Big Data—No Problem
Big Analytics in a Secure Environment—Problem

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Agenda

- Background
- Defining the Problem
- Quick Overview of the Cyber Threat Landscape
- Addressing the Challenges
- Example Solution
- Next Steps
- Q&A.

BACKGROUND

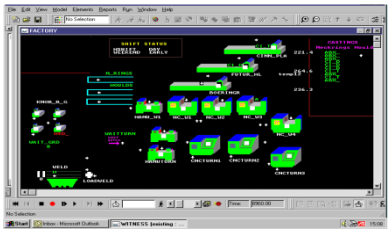
Quick reminder as to what constitutes HPC…

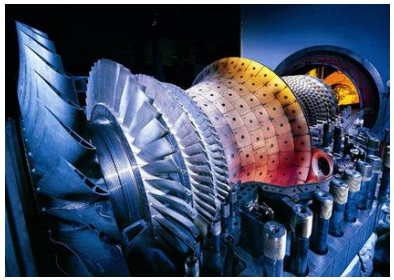
- Numerical Intensive:

- Data Intensive:

- Graphics Intensive:

- Modeling, Simulation & Analytics:





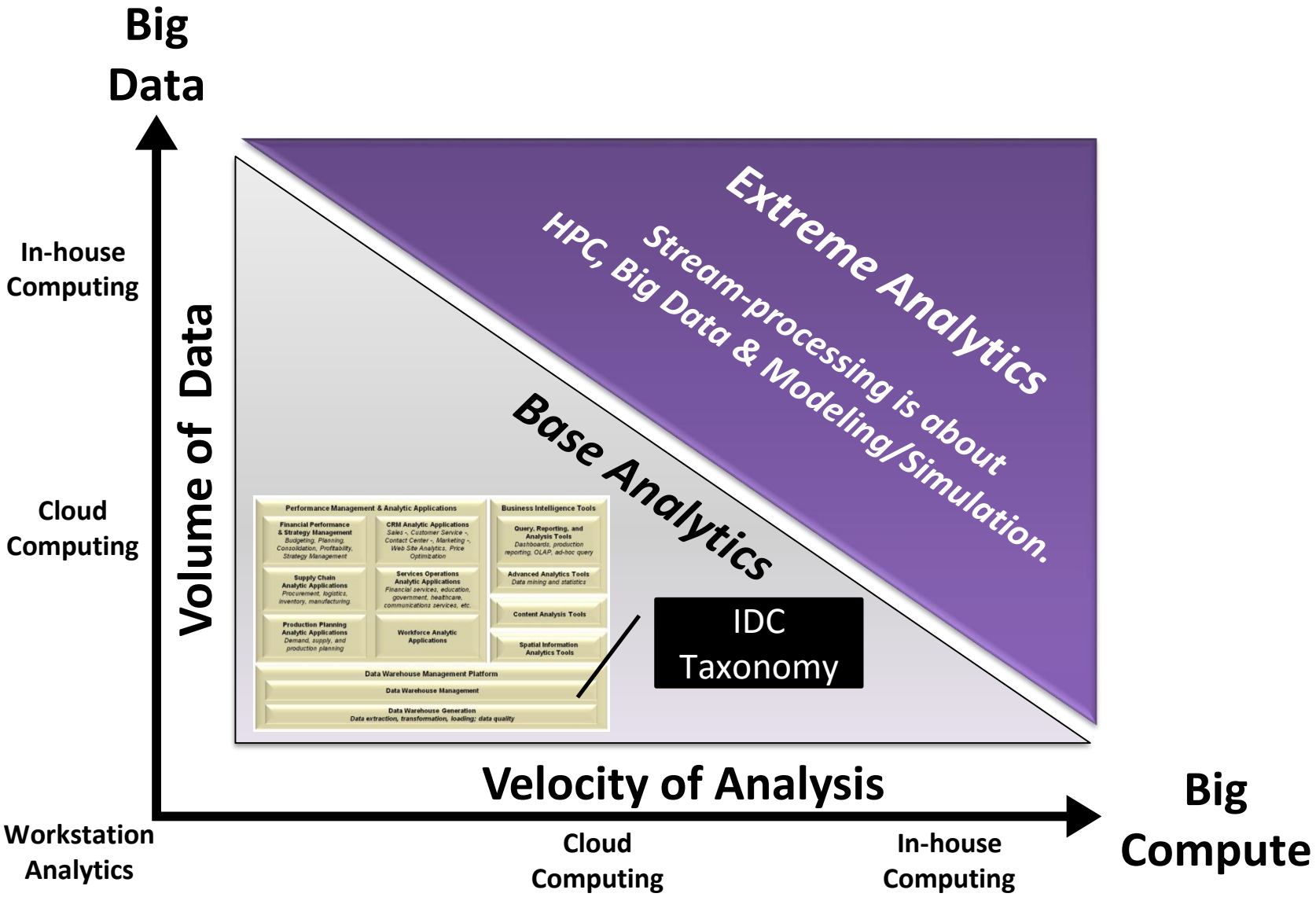
- Collaborative Decision Support:

Do this all in (near) Real-Time.

"Big data starts a little ***BIT*** at a time."

