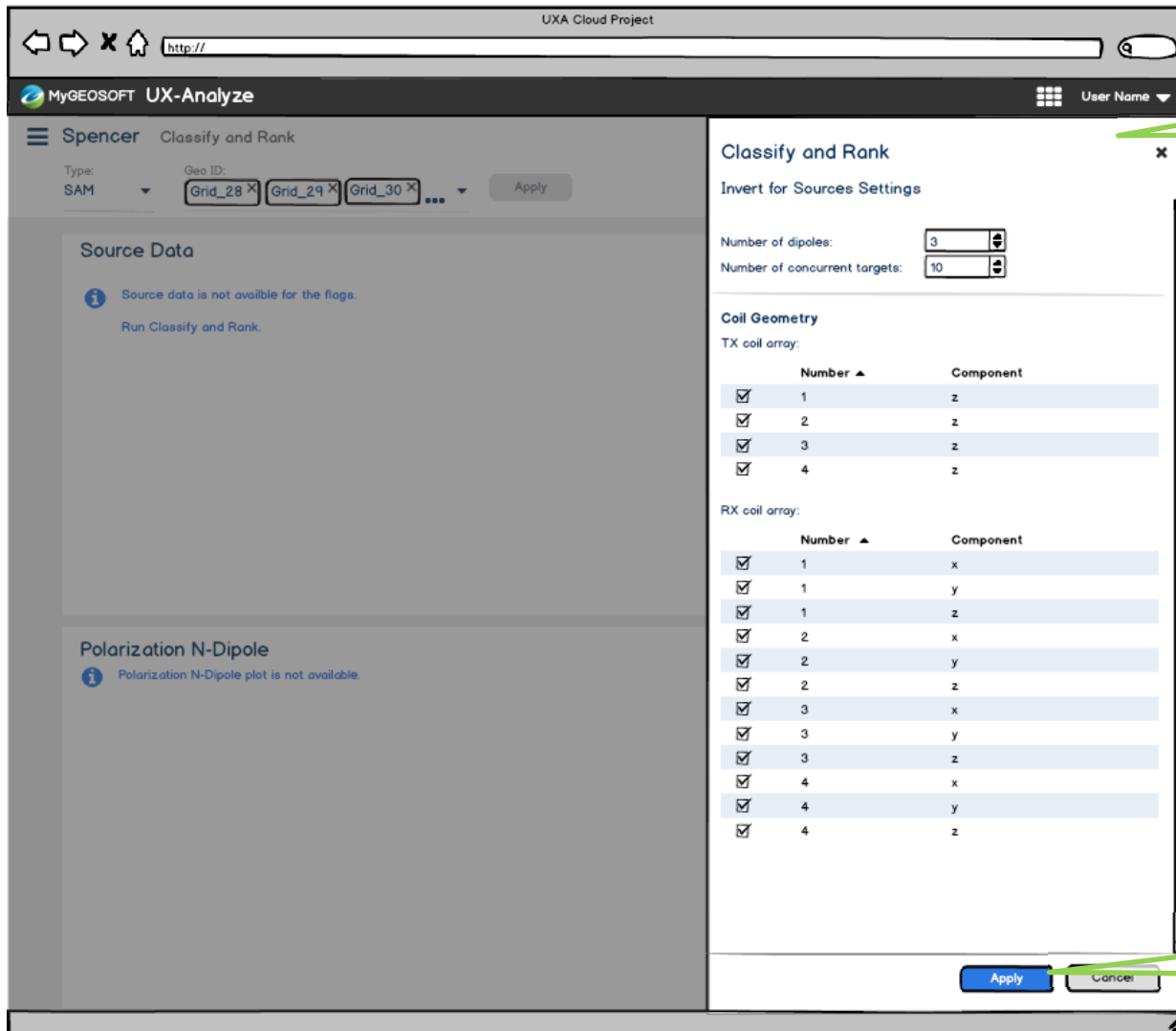


The screenshot displays the MyGEO SOFT UX-Analyze software interface. The main window is titled "UXA Cloud Project" and shows the "Classify and Rank" dialog box. The dialog box is divided into several sections:

- Data:** SLO\_SAM
- Library:** (empty)
- Tools:**
  - Processes:**
    - Invert for sources
    - Library match to IVS
    - Self match
    - Prioritized dig list
    - Set thresholds and prioritize
  - Chi2 threshold: (input field)
  - Self match cluster threshold: (input field)
  - Minimum polarization amplitude: (input field)
- Plots:**
  - Polarization with library:**
    - N-dipole source
    - Cluster
    - Single source
  - Size and decay:**
    - Measured vs modelled
    - Cluster
    - Classify
  - Map:**
    - Measured and modelled data
  - Classify and rank:**
    - Classify decision plot
    - Final ranking

At the bottom of the dialog box, there are "Run" and "Cancel" buttons. Two callout boxes with green borders point to specific settings: "Classify and Rank Bundler" points to the top right corner of the dialog box, and "Invert for Sources Settings" points to the "Invert for sources" checkbox.

# Technical Progress



The screenshot shows the MyGEO SOFT UX-Analyze web interface. The main window is titled 'UXA Cloud Project'. The left sidebar shows a navigation menu with 'Spencer' selected and 'Classify and Rank' as the active view. The main content area is divided into two panels. The left panel, 'Source Data', contains a message: 'Source data is not available for the flags. Run Classify and Rank.' The right panel, 'Classify and Rank', contains the following settings:

