Evaluating RFID Infrastructures

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Overview

- ## Introduction
  - What are "RFID Infrastructures"?
  - Motivation

- ## Criteria for Evaluation

- ## Applying These Criteria Exemplarily

- ## Conclusion & Outlook

RFID Infrastructure

- **Software** infrastructure to **collect, filter** and **enrich** raw RFID-data before **sending** it to the backend systems
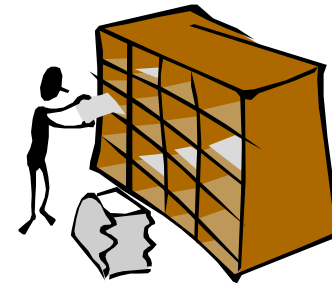

1. Managing
RFID-reader(s) to collect raw-RFID-data

2. Enriching
e.g. by
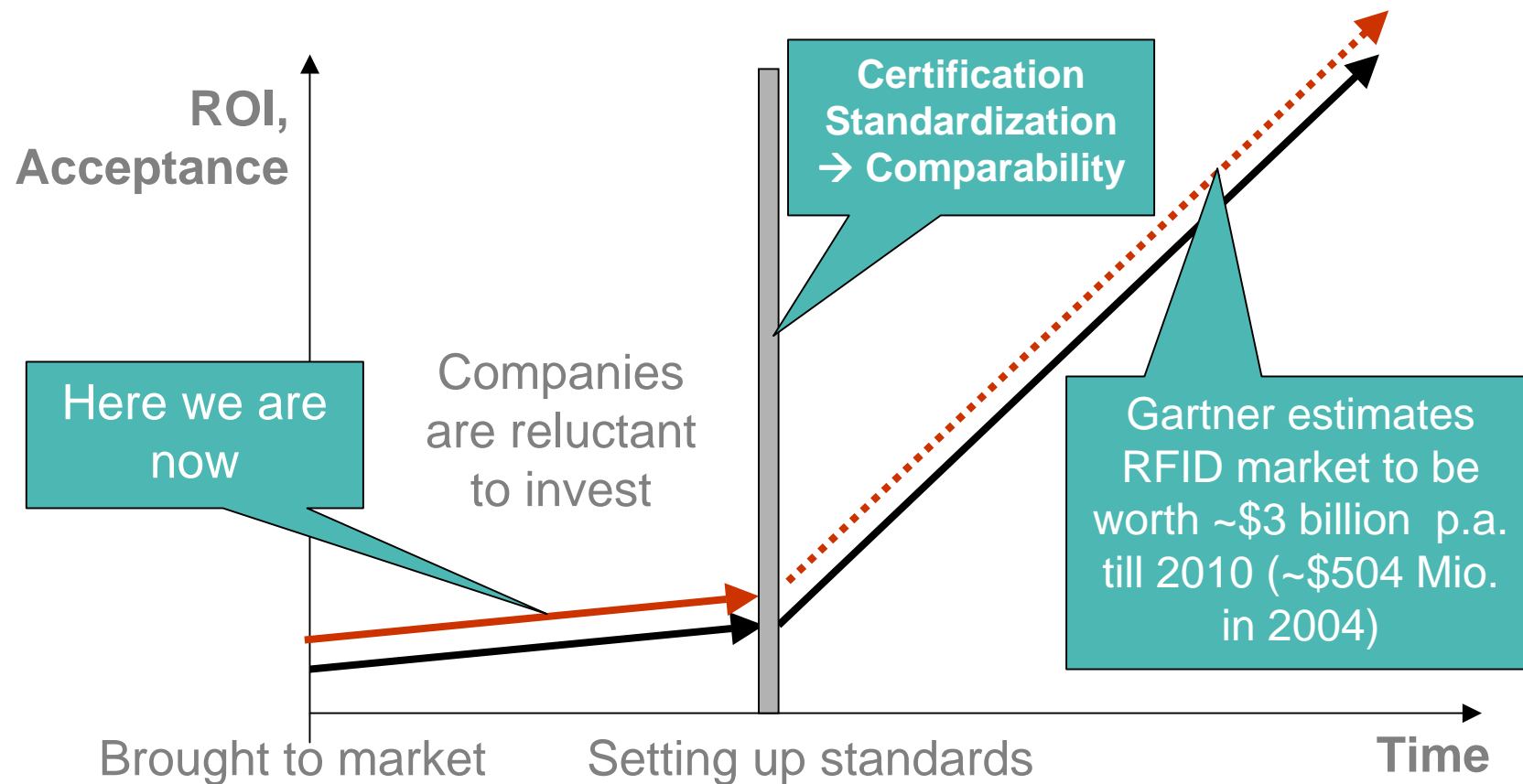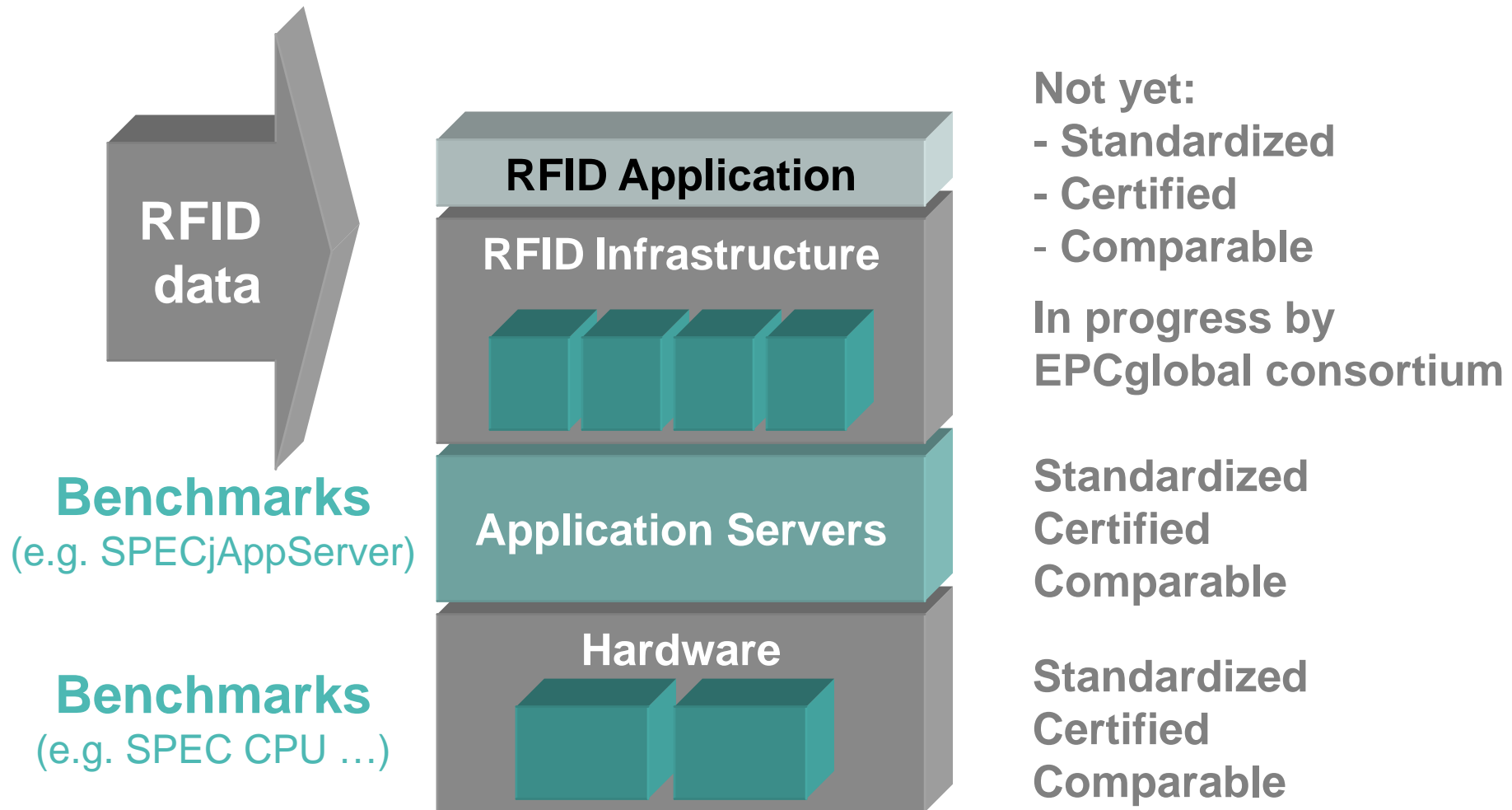- Filtering
- Accumulating

