MODERNIZING FORM-BASED FIELD WORKFLOWS USING SURVEY123 FOR ARCGIS

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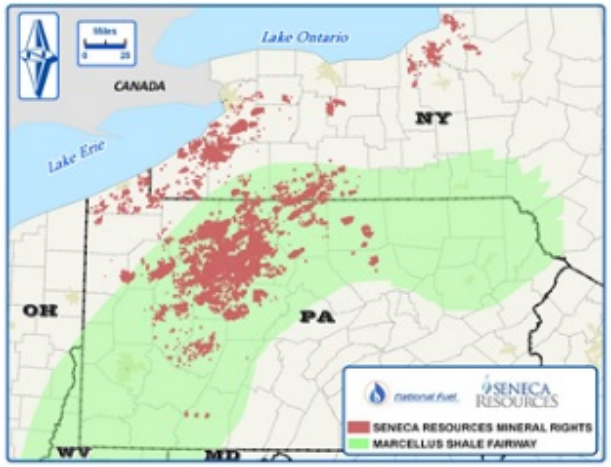
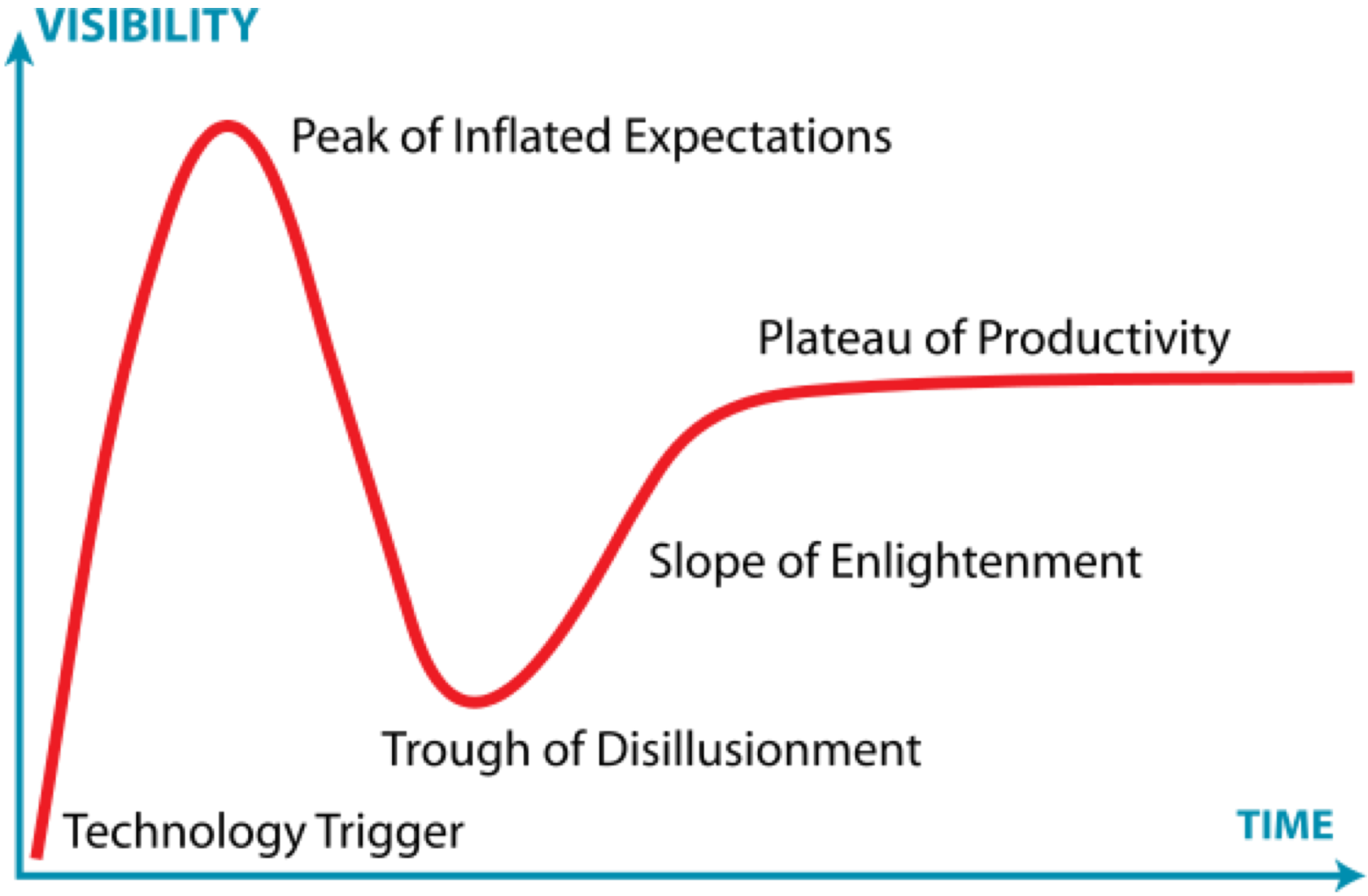
About Seneca Resources Corporation

- Seneca Resources Corporation (Seneca), the exploration and production segment of National Fuel Gas Company, headquartered in Houston, Texas, explores for, develops and produces natural gas and oil reserves in California and the Appalachian Region including the Marcellus and Utica Shales.



Special Achievement in GIS
2014 Award Winner

Gartner Hype Cycle



Once upon a time…

- The primary means of field data collection was the paper form.
  - Daily, Weekly, Monthly, Quarterly, Annual Inspections
  - Regular Maintenance
  - Environmental
  - Regulatory Compliance

Well Pad Monthly Inspection Report

must be performed and during the boxes below place an X that is relevant to that above ground structure. For ANY no answer should a "yes" be checked, a comment MUST be noted as to what the issue(s) are. Should more space be required use the remarks section at the bottom of the page or a separate sheet of paper.

