Data-centric approach for industrial internet of things (IIoT)

Availability of smart devices is transforming industries like manufacturing, energy, transportation and healthcare. However, the full potential is not yet used and half of the decisions remain gut-based rather than data-driven. Average organization only uses approximately 50% of information they have in the decision making process.

While consumer industries have highly benefited from data availability, industrial applications with high requirements for reliability, real-time processing and security have not progressed as fast. Moreover, companies in these sectors are usually application-centric:
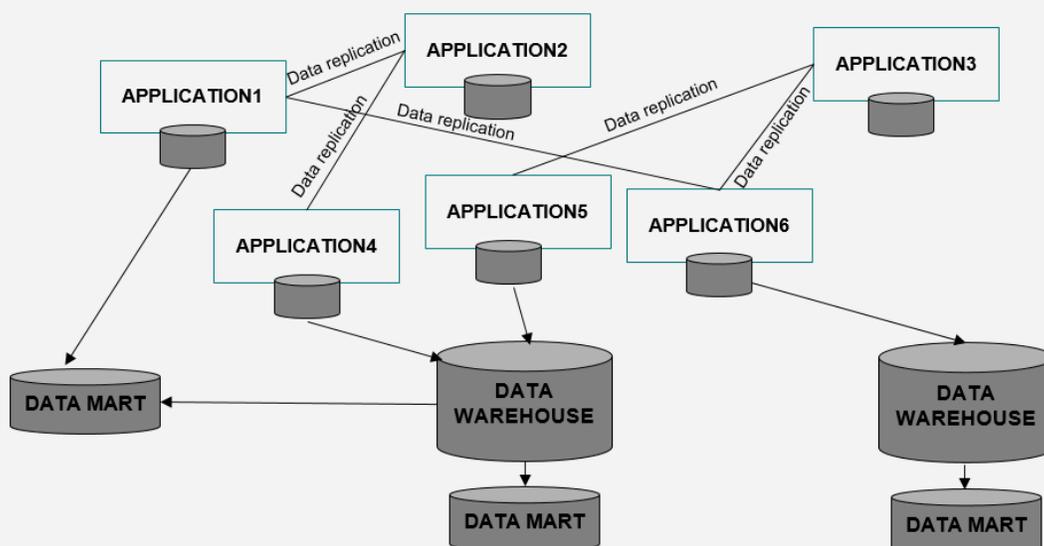
This creates a number of barriers to truly embrace the data revolution and use its full potential:

- Data is stored in silos
- No integrated vision and common data model: each application stores data in a different way
- No real time overview due to delays in data replication
- Difficulty to scale

While internet has touched the industries like defence, healthcare, manufaturing and infrastructure, lack of connectivity and scalability, questionable security and reliability has blocked full automation. However, the need to siginificantly improve performance and potential to do that have not dissapeared.

DATA-CENTRIC APPROACH TO ACHIEVE FULL POTENTIAL

To achieve full automation potential, the architecture needs to be data-centric: where data is the primary asset, while applications can come and go. For that we in Elsis PRO use Data Distribution Service (DDS): IIoT standard, which is one of the few data-centric transport and framework standards.

The data-centric approach used by DDS allows the definition of common data models for seamless interoperability. DDS works by viewing the data as conceptual common data space. In reality, each application still owns its own data, but DDS has access to it and can transfer it as required.
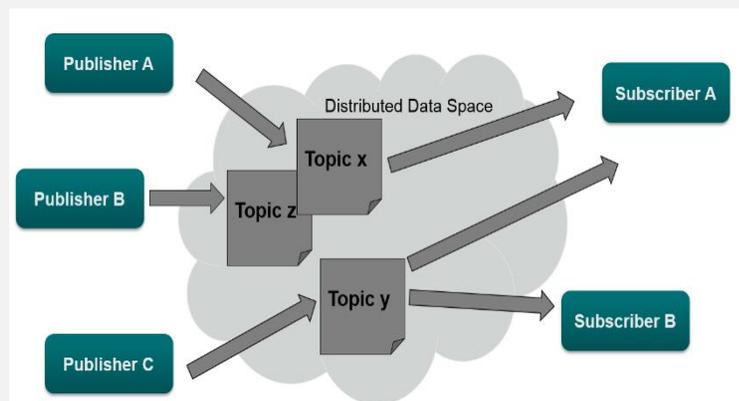
Moreover, it reduces complexity of each application, as the system administrators only need to specify how and when to share data, while DDS takes care of the managed secure data sharing.

MAIN CONCERNS: RELIABILITY AND SECURITY

The main concerns and barriers to use IIoT are reliability and security. There needs to be sufficient trust that the platform is robust is enough to ensure that the data will get where it needs to in the right time, in the right quality and will not be leaked to the wrong hands.

DDS has been designed to solve challenges with scalability, extremely high security standards and real-time requirements:

- **Scalability:** robust DDS architectures can achive near lineal scalability. For large and dynamic systems, it also offers automatic discovery that simplifies system integration and dramatically reduces costs.
- **Security:** DDS is an open OMG standard that defines comprehensive security model for compliant implementations.

