

# Role of Open Data for Better Disaster Management

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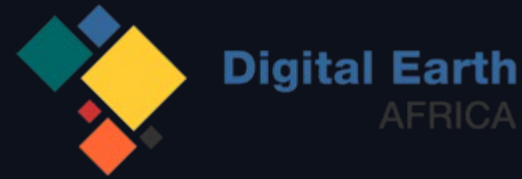
Digital Earth  
AFRICA

# Digital Earth Africa



# Value proposition

- An African solution
- Run by Africans in Africa
- To solve African problems
- Insights for all of Africa
  - Prebuilt services available
  - Build your own
- It's **free**

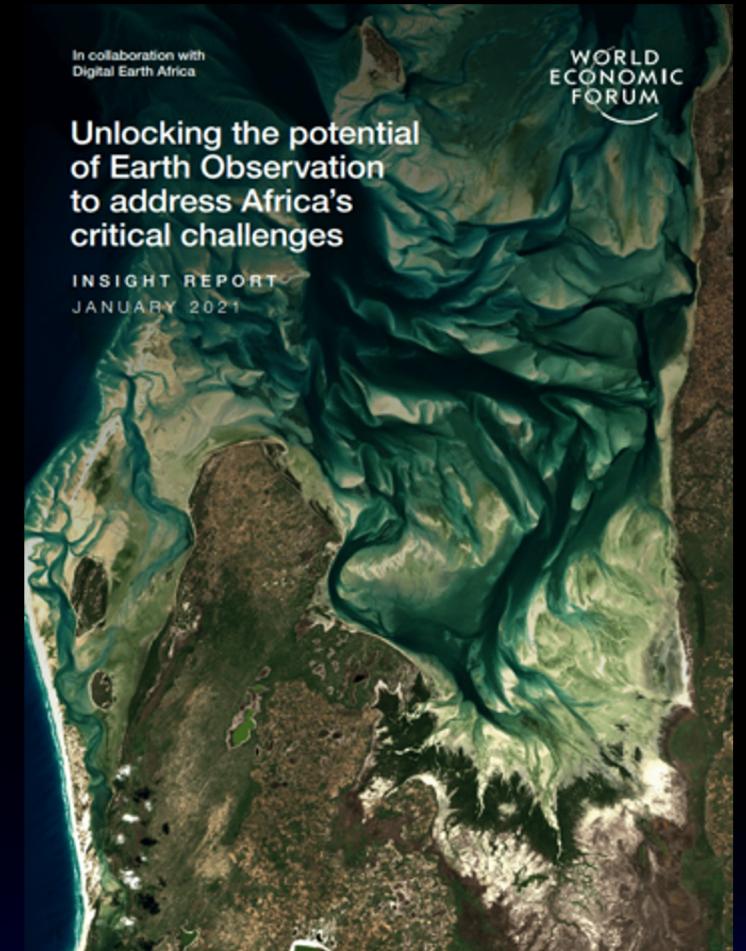


UNLOCKING THE  
PROMISE OF  
TOMORROW FROM  
THE PATTERNS OF THE  
PAST

# The value of Earth observation data

## REALIZING THE POTENTIAL

- The potential (economic) value of EO data for Africa is in the billions of dollars – through improvements in agricultural production, water use, regulation of mining, digital transformation/accelerated growth, etc.
- Digital Earth Africa (DE Africa) aims to unlock this potential!



# From products to people

## APPLICATION CASE STUDIES

### Mapping forest fires

Rapid impact assessment - Mt Kenya

Digital Earth Africa - Ethiopia HCM Briefing

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### Earth observation to protect wetlands

#### Preservation of mangroves in Sabaki Estuary, KEFRI

- Wetlands, including river deltas, peatlands and mangroves are a crucial part of the Kenyan landscape and biodiversity. The Kenya Forest Research Institute (KEFRI) has been supporting the monitoring and protection of wetlands in the country, taking part in World Wetlands Day to celebrate the **six** Ramsar sites across Kenya.
- Dr. Stanley Nadir, a research scientist in Soil Science and Water Management with KEFRI recognised the need to protect the important ecosystems against Digital provide

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### Co-developing Use Cases as Path to Decision Makers

#### Cotton Farming in Simiyu District, Tanzania

Minister of Finance and Planning Dr Philip S Mpango

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### Giraffes, satellite data & a shrinking island

#### Cane poaching

##### Food security & local farmers

#### Climate resilience in Kenya

- DE Africa platform was recently used to assess the habitat of a herd of endangered Rothschild's giraffes, who were living on an island in the centre of Kenya's Lake Baringo. The island, whose shoreline has been receding for some time, eventually became uninhabitable for the giraffe population, which was moved by raft to safer territory.
- Published both as a [Story Map](#) and a [Video](#)
- Collaboration with the Northern Rangelands Trust, Kenyan conservation groups, and the Global Partnership for Sustainable Development Data.

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### Giraffes, satellite data & a shrinking island

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### Unsustainable agriculture, Lake Naivasha

#### Impact of pesticide overuse on water quality

- Pesticides overuse is a serious problem in Kenyan farms with wide-reaching consequences for human health and the environment.
- Lentara (AgriTech company) are working with the World Wildlife Fund to raise awareness on the negative impacts of bad farming practices.
- Joyce Siundu used DE Africa to demonstrate impact on water quality and quantity in Lake Naivasha, Kenya through time and help encourage use of organic farm inputs as a substitute for chemical fertilizer.

