MAY 17 - 19, 2022

MANDALAY BAY | **LAS VEGAS, NV**

RFID/IoT for Warehouse and Inventory Management

Building you business case

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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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
- Judge @RFID Journal Award

Objective of the presentation

How to develop an RFID business case and justify your investment (Qualitatively /Quantifiably)

- **Assess the financial impact (costs & benefits) of your RFID/IoT project**
- Assess & Monitor your performance

Start Your Business case!

RFID/IoT
(i) as a solution
(ii) as a mean to resolve business problems
(iii) or to leverage on new opportunities!

Not JUST a technology!

and before counting the money…

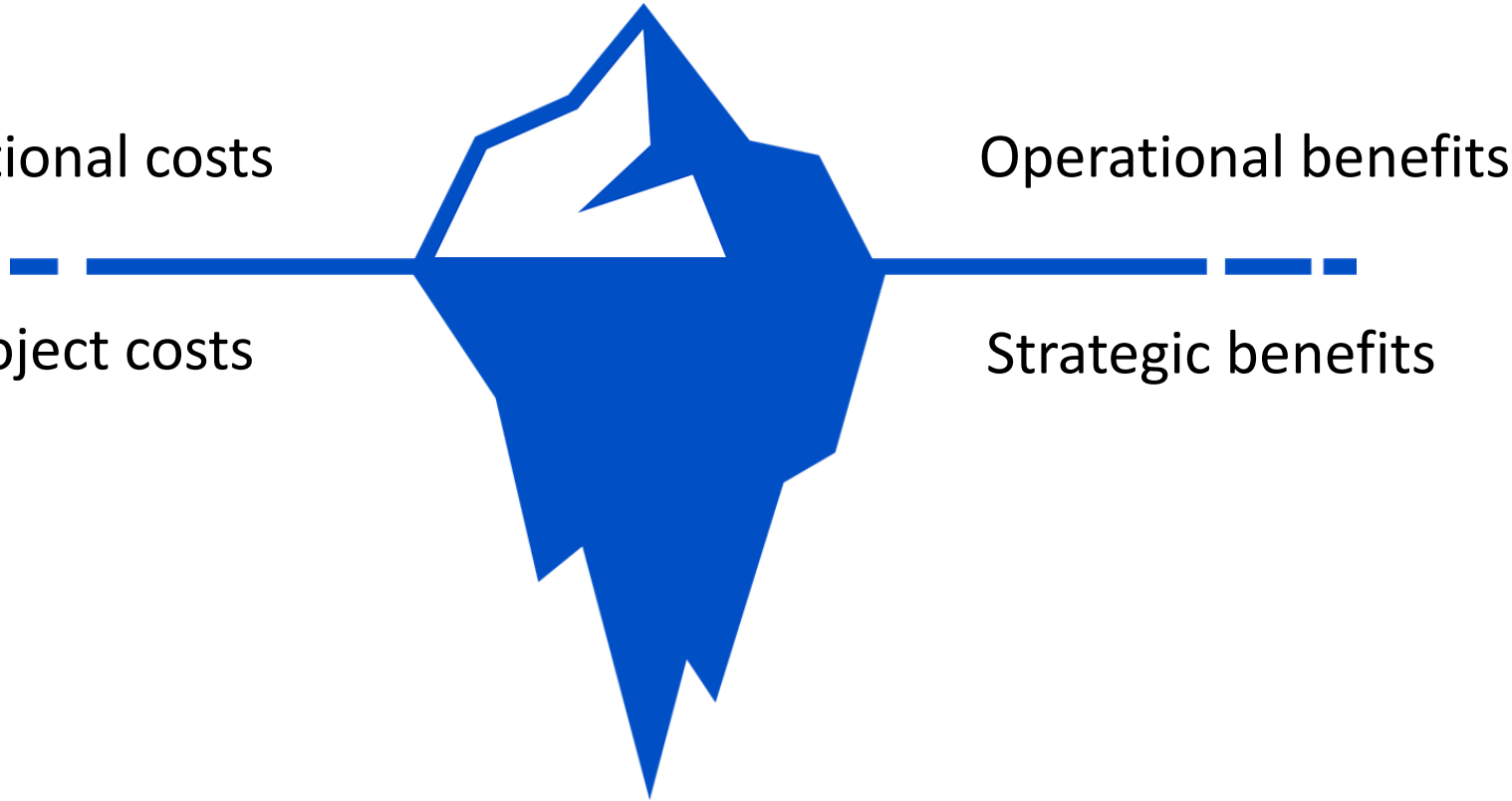
Consider:

- **The benefits:** How will your company benefit from RFID-IoT driven visibility across the supply chain?