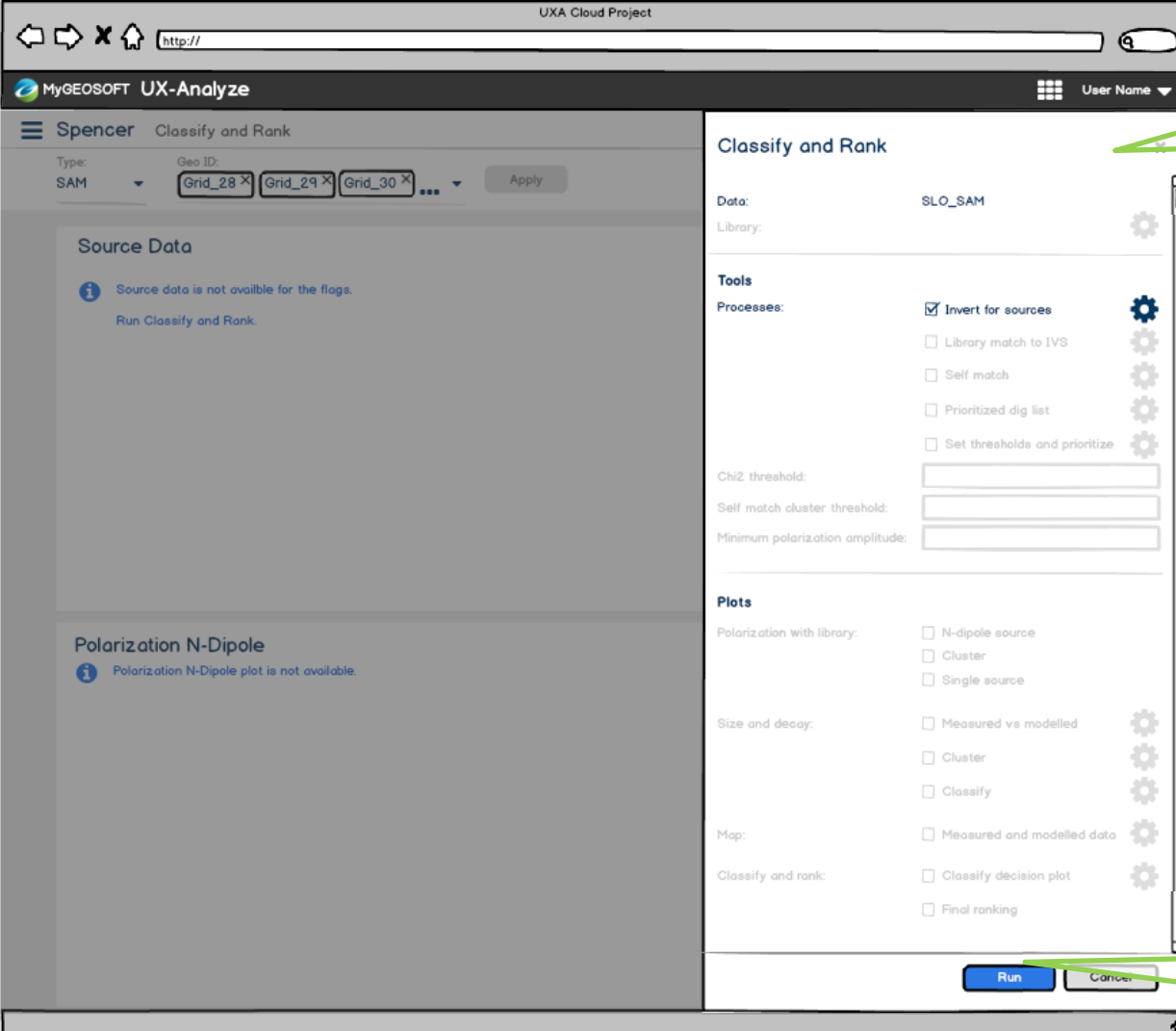
- Invert for Sources Settings:**
  - Number of dipoles: 3
  - Number of concurrent targets: 10
- Coil Geometry:**
  - TX coil array:**

Number	Component
<input checked="" type="checkbox"/> 1	z
<input checked="" type="checkbox"/> 2	z
<input checked="" type="checkbox"/> 3	z
<input checked="" type="checkbox"/> 4	z
  - RX coil array:**

Number	Component
<input checked="" type="checkbox"/> 1	x
<input checked="" type="checkbox"/> 1	y
<input checked="" type="checkbox"/> 1	z
<input checked="" type="checkbox"/> 2	x
<input checked="" type="checkbox"/> 2	y
<input checked="" type="checkbox"/> 2	z
<input checked="" type="checkbox"/> 3	x
<input checked="" type="checkbox"/> 3	y
<input checked="" type="checkbox"/> 3	z
<input checked="" type="checkbox"/> 4	x
<input checked="" type="checkbox"/> 4	y
<input checked="" type="checkbox"/> 4	z

At the bottom right of the 'Classify and Rank' panel, there are 'Apply' and 'Cancel' buttons. A green callout box points to the 'Apply' button with the text 'Applies changes made.' Another green callout box points to the 'Classify and Rank' title bar with the text 'Invert for Sources Settings'.

