



ENVIEW

# Automating the Analysis of 3D Point Clouds through Scalable AI

2020 P3DL CoP Conference

# Unprecedented Times

We live in a world where access to geospatial data has never been more prevalent and offered so much potential to improve every aspect of our lives



Sensor Proliferation

Commoditization of data collection and the proliferation of low-cost sensors have allowed us to map the world daily and at high resolutions



Incredible Value

Reaching every field of human endeavor and allowing us to derive value from decisions based on a “perfect” understanding and measured in the 10-100s of \$Billions



However.....

Just because we can collect data, does not mean that we can analyze and action it. Meaningful insights are unable to be realized given the overwhelming firehose of data.

# Challenges with Current Processes

Legacy tools and methodologies are not longer optimal in the age of multi-source intelligence. New and larger datasets make an analyst's job more difficult and present the need for technology innovation.



Challenges with Legacy Software

Expected to perform complex analyses with limited IT infrastructure and desktop software void of modern architectures



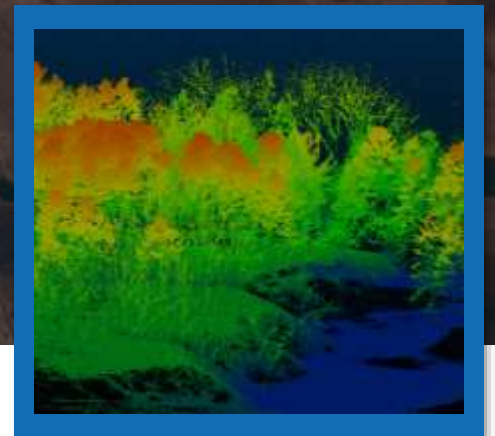
GEOINT Vulnerabilities

Big data is easily disrupted at comms bottlenecks. Traditional analysis is no longer viable in a post-COVID world.



2D Imagery Doesn't Represent a 3D World

Imagery is deeply valuable, but it doesn't accurately represent a 3D battlespace and requires expert interpretation before it is actionable.



3D Data is Complex and Hard to Manage

3D data is highly desired by end-users but is large, complicated, and requires expert analysis.

# Negative Impact and Pain

These challenges result in material pain for organizations, end-users, and the National mission. Without new tools the problems will get worse as more data accumulates.



Delayed Decision-Making

Challenge to produce timely intelligence products within the enemy decision cycle.