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### Intelligent agriculture

#### Supporting sustainable coffee production in Kenya

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# Services and analysis tools

- WOfS – water observations from space
- GeoMAD
- Food security
- Coastal erosion
- Chlorophyll-a in water bodies
- Monitoring mangroves
- Tidal data
- Wetlands
- Changes in urban extent
- Changes in vegetation



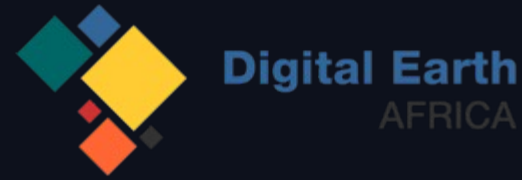
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Digital Earth  
AFRICA

# WOfS Processing..

- 1M Landsat scenes
- 300 compute nodes
- 2,000+ vCPU
- 5.5 TB RAM
- 4M GeoTIFF images
- 10 hours
- **Total cost = \$700**



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# National Oceanic Atmospheric Administration (NOAA)



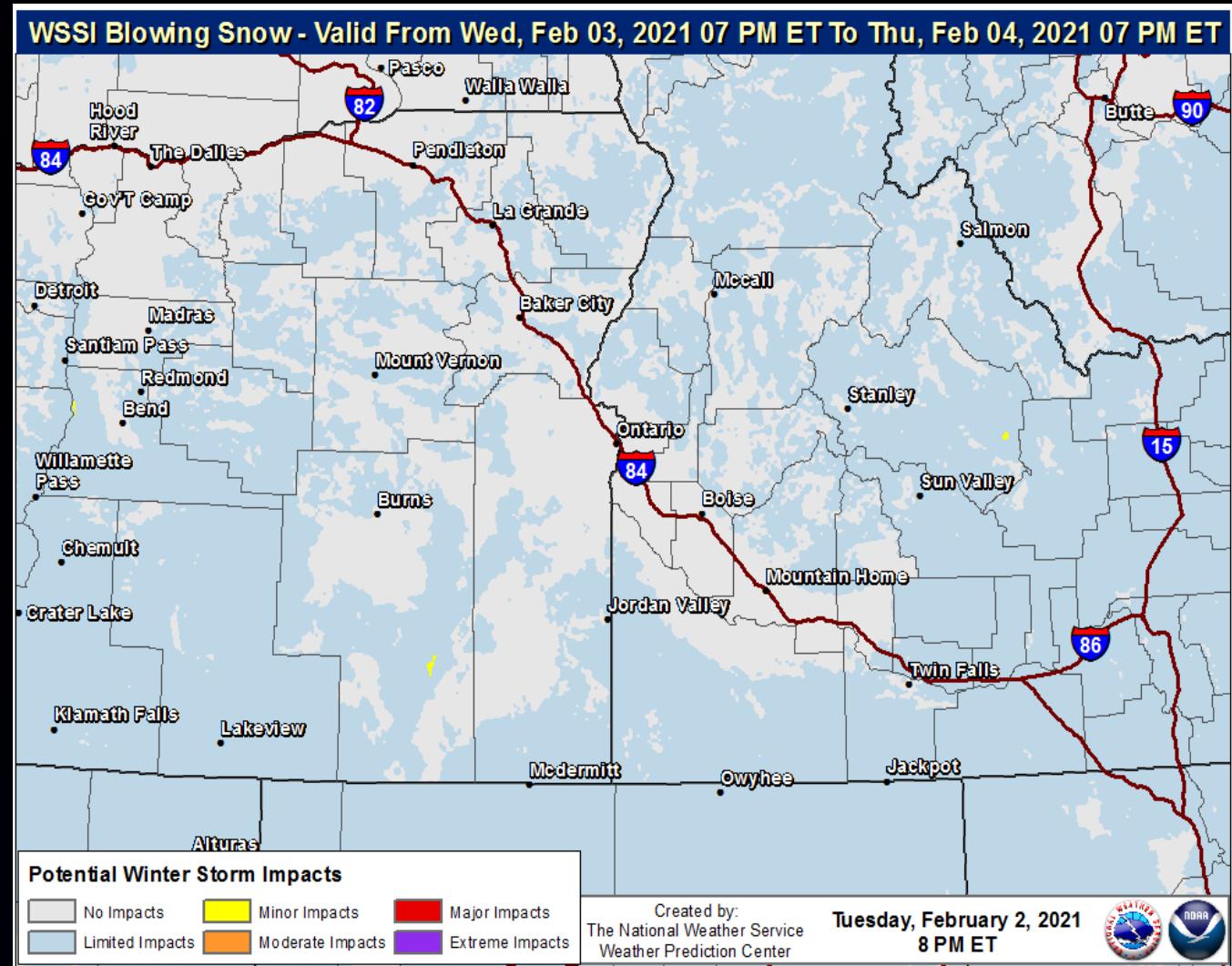
# NOAA ( National Oceanic Atmospheric Administration) use of geospatial technologies and data on AWS

GIS is at the core of supporting NOAA's mission. Geospatial technologies provide the framework to collect, store, analyze, and disseminate "NOAA's Environmental Intelligence."



# Use of GIS on AWS for weather prediction

NOAA - NWS (National Weather Service) will provide users with access to Geographic Information Systems (GIS) web services running on AWS Public Cloud (<https://www.weather.gov/gis/cloudgiswebservices>) from January 20, 2022.