But also

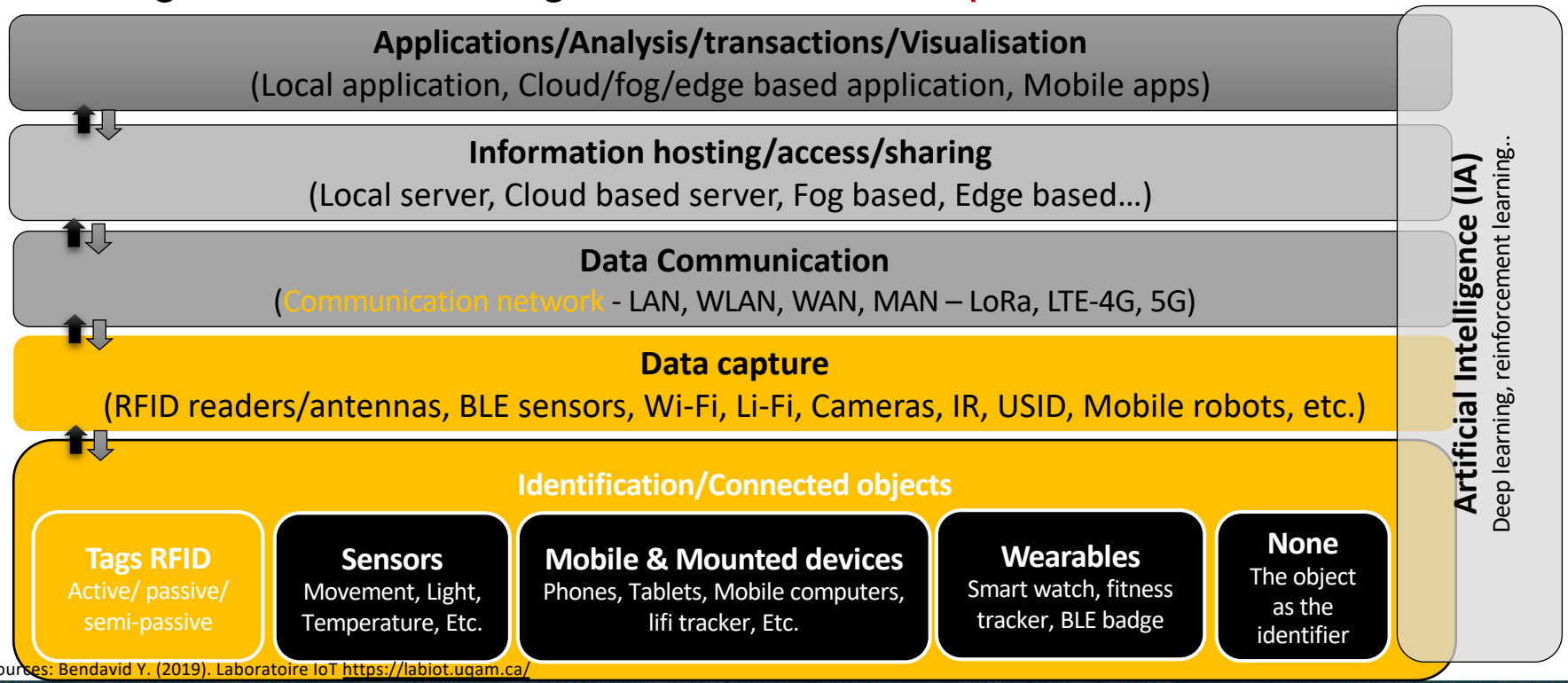
- **The Costs:** How will your company pay, both in hard costs and resources, for RFID-IoTdriven visibility?

