

## Government initiatives

# Reference Architecture enables locating objects for Danish hospitals

Technologies to keep track of the location of people and physical objects, whether indoors or outdoors, are continuously improving and quickly reaching maturity. The ability of locating objects and people provides for a wide range of opportunities for healthcare providers to significantly improve the efficiency of their operations. The National Reference Architecture is serving as a common framework for information technology (IT) projects in Denmark's healthcare, enabling the automatic location and identification of objects. Its goal is to make it easier to exchange location-related information and to capitalise on investments in location-related systems. In short, the reference architecture aims to drive significant improvements in hospital operations with many related benefits for patient care. Also the *National Reference Architecture* points to standards such as the GTIN, GRAI, EPICS to support exchange of locating information.

*By Lars Østrup Leiding*



## DANISH HEALTH DATA AUTHORITY

### Providing guidance in Danish healthcare

In 2015, the Danish Health Data Authority and Danish Regions agreed to extend an existing reference architecture published by the Danish Regions covering all healthcare providers throughout Denmark. The Danish Health Data Authority established a working group with representatives from municipalities, regions and the Ministry of Health, with support from GS1 Denmark, resulting in the National Reference Architecture for Object Locating and Identification. The national reference architecture was completed in October 2016, with an English version made available in April 2017.<sup>1</sup>

<sup>1</sup> [http://sundhedsdatastyrelsen.dk/-/media/sds/filer/rammer-og-retningslinjer/referencearkitektur-og-it-standarder/referencearkitektur/object-locating-and-identification-1,-d-,0,-d-,4,-d-,3\\_en-public.pdf?la=da](http://sundhedsdatastyrelsen.dk/-/media/sds/filer/rammer-og-retningslinjer/referencearkitektur-og-it-standarder/referencearkitektur/object-locating-and-identification-1,-d-,0,-d-,4,-d-,3_en-public.pdf?la=da)

The Danish Health Data Authority <sup>2</sup> has the task of creating coherent health data and digital solutions for patients and clinicians, research and administrative purposes within Danish healthcare. Thus the Danish Health Data Authority authorised by law to approve standards within health-it. Reference architectures describe architecture and points to standards within areas of strategic interest.

<sup>2</sup> *The Danish Health Data Authority can approve standards according to an executive order. Read more here: <http://sundhedsdatastyrelsen.dk/da/rammer-og-retningslinjer/om-referencearkitektur-og-standarder/referencearkitektur>.*

## A call for a common solution

Danish healthcare providers continuously look for ways to provide high-quality patient care while better managing their time, resources and costs. Although patients feel safe in the Danish healthcare system, avoidable mistakes still occur. By improving logistics processes, healthcare providers can tap into an important source of efficiency improvements for their operations as well as avoid errors for greater patient safety.

Hospital staff can also spend a significant amount of time trying to locate other people, equipment and other assets. Time, effort and costs are expended in stocking goods and equipment; yet, savings could be realised if health services were more effectively shared and coordinated.

Streamlining a healthcare environment is certainly a difficult task since much of what takes place during a normal day in a hospital is inevitably unplanned. When unplanned activities override planned ones, people, equipment and assets that should be in one location, are suddenly needed to solve a problem in another.

It comes as no surprise that automatically identifying and locating these people, equipment and assets is essential to ensuring more efficient processes—for planned and unplanned events. With support from healthcare IT systems to help locate vital staff and equipment, healthcare providers can better plan, coordinate and use their resources.

Since enabling technologies are being developed rapidly and in many different directions, it is important that competences are adopted to avoid being locked into specific solutions. New technologies will create new possibilities for a better and more effective and efficient healthcare environment; therefore, it's critical that the healthcare industry respond to new developments in a way that allows us to develop "in the same direction."

Cross-sector services across regions and municipalities are becoming an increasingly important priority, which means that cross-sector equipment and services will be more prevalent in the future. It's expected that this development will gain momentum in years to come, adding pressure to the challenges mentioned above, and underscoring the need for a common approach.

