SNIA CSTI | CLOUD STORAGE TECHNOLOGIES

The Influence of IoT on Data Strategy

Live Webcast

May 14, 2020

10:00 am PT

Today's Presenters

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SNIA-At-A-Glance

185
industry leading organizations

2,000
active contributing members

50,000
IT end users & storage pros worldwide

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SNIA CSTI | CLOUD STORAGE TECHNOLOGIES

What We Do

Educate vendors and users on cloud storage, data services and orchestration

Support & promote business models and architectures: OpenStack, Software Defined Storage, Kubernetes, Object Storage

Understand Hyperscaler requirements Incorporate them into standards and programs

Collaborate with other industry associations

Agenda

- What is IoT?
- Comparing traditional applications with IoT applications
- Data… Data… DATA… (the volume difference)
- The new security posture for IoT
- The end to end flow of IoT data
- Summary

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What is IoT?

…and why should we care?

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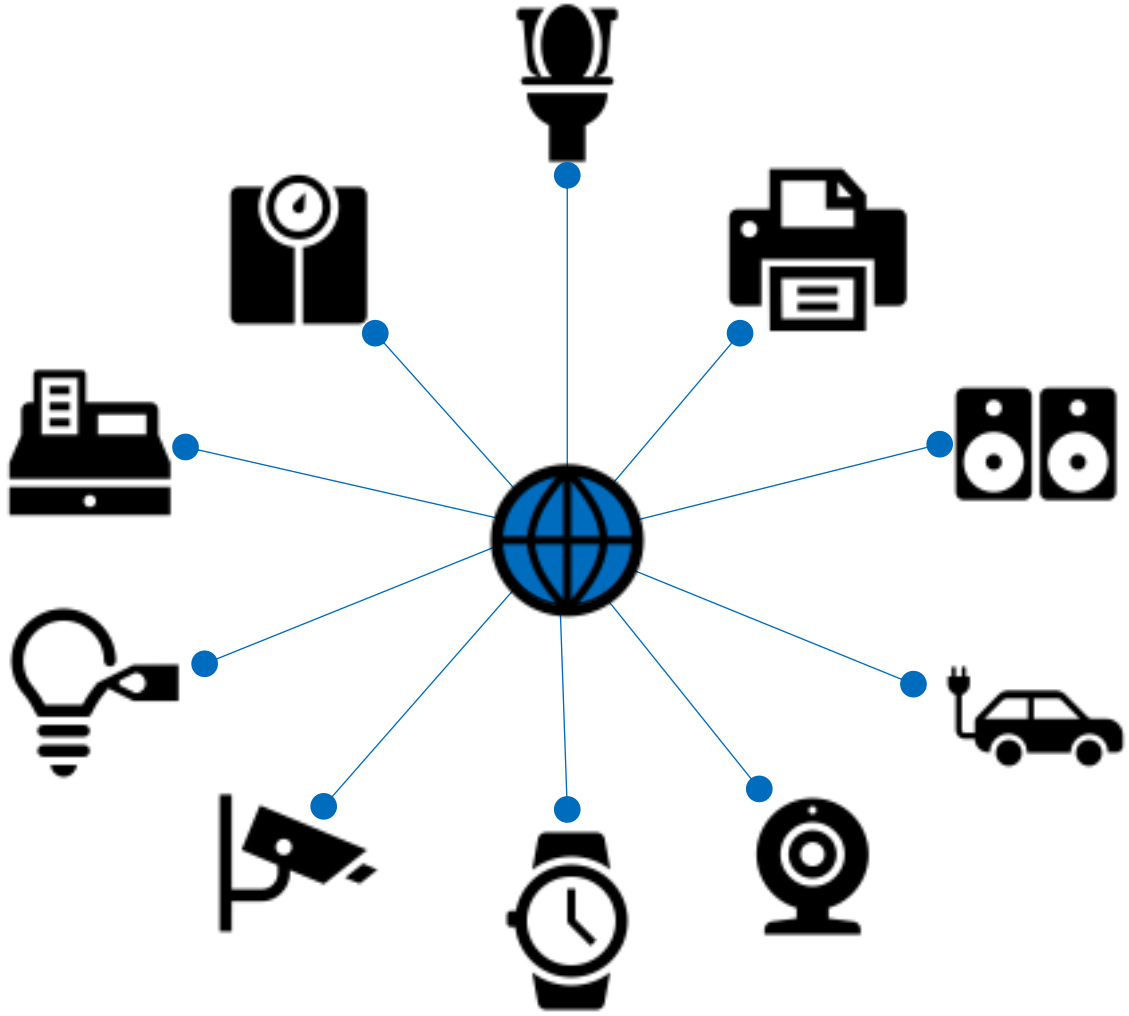
What is IoT? (…and why should we care?)

- As the name suggests, the network of a plethora of connected devices
  - Personal Devices
    - Phones
    - Watches
    - Cars
    - Toilets!
  - Industrial Devices
    - Manufacturing Equipment
    - Industrial Sensors
    - Autonomous Vehicles
    - Vehicle Fleets



