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AUTO-ID LABS

RFID in Manufacturing: Current and Future

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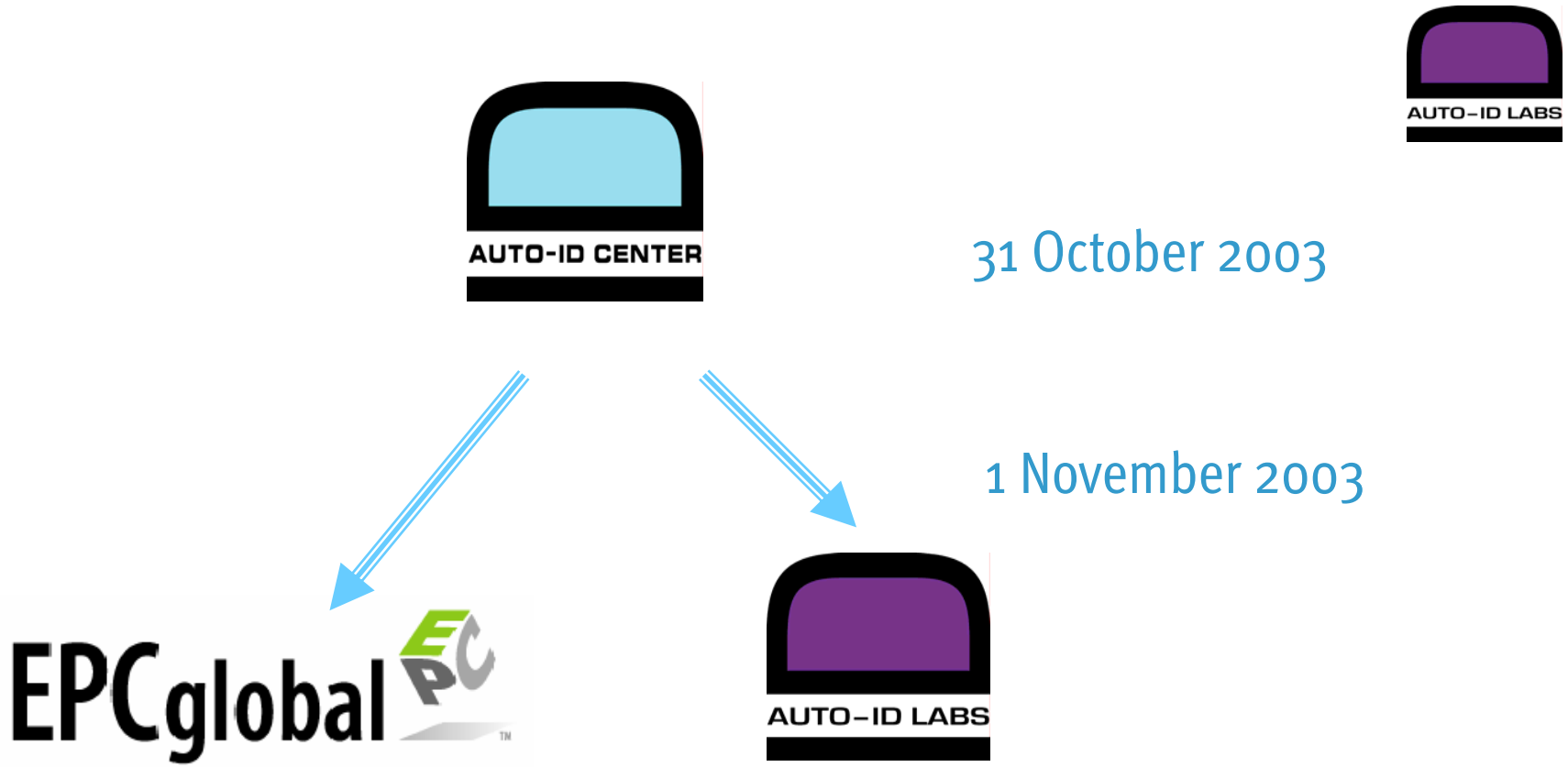
overview

- Introduction
- RFID in Manufacturing
- Near Term Deployment
- Longer Term Deployments
- Concluding Comments

EPCglobal and Auto ID Labs



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auto id labs

- Labs: MIT, Cambridge, Adelaide, St Gallen, Keio, Fudan
- Perform a coordinated program of fundamental and applied research, development, and education related to automated identification and the EPC System
- Key research areas
  - Standards and Regulations
  - Tag and Reader Systems
  - Information and Control Systems
  - Consortium Research

Auto ID Center Background

- Mission
  - Re-think the role and implementation of the barcode
  - Connecting information and physical flows (“ bits to atoms”) in the supply chain

- What do you need to do this?
  - Some way of automatic, reliable transfer and update of information based on physical operations
  - One single system for the whole supply chain
  - RFID as the key element .....