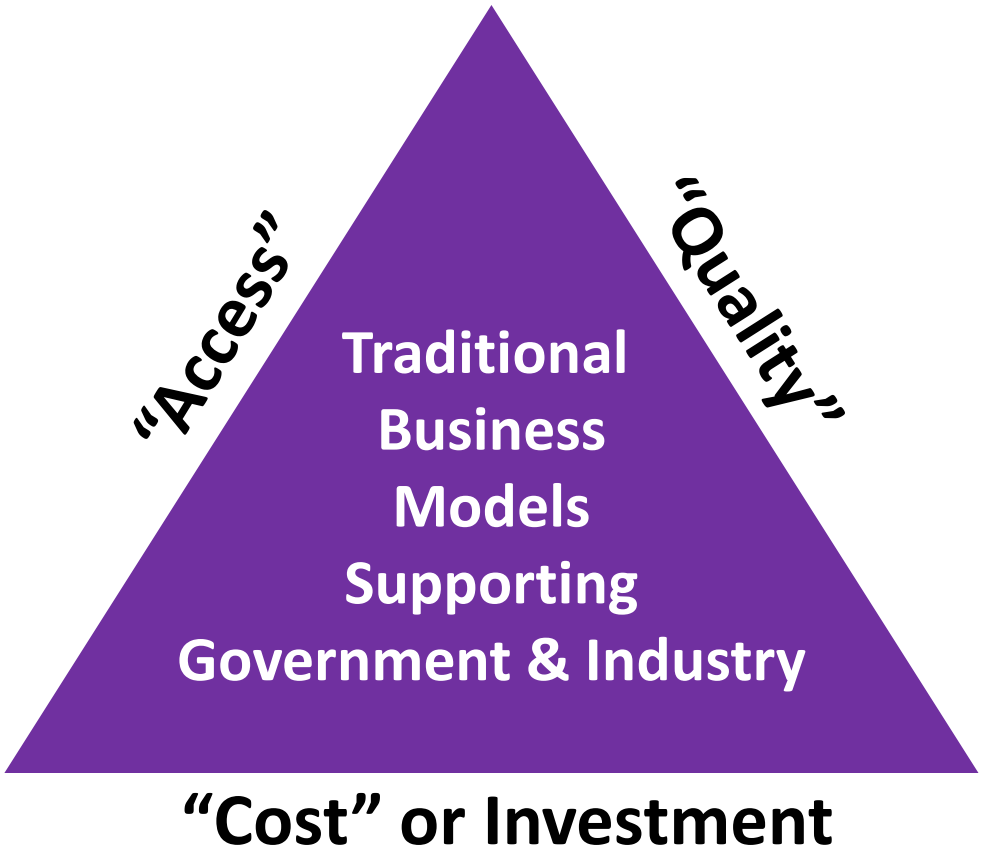
"Big Data is like teenage sex: everyone talks about it, nobody really knows how to do it, everyone thinks everyone else is doing it, so everyone claims they are doing it."

Mapping to the HPC Cloud



DEFINING THE PROBLEM (HIGH LEVEL)