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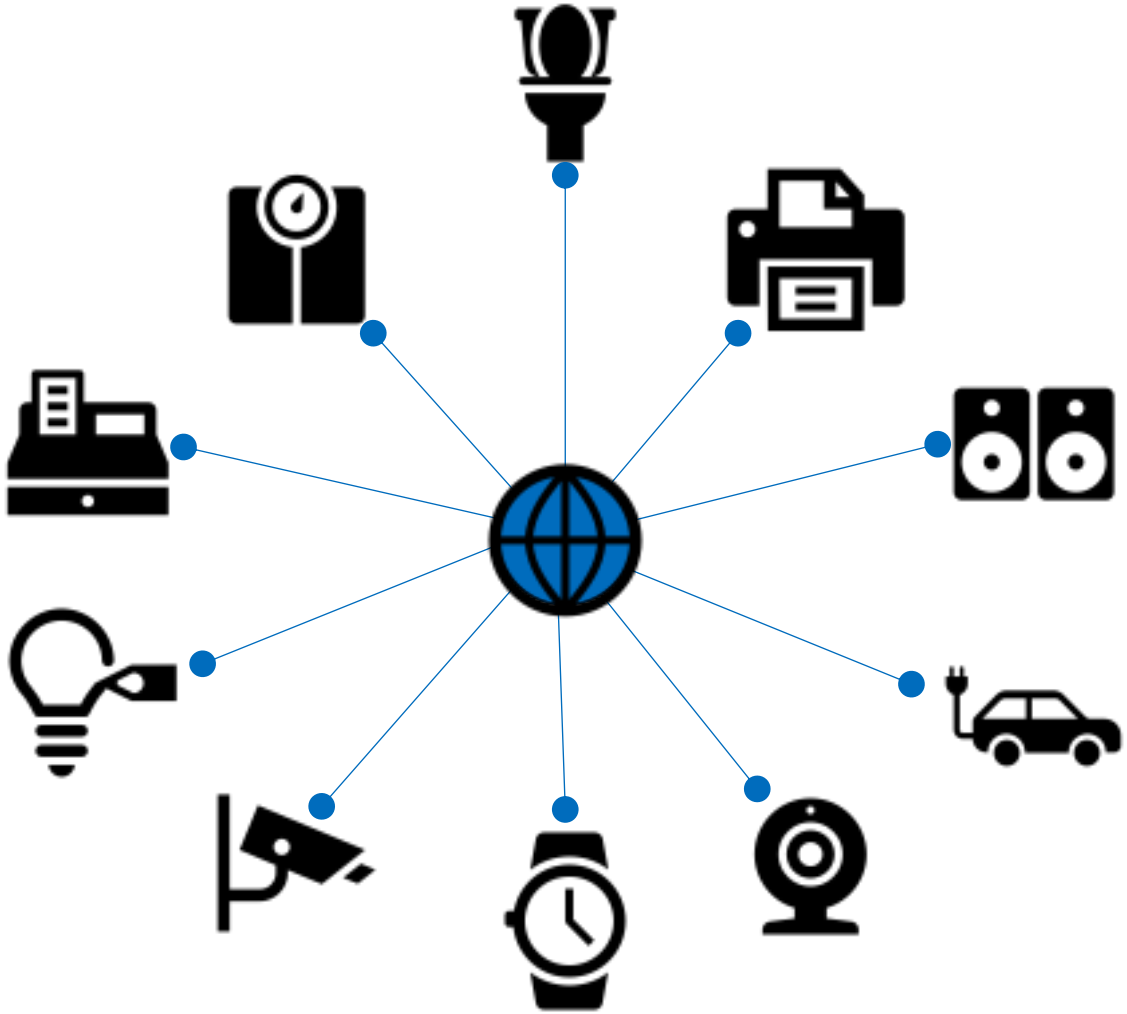
What is IoT? (…and why should we care?)

- The value from each device is increased when the data from it is aggregated with other data
  - E.g. In autonomous driving, using data from cars further along the road to better understand driving conditions
  - Augment that data with weather data to predict surface conditions
- Devices can be both producers and consumers of data…
  - … but mostly producers!
- Deployed devices often need management.
  - Updating to new firmware
  - Software updates
  - Authentication material refreshed



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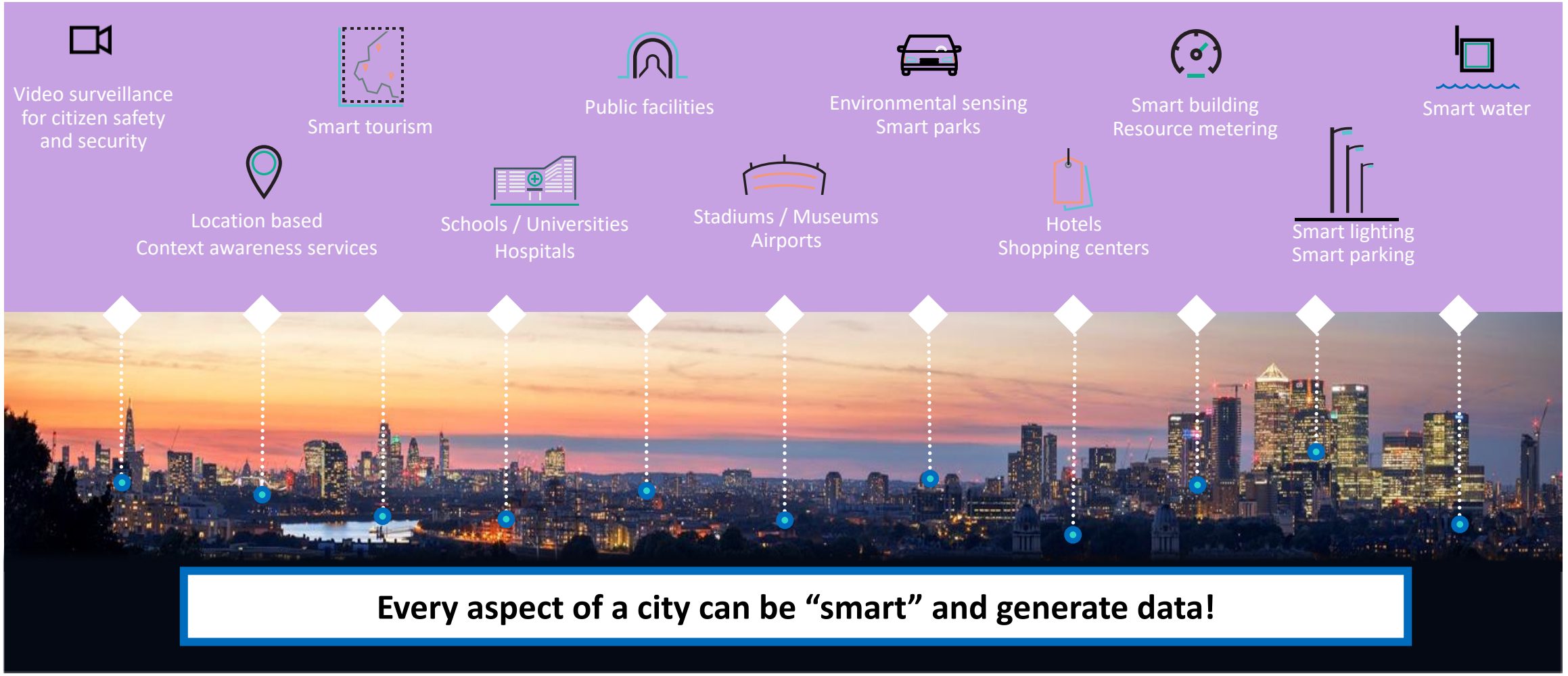
IoT Example: Smart City



