Digitalisation of building components and systems

Using RFID to identify building components through the whole life cycle – from manufacturing to operation

GS1 Industry and Standards Event – 10.10.2017

Inge Aarseth
Project Manager Digital Collaboration and Interface Management
The Tønsberg Project
Vestfold Hospital Trust
Part of South-Eastern Norway Regional Health Authority

Key numbers

Vestfold Hospital Trust – some key numbers*:

- Specialist health care for ca 220.000 inhabitants in Vestfold county

- Have several sites in Vestfold

- Yearly man work: Ca 4.000

- Outpatient consultants: ca 350.000

- Number of beds: Somatic 400, psychiatry 190

- Budget: Ca 5 Billion NOK

- Ca 180.000 m2 – hospital areas

- Located 100 km south west of Oslo

- *Part of the South Eastern Norway Regional Health Authority.*

*2015

South Eastern Norway Regional Health Authority – some key numbers:

- Specialist health care for 56 % of the Norwegian population

- Have 11 Hospital Trusts

- Number of employees: Ca 77.000

- Budget: Ca 80 Billion NOK

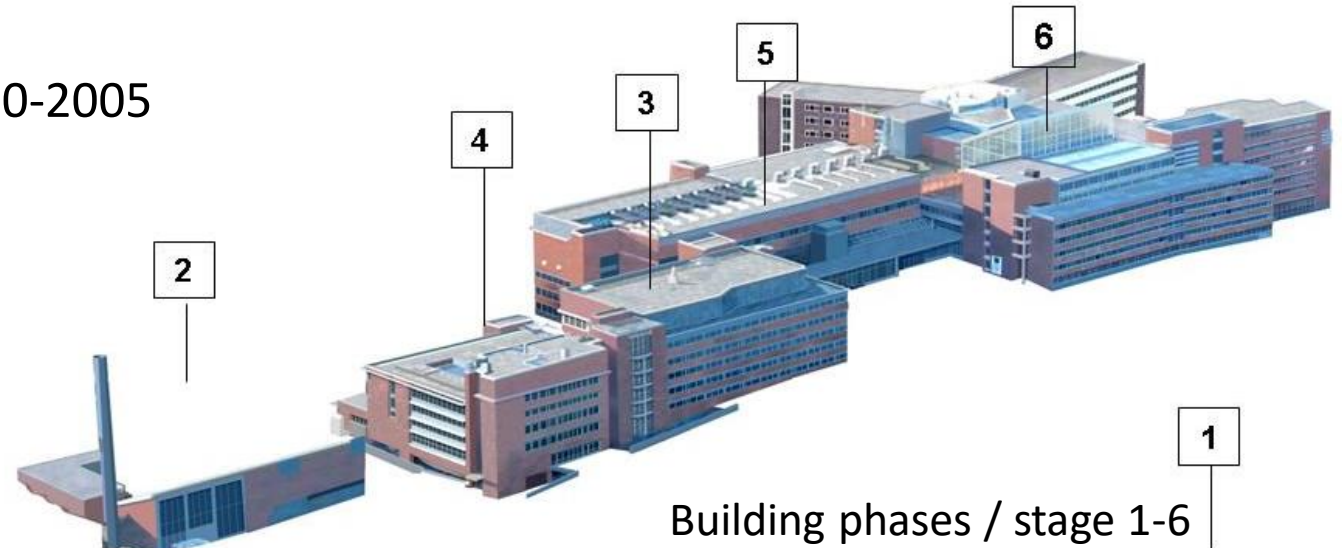- Ca 2.6 millions square meters hospital areas

Sykehuset i Vestfold

CURA

SKANSKA

Vestfold Hospial Trust

- Main Hospital Development Project – from 1990-2005
  on the main hospital site in Tønsberg:

  - Divided in 7 building phases /stages
  - 85% of the buildings area are "new"

Building phases / stage 1-6

- Several other building projects – from 2006
  - Drug addiction clinic
  - Psychiatry outpatient clinic
  - Multilevel parking garage with helipad

Sykehuset i Vestfold

CURA

SKANSKA

The Tønsberg Project

Project owner:

Sykehuset i Vestfold HF (Vestfold Hospital Trust)

Scope:

- Total ca 45.000 m2
    - Psychiatric building - 12.000 m2 – Finished in 2019
    - Somatic building -   33.000 m2 – Finished in 2021
- Ca 2,7 Billion NOK
- Project period : 2015 - 2021

Project goals:

