IoT and Big Data

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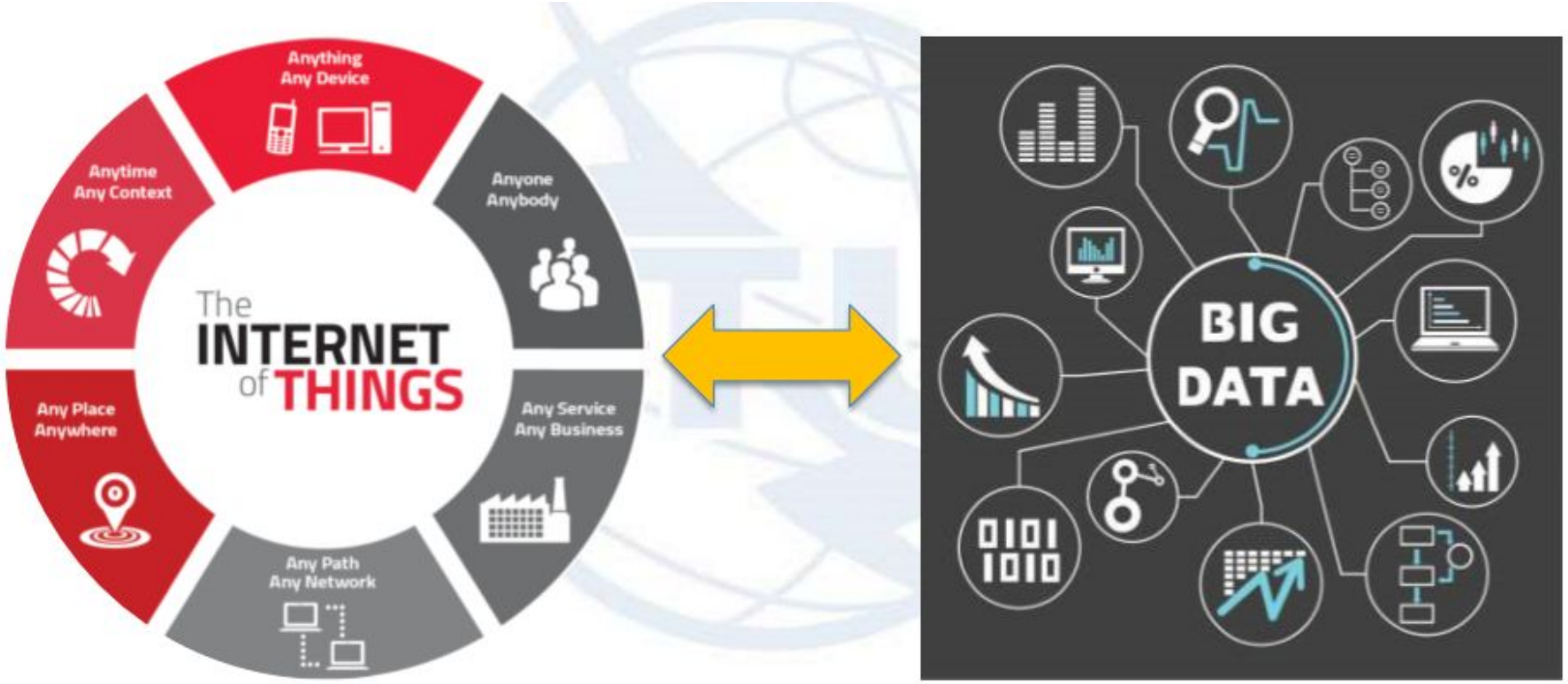
Big Data

- A paradigm for enabling the collection, storage, management, analysis and visualization, potentially under real-time constraints, of extensive datasets with heterogeneous characteristics.
- Roles of Big Data ecosystem
  - data provider,
  - big data service provider,
  - big data service customer.