Zeroing in on the Problem: The Iron Triangle

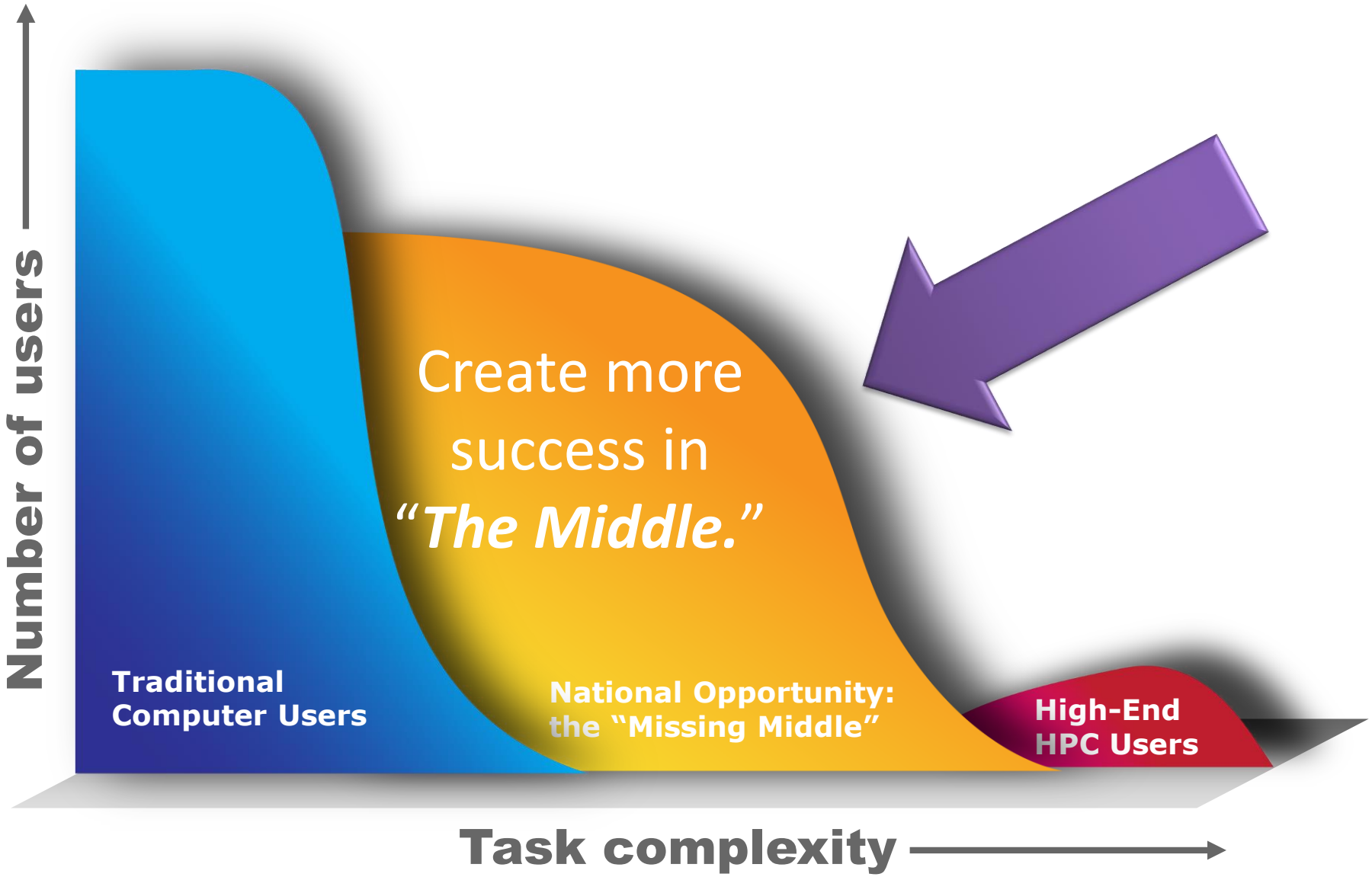


Outmoded Business Model

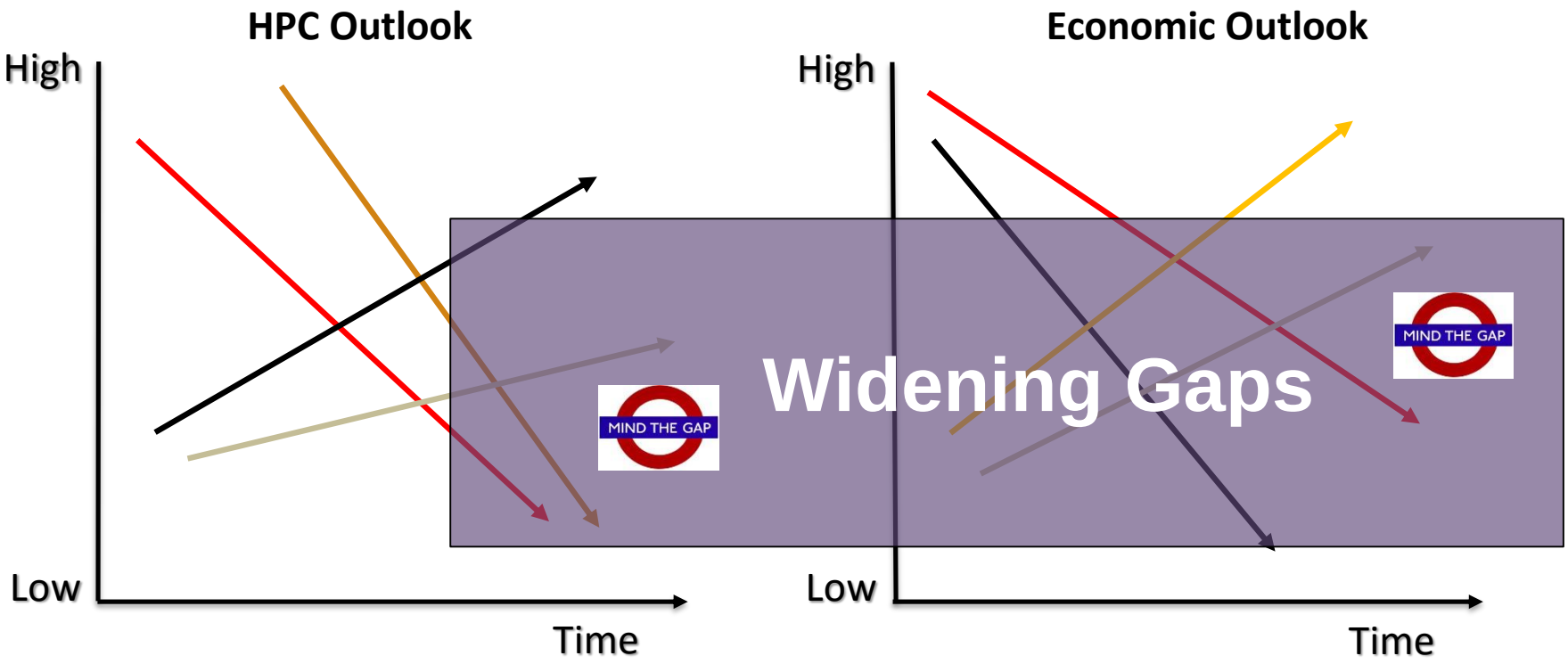
- Assumption is that quality, exclusivity and expense correlate to an outcome.
- It is futile to think that current business models can ever extend beyond the "elite" and those with means.
- Fuels endless debates, bureaucracy, funding, standards, etc.

Access = Security, On demand (Cloud), ISV-enabled or Licensable Applications, Network Capacity, …
Quality = Expertise, Cultural Inertia, Politics, Client's Time Availability, Trust, …

Zeroing in on the Problem: Missing Middle



Macro Economics Perspective



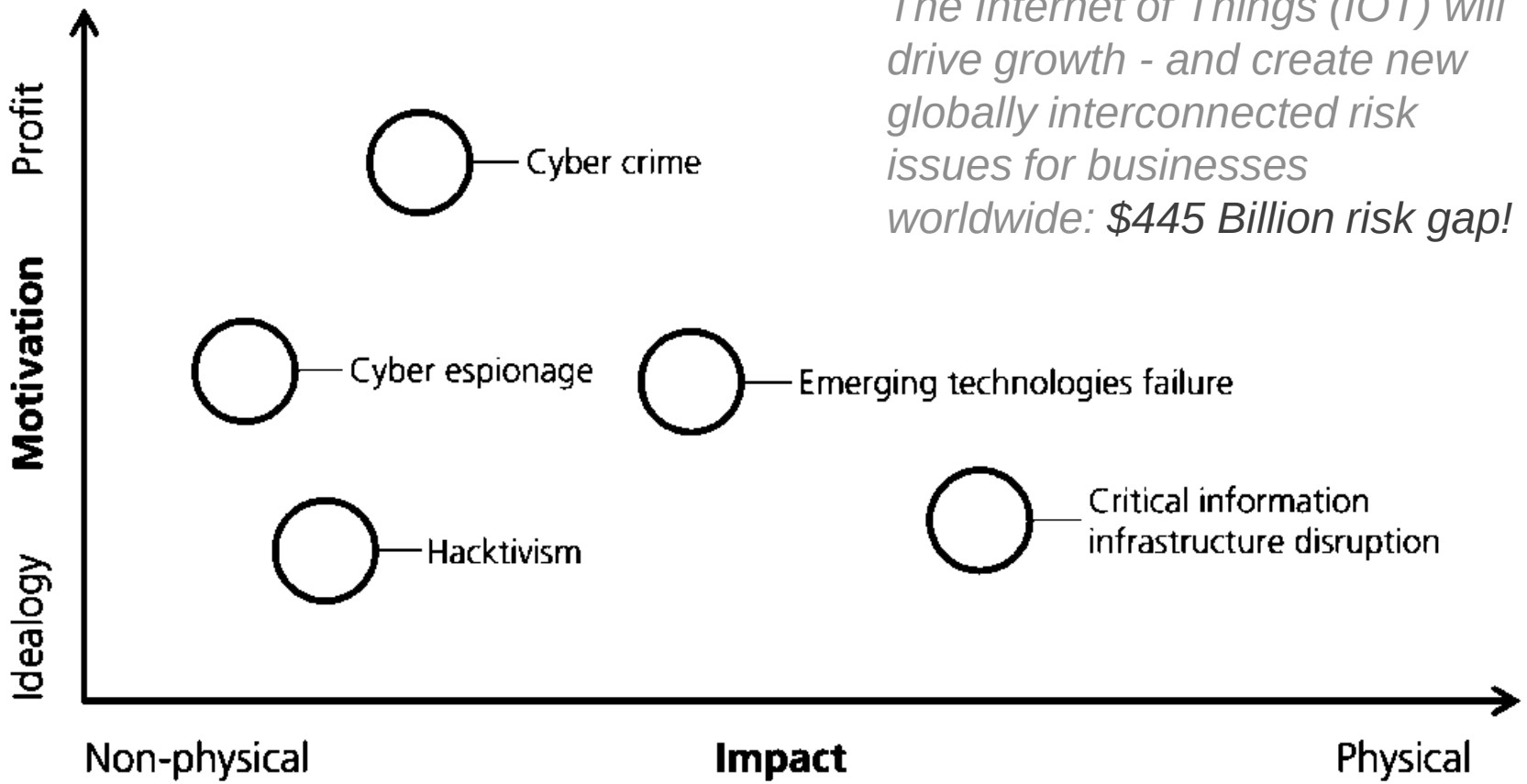
- Raw Performance
- Applicable HPC Domains
- Utilization
- Skills (wetware)

