

# Leveraging ArcGIS Enterprise as a solution ecosystem for a startup or small operator

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# Tellurian

- Building a low-cost, fully-integrated Liquid Natural Gas business
- Includes Upstream, Pipeline, LNG terminal teams
- Upstream activities are fully operational
- ~150 employees

# Project Team

*Identifying key roles: Champion, Executive Sponsor, & Technical Leadership*

## Technical

Mike Bailey, GISP – GIS Advisor, Upstream

Dee Glazebrook – Manager, IT Enterprise Reporting Products

Jason Ramirez, GISP – GIS Consultant, Cartodyne

## Management

Ami Arief – SVP, Upstream Resources

Matt Williams - VP, Upstream Geoscience

Rafael Ordonez - Director, IT Application Support



# Business Challenge

*Develop your business-first geospatial strategy*



*Upstream Team (2017):*

**Use Case:** Easily accessible web-based GIS tools to visualize and interact with operational data

## Activities

- Initial data aggregation for Area of Interest (public domain)
- ArcGIS Enterprise Deployment (Azure)
- I - Visualizations & Mapping (land, regulatory, ad hoc)
- Integrate subscription data (Enverus, IHS, Rextag)
- Special projects





# Data Aggregation

## *Project Data, Where to Start?*

Public facing and Esri data:

- U.S. Energy Information Administration
- SONRIS
- Texas Railroad Commission
- Esri Data and Maps

Maps



File



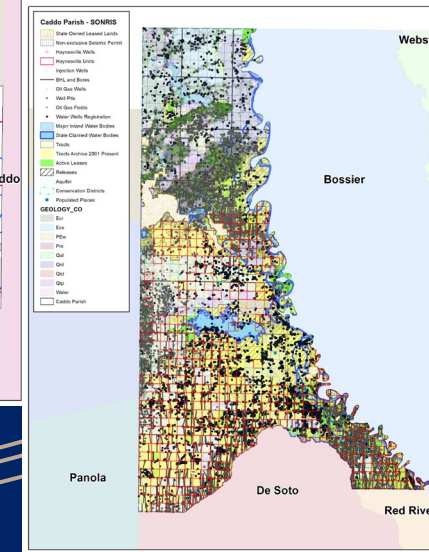
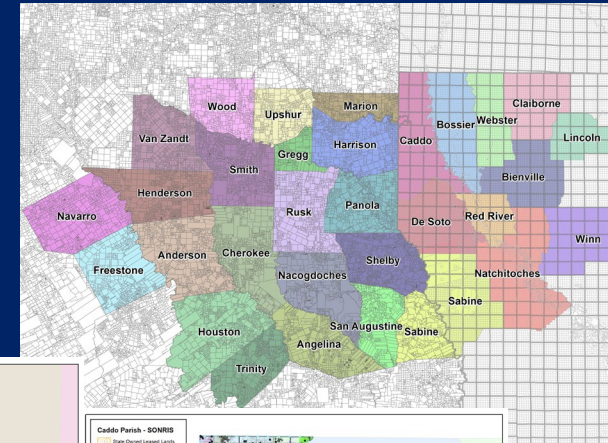
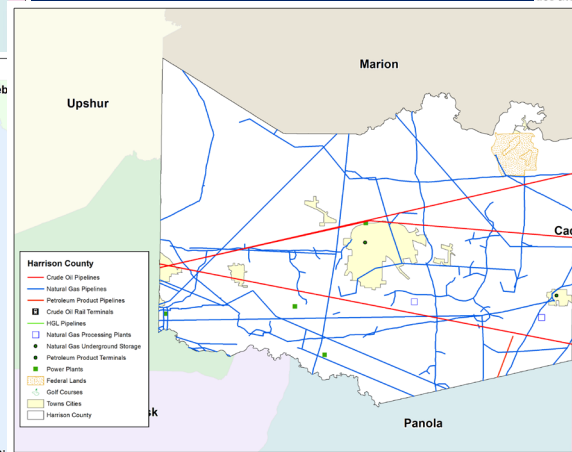
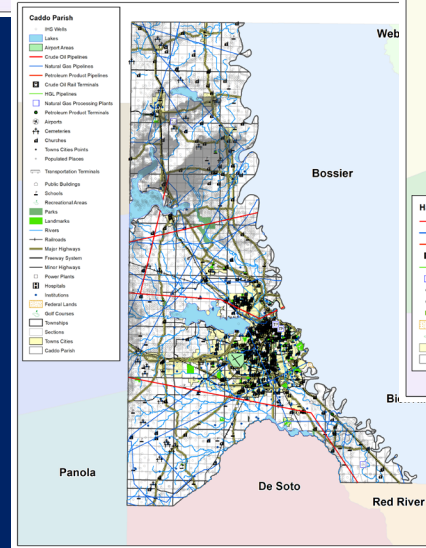
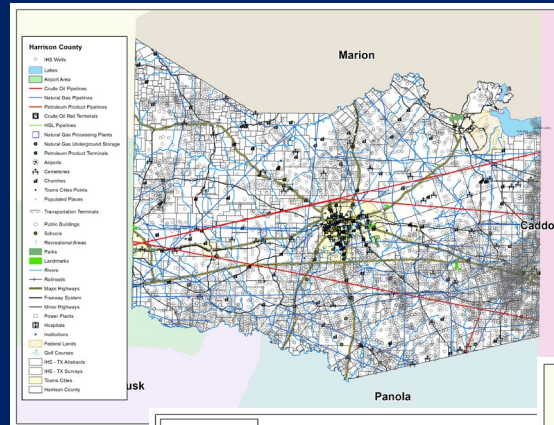
Shapefile