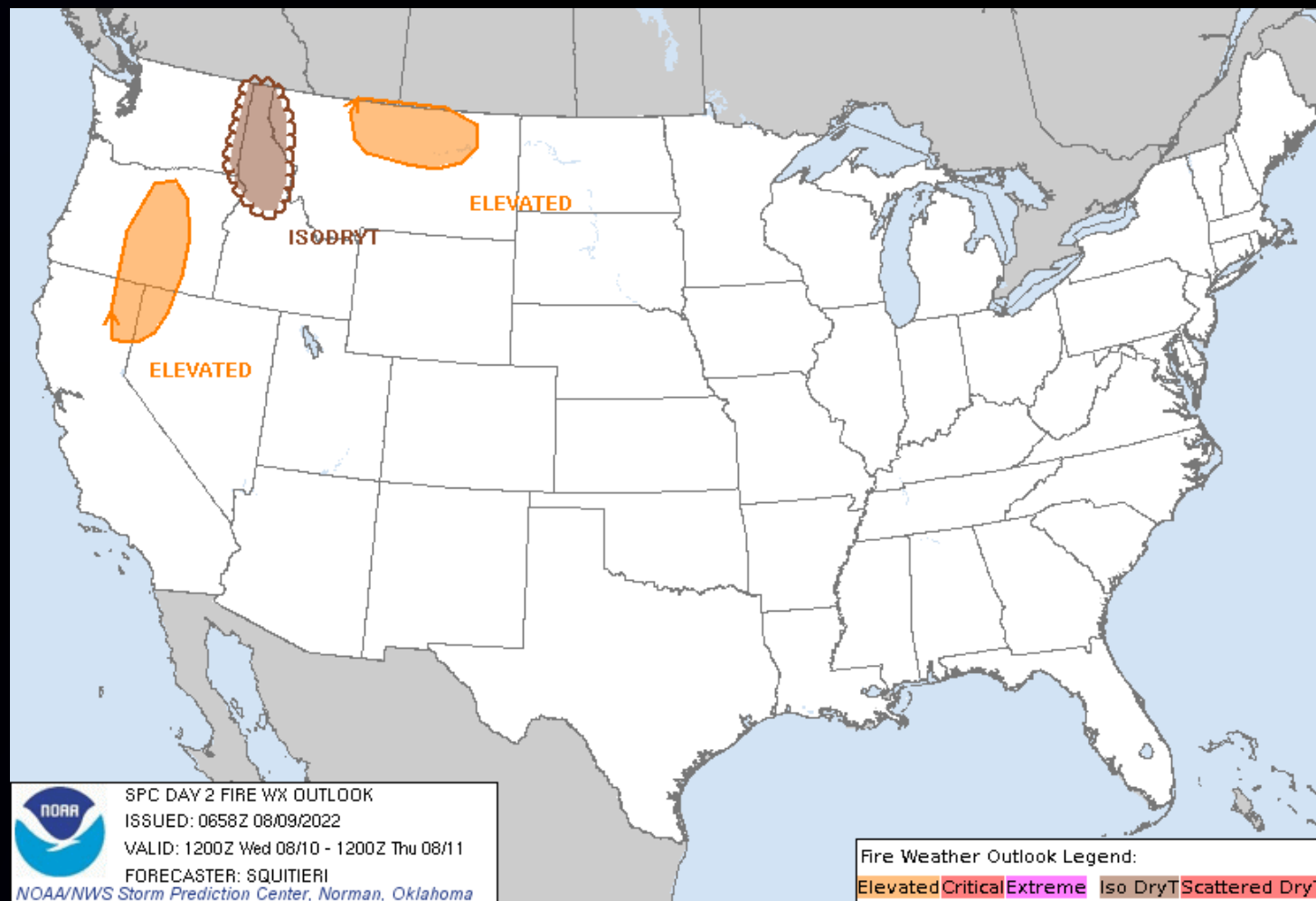


# Predicting catastrophic events using GIS on AWS

NOAA – NWS uses GIS on AWS to ensure safety of life and property

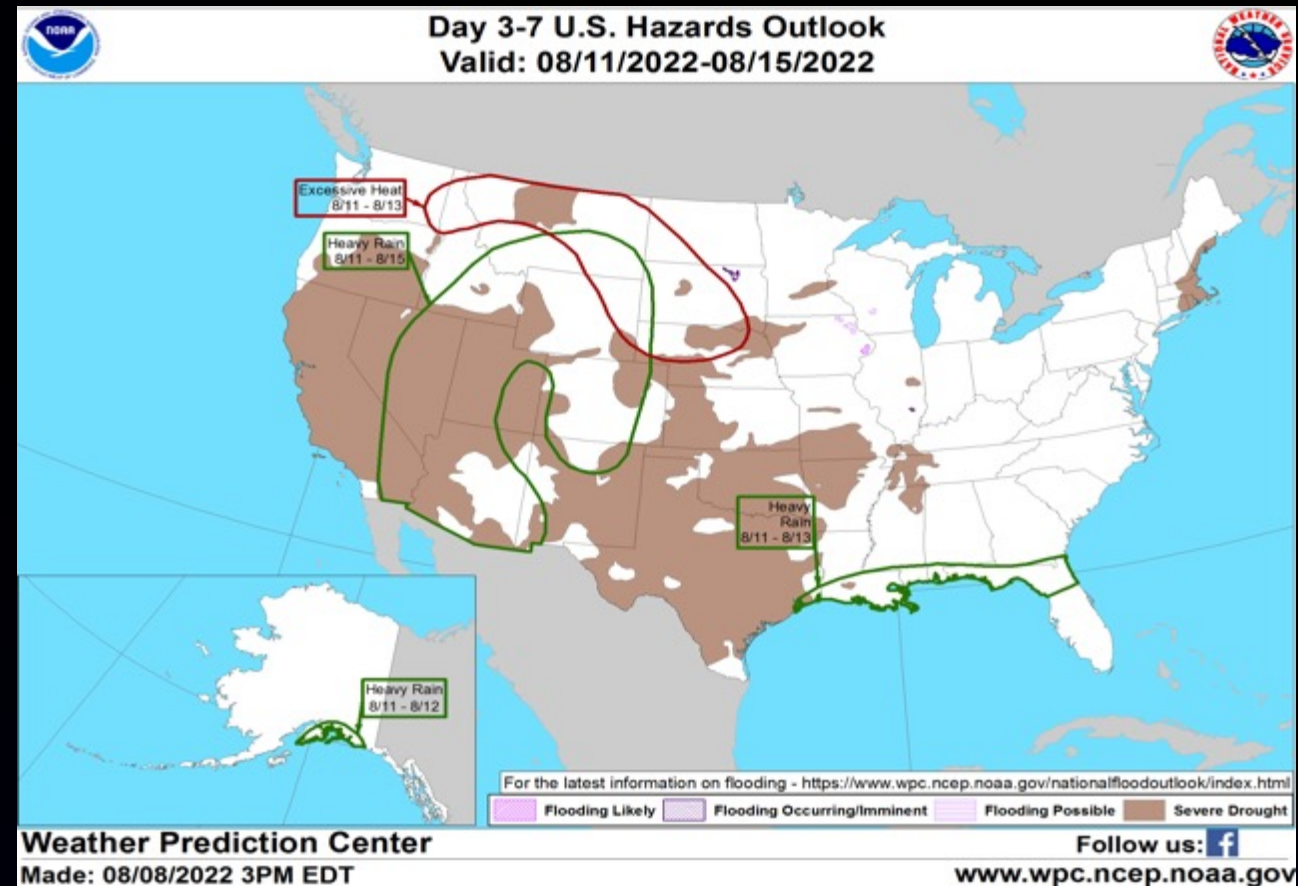
NWS Fire Weather Spot

[https://mapservices.weather.noaa.gov/vector/rest/services/fire\\_weather/nws\\_fire\\_weather\\_spot/MapServer](https://mapservices.weather.noaa.gov/vector/rest/services/fire_weather/nws_fire_weather_spot/MapServer)



