

Some Big Data Challenges

“2,500,000,000,000,000,000 Bytes (2.5×10^{18})
of data are created every day!” (2012)

or

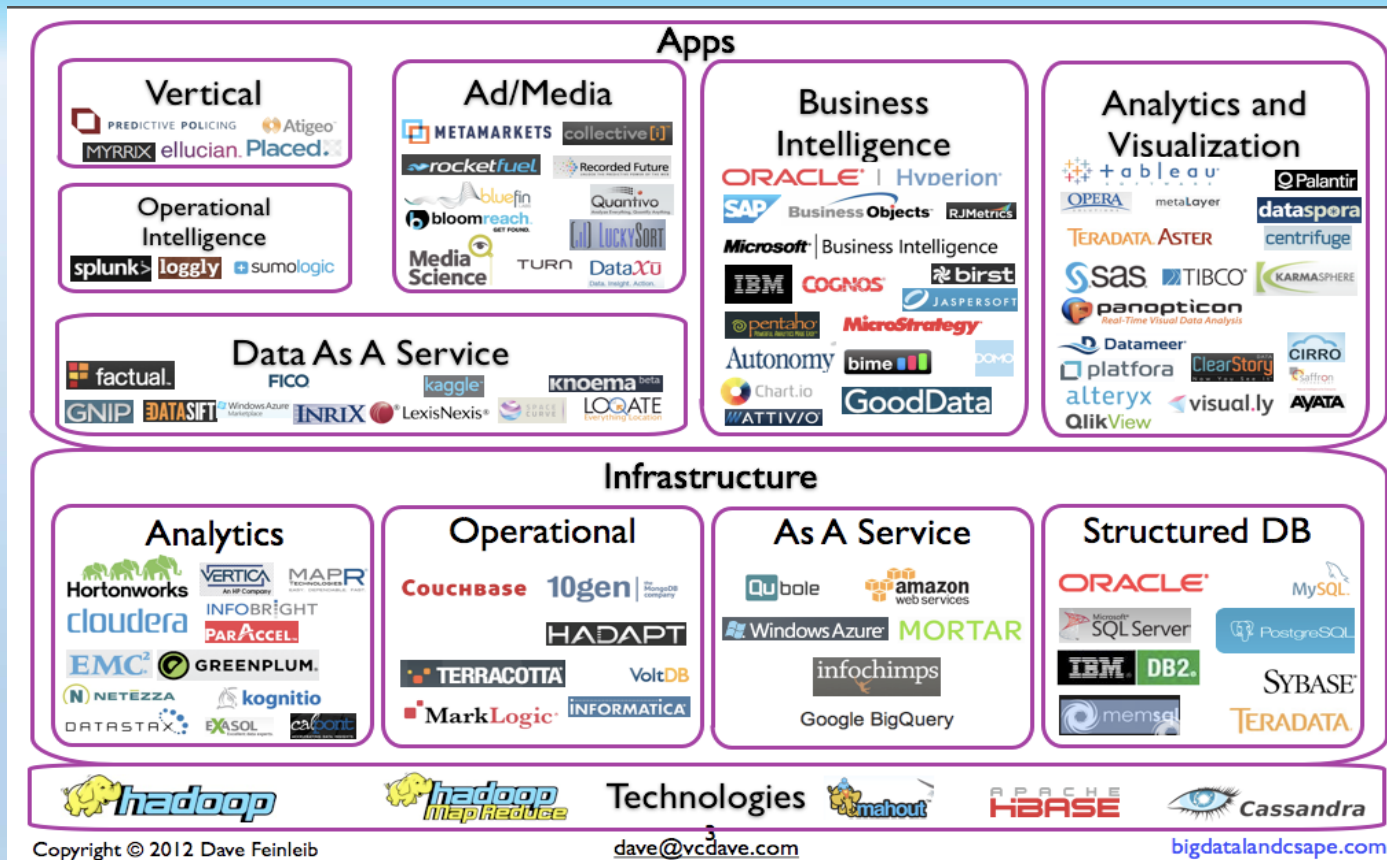
8,000,000,000,000,000,000

“(8 exabytes) of new data were stored globally by enterprises
in 2010”