Key Thrusts

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1. **low cost tags and reader systems**
   -> reducing chip price = reducing amount of silicon required
      -> minimising information stored on chip
         -> ID on chip only, other information on data base

2. **business justification through multiple applications/companies**
   -> standardised tag/reader systems
      -> standardised data management and communication systems
         -> EPC network system as extension to the internet

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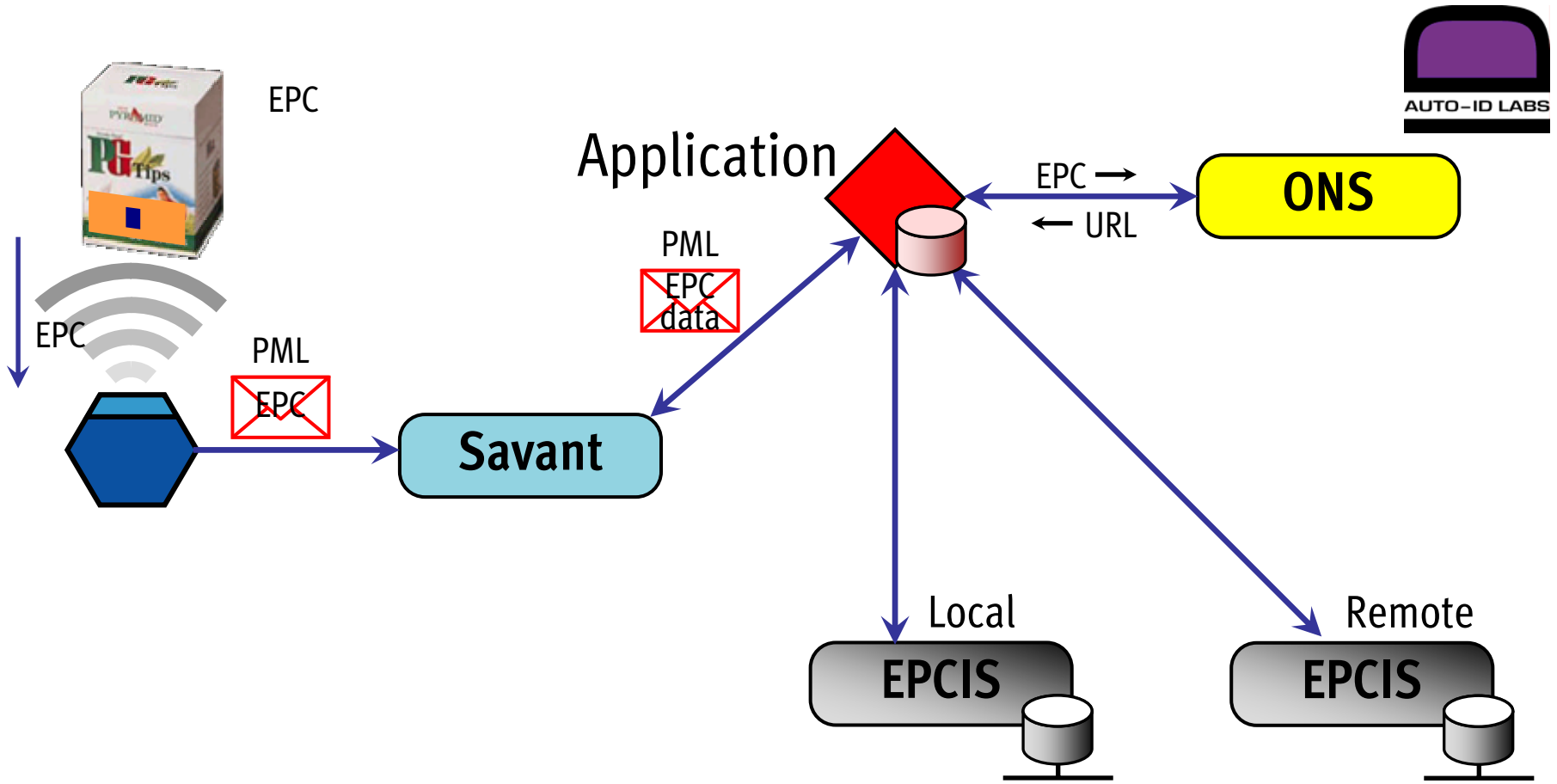
EPC Network technology building blocks



