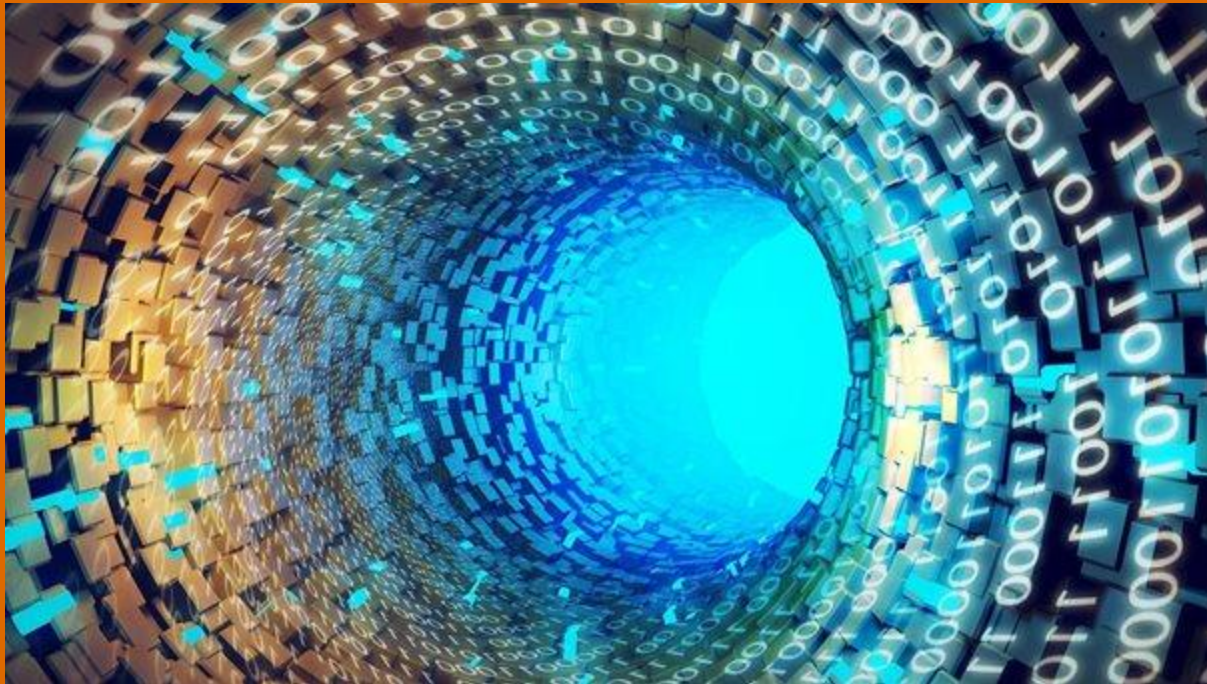


# *Big Data Analytics in Defense Sector*



**Faisal Karim Bhutta,  
Pakistan**

---

## *About Myself*

1. Deputy Project Director, Govt Organization (Pakistan)
2. MS in Information Security, NUST
3. 10+ years experience of managing Data Center, enterprise content management & collaboration suite development & deployment, information security risk management and SEIMs implementation
4. ISO 27001 Lead Implementer & MCITP certified



