
RFID
JOURNAL
LIVE!
20
YRS
2003 - 2022
MAY 17 - 19, 2022
MANDALAY BAY | LAS VEGAS, NV

RFID/IoT for Warehouse and Inventory Management

Designing Your RFID/IoT Solution

Presenter: Samad Rostampour
Professor, Vanier College and IT director @ IoT Lab, Université du Québec à Montréal (UQAM)
With the **collaboration of Ygal Bendavid**
director @IoT Lab, Université du Québec à Montréal (UQAM)

RFID JOURNAL LIVE!

MAY 17-19, 2022

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- SPEAKERS
- KEYNOTES
- INDUSTRY TRACKS
- BATTERY-FREE BLUETOOTH TAGGING WORKSHOP
- FAST-TRACK RFID TRAINING
- CO-LOCATED EVENTS
- 2022 PRESENTATIONS

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AGENDA AT A GLANCE

2022 BROCHURE

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Exhibit /Inquire

Today's Program

- 10:45 AM - 11:30 AM: RFID/IoT in Warehouse & Inventory Management Basics
- 11:30 AM - 12:15 PM : Linking RFID to Inventory-Management Best Practices
- 12:15 -13h00 PM : Lunch time
- 1:00 PM - 1:45 PM: Targeting the Correct RFID Technology for the Right Project
- 1:45 PM - 2:30 PM : Key Steps in Building an Inventory-Management RFID Solution: Build Your Own RFID Portal
- 2:30 -2h45 PM : Break time
- **2:45 PM - 3:30 PM: Designing Your RFID Solution**
- 3:30 PM - 4:15 PM: Building Your RFID Business Case

Your Presenter

Samad Rostampour

- Professor @ Computer Science Department, Vanier College, Montreal
- IT Director, IoT lab., UQAM University, Montreal (https://labiot.uqam.ca/)
- Judge @RFID Journal Award

LABO IOT Internet des Objets ESG UQÀM

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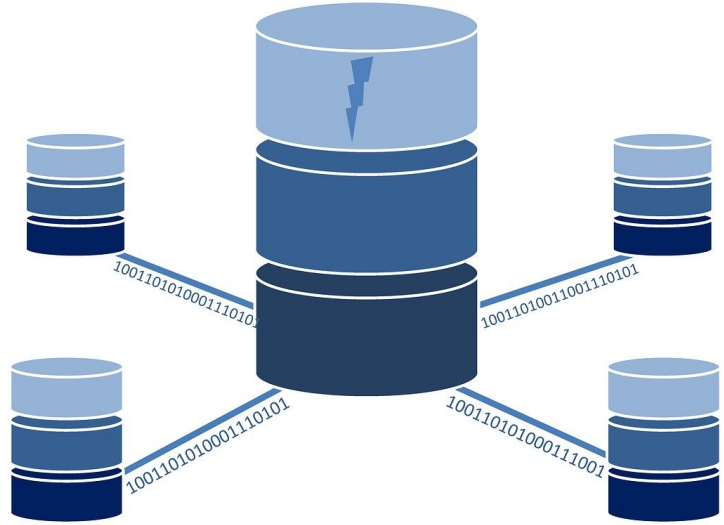
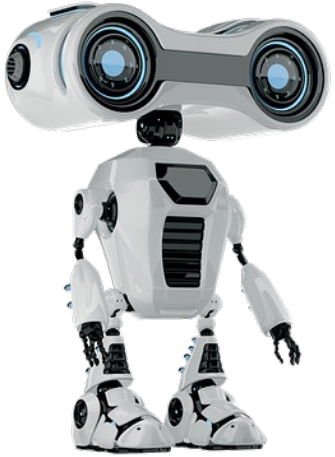
Objective of the presentation

- **Moving from ideas to projects: a PLC perspective**
- Building different RFID scenarios
- Assessing the impacts of business scenarios on the RFID solution's design
- Conducting trade-off analysis & selecting the right design

Context of the presentation

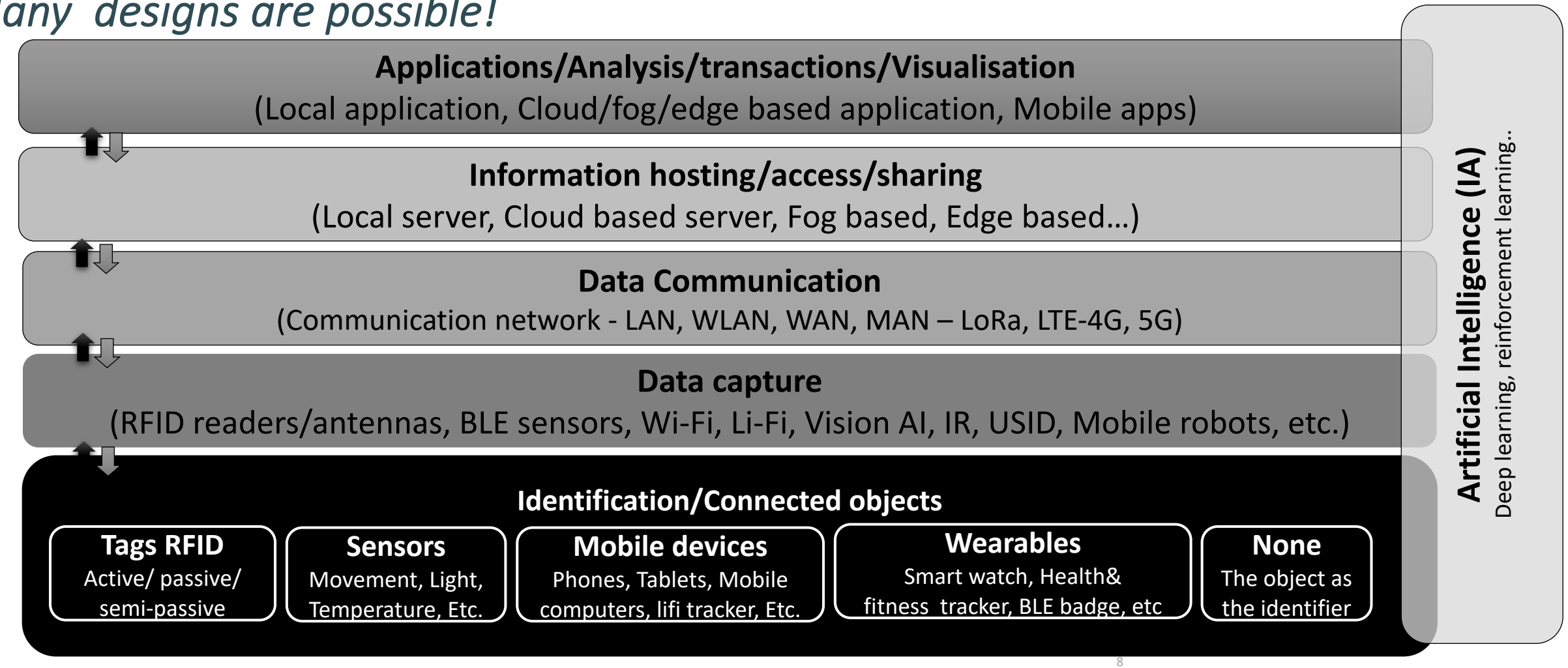
There are various ways to deliver a solution





