Framing Potential Wildfire Opportunities for DRF

THEMES TO GUIDE DRF FIT TO WILDFIRE OPPORTUNITIES

DRF Application Themes

- Fusing data in real-time
- Supporting autonomous agents to discover data sources and transact with systems, without human involvement
- Supporting complex operations in a dynamic real-time environment – "the fog of war" – and maintaining overall situational awareness

TIME SPECTRUM OF WILDFIRE TECHNOLOGY OPPORTUNITIES

DRF Focus Areas

Pre-fire season	**Heightened fire risk**	**Fire ignition event**	**Fire suppression**	**Post-fire**
Assess fire risk	Predict ignition risk	**Quickly:**	Quick suppression	Assess impacts
Mitigate risk	Allocate resources*	Observe (the fire)	Sustaining suppression	Support recovery
Secure resources*	Detect fires	Orient (classify it)	Support operators	Gather learnings
		Decide (respond?)	Communications	Adapt for future
		Act (how?)	Logistics	
			Disaster response	
			Evacuation	

* "Resources" can be many things – for detection, suppression, mitigation, other

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PRE-FIRE SEASON

Categories

Geospatial data systems for identifying and mitigating wildfire risk factors

- Unmanned airborne data collection systems

Economic models to understand and justify investment in new approaches based on rapid response to incipient wildfires

- Geospatial data and modeling systems; wildfire simulation and modeling systems

Novel approaches to reducing wildland fire risk

- Measuring deadwood fuel
- Installation of lightning rods, other mitigants, on trees and infrastructure

Assessment for DRF

- Real-time capabilities are generally not a requirement

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HEIGHTENED ALERT DURING TIMES OF HIGH FIRE RISK

Categories

Improved ability to predict times of high fire risk
Weather data and models relevant to fire risk for all regions globally

Ability to maintain a rapid response capability continuously during times of high fire risk
Simple and effective unmanned airborne assets for fire ISR

Assessment for DRF

- Fusing data from satellite, airborne, and ground assets to update fire risk and support allocation of detection and response resources

- Dispatching manned and unmanned agents to look for fire starts due to lightning strikes, powerline failures, etc.

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DETECTING AND RESPONDING TO A FIRE

Categories

Rapid detection and classification of wildfire ignition events

- Satellite, airborne sensors, ground sensor networks – fusion of information
- Rapid classification of fires to identify/rank fires that pose a risk – geospatial data, etc.

**Information systems supporting rapid decisions for response to prioritized fires**

- Prioritize fires relative to lives, structures, communities at risk, and other factors
- Support big-picture decisions and strategic coordination

Command and control systems for coordinating directing of firefighting assets

- Communications and data sharing across stakeholders
- Highly automated and unmanned systems
- Human-machine interfaces to support commanders and maintain situational awareness
- Interfaces to seamlessly and intuitively coordinate swarmed response of multiple assets

Assessment for DRF

- Supporting autonomous airborne agents to transit to an area and detect any fire

- Fusing data from wide-area sensors with up-close drone sensors to build situational awareness to support decision-makers