- Hardware Costs
- Software Costs
- Demands, Time Sensitivity, Pressures
- Effective Use of Industry Skills

CYBER THREAT LANDSCAPE

"We have entered the era of the ***Cyber Arms Race***"

Cyber Risk Landscape by Motivation & Impact



The Internet of Things (IOT) will drive growth - and create new globally interconnected risk issues for businesses worldwide: $445 Billion risk gap!

Source: ESADEgeo.

Quick Overview of the Cyber Threat Landscape

The Security Triad, known as ***CIA*** consist of

- **Confidentiality**:
  - Addresses how secret the information is.
  - If someone obtains the information, the confidentiality has been compromised.
  - Locked doors, fences, and guards can be used to keep physical structures secure.
  - Passwords, encryption, and firewalls can be used to secure computer systems and networks.
- **Integrity**:
  - Addresses the correctness of the data.
  - Data must be protected both while in storage and in transmit.
  - If data has been modified while in storage or in transmission, the integrity has been compromised.
- **Availability**:
  - Data should be available when the user needs it.
  - Employing a backup strategy and disaster recovery plan ensures data is always available.

Common Modes of Hacking

- Internal penetration
- External penetration
- Information gathering
- Networks
- Application
- Workflow
- Denial-of-Service
- Physical security
- Authentication systems
- Database, Data Lakes
- Stolen equipment
- Social “re-engineering”

Attack Methodology or Vector

- Performing reconnaissance
- Scanning and enumeration
- Gaining access
- Escalation of privilege
- Maintaining access
- Covering tracks and placing backdoors.