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Comparing Traditional & IoT Apps

The fundamental differences

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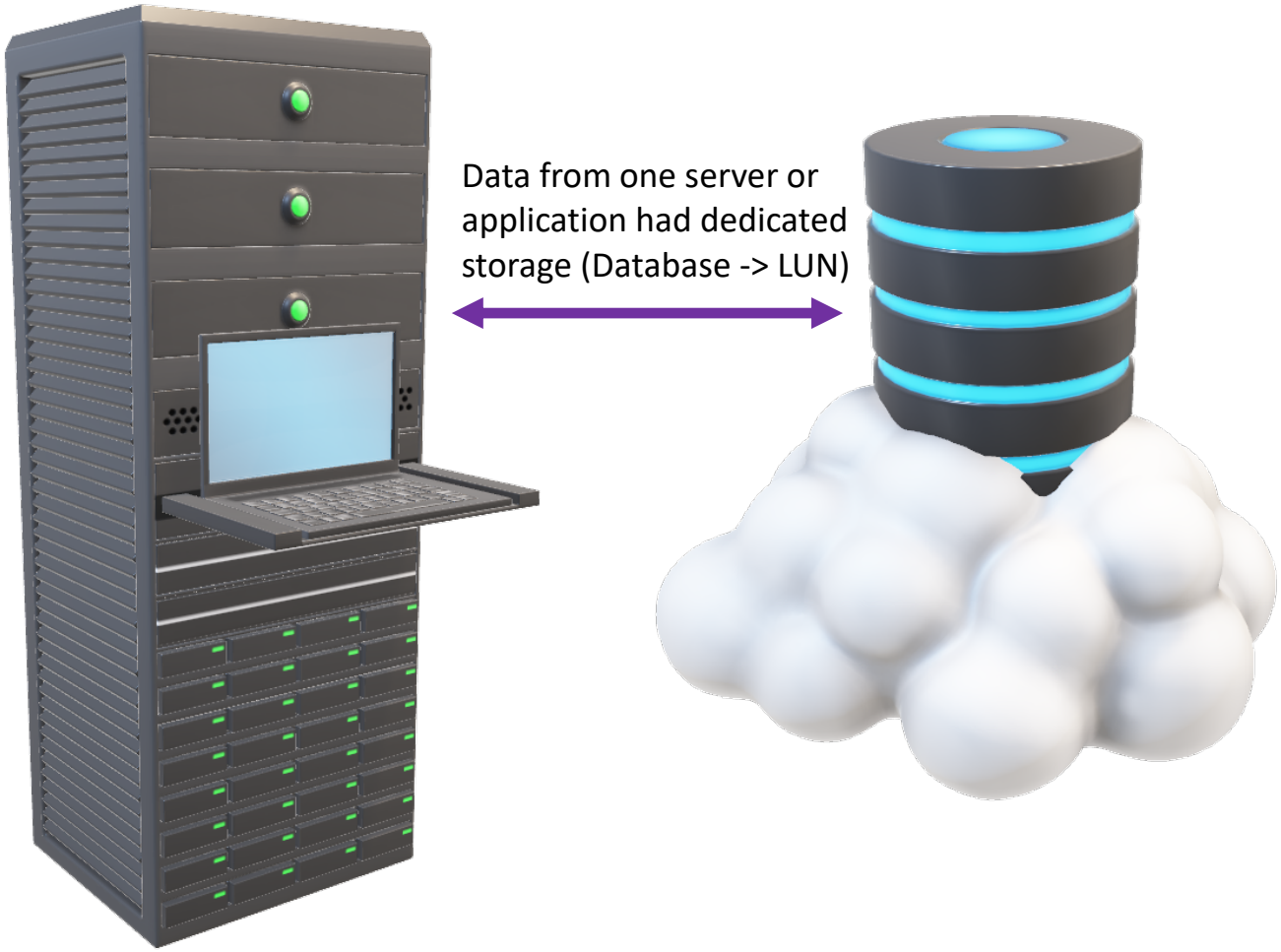
Traditional Storage Model



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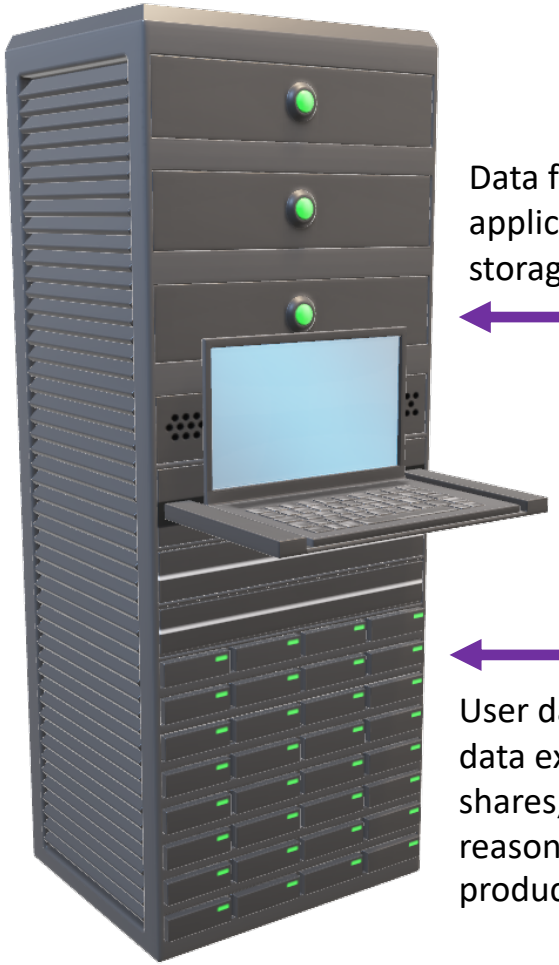
Shared Storage Model



