NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY

Know the Earth... Show the Way... Understand the World

GEOINT Big Data:
Implementing the Right Big Data Architecture

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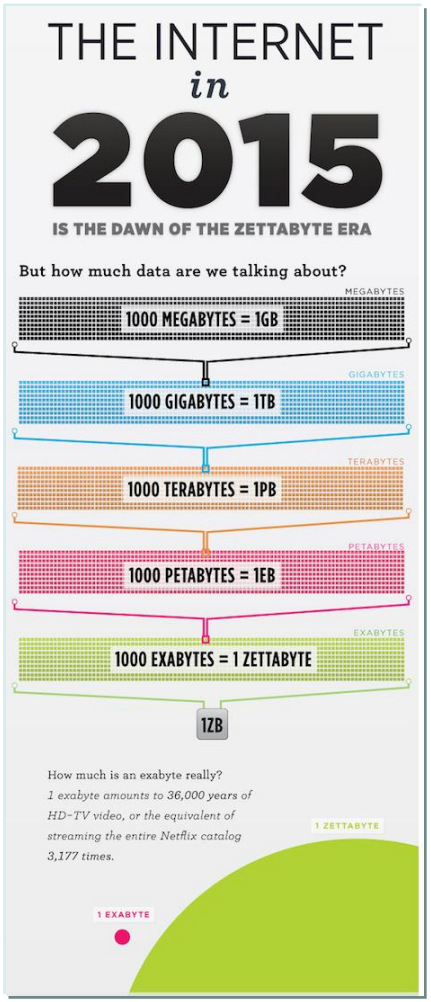
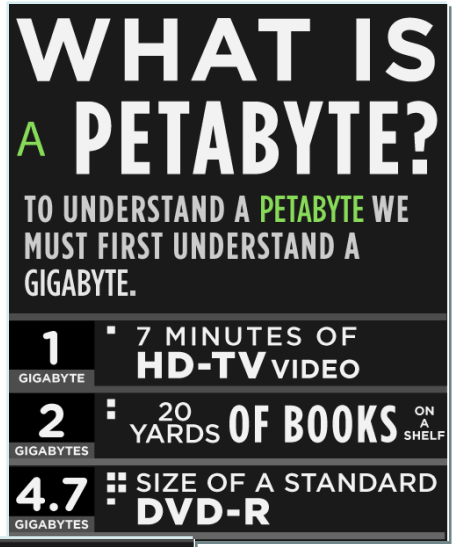
Lead Global Compute Architect, NGA

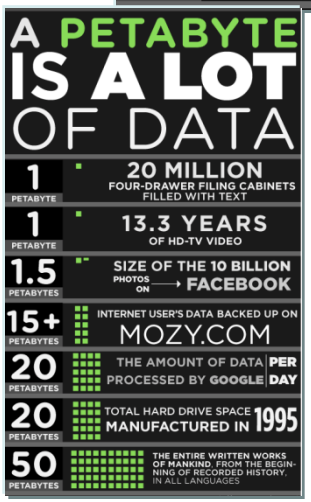
2013 Joint GMU-AFCEA Symposium

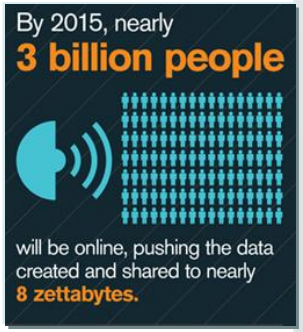
- We must significantly improve how mission solutions are designed, developed, deployed and measured
- Cloud models need to support hosting real-time software engineering, service composition, and continuous integration processes
- Capabilities that are extensible, configurable mission services, APIs, and applications for on-demand, self-service analytics multi-tenant platform