PAD Church Run L13-N

GENERAL	YES	NO	COMMENTS
Signs not legible or present			
Containment (s) are damaged or leaking			
Chemical Injection/containment deteriorated			
Automation control boxes opened & not locked			
Any bleed points not secured with a plug or blind flange			
PRODUCTION STORAGE TANKS			
Production Storage Tanks show signs of liquid leakage			
Production Storage Tanks are damaged, rusted or deteriorated			
Man ways bolts are damaged (Cat Walk)			
Truck Loading/Unloading Facility is damaged			
Fluid inlet valves at storage tanks & valves on header closed (Should be locked open)			
Manual drain valve on each storage tank open (Should be closed & plugged)			
Gate on storage tank cat walk unlocked and open (Should be closed & locked)			
GPUs / HEATERS			
GPU(s)/Heaters leaking glycol or deteriorated (Note the well number that applies)			
GPU Flushed (If yes, list well # in comments)			
Flame is not burning correctly inside fire tube			
Any in-line valves for PRV not locked open			
In-Line Heater fuel controls expired (Should have cover)			
Blowdown & heater bypass valves left open (Should be closed & locked)			
Cabinets/Shed's unsecure (Should be locked)			
PIPING			
Buried pipelines are exposed			
Pipe Racks and piping is deteriorated			
Corrosion evident on production facility piping			
WELLHEADS			
Wellheads show signs of corrosion (Note the well number that applies)			
Cellar grating shows signs of corrosion			
Cellar has debris or any obstructions			
Cellar unsecure, unsafe, or not properly grated			
Wells not properly marked with registration tags on wellhead (Note well # if missing)			
ESD handwheels/cranks left by wellhead(s)			

NOTE: Well S/I Requirement: If the well has been shut in for more than 24 hours ensure the primary feed valves including the interior casing wing valves, and the lower master valve are secured with a cable and lock.

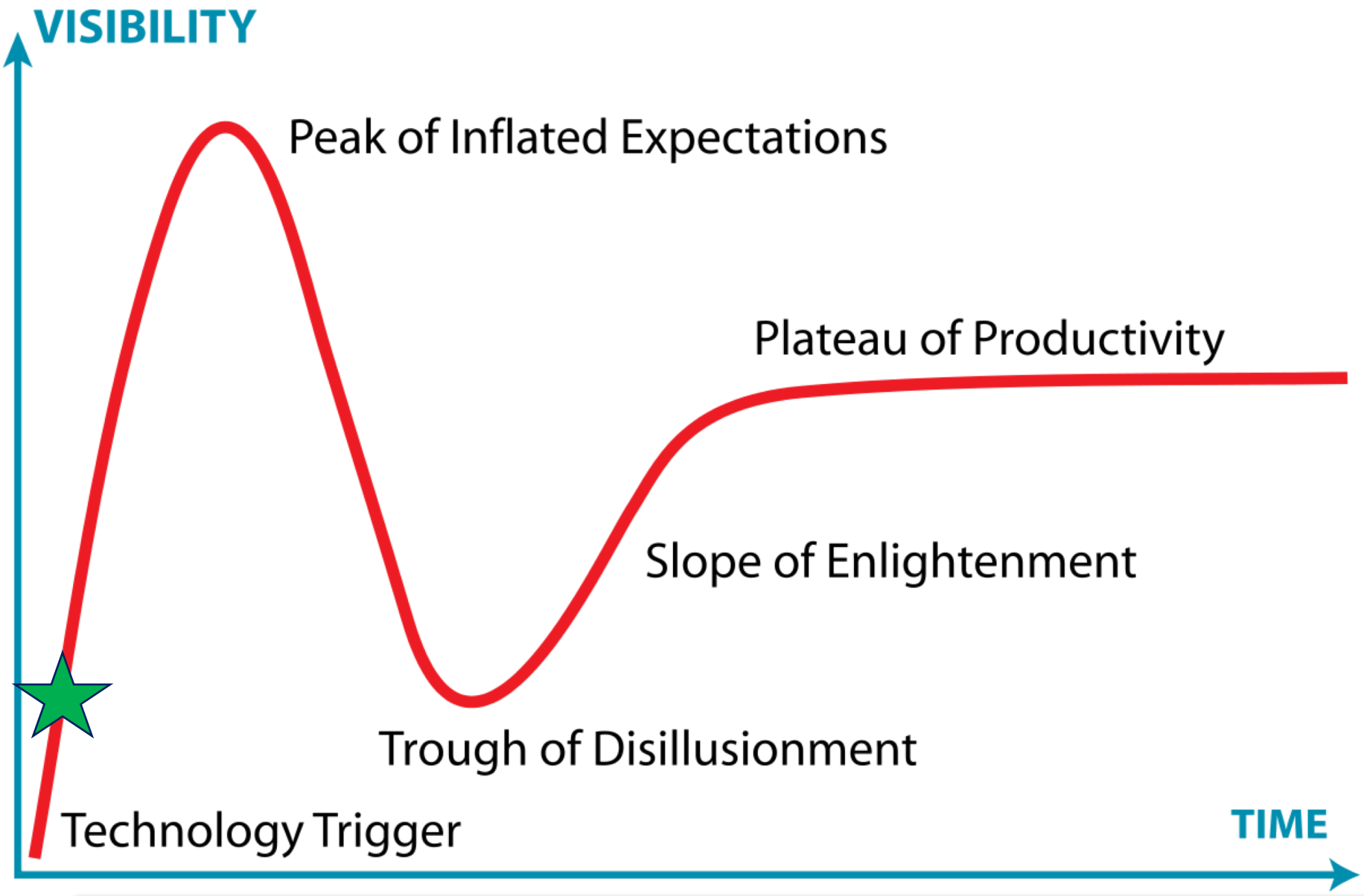
REMARKS: _____

Signature: _____ Date: _____

And then one day…

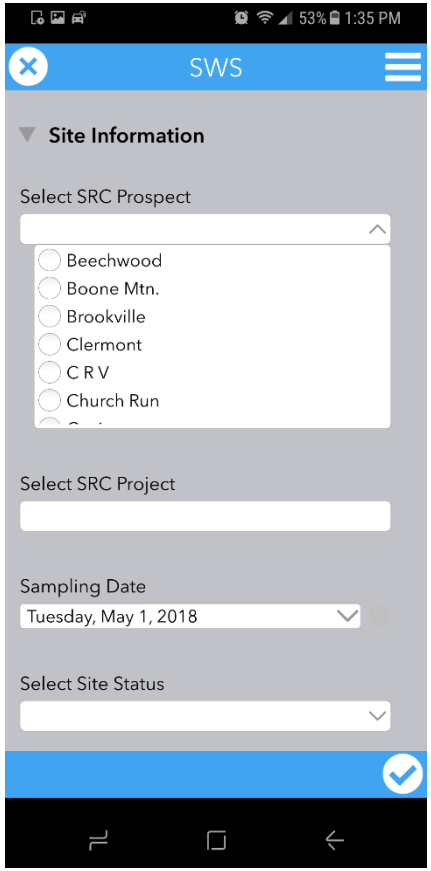
- On September 15th, 2015, the Geomatics team decided that we could collect field data more efficiently using Survey123 for ArcGIS.