Tables



# Data Aggregation



# ArcGIS Enterprise Deployment

*How do we share and collaborate?*

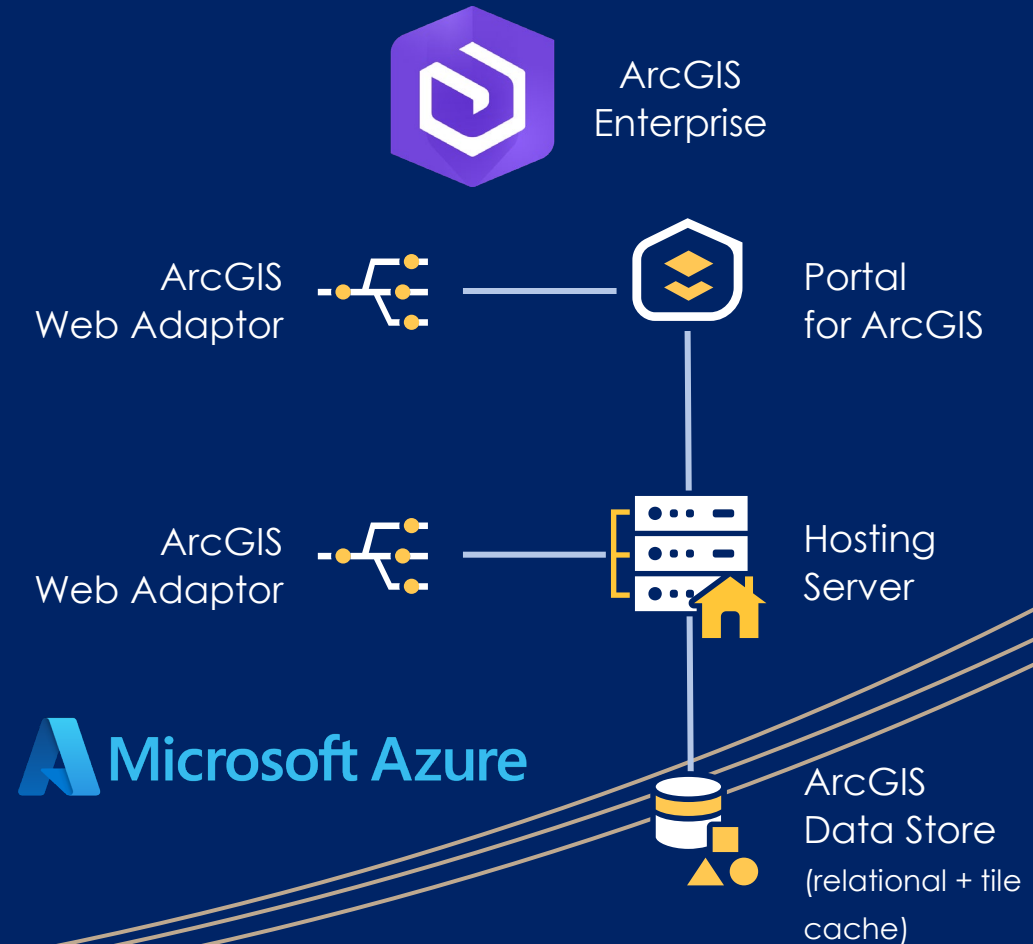
IT cloud-first strategy with emphasis on security:

