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Automatic identification and traceability of items and people in modern hospitals. Expositive document.

INTRODUCTION AND COMPREHENSIVE CONSIDERATIONS.

General Specification.

Central Denmark Region wants to obtain automatic identification and traceability of items and people in its hospitals. Some of these hospitals are under construction.
The other four Danish regions are expected to be given the option of using the contract that Central Denmark Region will enter into with the chosen contractor.

The overall solution must be future-proof with regard to identification and traceability technologies, and systems and technologies must comply with all relevant standards, e.g. GS/1-related and HL7.

The contractor will provide the software for the overall solution and will also assist and counsel Central Denmark Region in obtaining the necessary identification and traceability hardware through a subsequent tender.

The software for the overall solution may be described as consisting of a layer of applications and a layer of integration, the latter handling and enriching data from the identification and traceability hardware, including, but not confined to, a location database and a concept for big data.

For the layer of applications Central Denmark Region has identified 40+ scenarios/applications where automatic identification and traceability will add value to the various processes in the hospitals. 4 of these will be needed in a first, basic version and together with the integration layer be ready for use by June 2014. During subsequent processes of innovation and development the contractor will provide the Region with additional functions and applications.

Automatic identification and traceability in hospitals is still in its infancy and awaits much innovation and development. Based on established experience within both healthcare and logistics domains the contractor will provide the Region with competent and efficient contribution to such innovation and development – and will challenge the Region accordingly.

Automatic Identification and Traceability of Items and People in Hospitals.

The successful obtaining of automatic identification and traceability will represent a complicated trade-off between several elements, e.g. accuracy and precision, real-time delays, prize of infrastructure, prize of tags, security and safety, etc. The precise location of this trade-off must be established on the basis of a clever understanding of the potential value which the solution may create as well as a profound understanding of the many possible ways of categorizing items and people in a modern hospital. People may be categorized as staff, patients, relatives and other guests, but each of these categories may have to be subject to further break-down. Items may be categorized as equipment and articles for consumption, but also dimensions like size, function and value may be relevant. Will automatic identification and traceability necessarily come in a one-size-fits-all solution? Or should we already now create - or at least prepare for - a general solution with several different ways of identification and traceability?

Basically the reason for automatic identification and traceability is our need to know where items and people are. However, the correct answer to such a question ("where is nurse Petersen?", "where is the nearest defibrillator?") depends on *who* is asking, *why* the question is asked and *when* it is asked. Translating the X-Y-Z coordinates from any given and read tag into useful information is no trivial task.

The overall process.

The overall solution will be obtained through two subsequent tenders. The first, which is addressed in this document, will focus on software and strategic partnership, and the second will focus on the relevant hardware. The first tender will be carried out as a design contest with subsequent negotiations with one or more winners.

The plan implies, that the first supplier will be identified by mid June 2013. Starting august 2013 the subsequent tender for hardware will be released and concluded by November 2013.

The basic infrastructure elements and the basic applications must be in operation by June 2014 in "Det Nye Universitetshospital" (The New University Hospital) in Aarhus. Prior to this, the suppliers must carry out proof-of-concept implementations, probably in an existing hospital ward and in some other hospital environment. Successful proofs-of-concept will be a condition for further implementation.

GENERAL AND SPECIFIC REQUIREMENTS.

In the following three sections an overview of the functional, technical and strategic requirements connected to the tender will be listed. These requirements are listed on a general level. In the final requirements specification the requirements will be more detailed and specific.

Functional and technical requirements.

Applications.
As mentioned above, Central Denmark Region has identified 40+ applications. For the initial system ready for use by June 2014 these four applications have been chosen:

Logistics management.
Management of transport and storage of items and people within and between hospitals. With a number of hospitals distributed over 13.000 km2 and with some division of labour between the hospitals, an effective management of intra- as well as inter-hospital transports is necessary.

Search.
Quick searches for people and items. Must be accessible via state-of-the-art devices. High focus on usability.

Bed management.
Management of hospital beds. Overview of the whereabouts of beds, planning of cleaning and maintenance of beds. Includes simple user interface for the individual bed.

Blood management.
Management of data for processing, storage and transfusion of blood components. Collection of information concerning the processing of blood components for transfusion and plasma fractionation through collection of whole blood, transport, production of blood components, testing, inventory control, delivery for transfusion, bed-side control of patient identity and registration of transfusion or return/disposal of individual blood components.

The middleware.
Any given set of data on specific physical location of an item or a person, e.g. from a reader or from a system, must be processed by the middleware and subsequently presented as information for further use by external actors, e.g. applications.

The middleware will handle relevant integrations to other systems, e.g. facilities management, devices management, Clinical Logistics, etc.

The supplier will, among other things, be expected to suggest a suitable architectural design for the middleware.

Big data.
The middleware must contain a concept for big data, i.e. methods for discarding data to make way for information. Data presented to an actor must be processed to a relevant information level discarding unnecessary data leaving a minimal information load for the subscribing/ receiving actor to handle.

Locations database.
Central Denmark Region will require a maintainable database for logical and physical locations. This database will be required to contain a unique identifiable representation of the Region's conceptual model for location.

Real-time.
Traceability of items and people moving around in a hospital implies a real-time perspective. The supplier must present a method for optimizing various categories of data-flows classifying them to identify scenarios for hardware and software scalability and subsequent provisioning the required infrastructure.

Technological agnosticism.
The overall solution must be technology agnostic. Layered and parallel methods supporting multiple reader-ID and data transport methods must be applied.

Open standardized interfaces.
Event and status information must be accessible through open standardized interfaces.

Information access.
Information access must be obtained through a principle of least privilege. Methods for information security in Central Denmark Region are based on the ISO27000 family of standards.

Performance surveillance.
The overall performance of the system and its functions must be able to be kept under suitable surveillance.

Multilayered positioning.
In order to obtain optimized localization of items and people, techniques for multilayered positioning may be necessary in certain use cases.

Strategic requirements.

This section lists and pins down requirements to the contractor of taking on the role of a strategic partner.

The contractor must have the essential qualifications for taking on the role of a strategic partner for Central Denmark Region:

- Insight in and proven experience with collaborative innovation models – e.g. participatory innovation and user driven innovation. The contractor will in the design contest suggest one or more concrete innovation models.
- Comprehensive experiences and capacities for advanced level system and software development.
- The contractor will suggest concrete models for:
    - Pricing.
    - Payment.
    - Financing.
- Insight in and proven competences related to the health sector in general and being in touch with clinical practice. The contractor must have employees with health care education and training.

- Insight in and proven competences related to logistics domains. The contractor must have high references on implementation of advanced logistics systems.
- The contractor must be able to demonstrate running installations – not necessarily in health care domains but matching in size and complexity.
- Insight in and proven competences related to relevant technologies of traceability and identification.
- Readiness to enter into the Region's business processes for technology adaptation.
- The contractor must match the preferred method of project management of the region: Prince2.
- The contractor must have proven experience with agile methods of development.
- The contractor must have a permanent focus on swift operations optimisation and optimisation for performance (not just in case of correction of errors but also changes due to changes in regulation or "cases").
- The contractor must suggest concrete and operational measurement points and methods for continuous demonstration of the intensity of his customer focus living up to a level matching his role as strategic partner.

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