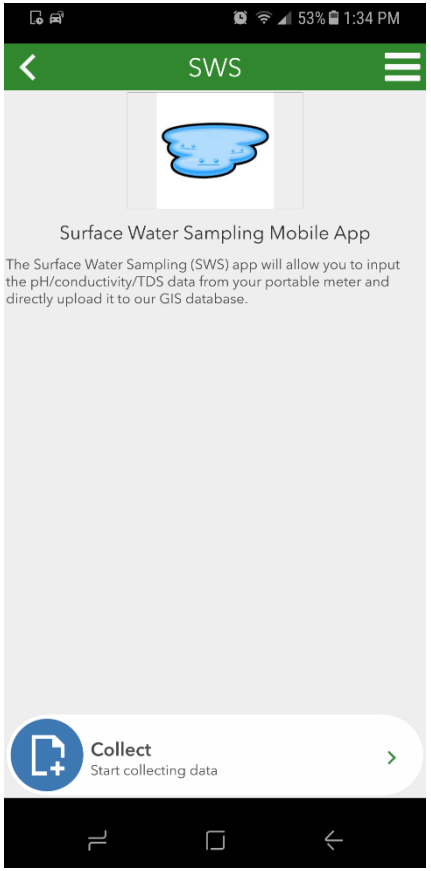
SENECA RESOURCES

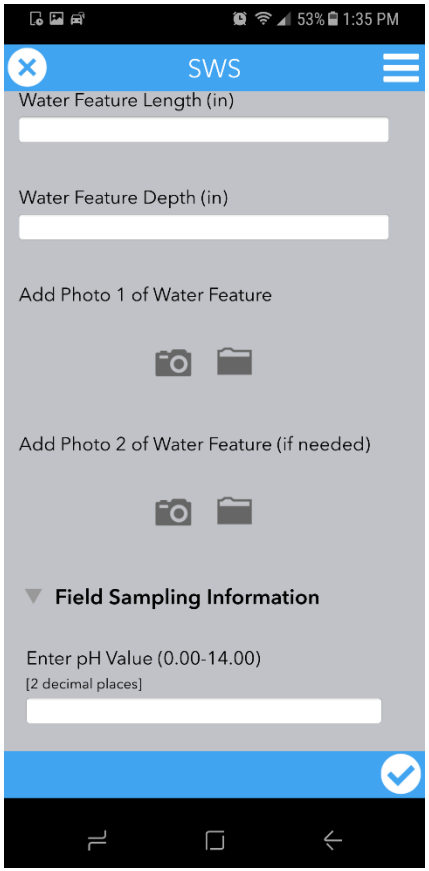


And then there was one

- We developed our first survey in late 2015/early 2016 for a water sampling project.







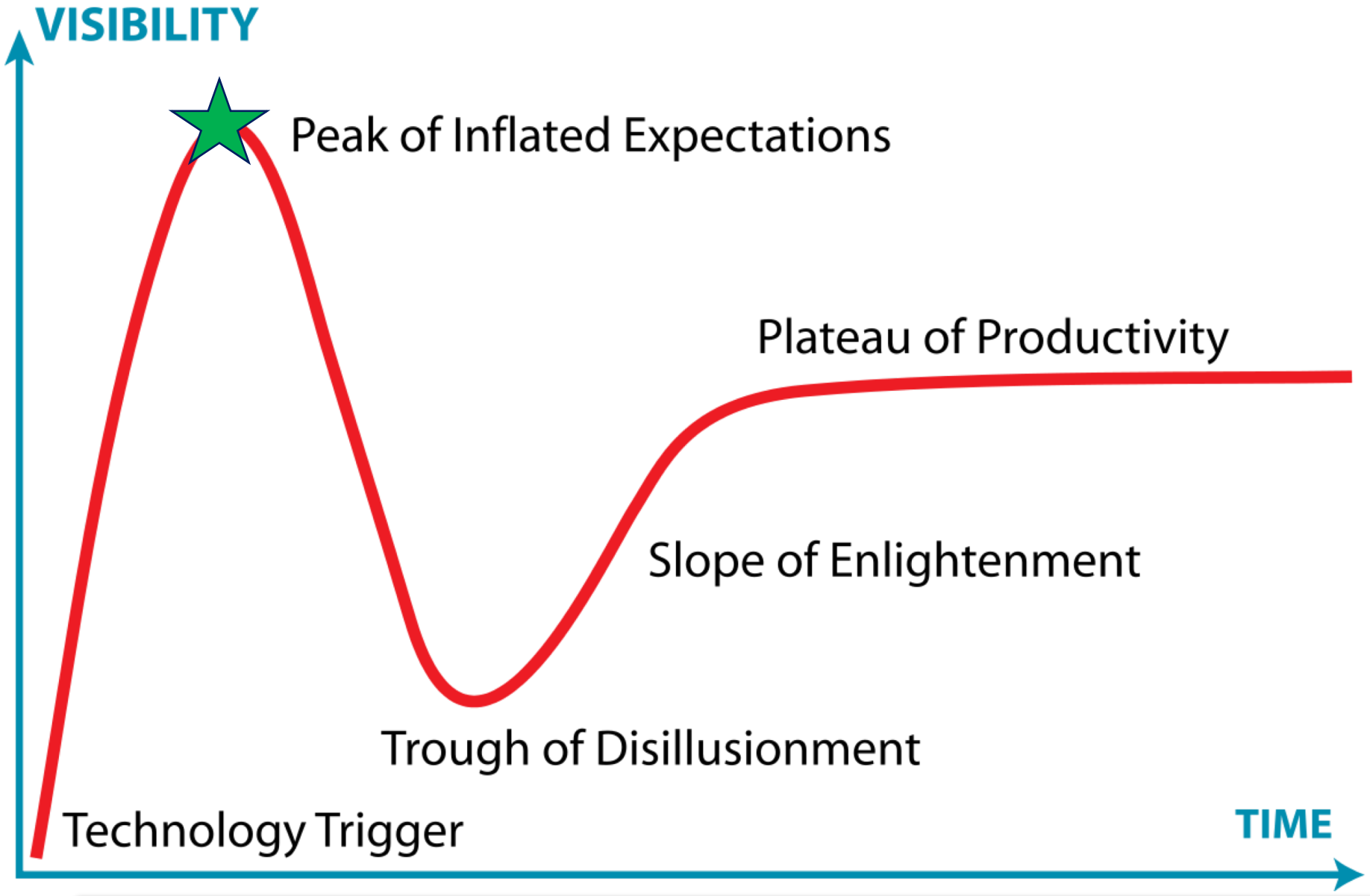
And then Esri added more

- OAuth support
- Full Productization of Survey123
- Barcodes/Scanners/Photos
- Attachments/Repeats/Collapsible Groups
- Integration with
  - Workforce for ArcGIS
  - Collector for ArcGIS
  - Explorer for ArcGIS