- Single Machine Base Deployment
- Microsoft Azure
- Security, VPN access only, no external

Desktop



Webmap



# ArcGIS Enterprise Deployment

The image displays four overlapping screenshots of the ArcGIS Enterprise web application interface:

- Top Left:** The 'Tellurian GIS Portal' home page. The navigation bar includes Home, Gallery, Map, Scene, Groups, Content, and Organization. A large 'TELLURIAN' logo is centered. A welcome message states: 'Welcome to the Tellurian Portal for ArcGIS. This secure and highly collaborative environment gives you the ability to easily share maps and spatial assets with other portal users within the Tellurian organization. In addition to a general use Tellurian organizational group, there are Portal groups created for the Geoscience, Pipeline, Land, and LNG teams. Group members have access to web mapping applications containing GIS data layers relevant to their business team. While these team applications have robust customized functionality, they are configured to be read only. Please contact the IT Helpdesk if you have any questions.'
- Top Right:** A map view titled 'Land Team App 2'. A 'Query' dialog box is open, showing search criteria: 'Agreement contains 106171', 'Original\_L contains RAMBIN', and '1=1'. The 'Apply' button is highlighted. A 'Layer List' on the right shows layers like 'Land\_Team\_App\_PRD2', 'Wells', 'Tellurian', 'Haynesville Operators', 'Texas Abstracts', 'Faults', 'Cultural', 'USA State Boundaries', 'USA Counties', 'Lignite Mines', 'Gen6 Sand Pit', 'HBP', and 'Undeveloped'.
- Bottom Left:** The 'Content - My Content' page. It shows a grid of items. The first item is 'pds\_frac\_schedule\_v5' by portaladmin, created on Apr 23, 2022. Other items include 'JobSite App PRD Map' and 'JobSite\_App\_PRD'. A left sidebar shows 'Folders' (All My Content, portaladmin, Survey-HSSE Field Data, Survey-HSSE Inspections, Survey-Water Quality) and 'Filters' (Categories: No Categories Yet).
- Bottom Right:** The 'Groups' page, listing organizational groups:
  - Geoscience Team:** Owner: portaladmin, Created: Mar 16, 2018, Last updated: Apr 25, 2022. Viewable by: Organization. This is the Geoscience Team GIS portal organizational group.
  - Land Team:** Owner: portaladmin, Created: Mar 16, 2018, Last updated: Apr 25, 2022. Viewable by: Organization. This is the Land Team GIS portal organizational group.
  - LNG Team:** Owner: portaladmin, Created: Mar 16, 2018, Last updated: Apr 25, 2022. Viewable by: Organization. This is the LNG Team GIS portal organizational group.
  - Pipeline Team:** Owner: portaladmin, Created: Mar 16, 2018, Last updated: Apr 25, 2022. Viewable by: Organization. This is the Pipeline Team GIS portal organizational group.