# Technical Progress

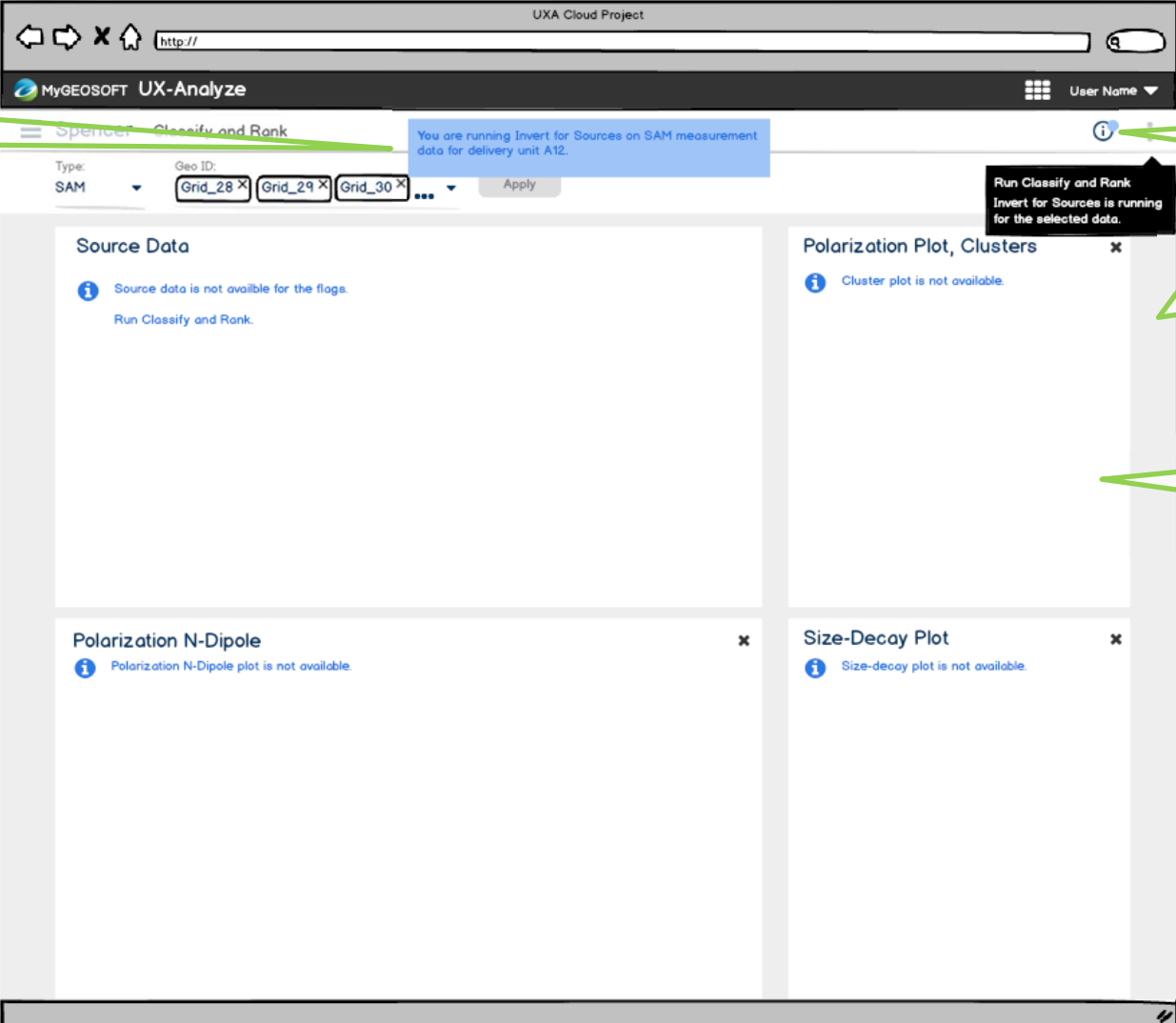


The screenshot shows the MyGEOUSOFT UX-Analyze web interface. The browser title is 'UXA Cloud Project'. The page header includes 'MyGEOUSOFT UX-Analyze' and a user profile 'User Name'. The main content area is titled 'Classify and Rank' and is divided into two panels. The left panel, 'Source Data', shows 'Type: SAM' and 'Geo ID: Grid\_28 X Grid\_29 X Grid\_30 X' with an 'Apply' button. Below this, it states 'Source data is not available for the flags.' and 'Polarization N-Dipole' plot is also unavailable. The right panel, 'Classify and Rank', contains configuration options: 'Data: SLO\_SAM', 'Library:' (with a gear icon), 'Tools' section with 'Processes' (including 'Invert for sources' checked, 'Library match to IVS', 'Self match', 'Prioritized dig list', and 'Set thresholds and prioritize'), 'Chi2 threshold:', 'Self match cluster threshold:', and 'Minimum polarization amplitude:' (all with input fields). The 'Plots' section includes 'Polarization with library' (N-dipole source, Cluster, Single source), 'Size and decay' (Measured vs modelled, Cluster, Classify), 'Map' (Measured and modelled data), and 'Classify and rank' (Classify decision plot, Final ranking). At the bottom right, there are 'Run' and 'Cancel' buttons.

Classify and Rank Bundler re-appears

Clicking Run, runs process in the cloud.

# Technical Progress



An info message box appears for 10 seconds.

Blue badge appears.

Classify and Rank icon is disabled for the selected Type and Geo ID that is running in the cloud.

Clicking on Activities icon opens a panel.

You are running Invert for Sources on SAM measurement data for delivery unit A12.

Run Classify and Rank  
Invert for Sources is running for the selected data.

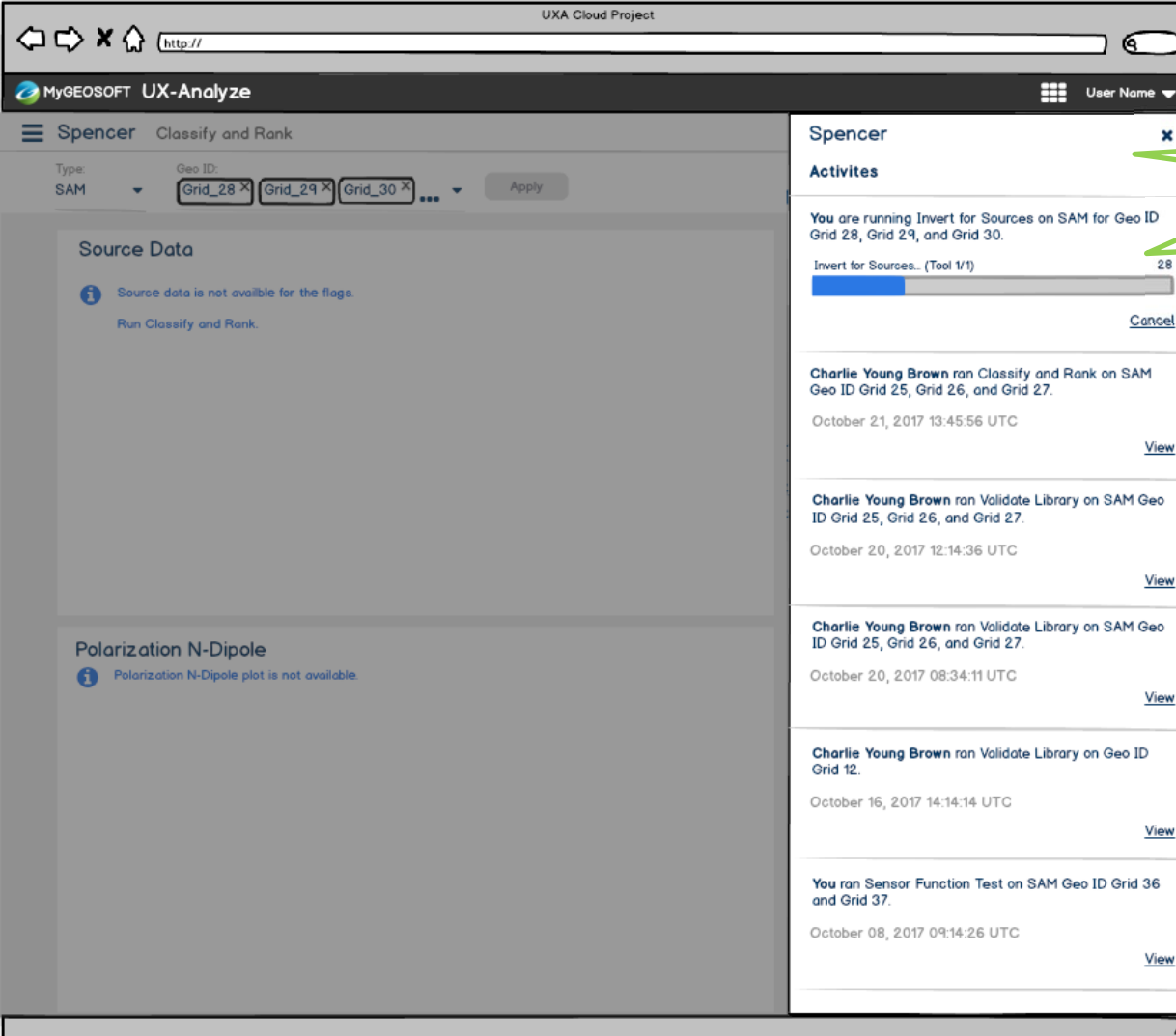
Source Data  
Source data is not available for the flags.  
Run Classify and Rank.