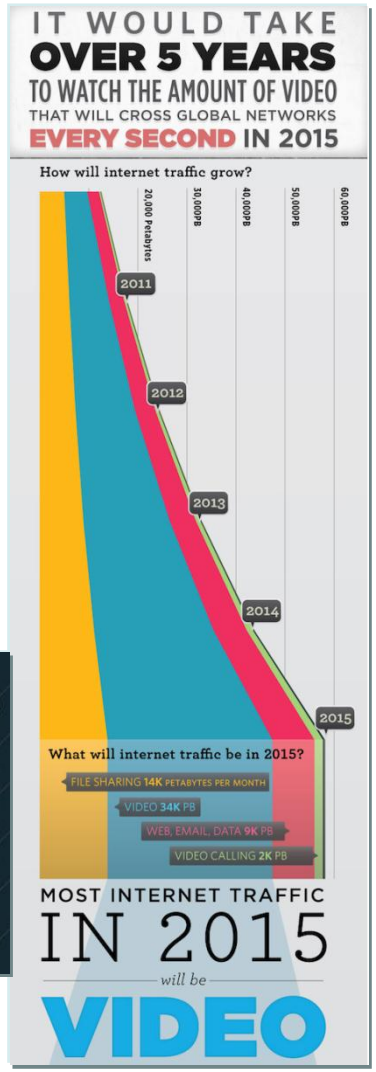
The Problem…

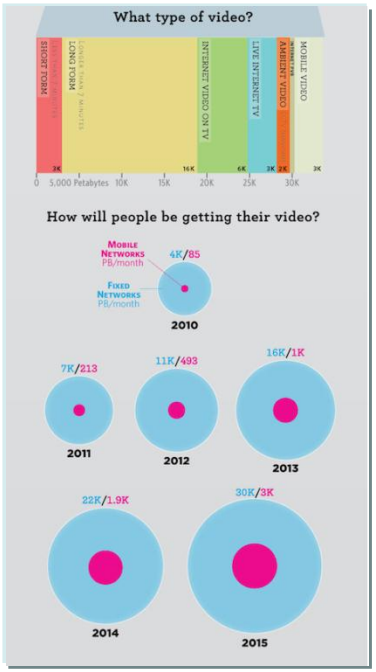


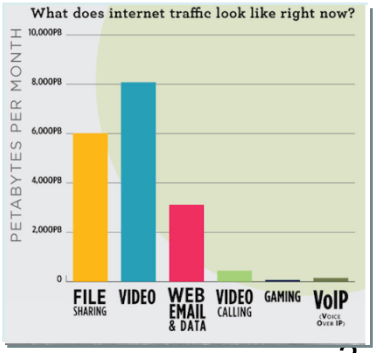












http://mrpalsmy.wordpress.com/category/btechno/

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Know the Earth... Show the Way... Understand the World

Know The Earth...
Show The Way...
Understand the World

ANTICIPATE

Where something is...
Why it's there...
What may happen...

Target-Based → **Activity-Based**

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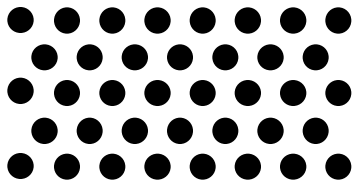
Volume