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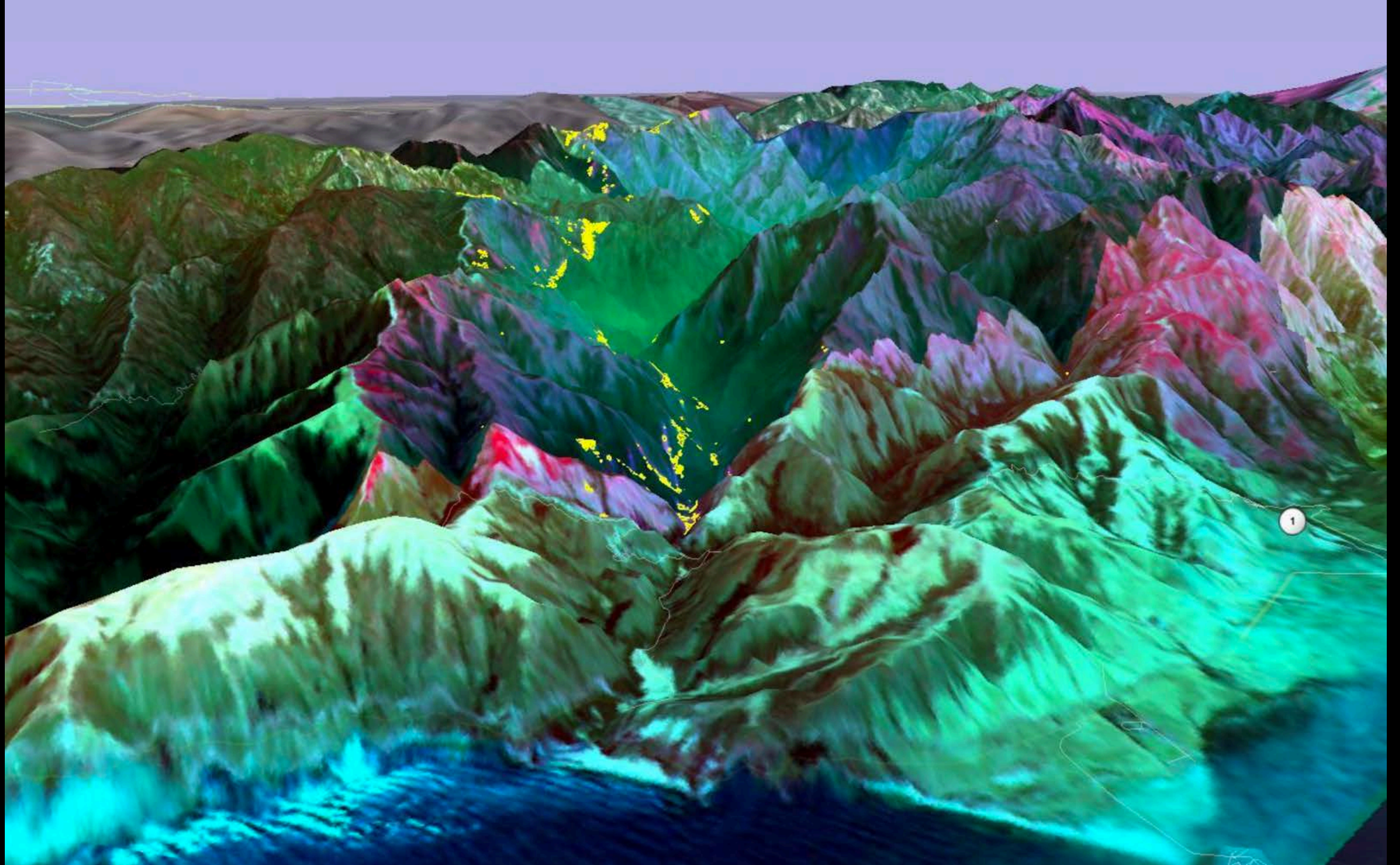
FIGHTING THE FIRE

Categories

Airborne asset systems to respond within minutes to wildfire ignition events

Unmanned air assets persistently ready for immediate response
Unmanned air assets able to augment scale of aerial wildfire response

Stand-off fire retardant delivery systems able to deliver with high precision in all weather conditions, day or night

Technologies to support and enhance a sustained response to a large wildfire

- Air assets to set up ad-hoc wireless communication networks
- Air assets to provide improved situational awareness to coordinate fire response

Technologies to support firefighters

- Air assets to logistically support ground firefighters with supplies
- Improved lift systems for helicopter rescue/extraction, and slung loads
- Improved logistical support (supply, health, comfort, safety) for firefighters
- Improved information picture delivered to ground firefighters for safety, effectiveness

Assessment for DRF

- Directing manned and unmanned resources to achieve directed end objectives – optimization
- Ensuring a safe airborne operating environment for drones and manned aircraft inside a TFR
- Fighting the fire 24/7 using unmanned assets when manned assets are grounded
- Providing resupply to teams on the ground via drone
- Providing datalink communications throughout a wilderness area via persistent drone
- Providing tactical ISR on fire conditions during the fight
- Fusing fire condition data with other categories and sources to maintain situational awareness during fast changing fire conditions

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POST-FIRE

Categories

Airborne systems to collect data and assess fire impacts

Data, systems, and technologies to support recovery of burned wildlands

Learning systems to improve future fire detection and response based on experience

Assessment for DRF
- Real-time capabilities are generally not a requirement

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