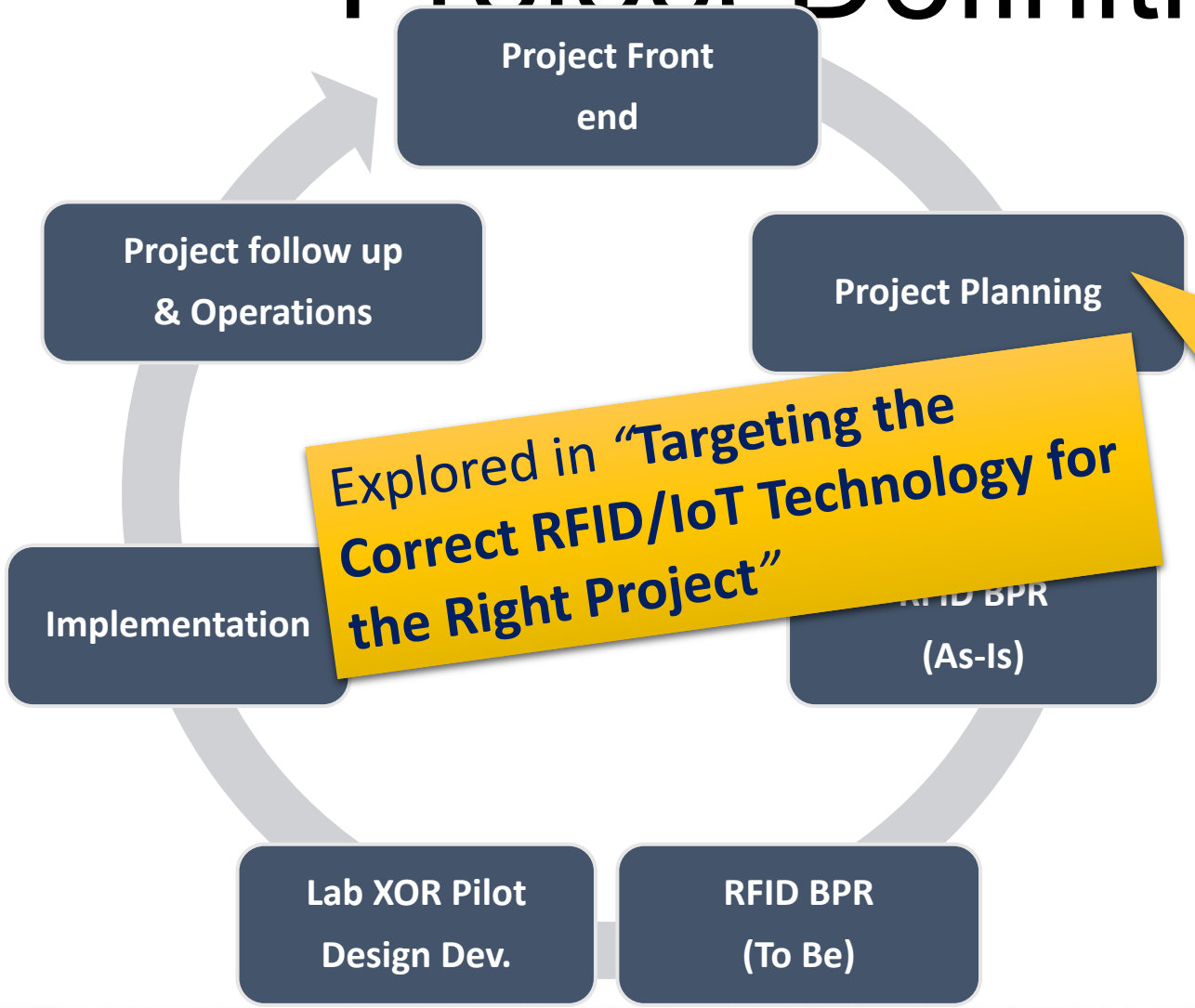
RFID-IoT multi-layer system

Many designs are possible!



Project Definition and planning

RFID Project life cycle



Explored in **"Targeting the Correct RFID/IoT Technology for the Right Project"**

- **<u>Project Definition/requirements</u>**
- Project initial planning & comm.
- High level Business case / value
- Project / Pilot site pre-selection
- Team building & Education

Project Management BOK

Project Management

Project integration Management	Project Scope Management	Project Time Management
Develop Project charter Develop preliminary project scope management Develop PM Plan Etc.		
Project Cost Management	**Project Quality Management**	**Project HR Management**
Project Communication Mgt	**Project Risk Management**	**Project Procurement Management**

Source: Adapted du PMBOK

Objective of the presentation

- Moving from ideas to projects: a PLC perspective
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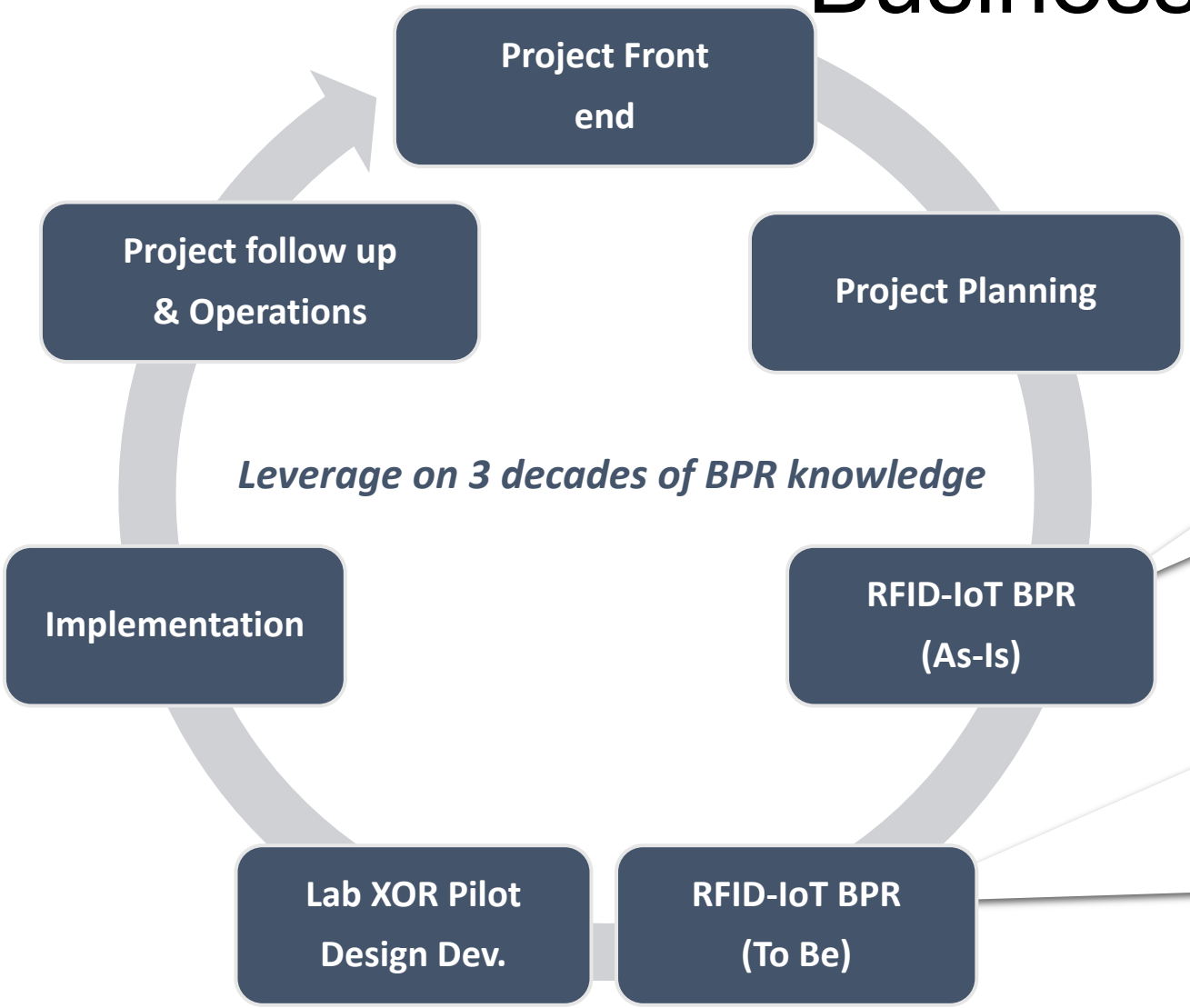
- Conducting trade-off analysis

Business Process Reengineering

In the RFID Project life cycle

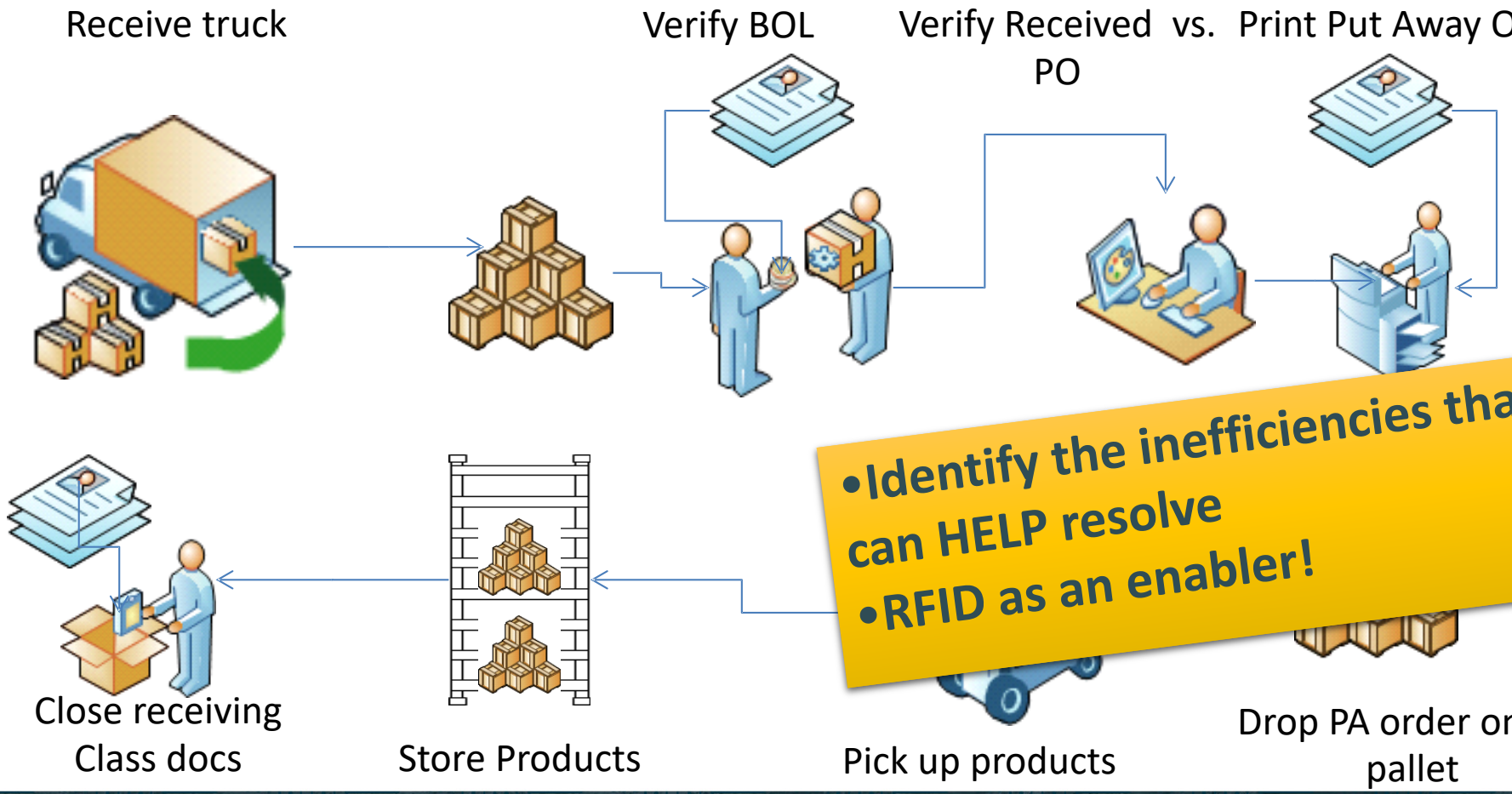


- Operations & process analysis (models) / Performance assessment

- Benchmark analysis & Re-design processes (scenarios)
- Project (Re)Scoping, & revised planning
- Business case & scenarios sensitivity analysis
- Impact analysis & trade-off