Key Thrusts again

1. **low cost tags and reader systems**
   -> reducing chip price = reducing amount of silicon
   -> minimising information stored on chip
   -> ID on chip only, other information on data base

tag specs
EPC
EPC/EPCIS

2. **business justification through multiple applications/companies**
   -> standardised tag/reader systems
   -> standardised data management and comms
   -> EPC network as extension to the internet

tag/reader specs
Savant/PML
EPC/ONS/EPCIS

Stand Alone rfid v epc network

	Tolling	Library	Asset	Baggage	EAS	Supply Chain
Complexity of Information on Tag	M	L	H	L	L	L
Single or Multiple Applications for Each Tag	S	S	S	S	S	M
Volume of Tags	L	L	L	M	M	H
Expected Life of Tag	H	H	H	M	M	L

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Source: Hodges, McFarlane, Radio Frequency Identification: Technology, Applications and Impact, OECD Report, Dec, 2003

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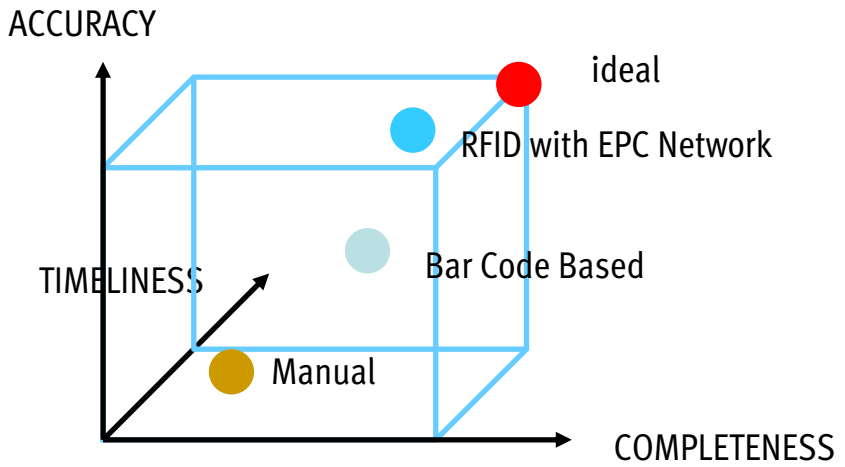
enhanced product information

- value of EPC Network is in enhancing the quality of information available to make decisions
- information quality dimensions
  - accuracy
  - completeness
  - timeliness



- benefits only extracted when *information is turned into action*
- *... automation*

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rfid in manufacturing

Little direct attention lately but

- most technological advanced element of the supply chain
- sophisticated IT systems geared for real time data
- manufacturer is increasingly responsible for the products life cycle
- manufacturer is often the central hub of the supply chain
- decoupled from the privacy concerns
- potential gains in terms of cost reductions (short term) and value add (longer term)