# Flood and water hazard prediction with GIS on AWS

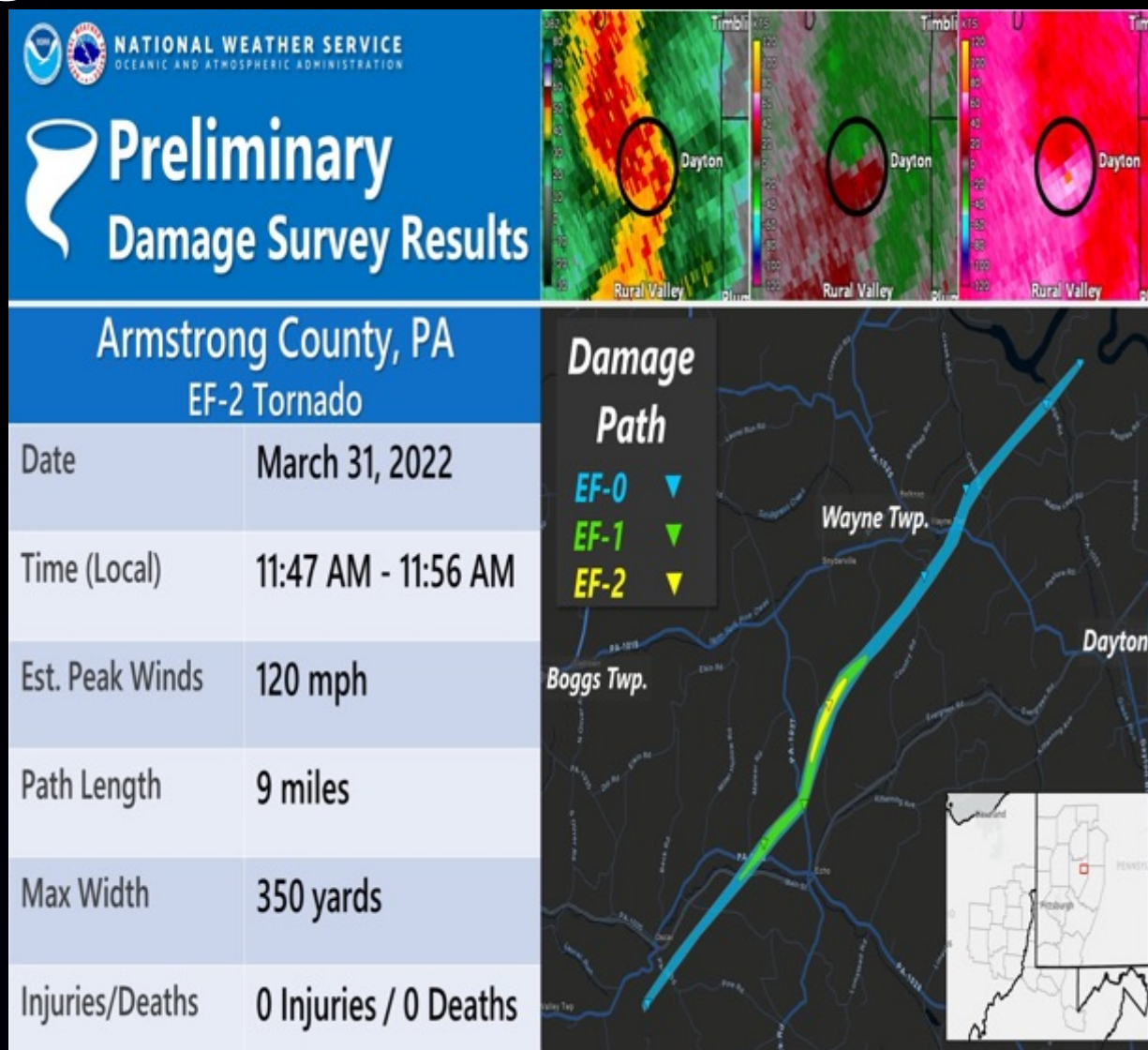
The National Water Model (NWM) is a hydrologic modelling framework that simulates observed and forecast streamflow over the entire continental United States (CONUS)



# Damage assessments using GIS and AWS

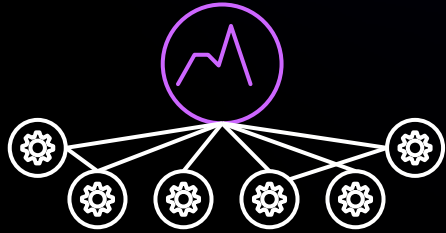
The National Weather Service (NWS) Damage Assessment Toolkit (DAT) has been utilized experimentally since 2009 to assess damage following tornadoes and convective wind events.

