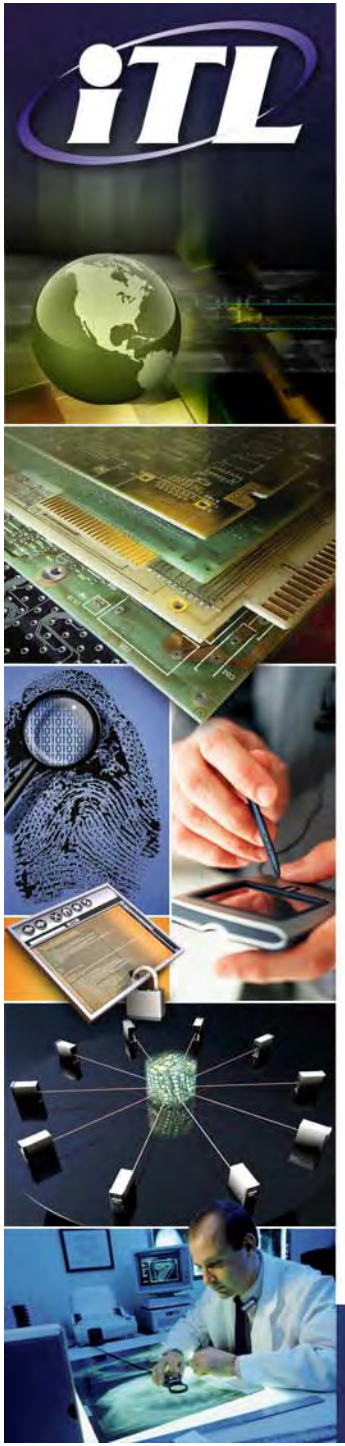

Standard Enterprise Big Data Ecosystem

Wo Chang
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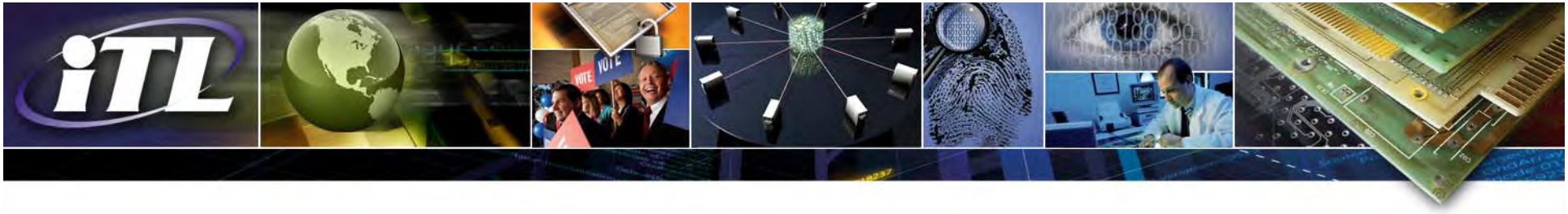
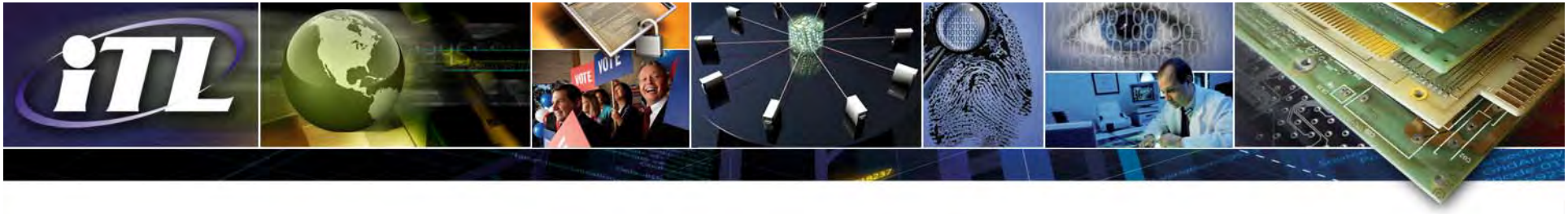
March 22, 2017



Agenda

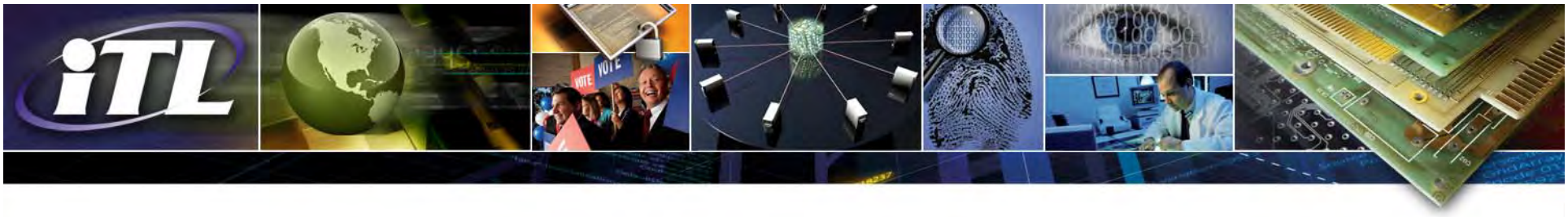
- Why Enterprise Computing is Important?
- What's the Computing Infrastructure Trend?
- What are the Challenges in Big Data Architecture and Infrastructure?
- What's the Standard Big Data Enterprise Ecosystem?
- NIST Big Data Public Working Group – Foundation Documents to JTC 1/WG 9
- ISO/IEC JTC 1 Study Group on Big Data Report (year 2014)
- ISO/IEC JTC 1/WG 9 Working Group on Big Data Activities (2015 – now)
- How Can You Help?



Why Enterprise Computing is Important?

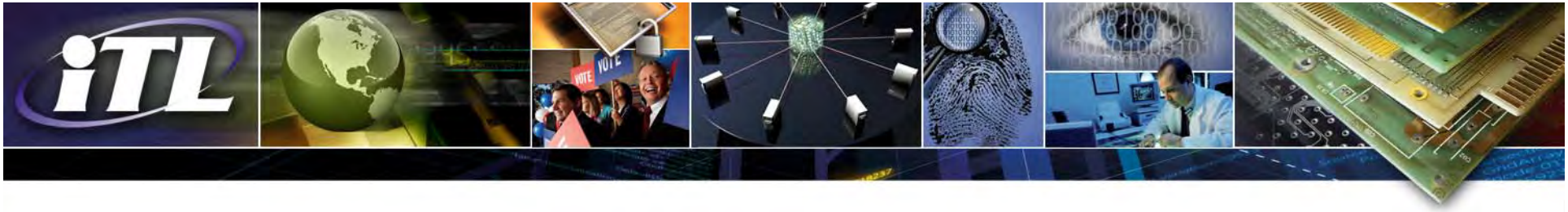
Enterprise computing is sometimes sold to business users as an entire platform that can be applied broadly across an organization and then further customized by users within each area. This means the *analytics, reporting, database management and other applications are standard across the system*, while the application packages being used and the data being accessed in each area will be different. In this sense, enterprise computing is a departure from finding single software solutions to specific business problems, such as inventory or accounting software. Instead, *enterprise computing is intended to offer integrated solutions to these problems*.