---

It comes as no surprise that automatically identifying and locating these people, equipment and assets is essential to ensuring more efficient processes—for planned and unplanned events. With support from healthcare IT systems to help locate vital staff and equipment, healthcare providers can better plan, coordinate and use their resources.

## Alignment for all IT systems

The National Reference Architecture supports all IT systems that enable traceability for healthcare providers. It establishes targets and a framework, so that the various healthcare stakeholders can align and develop a traceability solution together and achieve interoperability.

The reference architecture provides a layered architecture. Included in the architecture is an integration system model that receives and presents identification data via an identifier such as a Global Trade Item Number® (GTIN®), Serial GTIN, Global Returnable Asset Identifier (GRAI) and Global Individual Asset Identifier (GIAI) along with location data identified by a GS1 Global Location Number (GLN), using established GS1 standards like EPCIS for creating and sharing event data.

Currently, the systems that produce location data and the systems that use the location data are not interoperable. With the reference architecture, an increase in usage with fewer integration problems is expected.

In short, the reference architecture helps provide a common and robust set of opportunities for introducing object-location systems, allowing healthcare providers to take advantage of the huge potential provided by these solutions.

## Creating value in many ways

The National Reference Architecture is helping to achieve Denmark's vision and goals for increased efficiencies in its healthcare provider system. The reference architecture is comprehensive, ensuring its viability in supporting future, new business requirements and changes in the ever-changing healthcare environment.

This flexibility requires using globally approved standards, so that interdependencies between applications, technologies and external factors are minimised. The reference architecture ensures a "decoupling" between applications and their underlying technologies and infrastructure. For this, applications and technologies must be able to evolve independently of each other and without major interdependencies.

To describe the value created by the reference architecture, the following use cases provide some examples:

- Improved inventory management in the home healthcare sector with easier and more precise inventory processes, including the retrieval of equipment on loan
- Locating the nearest member of staff in order to assign a specific task in the home healthcare sector
- Better planning of service tasks by making it easier to find workers for specific tasks in hospitals
- Learning from analyses of location data to optimise transport routes and inventory management in hospitals
- Getting a notification when a dementia patient leaves a specific area and being able to locate this patient quickly
- Using location data on a national basis for research and planning, in particular
- Locating diverse pieces of healthcare equipment on loan for retrieval, avoiding the loss of equipment and associated expense of replacements

## A number of benefits

Using the reference architecture has proven to deliver (and will continue to deliver) a number of benefits for healthcare providers and their IT systems, including:

- ✓ Simplifying systems integration, making it easier for systems to communicate with each other

- ✓ Facilitating access to location data and its value
- ✓ Delivery of a platform for reusing methodologies and software components across systems
- ✓ Providing a conceptual framework for communicating about object location and identification
- ✓ Serving as an inspiration for new systems or changes to existing systems, so that the data available is used in the best possible ways
- ✓ Providing a guideline for requirement specifications in the procurement of IT solutions
- ✓ Increased reuse and reduced operational problems associated with integration of systems
- ✓ Serving to substantiate standards approvals by the Danish Health Data Authority

---

The National Reference Architecture is helping to achieve Denmark's vision and goals for increased efficiencies in its healthcare provider system.

### About the Author



**Lars Østrup Leiding**, Enterprise Architect with the Danish Health Data Authority, has 10 years' experience in Enterprise Architecture. He works within interoperability and standardisation. Lars is engaged in strategic initiatives for creating a modern health sector and take part in the development for the new

common public architecture in Denmark. Lars holds a MSc. in Physics and Computer Science and is TOGAF certified.

### About the Danish Health Data Authority

**The Danish Health Data Authority** is responsible for creating coherent health data and digital solutions that benefit patients and clinicians as well as research and administrative purposes in the healthcare sector. As such the Danish Health Data Authority provides health data about activities, finances and quality to healthcare professionals in regions and municipalities as well as citizens and other relevant users. It strengthens the overall digitisation; and promotes a coherent data and IT infrastructure in the healthcare sector focusing on data security.

<http://sundhedsdatastyrelsen.dk/da>