ADDRESSING THE CHALLENGES

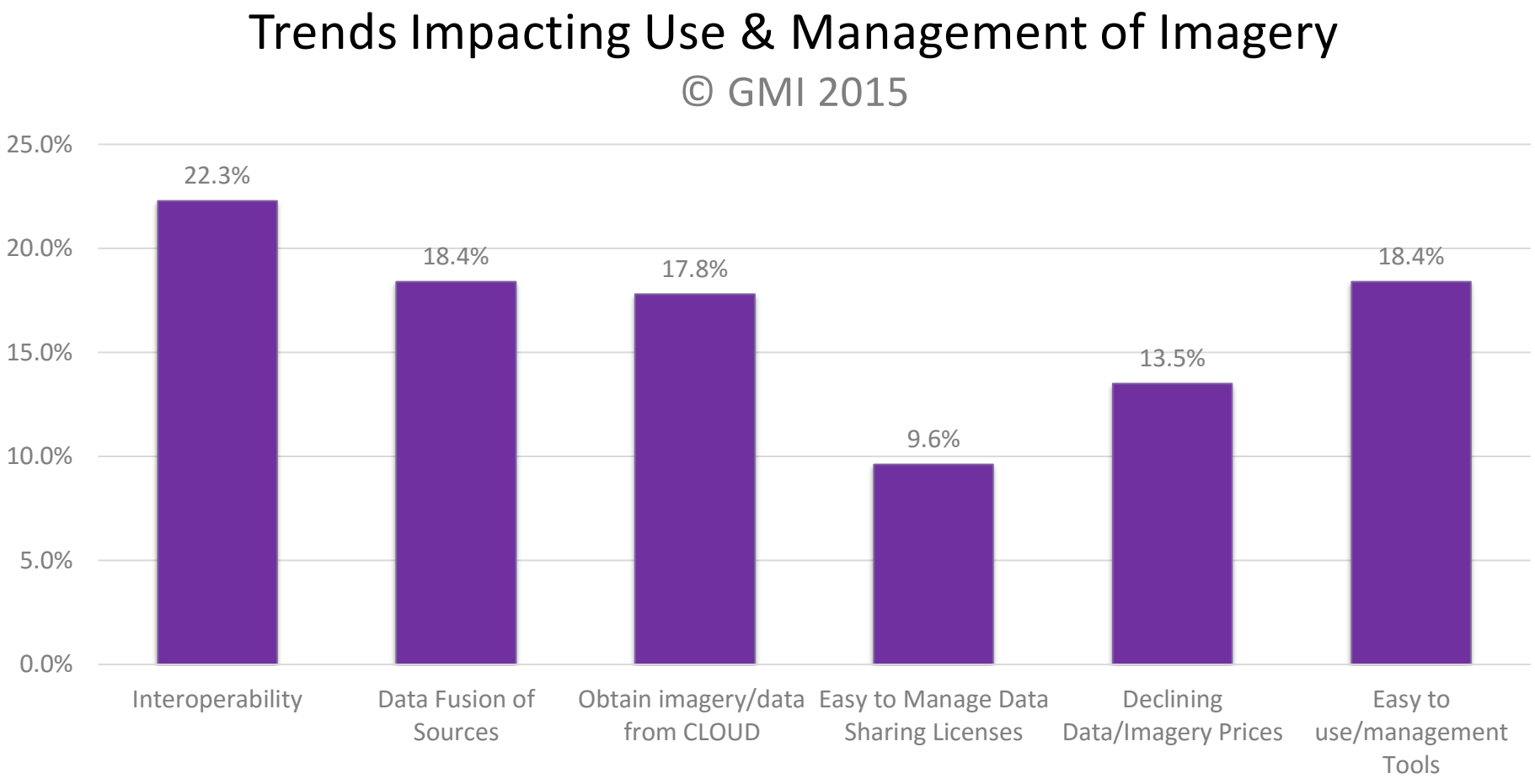
A Solution: MORE Opportunity™

(Maximizing and Optimizing Research and Educational Opportunity)

Mission: MORE Opportunity™

- Give underserved groups access to the HPC Cloud & Model as a Service
- Team with institutions, tribal groups, labs, businesses & communities in R&D
- Solve real-world problems building technical skills to secure the ***Workforce of the Future***.

Market Dynamics: Addressing Agility



Addressing the Challenges

- Continued Commoditization of Geo Data / Imagery / Tools and New Entrants Globally
- Provider must still focus on Targeted Marketing and Establishing a Channel to the Customer
- Investments on the Rise for Small Sat Hardware, Including Launch Capabilities and Automated Geo Tools - Predictive & Algorithmic Analytics.

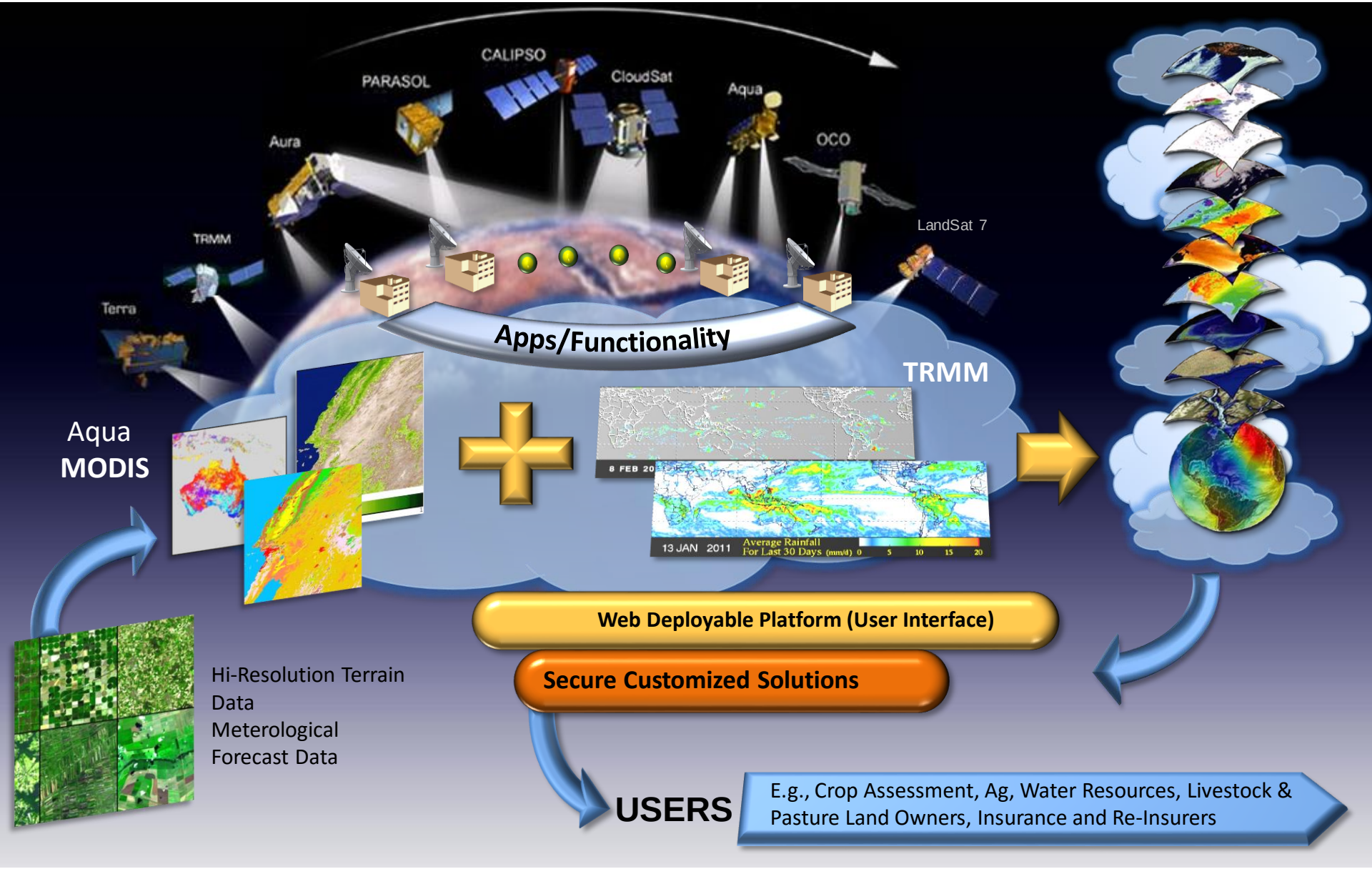
Key Barriers to Success

- Tools and templates for managing risk in the transition from digitization to the digital workflow
- Expertise and knowledge using scalable systems (human tools)
- Creation of digital models (software tools)
- Cost – not the primary obstacle any longer!