Data from one server or application had dedicated storage (Database -> LUN)

User data and shared data existing in file shares, but still with reasonable limited producers and consumers

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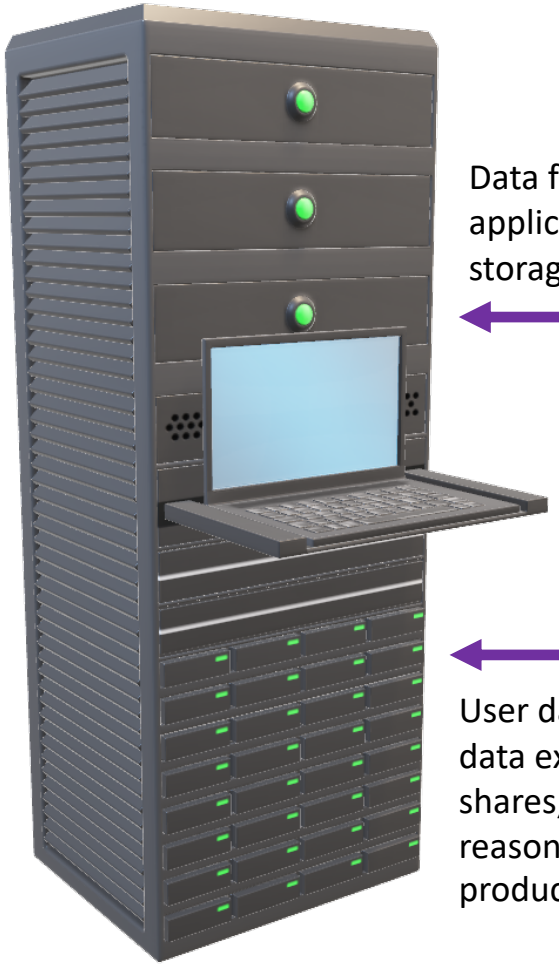
Overwhelmed! Storage Model



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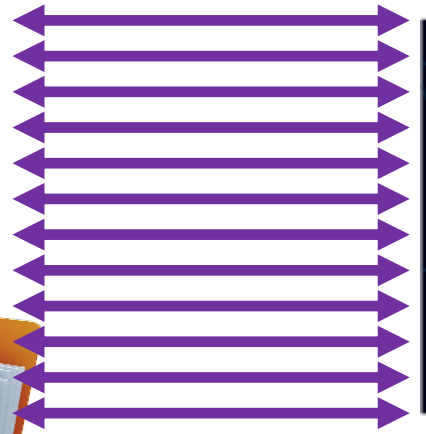

Billions of devices all sending and receiving data in all time frames:

- Constantly (streaming)
- Batch
- Random!

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Data… Data… DATA!

The new volume of data IoT brings

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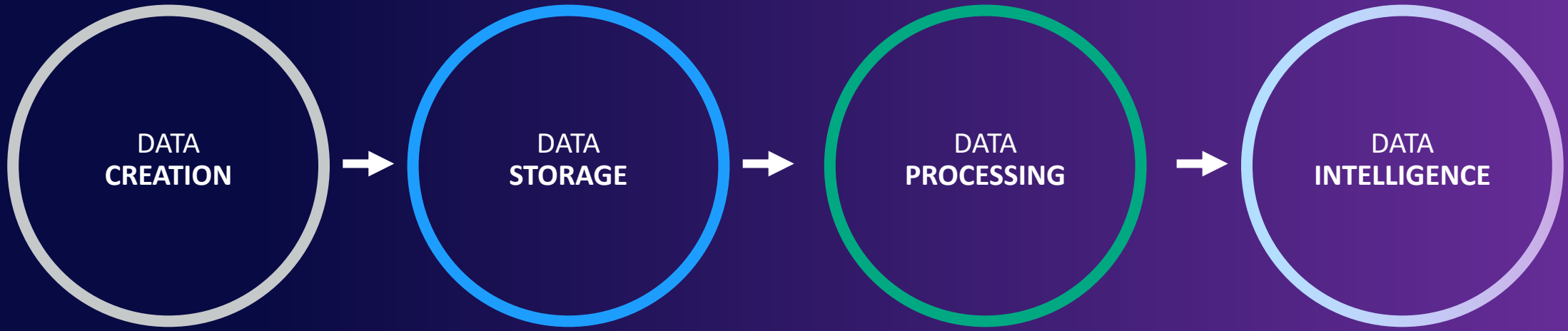
The Data Analytics Pipeline



Data generated by sensors, applications, humans for a primary use case.

Data persisted for supporting the primary use case and for analytics purposes.

Data is optimized by consolidation, cleaning, transformation into relevant formats and reduced.

Data is analyzed, interpreted, and reasonable actions are derived and executed.

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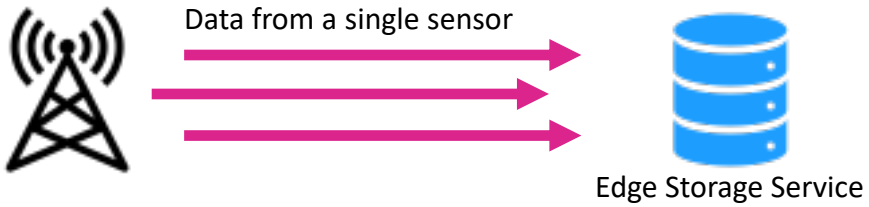
Data... Data... DATA!



- Data can be streaming from a particular sensor or group
- Data could be batched at regular intervals
- Data could be event driven meaning less predictable traffic patterns
- Volume and I/O patterns could be quite random
- The Edge Storage service depicted here could actually be anywhere, core data center, cloud or near the data source.