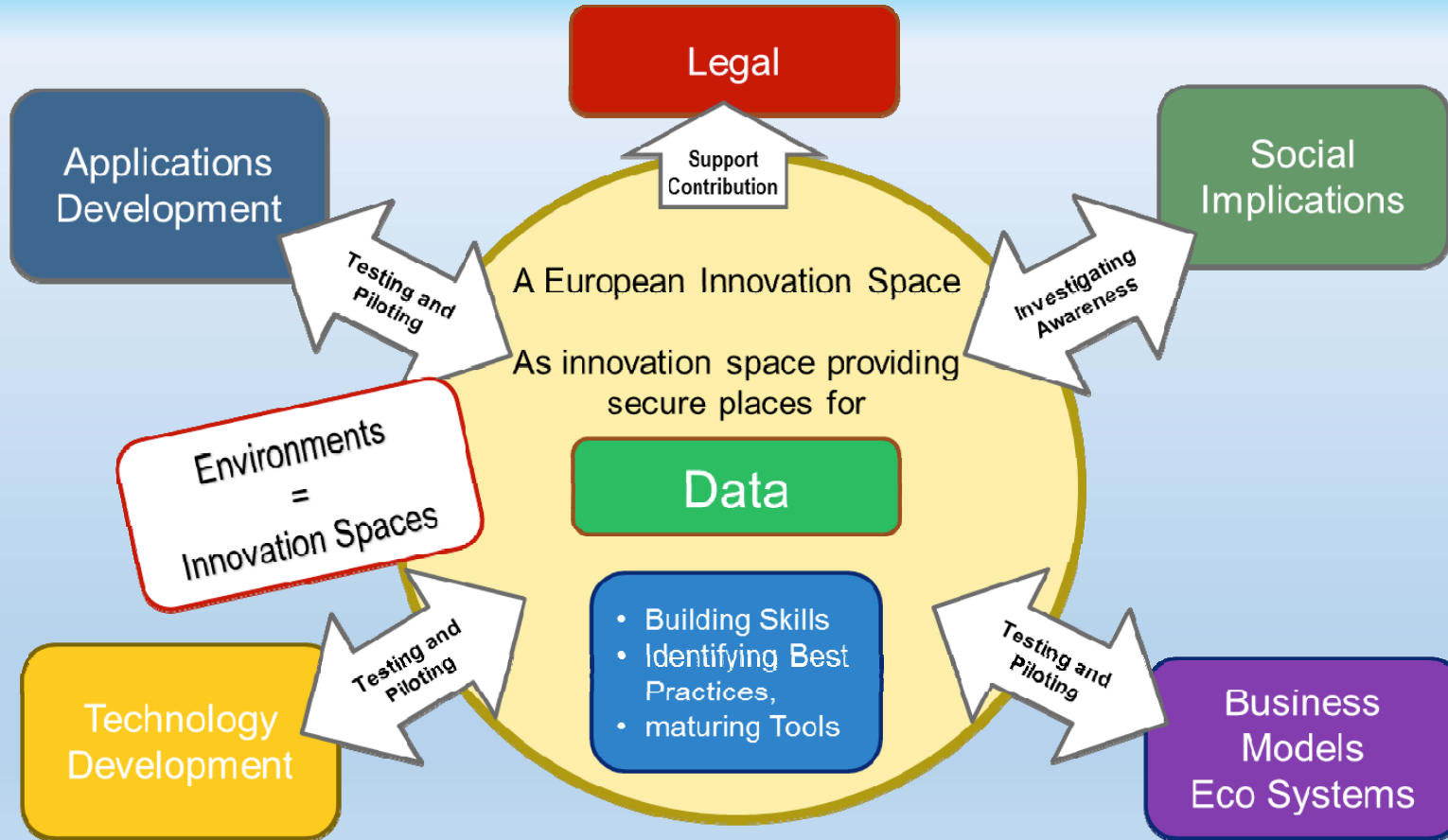
Source: McKinsey Global Institute

Big Data is BIG!