Polarization Plot, Clusters  
Cluster plot is not available.

Polarization N-Dipole  
Polarization N-Dipole plot is not available.

Size-Decay Plot  
Size-decay plot is not available.

# Technical Progress

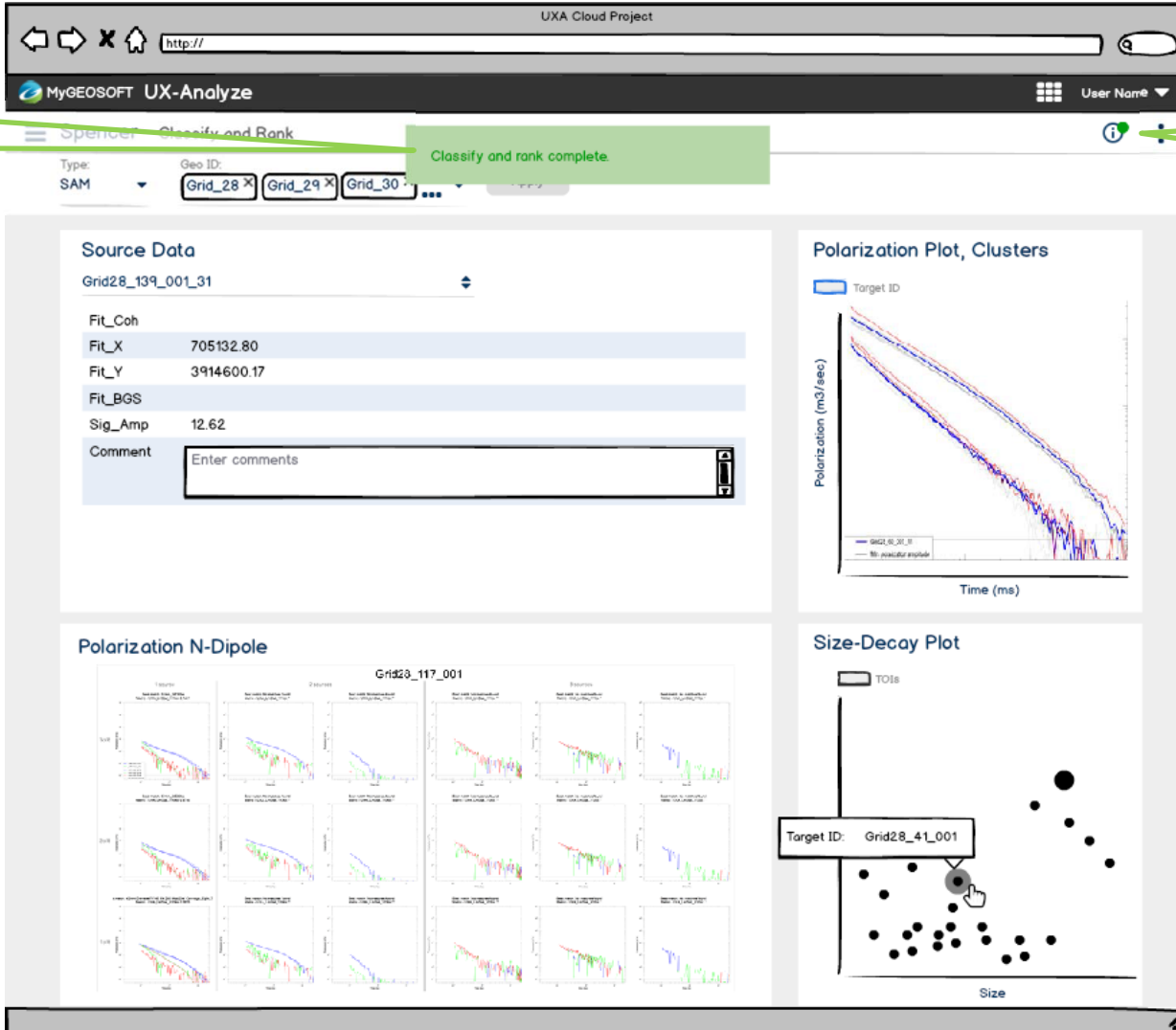


The screenshot displays the MyGEO SOFT UX-Analyze web interface. The main workspace is titled 'Spencer' and 'Classify and Rank'. It shows a 'Source Data' section with a message: 'Source data is not available for the flags. Run Classify and Rank.' Below this is a 'Polarization N-Dipole' section with a message: 'Polarization N-Dipole plot is not available.' On the right, an 'Activities Panel' lists recent tasks. The top activity is 'Invert for Sources... (Tool 1/1)' on SAM for Geo ID Grid 28, Grid 29, and Grid 30, with a progress bar at 28% and a 'Cancel' button. Other activities include 'Classify and Rank on SAM Geo ID Grid 25, Grid 26, and Grid 27' (October 21, 2017 13:45:56 UTC), 'Validate Library on SAM Geo ID Grid 25, Grid 26, and Grid 27' (October 20, 2017 12:14:36 UTC), 'Validate Library on SAM Geo ID Grid 25, Grid 26, and Grid 27' (October 20, 2017 08:34:11 UTC), 'Validate Library on Geo ID Grid 12' (October 16, 2017 14:14:14 UTC), and 'Sensor Function Test on SAM Geo ID Grid 36 and Grid 37' (October 08, 2017 09:14:26 UTC). Each activity has a 'View' link.

Activities Panel

Progress of process running in the cloud.