Source: https://www.techopedia.com/definition/27854/enterprise-computing

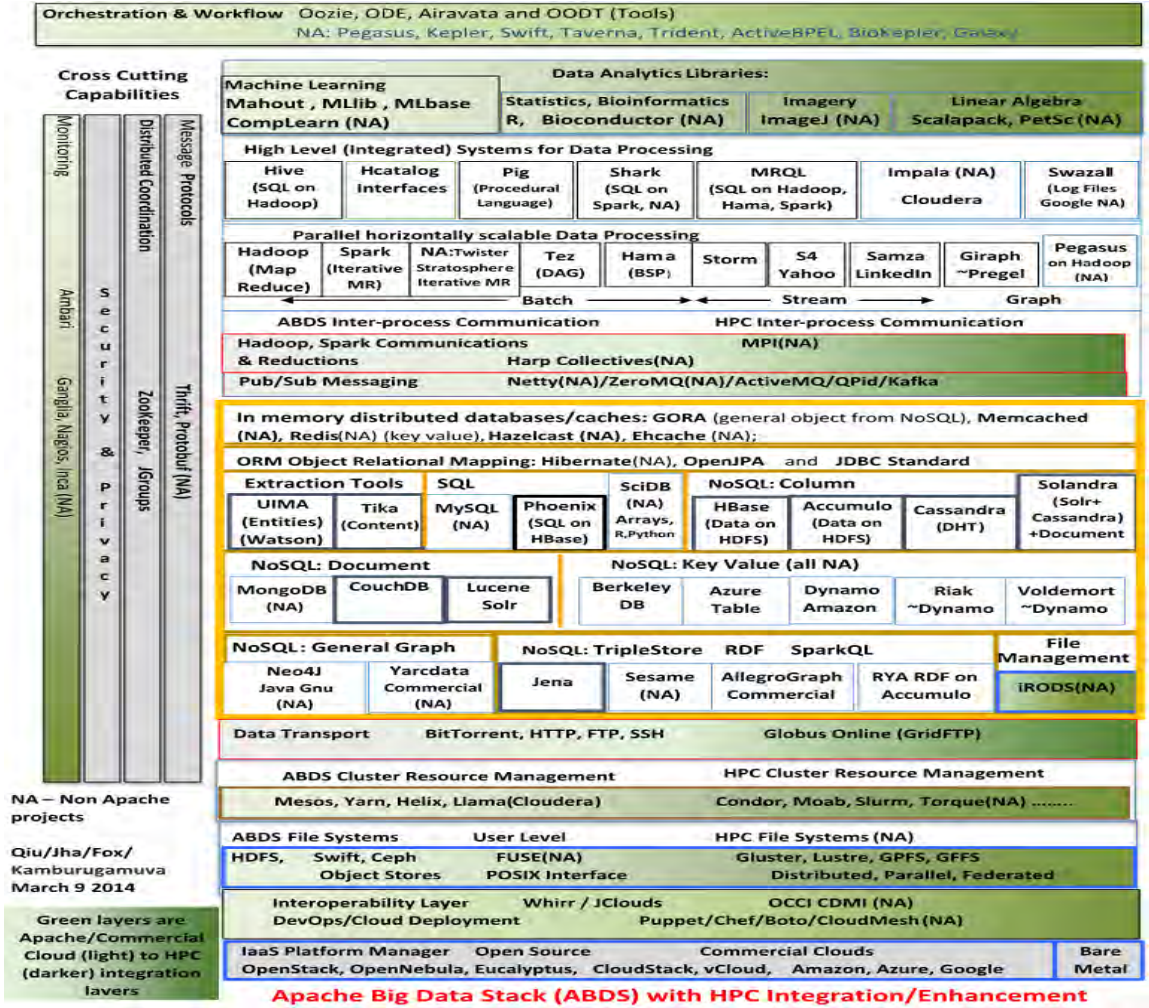


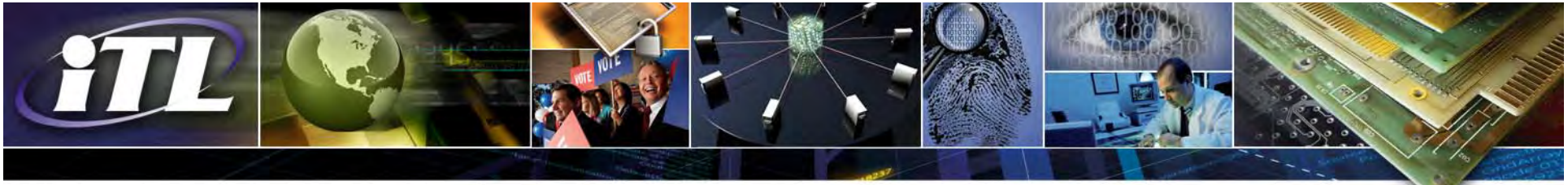
What's the Computing Infrastructure Trend?

Distributed Computing	Remote Procedure Calls (RPC)	Common Object Request Broker Architecture (CORBA)	Grid Computing	Others…
Virtualization (multicores/GPUs)	Partial Virtualization	Full Virtualization	Paravirtualization	Others…
Cloud Computing	Software as a Service	Platform as a Service	Infrastructure as a Service	Others…
Containerization	Microservices	Orchestrations	Others…	

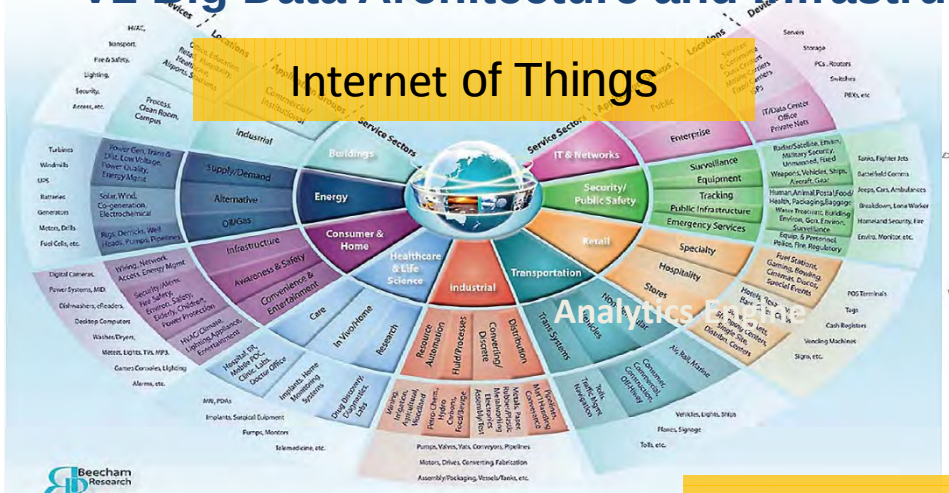


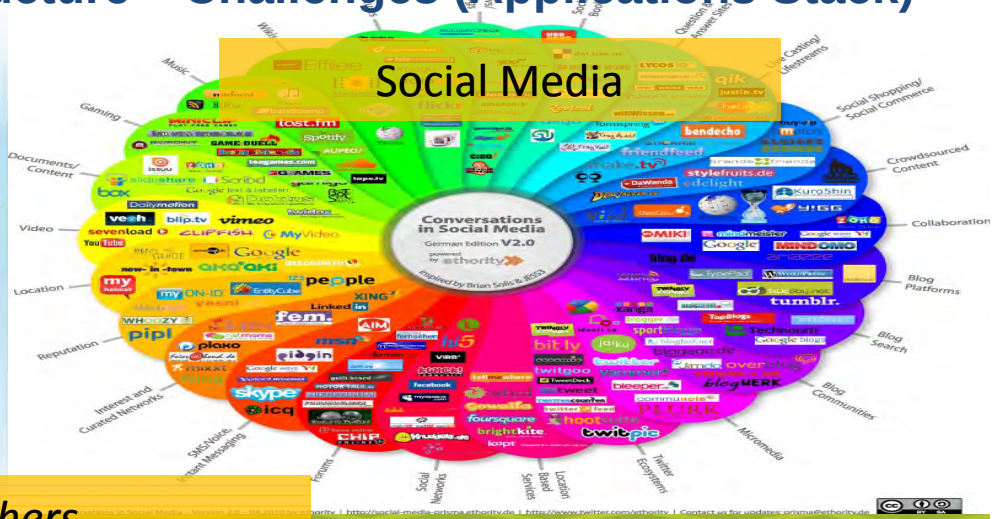
Big Data Architecture and Infrastructure – Challenges (Computing Stack)





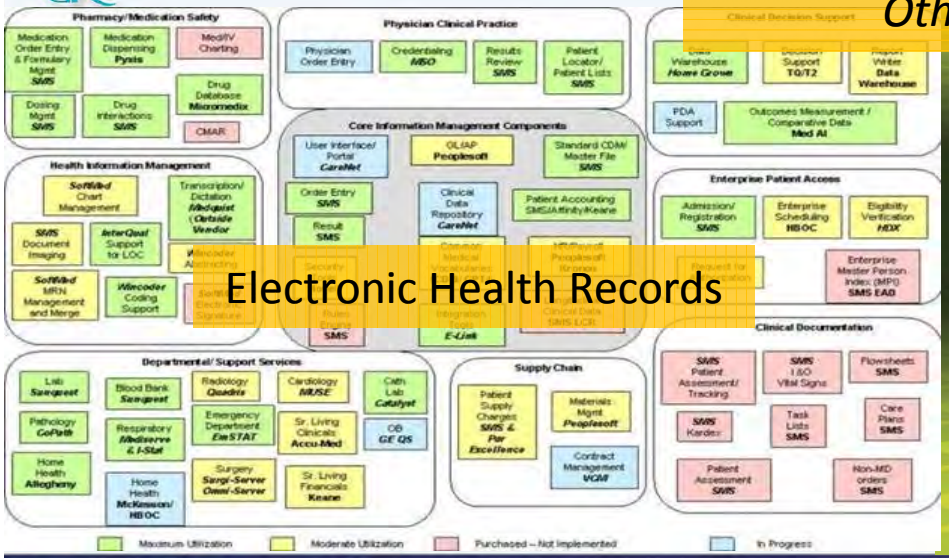
V2 Big Data Architecture and Infrastructure – Challenges (Applications Stack)