<https://apps.dat.noaa.gov/StormDamage/DamageViewer/>

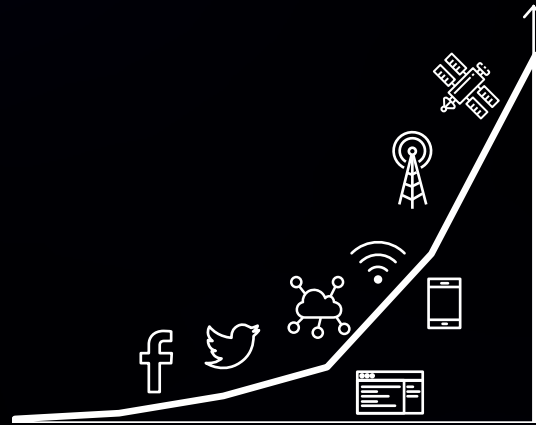


So, what is the problem,  
anyway?

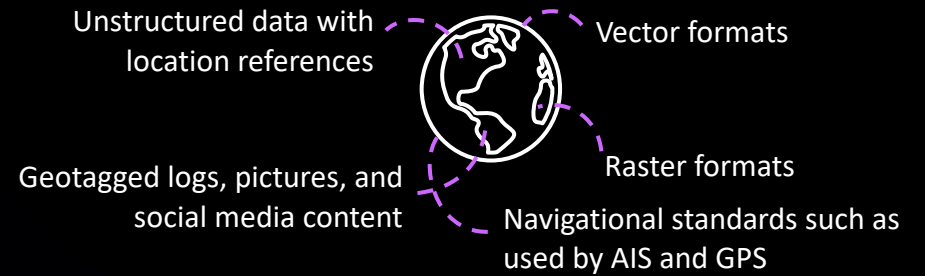
# The new realities of imagery and geospatial data



**Demand for faster  
decision-making**



**Explosion of data**



**Explosion of geospatial data  
standards**

“Data must be organized, well documented, consistently formatted, and error free. Cleaning the data is often the most taxing part of data science, and is frequently 80% of the work.”

- Excerpt from *Data Driven*,
- by DJ Patil and Hilary Mason



# Overview of open data on AWS

Sharing data in the cloud lets data users spend more time on data analysis rather than data acquisition

