

GeoAI in the Maritime domain using ArcGIS Notebooks

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Agenda

- Introduction
- ArcGIS Notebooks
- AI Solution Architecture
- Demo
- Closing Up



Introduction

Artificial intelligence

From Wikipedia, the free encyclopedia

"AI" redirects here. For other uses, see [AI \(disambiguation\)](#) and [Artificial intelligence \(disambiguation\)](#).

In [computer science](#), **artificial intelligence** (**AI**), sometimes called **machine intelligence**, is [intelligence](#) demonstrated by [machines](#), in contrast to the **natural intelligence** displayed by humans and animals. Colloquially, the term "artificial intelligence" is used to describe machines that mimic "cognitive" functions that humans associate with other [human minds](#), such as "learning" and "problem solving".^[1]

As machines become increasingly capable, tasks considered to require "intelligence" are often removed from the definition of AI, a phenomenon known as the [AI effect](#).^[2] A quip in [Tesler's Theorem](#) says "AI is whatever hasn't been done yet."^[3] For instance, [optical character recognition](#) is frequently excluded from things considered to be AI, having become a routine technology.^[4] Modern machine capabilities generally classified as AI include successfully [understanding human speech](#),^[5] competing at the highest level in [strategic game](#) systems (such as [chess](#) and [Go](#)),^[6] [autonomously operating cars](#), intelligent routing in [content delivery networks](#), and [military simulations](#).

Artificial intelligence can be classified into three different types of systems: analytical, human-inspired, and humanized artificial intelligence.^[7] Analytical AI has only characteristics consistent with [cognitive intelligence](#); generating a cognitive representation of the world and using learning based on past experience to inform future decisions. Human-inspired AI has elements from cognitive and [emotional intelligence](#); understanding human emotions, in addition to cognitive elements, and considering them in their [decision making](#). Humanized AI shows characteristics of all types of competencies (i.e., cognitive, emotional, and [social intelligence](#)), is able to be [self-conscious](#) and is [self-aware](#) in interactions with others.



What is (Geo)AI? (more simple)