Business Process Reengineering

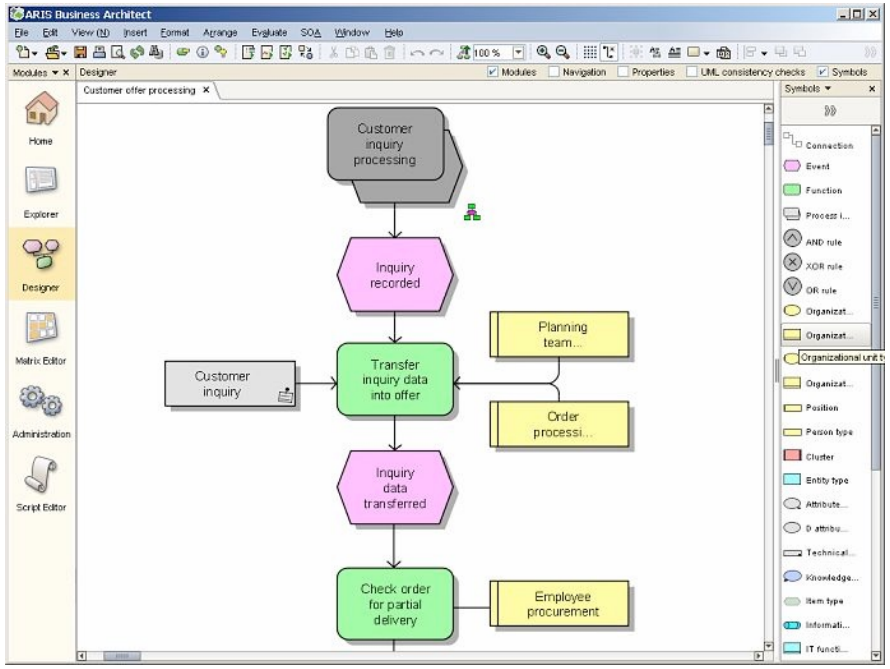
A High Level Example

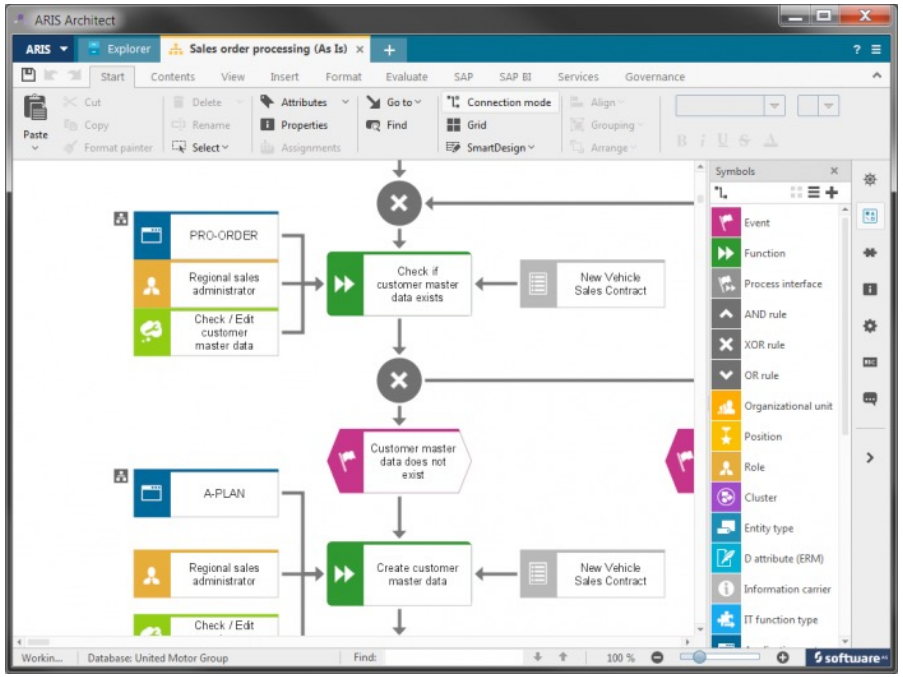


Data analysis & Sol. Development

Use Process Modeling Methods & standards

For example: *'Event-driven process chain' (EPC)* modeling language to describe business processes & workflows





Data analysis & Sol. Development

Design "to Be" business & technological Scenarios

Manufacturer Activities
Assembling

Distributors Activities
Storage & distribution

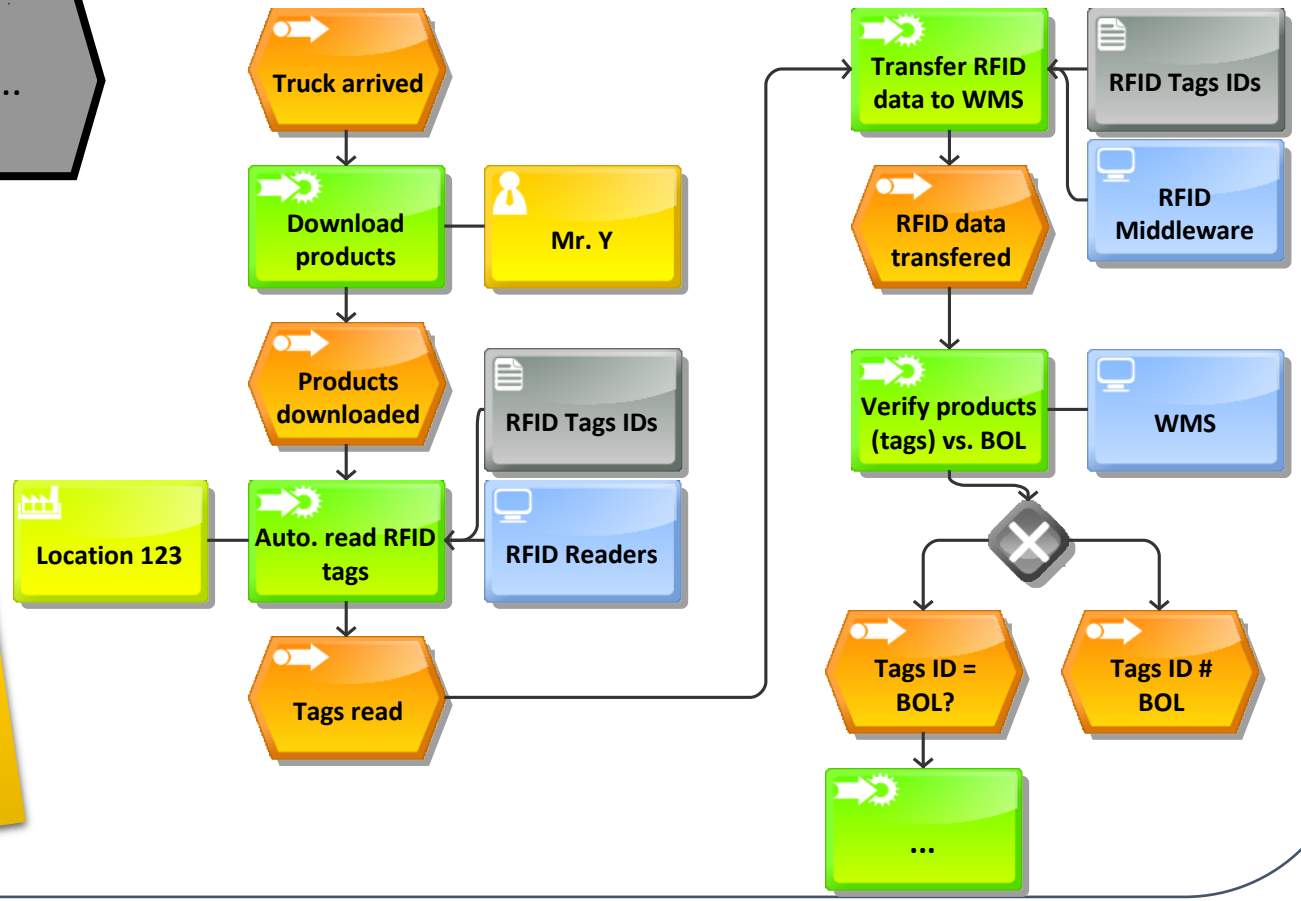
Retailers Activities
Storage & distribution

..