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drivers for manufacturing

Zero Term – Compliance Driven

Near Term – Cost Driven

Medium Term – Value Driven

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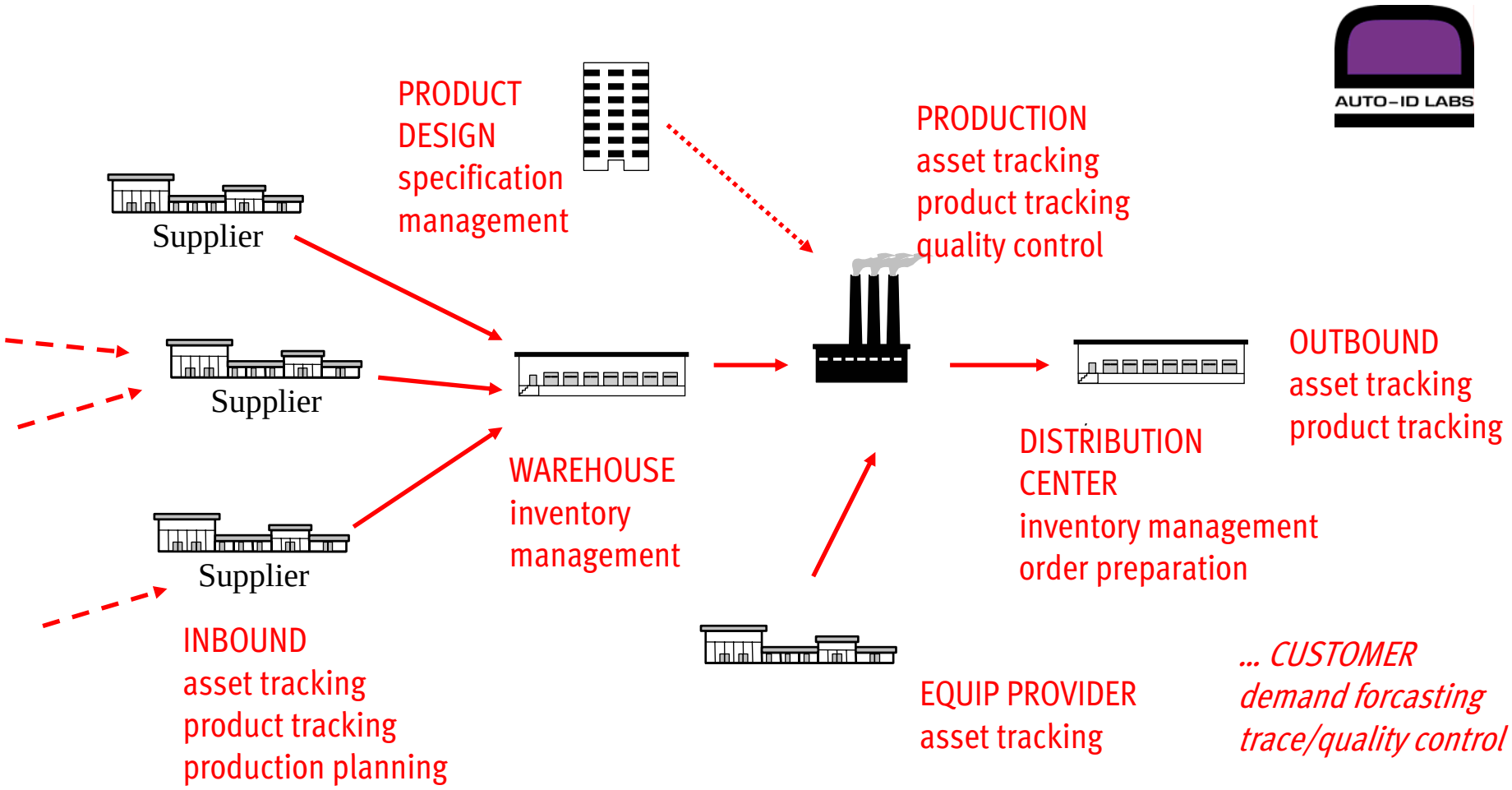
deployment areas



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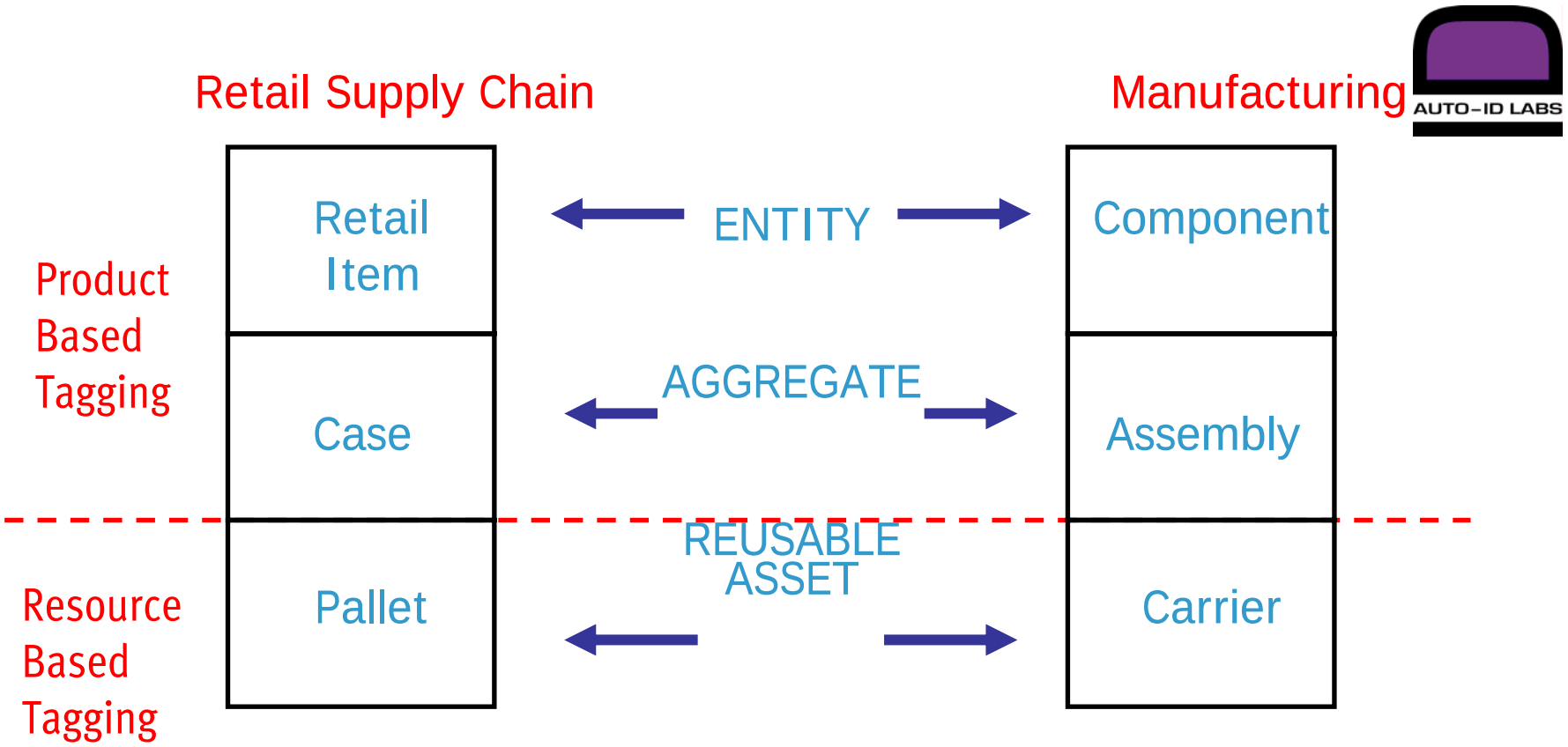
tag deployment