Costs & Benefits



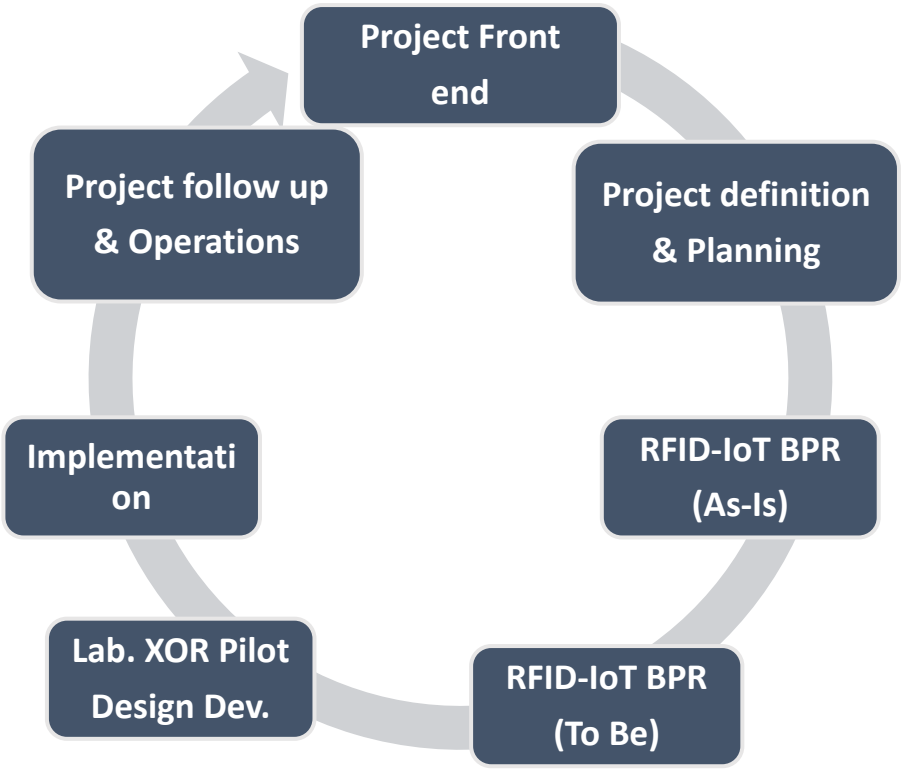
IoT Infrastructure

& Integration with existing IT infrastructure & processes



Sources: Bendavid Y. (2019). Laboratoire IoT https://labiot.uqam.ca/

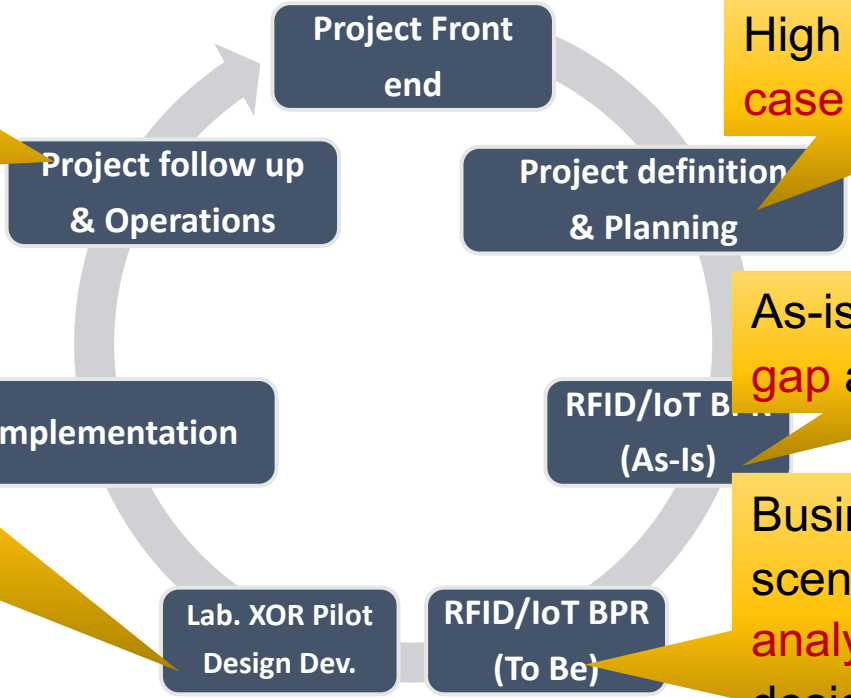
Building on existing Infrastructure



RFID/IoT Business Case in the

in the Project life cycle

Measuring performance and continuous case assessment (TCO)



High level Business case / value

As-is performance & gap analysis

Business cases & scenarios sensitivity analysis based on ≠ designs

Revision of the Business case: assess realistic impacts based on experimentation (Lab & pilot) & RFI/RFQ/…

RFID/IoT Business Case in the

Project life cycle

- Needs-requirements
- Project Planning
- Procurement Process
- RFID /IoT Prototyping
- Physical infrastructure
- Software infrastructure
- Configuration - integration
- Deployment
- Maintenance (TCO)
- …

RFID/IoT costs in the Poject life cycle

Project/Infrastructure Cost Analysis(1 of 2)

Project Preparation

- Opportunity Assessment
- Business Case Development
- RFID Strategy Development
- Use Case Generation
- Procurement Management (plan-source)
- Solution Architecture Development
- System Integration Assessment
- Business Process Assessment
- Experimentation/Testing (validation of the business case)

RFID hardware

- RFID Tags (logistic units -Pallet, case, item, mobile asset, …)
- Readers and Antennas
- Mounting Accessories
- RFID printers and label Applicators
- Ancillary devices (motions sensors, horns, lights, …)
- Other Infrastructure Costs (new servers & computers, infrastructure upgrade,
- Etc.

RFID/IoT costs in the Poject life cycle

Project/Infrastructure Cost Analysis(1 of 2)

Installation Costs

- Initial Site Survey
- Design selection
- Hardware installation
- Testing and trouble shoot…

Ongoing System admin.

- Network Management System
- Reader Firmware Upgrades
- Damaged Readers/Antennas
- Performance Monitoring
- Maintenance…

RFID Software Costs

- RFID Middleware Solution
- Middleware System Integration (with WMS, ERP, Track& trace sol.)
- Interface Customization
- Engineering/Business Process Change

Other expenses

- Physical warehouse modification
- New resources (business analysts)
- Training

So…should we spend some money on that?

Pics: pixabay.com/

ROI analysis – a look @ the costs of inventory

Classic - Costs of inventory

Carrying Costs

Facility storage

rent, depreciation, power, heat, cooling, lighting, security, taxes, insurances, etc.

Material handling

Ordering costs

Replenishment ($/order)
Requisition, PO, transportation, shipping, receiving, handling, accounting, auditing, etc.