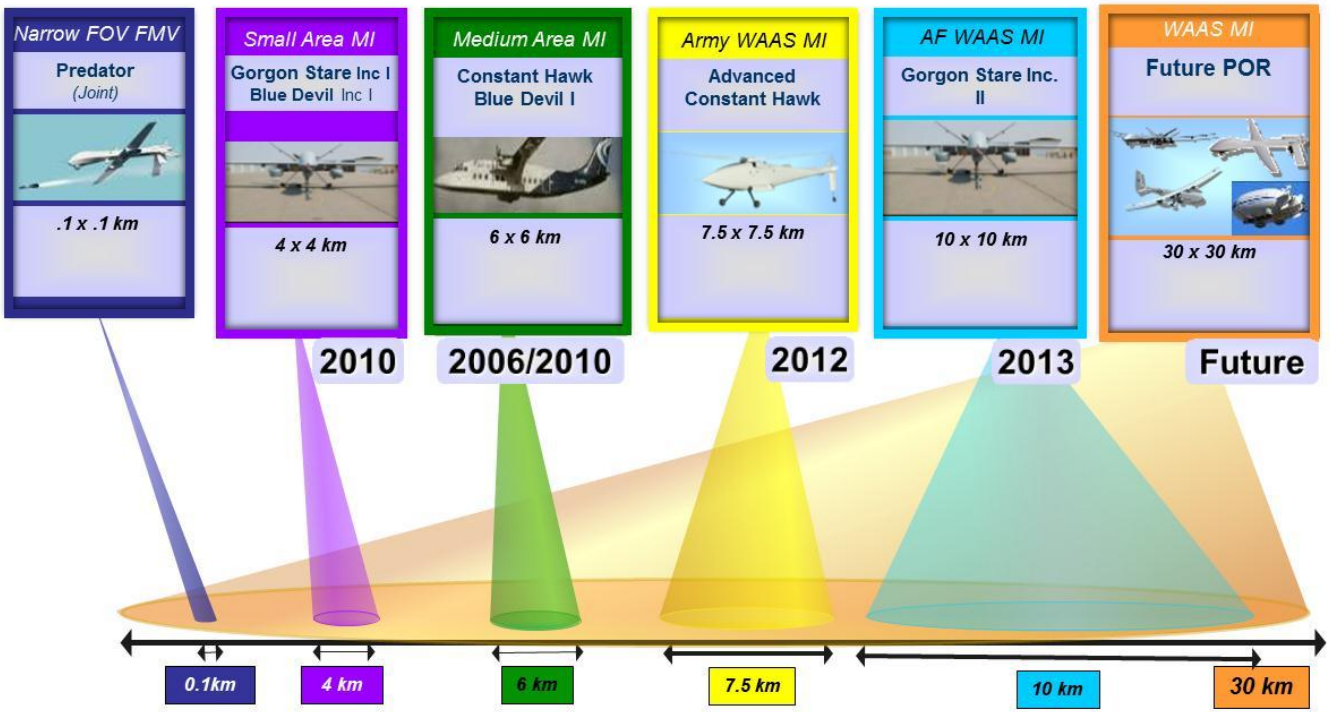
VOLUME



data at rest

Terabyes to exabytes of existing data to process

New Sensor Capabilities Driving Need For New PED Solutions



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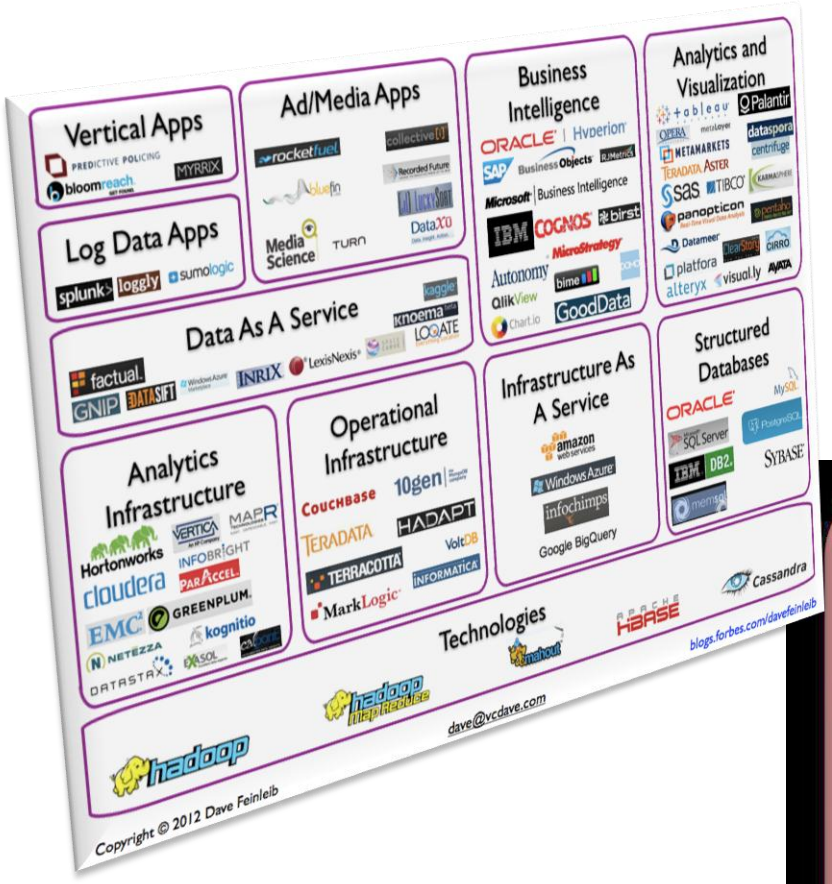
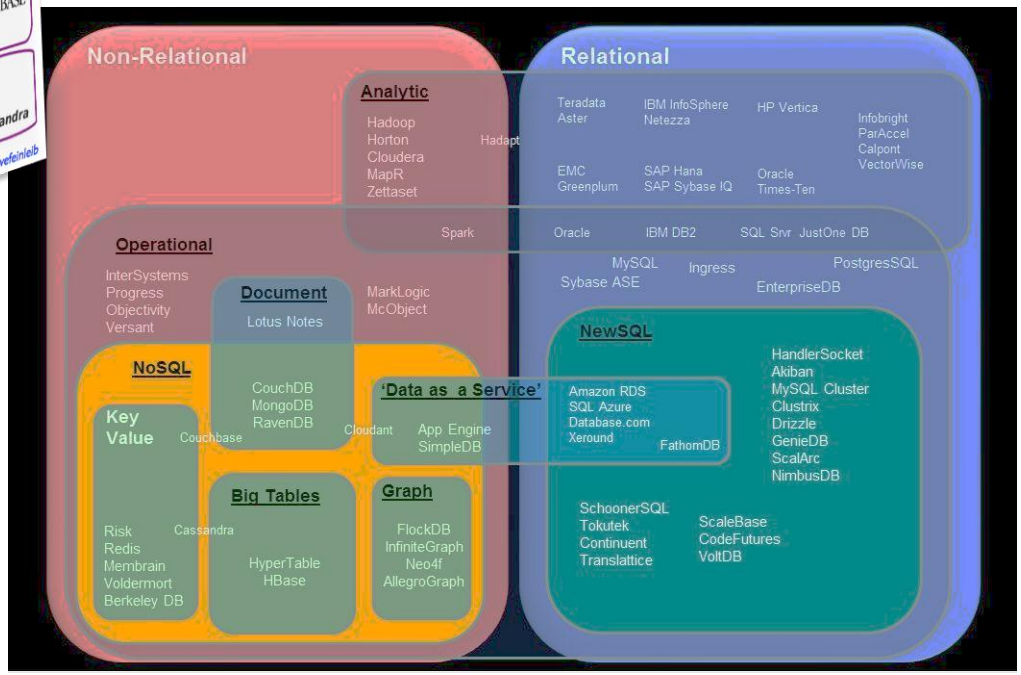
- ***Sensor and Processing Data***
- ***Spectral - more bands***
- ***LIDAR***
- ***Giga-pixel sensors***
- ***30 FPS WAMI***
- ***Video SAR***
- ***Higher quality Optics***
- ***Source Metadata***
- ***Records***
- ***Transactions (Crowd Sourcing)***
- ***Tables, Document, Chat***
- ***Data from Humans***

Big Data Solutions: One Size DOES NOT Fit All



- Rapidly growing technology sector and an ecosystem that constantly is changing—need to find the right solution for your own unique circumstances
- NGA is developing a GEOINT Operating Framework which is a set of principles that directs architecture, standards, tradecraft, and enabling technology which will in turn guide how our workforce, content, and systems interact to produce GEOINT products and services.