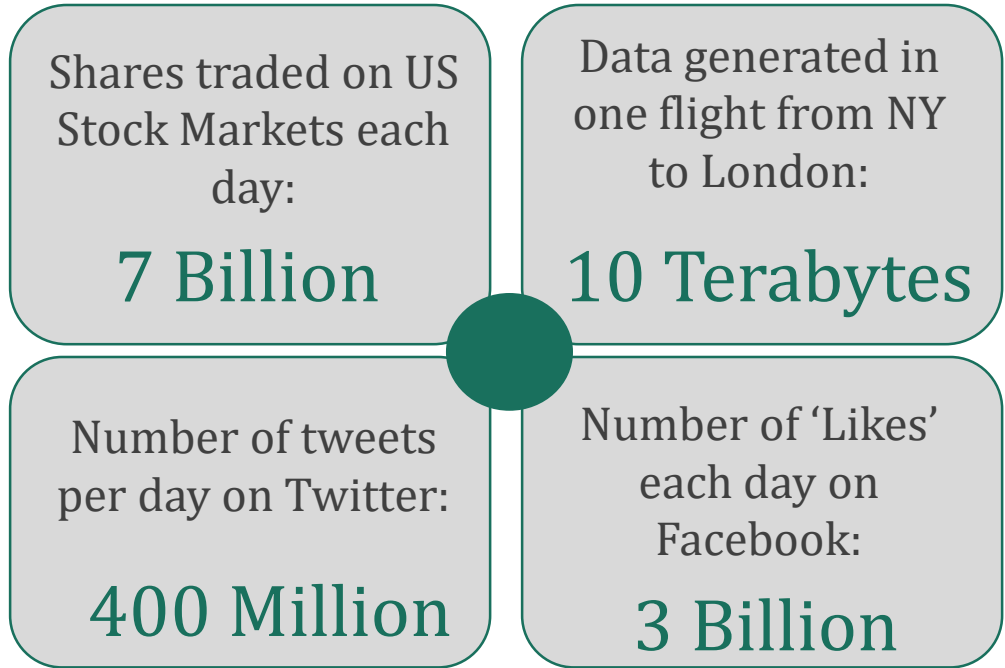
---

# *Agenda*

1. Introduction to Big Data
2. Big Data Analytics
3. Challenges for Big Data Analytics
4. Big Data Analytics for Modern Warfare & combat operation

# ***BIG DATA***

Data that is **TOO LARGE & TOO COMPLEX** for conventional data tools to capture, store and analyze.



**90** %

OF THE WORLD'S DATA WAS GENERATED IN THE **LAST TWO YEARS** [1]

Roughly 2.5 quintillion bytes of data generated every day

According to Gartner, 6 billion IoT devices in use today & expected to grow to 20 billion by 2020