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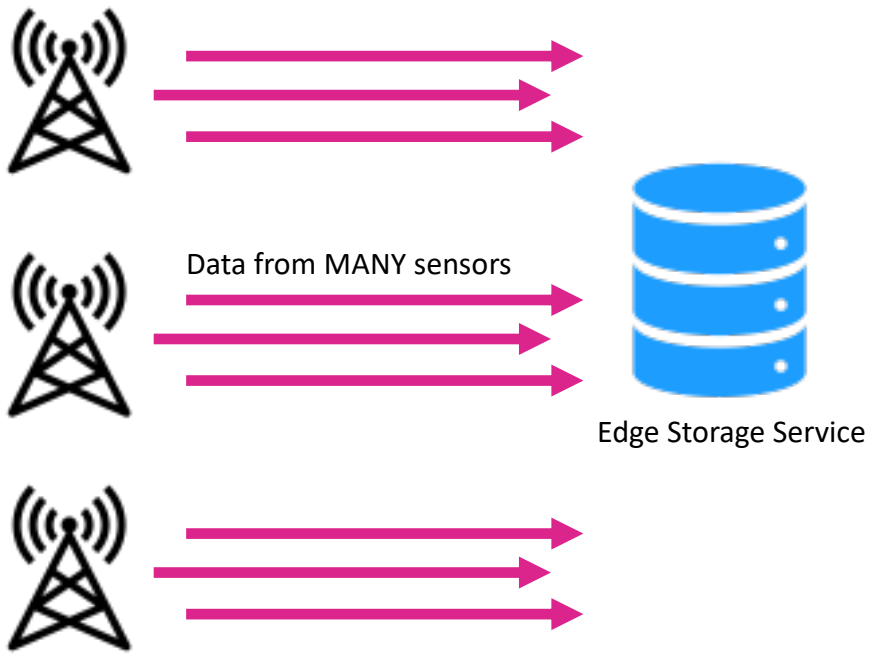
Data... Data... DATA!



- Multiple sensors will often be deployed
- Could be, for example:
  - Cameras
  - Seismic sensors
  - Machine Telemetry
- Data is often small in size but frequent or bundled into batches
- Connectivity with the source is also not guaranteed so retries could be common

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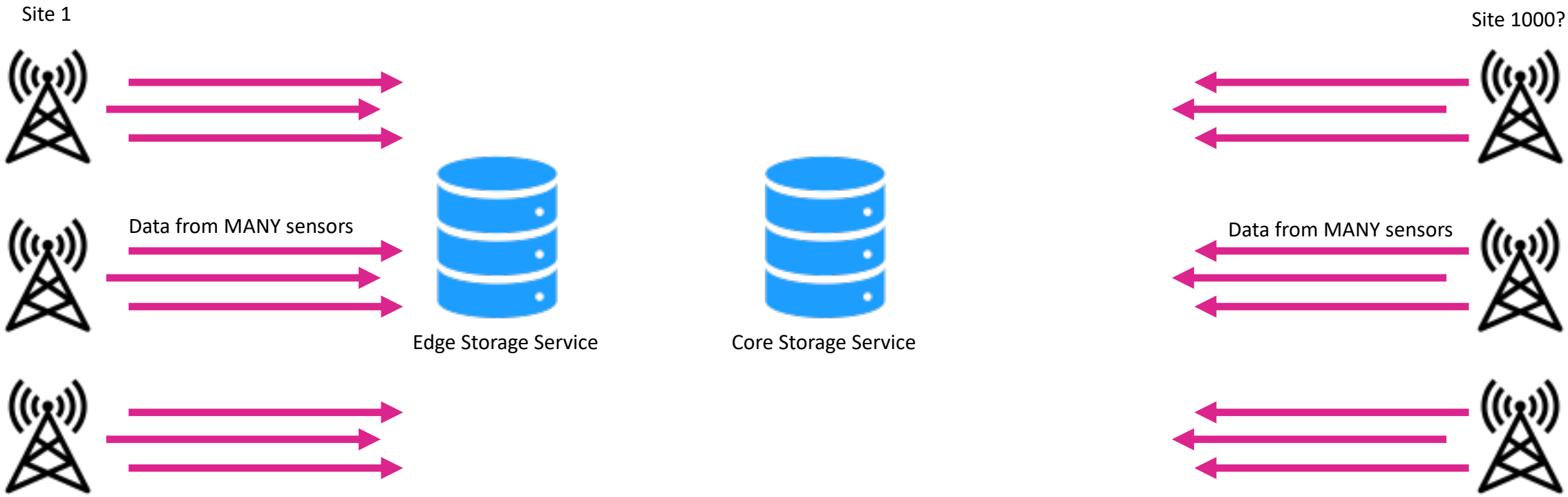
Data... Data... DATA!