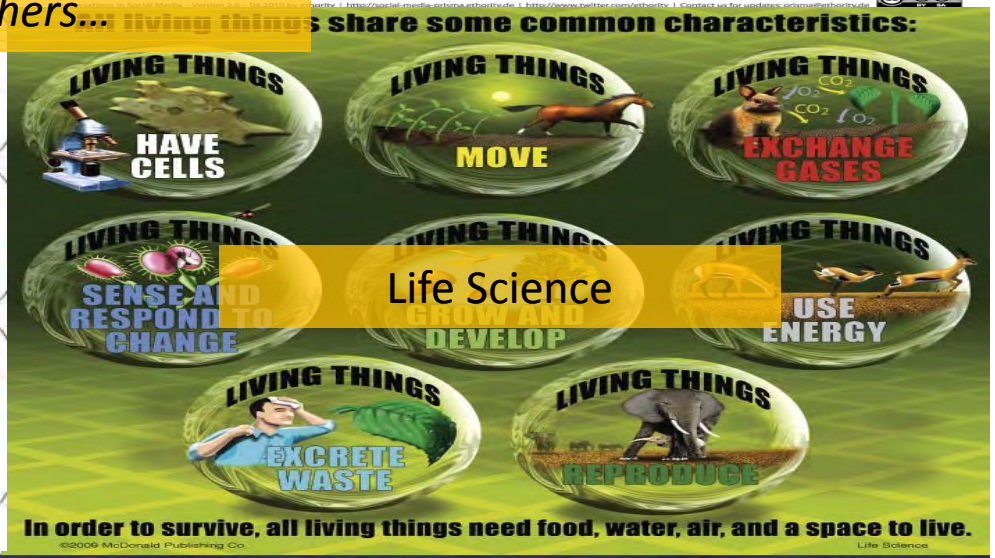


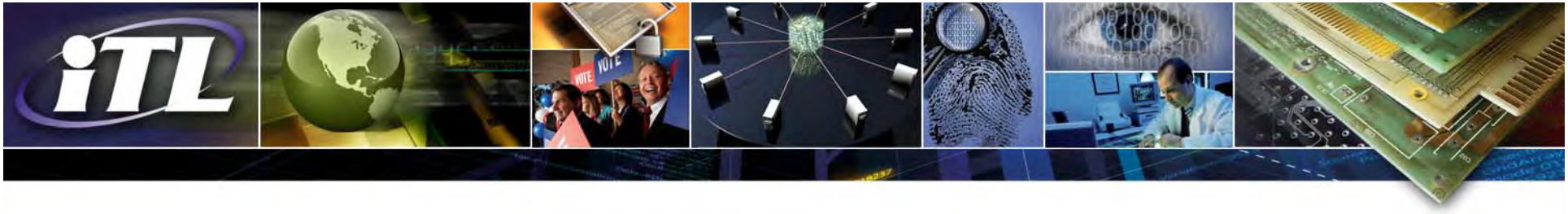


Analytics Reference

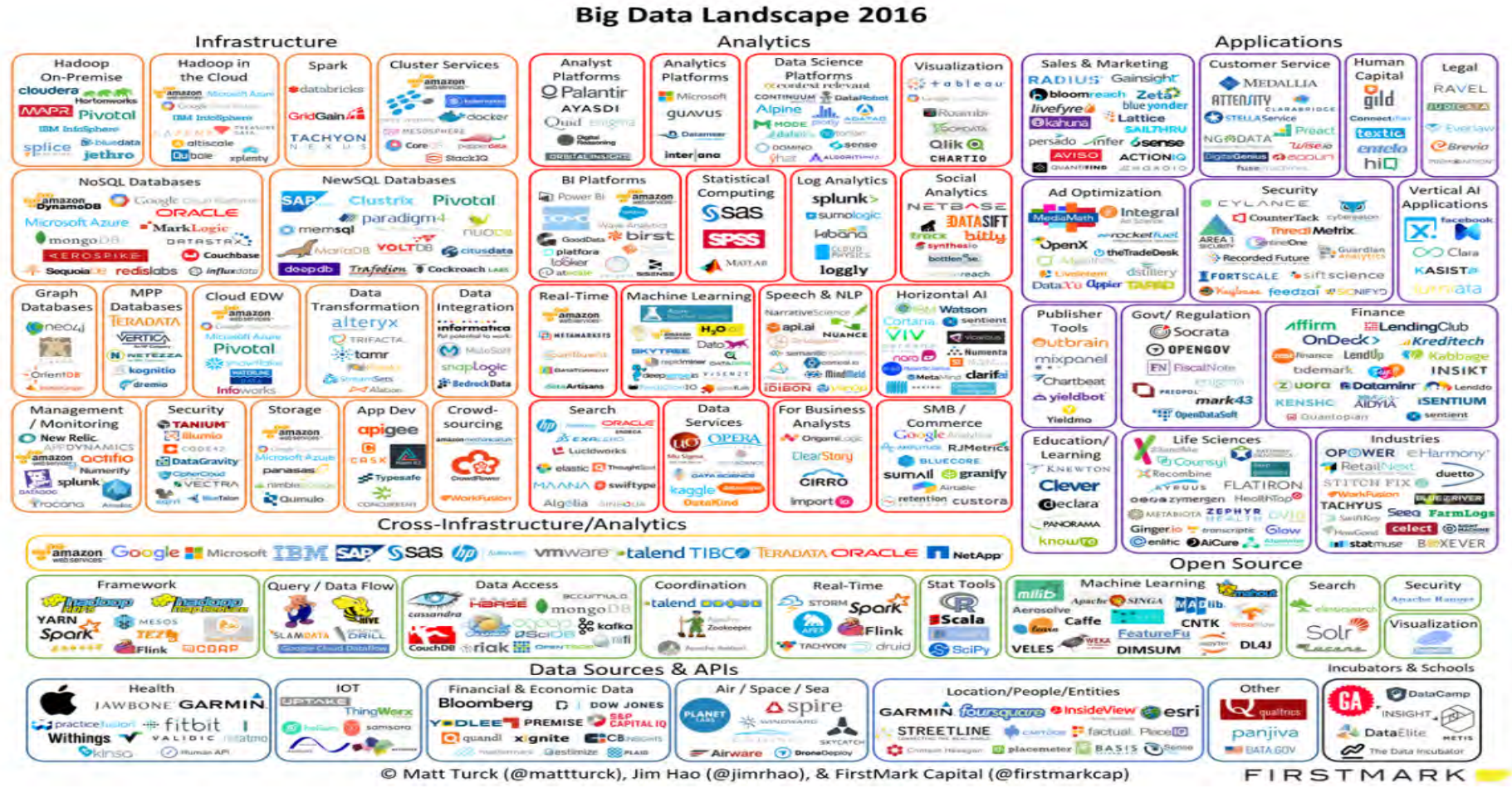
Others…



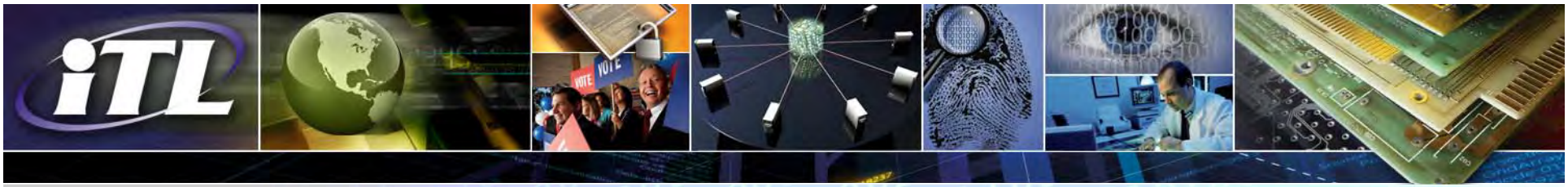




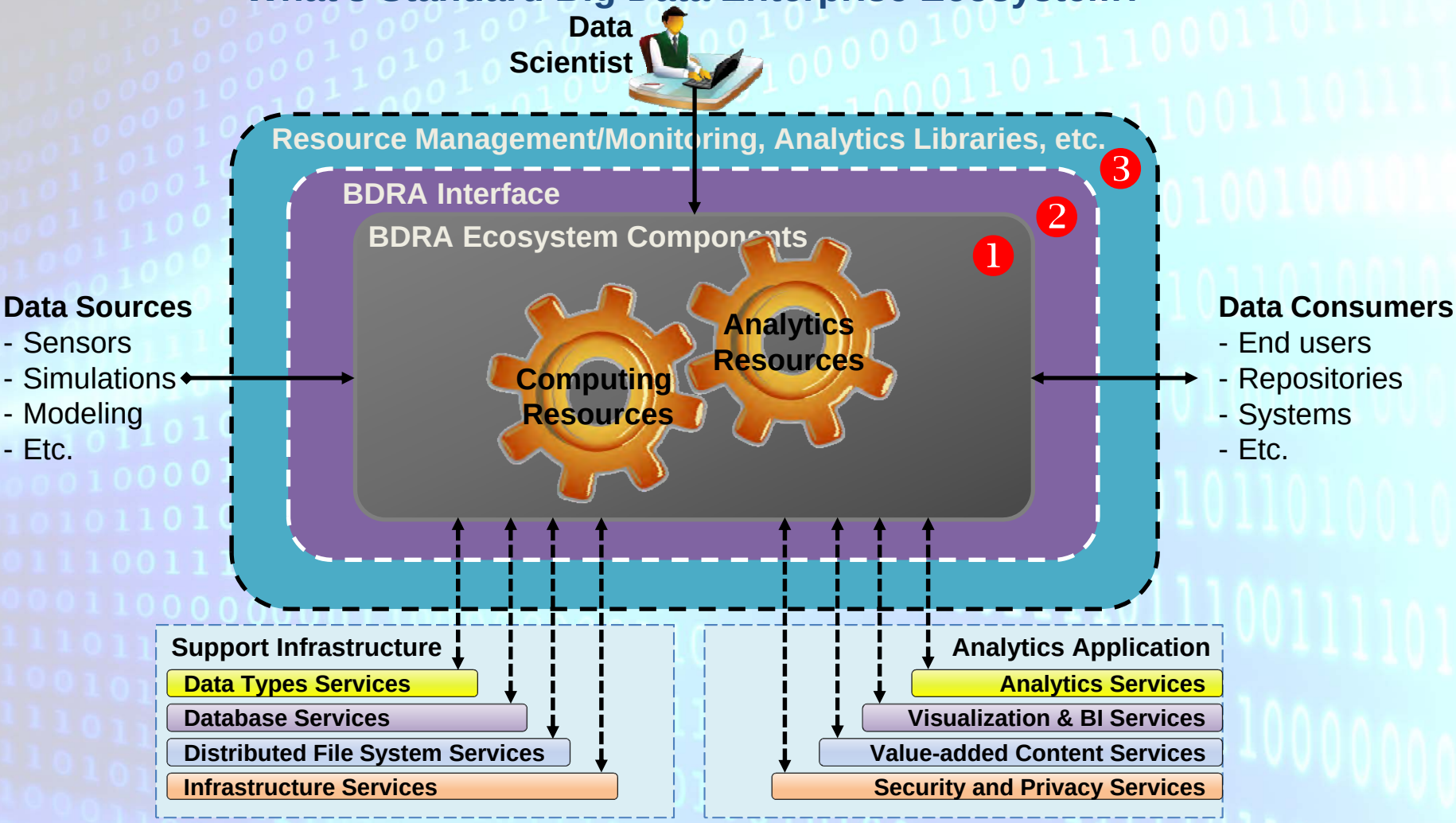
Big Data Architecture and Infrastructure – Challenges (Integration)

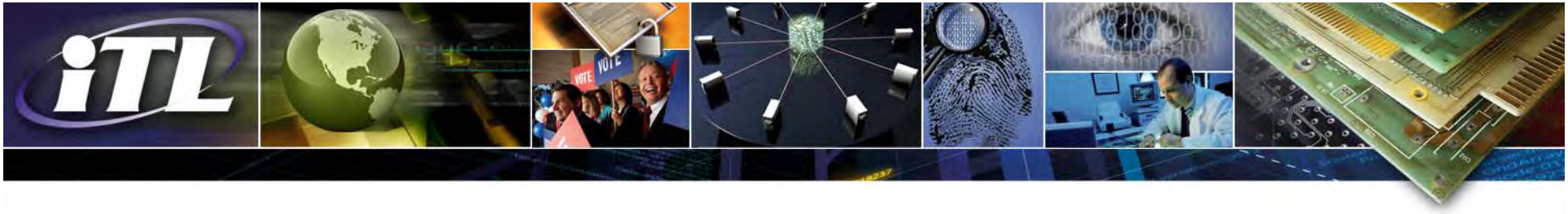


Source: http://www.199it.com/wp-content/uploads/2016/02/matt_turck_big_data_landscape_full.pngheading



What's Standard Big Data Enterprise Ecosystem?





NIST Big Data Public Working Group (NBD-PWG)

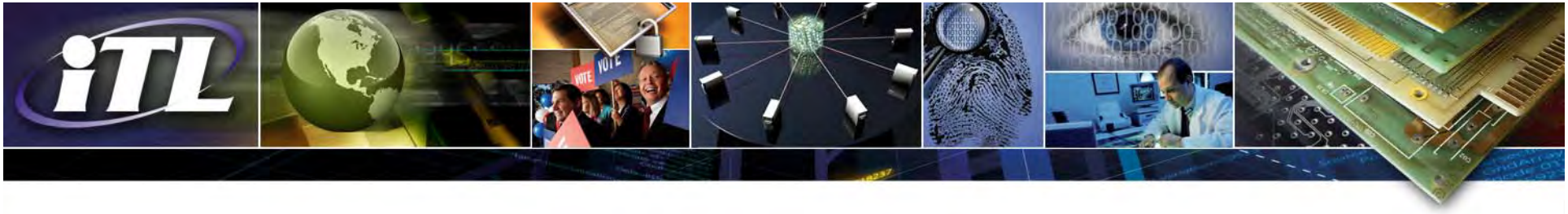
Focus: *Develop a consensus-based reference architecture that is vendor-neutral, technology and infrastructure agnostic to enable any stakeholders to perform analytics processing for their given data sources without worrying about the underlying computing environment.*

Activities with 5 Subgroups:

1. Definitions & Taxonomies
2. Use Cases & Requirements
3. Security & Privacy
4. Reference Architecture
5. Standards Roadmap

Development:

1. Identify the high-level NIST Big Data Reference Architecture (NBDRA) key components, which are technology, infrastructure, and vendor agnostic.
2. Define general interfaces between the NBDRA components.
3. Validate the NBDRA by building Big Data general applications through the general interfaces.



NIST Big Data Public Working Group (NBD-PWG)

Status: V1 (high-level NBD-RA components and descriptions) Big Data Interoperability Framework, Released September 16, 2015