# It's a Big Data World

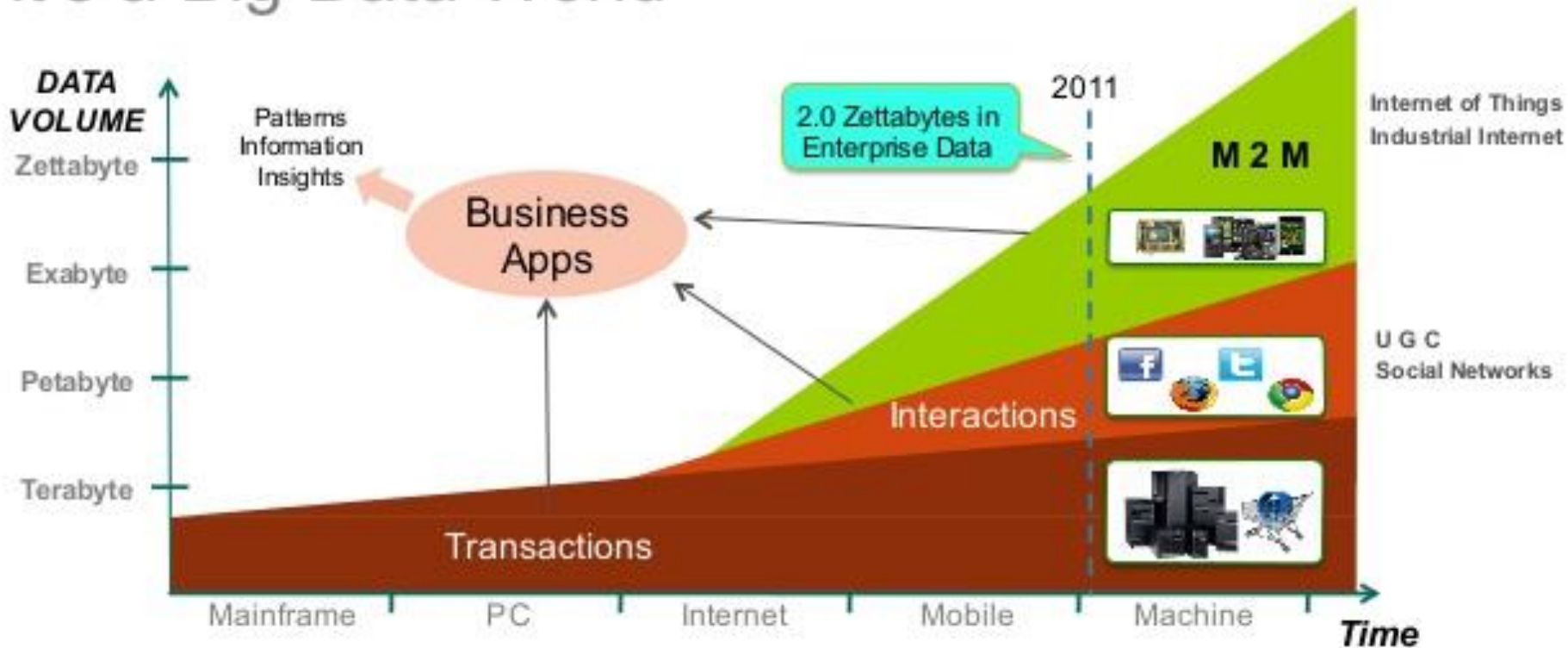


Chart based on IDC and UC Berkeley Data Growth Estimates, Source: IDC & CosmoBC.com:  
<http://techblog.cosmobc.com/2011/08/26/data-storage-infographic/>

World's data volume will grow by 40% per year and 50 times by 2020 (data coming from human and machine activities) [2]





The Economist, Feb 25, 2010

IN 2010 THE DIGITAL UNIVERSE WAS  
**1.2 ZETTABYTES**

IN A DECADE THE DIGITAL UNIVERSE WILL BE  
**35 ZETTABYTES**

**90%** OF THE DIGITAL UNIVERSE IS  
**UNSTRUCTURED**

IN 2011 THE DIGITAL UNIVERSE IS  
**300 QUADRILLION** FILES

# Big Data Characteristics

Big Data is just data with:

## Volume

*Data at Rest*

Reflects the size of a data set.

Terabytes  
Files  
Records  
Transactions  
Tables

## Velocity

*Data in Motion*

The speed at which data is generated and used. It may need to be analyzed just as quickly

Batch  
Near Time  
Real Time  
Streams

## Variety

*Data in Many forms*

Represents the diversity of the data.