Plan

Source

Deliver

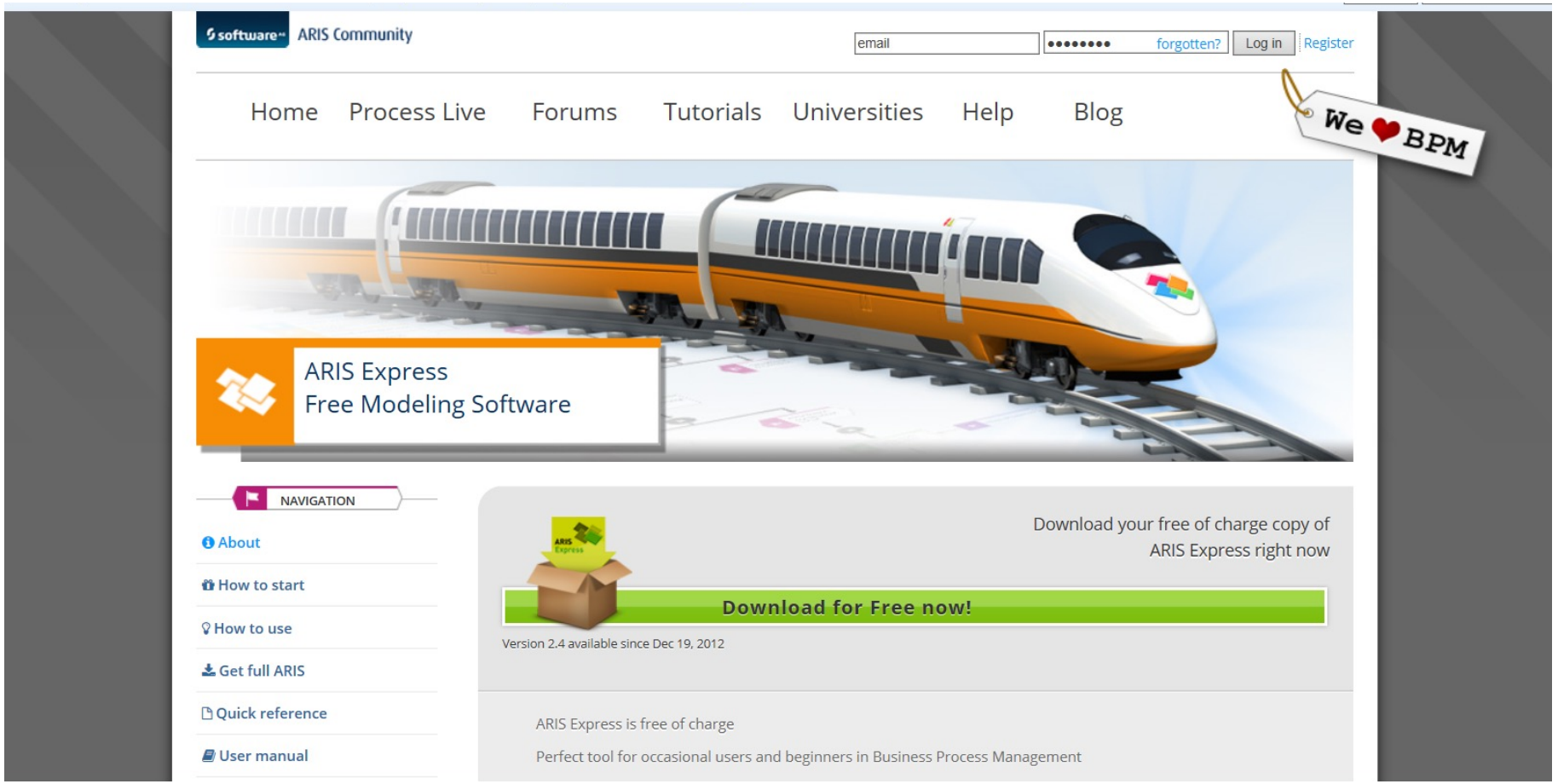


Remember that any revision of the redesigned scenarios directly affects the business case - sensitivity analysis