http://bigdatawg.nist.gov

NIST SP1500-1: Definitions

NIST SP1500-2: Taxonomies

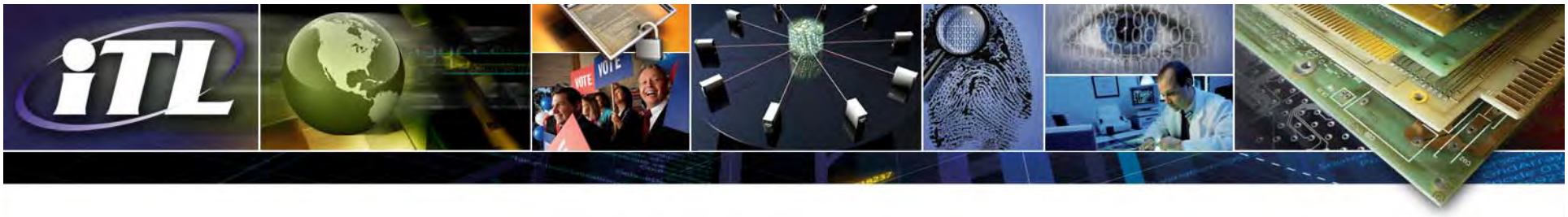
NIST SP1500-3: Use Cases & Requirements

NIST SP1500-4: Security & Privacy

NIST SP1500-5: Architecture Survey – White Paper

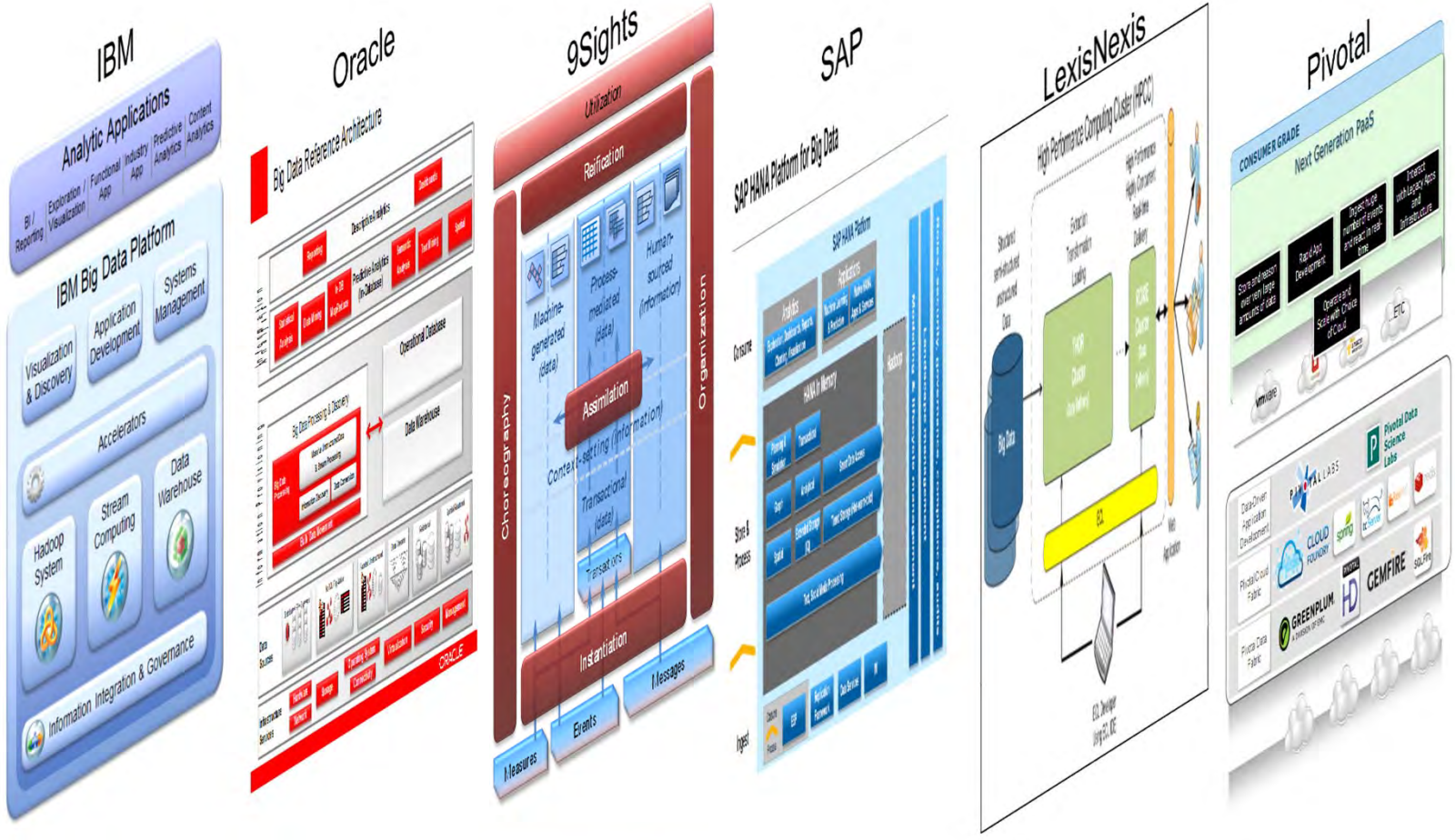
NIST SP1500-6: Reference Architecture

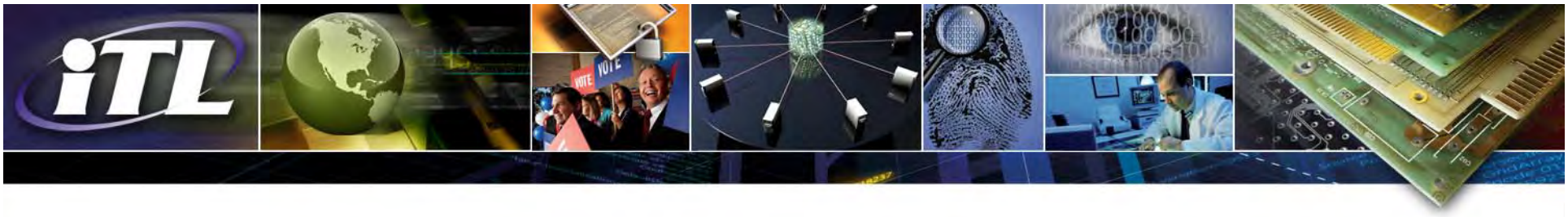
NIST SP1500-7: Standards Roadmap



NIST Big Data Public Working Group (NBD-PWG)

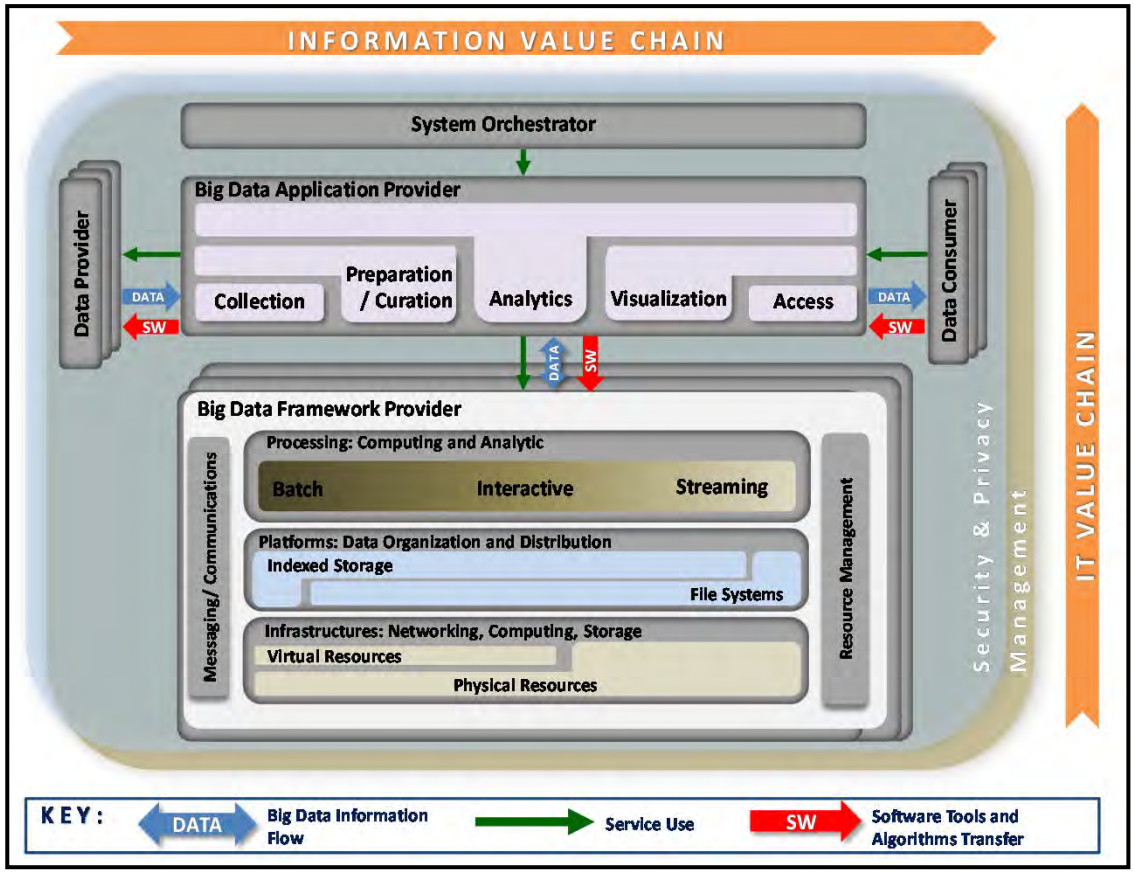
Vendors Big Data architectures





NIST Big Data Public Working Group (NBD-PWG)

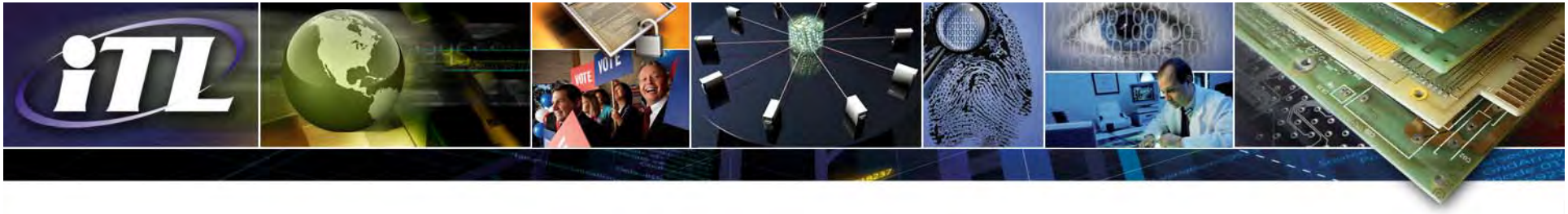
V2 focuses on interface between NBD-RA components through use cases by



- Analyze activities diagrams
- Analyze functional diagrams
- Apply DevOps/Containers on small scale implementations