Structured  
Unstructured  
Semi structure

BIG DATA=  
Structured+  
Unstructured

## Veracity

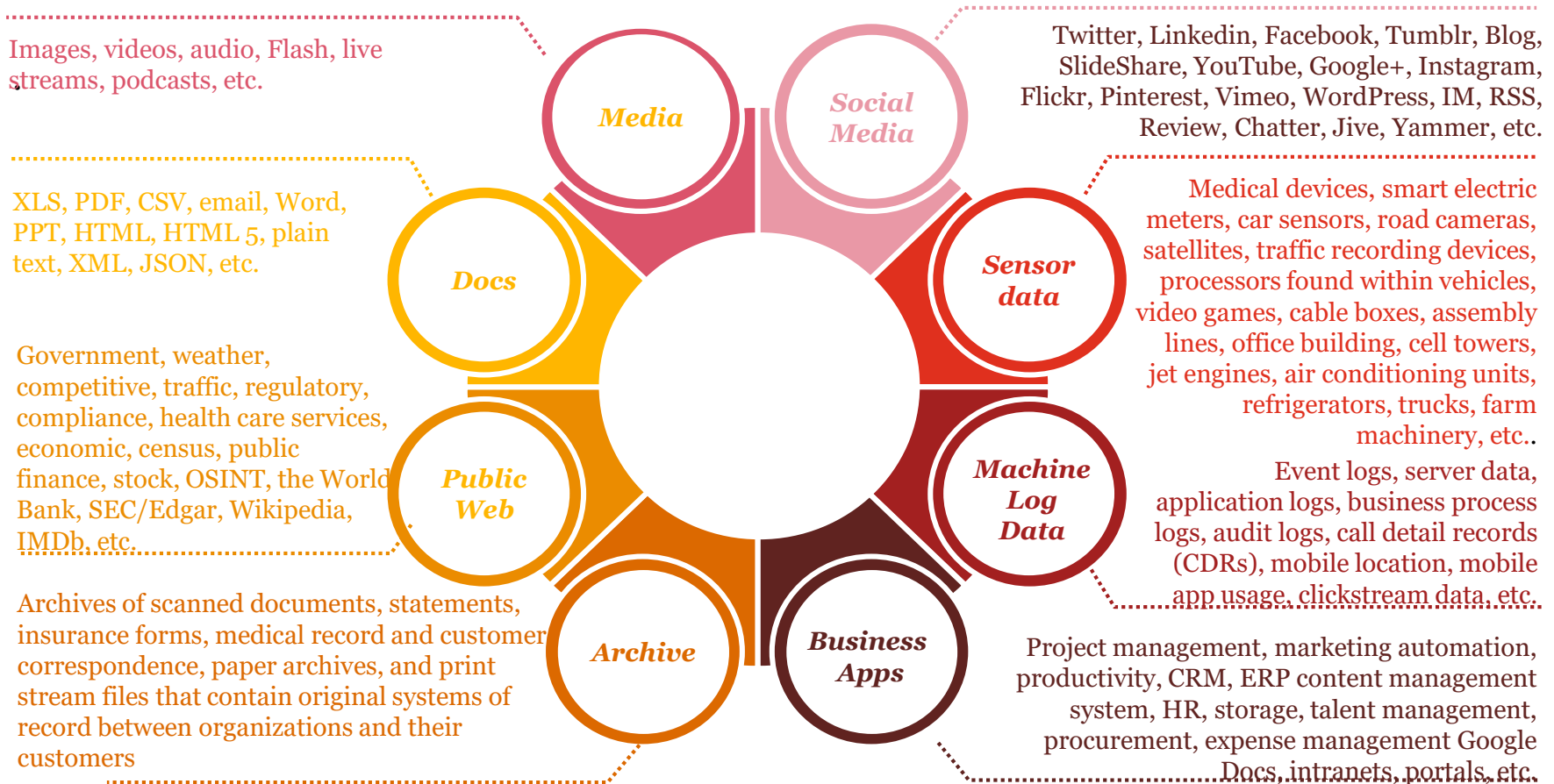
*Data in Doubt*

Accuracy  
trustworthiness and  
consistency of data

# Types of Big Data

Variety is the most unique aspect of Big Data. Data can be of any form:

- Structured Data (Relational databases, formatted messages etc)
- Unstructured data (Files, multimedia, social network, tweets etc)
- Semi structured (Documents XML, Tagged text/ media etc)