AI \equiv Knowledge

Data

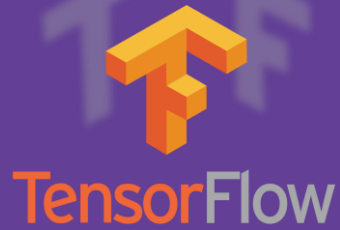
All of us

GeoAI
AI with spatial
context



NavD

Tools 4 AI





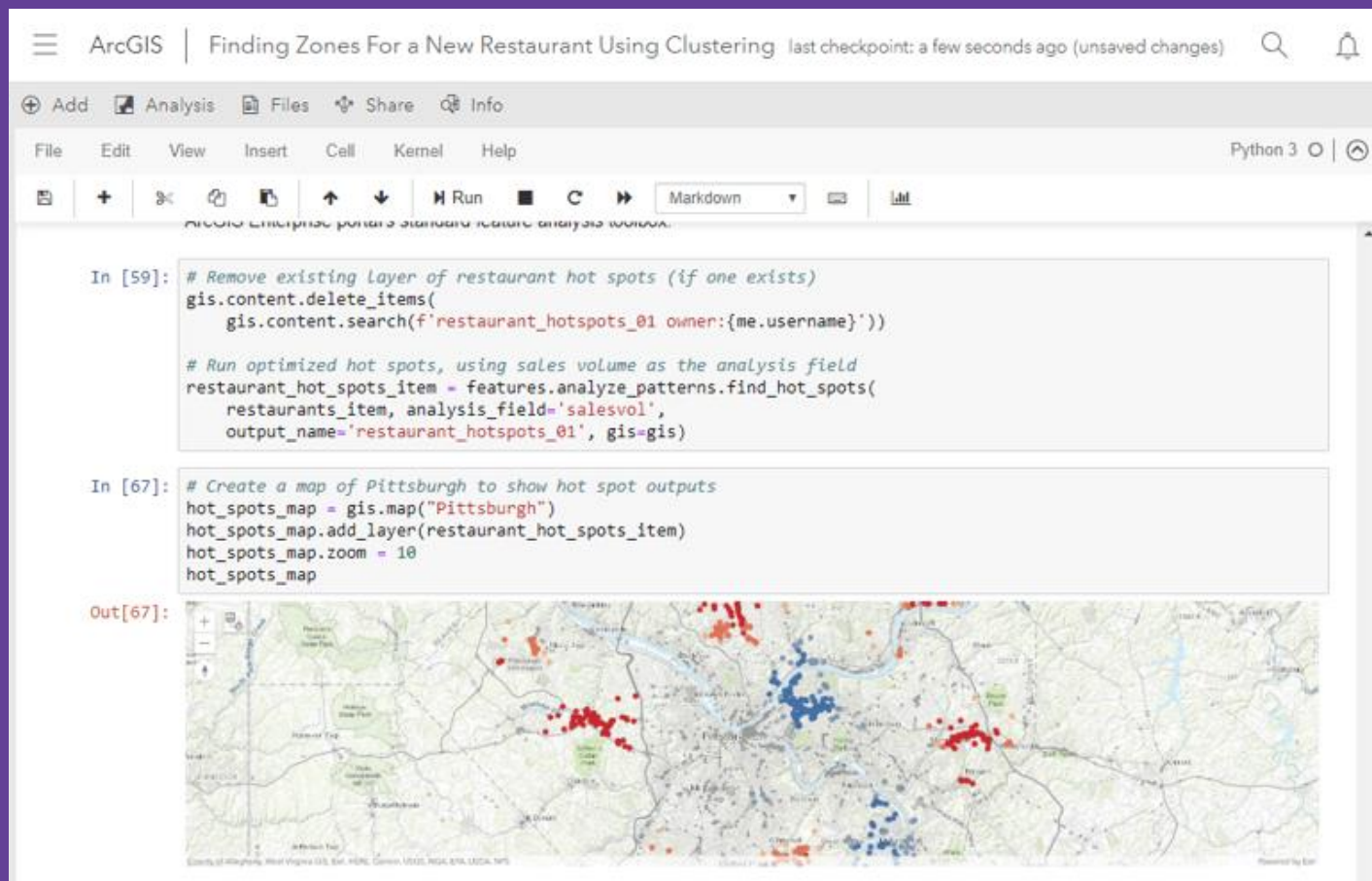
We need a lot of these!!!!

And That's Data!!!!

AND WHEN I SAY A LOT OF DATA,
I DON'T MEAN BIG DATA.....
I MEAN MULTI-SOURCE DATA!!!!