- Zero injuries – no workplace crime
- 10% lower cost than comparable projects
- Built 50 % faster than comparable traditional projects (above ground)
- Use of open BIM (6D +) according to buildingSMART's open industry standards
- Zero building defects
- Industrialized building process

The Tønsberg Project (TP) – An IPD project

Integrated Project Delivery (IPD) Principles:

- Mutual Respect and Trust

- Mutual Benefit and Reward

- Collaborative Innovation and Decision making

- Early Involvement of Key Participants

- Early Goal Definition

- Intensified Planning

- Open Communication

- Appropriate Technology

- Organization and Leadership

Source: firstconsepts.com

Lean Construction in TP

- Last Planner
    - Master Scheduling
    - Phase Planning
    - Look-ahead/Constraint Planning
    - Pull Planning

- TVD/VDC/ICE in Design and Engineering
- A3 Process & Reporting
- Reliable Promising/PPC
- Continuous Improvement/Plus-Delta

Digital Collaboration

Vestfold Hospital Trust - The RFID journey

- We needed some kind of safety from theft of medical technical equipment and general user equipment in the 6th building stage – in 2003. Wanted to use RFID passive tags as a theft alarm, but discovered the RFID technology was not good enough for this purpose. Our journey with RFID started because of the potential for the hospital operations after the building project was finished – if all the equipment was RFID tagged. Ended up with a barcode marking and a separate theft protection system on most of the equipment (several thousands units) transported into the hospital.

- In 2009 we started to establish Facility Management requirements for our new BIM *(Building Information Modelling)* projects and RFID came on the agenda once more. Contacted GS1 Norway to get advice and we concluded that SGTIN was the best standard and technology available. This was written into our requirements for three projects, where we had to establish a basis for our future usage:
  - **First project**: The contractor didn't understand and we didn't have the resources to follow up. ☹
  - **Second project**: Partially implemented by the sub-contractors, but not connected to BIM or a FM system – due to lack of system
  - **Third project**: Implemented for most of the building elements – by the sub-contractors, however not connected to a FM system. Understood that the RFID tag have to be established by the manufacturer. Tried to use it on the building logistics but the software was not adapted to RFID tag – only barcodes.

Exploiting the potential of the digital building (BIM) and processes

Source: free-images.gatag.net

Today - (only 10% of the potential of the digital building is exploited in digital tools and BIM?) :

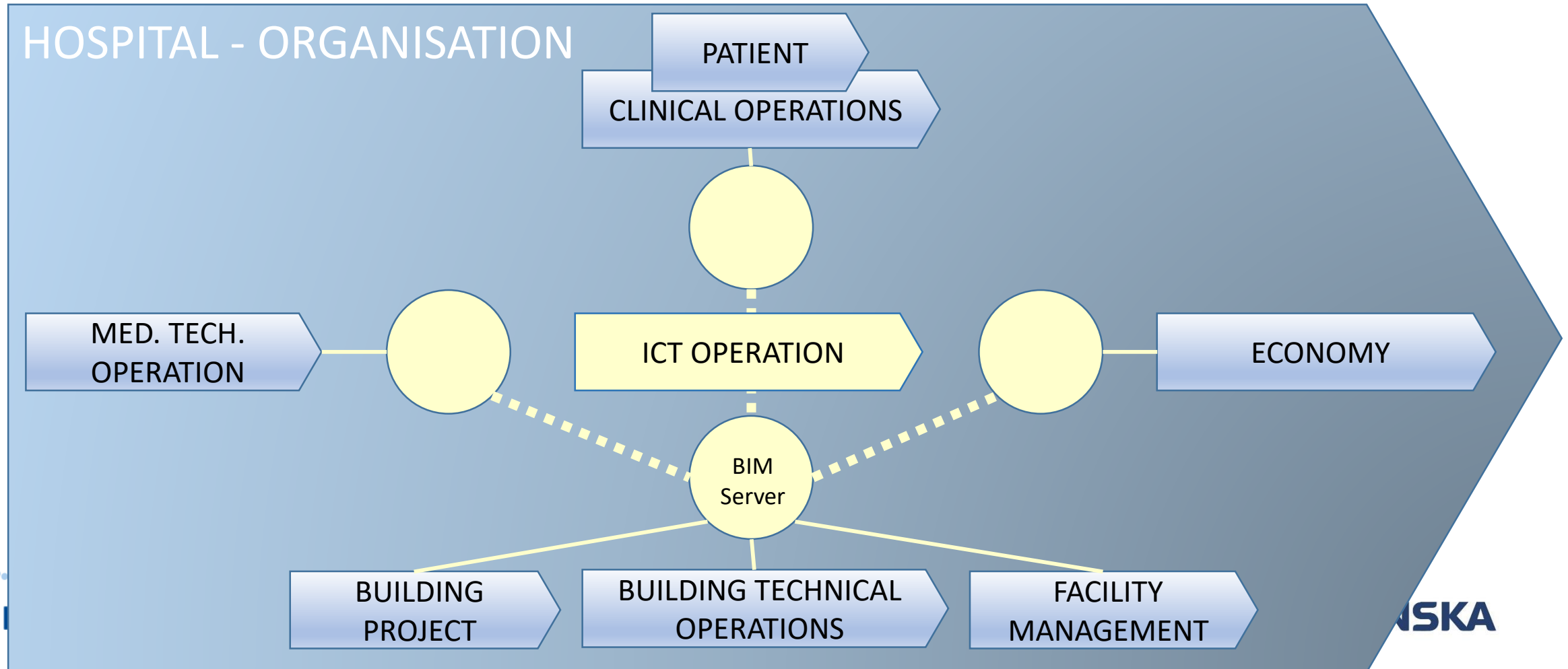- Project execution / coordination
- Some use in Facility Management

