Remote Sensing in Support of Disasters with a Focus on Wildland Fire

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Disaster Support at the Forest Service

The Forest Service manages disaster events and develops geospatial requirements to support those events in coordination with multiple stakeholders to support fully informed decision-making.

Remote sensing data is a key information input to decision support on wildland fire and other natural disasters.

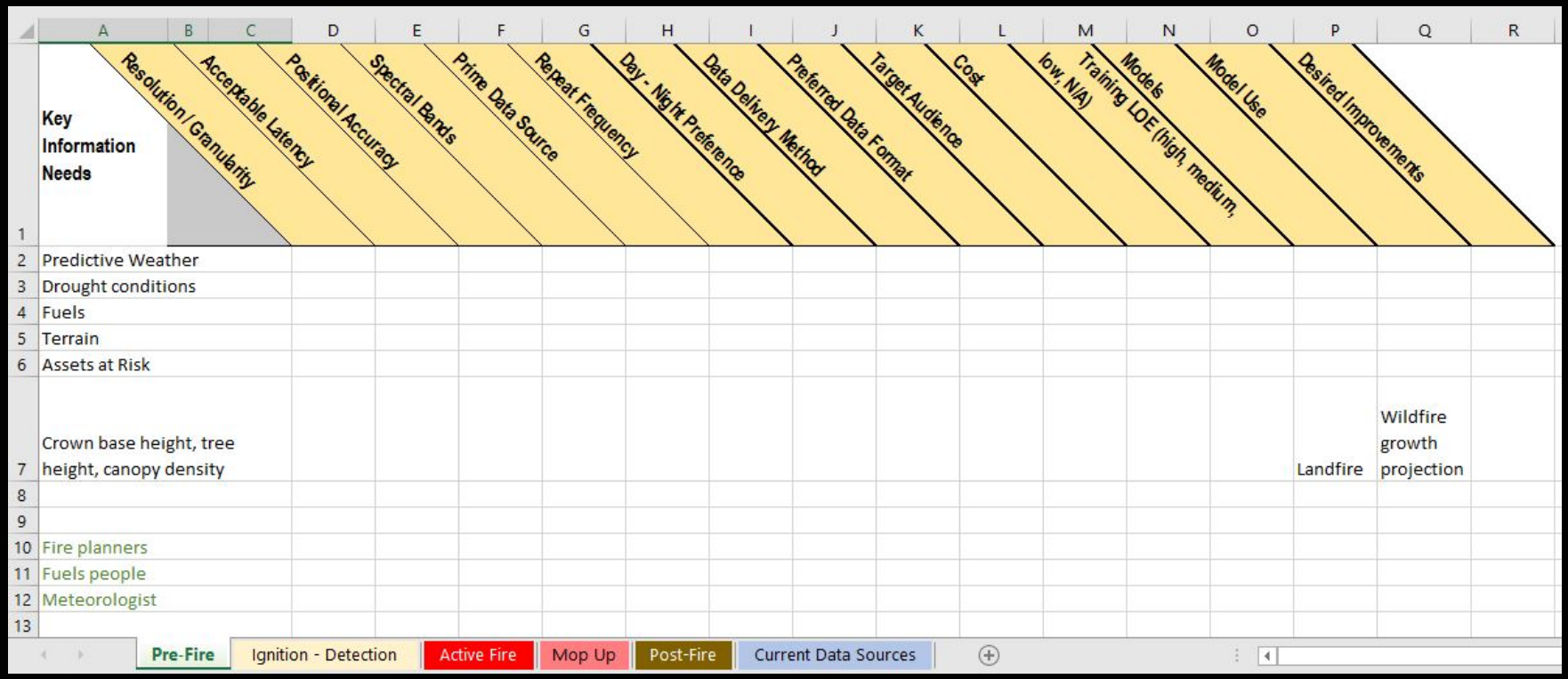
Disaster Support at the Forest Service

Requirements

Understanding the remote sensing / geospatial needs for each type of disaster is key to providing the right information at the right time to the right people.