Equipment

Labor
Record Keeping
Borrowing to purchase inventory

Shortage costs

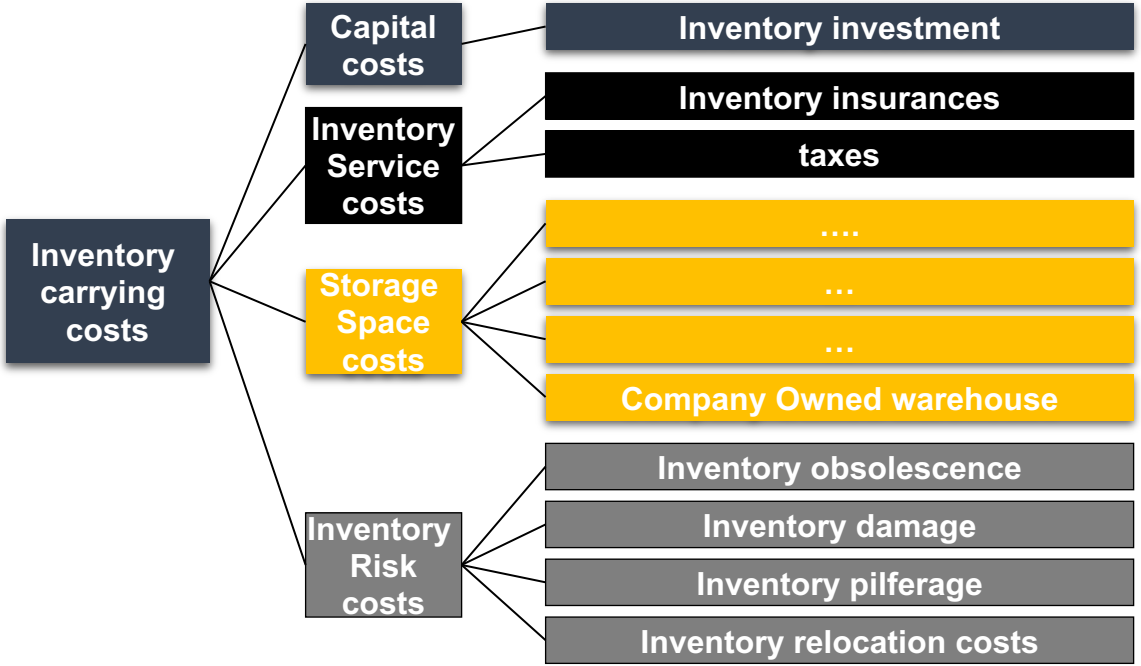
Stock outs costs – loss of sales & relative loss of profits
Customer dissatisfaction
Reputations…

Product deterioration

Spoilage, breakage, obsolescence, …

Structuring Inventory carrying costs

Using - Normative model of inventory carrying cost method



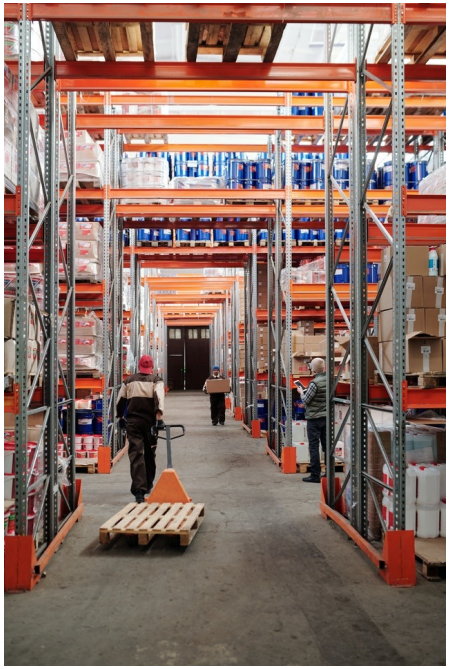


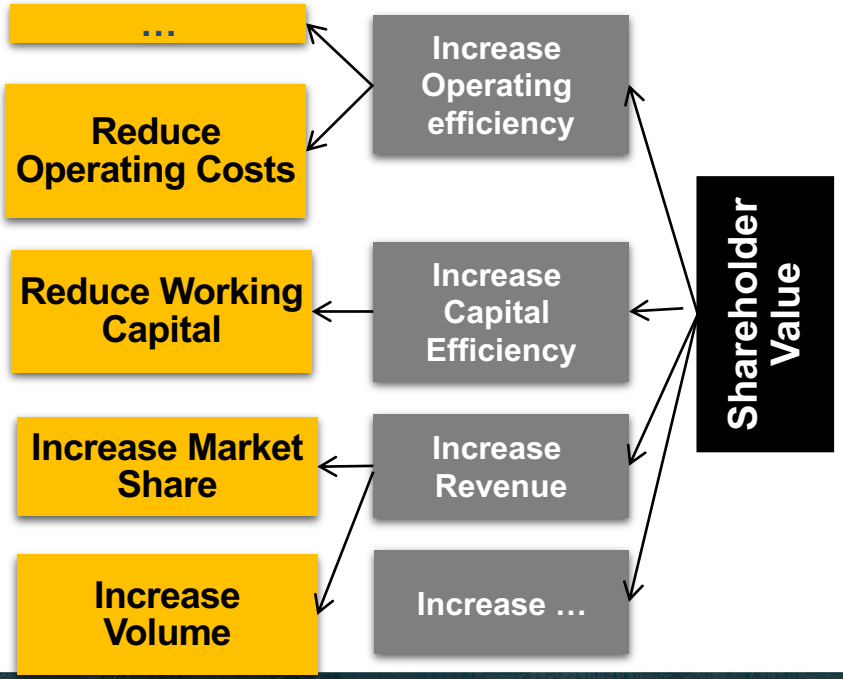
Photo de Tiger Lily provenant de Pexels

Matching the problems and the solution

Linking goals & actions

- **Reduced claims (overages/ shortages)**
- **Reduced labor costs** (e.g. receiving, put away, picking, shipping, assembling, reworking…)

- **Reduced inventory**
- **Reduced returns/ unsalable**
- **Increased asset utilization**
- **Improved on-shelf availability**
- **Reduced counterfeiting**
- **Improved customization options…**
- **Improved promotional planning and execution**
- **Improved shrink management**