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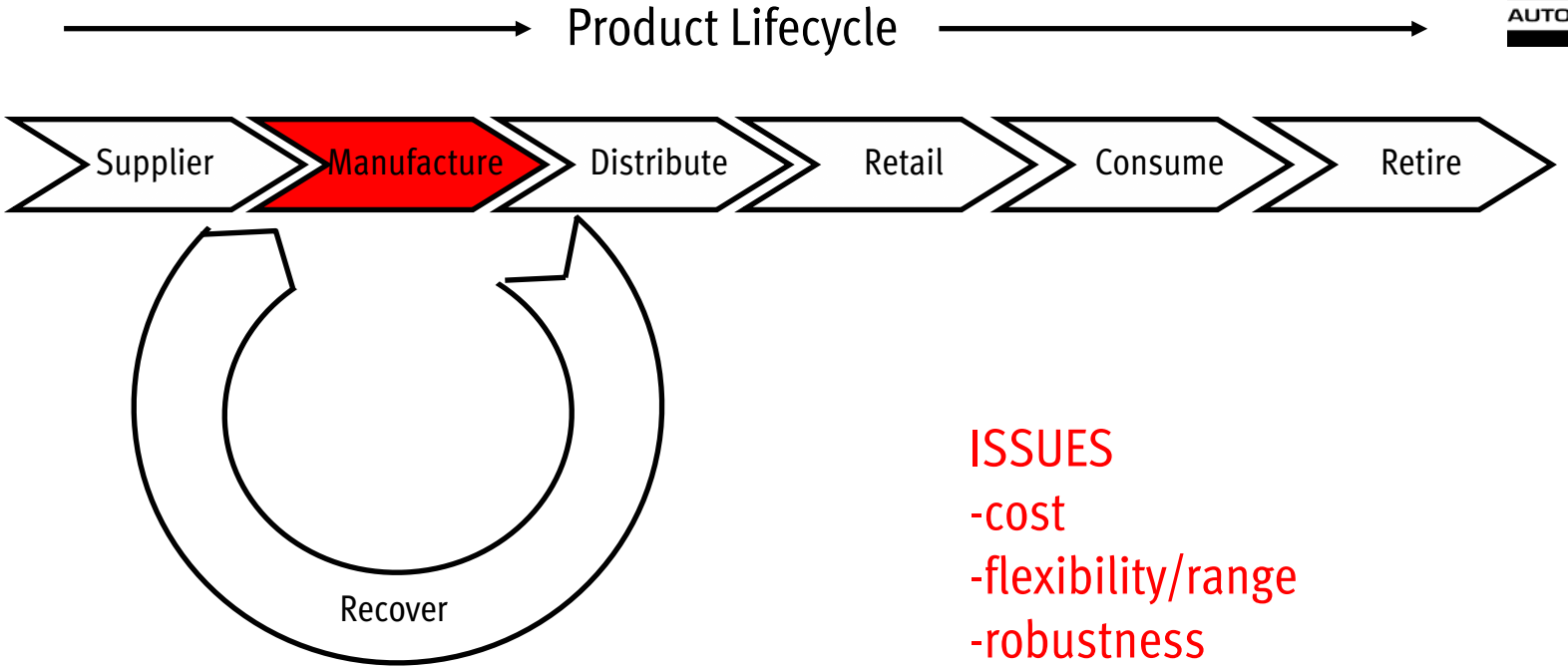
tag deployment