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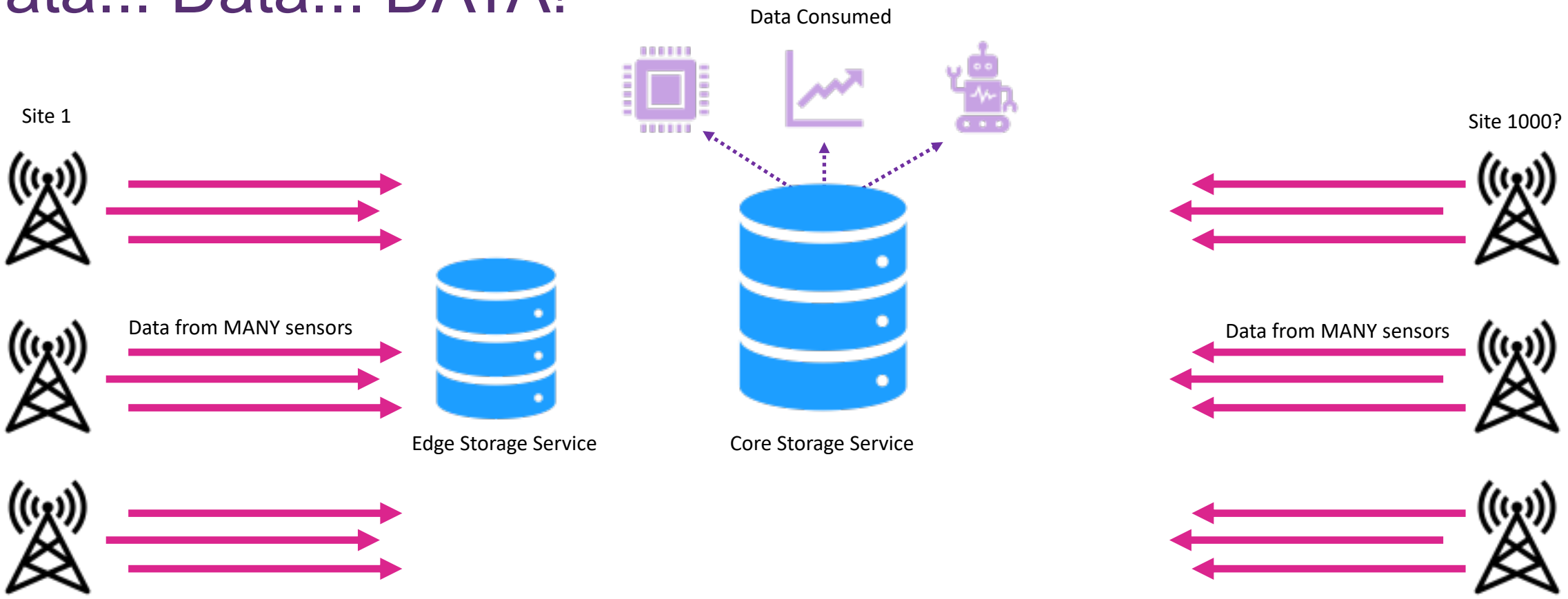

It's very easy for the data from multiple sites in multiple locations to overwhelm ingest storage if the fan-in ratio isn't considered. (Not in the SAN sense)

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The New Security Posture

Securing all the endpoints!

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IoT Security Considerations

- Very large attack surface
- Limited device resources
- Complex ecosystem
- Fragmentation of standards and regulations
- Widespread deployment
- Security integration
- Safety aspects
- Low cost
- Lack of expertise
- Security updates
- Insecure programming
- Unclear liabilities

SOURCE: ENISA Baseline Security Recommendations for IoT

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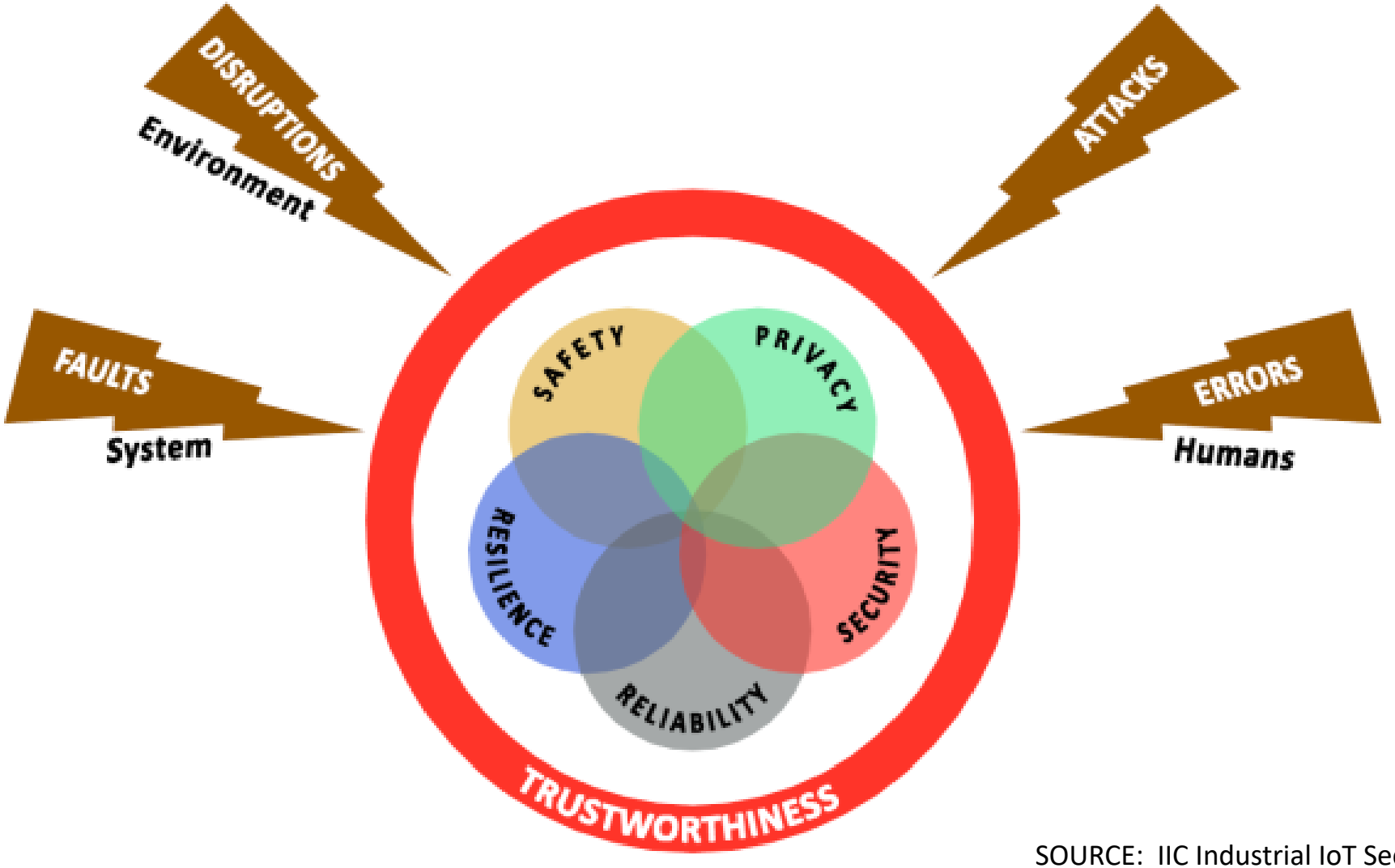
Trustworthiness of IoT