Source: Academia RFID – RFID Pro certification

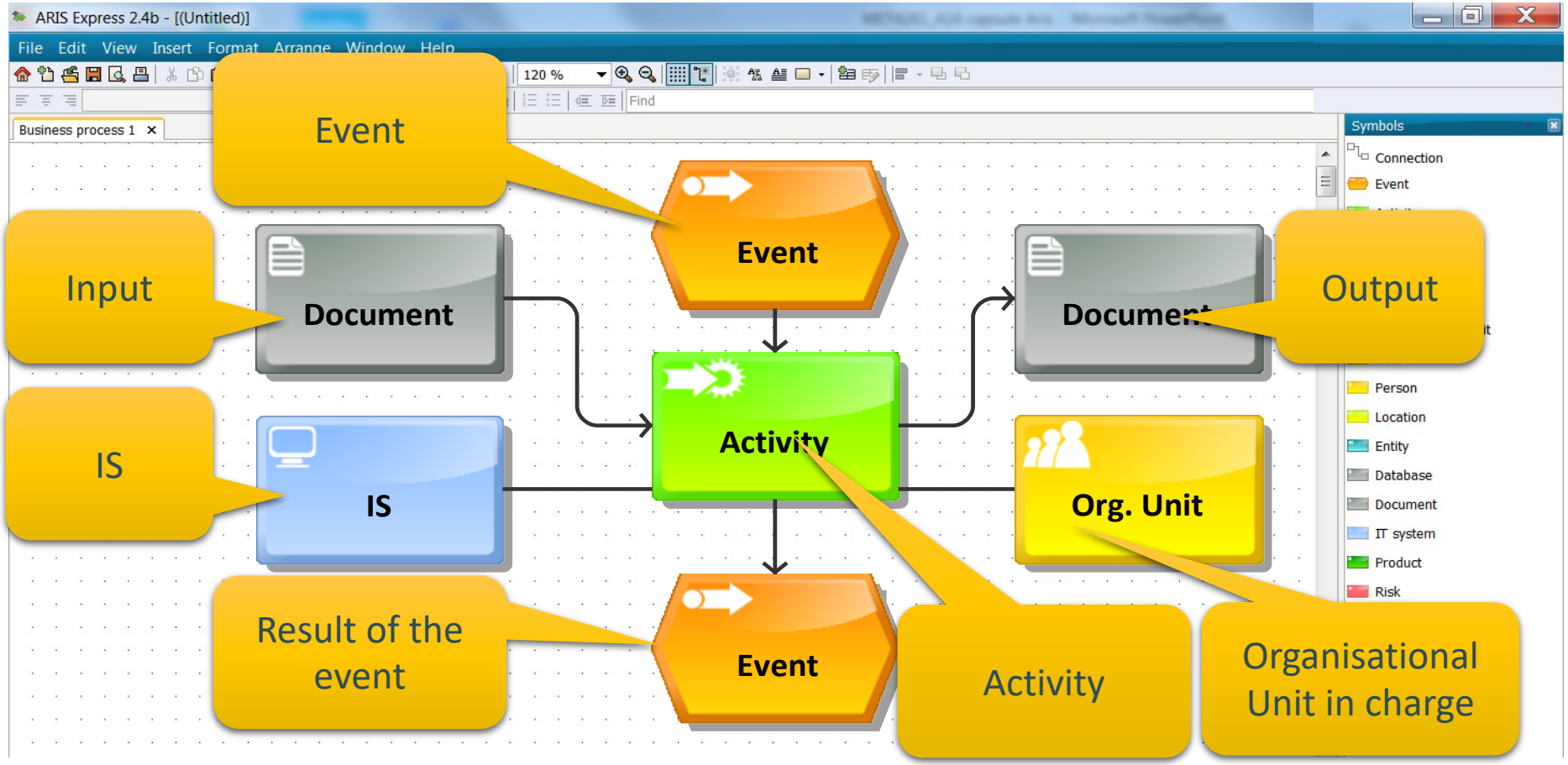
Data analysis & Sol. Development

Use Process Modeling Methods & tools



Data analysis & Sol. Development

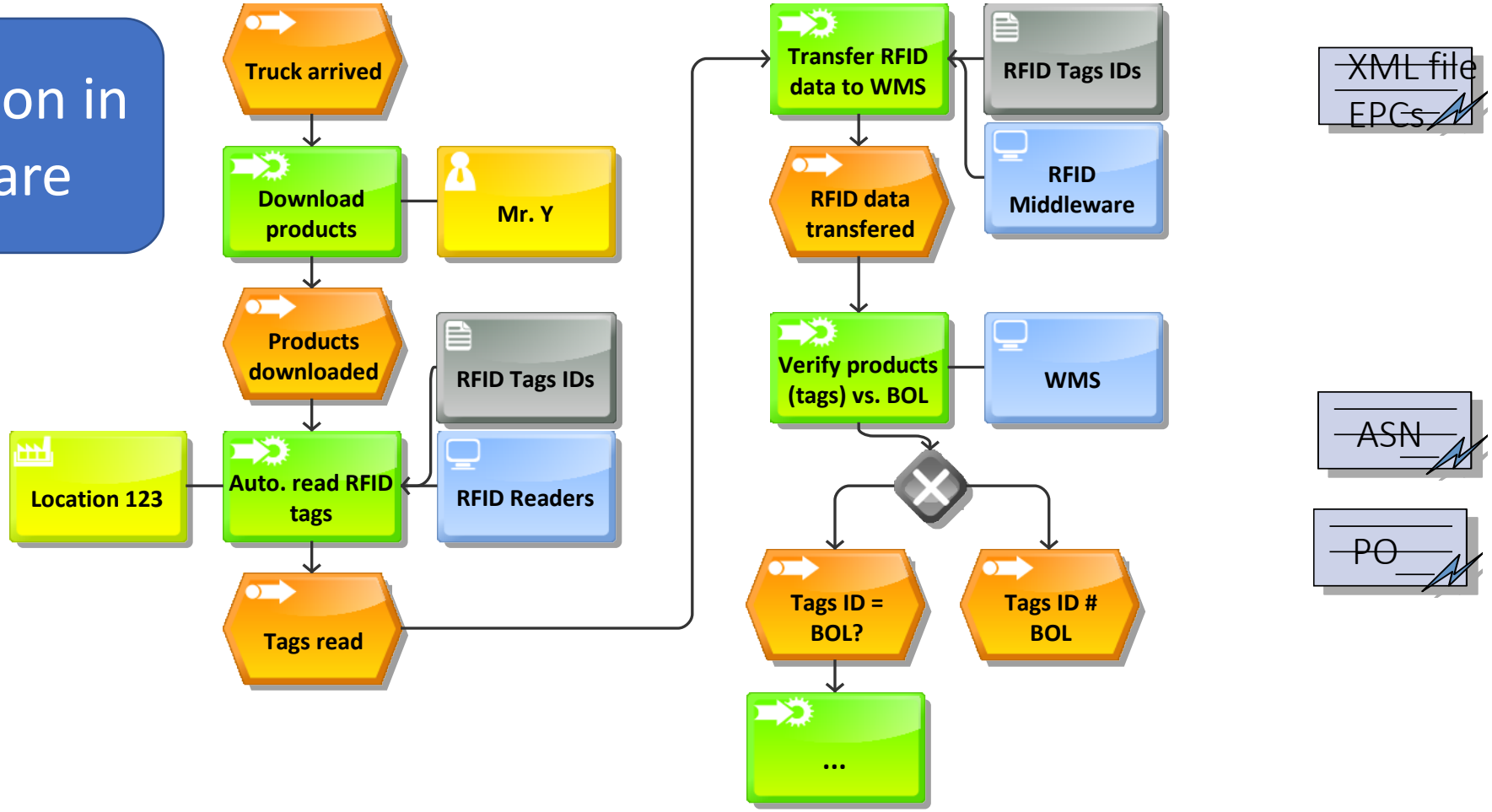
EPC modeling language- The logic for process mapping



Data analysis & Sol. Development

Build your scenarios (an example for receiving)

Implementation in ARIS Software



Data analysis & Sol. Development

Build your scenarios (an example for receiving)

What type of tags?

What type of readers?

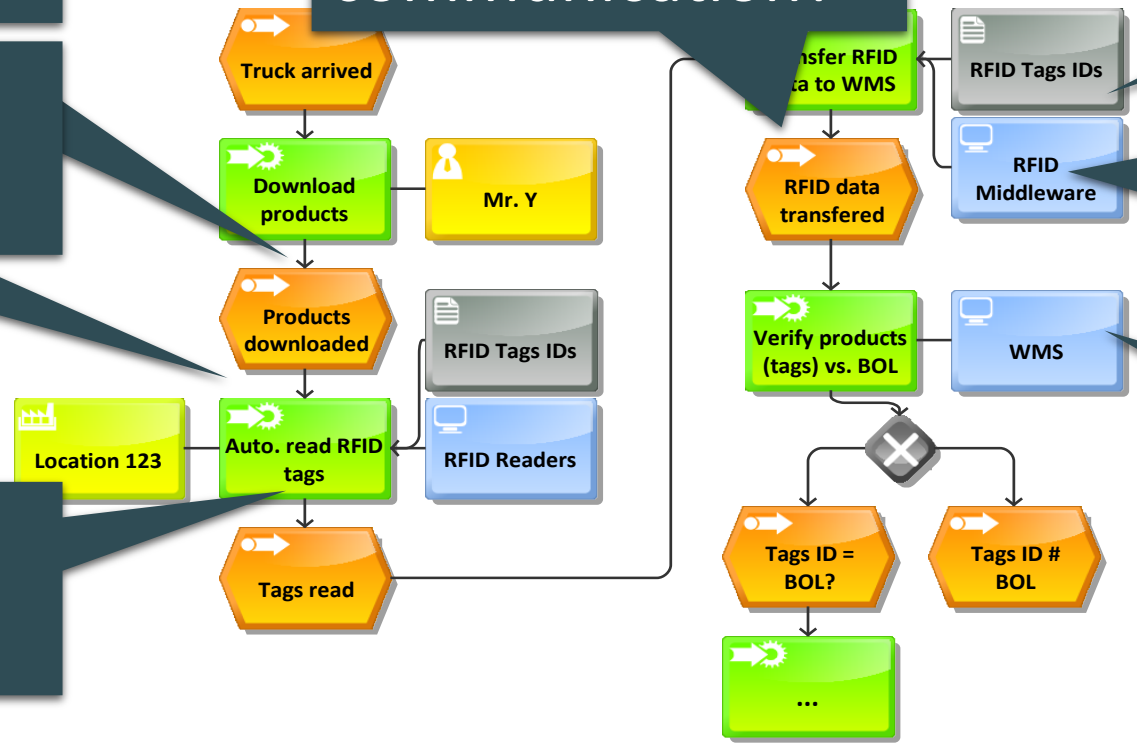
What type of feed back devices?

What type of communication?

What type of data formats?

What type of Middleware platform?

What type of integration?



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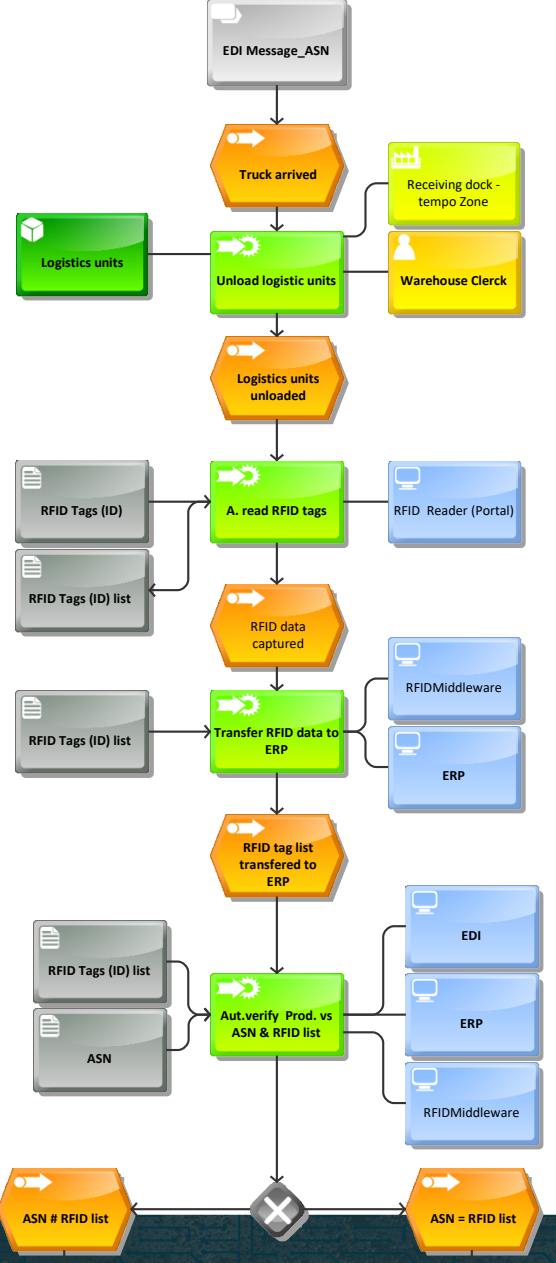
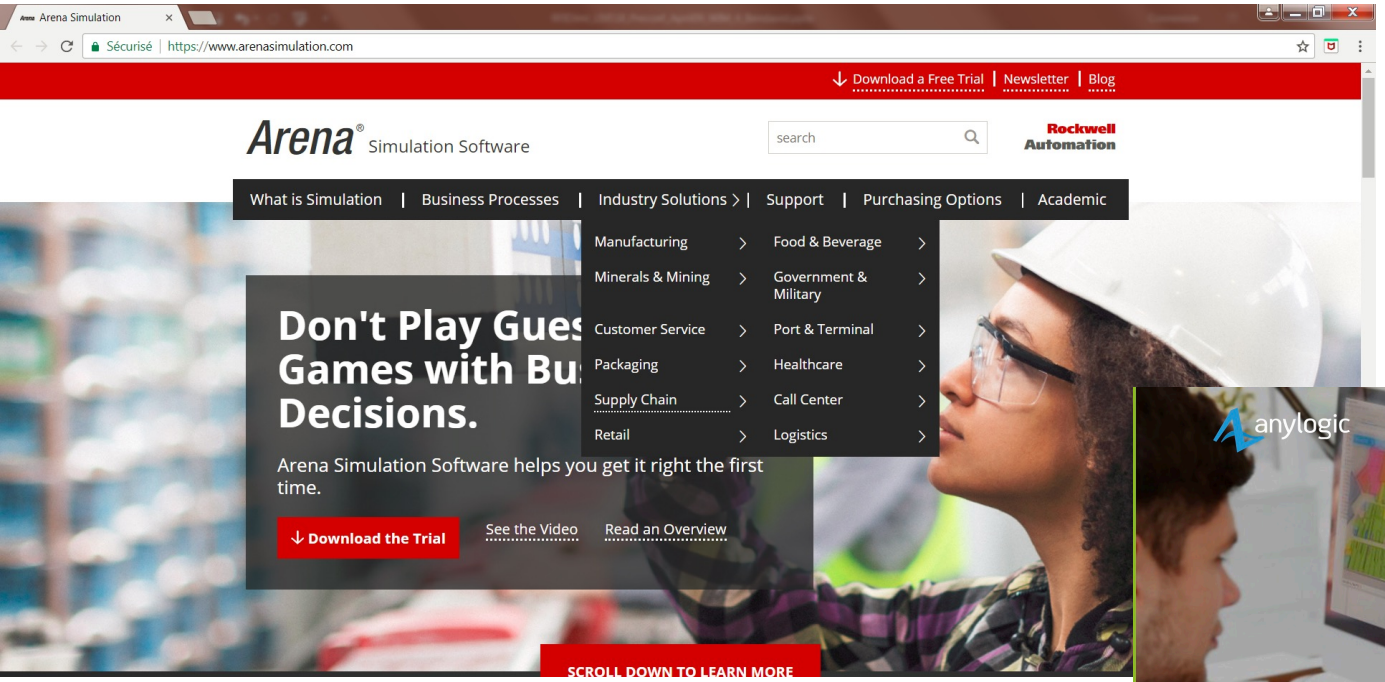
Data analysis & Sol. Development