# Technical Progress



The screenshot shows the MyGEOUSOFT UX-Analyze web application interface. At the top, a browser address bar shows 'http://'. The application header includes 'MyGEOUSOFT UX-Analyze' and a user profile 'User Name'. A green success message box in the center reads 'Classify and rank complete'. Below this, the 'Source Data' section for 'Grid28\_139\_001\_31' displays the following parameters:

Fit_Coh	
Fit_X	705132.80
Fit_Y	3914600.17
Fit_BGS	
Sig_Amp	12.62
Comment	<input type="text" value="Enter comments"/>

The interface also features several plots:

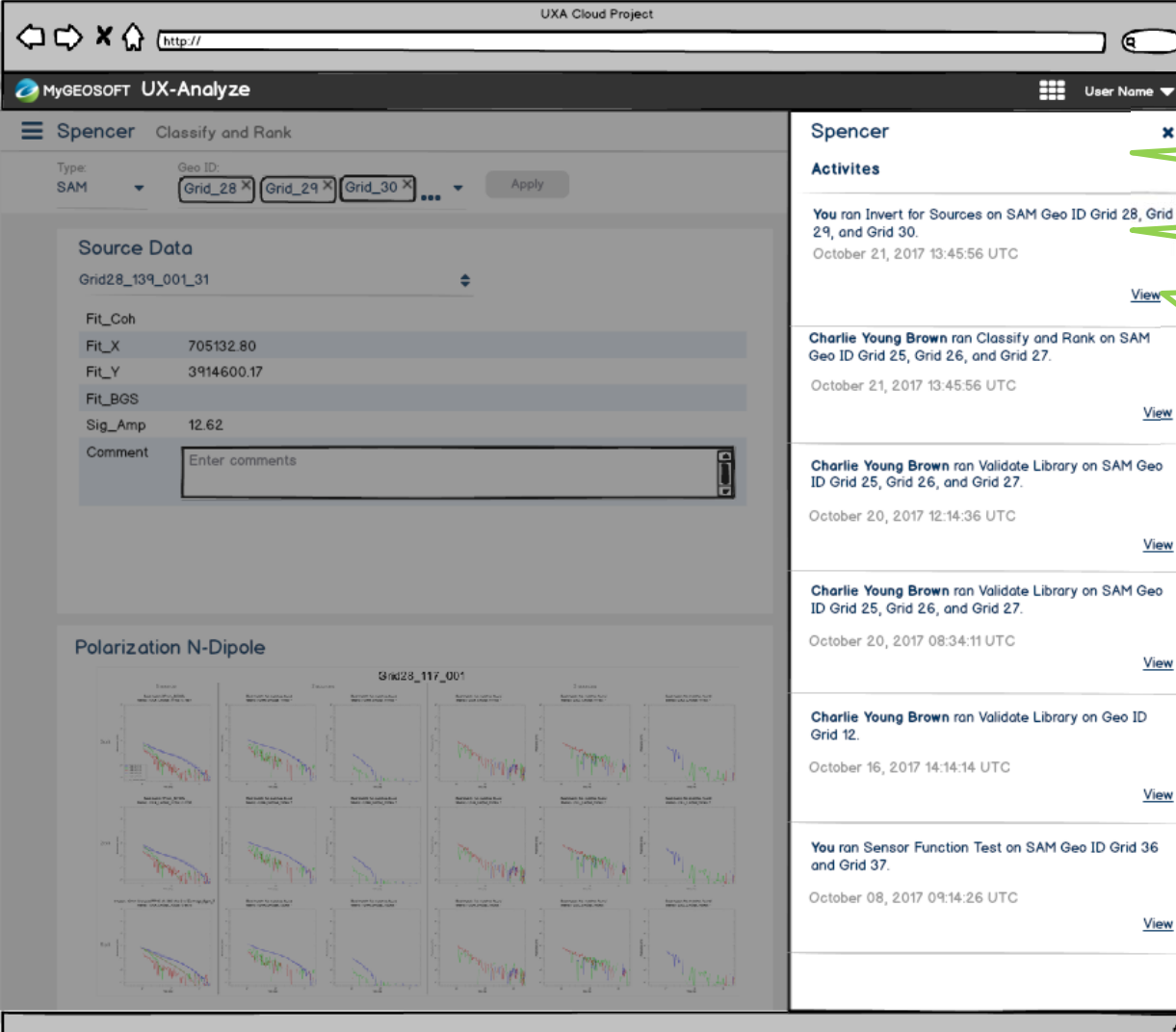
- Polarization Plot, Clusters:** A line graph showing Polarization (m3/sec) vs Time (ms) for 'Target ID'. It includes a legend for 'Grid28\_30\_8' and 'Fit: anisotropic model'.
- Polarization N-Dipole:** A grid of 15 small plots for 'Grid28\_117\_001', each showing polarization data for different orientations.
- Size-Decay Plot:** A scatter plot of TOIs vs Size. A tooltip for 'Target ID: Grid28\_41L\_001' points to a specific data point.

A success message box appears for 10 seconds.

Green badge appears.



# Technical Progress



The screenshot displays the MyGEO SOFT UX-Analyze interface for the 'Spencer' project. The main panel shows 'Source Data' for 'Grid28\_139\_001\_31' with parameters: Fit\_X (705132.80), Fit\_Y (3914600.17), Fit\_BGS, and Sig\_Amp (12.62). Below this is a 'Polarization N-Dipole' section with a grid of plots. On the right, an 'Activities Panel' lists recent actions:

- You** ran Invert for Sources on SAM Geo ID Grid 28, Grid 29, and Grid 30. (October 21, 2017 13:45:56 UTC)
- Charlie Young Brown** ran Classify and Rank on SAM Geo ID Grid 25, Grid 26, and Grid 27. (October 21, 2017 13:45:56 UTC)
- Charlie Young Brown** ran Validate Library on SAM Geo ID Grid 25, Grid 26, and Grid 27. (October 20, 2017 12:14:36 UTC)
- Charlie Young Brown** ran Validate Library on SAM Geo ID Grid 25, Grid 26, and Grid 27. (October 20, 2017 08:34:11 UTC)
- Charlie Young Brown** ran Validate Library on Geo ID Grid 12. (October 16, 2017 14:14:14 UTC)
- You** ran Sensor Function Test on SAM Geo ID Grid 36 and Grid 37. (October 08, 2017 09:14:26 UTC)

Activities Panel

Log of activities for project Spencer.

Clicking View brings the user to that view with the Type and Geo ID selected.