# Visualization & Mapping

*Defining the look, style, and functionality of spatial information*

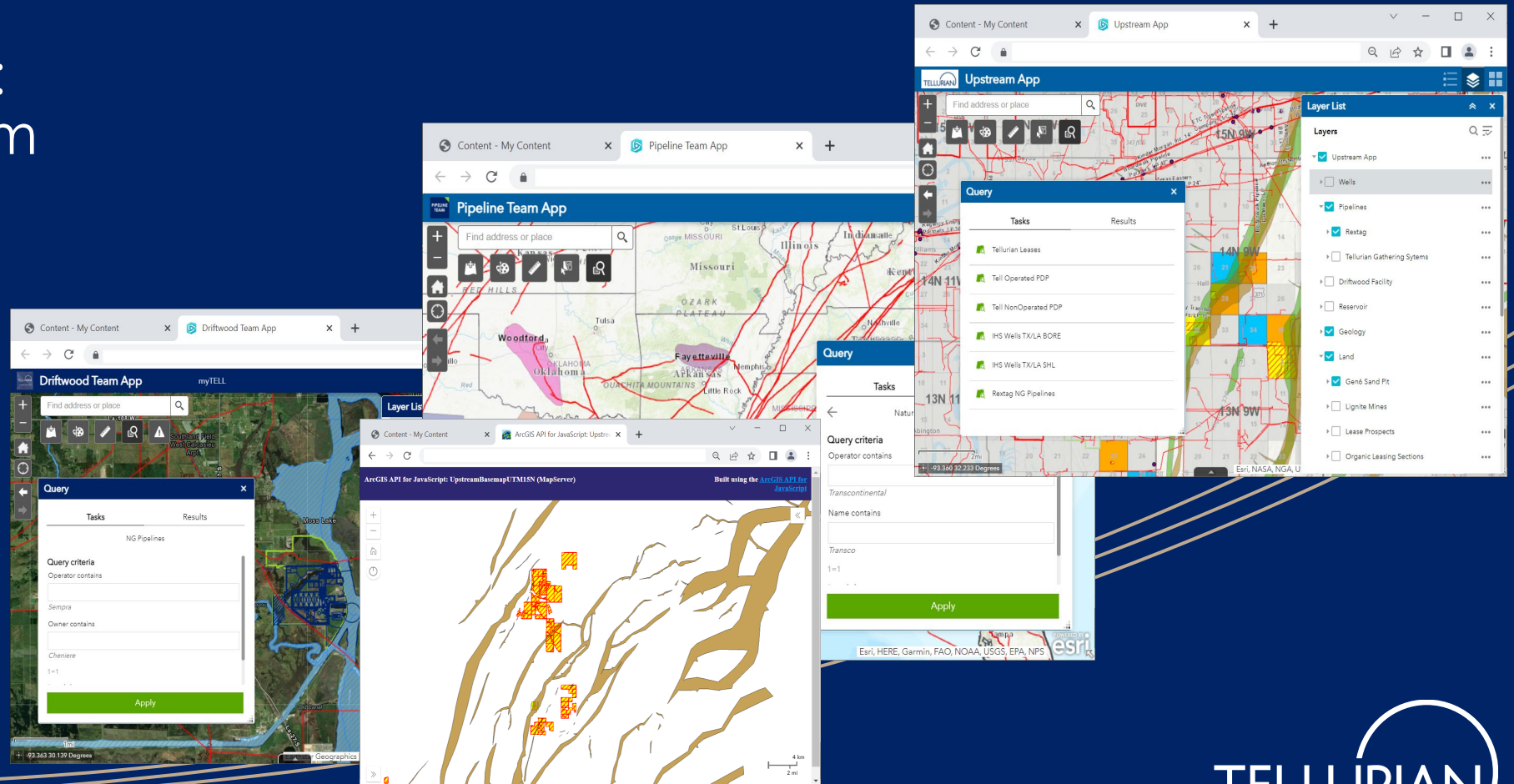
Team Web Apps:

- Upstream Team
- Pipeline Team
- LNG Team

Desktop Map



Plotter



# Data Integration

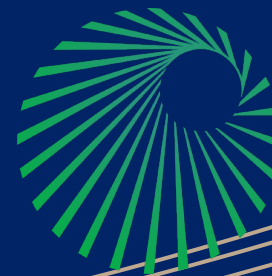
*Combining internally-produced data with data subscriptions*

Who are the vendors and how do we automate the updates?

- IHS Markit (Python)
- Enverus (toolbox/REST API)
- Rextag (Python)