Reusable Asset Lifecycle

ISSUES
-cost
-flexibility/range
-robustness
-standards

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Integration with existing systems

- Systems Integration Challenges
  - Physical hardware
  - Information systems (e.g. middleware)
  - Business process

- Also consider levels (or extents) of integration
  - Connected – replacing barcodes with EPC Network data
  - Coordinated – enhancing existing processes with EPC data
  - Coherent – redesigning processes from scratch to leverage EPC

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drivers – zero term

Compliance

- dominant theme at present
- response to retailer demands
- shipping & receipt of goods application

Little direct benefit to manufacturer
Involvement critical however

» little choice

» influence adoption pathways – hardware/software

» relatively steep learning curve

drivers – near term

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Cost Reduction

- inventory management
- warehouse management
- raw materials management

Delivery Performance

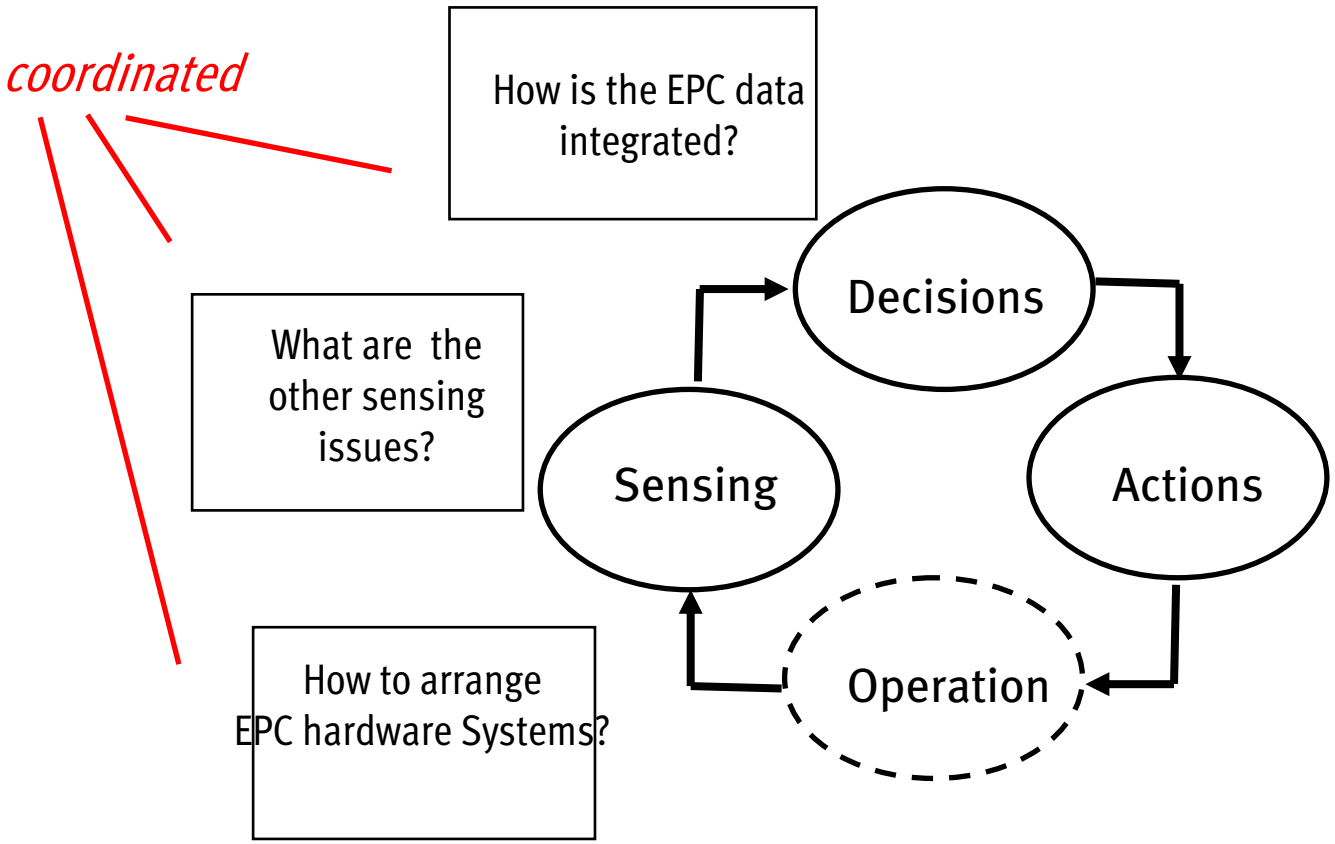
- OTIF: aggregate tracking - WYSIWYG
- Quality Assurance: specification/product trace