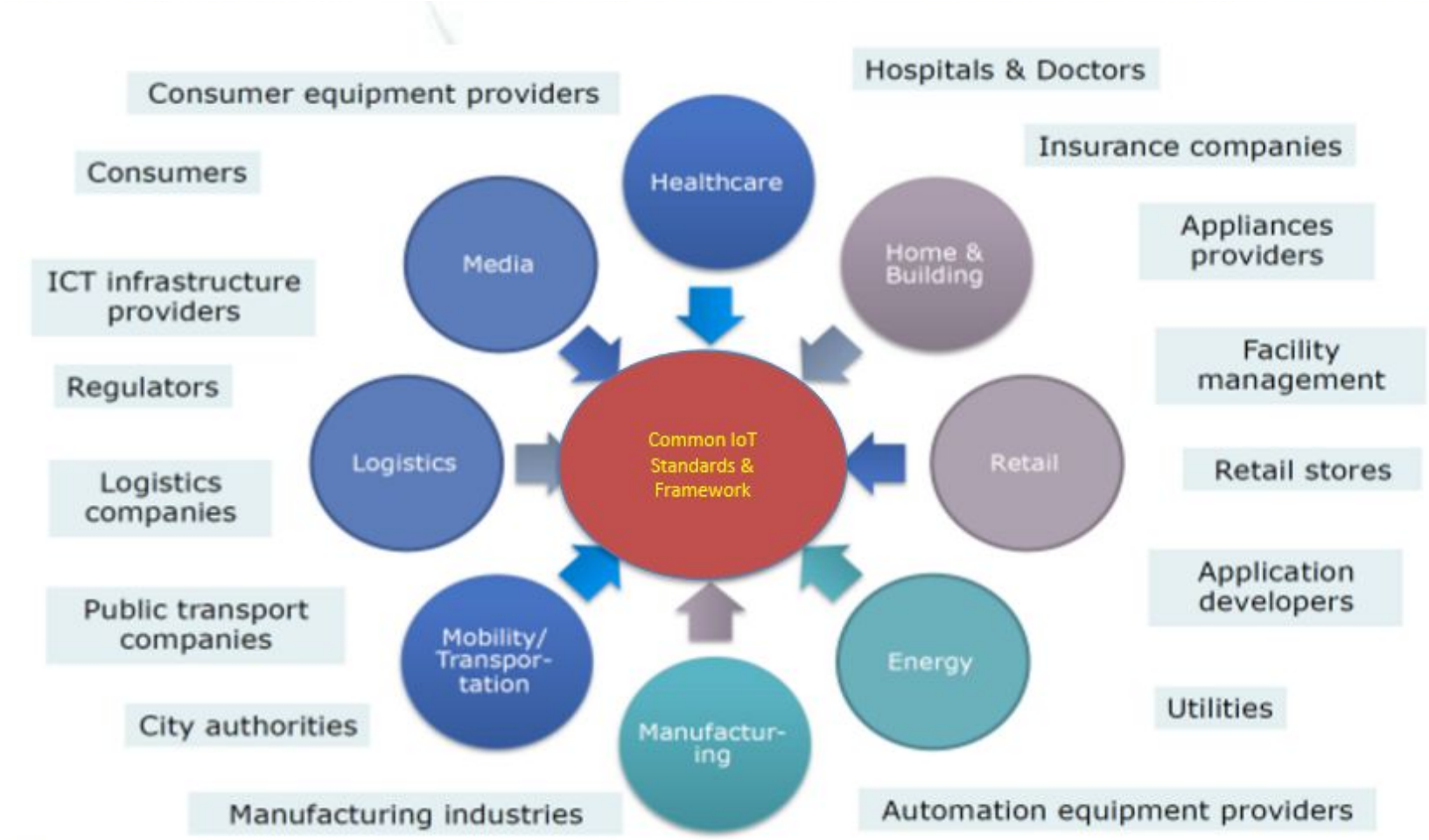
IoT and Big Data Integration



- Big data is about data, plain and simple.
- You can add all sorts of adjectives when talking about data.

- IoT is about data, devices, and connectivity.
- Data – big and small – is front and center in the IoT world of connected devices.