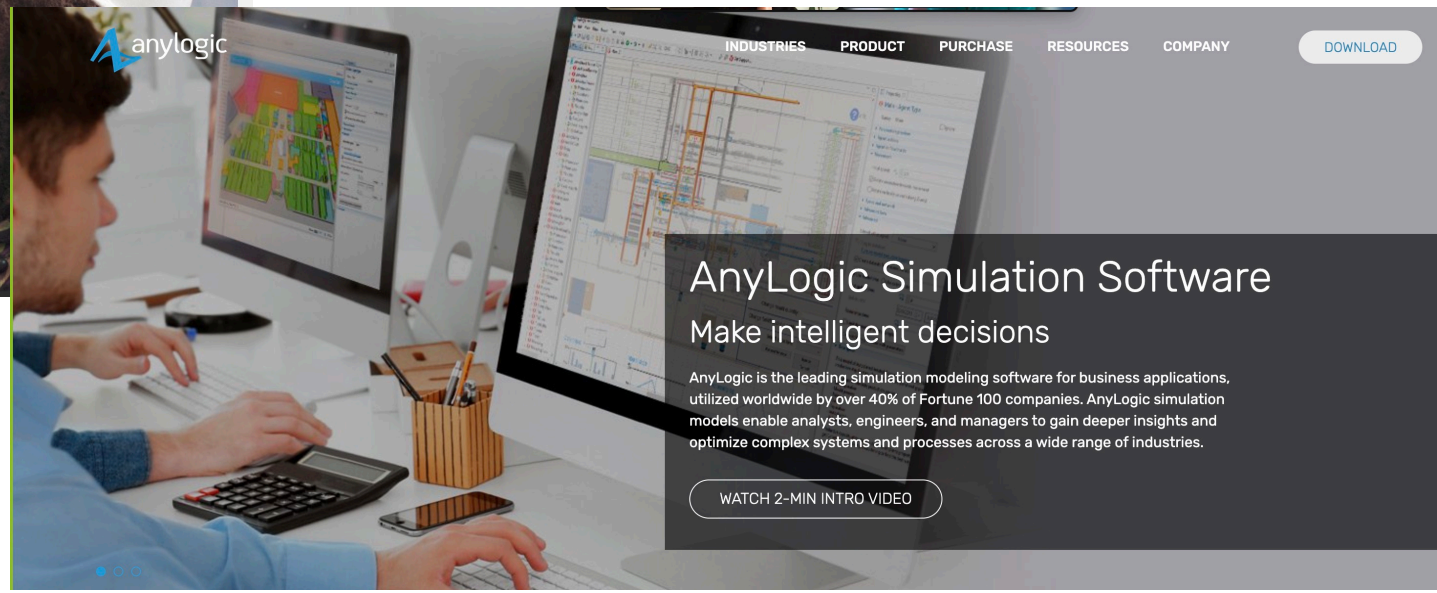
Build & assess your scenarios - Using BPR approaches



Data analysis & Sol. Development

Build & assess your scenarios - Using simulation tools





https://www.arenasimulation.com/

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- **Conducting trade-off analysis & selecting the right design**

Select the RFID tech. for your case

RFID system requirements & Trade off analysis

Example: Tags Requirements	Option 1	Option 2	Option 3	Option n
Approximate Price (USD)				
Life Cycle				
Read / Write Range				
Read / Write Speed				
Data Capacity				
Operating Temperatures				
Shape and Size (Form factor)				
Etc.....				

- Build similar matrix with each RFID system layer (tags, reader, middleware, etc.)
- Needs vs. wants

Designing an RFID-IoT solution

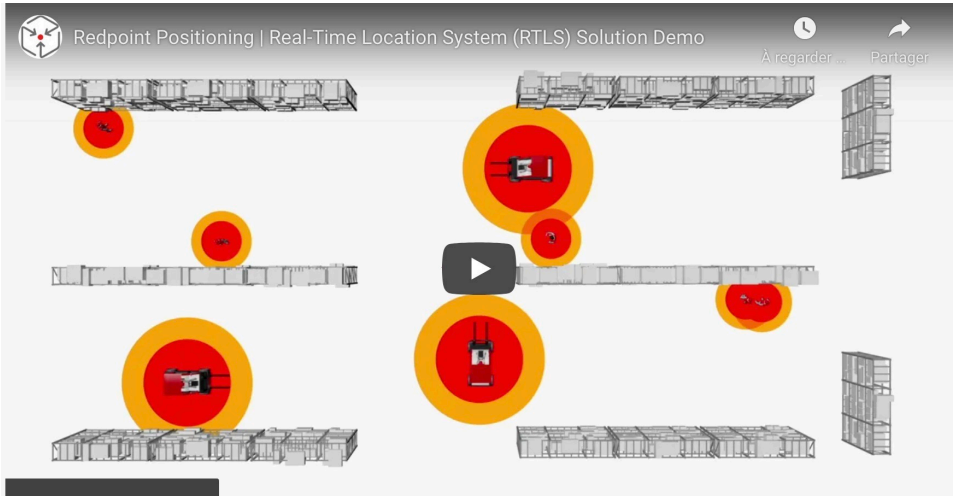
An example

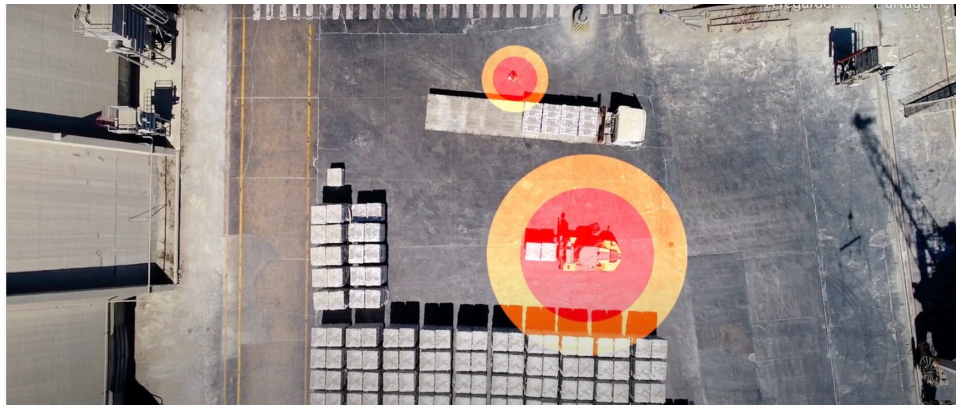
Image par Robin Higgins de Pixabay

- How can you track this forklift in a closed warehouse?
- How can you track the transactions related to this forklift?

Forklift tracking

FIRST OF ALL Define the objective(s)





- REDUCE Warehouse management inefficiencies
- BE ABLE to assign picking request to a forklift
  - HAVE visibility on real time location
  - HAVE visibility on activity (idle movement)
- Accidents in the warehouse and the yard
  - PREVENT Speed riding
  - ALLOW visibility on approaching vehicles
    - Prevent/reduce accidents
  - ALLOW visibility on approaching employees
    - Prevent/reduce accidents
- IMPROVE vehicle maintenance Process
  - REDUCE Idle time
  - …

UWB Contestants Propose Tracking Pets, Forklifts, Elevator Use

Dec 7, 2020 ▸ by Claire Swedberg

Sewio launched its Digital Hero contest in September, offering enablement kits to three finalists with the best ideas, and received nearly six times the number of responses it expected, ranging from industrial to healthcare and COVID-19 management.

Four Naval Shipyards Deploying Forklift-Based RFID System

Feb 12, 2019 ▸ by Claire Swedberg

The National Center for Manufacturing Sciences is preparing to deploy UHF RFID readers from Venture Research at the Puget Sound Naval Shipyard this spring, followed by three more piers, to manage container location and movement.