Some Competitive Advantage to early adopters

One off inventory reduction gains

Permanent gains in staff levels, delivery performance

manufacturing Systems Integration



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example: fmcg manufacturer

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Tagging of navigation points, readers on forklifts to ensure high speed loading accuracy

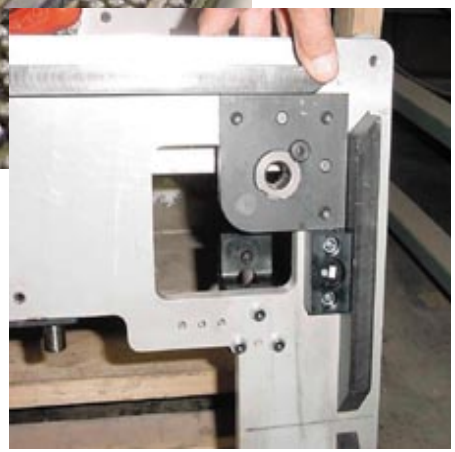
- Product Information: speed or accuracy c.f. bar code
- *RFID System:* HF (in concrete)
- Deployment Area: outbound
- Tag Deployment: Floor!, Assets – pallets preferred!
- Integration: connected

example: auto part manufacturer

Tagging of seat carriers for OEM compliance and ensuring high OTIF

- Product Information: accuracy
- *RFID System:* HF
- Deployment Area: outbound, (production)
- Tag Deployment: Carrier system
- Integration: connected, (coordinated)

Indirect gains in better asset utilisation



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near term characteristics

- Product Information: cost/accuracy
- *RFID System* Components: ID, tags, readers
- Deployment Area: outbound, warehouse
- Tag Deployment: asset, limited aggregate
- Integration: connected, coordinated

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drivers – longer term

Value Adding
- rapid customer response
- customisation
- enhanced offerings (information support)