Information about the data…

Information about the data,

metadata

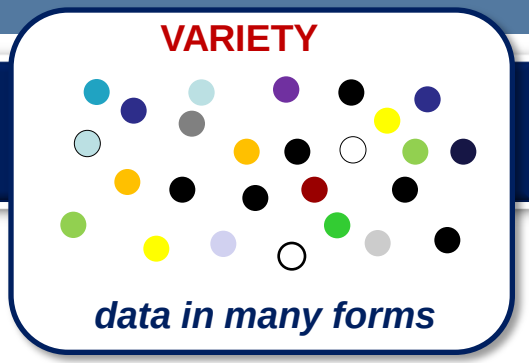
about the information about the data,

entity extraction

about the information about the data for knowledge to intelligence.

contextual resolution

Information about the data



GEOINT types of data are vast

- Relational Data
- File Systems
- Content Management
- Email
- CRM
- Supply Chain
- ERP
- RSS Feeds
- Cloud
- Custom Sources
- External Sources

Phenomenologies
- Geophysics
- Hyperspectral
- Infrared
- LIDAR
- Motion/Video
- Panchromatic
- Polarimetric
- Radar

Platforms
- Airborne
- Spaceborne
- Handheld
- Surface
- Subsurface

Providers
- National
- DoD
- Local/State
- Commercial
- Foreign/International
- Open Source

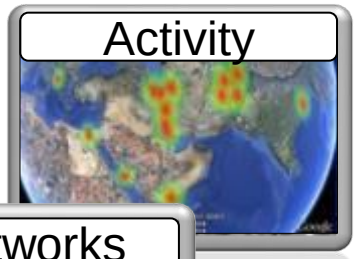
Foundation
- Elevation
- Features
- Gravity
- Controlled Imagery
- GPS
- Soils
- Bathymetry

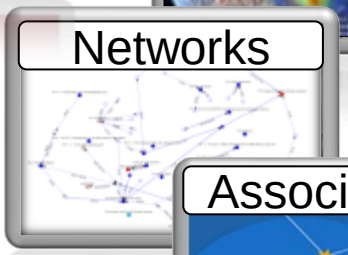
Providers
- NGA
- COCOMS
- Commercial
- Open Source
- Service/ Intel Centers
- Intel Agencies
- International

Services
Request…Tasking…Collection…Discovery…Retrieval…
Dissemination…Processing...Analytic…Archive

User / Problem Solver
Detect … Classify … Characterize
Identify … Understand

- Foundation Data
- SIGINT
- HUMINT
- OSINT
- GEOINT
- MASINT





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- **Structured Data**
  - Transactional
  - Time phased data
- **Semi &/or Unstructured Data**
  - Text Report
  - Emails
  - Presentations
  - Videos
- **Patterns**
  - Point of interest over time