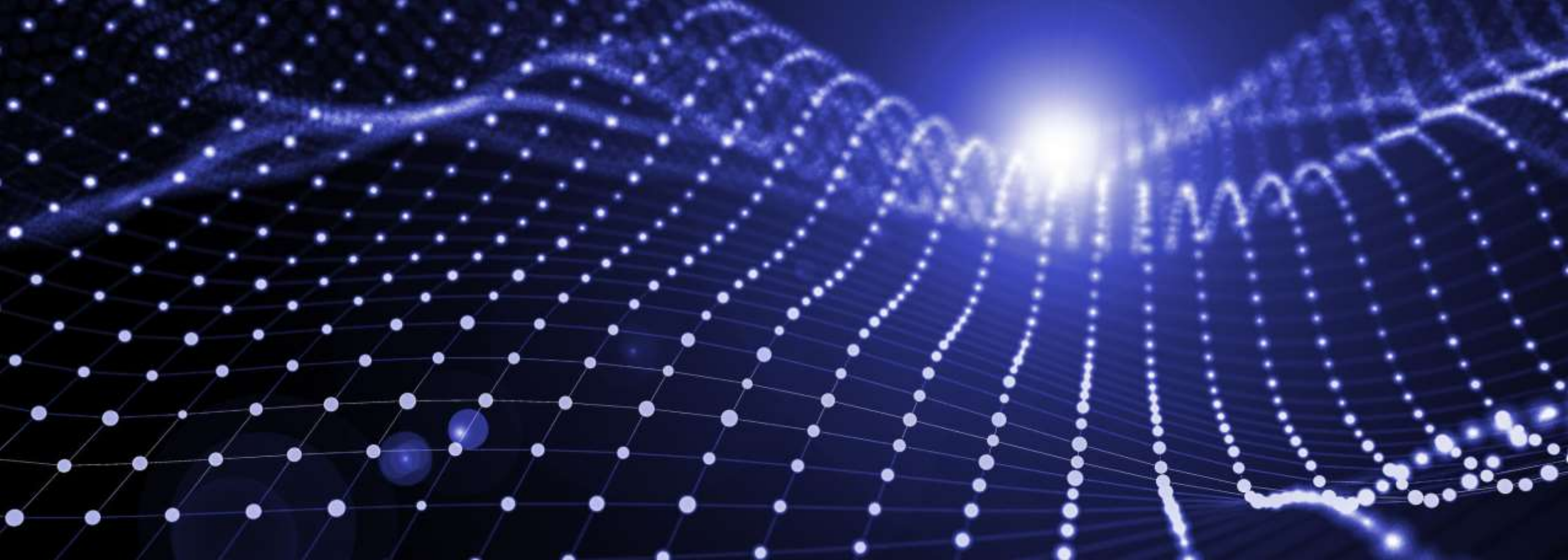
Impact to Mission and Warfighter

Delay or disruption to timely GEOINT has a major negative impact to the warfighter:



Impact to the Enterprise

Mitigation is done by significant manual effort, pulling personnel away other mission critical initiatives.



## Turning to AI/ML

The community is rightfully turning to AI/ML automation to help sift through the mountain of data and highlight only those kernels of insight that people truly care about



## Applicability to 2D

Open libraries like TensorFlow have allowed increased the adoption of AI/ML when trying to sift through and analyze structured, 2D data sets like imagery.... But once again, 2D data doesn't accurately represent a 3D battlespace and manual interpretation is still needed

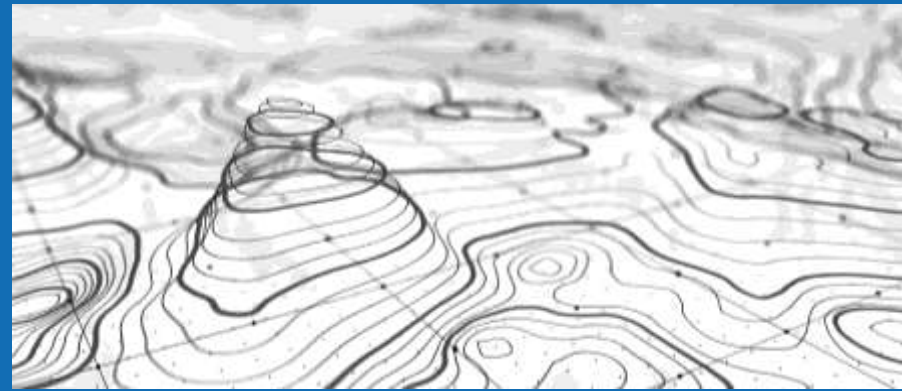
# Age of 3D

3D Point Clouds don't have texture like a 2D image and are pure geometry and numbers, albeit unstructured. We can now move beyond subjective interpretation of image texture and into to the quantitative measurement of physical geometry.



Immense Value

Greater level of fidelity and accuracy gives insights that are not possible with 2D Data



AI/ML Limitations

Given its unstructured nature, traditional AI/ML breaks on 3D data. So despite its value the pain points still exist.



# ENVIEW

The limitations and pain was experienced firsthand and is what drives us today



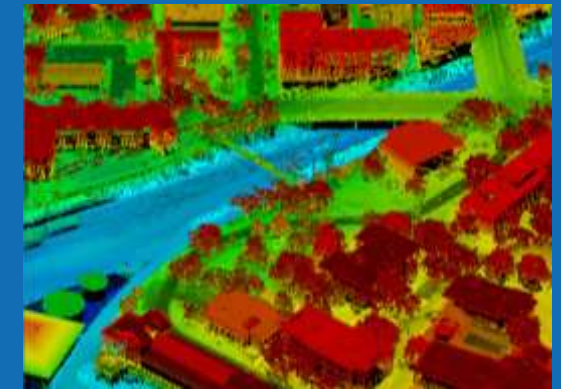
### Inspiration

Enview was born from lessons learned in Afghanistan on the benefits and challenges of 3D geospatial data



### 2D Data Limitations

Inferring truths about a 3D world by interpreting 2D imagery hides insights and introduces errors



### 3D Data Challenges

Incredible insights possible but analysis has been painfully slow, manual, and prohibitively expensive

# Novel & Unique AI/ML Framework

Enview has developed a unique, best-in-class set of tools to exploit and operationalize 3D GEOINT. Modern computing practices enable Enview to support a scale of data currently underserved by available technology



3D Computer  
Vision

Many orgs can create 3D data; doing computer vision on it is a totally different matter.