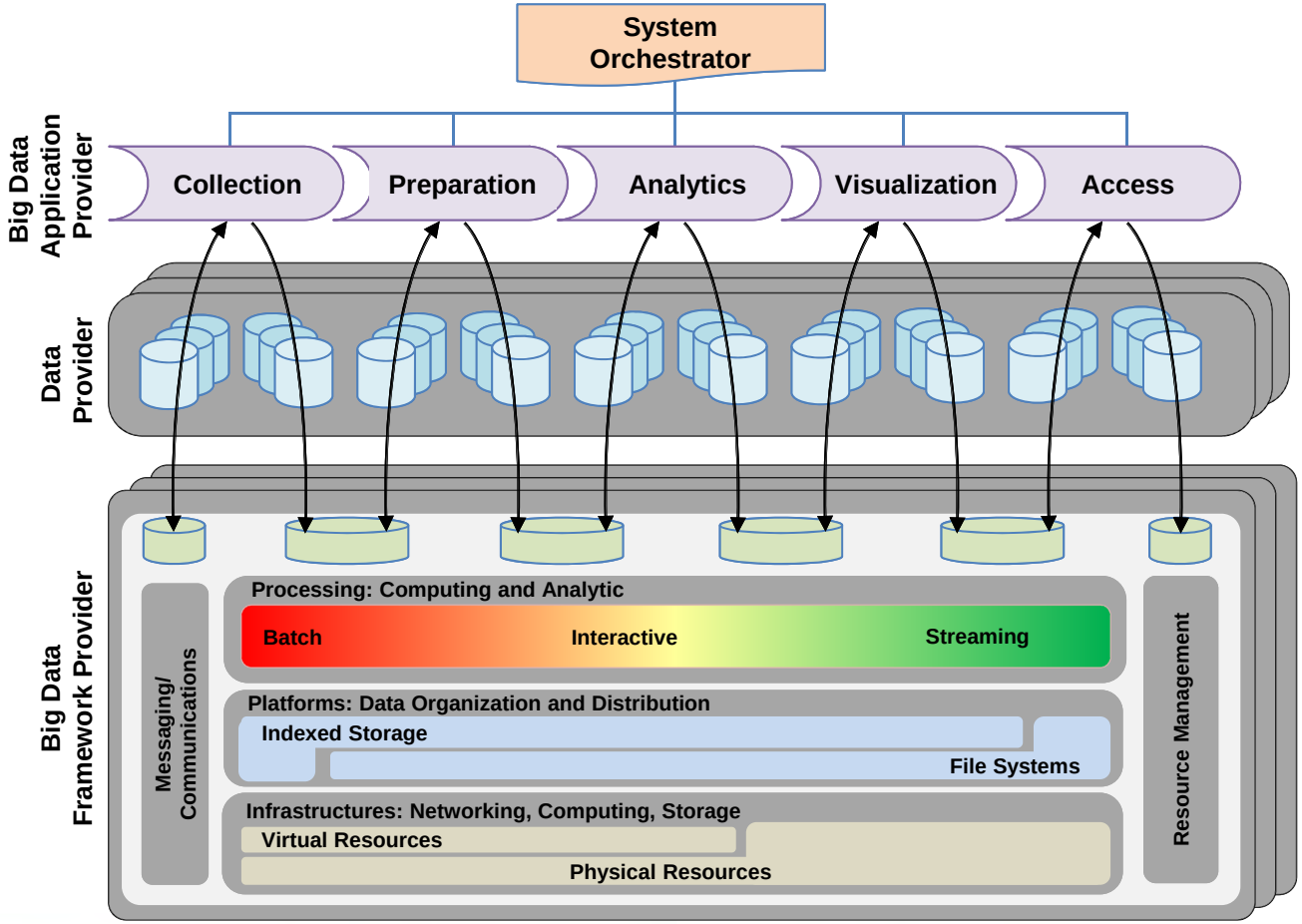
Goals:

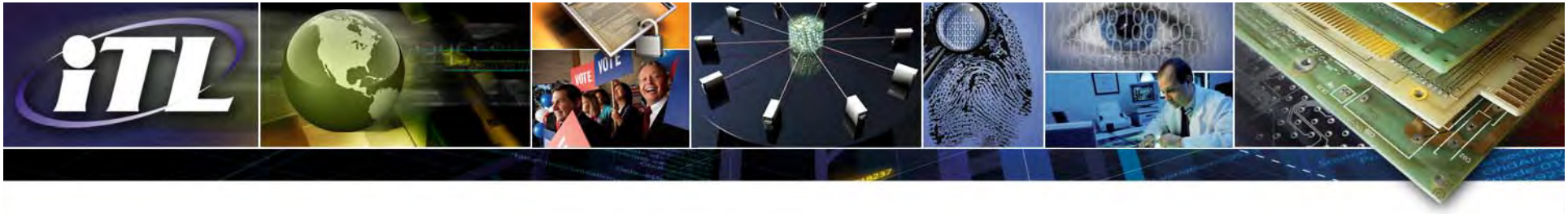
- Aggregate low-level interactions into high-level general interfaces
- Produce set of white papers to demo how NBD-RA can be used



NIST Big Data Public Working Group (NBD-PWG)

V2 NIST Big Data Reference Architecture Interface Interaction and workflow





NIST Big Data Public Working Group (NBD-PWG)

V2 NIST Big Data Reference Architecture Interface Goals – Portability and Scalability

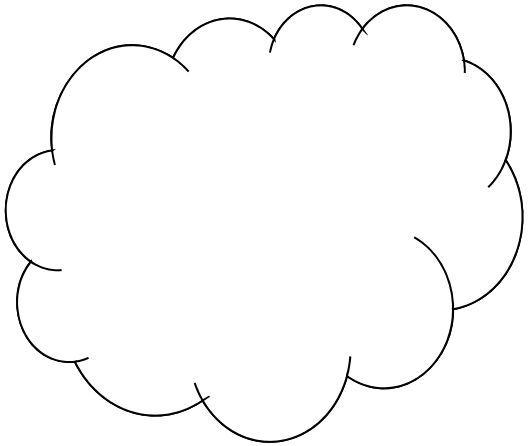
(With support of High Performance Computing + Big Data Stacks)

Laptop

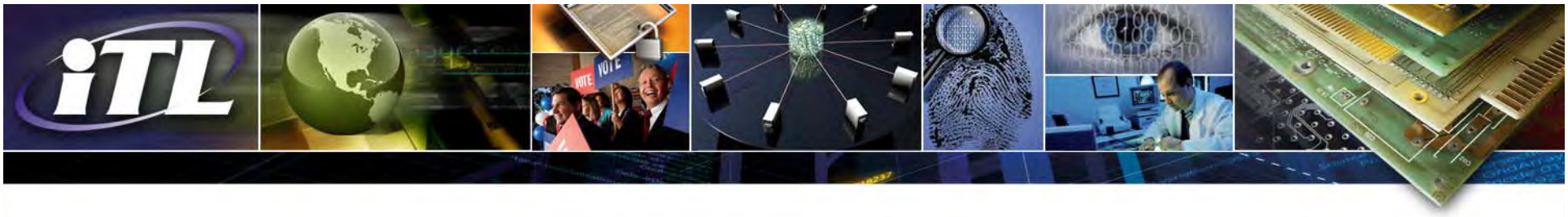
Desktop/Server

……

Data Center
Many CPUs/Cores/GPUs



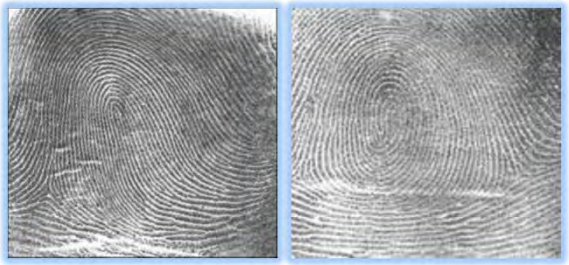
Cloud



NIST Big Data Public Working Group (NBD-PWG)

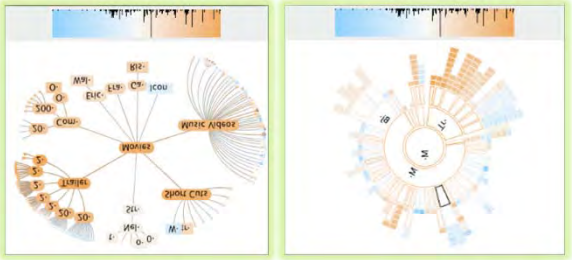
V2 NIST Big Data Development Strategies

Selection of use cases: (a) available of datasets and (b) available of analytics codes