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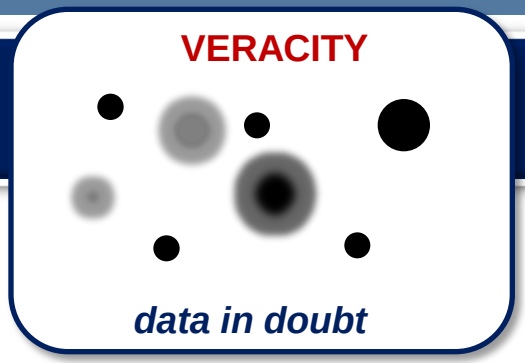
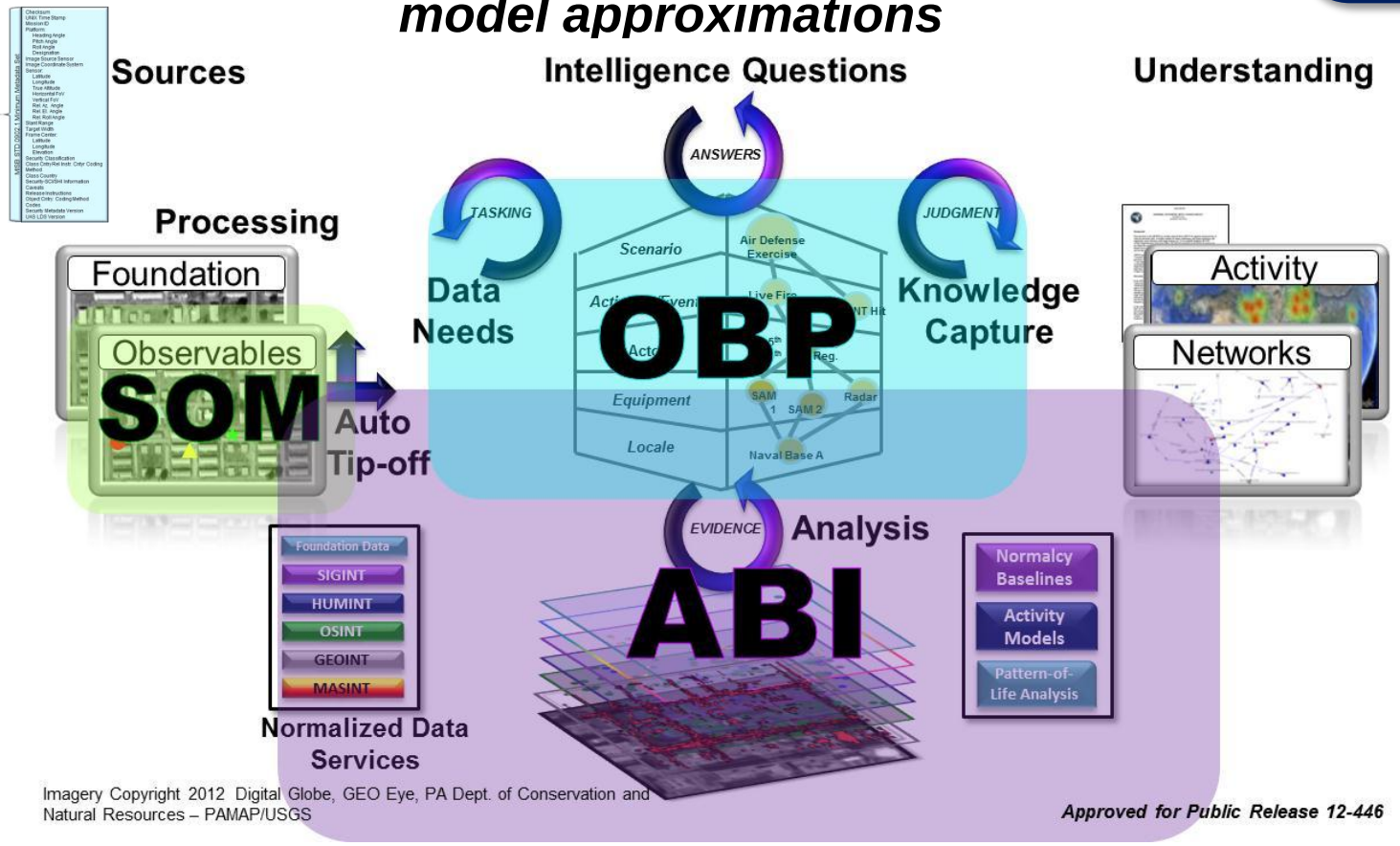
about the information about the data



Uncertainty due to data inconsistency & incompleteness, ambiguities, latency, deception, model approximations



- ***Metadata***
- ***Standards***
- ***Tagging***
- ***Ontologies***
- ***Discoverability***
- ***Governance***
- ***Accuracy***
- ***Precision***
- ***Data Quality***
- ***Data Retention***
- ***Analytic Confidence/Rating***
- ***Calibration***