And then Seneca added more

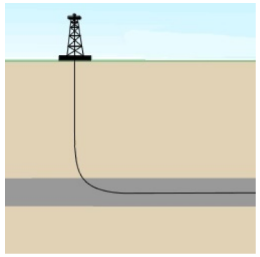
- Tablets for field staff
- E-mail notification through GeoEvent Extension for ArcGIS
- Asset barcodes
- Multiple departments
- Data management
- More surveys …

SENECA RESOURCES



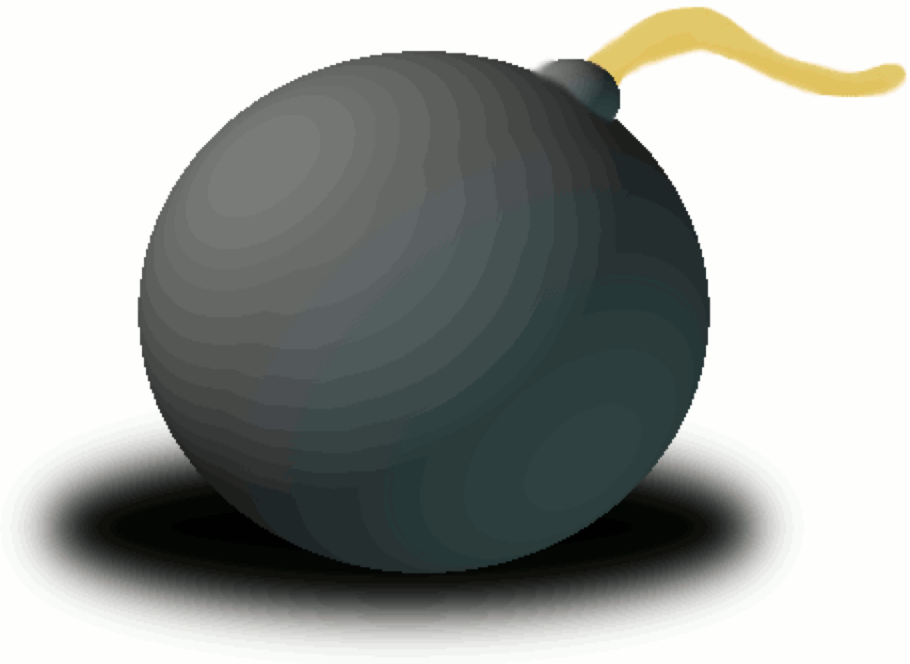
And then there was more

- Frac Stage Report – Environmental Engineering
- Mechanical Integrity Assessment (MIA) – Production
- Pad & Well Inspections (Kill test) – Production
- Equipment Replacement – Facilities
- LDAR Inspection – Environment, Health & Safety (EHS)
- Meter Calibration – Highland Field Services (HFS), EHS, Production