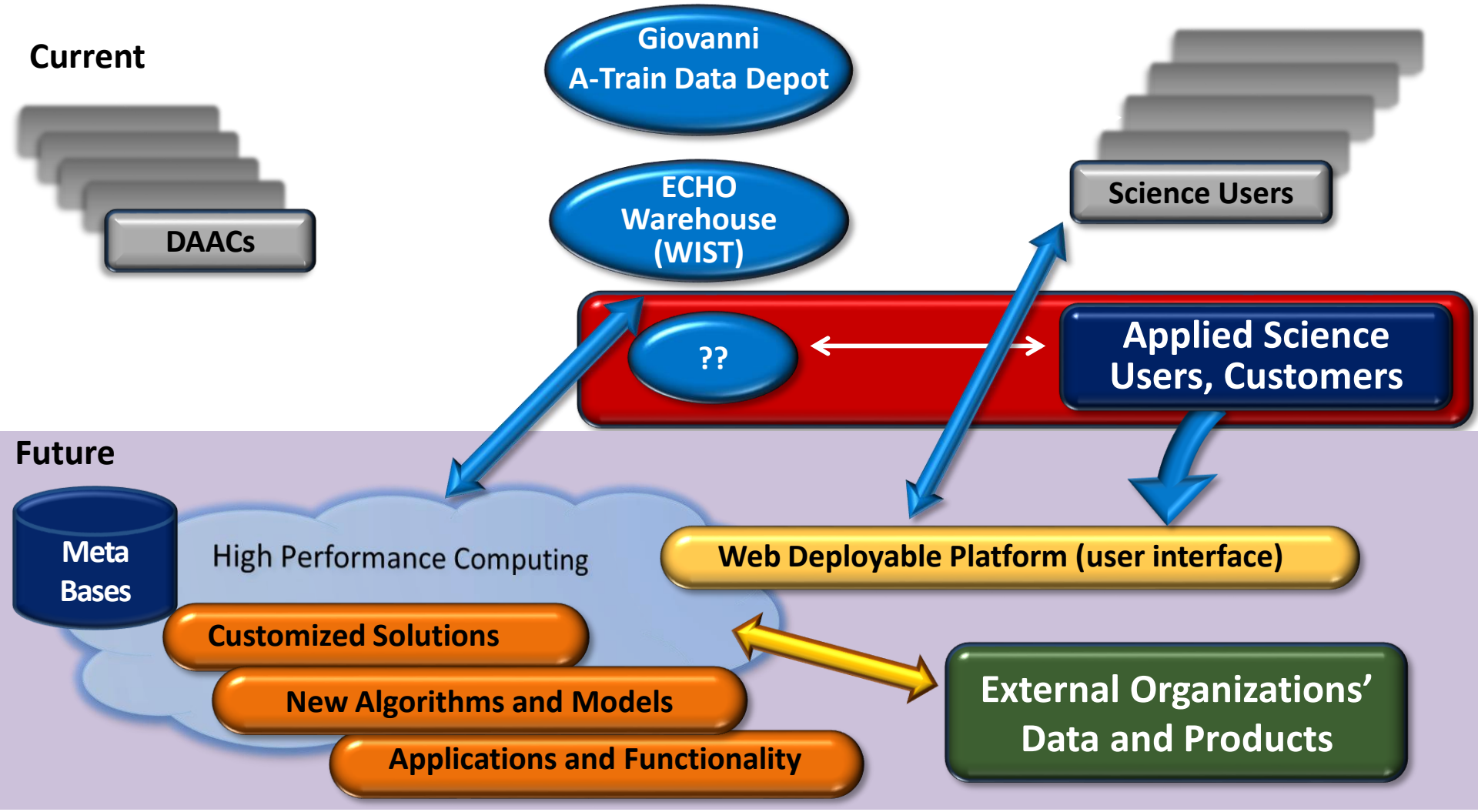
Next Steps…

- Accelerate the collaboration among public and private partnerships that are needed to securely deliver agile market solutions for actionable situational intelligence
  - Develop modeling and simulation talent within the workforce
  - Promote successful risk-mitigation strategies
  - Bring together tools makers with small- and medium-sized enterprises
  - Facilitate creation of complete, scalable solutions.

DEPLOYED SOLUTION (EXAMPLE)


CALIPSO
PARASOL
CloudSat
Aqua
Aura
OCO
TRMM
LandSat 7
Terra
Apps/Functionality
TRMM
Aqua
MODIS
8 FEB 20
13 JAN 2011
Average Rainfall
For Last 30 Days (mm/d) 0 5 10 15 20
Web Deployable Platform (User Interface)
Secure Customized Solutions
Hi-Resolution Terrain
Data
Meterological
Forecast Data
USERS
E.g., Crop Assessment, Ag, Water Resources, Livestock &
Pasture Land Owners, Insurance and Re-Insurers

Leveraging Existing Data Repositories, Access & Tools



IN CONCLUSION …

Discovery, Access & Retrieval for the Underserved

- Make Remote Sensing and Geospatial Information Systems data readily discoverable, accessible, visualized and useable
- Provide Modeling as a Service (MaaS)
- Scalable-up for a wide, varied and growing consumers (informed and uninformed users)
- Deploy systems without the need to know the existence of, or necessity of, the data and models they need to solve their geospatial and temporal problems.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teşekkür ederim
спасибо
dank je
thank you
gracias
tapadh leat
bedankt
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mauruuru
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go raibh maith agat
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kop khun krap
arigatō
takk
dakujem
grazie
мерси
terima kasih
감사합니다
merci
ευχαριστώ