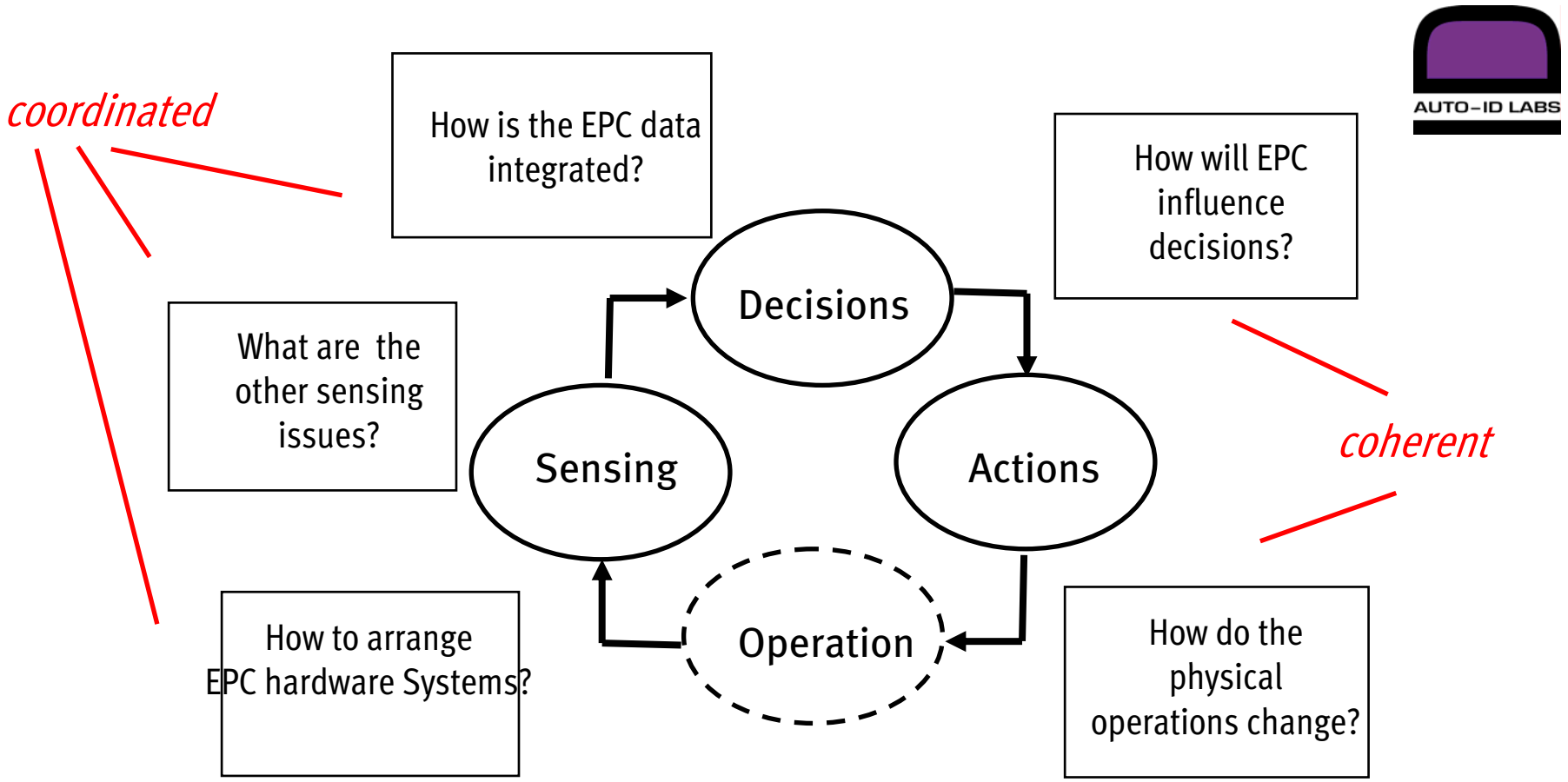
Product Extensions
- service life management
- disposal

Potential for significant differentiation

Alignment with/ Influence on core business strategy

Reengineering

manufacturing Systems Integration



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example: aero manufacturer

Tagging of parts, paperwork and tools to reduce complexity and improve system performance in aircraft assembly

Indirect gains in better asset utilisation

- Product Information: accuracy, *(completeness)*
- *RFID System:* UHF
- Deployment Area: inbound, production
- Tag Deployment: Reusable containers
- Integration: coordinated, *(coherence)*

example: auto manufacturer

Tagging of vehicle carriers for enabling customisation of each recreation vehicle to specific order needs

- Product Information: completeness
- *RFID System: U*HF
- Deployment Area: inbound, production
- Tag Deployment: Carrier system
- Integration: coordinated, *(coherent)*

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example: laboratory packing operation

Order driven packing operation enabling order specification and ammendment.

Production driven directly by customer preferences

- Product Information: timeliness, completeness
- *RFID System:* HF *(UHF changeover)*
- Deployment Area: inbound, production
- Tag Deployment: Item/Aggregate tagging
- Integration: coordinated, *(coherent)*

example: laboratory packing operation

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longer term characteristics

- Product Information: completeness
- *RFID System* Components: middleware, network
- Deployment Area: production, inbound
- Tag Deployment: aggregate, item
- Integration: coherency

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Concluding Comments

- Barriers
  - non standard deployments
  - complex tagging situations
  - effective integration (*middleware problem*)
  - removing artificial constraints to extracting benefits

Concluding Comments

- Manufacturing and Wider Deployment
  - Manufacturing gains from upstream/downstream deployments and vice-versa
  - Multiple applications / shared product oriented information
  - key is to view RFID as a network extension
  - …. manufacturer responsibility in EU legislations

Manufacturing Special Interest Project

- **Aim:** Provide a focus for common research and development issues in manufacturing RFID deployment
- **Typical Themes**

  - RFID Deployment – technology /operations considerations, constraints
  - Systems Integration – Bar Code, Other Sensors, Middleware
  - Reeingeering – rethinking BIS, control and operations
  - Adoption Support – business cases, standards, cross sectoral learning

- **Location:** Based at Cambridge – teaming with other labs and key organisations
- **Register:** for information, events and project details at

http:// www.autoidlabs.org/manufacturing

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