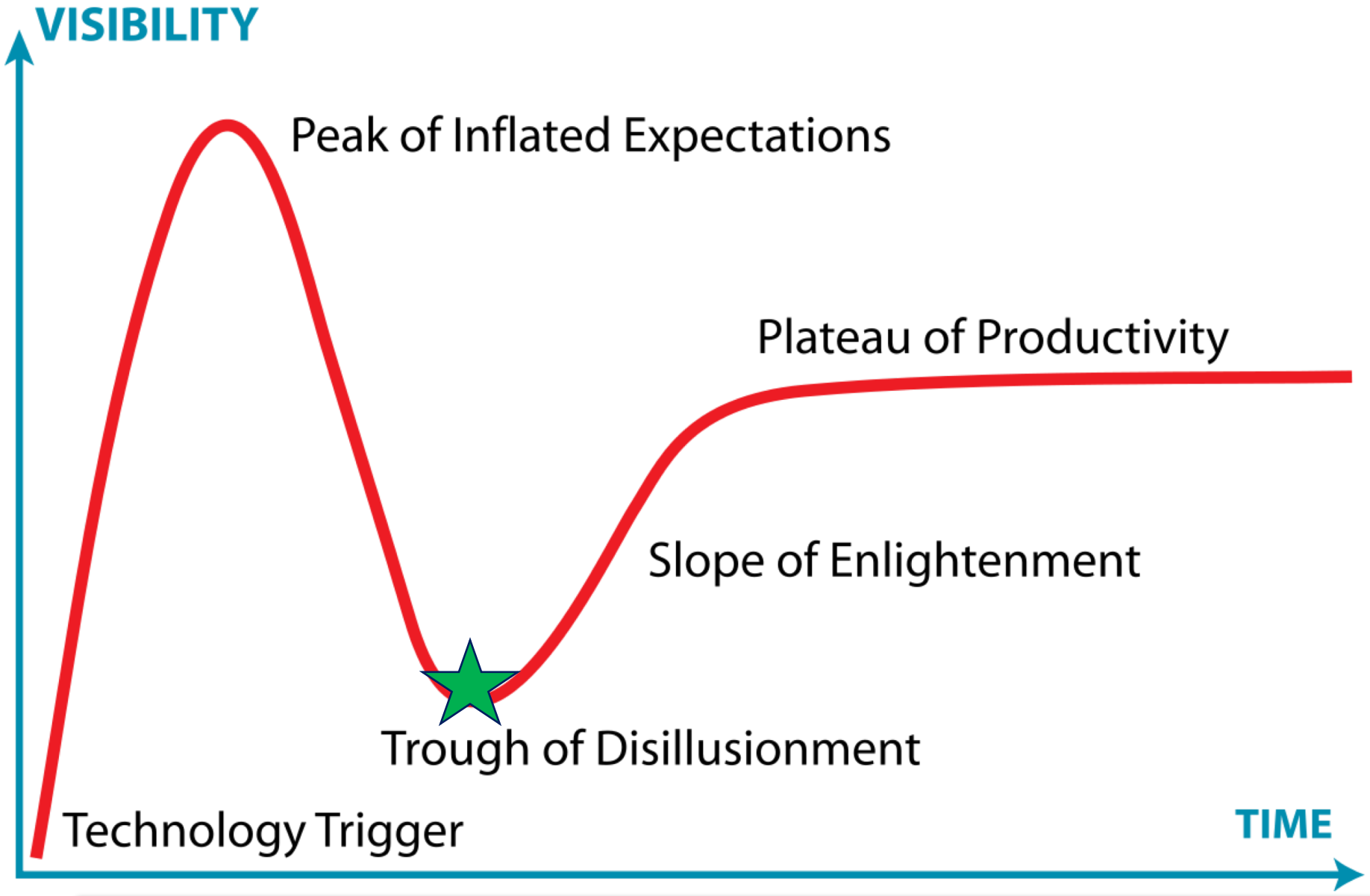


Pump the brakes

- Overwriting of HFS
- GeoEvent/E-mail BOMB
- Data Field capitalization

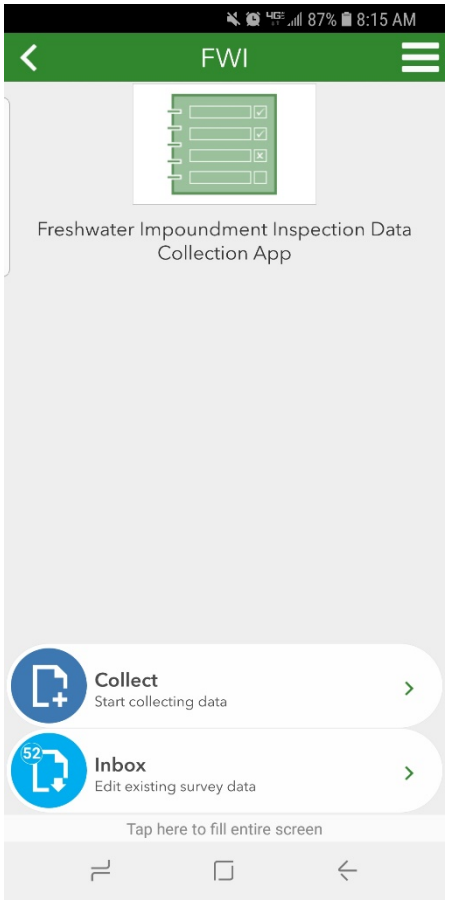


SENECA RESOURCES

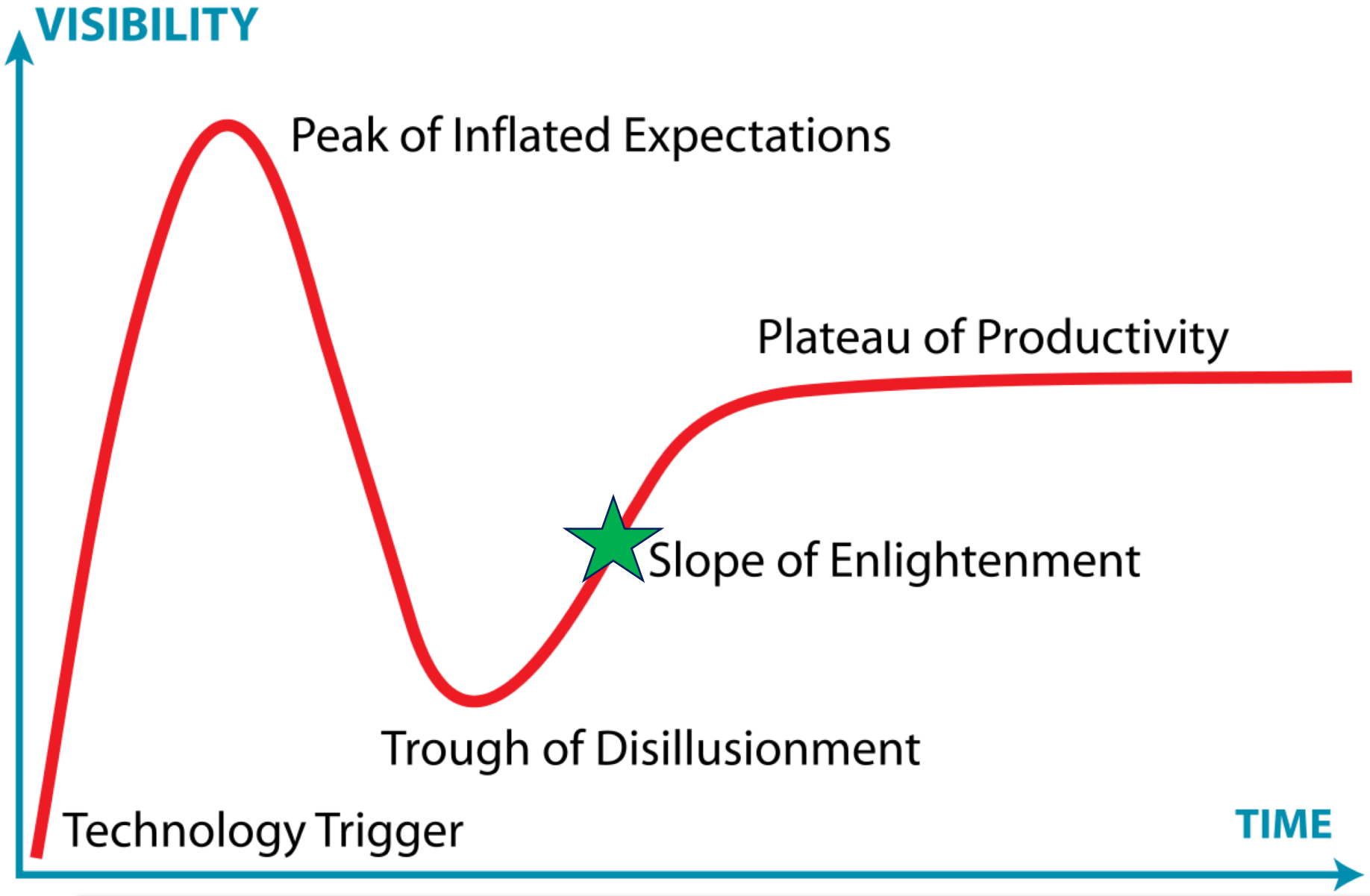


And Then

- Adjusted our surveys
- Improved our survey building skills
- Took advantage of new features that are continually being added to Survey123
- Continued to work with the Survey123 team at Esri to get fixes into the program to meet our needs

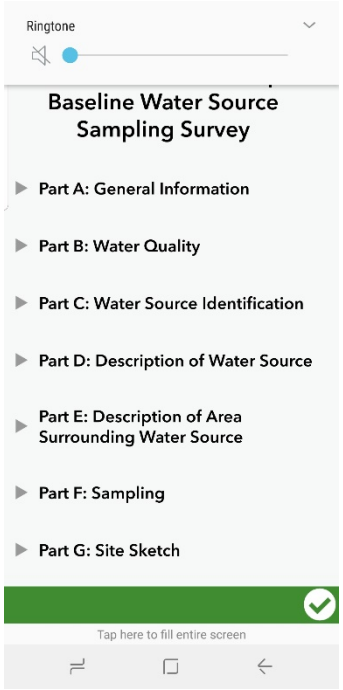


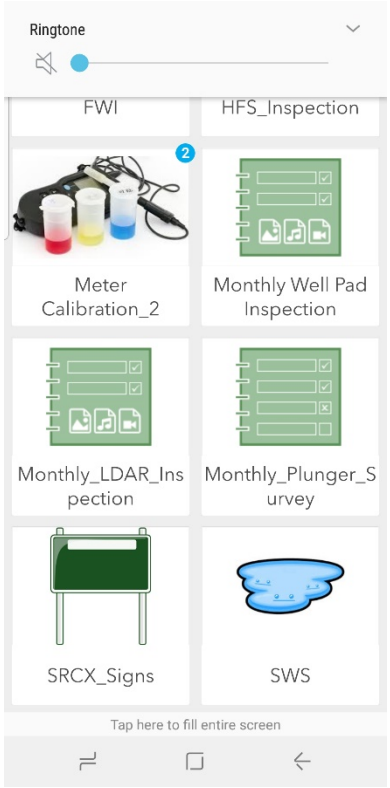
SENECA RESOURCES



And Now We Have

- Over 15 forms being used daily
- 13 iPad minis and 2 Samsung Galaxy Tab E in the field being used by contractors
- Streamlined our data management to ensure data to gets to employees in a timely manner
- Developing more surveys across multiple departments