 ENVERUS

 REXTAG



IHS Markit®

Webmap



Database



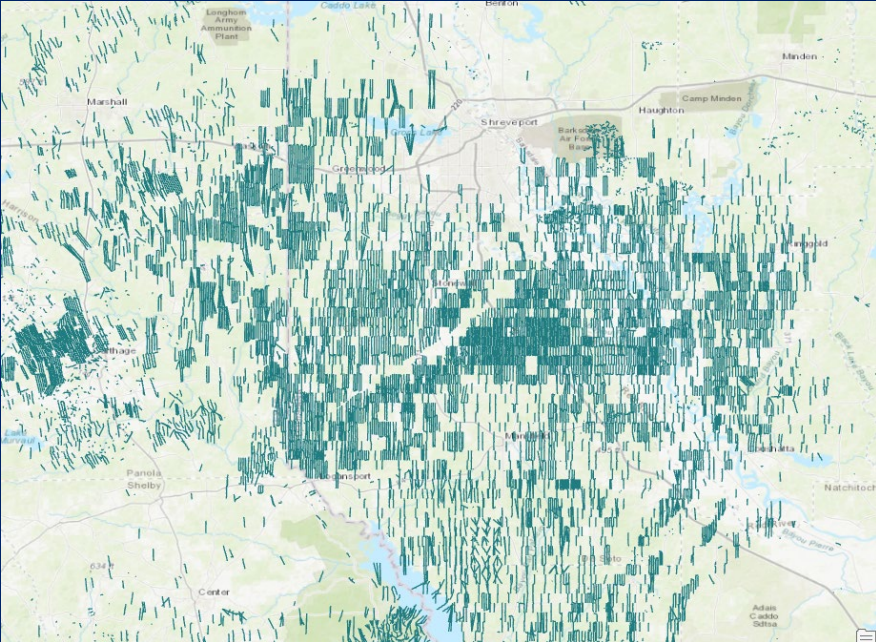
GIS Storage



 TELLURIAN

# Data Integration

## IHS – Well Locations & Well Header Info



```
import arcpy

# set input/output parameters
outputgdb = r"\\azu-file-01\GIS_Data\Geodatabase\IHS_Markit\AllWells_IHS\AllWells_IHS.gdb"
sdefile = r"\\azu-file-01\GIS_Data\Geodatabase\IHS_Markit\AllWells_IHS\azu-sql-01.sde"
databasename = "IHSM_Meridian"
viewname = "UCS_AllWells_TX_LA"

arcpy.env.workspace = outputgdb
arcpy.env.overwriteOutput = True

# delete the old feature classes
while len(arcpy.ListFeatureClasses(viewname + "_*")) > 0:
    ListFC = arcpy.ListFeatureClasses(viewname + "_*")
    for FC in ListFC:
        arcpy.Delete_management(FC)

# set the input feature classes
fcWB = sdefile + "\\\" + databasename + ".dbo." + viewname + "_WB"
fcSH = sdefile + "\\\" + databasename + ".dbo." + viewname + "_SH"
fcBH = sdefile + "\\\" + databasename + ".dbo." + viewname + "_BH"

# copy FC to geodatabase
arcpy.FeatureClassToFeatureClass_conversion(fcWB, outputgdb, "UCS_AllWells_TX_LA_WB")
arcpy.FeatureClassToFeatureClass_conversion(fcSH, outputgdb, "UCS_AllWells_TX_LA_SH")
arcpy.FeatureClassToFeatureClass_conversion(fcBH, outputgdb, "UCS_AllWells_TX_LA_BH")
```