SOURCE: IIC Industrial IoT Security Framework

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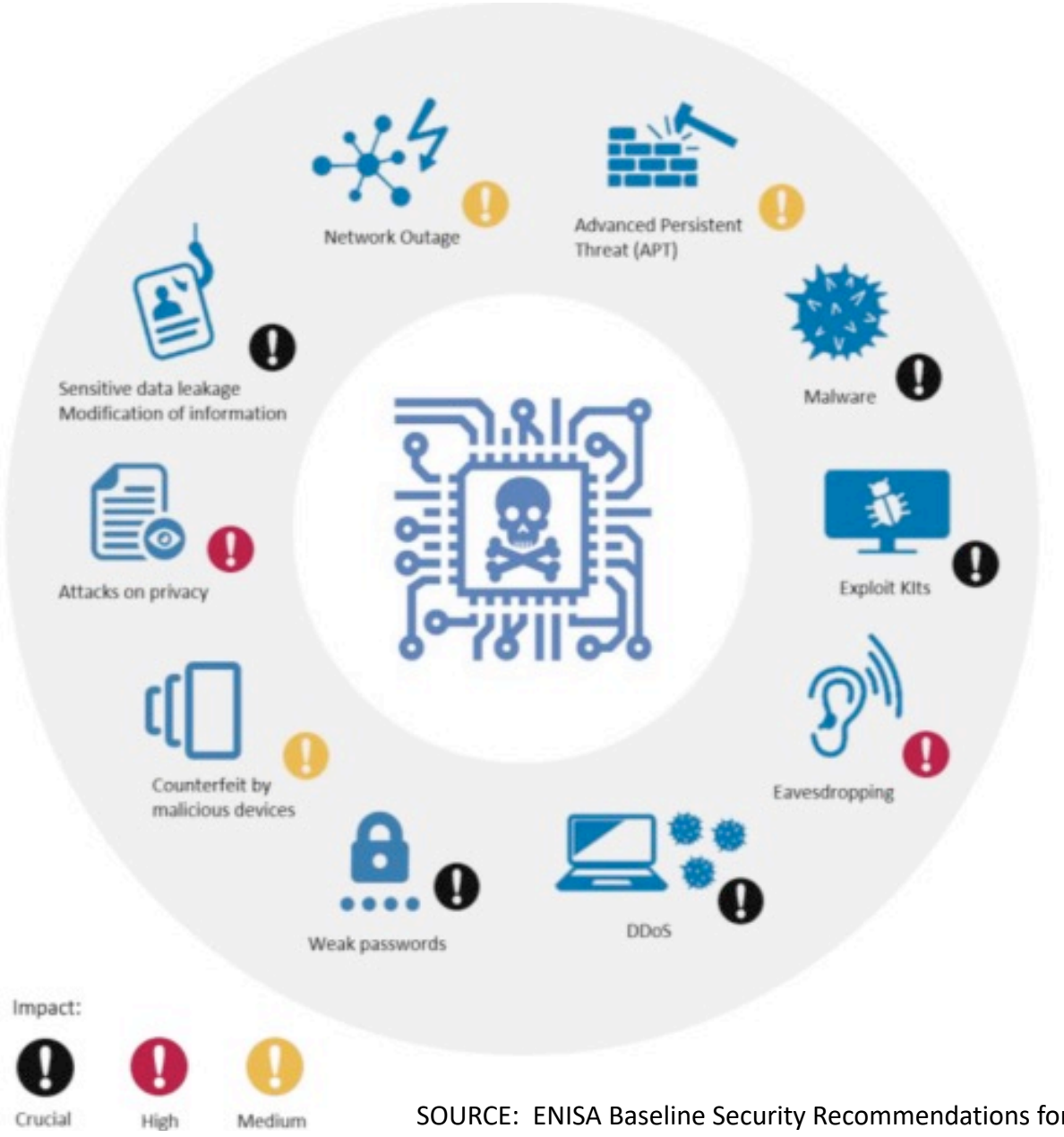
IoT Threats & Impacts

- Many IoT devices interact with the physical world in ways conventional IT devices usually do not.
- Many IoT devices cannot be accessed, managed, or monitored in the same ways conventional IT devices can.
- The availability, efficiency, and effectiveness of cybersecurity and privacy capabilities are often different for IoT devices than conventional IT devices.



SOURCE: ENISA Baseline Security Recommendations for IoT

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Useful IoT Resources

- ISO/IEC 20924:2018 (IoT Vocabulary)
- ISO/IEC 30148 (IoT Reference Architecture)
- ISO/IEC 27030 (IoT Security & Privacy Guidelines) draft
- ISO/IEC 27402 (IoT Security & Privacy Core Requirements) draft
- ISO/IEC 24391 (IoT-domotics Security & Privacy) draft
- NISTIR 8228 (Managing IoT Cybersecurity & Privacy Risks)
- NISTIR 8259 (Vendor Core Cybersecurity Baseline) draft
- ENISA Baseline Security Recommendations for IoT
- IIC Industrial IoT Security Framework

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The End to End Flow of IoT Data

What is the data pipeline and where does it go?