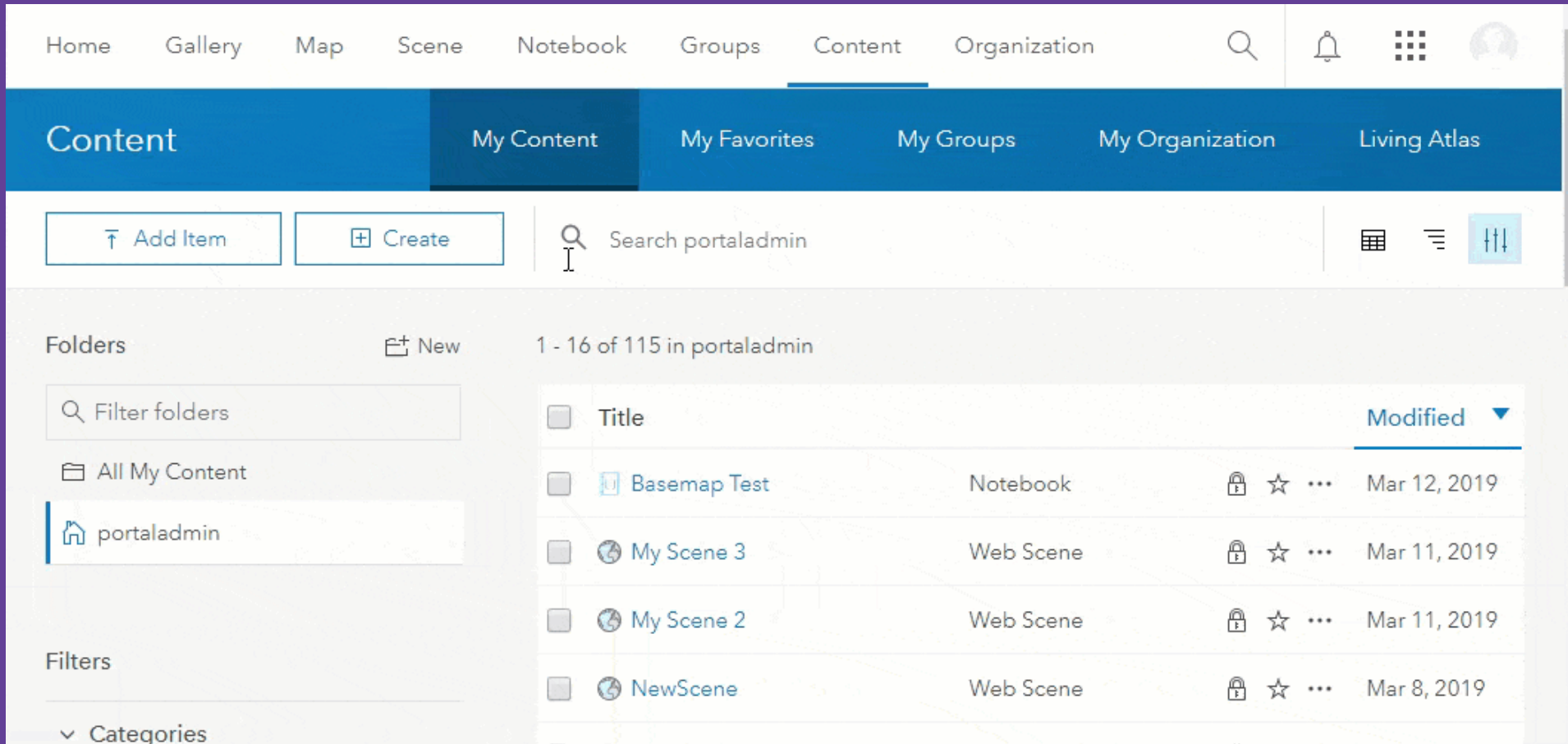
ArcGIS Notebooks

Seamless integration with the portal



ArcGIS Notebooks

Turn analysis into action



The screenshot displays the ArcGIS Content interface. The top navigation bar includes links for Home, Gallery, Map, Scene, Notebook, Groups, Content (selected), and Organization. Below this, a secondary bar shows 'Content' and 'My Content' (selected), along with 'My Favorites', 'My Groups', 'My Organization', and 'Living Atlas'. A search bar is present with the text 'Search portaladmin'. The main content area shows a list of items under the 'portaladmin' folder. The list includes a 'Basemap Test' Notebook and three 'Web Scene' items: 'My Scene 3', 'My Scene 2', and 'NewScene'. Each item has a checkbox, a lock icon, a star icon, and a menu icon. The 'Modified' column shows dates: Mar 12, 2019 for the Notebook, and Mar 11, 2019 and Mar 8, 2019 for the Web Scenes.