Presented by …

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Presentation Abstract

16.040 Big Data - No Problem; Big Analysis in a Secure Environment – Problem

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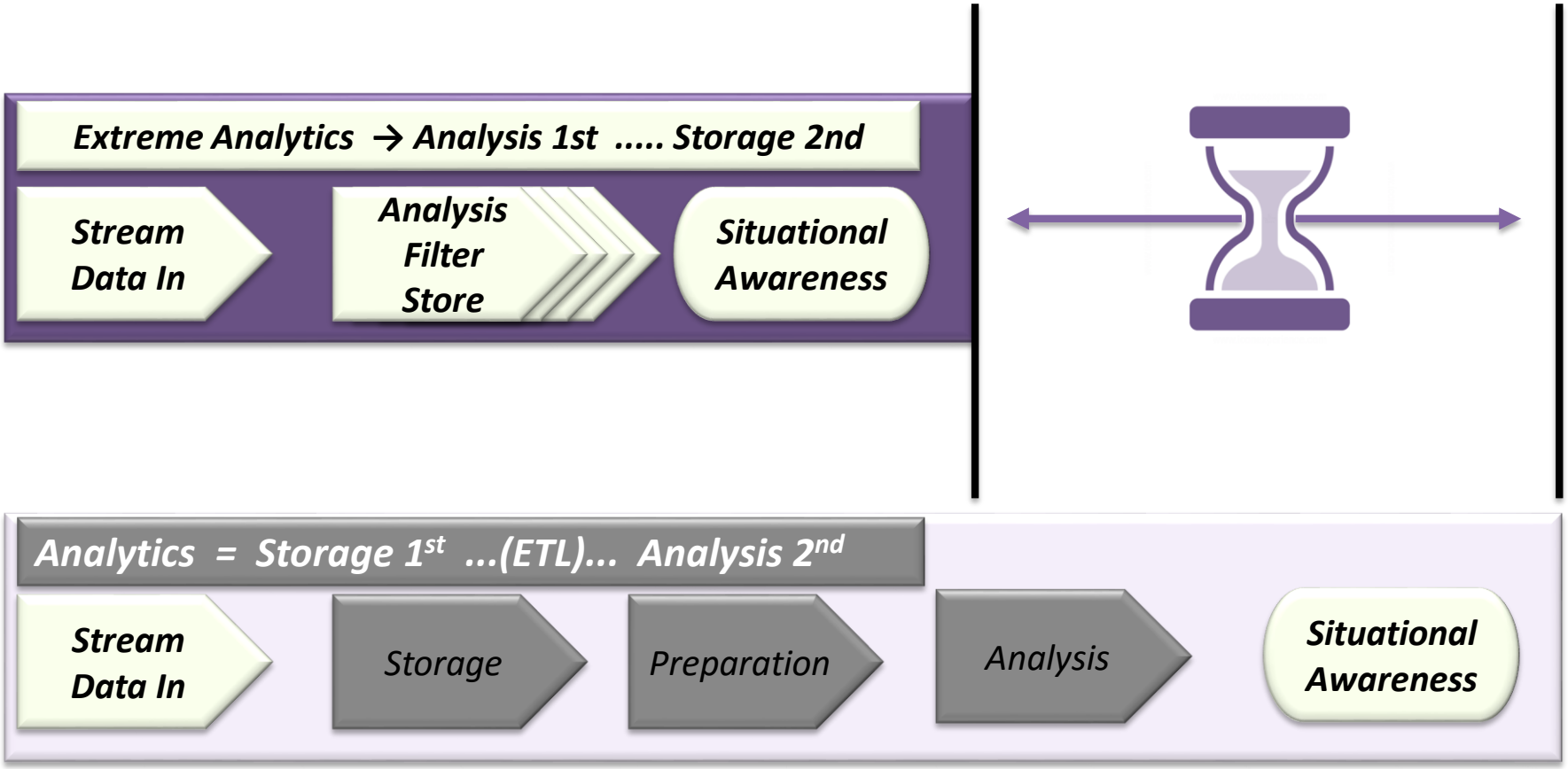
An organization's ability to execute its critical responsibilities depends on the confidentiality, integrity and availability of secure facilities and computer systems, data and workflows that support its mission ALONG WITH the methods to analyze that data. Modern methods for the identification of cyber threats increasingly involve techniques featuring cross-analysis of data coming from several different sources-and these techniques further increase the need for big compute capacity which is secure. How can organization’s leverage the emergence of the tangible need for excellent analysis tools, big or high compute power and big data to perform the large number of "analysis methods and security checks" required in an extremely short time" and what are the economic benefits and costs of this analysis. This becomes increasingly difficult with the multiple geospatial data sets available as the “skies continue to darken” with data from small sats and unmanned imagers. This presentation will provide an overview of the multiple methods and ways in which the US government and the commercial market space are focusing on this challenge.

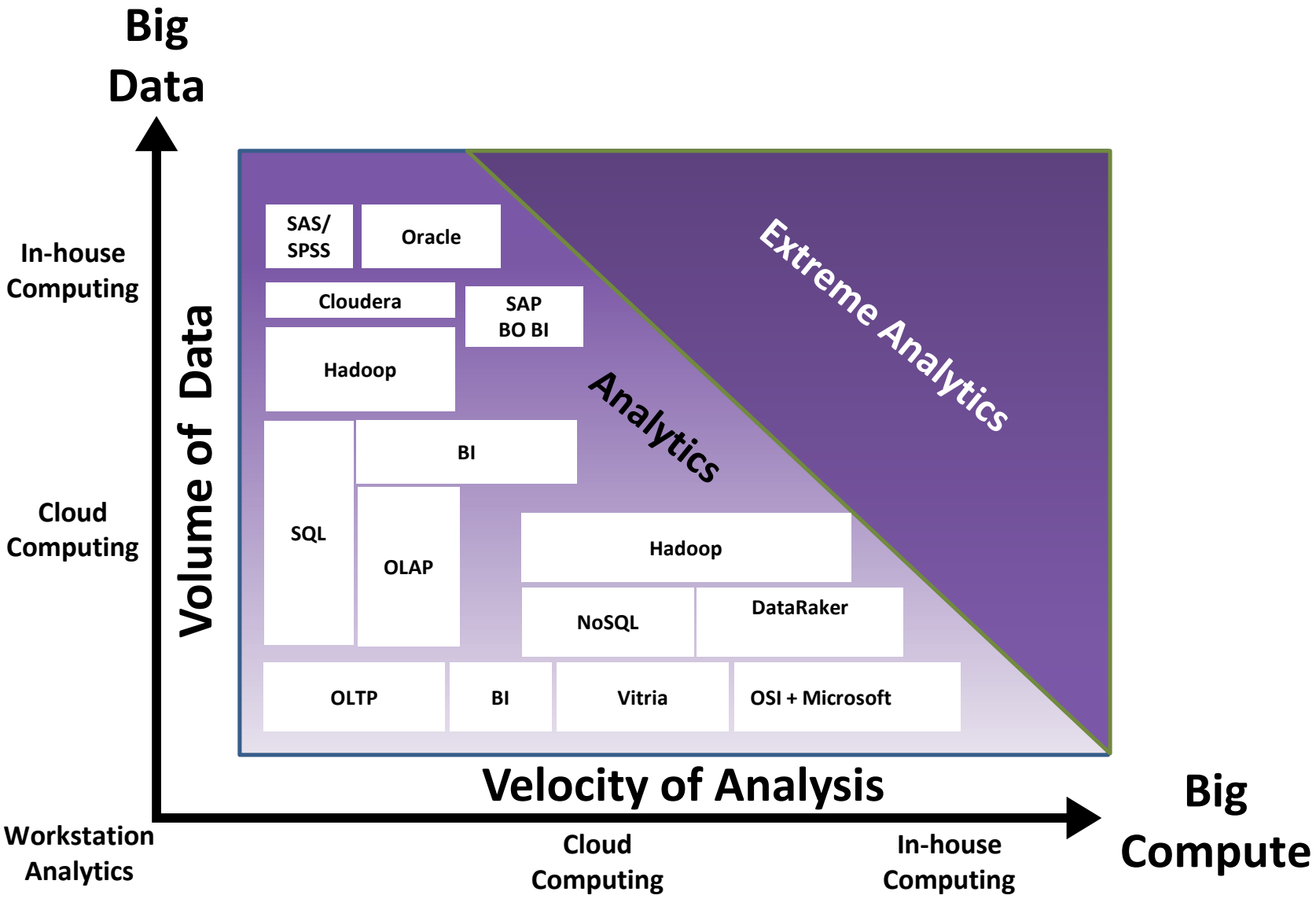
Model-driving, Stream-processing Analytics