<https://opendata.aws>

# Advantages of sharing data in the cloud



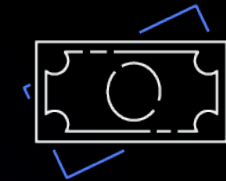
Global community of users



New services and tools



Faster pace of research

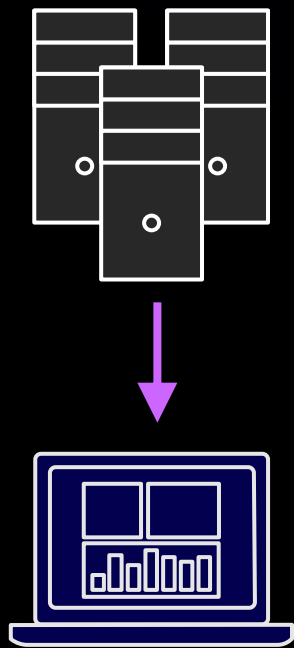


Lower cost of research

# Bring your algorithms **to the data**

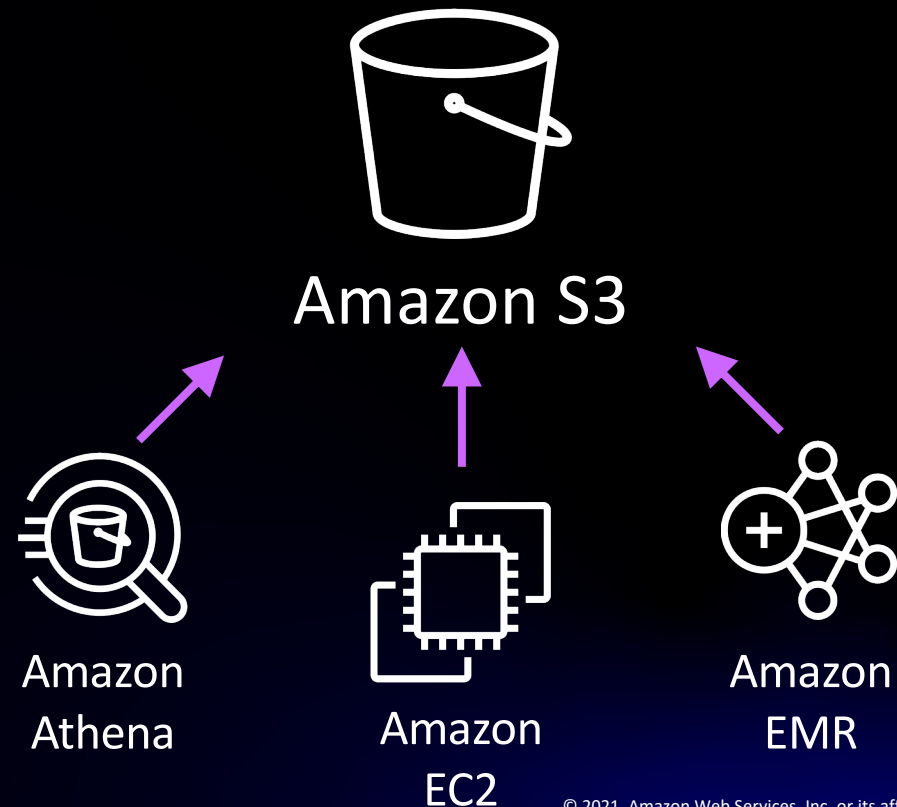
## Traditional approach

Move data to computing resources



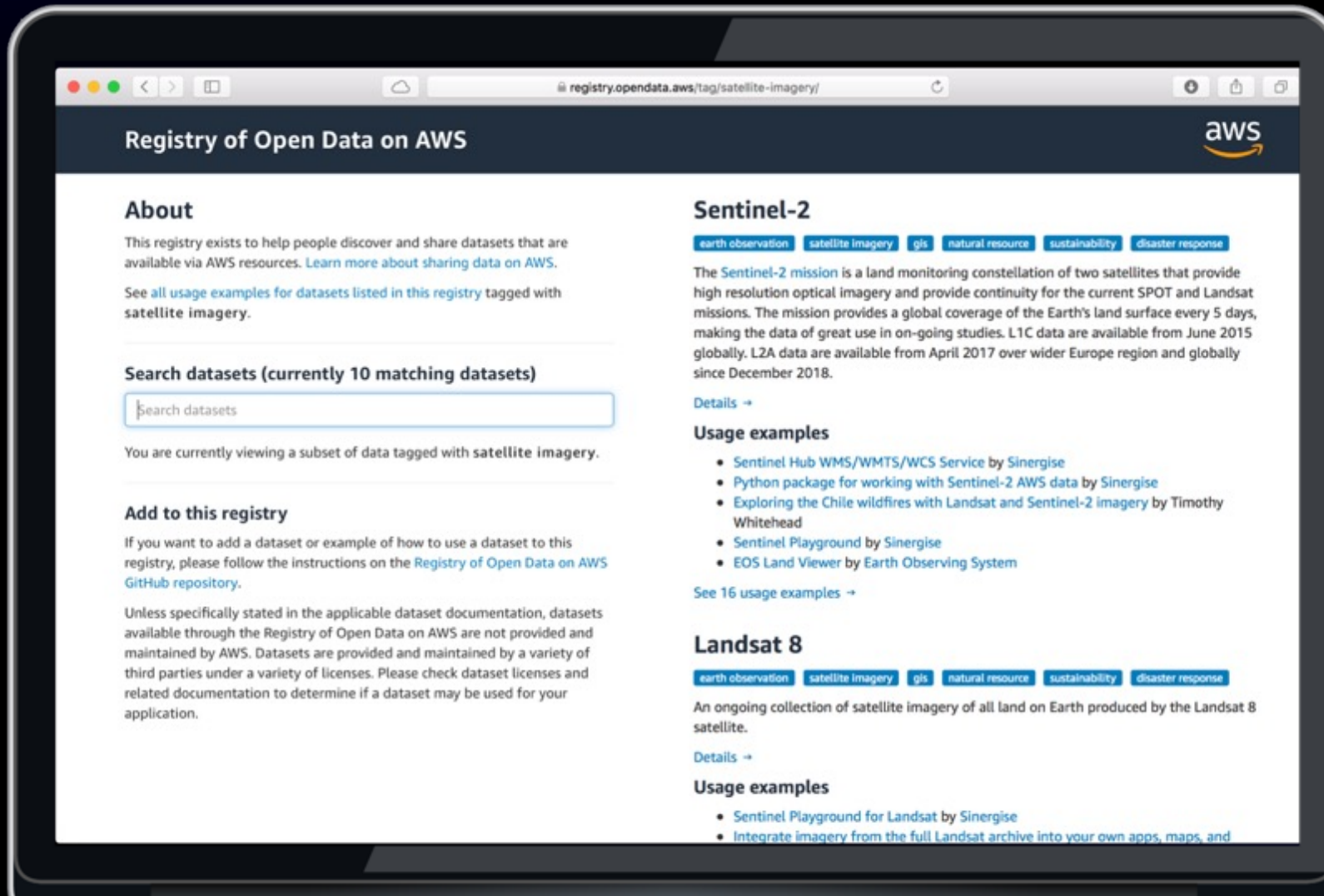
## Cloud approach

Move computing resources to data



# Open data on AWS

- [HTTPS://REGISTRY.OPENDATA.AWS/](https://registry.opendata.aws/)



# Global and Regional Data Can Fill Gaps in Your Own Data & Create New Business Models

## AWS Open Data



Global / Continental

## AWS Data Exchange



Regional

## Customer Proprietary Data



Parcel

# Putting the data to work

# Monitoring at-risk bodies of water from space

- The **Bluedot Observatory** uses Sentinel-2 satellite data on AWS to monitor water bodies around the world
- *“The cost to process one month of data for about 7,000 bodies of water currently in the system is 6 EUR. It is possible to set up world-scale systems with a shoestring budget.”*
  - - Grega Milcinski, Bluedot
  - [opendata.aws/bluedot](https://opendata.aws/bluedot)