Home Gallery Map Scene Notebook Groups Content Organization

Content My Content My Favorites My Groups My Organization Living Atlas

Add Item Create Search portaladmin

Folders New 1 - 16 of 115 in portaladmin

Filter folders

All My Content

portaladmin

Filters

Categories

<input type="checkbox"/>	Title		Modified
<input type="checkbox"/>	Basemap Test	Notebook	Mar 12, 2019
<input type="checkbox"/>	My Scene 3	Web Scene	Mar 11, 2019
<input type="checkbox"/>	My Scene 2	Web Scene	Mar 11, 2019
<input type="checkbox"/>	NewScene	Web Scene	Mar 8, 2019

ArcGIS Notebooks

Put Python to work for you

ArcGIS

Raster Analytics: Calculate wildfire landslide risk last checkpoint: a few seconds ago (unsaved changes)

Search

Notifications

Grid

Portal Admin portaladmin

Add Analysis Files Share Info

Save As Sample

File Edit View Insert Cell Kernel Help

Python 3

+ % Copy Paste Up Down Run Stop Refresh

Markdown

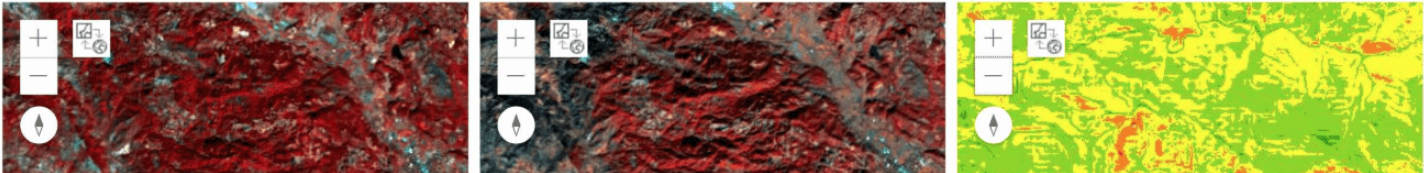
Step 3: Calculate the sum of the weighted input datasets

In this step, we calculate the final result of the weighted overlay by calculating the sum of the weighted input datasets. Areas that are most likely to have landslides according to our multi-criteria based on burn severity, slope, and stability index are assigned a value of 5 and displayed in red. Areas that are least likely to have landslides are assigned a value of 1 and displayed in green.

```
In [16]: landslide_risk = colormap(# burn severity
                                0.30 * burn_severity
                                +
                                # Slope index
                                0.55 * slope_index
                                +
                                # Stability index
                                0.15 * stability_index,
                                colormap=[[1, 56, 168, 0], [2, 141, 212, 0],
                                           [3, 255, 255, 0], [4, 255, 128, 0],
                                           [5, 255, 0, 0]],
                                astype='u8')
```

```
In [25]: # Create three maps to compare before and after imageries
# and the landslide risk map side by side
map1 = gis.map(location='-122.58, 38.45', zoomlevel=15)
map2 = gis.map(location='-122.58, 38.45', zoomlevel=15)
map3 = gis.map(location='-122.58, 38.45', zoomlevel=15)
map1.layout = Layout(flex='1 1', height='500px', padding='5px')
map2.layout = Layout(flex='1 1', height='500px', padding='5px')
map3.layout = Layout(flex='1 1', height='500px', padding='5px')
map1.add_layer(infrared_before)
map2.add_layer(infrared_after)
map3.add_layer(landslide_risk)
box = HBox([map1, map2, map3])
box
```

Out[25]:



ArcGIS Notebooks

It's not just for data science

The screenshot displays the ArcGIS Notebooks web application interface. At the top, a navigation bar includes links for Home, Gallery, Map, Scene, Notebook, Groups, Content, and Organization. A search icon, a notification bell, and a user profile icon labeled 'Portal Admin portaladmin' are also present. Below the navigation bar, a blue header section contains the text 'Esri Sample Notebooks' and three tabs: 'Overview', 'Content' (which is selected), and 'Members'. A search bar with the placeholder text 'Search group content' is located below the header. To the right of the search bar are icons for 'Table', 'Title', and 'Filter'. On the left side, a 'Filters' panel is visible, showing expandable sections for 'Item Type' (Maps, Layers, Scenes, Apps, Tools, Files), 'Date Modified', 'Tags', and 'Shared'. The main content area displays a table of 16 items, with the first 10 visible. Each row includes a title, a status icon, a star icon, a modified date, an owner, and a view count.