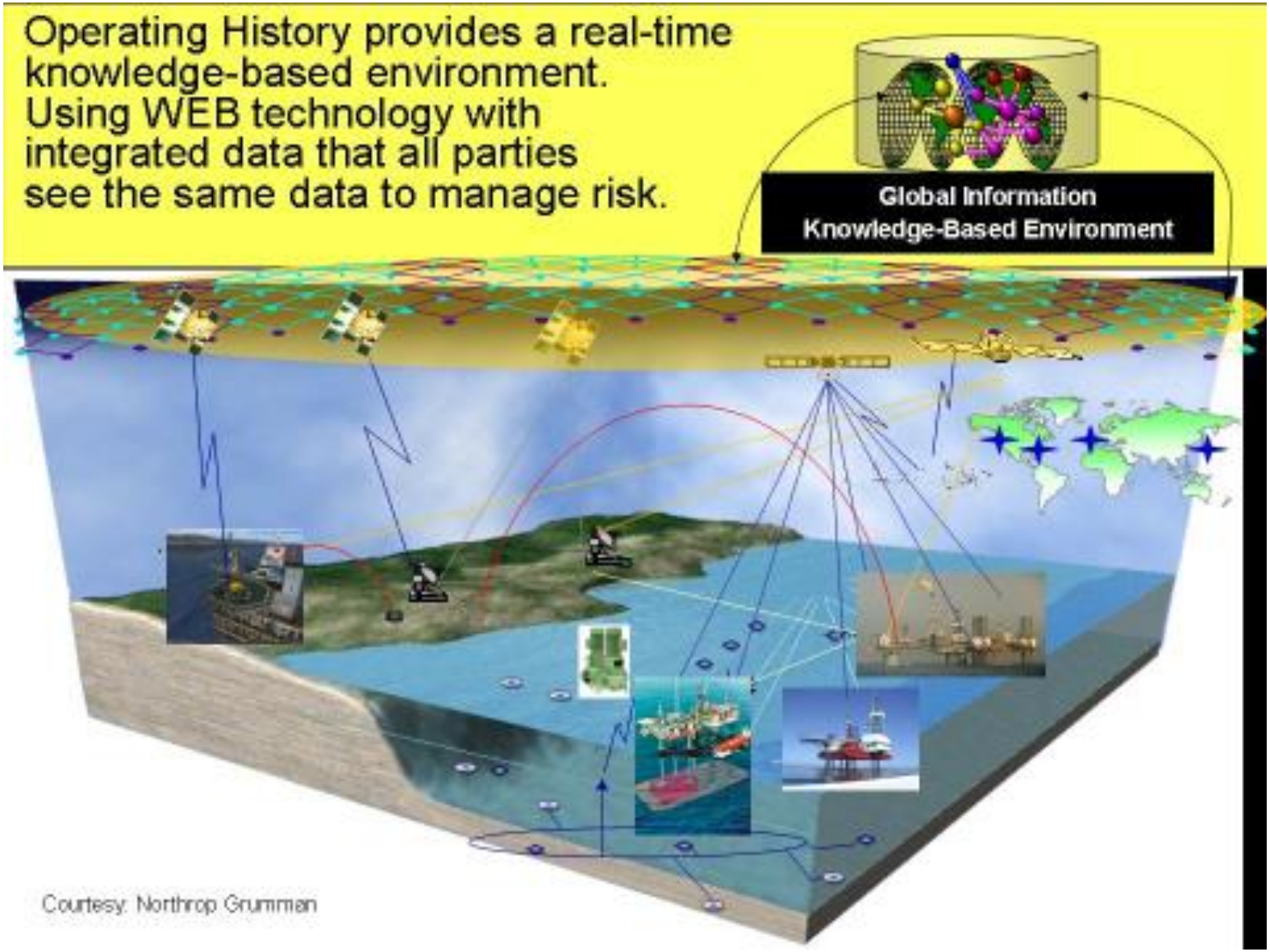
Source: Competing on Analytics, Davenport and Harris, 2007.

Analytics: At Rest vs. In Motion



Mapping to the HPC Cloud




Operating History provides a real-time knowledge-based environment. Using WEB technology with integrated data that all parties see the same data to manage risk.
Global Information Knowledge-Based Environment
Courtesy: Northrop Grumman

Drive ease-of-use and open access…
Not just secure access.