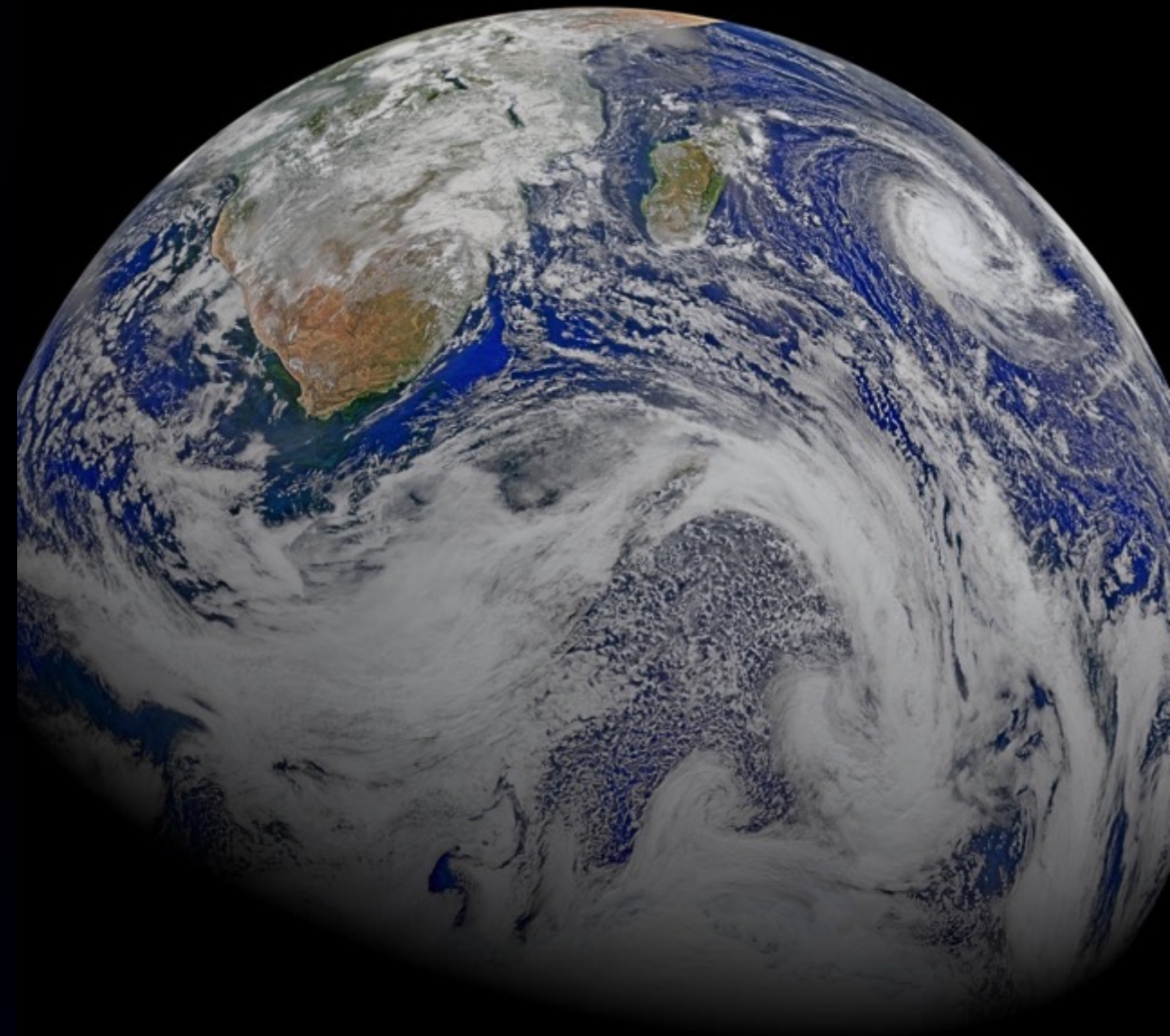




# Digital Earth Africa

Digital Earth Africa (DE Africa) will process openly accessible and freely available data to produce decision-ready products. Working closely with the AfriGEO community, DE Africa will be responsive to the information needs, challenges, and priorities of the African continent. DE Africa will leverage and build on existing capacity to enable the use of Earth observations to address key challenges across the continent.

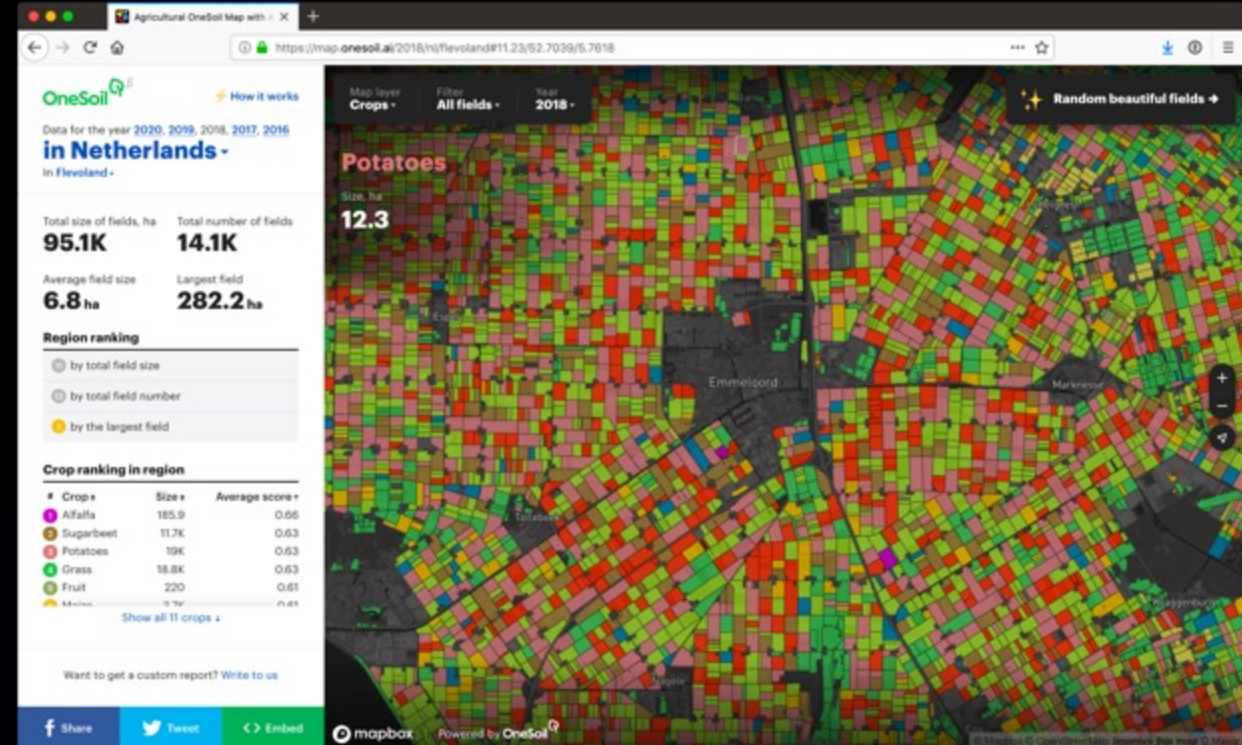
[www.digitalearthafrika.org](http://www.digitalearthafrika.org)



