GeoAI in the Maritime domain using ArcGIS Notebooks

Christos Charmatzis
@christoscharmatzis

NavD

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 ≡ Knowledge

Data

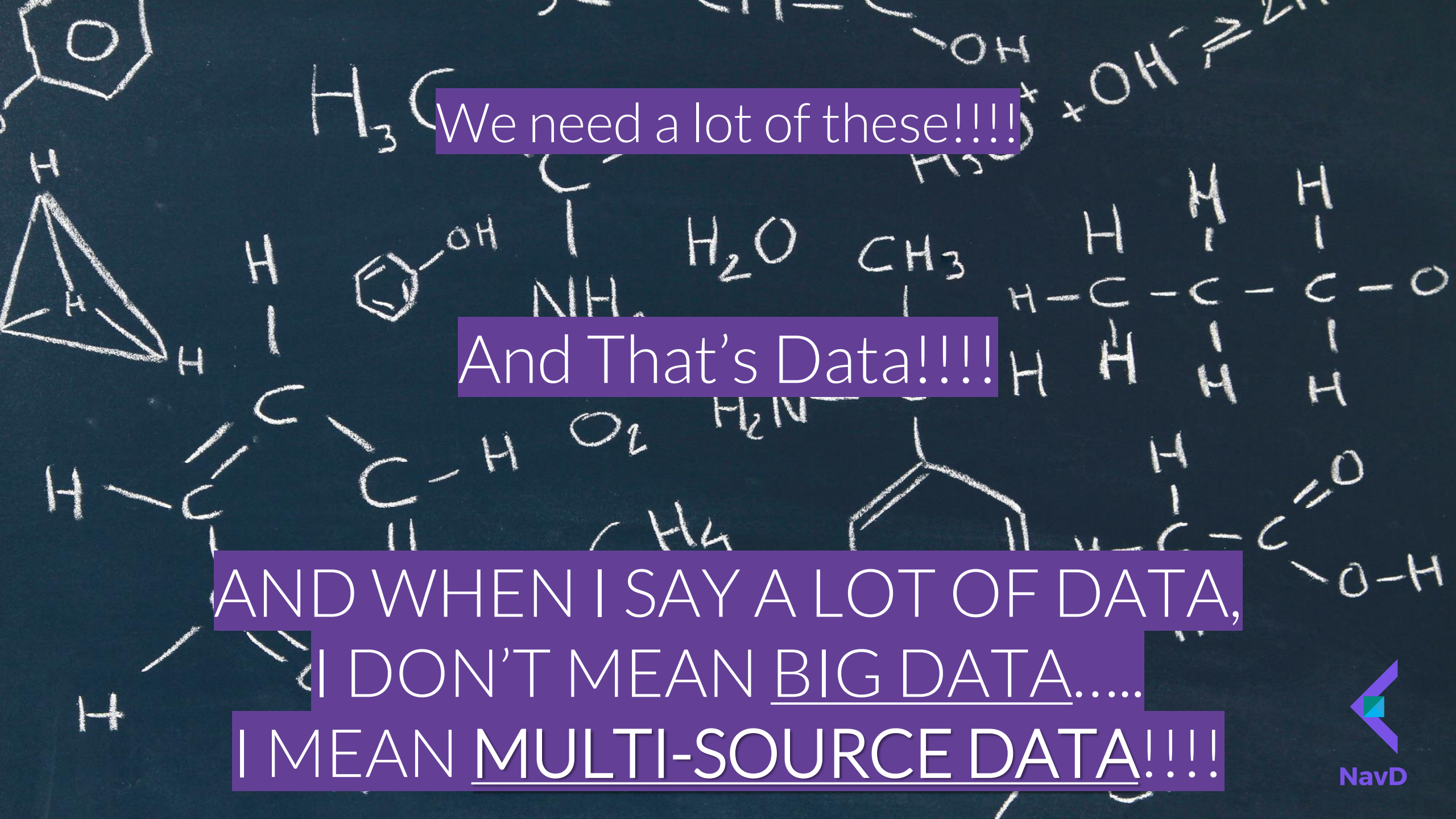
All of us

GeoAI
AI with spatial context

NavD

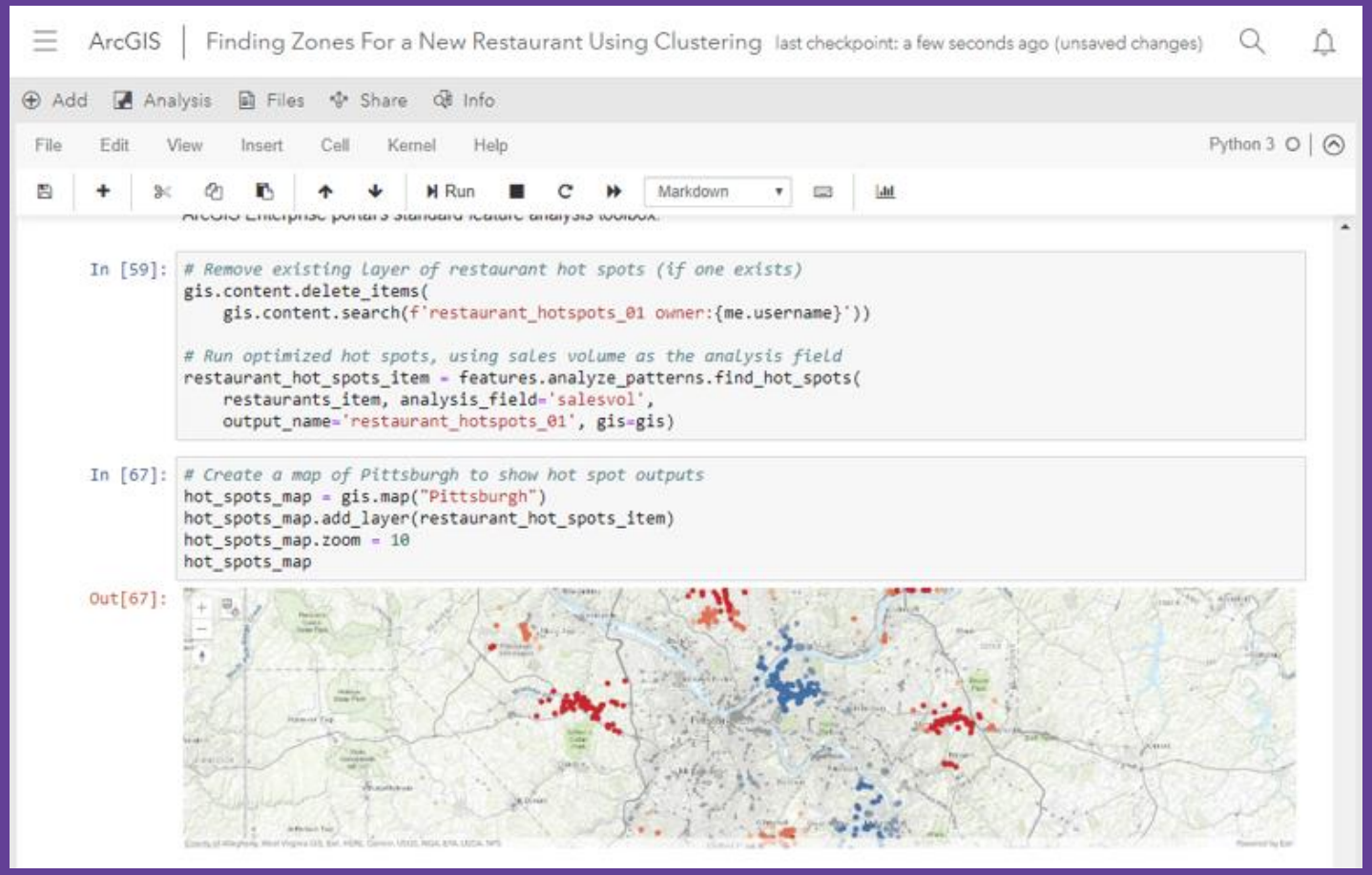