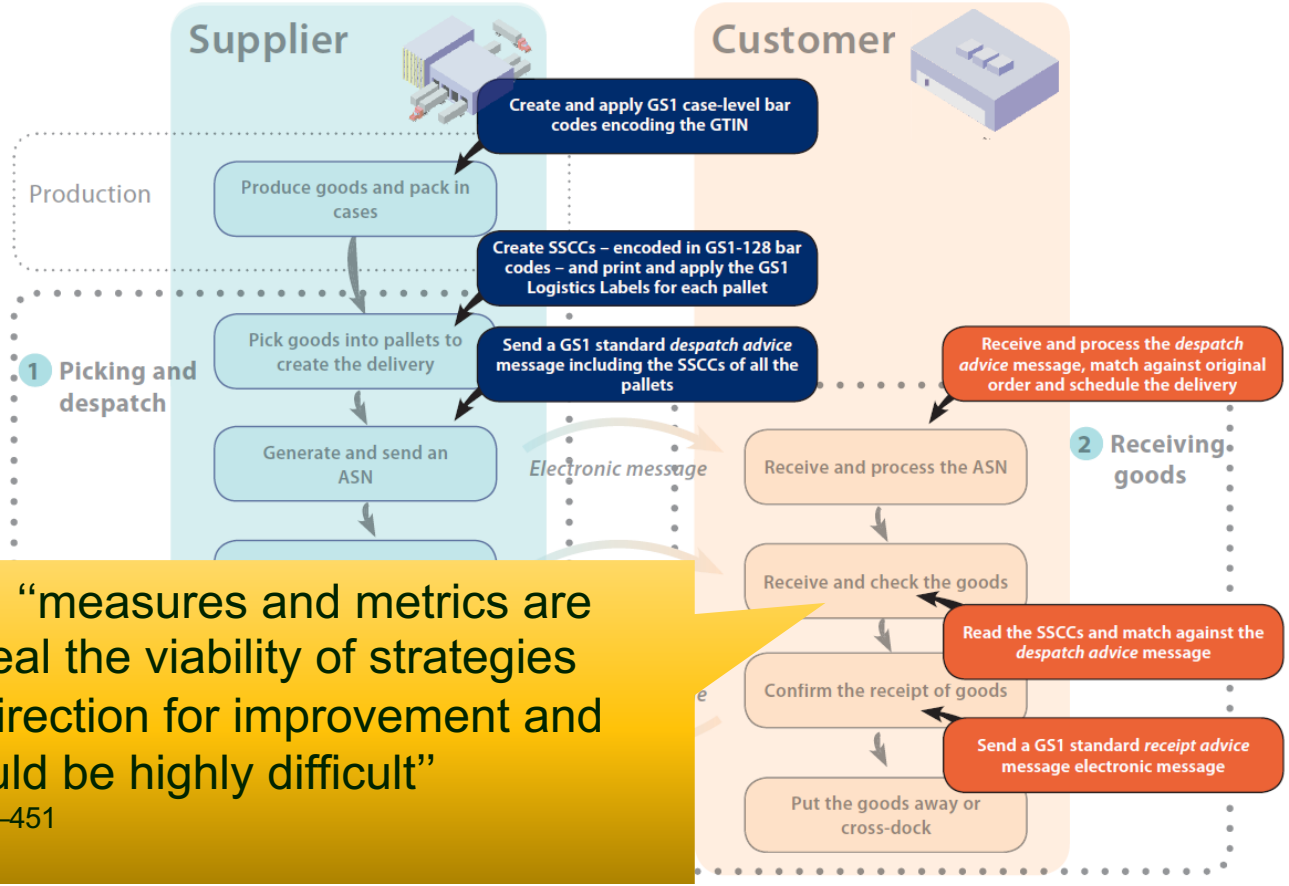
Objective of the presentation

How to develop an RFID business case and justify your investment (Qualitatively /Quantifiably)

- Assess the financial impact (costs & benefits) of your RFID/IoT project
- **Assess & Monitor your performance**

Build an RFID/IoT "Business case"

As is & To be



For any business case, "measures and metrics are needed to test and reveal the viability of strategies without which a clear direction for improvement and realization of goals would be highly difficult"

Gunasekaran and Ngai JOM 23(5):423–451

Source: GS1 UK Solution: Automated goods receipt

Assess & Monitor your performance

Select your KPIs for RFID-IoT impact assessment

- **Specificity:** associated to a problem/opportunity - facilitates the choice of corrective action
- **Validity:** measure the results – *measure what it is supposed to measure*
- **Reliability & Relevance:** associated with the main objective of the project & coherent with the strategy
- **Usefulness:** useful to support decision making
- **Simplicity:** easiness of collecting the data (to analyse)
- **Sensitivity:** sensitive to change
- **Sustainability:** relevant over time

Assess & Monitor your performance

KPIs for RFID impact assessment

- On time parts delivery percentage
- % of receipt authorized by PO
- % of orders released with full lead time
- Put away accuracy
- Put away cycle time
- Average picking time
- Shipping accuracy
- Inventory availability
- Average back-order length
- Inventory accuracy
- Inventory turnover
- Level of inventory
- Obsolete inventory percentage

- **What are your Priorities?**
- **How can RFID help you in addressing these challenges and opportunities**

Assess & Monitor your performance

Linking KPIs and objectives

- ***What is your objective?***
  - Level of inventory **(reduction)**
  - Service level **(improvement)**
  - stock level **(balanced)**
  - Storage space **(minimum)**
  - Handling costs (**reduction)**
  - Process improvement **(automation, cancellation)**
  - etc.