New potential areas – (90% (?) integrated digital solutions and BIM) :

- Connecting the value chain in the project implementation, both design and construction
- Establish new integrated processes

- BIM in operation and FM, ex:
    - Tight integration of the digital building with the organisations main processes
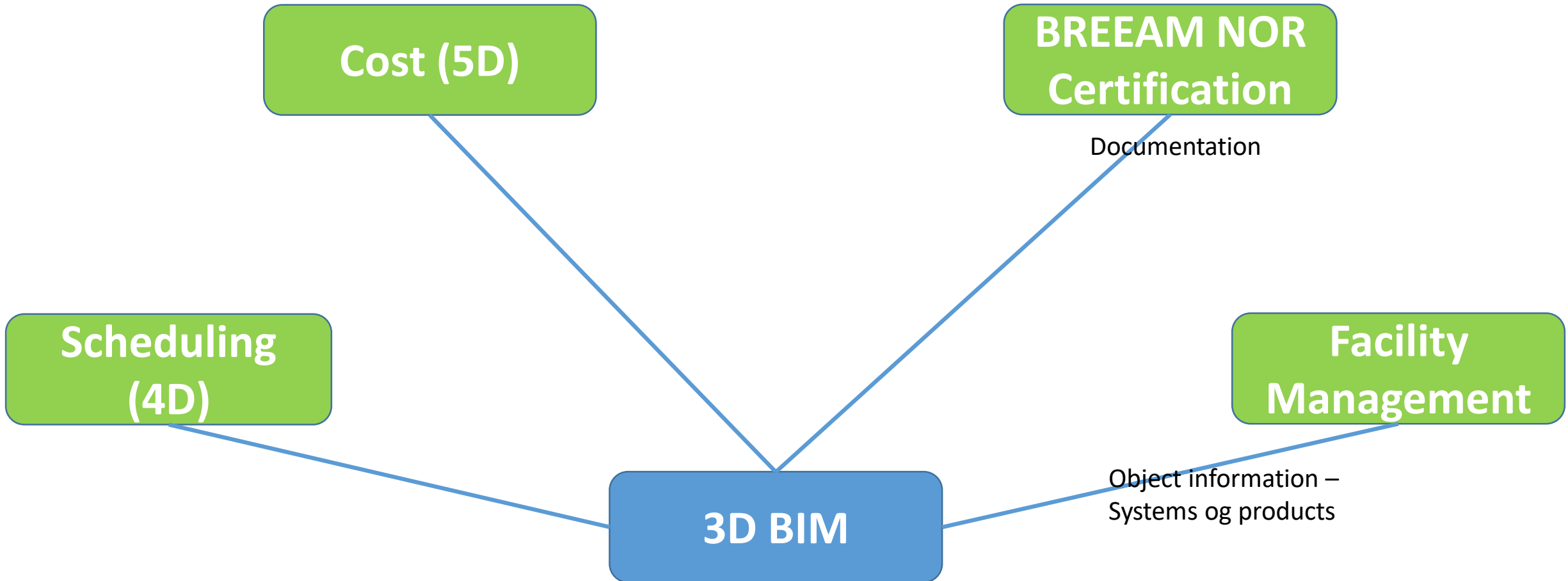   - Easy access to information of the buildings components and systems
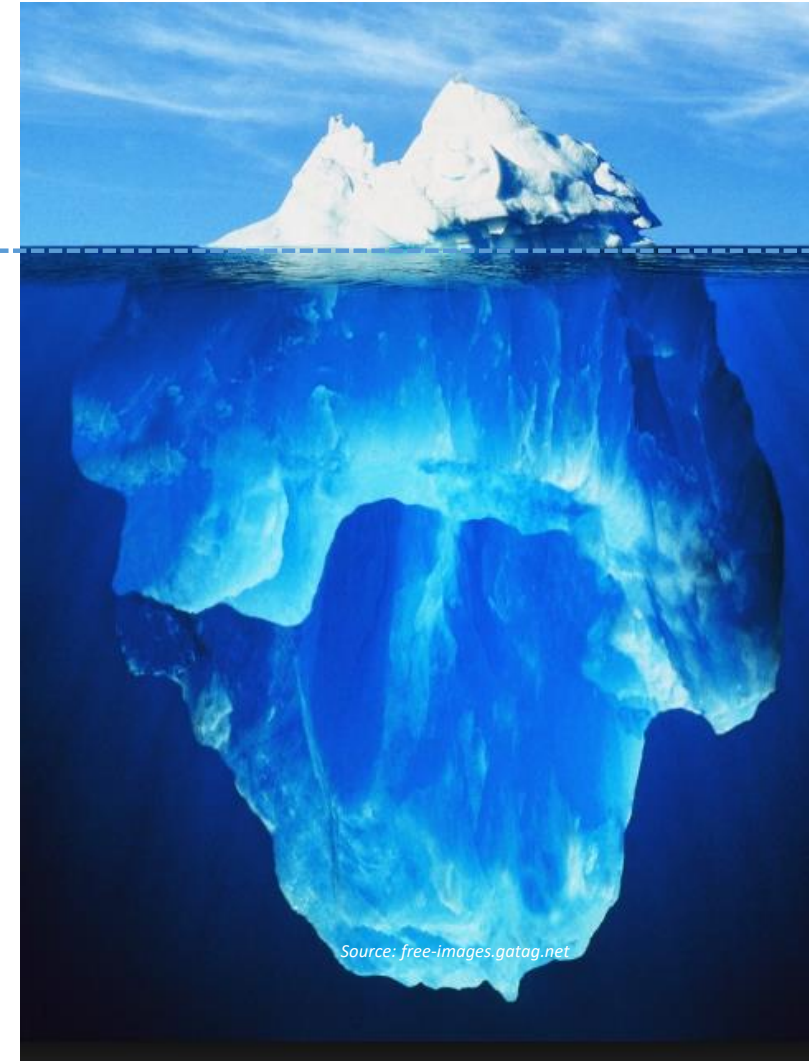
Enterprise BIM (EBIM)
– how to connect the organisations different value chains to the building – from the building project starts?