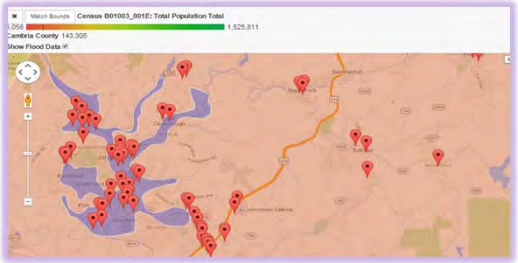


Fingerprints Matching

Human and Face Detection from Video



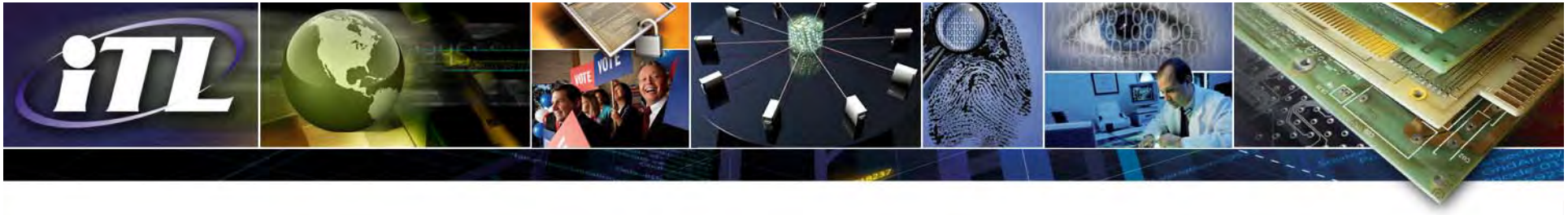
Twitter Feeds



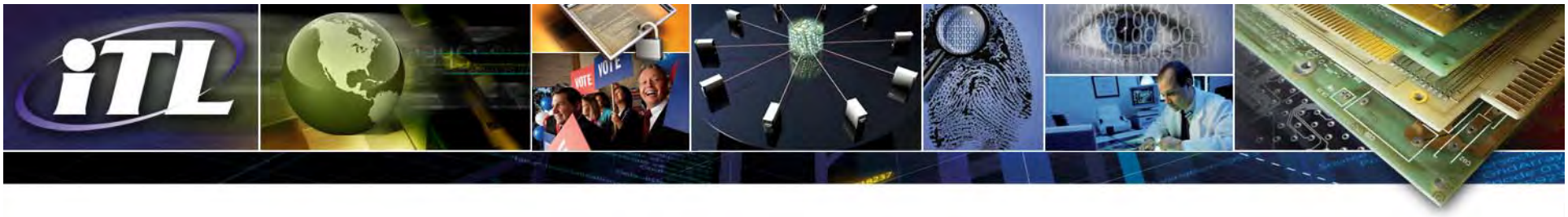
Spatial Big Data/GIS

Healthcare Payment Fraud

- Data warehousing
- Global Cities
- Earth Science
- Life Science
- IoT
- *Others…*



ISO/IEC Big Data Standardization



ISO/IEC JTC 1 Study Group on Big Data Report (Year 2014)

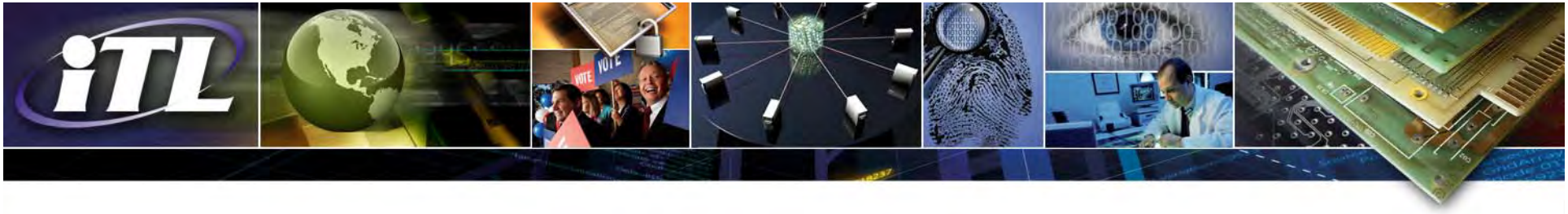
Summary Key Findings:

- Big Data systems are difficult to construct tools and applications that integrate data from multiple Big Data sources. The systems should be designed with security in mind from the ground up rather than have it emerge as an afterthought.
- Identified 16 potential standardization gaps to enable Big Data systems interoperability.

Organizational Drivers to Provide:

1. Insight: enable discovery of deeper, fresher insights from all enterprise data resources
2. Productivity: improve efficiency, effectiveness, and decision-making
3. Speed: facilitate more timely, agile response to business opportunities, threats, and challenges
4. Breadth: provide a single view of diverse data resources throughout the business chain
5. Control: support tighter security, protection, and governance of data throughout its lifecycle
6. Scalability: improve the scale, efficiency, performance, and cost-effectiveness of data/analytics platforms

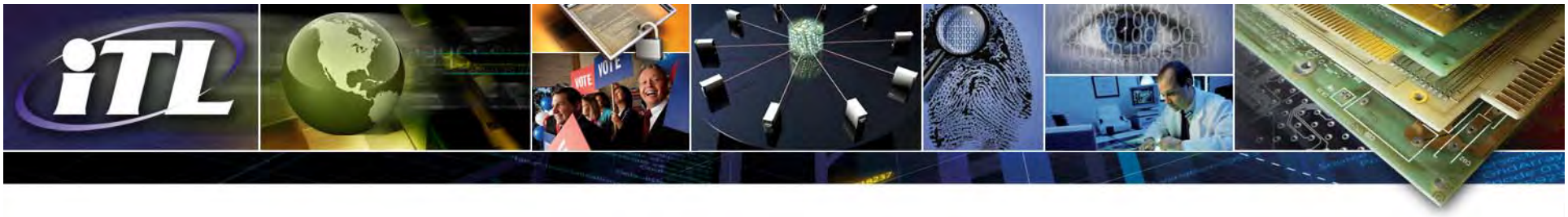
* JTC 1 Big Data Report: http://www.iso.org/iso/big_data_report-jtc1.pdf



ISO/IEC JTC 1/WG 9 Working Group on Big Data (2015 – now)

ISO/IEC JTC 1/WG 9 Working Group on Big Data (Jan. 2015 – now)

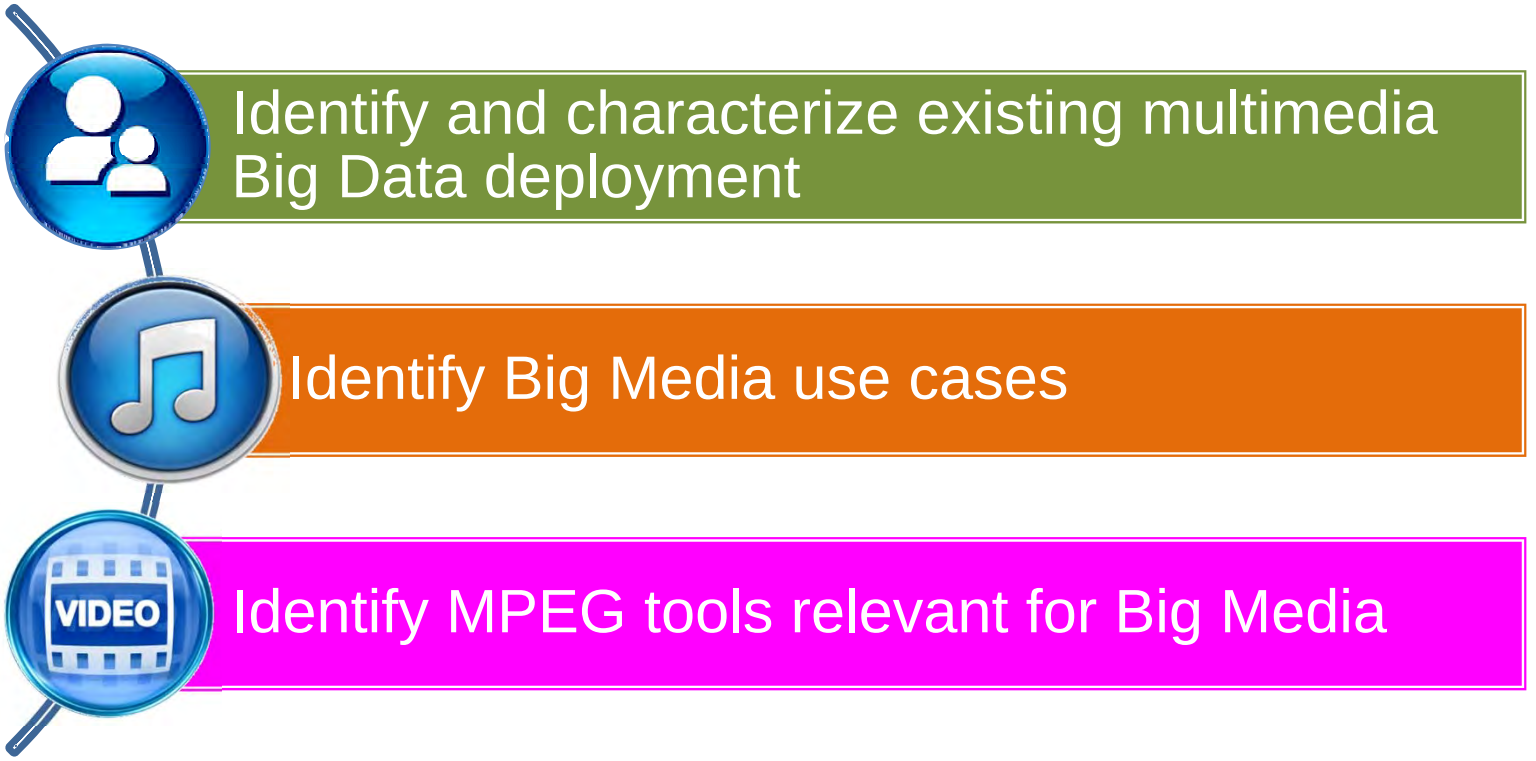
- 180+ from 26 NBs: Australia, Austria, Brazil, Canada, China, Finland, France, Germany, India, Ireland, Israel, Japan, Korea, Luxembourg, Mexico, Netherlands, Norway, Russian Federation, Saudi Arabia, Singapore, Slovenia, South Africa, Spain, Sweden, UK, US
- Current Projects
  - **ISO/IEC 20546 Information technology – Big data – Overview and vocabulary** (Committee Draft #2 as Dec. 2016)
  - **ISO/IEC 20547 Information Technology – Big data Reference architecture (5 Parts)**
    - Part 1: (TR) Framework and Application Process (2nd WD)
    - Part 2: (TR) Use Cases and Derived Requirements (PDTR-2)
    - Part 3: (IS) Reference Architecture (4th WD)
    - Part 4: (IS) Security and Privacy Fabric (2nd ED, under SC 27/WG 4)
    - Part 5: (TR) Standards Roadmap (PDTR)
- ISO/IEC Liaisons: SC 6/WG 7, SC 27, SC 29, SC 32, SC 36, SC 38, SC 39, ISO/TC 69, ISO/TC 204, ITU-T SG13, IIC