Mine-based Ultra-wideband to Cut Contacts, Collisions and Track Assets

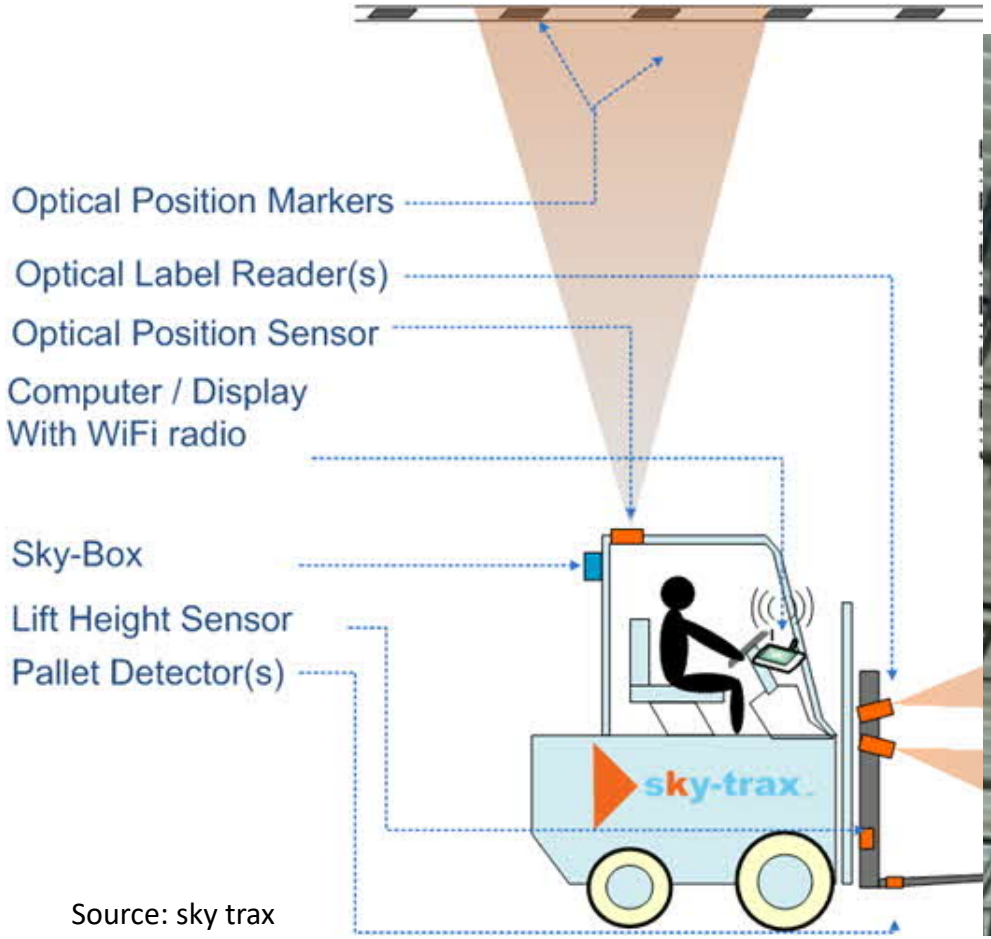
BY CLAIRE SWEDBERG

Redpoint Positioning's system is being tested at large-scale mines in North America and Asia to track the locations of people and vehicles for safety purposes, as well as to trace contacts for disease prevention and find tools and equipment.

Nov 15, 2021 Some mines are expanding the ways in which they use ultra-wideband (UWB) technology, by testing a solution that

Designing an RFID solution

Option 1: Bar codes of the ceiling



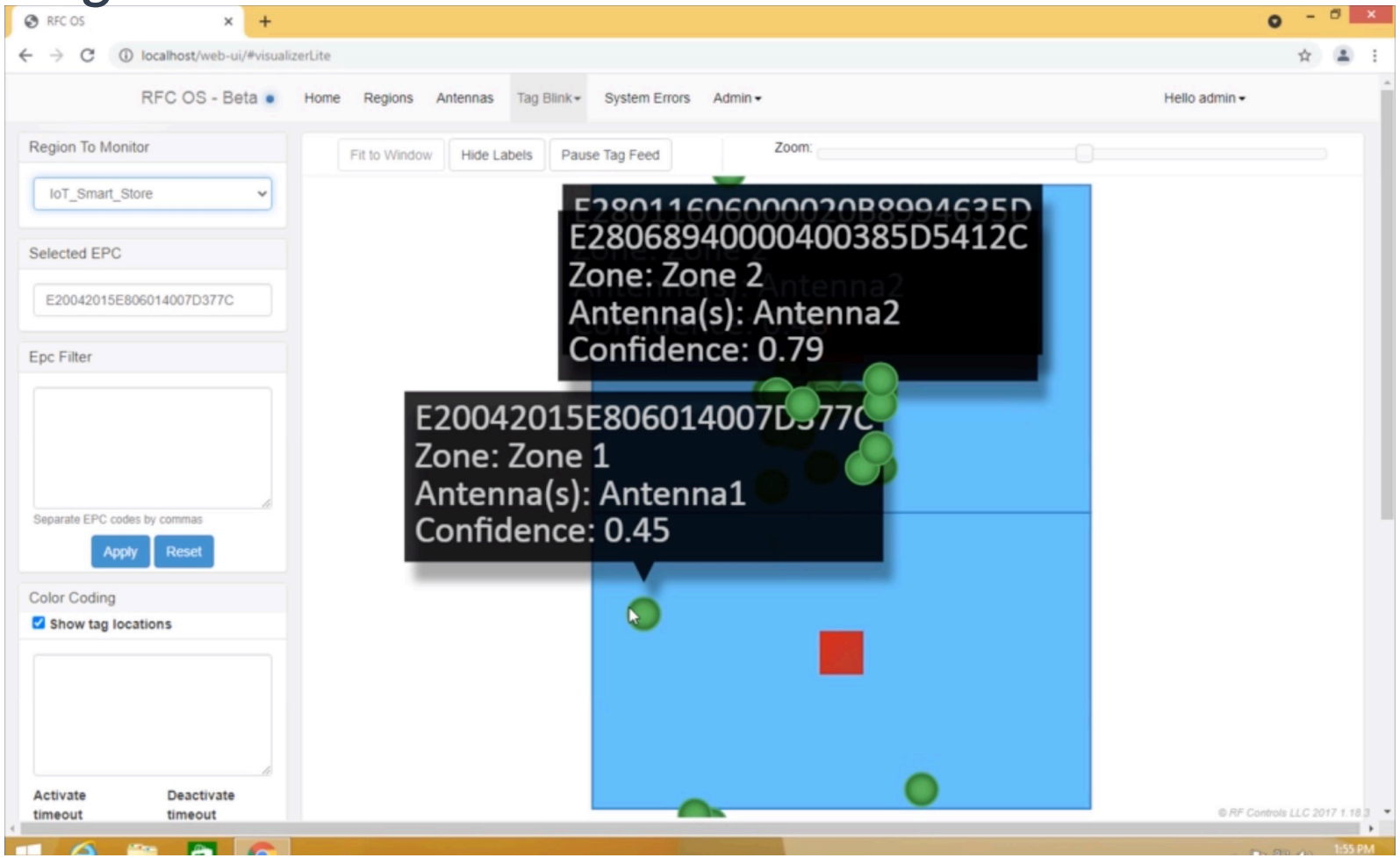
Source: sky trax

Designing an RFID solution

Option 2/3/4 – passive UHF RFID tags on the lift

Designing an RFID solution

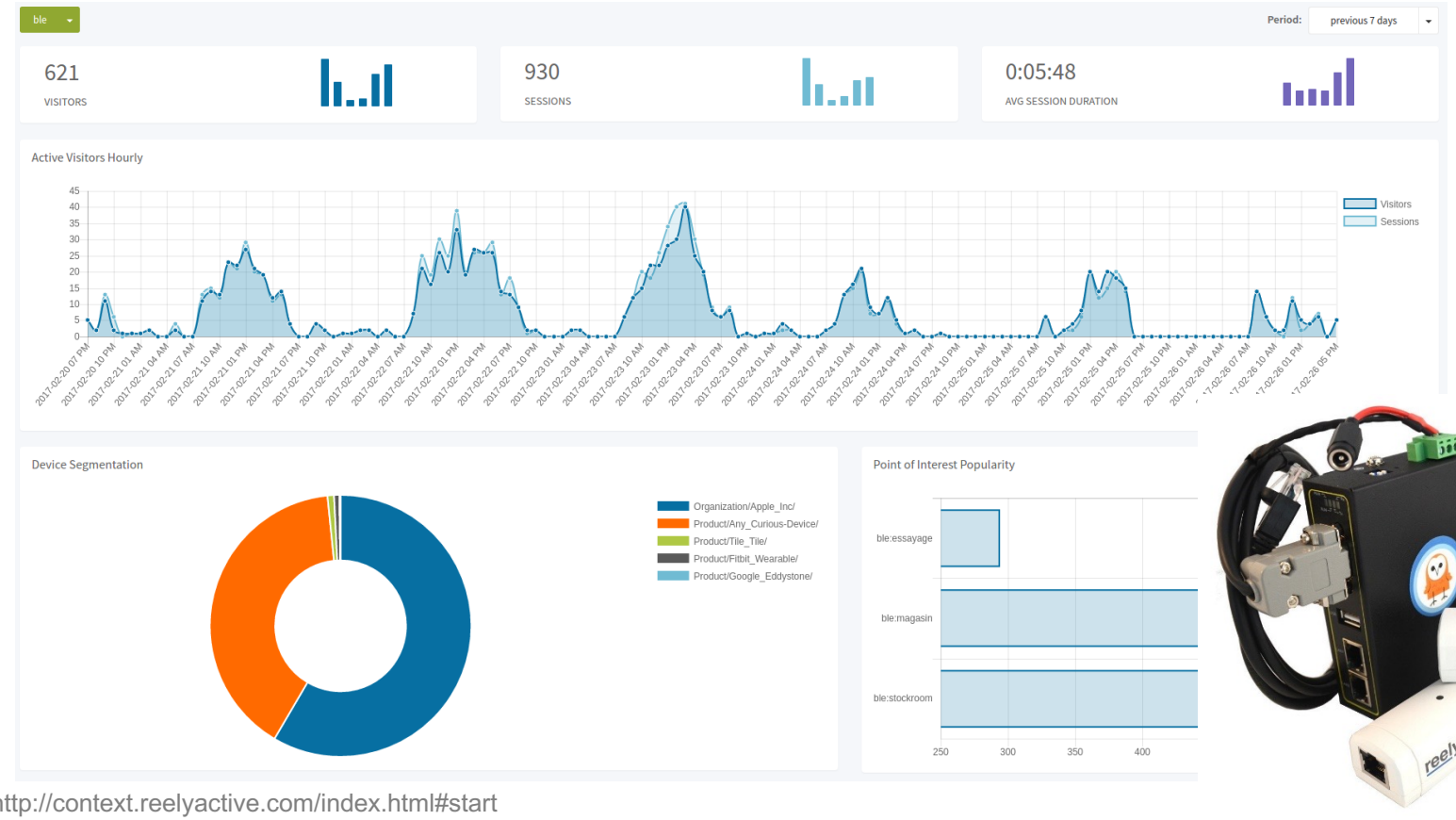
Passive RTLS-*UHF RFID tags on the lift*