# *Big Data Technologies*

---

## ➤ NoSQL

- MangoDB, Hbase, Cassandra, Couch DB

## ➤ The Hadoop Ecosystem

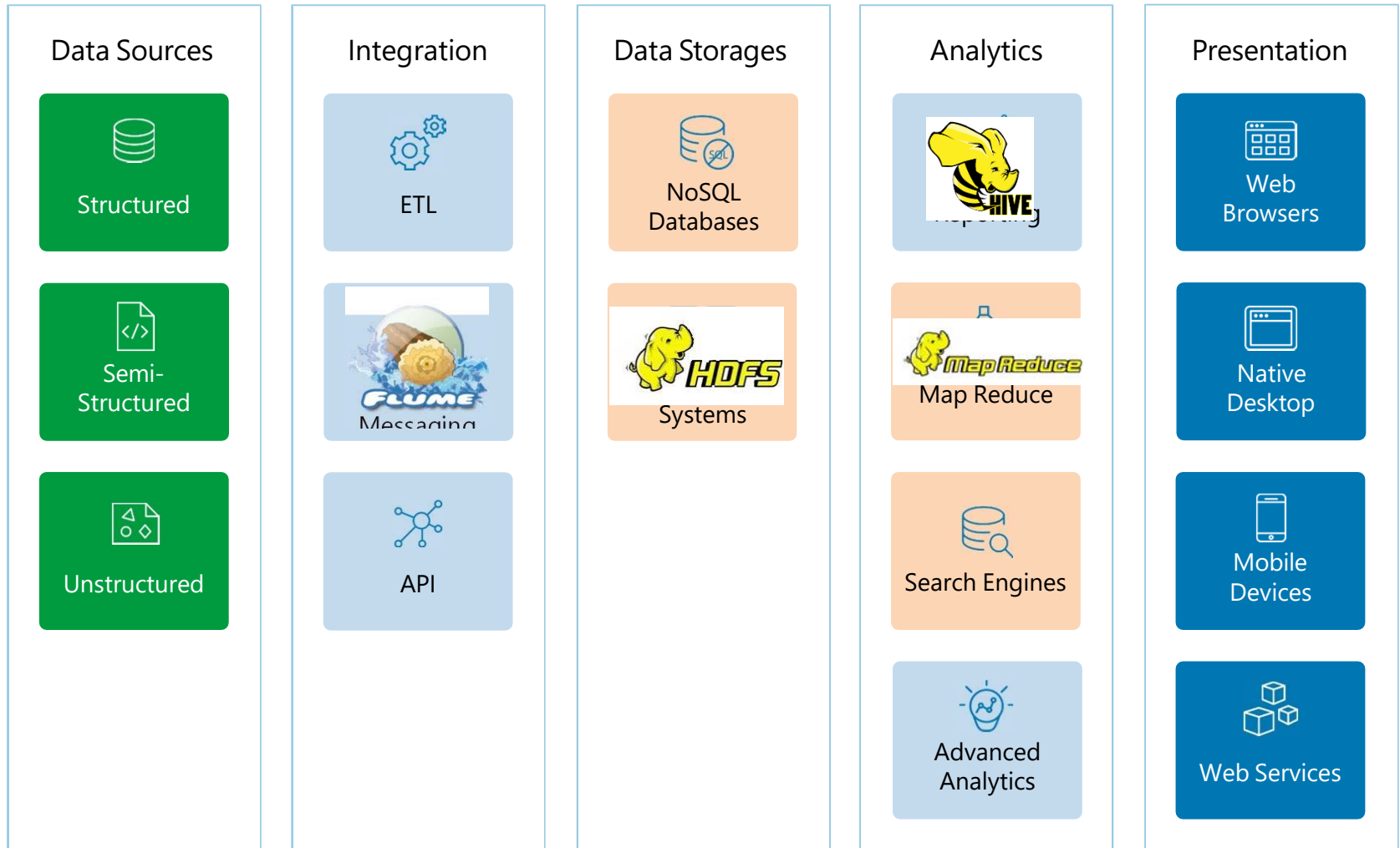
## ➤ Apache Spark

## ➤ Data Lakes

## ➤ Big Data security Solution

- Apache Ranger

# Reference Architecture for BIG DATA Implementation



# *Difference between Traditional Data Processing & Big Data*

<i>Traditional Techniques</i>	<i>Big Data</i>
<ul style="list-style-type: none"><li>• <b>No consideration for biasness, abnormality or noise in data</b></li></ul>	<ul style="list-style-type: none"><li>• <b>Data is kept clean and processes prevent 'dirty data' from accumulating</b></li></ul>
<ul style="list-style-type: none"><li>• <b>No real time analysis</b></li></ul>	<ul style="list-style-type: none"><li>• <b>Analyze data in real time</b></li><li>• <b>Auto deletion for unwanted data to ensure optimal storage use</b></li></ul>
<ul style="list-style-type: none"><li>• <b>Advanced analytics struggle with non-numerical data</b></li></ul>	<ul style="list-style-type: none"><li>• <b>Accommodate varying data types and data models</b></li></ul>
<ul style="list-style-type: none"><li>• <b>Analysis is limited to small data sets</b></li><li>• <b>High Costs &amp; High Memory</b> for analyzing large data sets</li></ul>	<ul style="list-style-type: none"><li>• <b>Scalable for huge amounts of multi-sourced data</b></li><li>• <b>Massive parallel processing capability</b></li><li>• <b>Low-cost data storage</b></li></ul>