Tools 4 AI

NavD


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!!!!
NavD

ArcGIS Notebooks

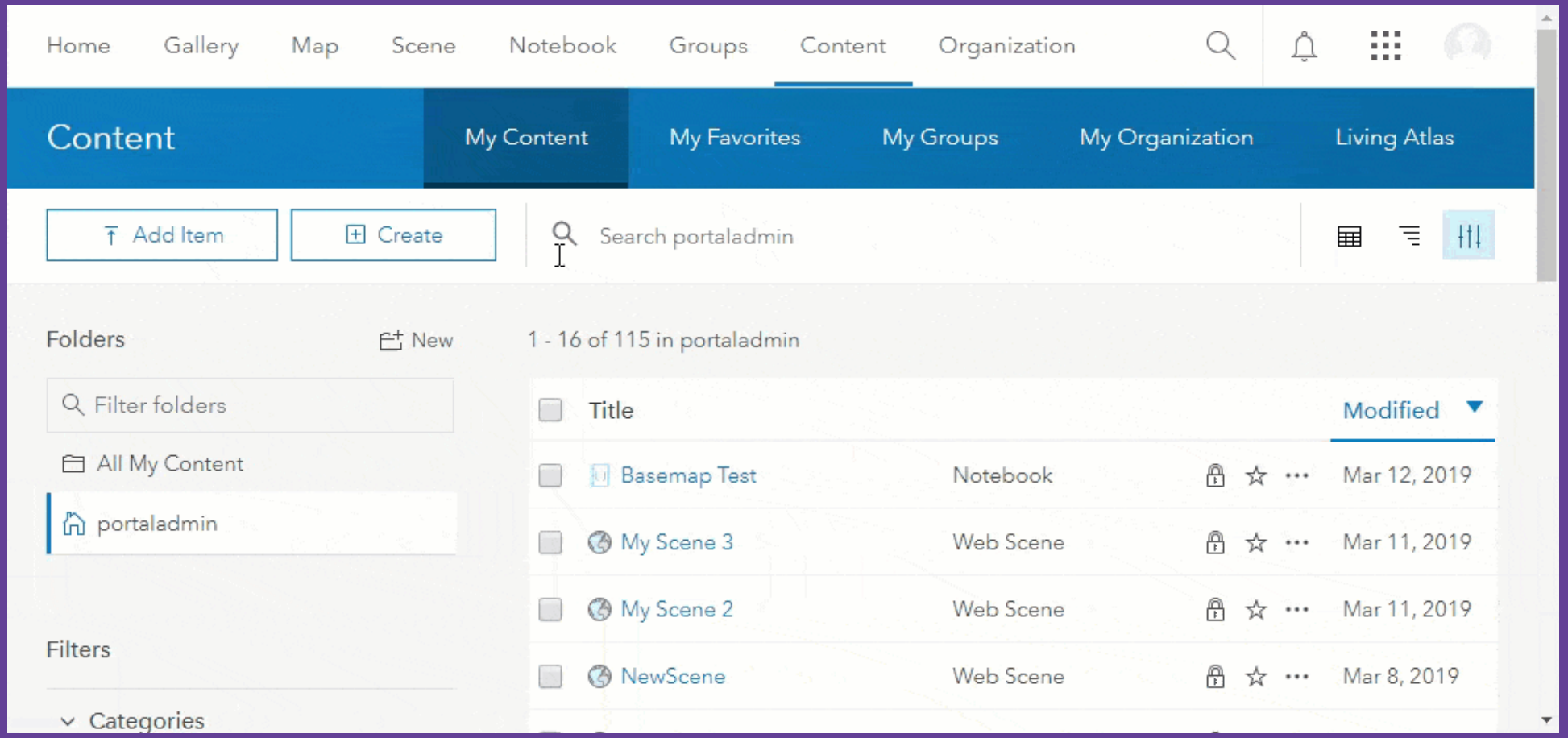
Seamless integration with the portal



NavD

ArcGIS Notebooks

Turn analysis into action



NavD

ArcGIS Notebooks

Put Python to work for you

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

Portal Admin
portaladmin

Add Analysis Files Share Info Save As Sample

File Edit View Insert Cell Kernel Help Python 3

Run Markdown

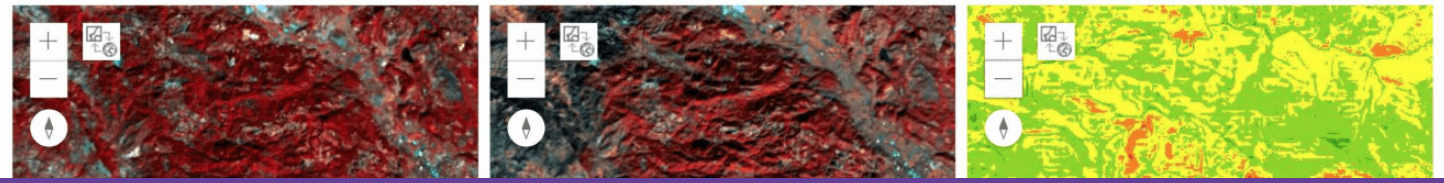
Step 3: Calculate the sum of the weighted input datasets