Artificial Intelligence &  
Deep Learning

Enview has developed custom convolution kernels and specialized deep learning frameworks to massively automate 3D GEOINT

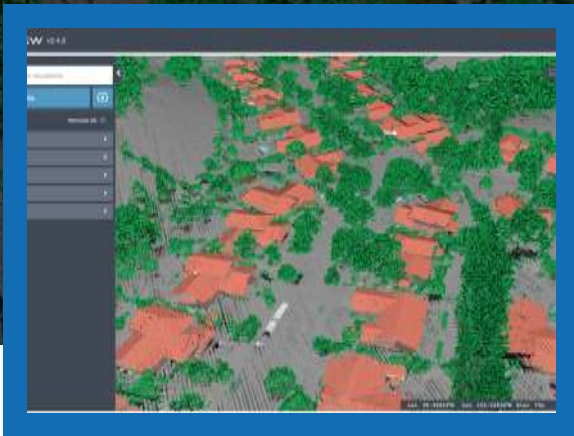


Modern Software  
Architectures

Leveraging massive parallelization, and modular orchestration to handle thousands of sq miles in hours versus weeks or months.

# Enview Explore™

Harnessing AI/ML to deliver 3D GEOINT at unprecedented scale and speed to empower analysts and forward-deployed warfighters



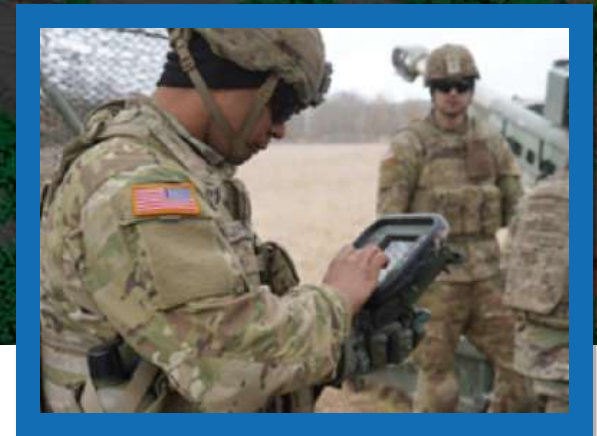
Easy-to-Use Cloud Application for All Users