BIM requirements in the project

Cost (5D)

BREEAM NOR Certification

Documentation

Scheduling (4D)

Facility Management

3D BIM

Object information – Systems og products

Main targets for our Facility Management (FM) BIM

Create FM BIM through design and production.

- BIM based FM information System

- Complete product data and system data available
 in the field

- System- and Product register

Facility Management BIM

FM-BIM:

- As-built model, where As-built = AS BUILT, and not just a generic representation

- Technical documentation easy available both in project execution and in building operation through the whole

  life cycle – connected to the digital building model (BIM).

  - Product Data for each product/object and system

  - Documentation (Service manuals, Instructions, etc.)

- Easy identification in the operational phase of the building (SGTIN on RFID-tags)

BIM-server *(Jotne EPM)*

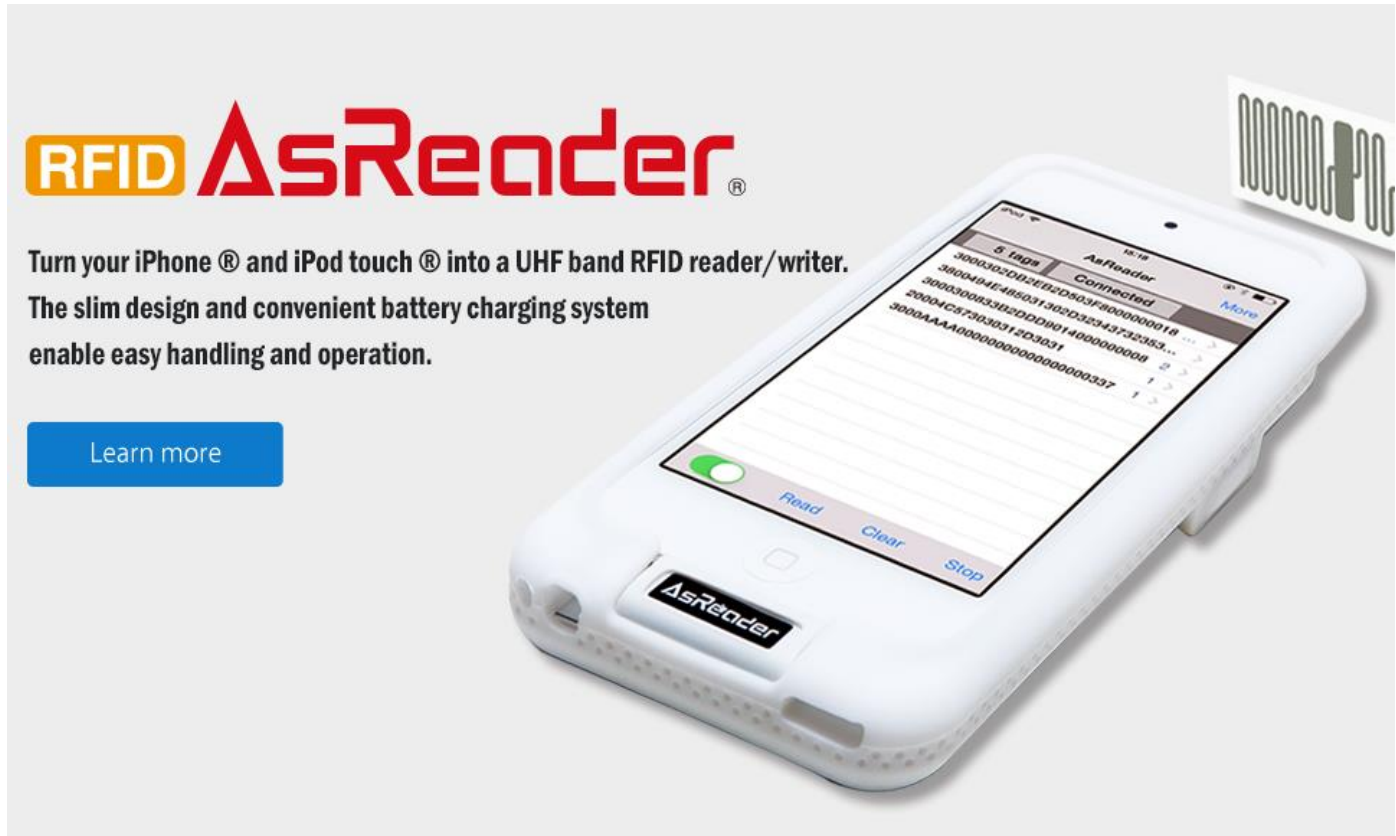| ISSUE MANAGEMENT SYSTEM	SYSTEM AND PRODUCT REGISTRY	Other modules