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
```

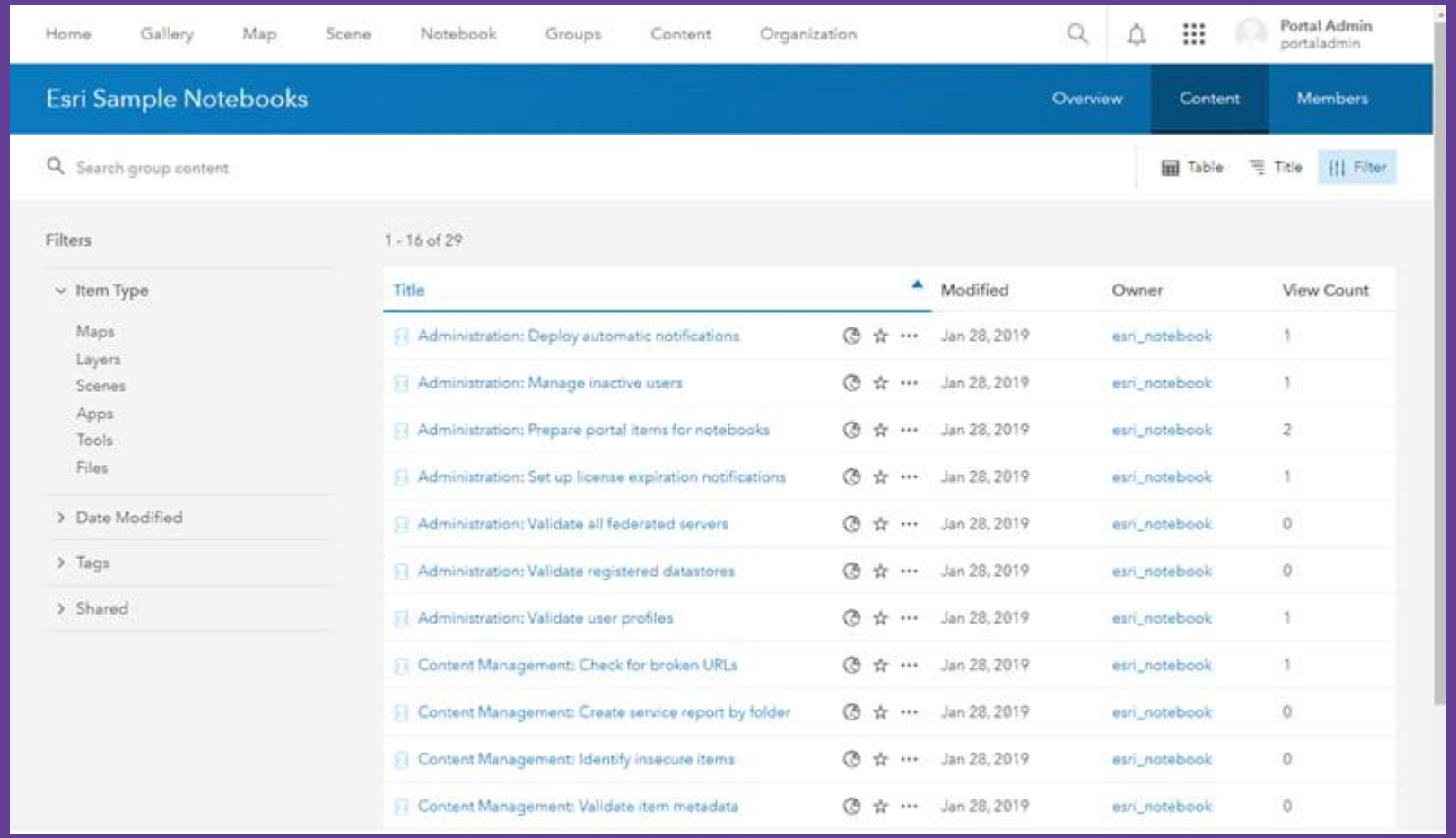
Out[25]:



NavD

ArcGIS Notebooks