# Technical Progress

UXA Cloud Project

MyGEOISOFT UX-Analyze

Spencer Classify and Rank

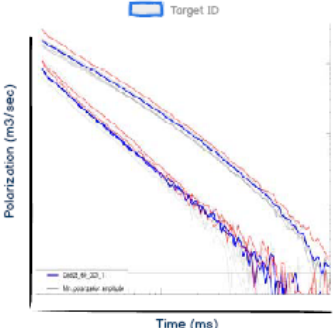
Type: SAM Geo ID: Grid\_28 X Grid\_29 X Grid\_30 X ... Apply

### Source Data

Grid28\_139\_001\_31

Fit_Coh	
Fit_X	705132.80
Fit_Y	3914600.17
Fit_BGS	
Sig_Amp	12.62
Comment	<input type="text" value="Enter comments"/>

### Polarization Plot, Clusters

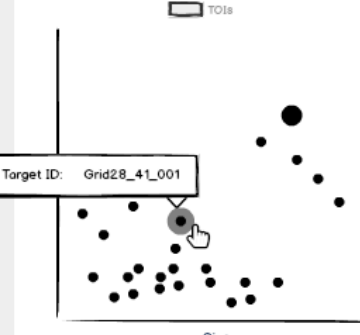


### Polarization N-Dipole

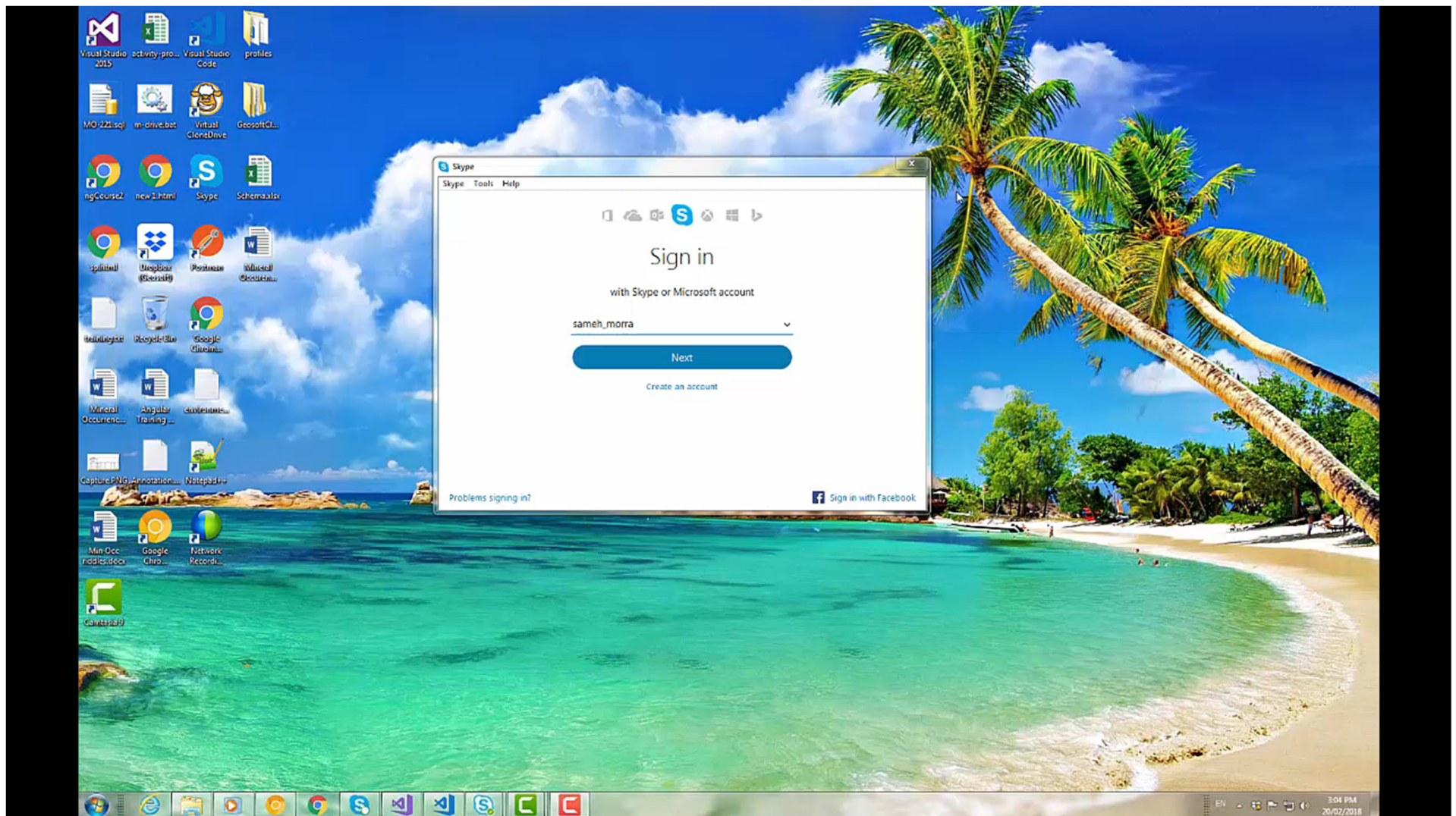
Grid28\_117\_001



### Size-Decay Plot



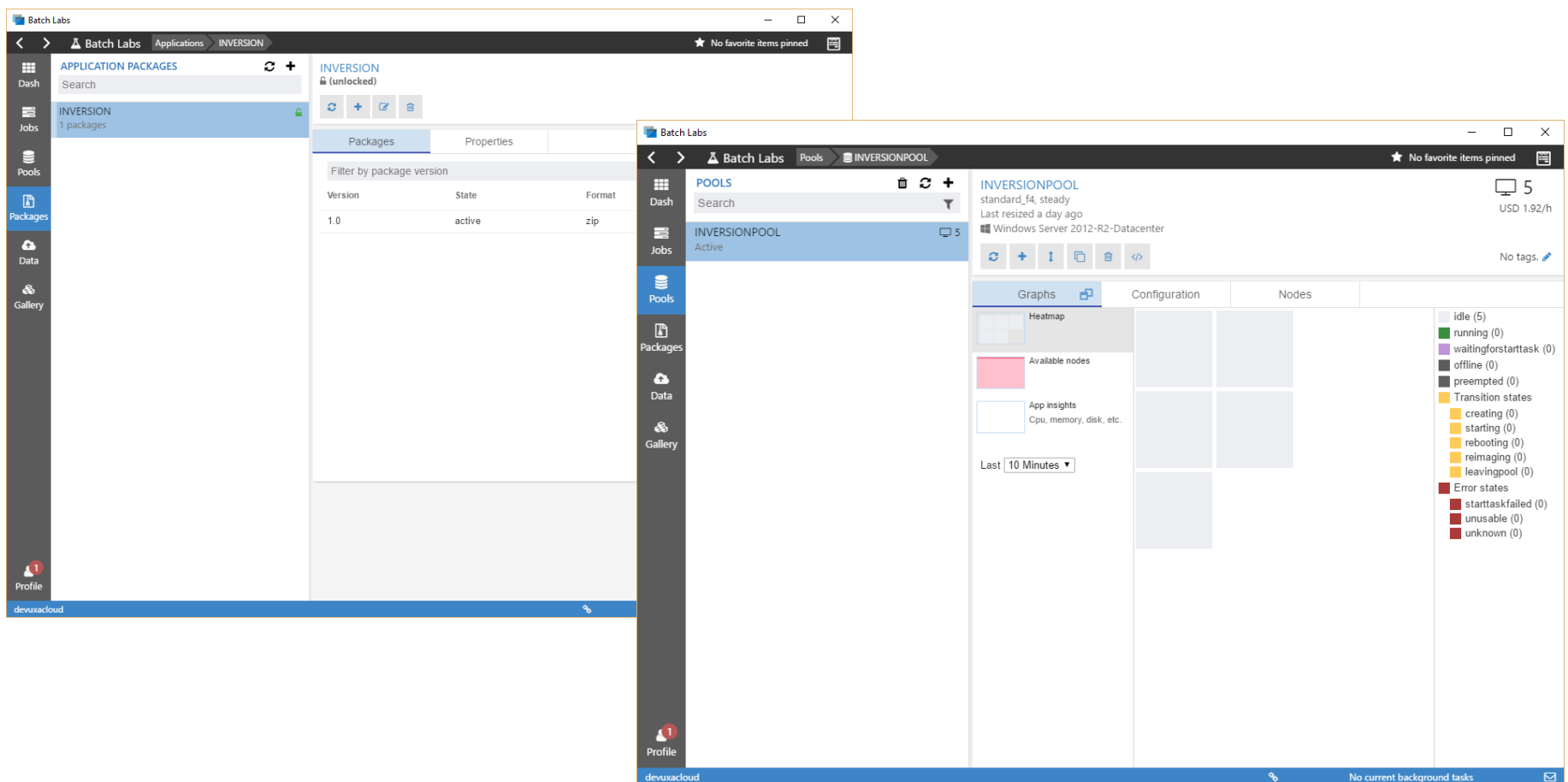
# Technical Progress



# Technical Progress

## Parallel batch jobs...

Application package (inversion DLL, instructions, IO Azure)  
Procure the Application pool (collection of virtual machines)



The screenshot displays the Batch Labs interface, which is divided into two main windows. The left window shows the 'APPLICATION PACKAGES' section for the 'INVERSION' application. It features a search bar and a table with the following data:

Version	State	Format
1.0	active	zip