Initially designed for defence purposes, it has built-in standardized encryption, access control and logging capabilities.

- **Reliability:** DDS enables extremely low latency of data transfer and makes it possible to publish different data types at whatever data rate is required or specified by the user (defined Quality of Service).

Moreover, DDS technology removes the need for actors (servers, message brokers) that can act as single point of failure. DDS data publishers and subscribers are independent of each other in space and time: e.g. even when the publisher is off, the data that has been produced before will be delivered to the subscriber in the required time, speed and quality.
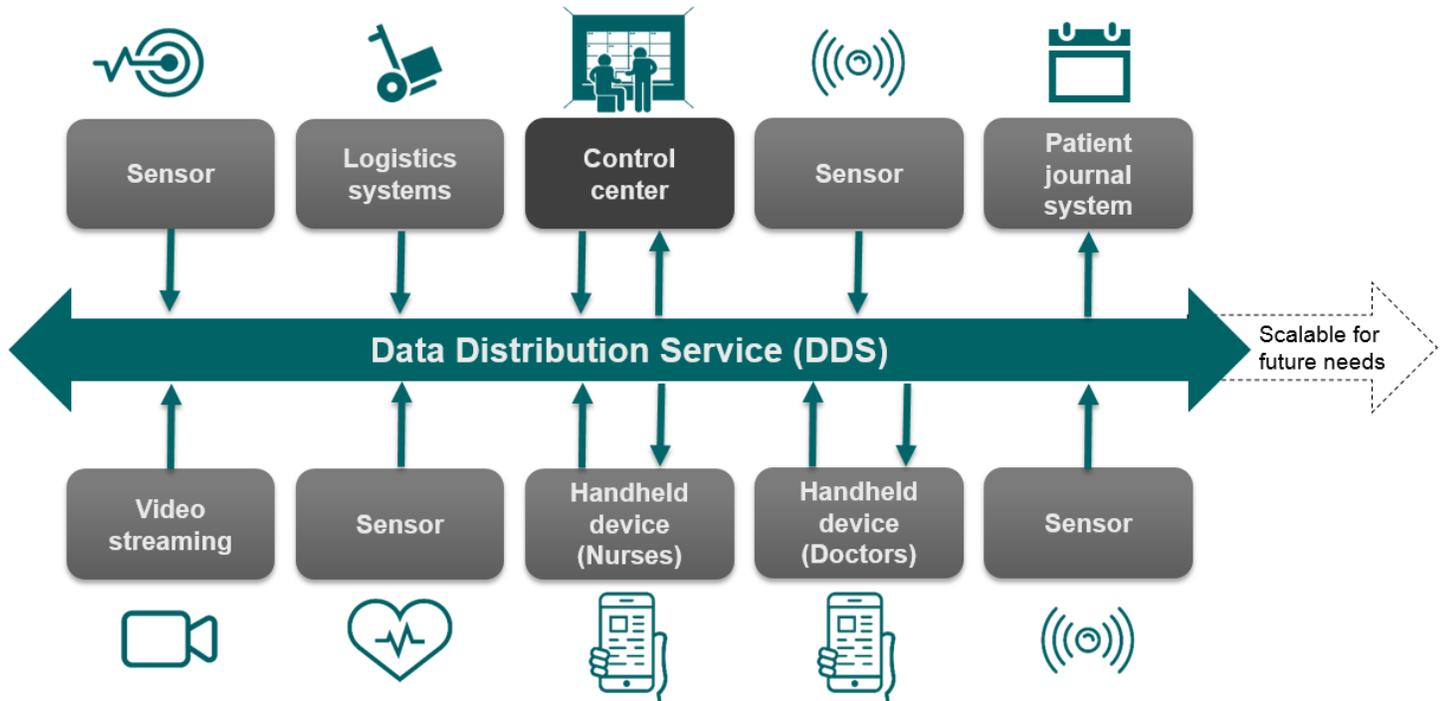
Example of DDS application smart hospital.

DDS: WILL IT FIT MY INDUSTRY?

Historically, DDS was designed for US Department of Defence by french Thales Group and american Real Time Innovations. However, in Elsis we work with DDS applications beyond defence:

- **Utilities:** real time data sharing capabilities provided by DDS meet requirements of smart energy and other utilities.
- **Oil&Gas:** this industry is experiencing enormous flow of data due to new sensor technology and needs an integrated system to share and distribute it.
- **Transportation:** from air traffic control to smart railways and highways, next generation transportation infrastructure relies of robust data sharing platforms.
- **Healthcare:** increasing number of medical devices are becoming smart and connected hospital opens many possibilities for better patient care (implementation example in the illustration above).
- **Manufacturing:** DDS provides excellent basis to further optimise and fully automate manufacturing process.

ABOUT ELSIS PRO

- Elsis was established in 1991 and has over the past 26 years grown to be a leading player in the Baltic region within information technology and communications (ICT) and intelligent engineering systems.
- We create innovative decision support software and custom-made integrative solutions combining our experience with ne west technologies and non-standard thinking.