Data generation by IoT domains

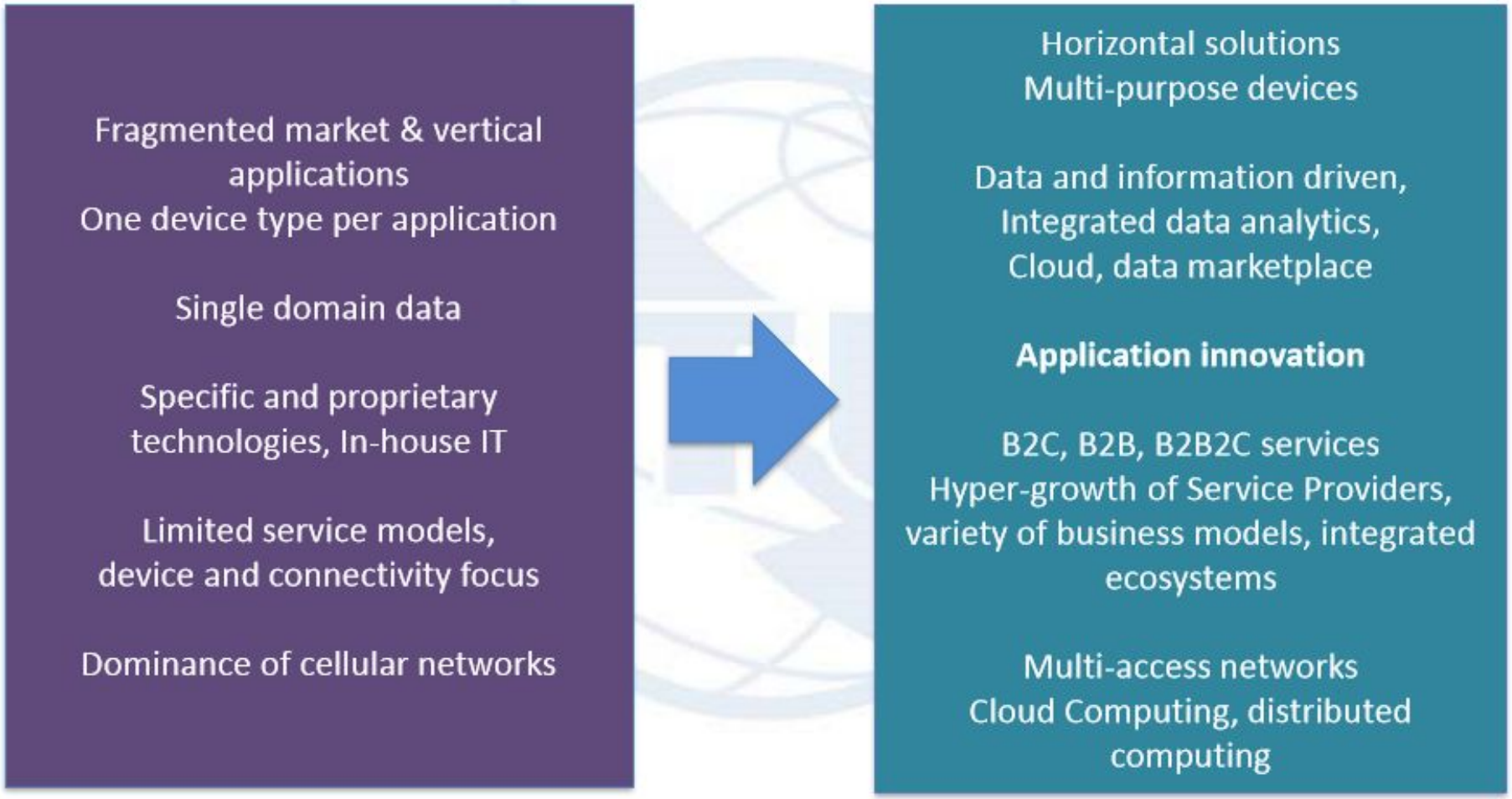


- The intersection of IoT and Big Data is creating a tremendous business opportunity, but the reality of today's IoT projects is that this potential has yet to be fully tapped.
- Better IoT Data Collection And Analysis Would Deliver More Value
- 70 per cent say they would make better, more meaningful decisions with improved data
- 86 per cent report that faster and more flexible analytics would increase the ROI of their IoT investments

IoT and data challenges

- 44% said that there was too much data to analyze effectively
- 36% said that it was difficult to capture data in the first place,
- 25% saying data was not captured reliably
- 19% saying that data was captured too slowly to be useful.
- Much like data capture, 26% said that the analysis process was too slow to be actionable,
- 24% said that business processes were too rigid to allow them to act on their findings – even if they were captured and crunched in time to be useful.
- While cost is often a limiting factor in many technology decisions, for IoT stakeholders, ease of use appears to be a more pressing issue than cost.
- More participants (76%) say they would collect and store more data if it were easier than those who said they would collect and store additional data if it were free.

Solution of IoT data issue



- Data analytics are a key revenue opportunity in IoT market
- Data analytics can allow organizations to drive revenue by sharing, analyzing and interpreting data, for multiple purposes
- Extraction of tangible business and technology value
- Response and action in real time, improving productivity and business processes, lowering operational and other costs
- Long-range forecasts enabling strategic actions
- Better/New service offer to customers, faster and more efficiently

- Some analysts indicate that by 2020 40% of data will come from sensors
- Multiple data sources: (real-time) data from things and context, historical and social data (cross-domain data exchange and correlation etc.)
- Data are mainly semi-structured and unstructured
- Data may have different precision and confidence levels
- Various operations to be made on data for the extraction of actionable
- intelligence (collection, de-noising, aggregation, adaptation, analysis)
- Raw data -> Information -> Knowledge (-> Wisdom)

Advantages of using Big Data in IoT

- Big Data technologies address several data challenges in the IoT
- Scalability, data integration, massive data mining, data accessibility and create value (Big Data Analytics)
- Integration and interoperability with legacy environments and applications
- System performances and reliability
- Wide spectrum of technologies and products, organizational impact, skilled personnel
- And analytics is becoming a multi-dimensional challenge (data at rest versus data in motion, and the related data cycle operations)
- Data privacy, access, security

Problems using Big Data with IoT

- Discovery of appropriate device and data sources
- Integration of heterogeneous devices, networks and data
- Scalability to cope with large numbers of devices, diverse and huge data, computational complexity of data interpretation
- Massive data mining, adaptable learning and efficient computing and processing
- Data querying
- Availability and (open) access to data resources and data, security and privacy of data (incl. doing mining, analytics)
- Interpretation: extraction of actionable intelligence from data
- Non-technical challenges are essential though (e.g. data ownership and governance)