Source: IoT lab ESG UC
Using RF Controls Technology

Designing an RFID solution

Option 5 – A BLE Approach



http://context.reelyactive.com/index.html#start

Designing an IoT solution

Option 6– Active RFID tags on the lift (RFID 433 Mhz, UWB, BLE AoA)

sewio

Product Solutions Customers Partners Demo Services Company Contact E-shop

Real-time and Historical Insights into Forklift Operation

By tracking your forklifts, logistics managers are gaining **full real-time visibility** of the fleet – not only by knowing the exact location of each forklift in real-time, but also by having the ability to track their historical locations with pinpoint accuracy.

The data is then transformed into easy-to-read metrics such as the distance traveled by each forklift, run time versus stop time, the ratio of loaded and unloaded time, the time needed to complete a task, as well as **the Overall Equipment Effectiveness (OEE)**. Given these insights, managers can improve processes and the overall efficiency and utilization of their fleet using the **forklift fleet management system**.

Link to this use case

https://www.sewio.net/forklift-tracking-monitoring-system/

Designing an RFID solution

Option 7 – RFID reader on the lift

Designing an IoT solution

potential solutions

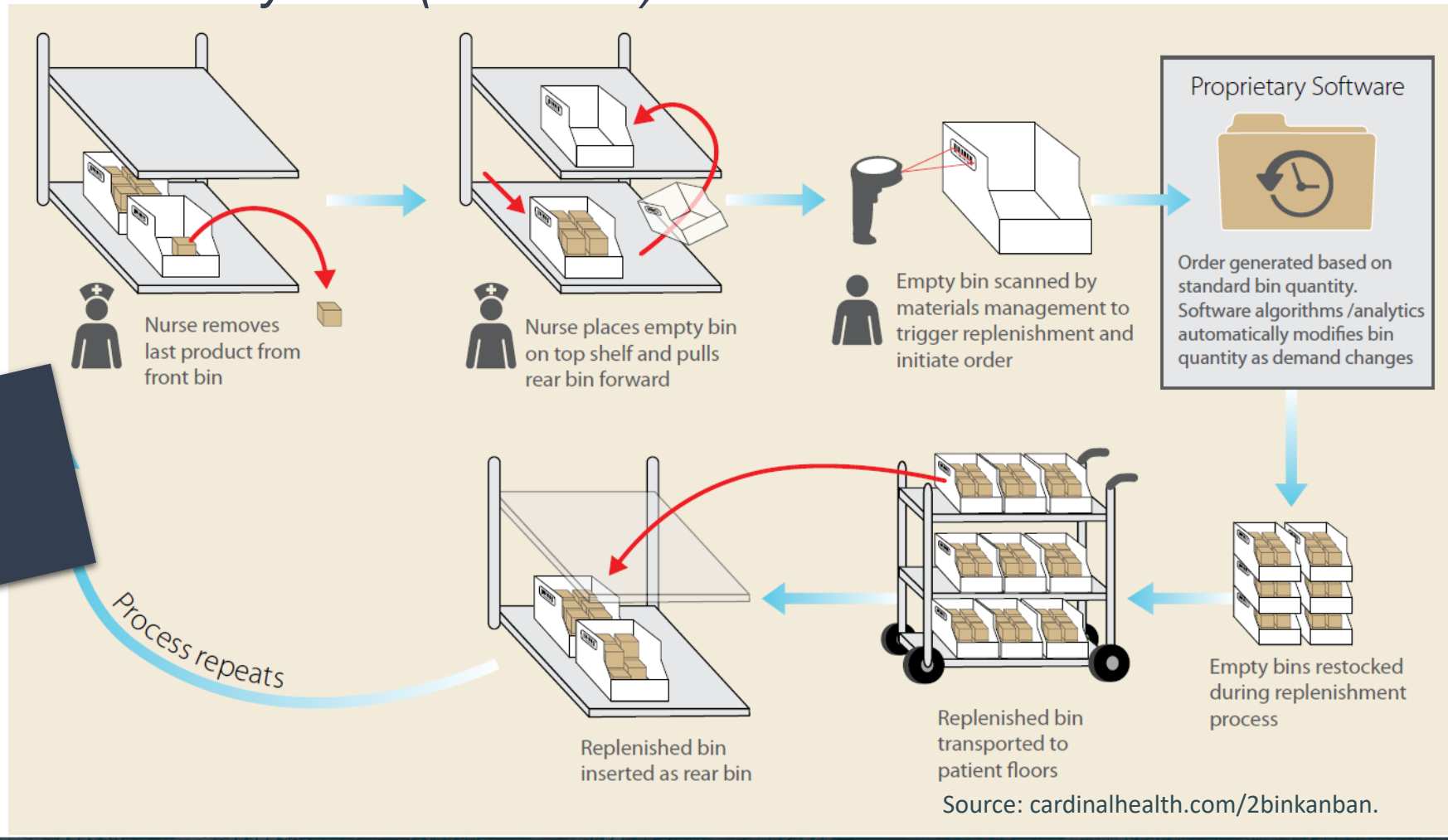
1. QR Bar code in the ceiling
2. Active RTLS - Active RFID tag on the lift
3. Active WiFi
4. Passive RTLS - UHF RFID tag on the lift (zone monitoring)
5. Passive UHF RFID tag on the lift (choke point monitoring)
6. Mounted passive UHF RFID reader on the lift (tags on the floor)
7. BLE beacons & lift/driver wireless device
8. BLE AoA
9. Lifi sensor
10. UWB
11. USID
12. External Cameras
13. Onboards cameras (e.g., Visual SLAM (vSLAM) technology)
14. …

Designing an RFID solution

An example

Designing a solution

Building 2Bin Kanban replenishment system (bar code)



Source: cardinalhealth.com/2binkanban.

Great, but ....

Designing an RFID solution

Building scenarios RFID 2Bin Kanban system (RFID HF)

See TECSYS - logi-d

Designing an RFID solution

Building scenarios RFID replenishment system (smart shelf)

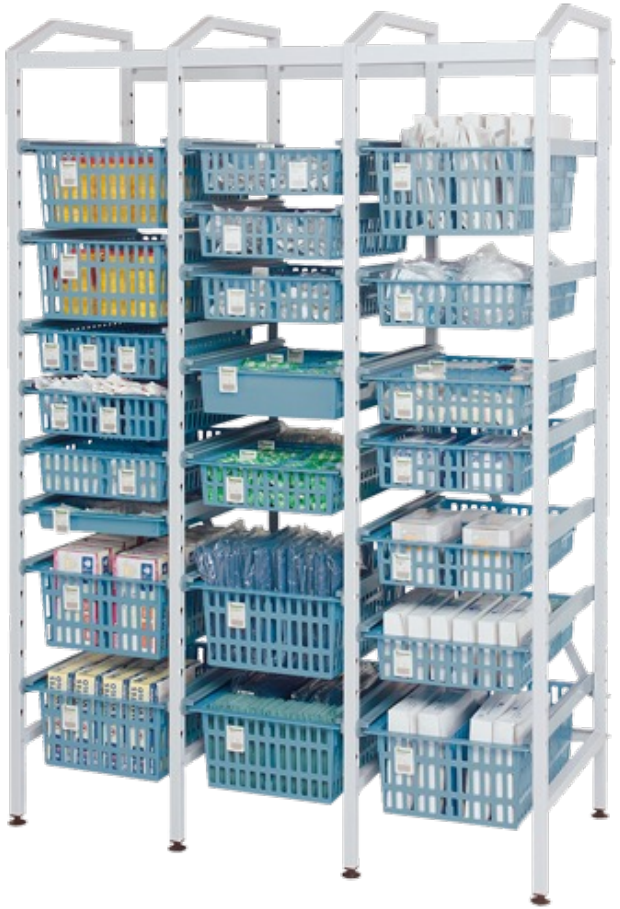
Source: Mobile Aspects

1. WHO opened the cabinet
2. WHAT item has been removed
3. At WHAT time
4. Trigger a Replenishment!

Source: Terso

Designing an RFID solution

An example & potential solutions



1. Bar code 2Bin Kanban replenishment system
2. Passive HF RFID 2Bin Kanban system
3. Passive UHF RFID 2Bin Kanban system
4. Passive UHF RFID smart shelves
5. Active RFID (buttons) tags Kanban
6. Passive RFID/light tags
7. Etc.

Don’t underestimate integration….

THANK YOU

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