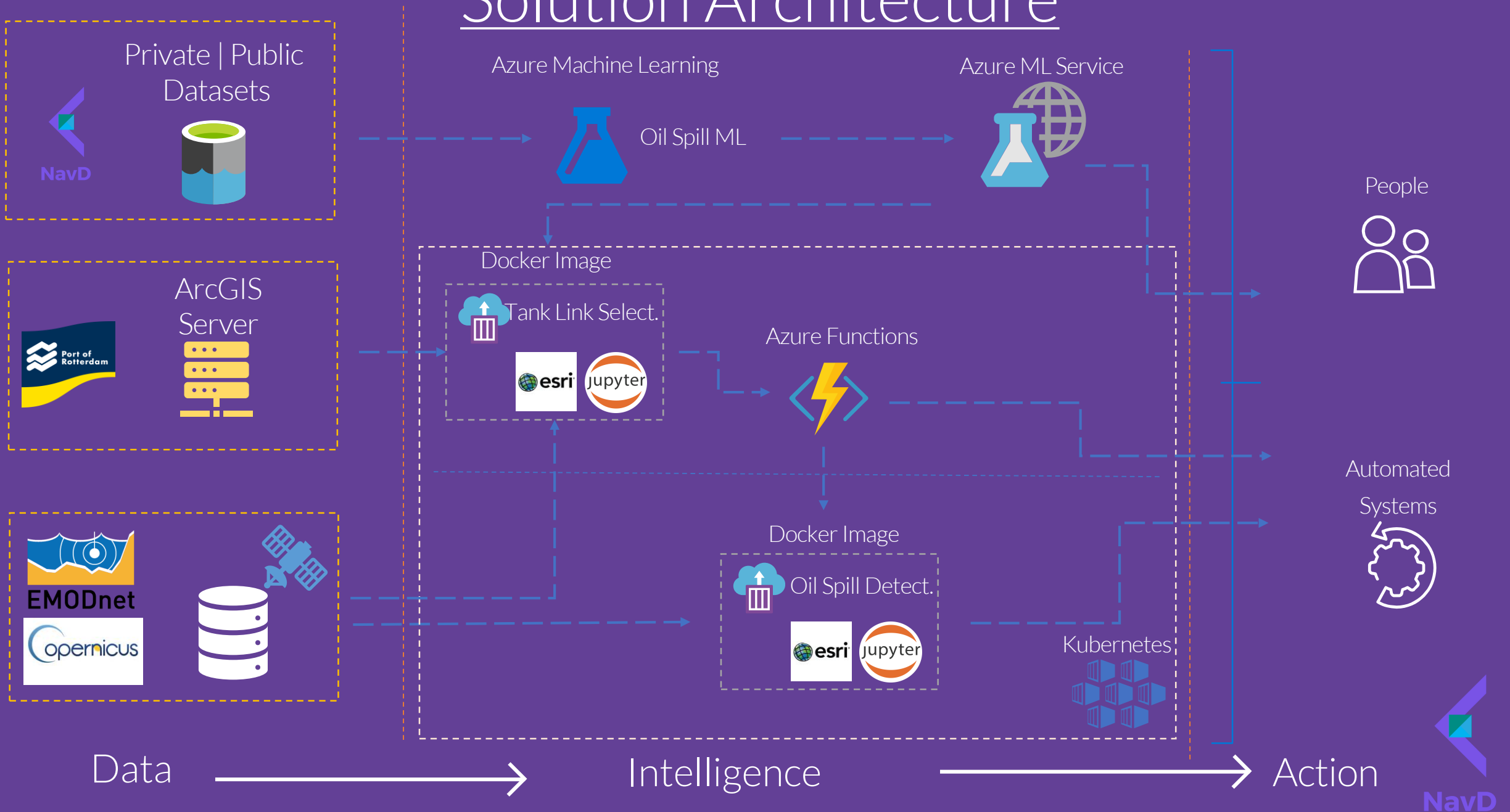
Title	Modified	Owner	View Count
Administration: Deploy automatic notifications	Jan 28, 2019	esri_notebook	1
Administration: Manage inactive users	Jan 28, 2019	esri_notebook	1
Administration: Prepare portal items for notebooks	Jan 28, 2019	esri_notebook	2
Administration: Set up license expiration notifications	Jan 28, 2019	esri_notebook	1
Administration: Validate all federated servers	Jan 28, 2019	esri_notebook	0
Administration: Validate registered datastores	Jan 28, 2019	esri_notebook	0
Administration: Validate user profiles	Jan 28, 2019	esri_notebook	1
Content Management: Check for broken URLs	Jan 28, 2019	esri_notebook	1
Content Management: Create service report by folder	Jan 28, 2019	esri_notebook	0
Content Management: Identify insecure items	Jan 28, 2019	esri_notebook	0
Content Management: Validate item metadata	Jan 28, 2019	esri_notebook	0