Visualize and share data as a COP or give to analysts for 3D data exploitation



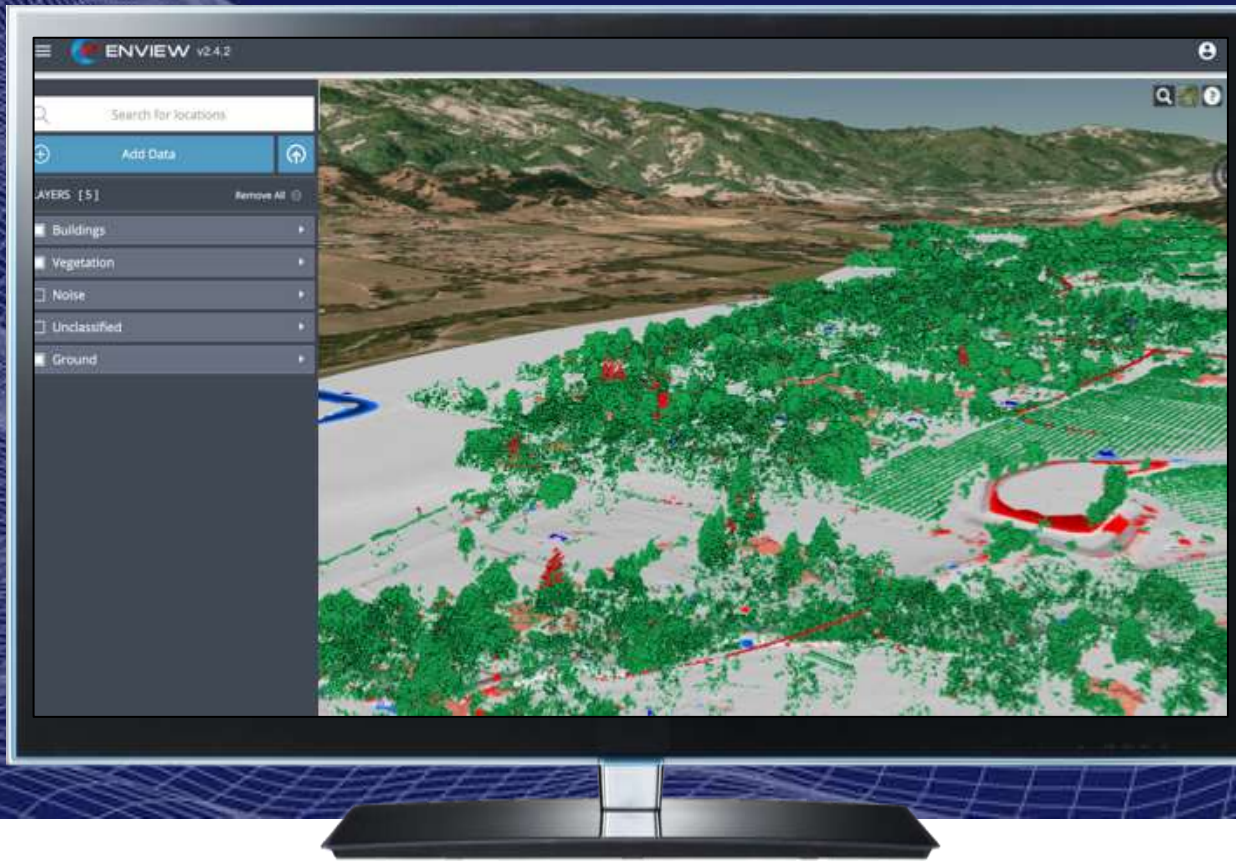
Automated 3D GEOINT at Scale

Automate data classification and object detection faster



Deploys into Your Workflow

Users at the Point of Need get results at the speed they need



## AI/ML Powered Object Detection

Enview Explore contains custom AI and machine learning to power scene classification, segmentation and automated object detection. The more data that Explore processes, the more it learns.



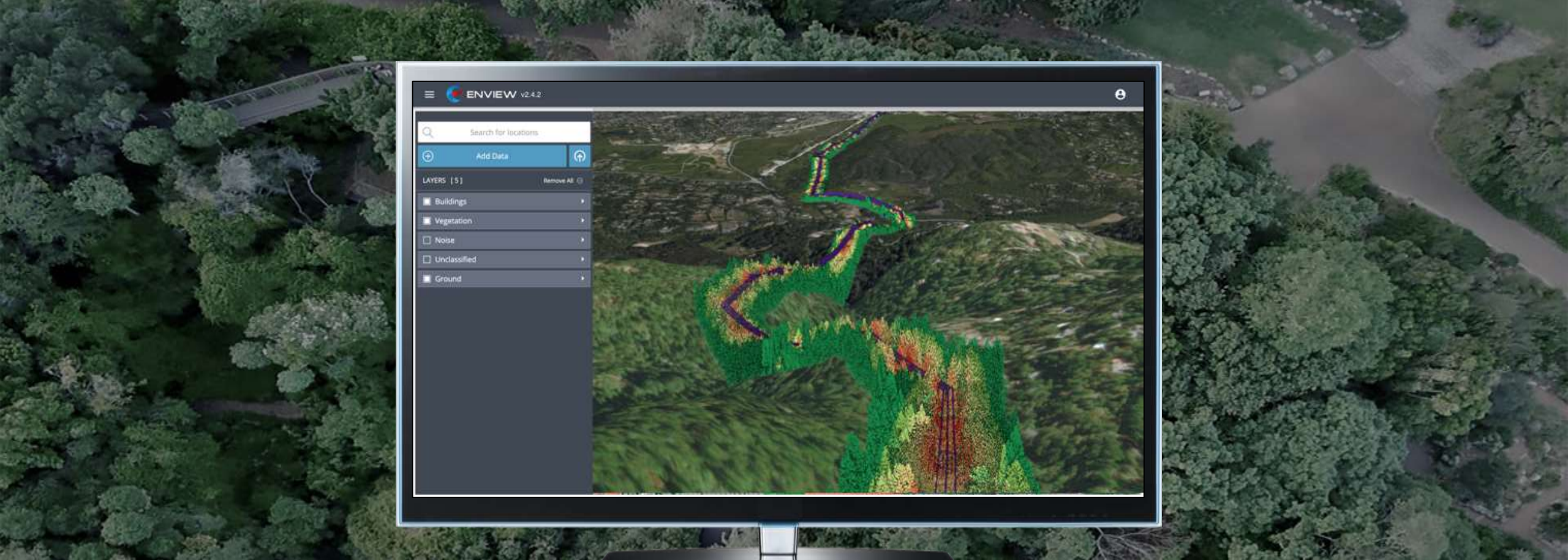
## Automatically Virtualize the Battlespace in 3D