The right window shows the 'POOLS' section for the 'INVERSIONPOOL'. It displays the pool's configuration, including 'standard\_f4, steady', 'Last resized a day ago', and 'Windows Server 2012-R2-Datacenter'. The pool is currently 'Active' and has 5 nodes. A heatmap is visible, showing the status of the nodes. The legend on the right indicates the following node states:

- idle (5)
- running (0)
- waitingforstarttask (0)
- offline (0)
- preempted (0)
- Transition states
  - creating (0)
  - starting (0)
  - rebooting (0)
  - reimaging (0)
  - leavingpool (0)
- Error states
  - starttaskfailed (0)
  - unusable (0)
  - unknown (0)

The interface also includes a sidebar with navigation options like Dash, Jobs, Pools, Packages, Data, and Gallery, and a bottom status bar indicating 'No current background tasks'.

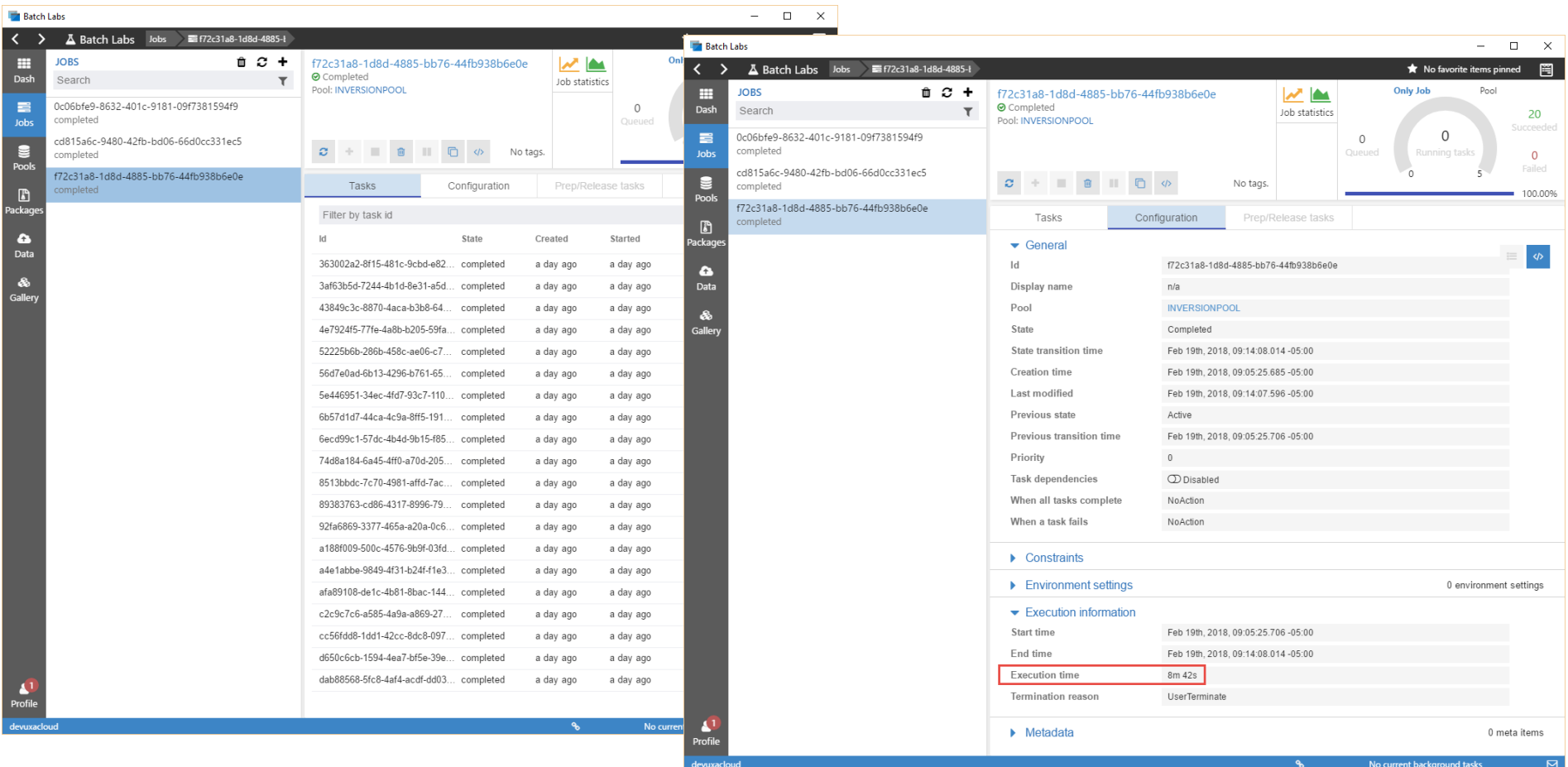
# Technical Progress

## Parallel batch jobs...example run

1000 cued data collections

20 VM's procured, each processed 50 measurements

Execution time < 9 minutes



The screenshot displays the Batch Labs interface with two overlapping windows. The left window shows a list of tasks for a job, and the right window shows the configuration and execution information for the same job.