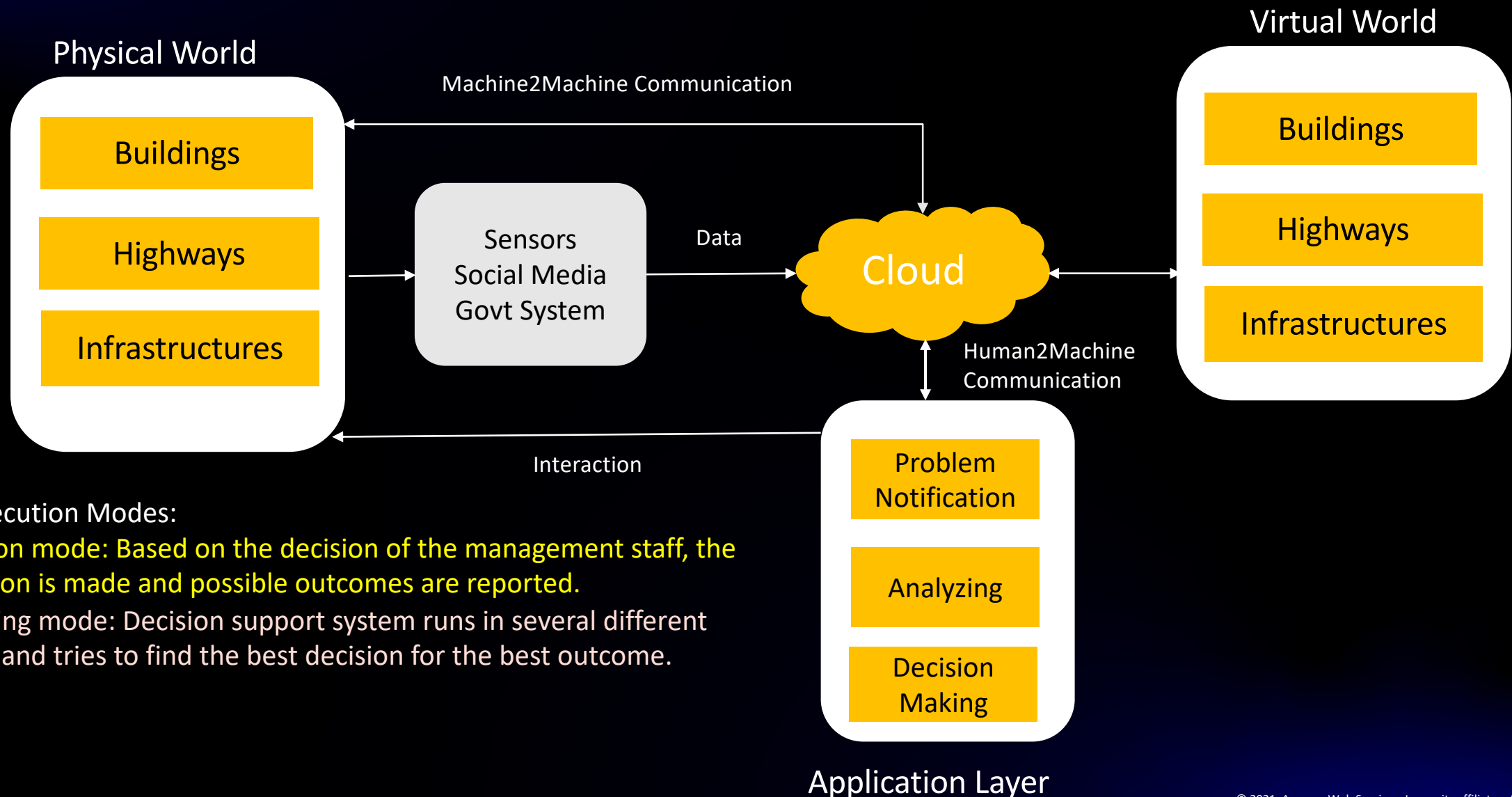
# Field monitoring at scale

- The imagery available from the AWS open data program enabled OneSoil to run boundary detection on 39.5M fields in Europe and 21M in the US
- The company automated a process that would have taken 49 years by hand
- *“With Copernicus Sentinel-2 multispectral images, we automatically determine a crop that grows on a field. To verify, we use data from the Sentinel-1 radar satellite. As a result, it is easy for farmers to use our system – the field boundaries and crop are ready for them.”*

- - Slava Mazai, OneSoil



# Way Forward: Digital Twin Based Disaster Management System Architecture



Two Execution Modes:

**Education mode:** Based on the decision of the management staff, the simulation is made and possible outcomes are reported.

**Estimating mode:** Decision support system runs in several different choices and tries to find the best decision for the best outcome.

# Thank you!

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