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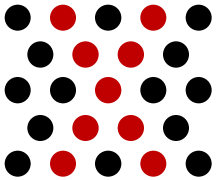
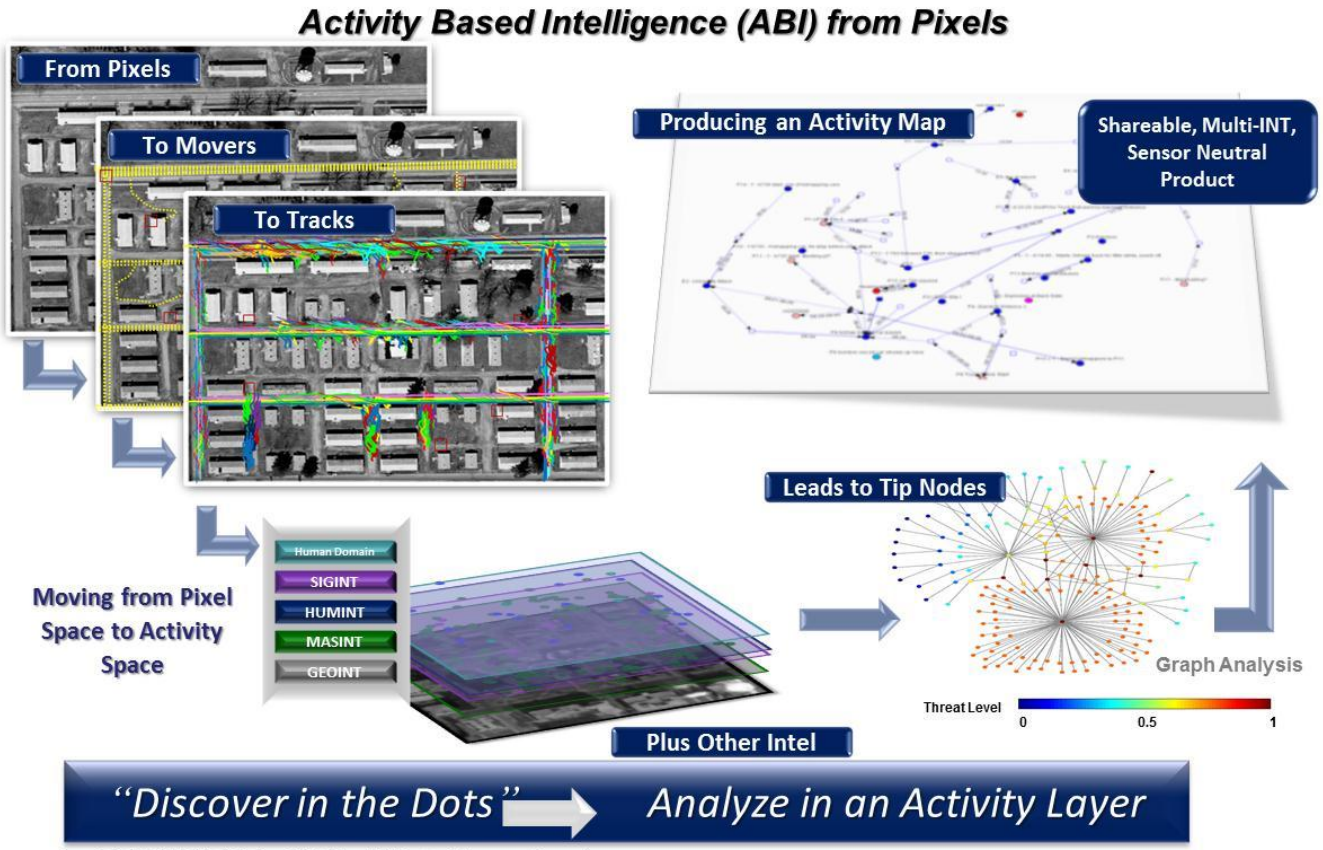
Visualization

VISUALIZATION



data patterns

Activity Based Intelligence (ABI) will form " the intellectual underpinning for how we conduct intelligence in the future"



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Activity and transactions are the fundamental building blocks