## *Potential of Big Data*

---

According to International Data Corporation (IDC), "Worldwide revenues for big data and business analytics (BDA) will reach \$150.8 billion in 2017, an increase of 12.4 percent over 2016"

---

*It's not just about the data...*

# *Big Data Analytics*

Methods of using Big Data to generate insight & explore hidden trends

**1** Machine Learning/Deep Learning

**2** IoT (Internet of Things) & Sensor Analytics

**3** Natural Language Processing

**4** Streaming Consumer Behavior

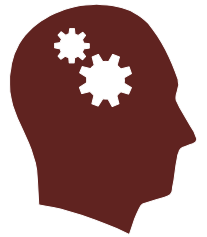
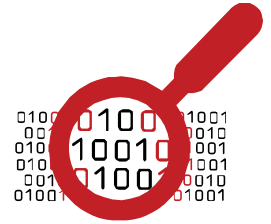
**5** Analyzing Data at large Scale

# Big Data Analytics

– the process of harnessing Big Data to yield valuable insights & hidden trends

Five important key aspects for analytics:

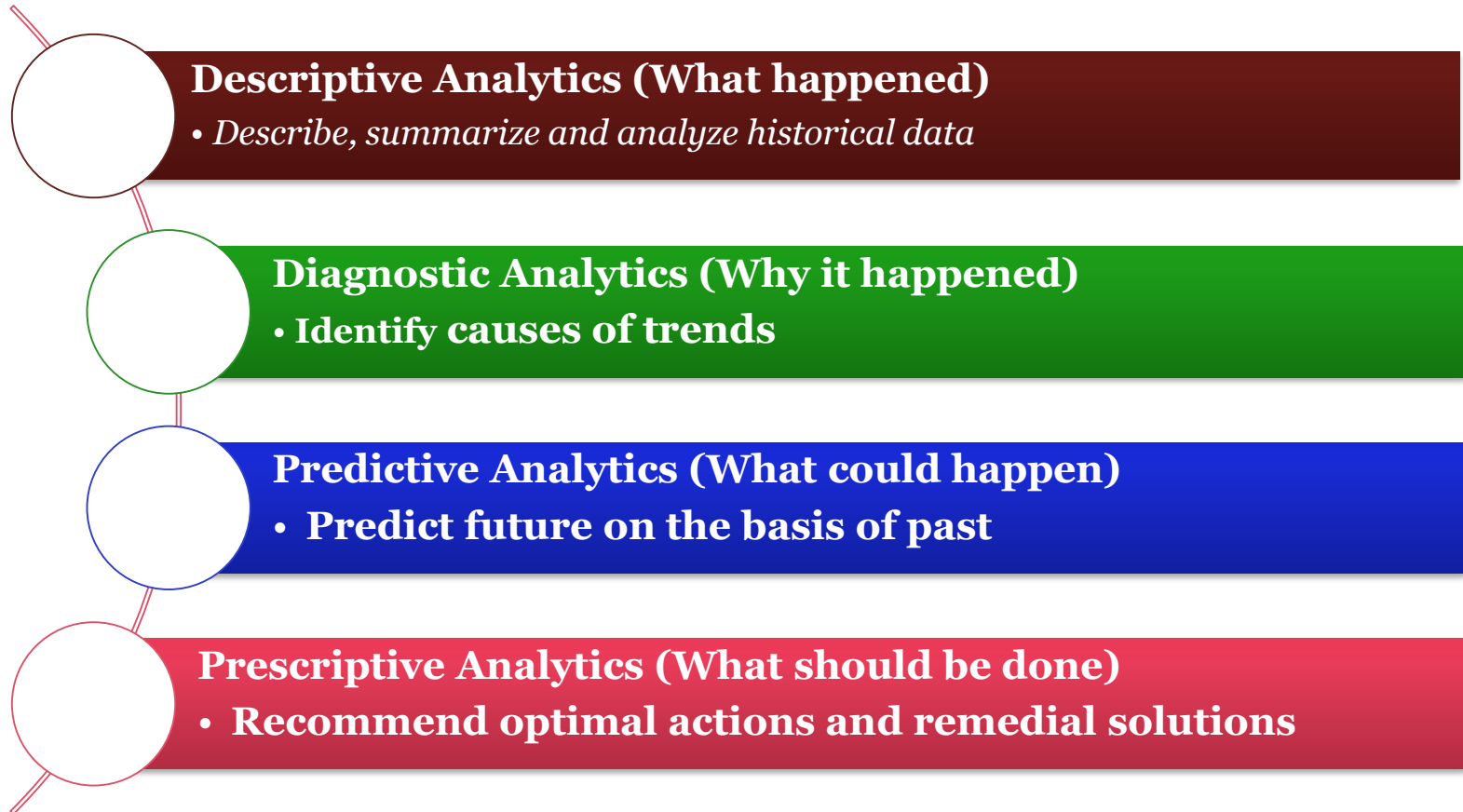
1. Decisions
  - Frequency, Speed & Complexity
2. Analytics
  - Network Analysis, AI
3. Data
  - Quality, Interoperability, Modularization
4. Technology
  - Distributed processing, Cloud Computing
5. Mindset & Skills
  - Resources & Skills