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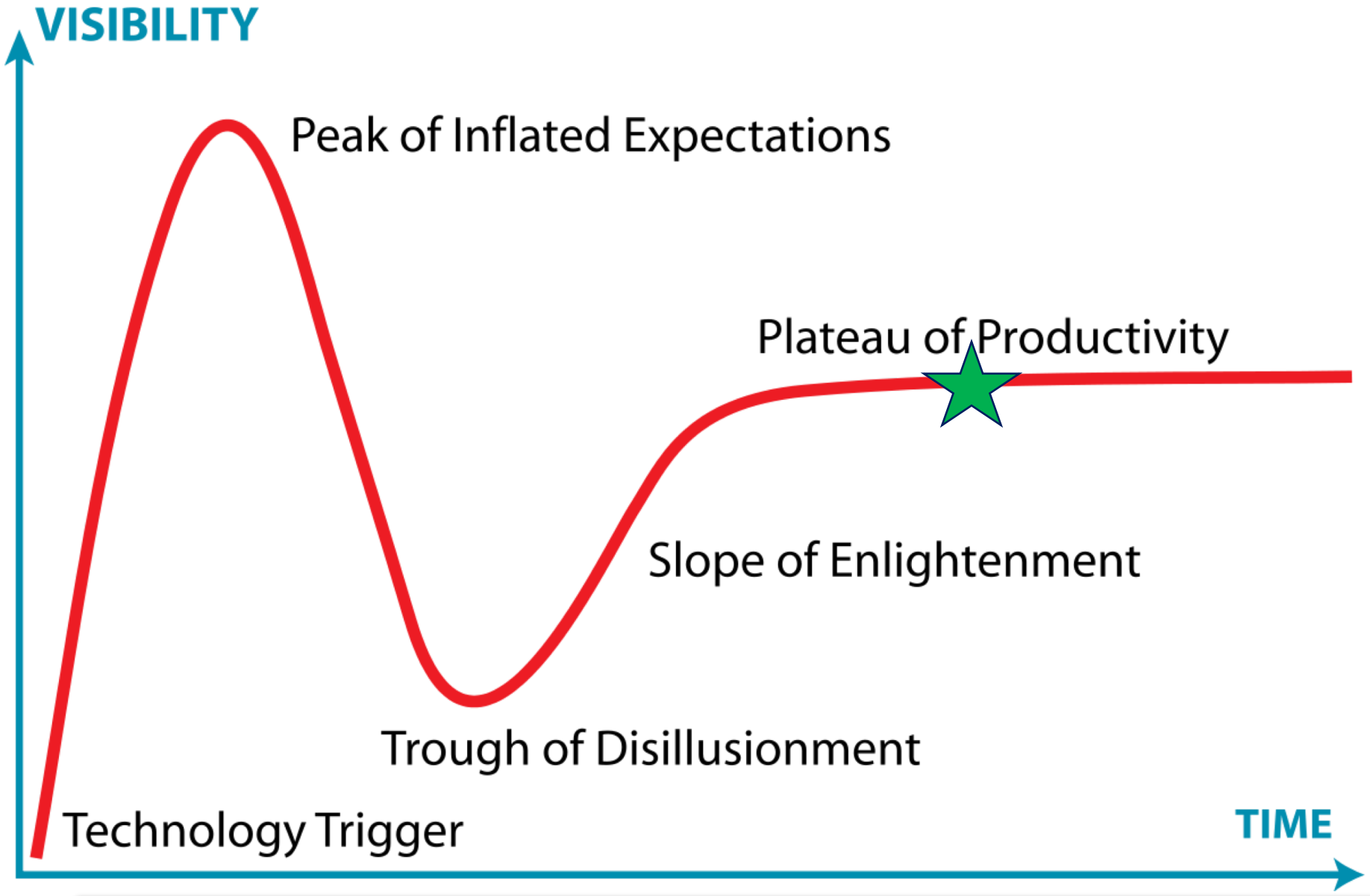


About Highland Field Services

- Highland Field Services (HFS) is a subsidiary of Seneca Resources Corporation, operating a wastewater treatment facility, centralized water storage facilities and pipeline network to manage and supply shale gas wastewater.