Extracted activity contains vital intelligence information

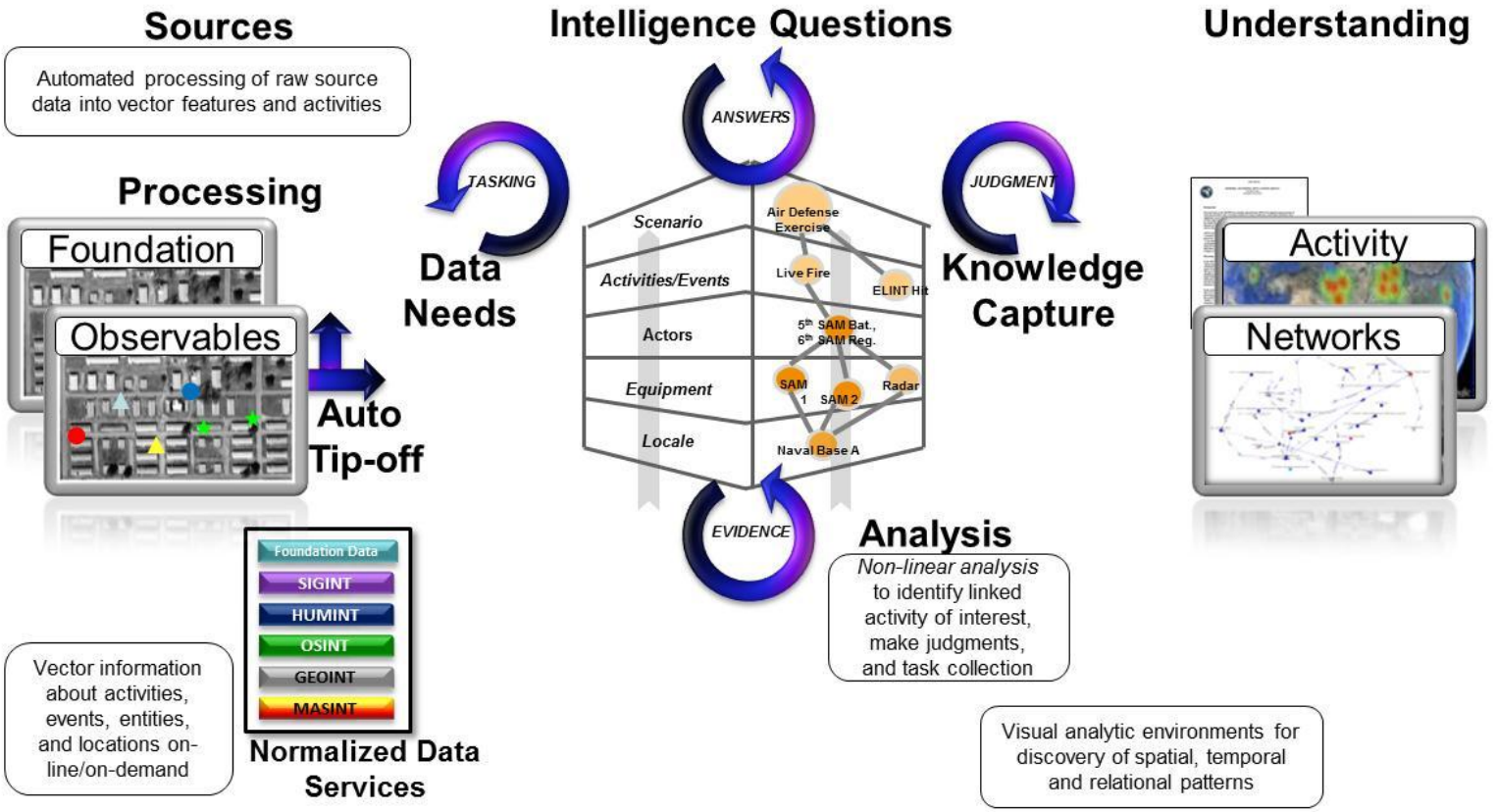
ABI optimizes exploitation of large scale data

Goals: Discover, find and characterize activity, patterns of life, networks and anomalies

about the information about the data for knowledge to intelligence

Activity-Based Intelligence in Action

Intelligence in Action Only!



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Questions?