GEOMETRY
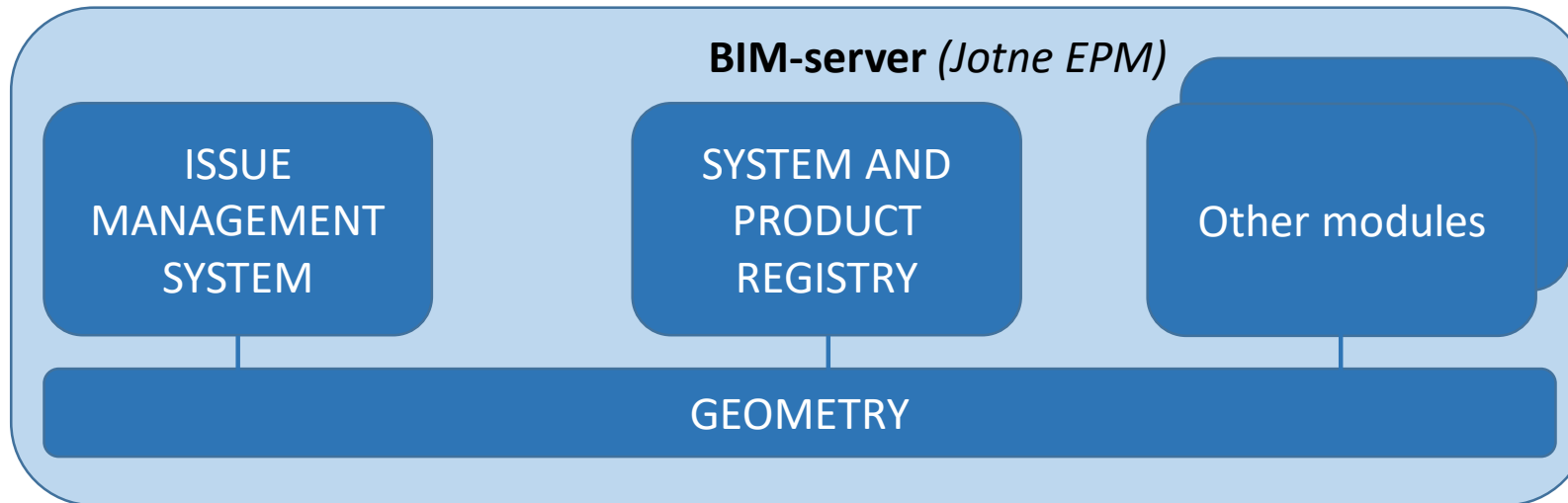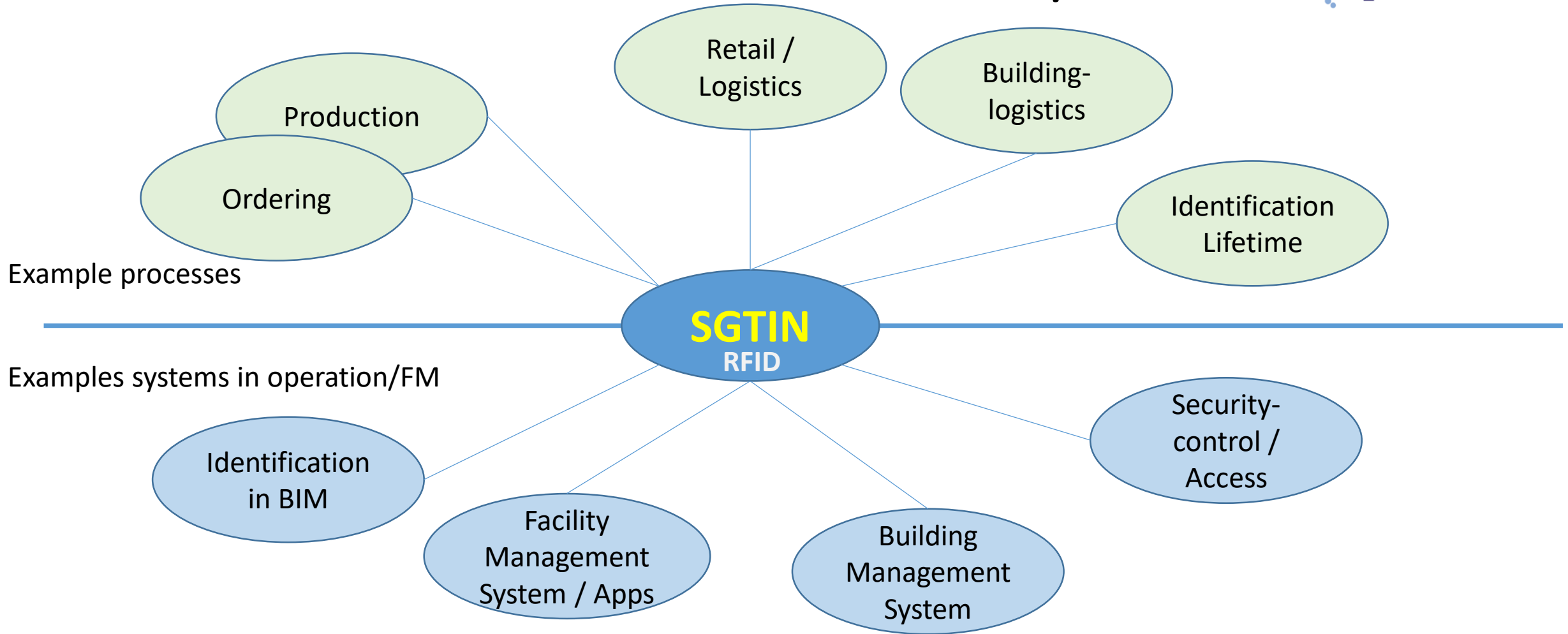
Type of products to be RFID-tagged with SGTIN

- In principle – should all objects in the building have an unique identification (SGTIN / RFID tag - passive), from their manufacturer. (Possibility to get full control of construction logistics)

- However – in the beginning we will focus on :

  - Products / objects which is regularly maintained like doors/windows/light fixtures etc.