Methods & tools for ROI analysis

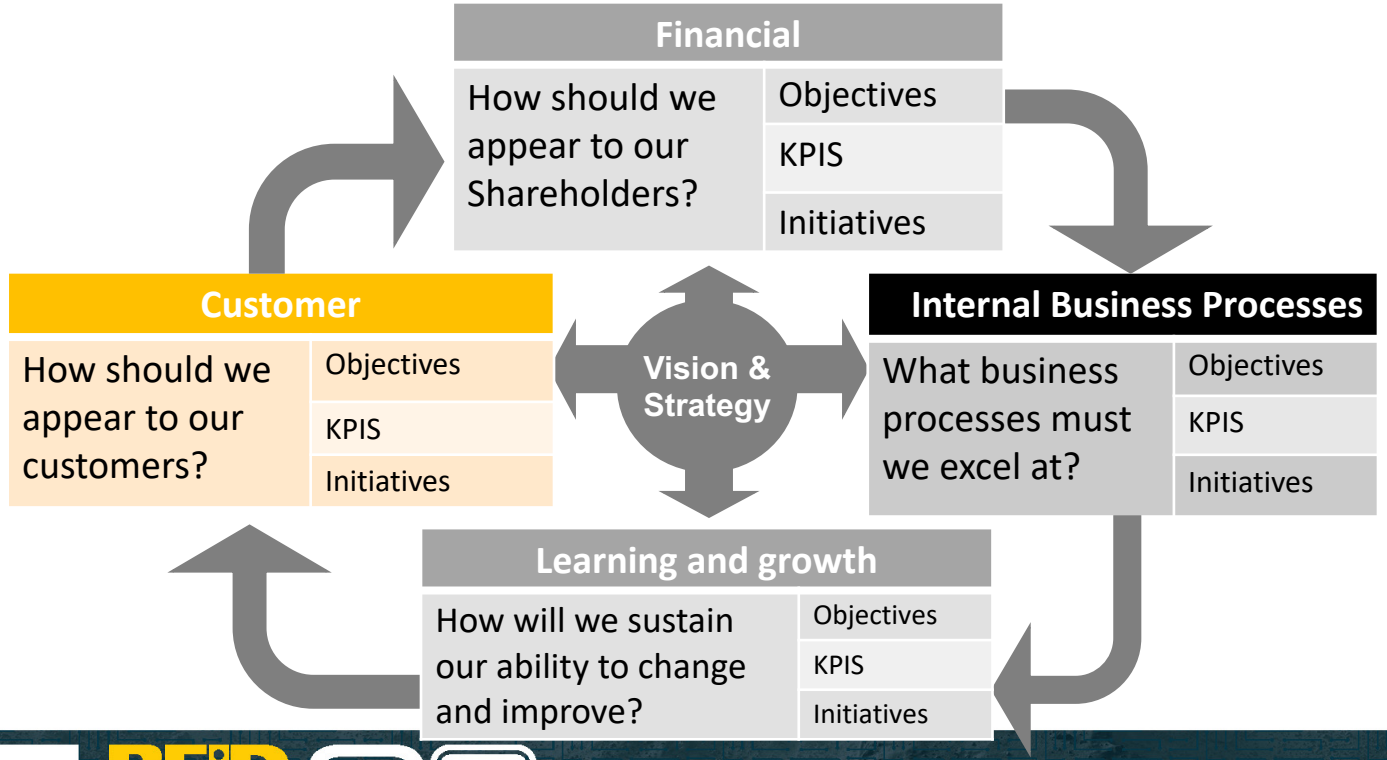
Scorecards/ Performance framework

1. ABC: Activity-Based Costing
2. FLR: Framework for Logistics Research
3. BSC: Balanced ScoreCard
4. **SCOR: Supply Chain Operation Reference Model**
5. GSCF framework
6. ASLOG audit
7. SASC: Strategic Audit Supply Chain
8. -Global EVALOG (Global MMOG/LE
9. EFQM: Excellence Model
10. SCALE: Supply Chain Advisor Level Evaluation
11. SPM: Strategic Profit Model

Estampe et al., (2013) frameworkforanalysingsupplychainperformanceevaluationmodels, Int. J. Production Economics 142 (2013) 247–258