Explore lets you quickly visualize the battlespace in an easy-to-use Common Operational Picture. There are no limits or restrictions on how many users can access Explore, so collaborating with teammates is easy and simple.



## Automated Change Detection

Explore's containerized architecture scales to process data across thousands of CPUs and GPUs. Change detection is done as quickly and often as you need to help better understand patterns of life.



## See Beneath the Canopy

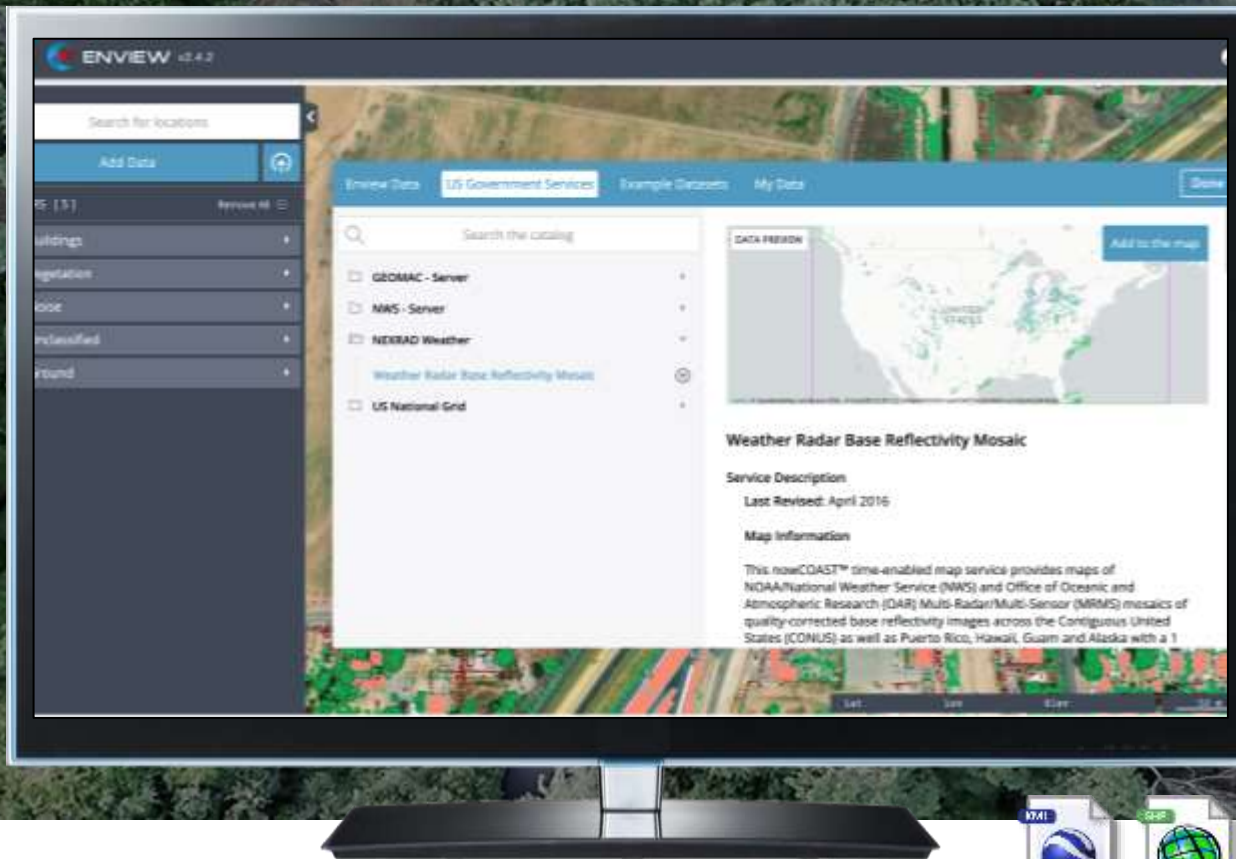
Enview Explore's powerful 3D data processing tools enable foliage penetration and hard object detection below the canopy in a matter of minutes, not days.