That looks busy.....



The only solution is to get smarter

Solution Architecture

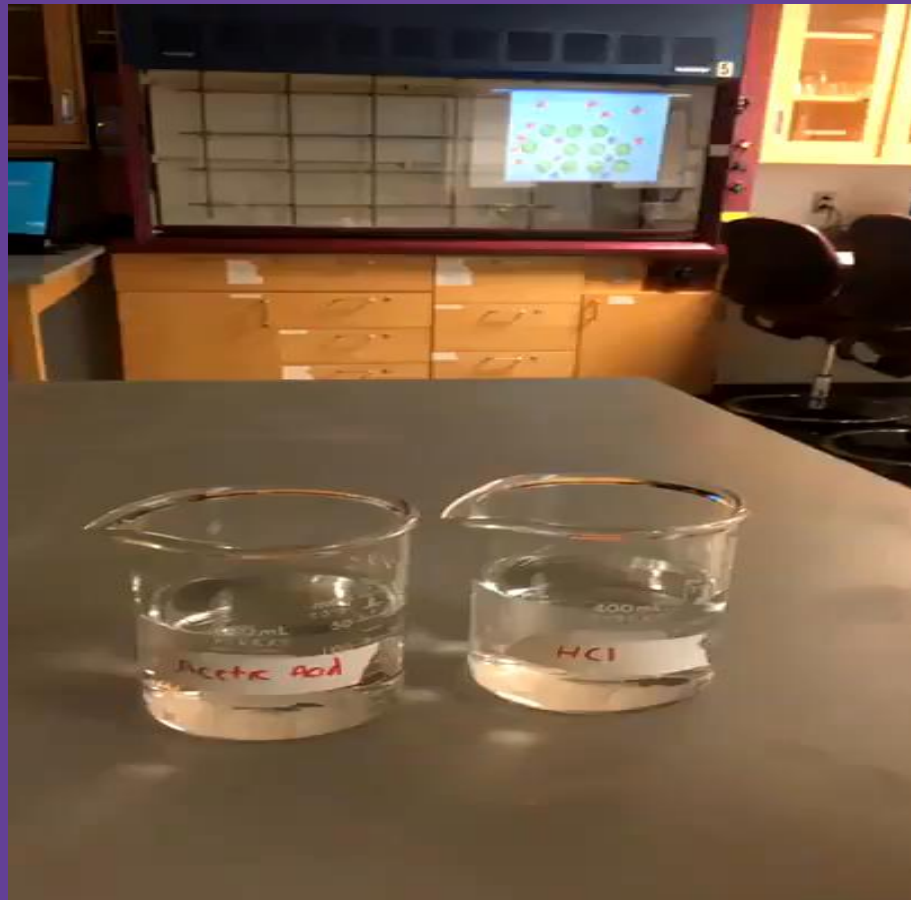


Demo



Wrap up

What we want for us to do...



What we end up to do....



Thank you

Qs + As



<https://navd.ai>



info@navd.ai



NavD