  - Products connected to different systems (ex. Building management systems) and products need some kind of service and attention or have user interface.

Information Logistic
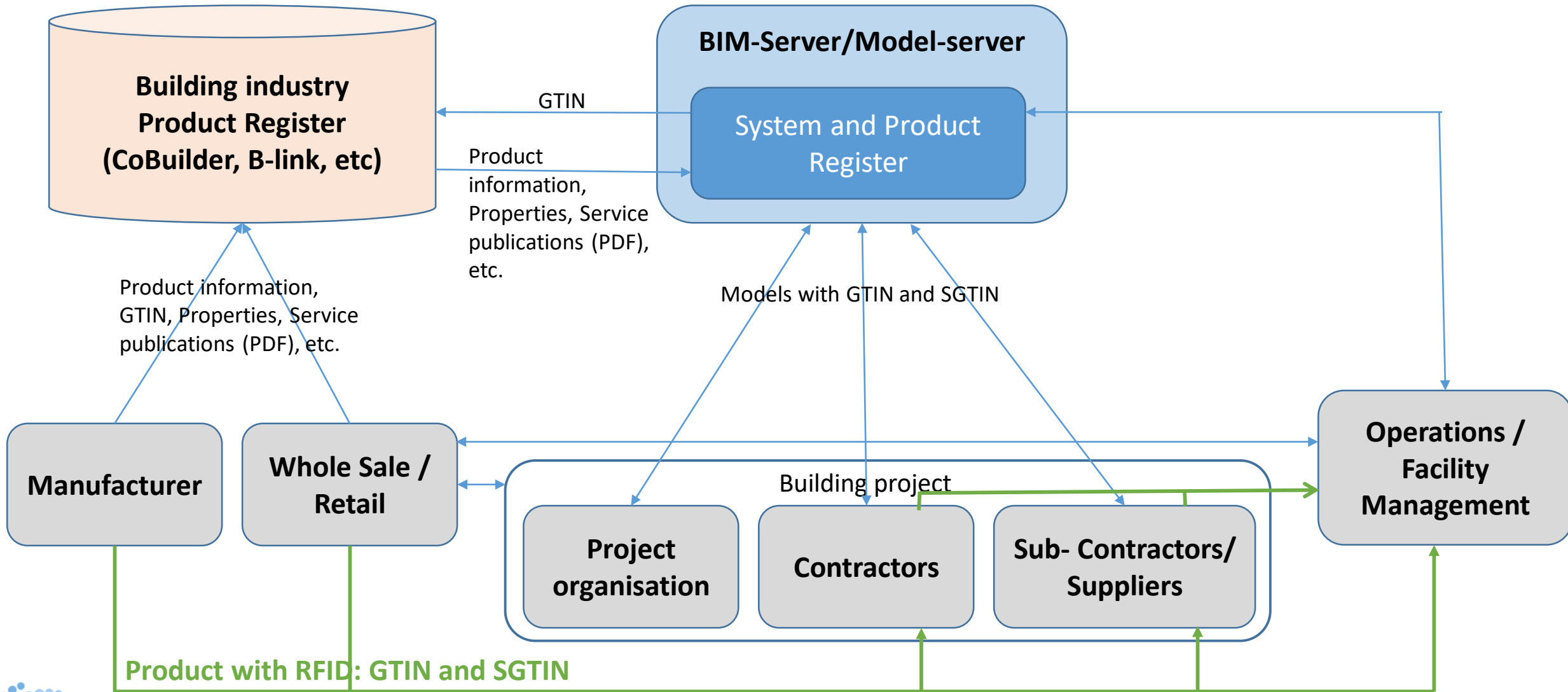
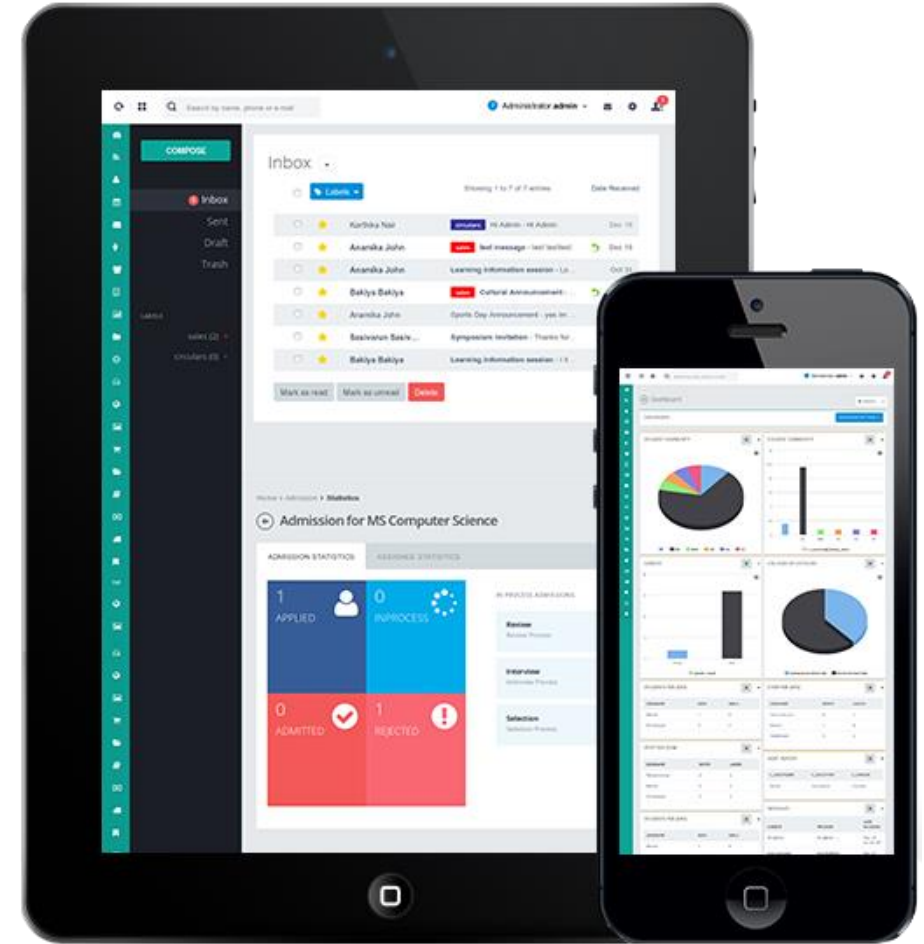# RFID – partner with knowledge of Mobile solutions, RFID and user interface