What information is needed? What frequency is desired? What do the geospatial products need to look like?

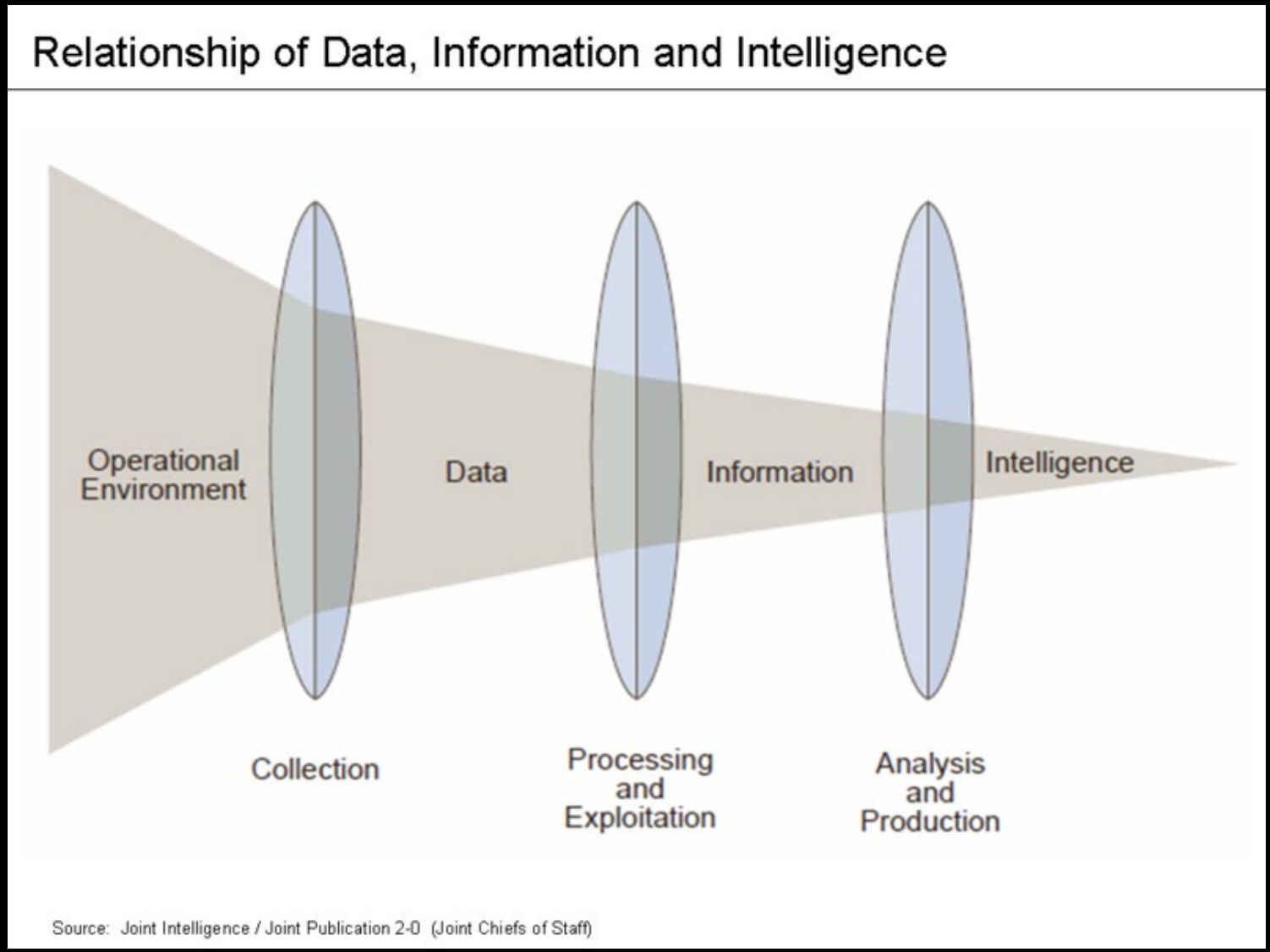
Requirements Matrix



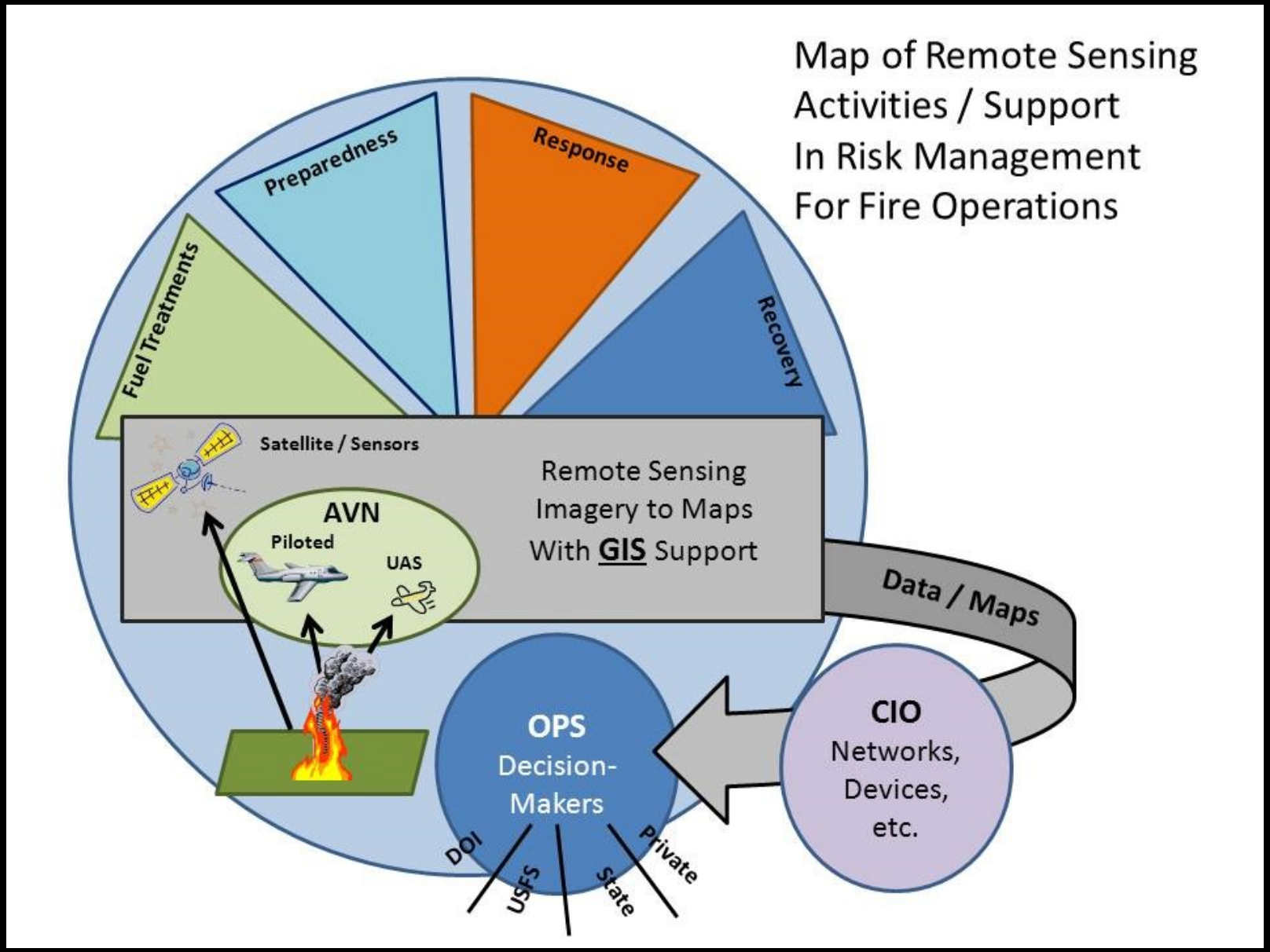
Key Information Needs	Resolution / Granularity	Acceptable Latency	Positional Accuracy	Spectral Bands	Prime Data Source	Repeat Frequency	Day - Night Preference	Data Delivery Method	Preferred Data Format	Target Audience	Cost	Training LOE (high, medium, low, N/A)	Models	Model Use	Desired Improvements
Predictive Weather															
Drought conditions															
Fuels															
Terrain															
Assets at Risk															
Crown base height, tree height, canopy density													Landfire	Wildfire growth projection	
Fire planners															
Fuels people															
Meteorologist															