## From Months to Minutes

Explore's containerized architecture can dynamically scale to process data across thousands of CPUs and GPUs. This automation solves your biggest pain: speed to insight.





## Dynamic 2D/3D Data Fusion

Ingest and present a dynamic catalogue of spatial data from additional sources. Whether stored locally, in a server, or available via a web-service, combining proprietary and open data allows for a holistic picture of the mission at hand



## Integrates with Commonly Used Software

In addition to the web browsers, Enview capabilities can integrate with your current tools like ATAK, Google Earth, ArcGIS, QT Modeler, UDL, and other COPs. Enview will soon work behind firewalls and on embedded devices.

# Quantitative Benefits

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## Accuracy

98% Vegetation

95% Buildings

## Speed

Up to 200x

Increase

## Scalability

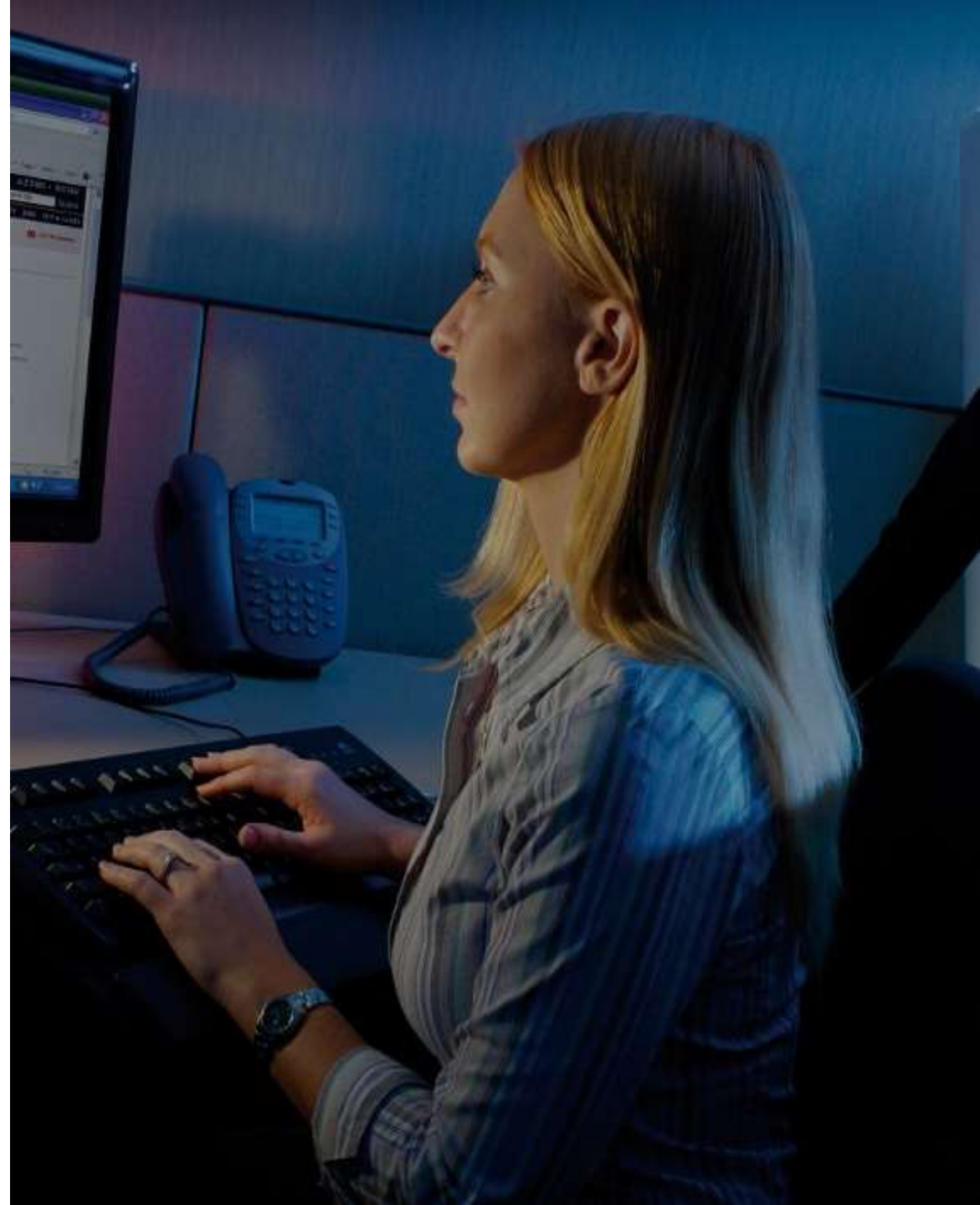
1000s of sq mi in

a few hours

## The Enview Impact

Explore gives analysts a massive improvement over current desktop processing capability. Analysis is scaled across hundreds of compute resources, and leverages AI/ML for massive increases in speed and accuracy.

**The result:** delivering 3D GEOINT at unprecedented scale and speed to empower analysts and forward-deployed warfighters



# Qualitative Benefits

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## For the Analyst

- Ability to produce intelligence products faster, removing stress and increasing fidelity
- Easy way to display and share results, without the need for training
- Reliable method for encapsulating, accessing and sharing tradecraft
- Removes the need for IA, GA, and All-Source to all be present

## For the End Customer

- Faster intelligence yields increased mission success
- Maintain strategic advantage over near peers in AI/ML
- Resilience due to decentralization of GEOINT
- Accessible at the point of need (HQ, Garrison, or TOC)