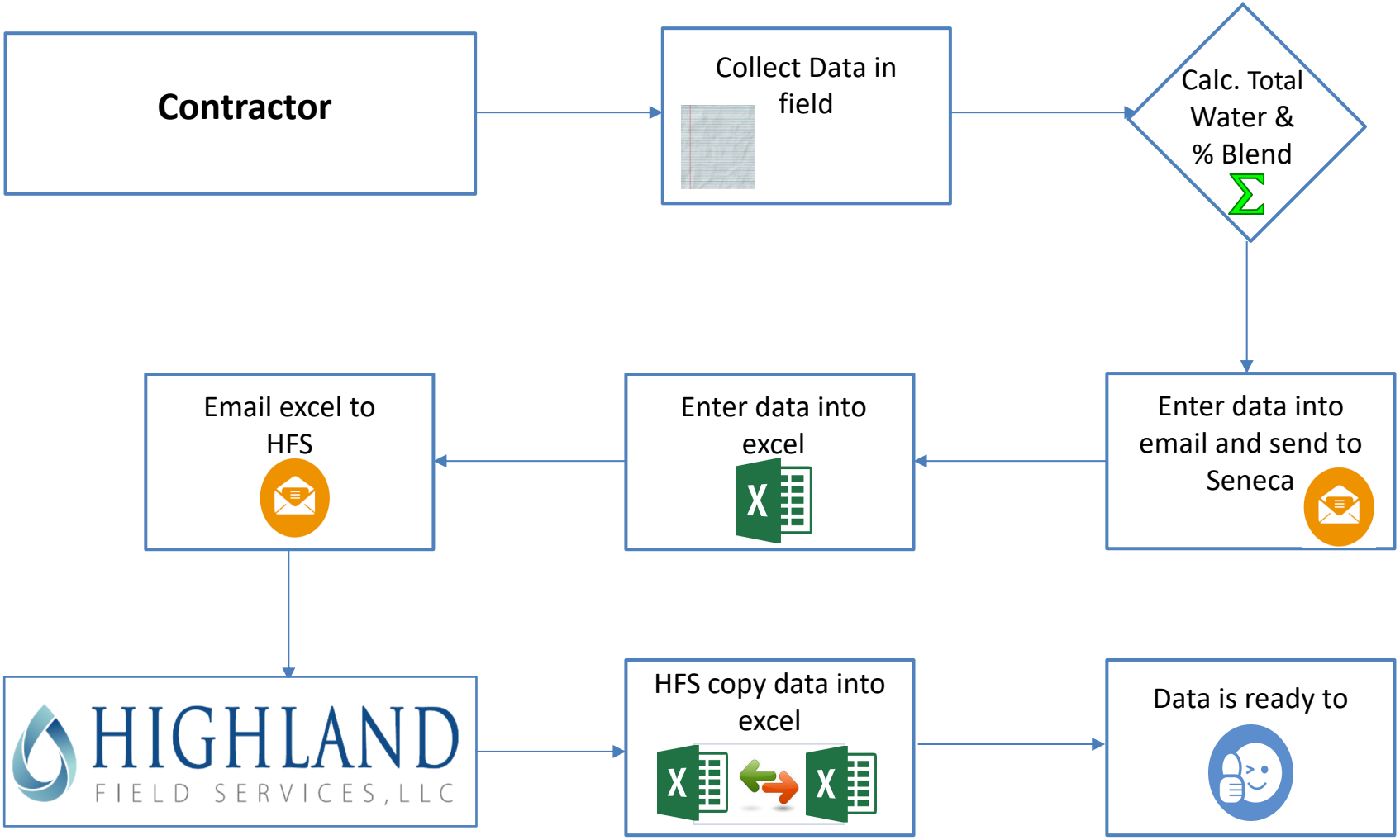
Frac Water?

- Hydraulic fracturing is a process where millions of gallons of water, sand and chemicals are pumped underground to break apart the rock and release the gas
- Manage the % Blend to achieve optimal results
- For each lateral drilled, Seneca must report Total Volume of water put downhole to PADEP
- The water must be traceable to its source (fresh, produced)
- Freshwater withdrawls are permitted and must be monitored to ensure observance of the permit.
- Internally, water volume is used for joint venture agreements and cost estimation

Out with the Old…

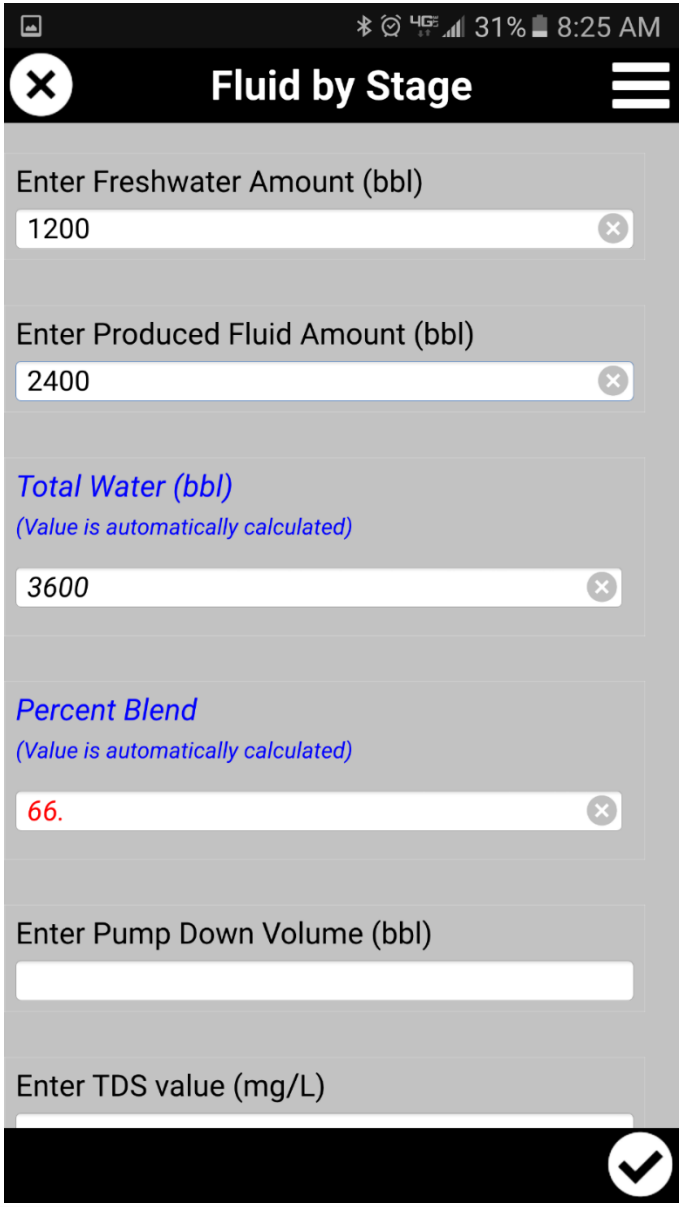
- Contractor collects data in field on paper
    - Contractor manually calculates Total Water and Percent Blend
- Contractor manually enters data into email and sends to HFS/Seneca employees
- Contractor manually enters data into excel daily data spreadsheet at end of day
- Contractor emails daily data spreadsheet to HFS/Seneca
- HFS/Seneca employee copies daily data from spreadsheet to HFS/Seneca Project Spreadsheet
- Data is ready for use

Existing Workflow



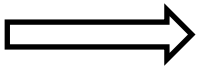
In with the New…

- Contractor collects data in field using Survey123
  - Survey 123 Automatically calculates Total Water and Percent Blend
  - Data uploaded to GIS database on close of survey
  - Email automatically generated and sent to HFS/Seneca employees
  - GIS database setup to automatically export daily data to HFS/Seneca Project Spreadsheet
- Data is ready for use

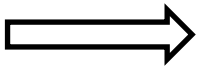


New Workflow

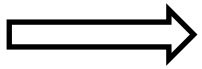
Data Collected in Field



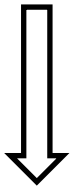
Data Uploaded to Hosted Feature Service



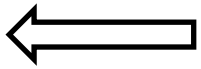
Python Script Uploads data to SDE every hour at 02 minutes after the hour - SDE View Created