Picture- Source : asreader.com

Picture- Source : creatrixcampus.com

RFID – GTIN / SGTIN requirements – *to be updated*

RFID tags shall satisfy the following requirements:

- Passive type RFID according to ISO 18000-6C

- Satisfy the GS1 EPC Global Tag Data Standard 9

- Environmentally protected against metal, water (submerged), wear and tear.

- The tag shall be placed inside of the main product – protected from the possibility to be easy dismounted, but readable from the outside.

RFID tags for products (components/products) shall contain the SGTIN number from the original manufacturer.

RFID – tag information

RFID UHF tags Memory:

Type	Mandatory information (Pre purchase programmed)	Wanted information (Post purchase programmed)
EPC Memory Bank	• **SGTIN**	
User Memory Bank		• Local Product Identification Number (Local TFM) • National Product Identification Number (TFM) • ISO Product Identification Number (International TFM)
Reserved Memory Bank		
TID Memory Bank		

If possible – we would like to have the possibility to add information to the RFID-tag at a later stage (after the product has left the manufacturers location)

Some considerations

- Security – avoid information about the building components to be to easy accessible for the public

- The level of maturity in the market. It is not common to use SGTIN at the moment.
  - The industry need to se the benefits for themselves and the usage in logistics
  - One global unique building product identification method, will give huge benefits to the software industry?

- Building owners need to give directions to the market
  - Statsbygg – one major public builder in Norway, has also discovered the possibilities in the usage of RFID with SGTIN and will start a minor pilot project in 2017.

Challenges to the industry

- Establish standards (national / global ?) for the usage of SGTIN in building products:
  - Who – shall establish the RFID tags → The original manufacturer
  - When – shall the RFID-tags be established (pre/during production or post production)
  - How – and where shall the RFID-tags be implemented into the building objects. (It is smart that the RFID tag is placed in the same "corner" – even from different door manufacturers.
  - What - type of RFID-tags are preferred (life time considerations)

- Give manufacturers arguments for using SGTIN in their production process / internal value chain – not proprietary solutions.

Questions?

www.tonsbergprosjektet.no

We have our own App, where you can get the latest information about our project (click on the symbol)

Search for TP at IOS App Store or Google Play.