# Supporting Multiple Missions

By dramatically reducing the time it takes to exploit 3D data teams can maximize the number of products they create in a variety of different functional mission areas



Imagery Interpretation



Intelligence Preparation of the Battlefield



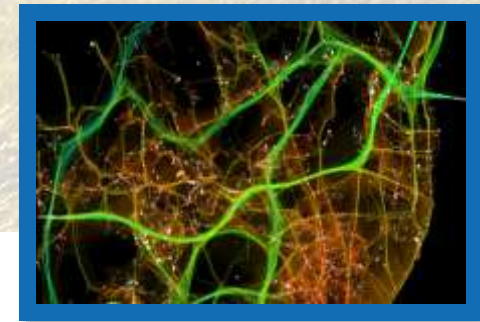
3D Battlespace Virtualization



Mobility & Terrain Planning



Mission Planning & Rehearsal



Pattern of Life Analysis

# Across the NSG/ASG and DoD

Helping solve a need in both the NSG/ASG and DoD.

### USAF STRATFI (SAF/AQ)

Selected as one of the AF's 21  
"big bets" by Dr. Will Roper

### NGA CRADA (3D GEOINT)

Automation of 3D GEOINT  
and HCI

### USAF Phase II SBIR (AMC, ACC, AETC)

Contingency response,  
Agile combat employment

### USAF Phase II SBIR (AFSOC, PACAF)

Overland navigation, Rapid  
damage assessment, HA/DR

### USAF Innovation (COMPACAF)

Installation resiliency, Air mobility  
operations, decentralized GEOINT

### USAF Phase I SBIR (SPDE)

Cruise missile defeat

*"As soon as I became aware of Enview, I strove to find a way to join their world-class team. The future of US national security depends upon innovative tech like Enview. Enview has specific and significant value to a number of government customers."*

- Robert Cardillo, Director (ret), NGA



*"Enview's Geospatial AI represents not just an improvement, but a game-changing warfighter capability. Its ability to use AI to create 3D models of the physical world are currently unparalleled."*

- USAF PEO for ISR/SOF



*"Enview's Tactical Organic Geospatial AI is the next evolution of Intelligence, Surveillance, and Reconnaissance. It aligns strongly with USSOCOM's AI Roadmap and priorities."*

- USSOCOM PEO for SRSE



*"Enview's AI platform aligns with the USD(R&E) AI and ML modernization priority. This type of capability could contribute to multiple future U.S. Army mission needs."*

- CTO for Army ASA/ALT



Try it For Yourself

Please reach out for access to Explore. We welcome the opportunity to collaborate and benchmark against your current workflows.



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