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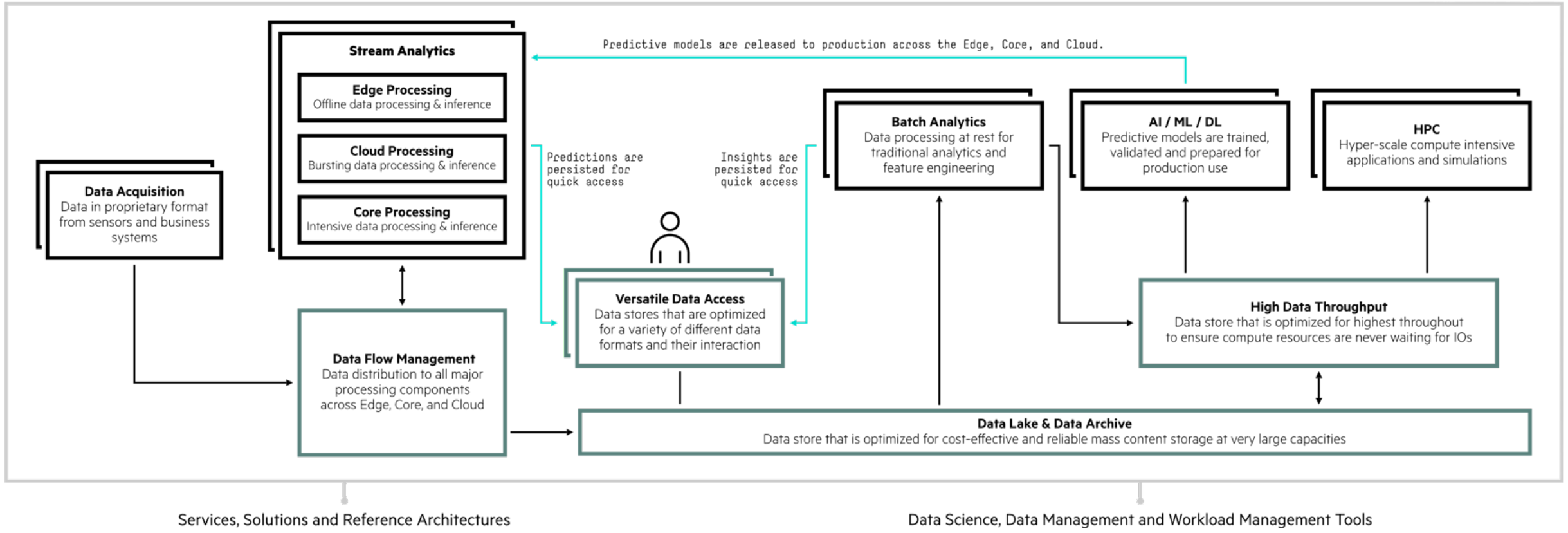
Data Pipeline

- A typical workflow



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Data Pipeline

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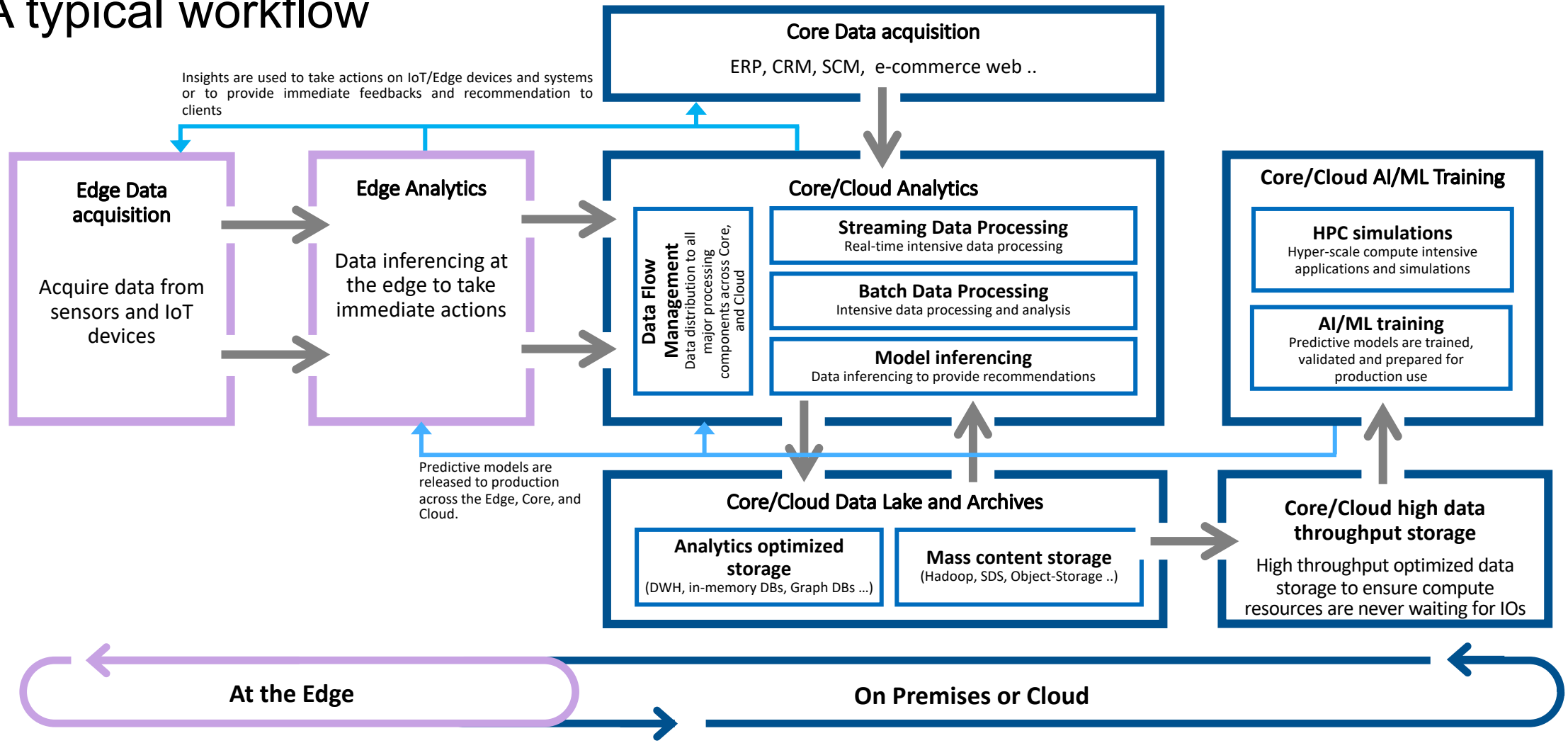

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Summary

- Internet of Things is all about data from the Edge
  - Devices generating data
  - Device to device communication
- Complex and unpredictable data patterns
- Capturing the data is not enough, it will get used in many different ways
- Security and governance needs to be information and context centric, not device centric
- IoT is no good in isolation, pipelines provide the path to value!

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Thank you!

Q & A

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