**Job Configuration (Right Window):**

- Id: f72c31a8-1d8d-4885-bb76-44fb938b6e0e
- Display name: n/a
- Pool: INVERSIONPOOL
- State: Completed
- State transition time: Feb 19th, 2018, 09:14:08.014-05:00
- Creation time: Feb 19th, 2018, 09:05:25.685-05:00
- Last modified: Feb 19th, 2018, 09:14:07.596-05:00
- Previous state: Active
- Previous transition time: Feb 19th, 2018, 09:05:25.706-05:00
- Priority: 0
- Task dependencies: Disabled
- When all tasks complete: NoAction
- When a task fails: NoAction

**Execution Information (Right Window):**

- Start time: Feb 19th, 2018, 09:05:25.706-05:00
- End time: Feb 19th, 2018, 09:14:08.014-05:00
- Execution time: 8m 42s
- Termination reason: User/Terminate

**Task List (Left Window):**

Id	State	Created	Started
363002a2-8f15-481c-9cbd-e82...	completed	a day ago	a day ago
3af63b5d-7244-4b1d-8e31-a5d...	completed	a day ago	a day ago
43849c3c-8870-4aca-b3b8-64...	completed	a day ago	a day ago
4e7924f5-77fe-4a8b-b205-59fa...	completed	a day ago	a day ago
52225b6b-286b-458c-ae06-c7...	completed	a day ago	a day ago
56d7e0ad-6b13-4296-b761-65...	completed	a day ago	a day ago
5e446951-34ec-4fd7-93c7-110...	completed	a day ago	a day ago
6b57d1d7-44ca-4c9a-8ff5-191...	completed	a day ago	a day ago
6ecd99c1-57dc-4b4d-9b15-485...	completed	a day ago	a day ago
74d8a184-6a45-4ff0-a70d-205...	completed	a day ago	a day ago
8513bbdc-7c70-4981-affd-7ac...	completed	a day ago	a day ago
89383763-cd86-4317-8996-79...	completed	a day ago	a day ago
92fa6869-3377-465a-a20a-0c6...	completed	a day ago	a day ago
a188f009-500c-4576-9b9f-03fd...	completed	a day ago	a day ago
a4e1abba-9849-4f31-b24f-41e3...	completed	a day ago	a day ago
afa89108-de1c-4b81-8bac-144...	completed	a day ago	a day ago
c2c9c7c6-a585-4a9a-a869-27...	completed	a day ago	a day ago
cc56fd8d-1dd1-42cc-8dc8-097...	completed	a day ago	a day ago
d650c6cb-1594-4ea7-bf5e-39e...	completed	a day ago	a day ago
dab88568-5fc8-4af4-acfd-dd03...	completed	a day ago	a day ago

# Technical Progress Demonstration Site

We proposed an initial system shakedown test, followed by the analysis of a complete, canned data set; processing the data in the same sequence as it was collected.

The data of opportunity are TBD and will be selected in consultation with the Program Office. The data recently collected the Former Lowry Bombing and Gunnery Range by Parsons may be a strong candidate.

The planned demonstration is one year out.

## How will the service be consumed – high-level vision

### • Implementation of UX-Analyze Cloud Service

*Managed Service* by Geosoft (initially)

- Provisioned cloud service, security, software and storage
- Infrastructure/framework & System configuration
- UX-Analyze deployment
- Project decommissioning

*Administered Service* by project prime contractor

- Manages user and project permissions
- UX-Analyze - data processing and analysis
- Overall project management
- Archiving and project completion

## How will the service be consumed – high-level vision

- **Subscription/Project fees**

- ◆ Provided as a service per project - rather than purchasing computers, software, IT services etc.
- ◆ Service fees based primarily on:
  - Project size
  - Project duration and scope
  - Number and type of users
  - Extendable if project is modified or expanded



# Action Items

**SEMS** ☰

DEAN KEISWETTER  
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SETTINGS SIGN OUT

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Project Directory

PROJECT: MR-201713

Dashboard

**Actions**

Contacts

Overview & Plan




Financials

Progress

Documents

## Actions

View my project actions

**MR-201713** In Progress

Efficient and Secure Cloud Computing for UXO Classification and Project Management

Dean Keiswetter | Acorn Science and Innovation, Inc.

FILTERS:  Documents  Show Closed EXCEL PDF

January 2018 Quarterly Progress Report	Submitted	Deliverable: None	Action Type: QPR	Due Date: 1/15/2018	☰
Revision - Plan: Cloud based Workflow - report describing the planned workflow (v2)	Pending	Deliverable: Other	Action Type: Subtask	Due Date: 2/6/2018 <span style="color: red;">⚠ Overdue 14 days</span>	☰
Revision - Plan: Cloud Structure Architecture - report detailing the architecture and final approach for cloud processing (v2)	Pending	Deliverable: Other	Action Type: Subtask	Due Date: 2/6/2018 <span style="color: red;">⚠ Overdue 14 days</span>	☰
Security Services	Pending	Deliverable: None	Action Type: Subtask	Due Date: 3/28/2018	☰
Reporting Services	Pending	Deliverable: None	Action Type: Subtask	Due Date: 8/28/2018	☰

# Technology Transfer

- Technology transfer is a critical part of this project.
- The primary technology transfer component of this specific effort is our report detailing the UX-Analyze Cloud and the direct, hands-on participation of a contractor, a Corps of Engineers geophysicist, and a State regulator in the final demonstration.

# Technology Transfer

- Upon successful completion of this program, we will solicit funding to aggressively pursue a number of technology transfer approaches targeting multiple audiences
  
- Suitable technology transfer approaches will likely include:
  - ◆ Training workshops, live or via webinar
  - ◆ Presentations at key conferences
  - ◆ Web-based tools (see example at link)
  - ◆ Technology fact sheets