---

Big Data Analytics improves the speed and efficiency with which we understand the past, and opens up entirely new avenues for preparing for and adapting to the future.



---

## ***Big Data & Analytics Challenges***

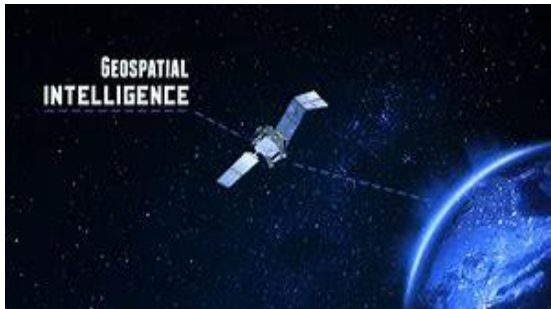
1. Dealing with data growth
  - More computational & High Cost of storage
  - In premises & off premises commodity infrastructure
2. Generating insight in a timely manner
  - Frequency of report generation from weekly to several times a day
3. Integrating disparate data source
  - Internal & external data source
4. Validating data
  - Cleaning & Standardization of data
- 5. *Big data security & privacy***
  - Attribute based encryption to make analytics fast
  - Homomorphic encryption for conducting analysis on encrypted data to ensure confidentiality

# Big Data Analytics Trends for Defense Sector

---



1. Unmanned Ariel Vehicle MQ-9 Reaper
  - 12 cameras
  - 40 GB information per second received at US ARGUS ground station
  - Real time analytics to provide accurate and timely information to frontline ground troop
  - Minimize collateral damage and life loss



2. Social Media Mining for terrorist databases & social media activities
3. Satellite Imaginary for geo spatial analytics for detection of any alien object
4. Cellphone GPS and Call Analysis of area under combat operation

# *Big Data Analytics Trends for Defense Sector*

---

## 1. Analytics for Multirole fighter planes

- Real time business intelligence
- Optimal flight maneuvering
- Audio/ Video Recording for post mission briefing & analysis
- Historical data repository for new trainee pilots to avoid mistakes
- Analysis of incoming signals from hostile electronic systems for adequate decision making
- Predictive Maintenance to minimize failures
  - Regression techniques & Machine Learning techniques



---

Thanks

---

# References

- [1] <http://www.iflscience.com/technology/how-much-data-does-the-world-generate-every-minute/>
- [2] <https://e27.co/worlds-data-volume-to-grow-40-per-year-50-times-by-2020-aureus-20150115-2/A>
- [3] <https://data-innovation.unsystem.org/system/files/2017-06/03%20-%20Ashraf%20Faramawi%20-%20Learning%20Lab%201-%20Big%20Data%20Analytics.pptx>
- [4] [https://resources.sei.cmu.edu/asset\\_files/Presentation/2014\\_017\\_101\\_89659.pdf](https://resources.sei.cmu.edu/asset_files/Presentation/2014_017_101_89659.pdf)