Assess & Monitor your performance

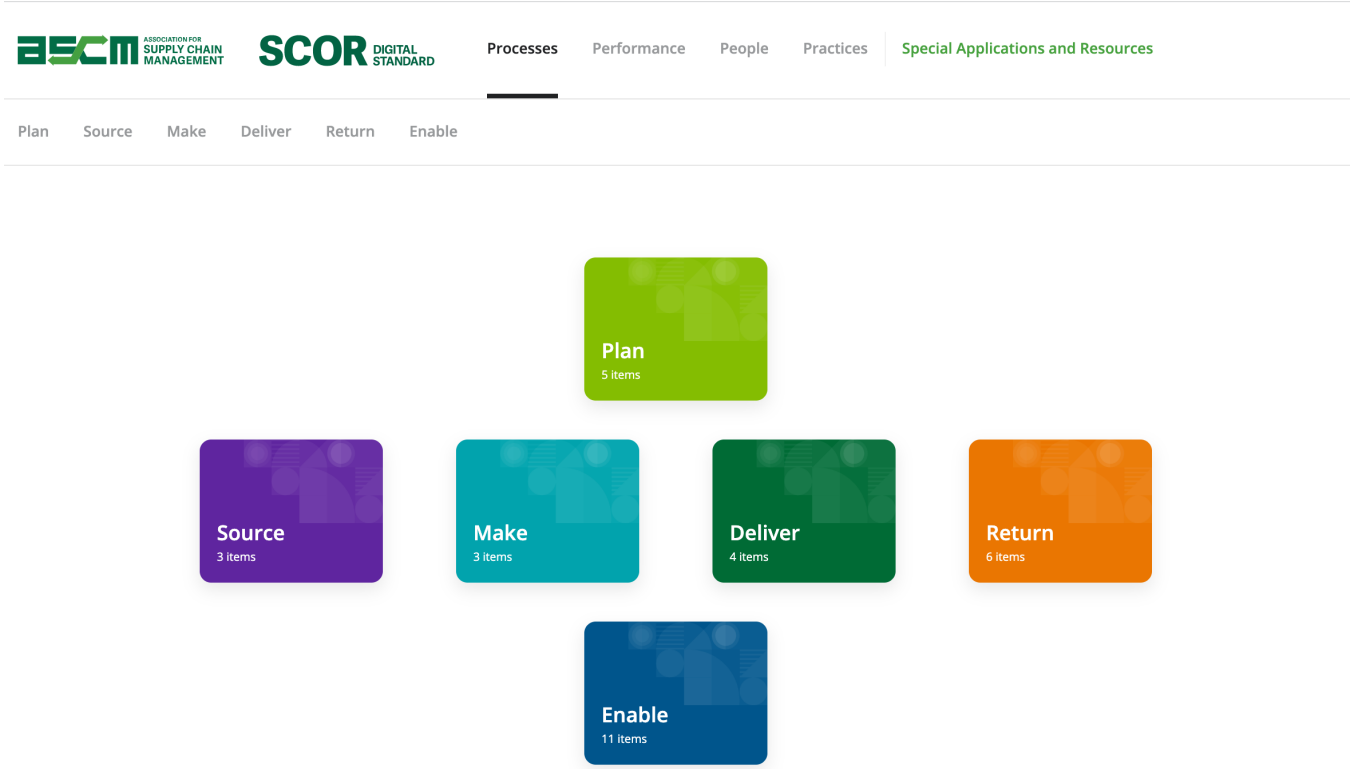
Classics frameworks to assess the performance



Balanced ScoreCard (Kaplan et Norton,1992)

Assess & Monitor your performance

Supply chain frameworks to assess the performance



https://scor.ascm.org/processes/introduction

Assess & Monitor your performance

Supply Chain Operations Reference (SCOR) model

Process reference models integrate the well-known concepts of **business process engineering, benchmarking, process measurement and organizational design** into a cross-functional framework.

(…) **links business processes, performance metrics, practices, and people skills into a unified structure**. It is hierarchical in nature, interactive and interlinked.

http://www.apics.org/apics-for-business/frameworks/scor

Assess & Monitor your performance *SCOR Metrics*

Supply Chain Reliability
RL.1.1 - Perfect Order Fulfillment
RL.2.1 - % of Orders Delivered In Full
RL.3.33 - Delivery Item Accuracy
RL.3.35 - Delivery Quantity Accuracy
RL.2.2 - Delivery Performance to Customer Commit Date
RL.3.32 - Customer Commit Date Achievement Time Customer Receiving
RL.3.34 - Delivery Location Accuracy
RL.2.3 - Documentation Accuracy
RL.3.31 - Compliance Documentation Accuracy
RL.3.43 - Other Required Documentation Accuracy
RL.3.45 - Payment Documentation Accuracy
RL.3.50 - Shipping Documentation Accuracy
RL.2.4 - Perfect Condition

Supply Chain Responsiveness
RS.1.1 - Order Fulfillment Cycle Time
RS.2.3 - Deliver Cycle Time
RS.3.16 - Build Loads Cycle Time
RS.3.18 - Consolidate Orders Cycle Time
RS.3.46 - Install Product Cycle Time
RS.3.51 - Load Product & Generate Shipping Documentation Cycle Time
RS.3.95 - Pack Product Cycle Time
RS.3.96 - Pick Product Cycle Time
RS.3.102 - Receive & Verify Product by Customer Cycle Time
RS.3.110 - Receive Product from Source or Make Cycle Time
RS.3.111 - Receive, Configure, Enter, & Validate Order Cycle Time
RS.3.116 - Reserve Resources and Determine Delivery Date Cycle Time
RS.3.117 - Route Shipments Cycle Time

https://www.apics.org/docs/default-source/scor-p-toolkits/apics-scc-scor-quick-reference-guide.pdf

Methods & tools for ROI analysis

Inventory control questions & related KPIs

Receiving

What is the % of orders accurately received complete and on time?
What is the percentage of orders accurately received against the ASN?

- Fixed RFID portal
- Integration with WMS
- Integration with supplier EDI

Put Away

What is the put-away accuracy (%)?
What is the put-away cycle time?

- Mobile RFID reader
- Integration with WMS

Picking

What is the picking accuracy (% orders picked accurately)?
What is the average picking time? Average picking cost?
What is the number of pull-lists processed per day?

- Mobile RFID reader
- Mounted reader
- …

Methods & tools for ROI analysis

Inventory control questions & related KPIs

Shipping

What is the average order turnaround time?
What is the Order Lines Shipped /Labor Hr?
What is the average back-order length?
What is the average lead time for an order?

Return management

What is the % of product returns (if any)?
What is the average return management process time?
What is the …

Inventory Control (Inbound)

What is the Inventory Availability?
What are the inventory carrying costs?
What is the inventory turnover?
What is the accuracy of inventory?
Is there an inventory obsolescence costs?
What is the shrinkage % (as a % of sales)?