Pre-Fire | Ignition - Detection | Active Fire | Mop Up | Post-Fire | Current Data Sources

Disaster Support at the Forest Service



Disaster Support at the Forest Service



Remote Sensing and Wildland Fire

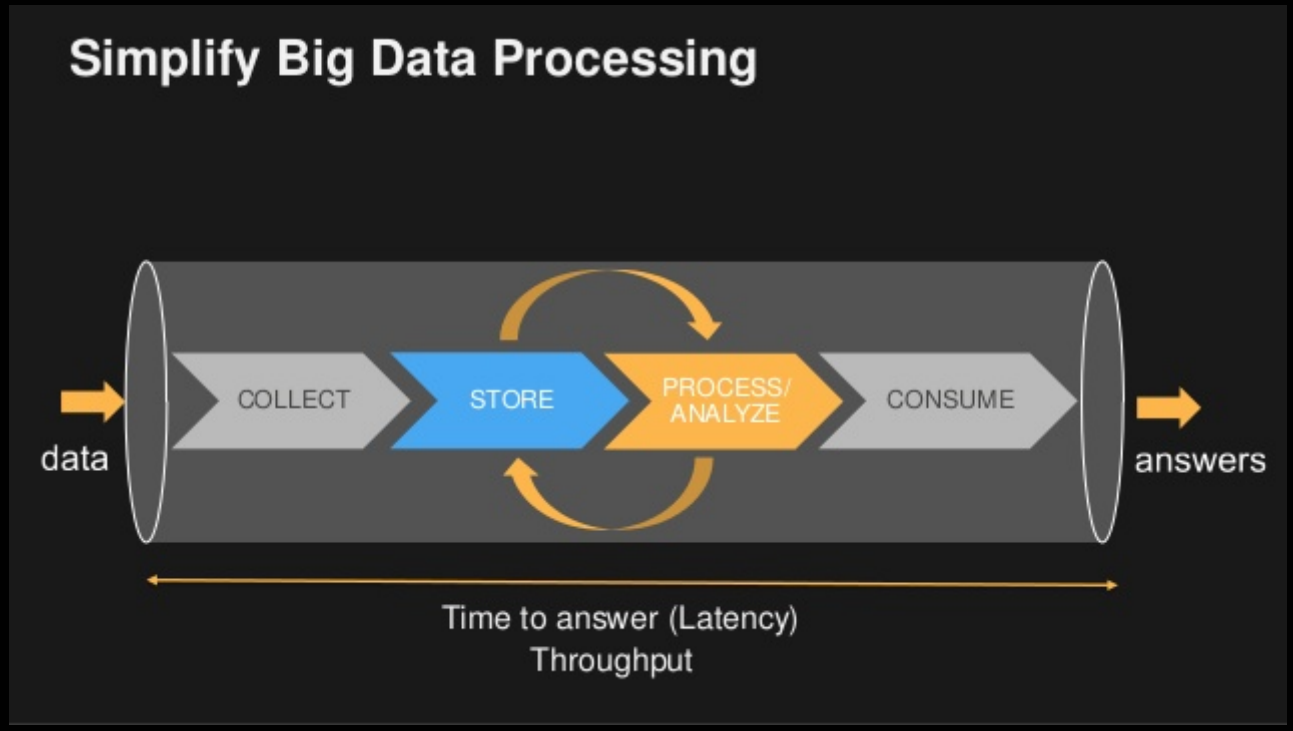
Fire Phases

- Pre Fire
  - Fuels, terrain, weather, assets at risk
- Fire Ignition (starts)
  - Where are the ignition points?
- Active Fire
  - Fire perimeter, hot spots, intense fire
- Post Fire
  - Fire severity

Remote Sensing Tools

- Manned Aircraft
  - NIROPS
- Unmanned Aircraft
- Satellite systems
  - MODIS / VIIRS
- Ground observation
  - Manned towers
  - Unmanned towers

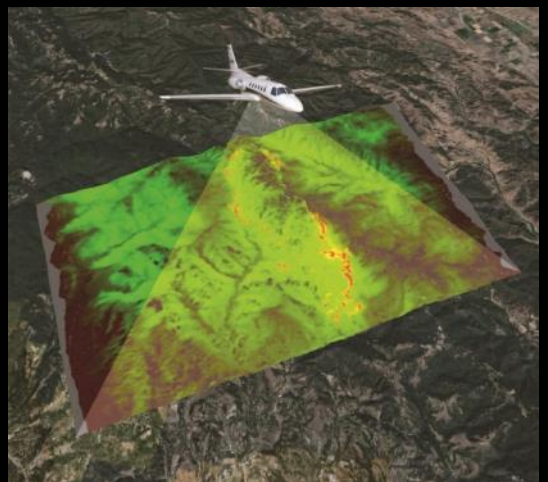
The Pipeline



Current Mapping Capabilities - NIROPS

NIROPS Fire Mapping

- 2 Forest Service aircraft
- 3 Phoenix Imaging Systems
  - 2 bands (3-5µm, 8-12µm)
  - 120° field of view
  - 6 mile swath at 10,000 ft AGL
  - Ortho-imagery delivered via Aircell
  - Can image 300,000 acres per hour
- Supplemental support via Aircraft 3*
- Overhead support ordered by the incident
- Both aircraft use the Aircell telecommunications system to downlink acquired imagery to an FTP site