It’s not just for data science

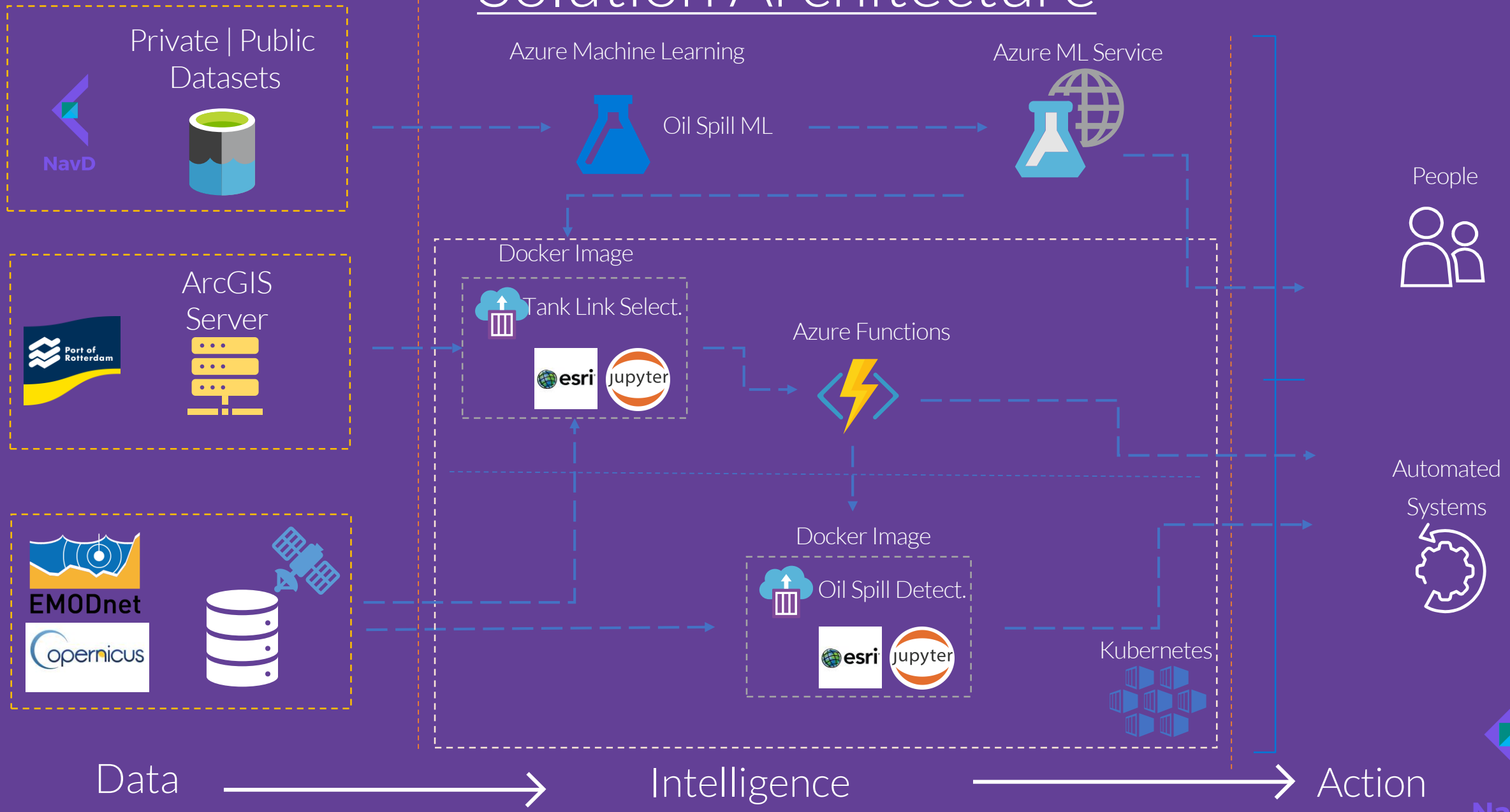


NavD

That looks busy…..

The only solution is to get smarter