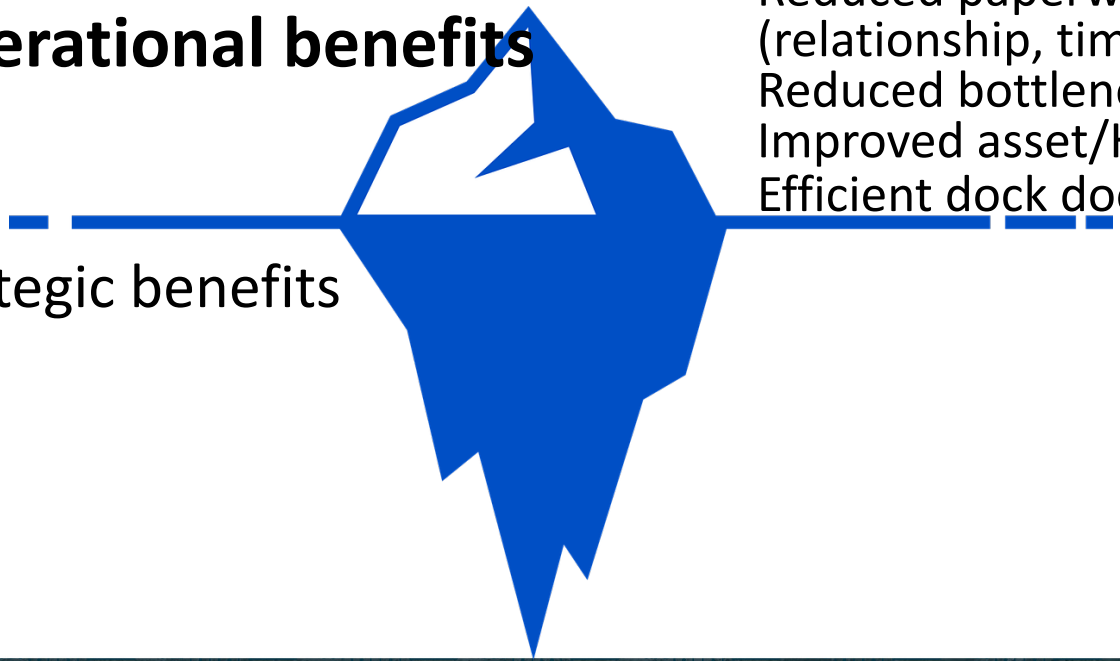
- Smart shelves (real time visibility on consumption – automated re-ordering)

Considering the full scope of benefits

More efficient processes

Faster data acquisition/verification
Reduced paperwork/errors/ Fewer claims (relationship, time, $)
Reduced bottlenecks
Improved asset/HR utilization
Efficient dock doors used by trailers

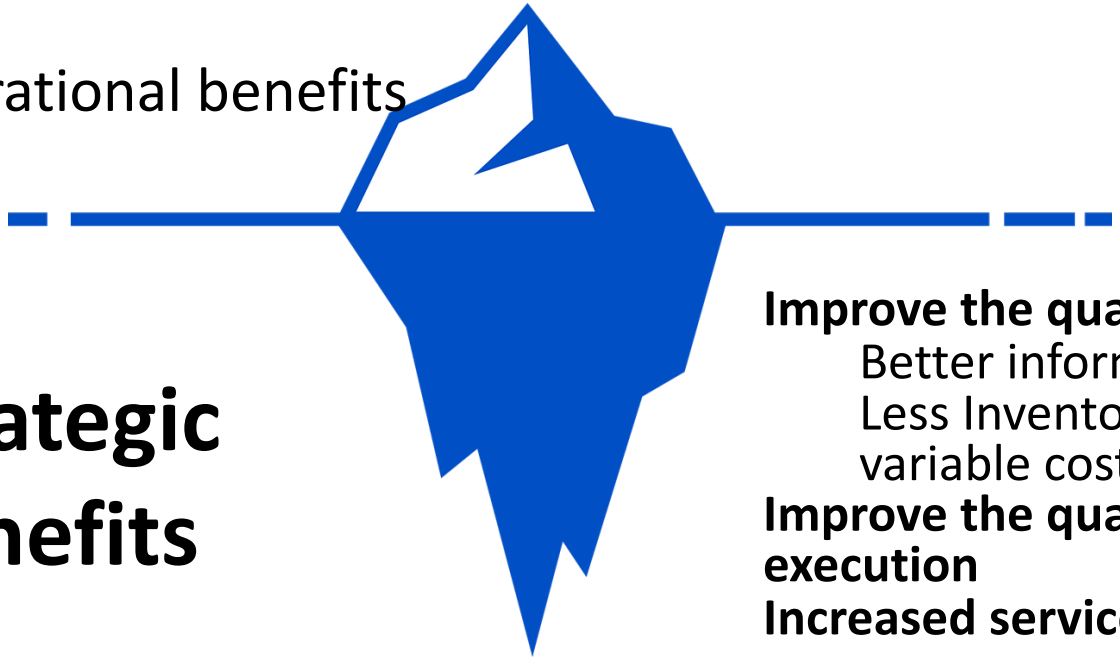
Operational benefits



Strategic benefits

Considering the full scope of benefits

Operational benefits



Strategic benefits

Improve the quality of information

Better informed management decisions
Less Inventory/More Cash flow/less variable costs, reduced shrinkage

Improve the quality of business process execution

Increased service level

…

Opening new business models

With connected warehouse

Strategic benefits

Conclusion

- An RFID business case should be a *living, breathing* document
- Continuous RFID/IoT developments (↓price, ↑performance)

“ Implementing RFID-IoT is just the start… ”

pexels-neosiam-594452

THANK YOU

RFID JOURNAL LIVE!

20 YRS

2003 - 2022