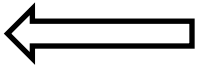
SDE View linked to Excel Worksheet



VBS script refreshes Excel Spreadsheet every hour at 06 minutes after the hour

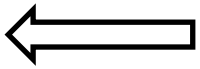


VBS script copies Excel Spreadsheet to HFS folder every hour at 08 minutes after the hour



SendEmail.exe

Windows Task Scheduler E-mails Excel Spreadsheet Every night at 8:10pm



Tech Stuff

- Survey123 for ArcGIS
- ArcGIS GeoEvent Extension for Server
- SendEmail.exe
- VBS Script
- Python Script
- SQL Server 2016
- Windows Task Scheduler

OpenSaveClose_FracStageReport.vbs - Notepad

File Edit Format View Help

```
'Write Excel.xls  Sheet's full path here
strPath = "\\pit-arcnas\GIS\_Data_Management\D08-O Stage Report.xlsx"


'Create an Excel instance and set visibility of the instance
Set objApp = CreateObject("Excel.Application")
objApp.Visible = True     '    or False

'Open workbook; Run Macro; Save Workbook with changes; Close; Quit Excel
Set wbToRun = objApp.Workbooks.Open(strPath)
wbToRun.Save
wbToRun.Close
objApp.Quit
```

CopySpreadsheetToHFS.vbs - Notepad

File Edit Format View Help

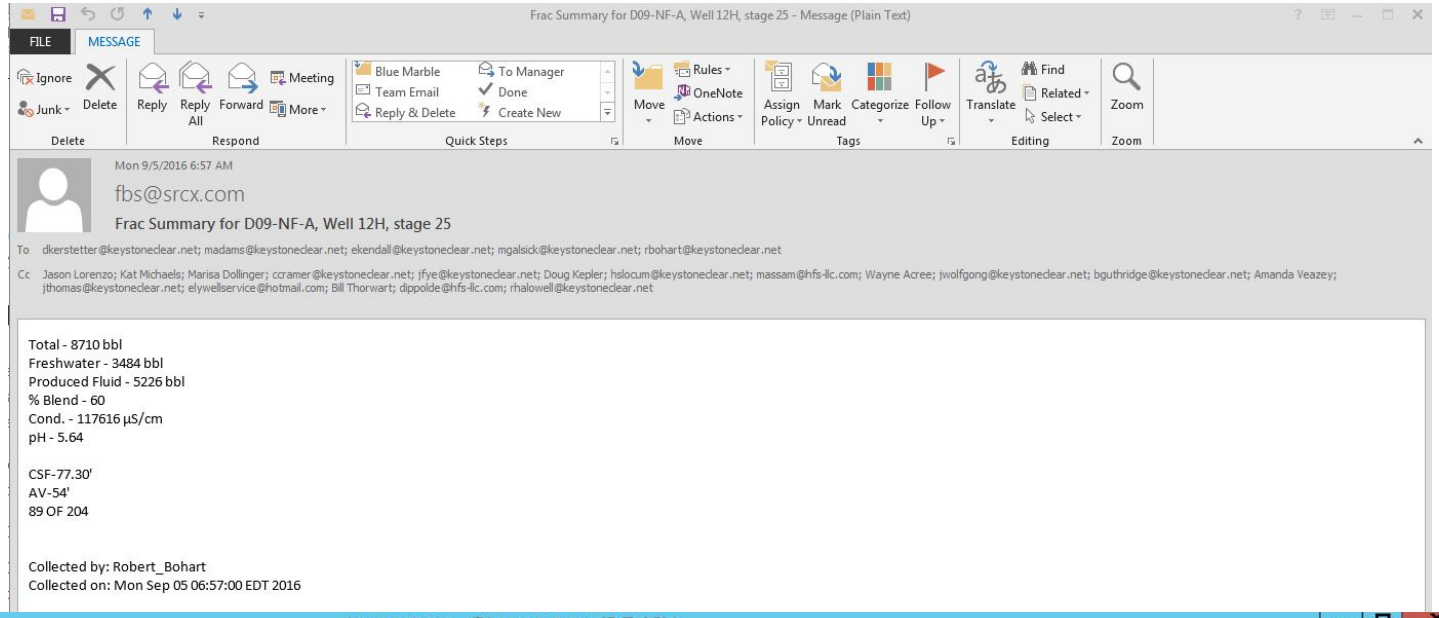
```
Dim objFSO
Dim sSourceFolder
Dim sDestFolder
Dim sDBFile
Const OVER_WRITE_FILES = True

Set objFSO = CreateObject("Scripting.FileSystemObject")
sSourceFolder = "\\pit-arcnas\GIS\_Data_Management"
sBackupFolder = "G:\HFS\Frac_Water_Report"
sDBFile = "D08-O Stage Report.xlsx"


'Copy the file as long as the file can be found
If objFSO.FileExists(sSourceFolder & "\" & sDBFile) Then
    objFSO.CopyFile sSourceFolder & "\" & sDBFile, sBackupFolder & "\" &
sDBFile, OVER_WRITE_FILES
End if

Set objFSO = Nothing
```

More Tech Stuff



export.py - C:\export.py (2.7.10)

File Edit Format Run Options Window Help

```
# -*- coding: utf-8 -*-
# ---------------------------------------------------------------------------
# export.py
# Created on: 2016-07-12
# Description: python script to export from BDS to SQL
# ---------------------------------------------------------------------------

# Import arcpy module
import arcpy


# Local variables:
fbs = r"C:\Users\boylej\AppData\Roaming\ESRI\Desktop10.4\ArcCatalog\BDS.sde\db_da458.hsu_0sv1f.hostedservice_f_b9df3325224040a034b82d7c38_fluid_by_stage_v
fbsApps = r"C:\Users\boylej\AppData\Roaming\ESRI\Desktop10.4\ArcCatalog\Apps.sde\Apps.DBO.Fluid_by_Stages"


arcpy.env.maintainSpatialIndex = True

# Process: Delete Features
arcpy.DeleteFeatures_management(fbsApps)


# Process: Append
arcpy.Append_management(fbs, fbsApps, "NO_TEST")
```

Key Takeaways

- Contractor very happy with switch from paper to digital form
  - "I was very happy to switch over to the app because I didn't have to do the summary every night", Interview with Operations Manager, August 4, 2016
- Eliminate 5 manual workflow tasks including 3 that can introduce data transcription errors
- Necessary to have on-site training of Contractor representative to be point person in the field
- Develop clear data flow internally and with Contractor
- Maintain open communication between Geomatics department & Contractor to solve any technical issues that arise
- Utilize existing workflow and new workflow simultaneously until new workflow is verified
- Saved approximately 1 billable hour per day per frac site
- Be prepared for bumps in the road

Questions

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Thank You

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