The Big Data Landscape



The 5 Dimensions of Big Data



Value of Big Data

- **Big Data is “*the next frontier for innovation, competition and productivity*”.**
- **The impact of Big Data provides huge potential for competition and growth for individual companies.**
- **The right use of Big Data can increase productivity, innovation, and competitiveness for entire sectors and economies.**

McKinsey Global Institute, Big Data: The next frontier for innovation, competition and productivity

Big Data in the Marine World

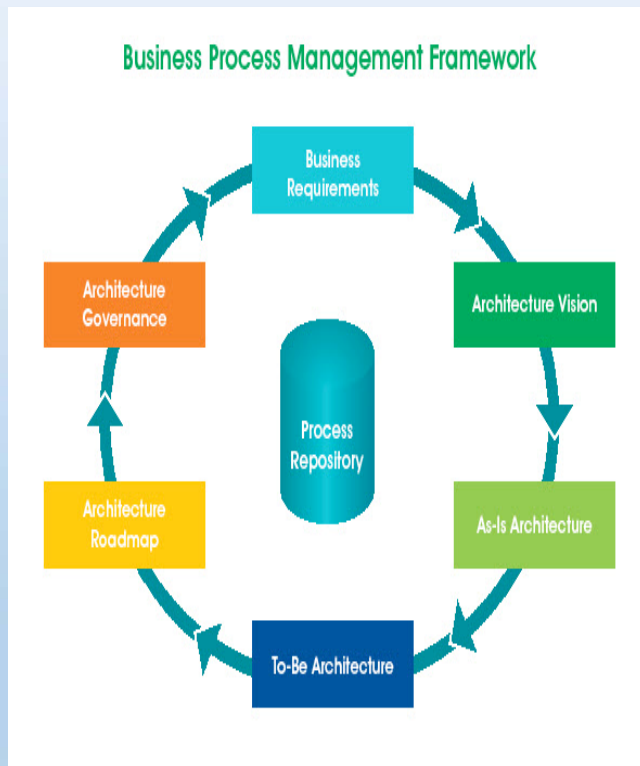
- **'Big Data' is not just about the size of some very large (scientific) datasets, which are becoming more common in the marine and environmental worlds generally, due to advances in technology (esp. remote sensing).**
- **It is also about the 'Big Data' that arises from hundreds, thousands, millions of data providers adding to the wealth of data already available from 'official' channels – i.e. crowdsourcing, social media, etc.**
- **And 'Big Data' arises when many simply very large datasets need to be combined to analyse specific problems, e.g. in hydrodynamics, meteorology, network analysis.**

Data Challenges

- **Volume**
- **Variety**
- **Velocity**
- **Veracity**
- **Data discovery**
- **Quality and relevance**
- **Data comprehensiveness**
- **Personally identifiable information**
- **Data dogmatism**
- **Scalability**



Process Challenges



- **Capturing data**
- **Aligning data from different sources**
- **Transforming the data into a form suitable for analysis**
- **Modelling it, either mathematically or via simulation**
- **Understanding the output**
 - **visualizing and sharing the results,**
 - **how to display complex analytics on a mobile device.**

Management Challenges

- **Skills development**
- **Data privacy**
- **Security & Governance**
 - **tracking how the data is used, transformed and derived**
- **Ethical issues**
 - **ensuring that data is used correctly**
 - **abiding by its intended uses and relevant laws**
- **Managing the Big Data lifecycle**



The Big Data Research Agenda

- **European Big Data Value Strategic Research & Innovation Agenda (SRIA)**
 - “The objective of the SRIA is to describe the main research challenges and needs for advancing Big Data Value in Europe in the next 5 to 10 years.”
- **USA - Big Data Research Initiative**
 - “cross-agency plans and research efforts to extract knowledge and insights from large and complex collections of digital data.”
- **US NSF to direct efforts to**
 - develop new methods to derive knowledge from data;
 - construct new infrastructure to manage, curate and serve data to communities; and
 - forge new approaches for associated education and training.

EU Big Data Research Agenda

- **Big Data Europe (BDE) Platform released - September 6, 2016.**
- **Platform to help communities solve societal challenges and problems by accelerating the process of getting started with big data technology.**
- **BDE platform is an easy-to-deploy, easy-to-use and adaptable (cluster-based and standalone) platform for running big data frameworks and tools.**
- **User can follow a simple set of instructions to install, or follow the installation [video](#) for getting started with the platform**

EU Big Data Research Agenda

Big Data Europe (BDE) Platform ...

- Pull ready-to-use images from the BDE repository or create a dataflow pipeline to realize a full data value chain using the components available at the BDE repository.
- Platform will be refined and expanded collaboratively with the users and the societal challenge (use case) partners.
- BDE platform will introduce the concept of *smart data* to support a range of processing tools for the semantic web and knowledge graphs.
- Visit <https://www.big-data-europe.eu/>