# Enverus – Leases and Units





# Data Integration

## Rextag - Python

```
ImportRextag_MasterWGS84_to_TELLGISDEV.py - C:\Scripts\Python\NightlyUpdates\ImportRext...
File Edit Format Run Options Window Help

# ImportRextag_MasterWGS84_to_TELLGISDEV.py
# Author: Jason Ramirez
# Created on:01/15/2019
# Updated: 6/27/2019 updated DEV_GIS variable to use svc-tellgis connection
# Description: Data loading from Rextag staging gSDB to TELLGISDEV

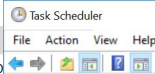
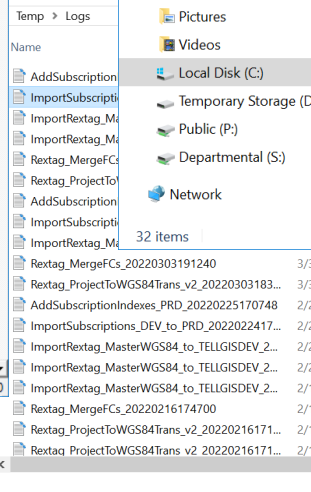
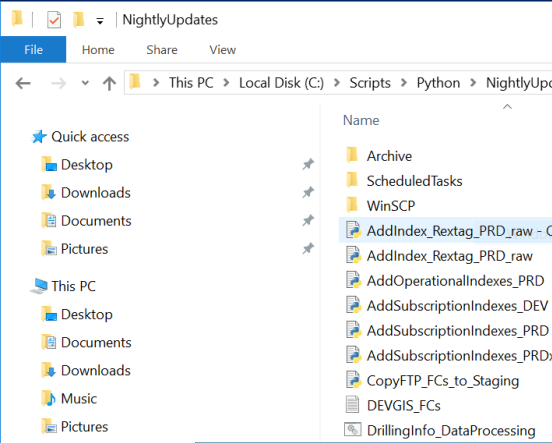
try:
    # Import arcpy module
    import arcpy
    import sys, time, traceback, string, os
    arcpy.env.overwriteOutput = True

    #Defines some functions used for getting messages from the gp and python
    def showGpMessage():
        arcpy.AddMessage(arcpy.GetMessages())
        print >> open(logFile, 'a'), arcpy.GetMessages()
        print arcpy.GetMessages()

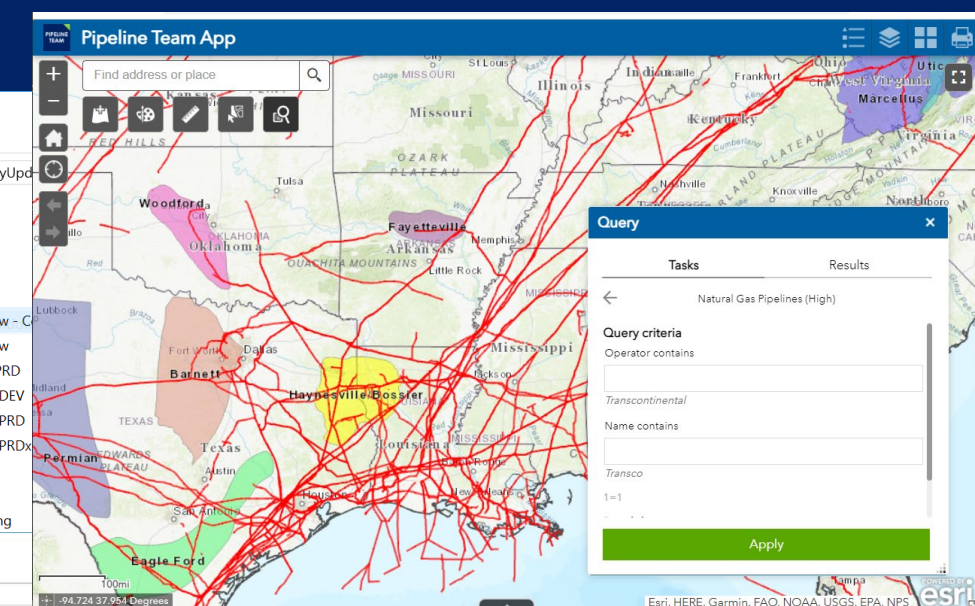
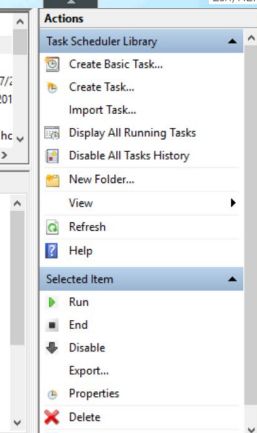
    def showPyMessage():
        arcpy.AddMessage(str(time.ctime()) + " - " + message)
        print >> open(logFile, 'a'), str(time.ctime()) + " - " + message
        print str(time.ctime()) + " - " + message

    def showPyMessage_BlankWithLine():
        arcpy.AddMessage("")
        message = ""
        messageblank = " "
        print >> open(logFile, 'a'), message
        print >> open(logFile, 'a'), messageblank
        print message
        print messageblank

    def showPyMessage_Blank():
        arcpy.AddMessage("")
        message = " "
```



Name	Status	Triggers
adm_1_0101 Start Services (Daily)	Ready	At 5:30 AM every day
adm_2_0100 Stop Services	Disabled	At 8:00 PM on 8/30/2019
adm_3_0300 Subscription Data DEV to PRD	Disabled	At 12:00 PM every Saturday of every week, starting 9/7/2019
adm_4_0310 Operational Data DEV to PRD	Disabled	At 9:00 PM every Friday of every week, starting 8/30/2019
Adobe Acrobat Update Task	Ready	Multiple triggers defined
ArcGIS Pro Indexing (TLN_aa.rglazebrook)	Ready	At 3:26 PM every day - After triggered, repeat every 1 h



# Special Projects

*Answering emergent business challenges with spatial solutions*



# Special Projects

## Infrastructure Dashboard

**Use Case:** We need to capture and visualize pipeline infrastructure for analysis and regulatory compliance

- Tablet interface for field works capturing assets
- Feed enterprise web apps like the Upstream App
- Collected data provide regulatory reporting under LDNR and PHMSA pipeline rules



# Special Projects

Construction Job Site Status App





# Thank you!

## **Presentation Questions**

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## **Media and Investor Relations**

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