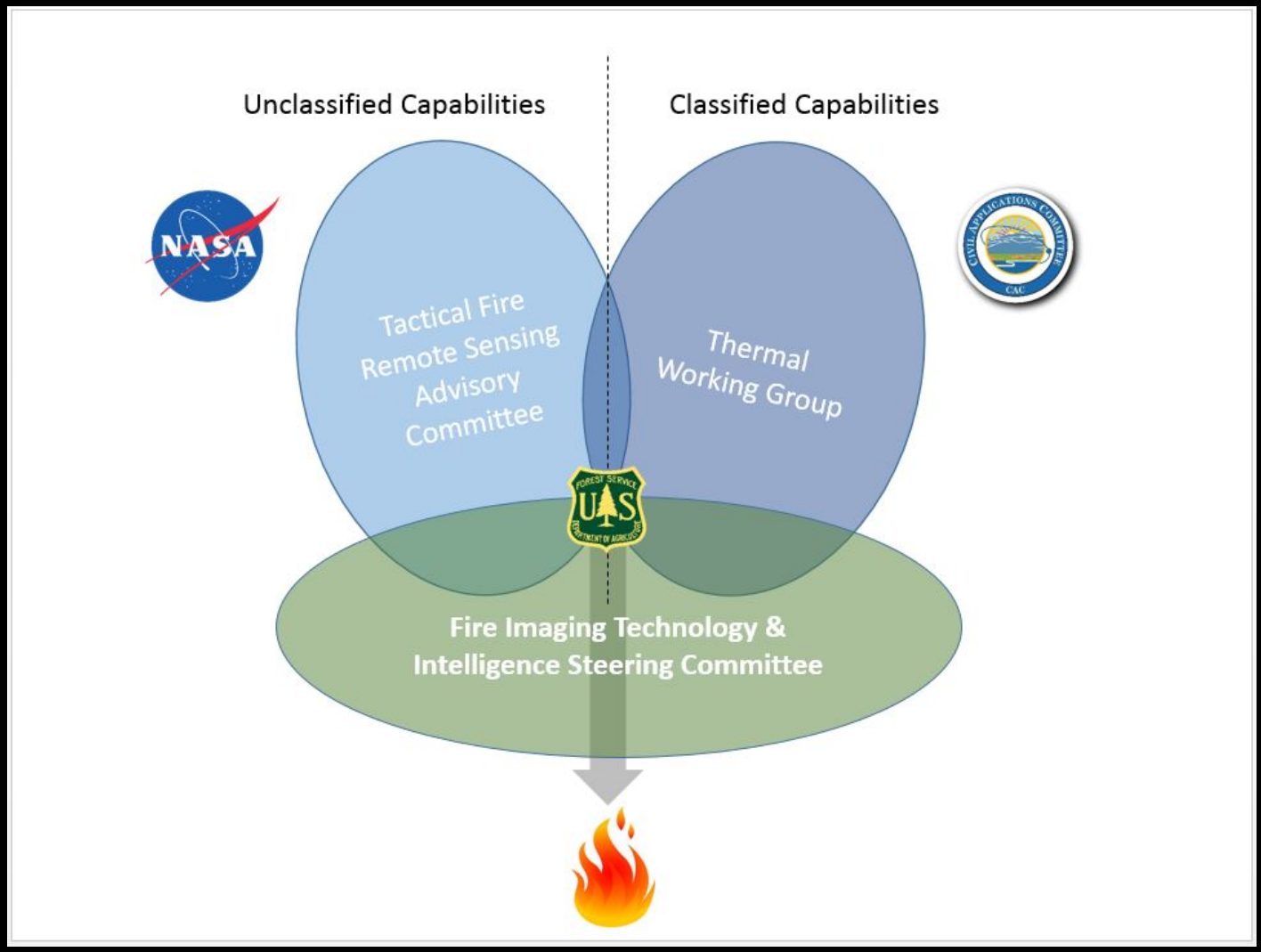
Current Capabilities – National Systems

- Firehawk Fire Mapping Capability (Aircraft 3)
  - The Firehawk capability provides large scale fire detection/mapping support to incident command operations. The Firehawk product is designed to have the same “look and feel” as products from NIROPS.
- Hawkeye Fire Detection and Reporting System
  - The Hawkeye Fire Detection and Reporting System uses airborne and space borne remote sensing assets to rapidly detect and report new fire starts within the continental United States.
  - Detected fire starts are relayed to the Ignition Point Database (IgPoint) operated and managed by the Forest Service.

Remote Sensing Working Groups

- Tactical Fire Remote Sensing Advisory Committee (TFRSAC) The TFRSAC is co-hosted by NASA and the Forest Service and is a broad collaborative forum for advancing and enabling the development and delivery of remote sensing platforms, sensors and decision support tools to the wildland fire community. Focus: largely unclassified.
  - The TFRSAC meets biannually and includes representatives from federal and state agencies, academic institutions, international partners, and the vendor community.
- Thermal Working Group (TWG) - has authority and responsibilities as a standing sub-working group under the Overhead Persistent Infrared (OPIR) Working Group (OWG) and Civil Applications Committee (CAC). The TWG is the coordinating body for advancing and enabling the development and delivery of data, information or products derived from classified thermal remote sensing platforms to civil users. Focus: largely classified.
  - The Thermal Working Group meets frequently, often in concert with the TFRSAC meetings.

Remote Sensing Working Groups



Comments / Questions?