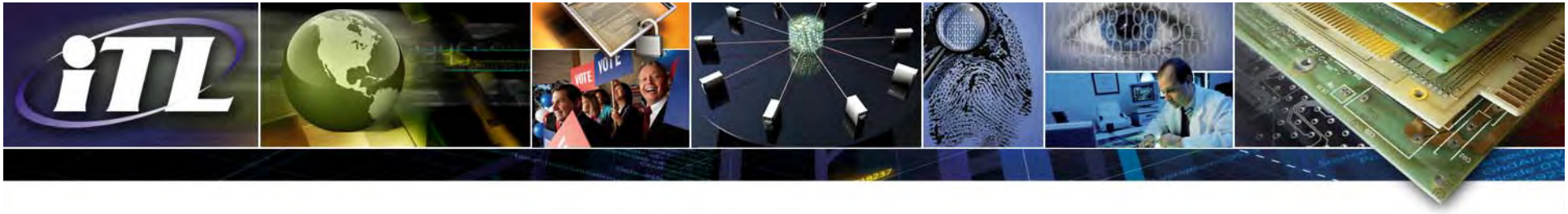


ISO/IEC JTC 1/WG 9 Big Data Standards Activities

ISO/IEC JTC 1/SC 29/WG 11 (MPEG) on Big Media

- Create AHG between SC 29/WG11 and WG9 to

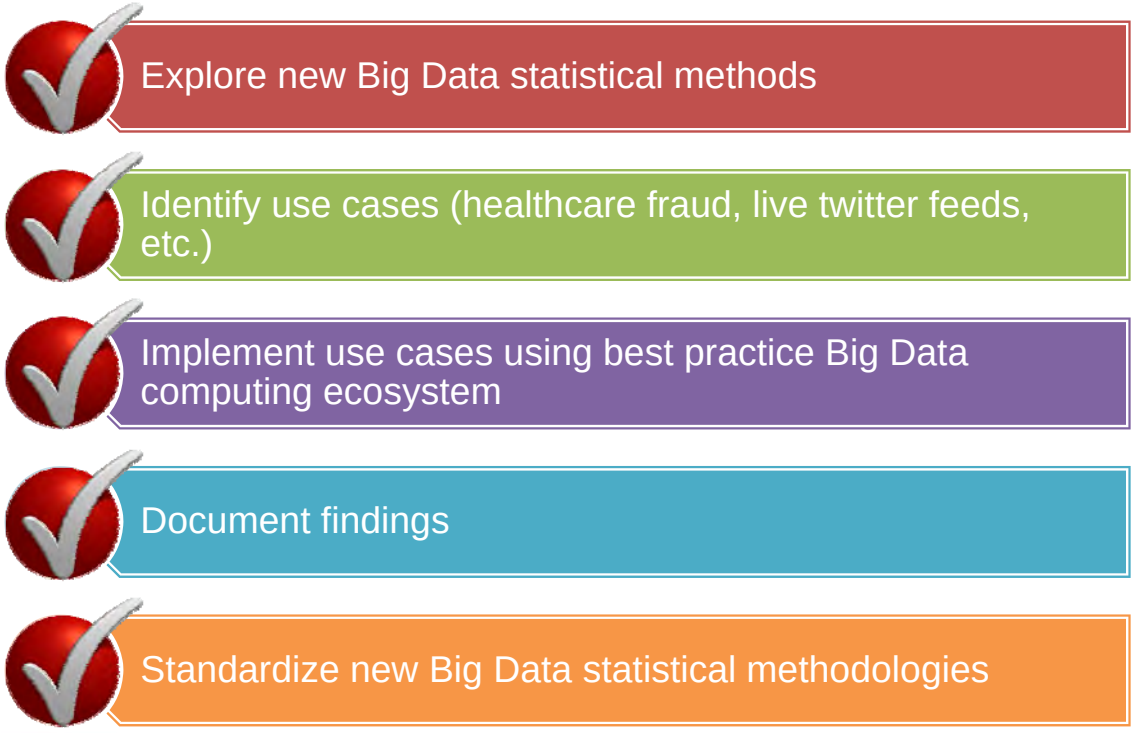


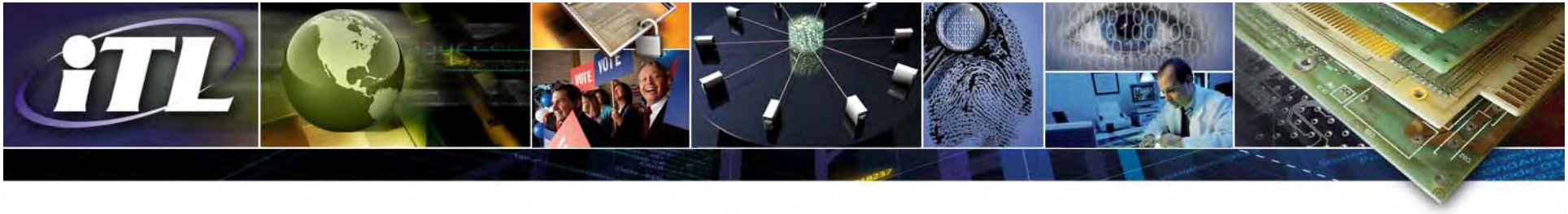


ISO/IEC JTC 1/WG 9 Big Data Standards Activities

ISO/TC69 – Applications of Statistical Methods

- Apply standard statistical methodologies (CRISP, SEMMA, etc.)
- Create AHG between TC69, WG9, and NIST Big Data PWG to:





ISO/IEC JTC 1/WG 9 Big Data Standards Activities

ISO/TC204 – Intelligent Transportation

- Apply standard statistical methodologies (CRISP, SEMMA, etc.)
- Create AHG between TC204 and WG9 to

Review SDOs in the Big Data area particularly architecture models, semantic definitions, metadata issues and APIs

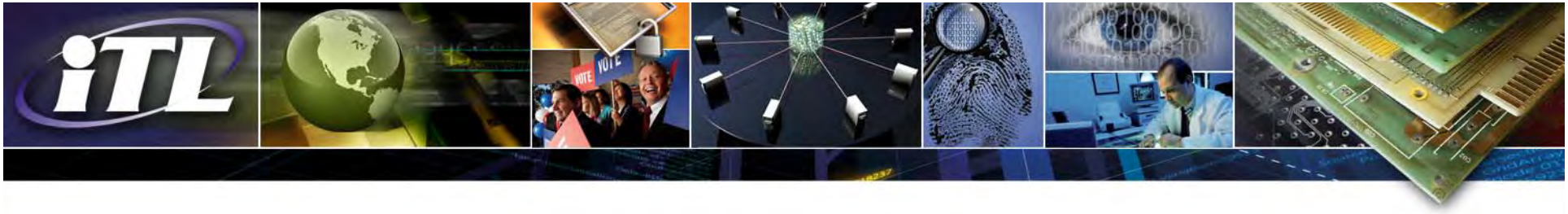
Identify “Big Data topics” needed for transport data exchange and external data sources; gather and / or generate use cases related to big data topics for ITS

Examine TC204 work that support the Big Data areas and identify the gaps to fit into the foundation / architecture currently under development by SDOs (e.g., ISO/IEC, IEEE, SAE)

Examine security, privacy, ownership, and usage issues related to Big Data ITS applications

Recommend future work items (if any) to be developed by TC204

Recommend liaisons with SDOs for which collaboration is needed



How Can You Help?

- Join and contribute to NIST and/or ISO/IEC JTC 1/WG 9.
- Review and comment NIST and/or ISO/IEC JTC 1/WG 9 documents
- Provide Big Data use cases and requirements
- Make available datasets and analytic tools to public so NIST and WG 9 can use
- Others…