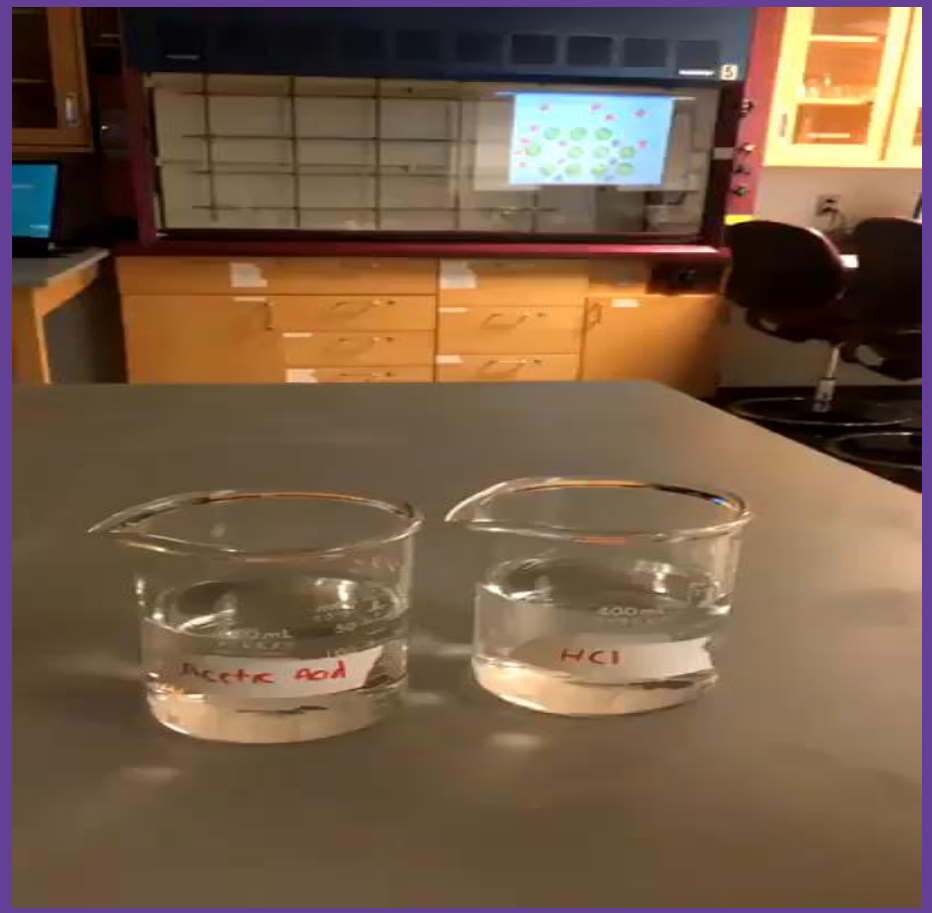
Solution Architecture



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