3. Exchanging enriched data
with backend-systems

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Motivation: Application Servers and RFID

- Development of RFID technology expected to be similar to Application Servers

ROI, Acceptance

Certification Standardization → Comparability

Here we are now

Companies are reluctant to invest

Gartner estimates RFID market to be worth ~$3 billion p.a. till 2010 (~$504 Mio. in 2004)

Brought to market

Setting up standards

Time

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Motivation: Standardization & Comparability

RFID data

Benchmarks
(e.g. SPECjAppServer)

Benchmarks
(e.g. SPEC CPU …)

RFID Application

RFID Infrastructure

Application Servers

Hardware

Not yet:
- Standardized
- Certified
- Comparable

In progress by
EPCglobal consortium

Standardized
Certified
Comparable

Standardized
Certified
Comparable

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Criteria For Evaluation

- Standardized functionality makes systems comparable → competition

- Comparability allows to decide on several alternatives

- Decisions should be based on proper evaluations

- We provide a basic framework, divided into categories:
  - **Technical Criteria**
  - **Integration Criteria**
  - **Economic Criteria**

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Criteria For Evaluation – Technical Criteria

- **Scalability**
  Ways to balance processing loads and extend an implemented system

- **Commitment to Standards**
  Supported communication- and/or document-standards (e.g. Web Services, EPCglobal Network)

- **Data Processing Capabilities**
  Level of filtering, attaching meta-data from backend-systems or other DBs?

- **Sharing of System Functionality**
  Level of modularization. How to share information with partners in the business process?

- **Performance**

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Criteria For Evaluation – Integration Criteria

- **Application Integration**
  Integration into existing software environments, dependencies and requirements

- **Customizability**
  How to customize built-in features, cost of work to include customer code?

Criteria For Evaluation – Economic Criteria

- **IT-Landscape**
    - Guidelines of the company
    - Existing environment
    - → Strategic management decision
- **License Models and Hardware Costs**
    - Initial Costs
    - Future (license) and support costs?
- **Training Operators**
    - End users
    - System administrators
- **Safety of Investment**
    - Support of future technologies
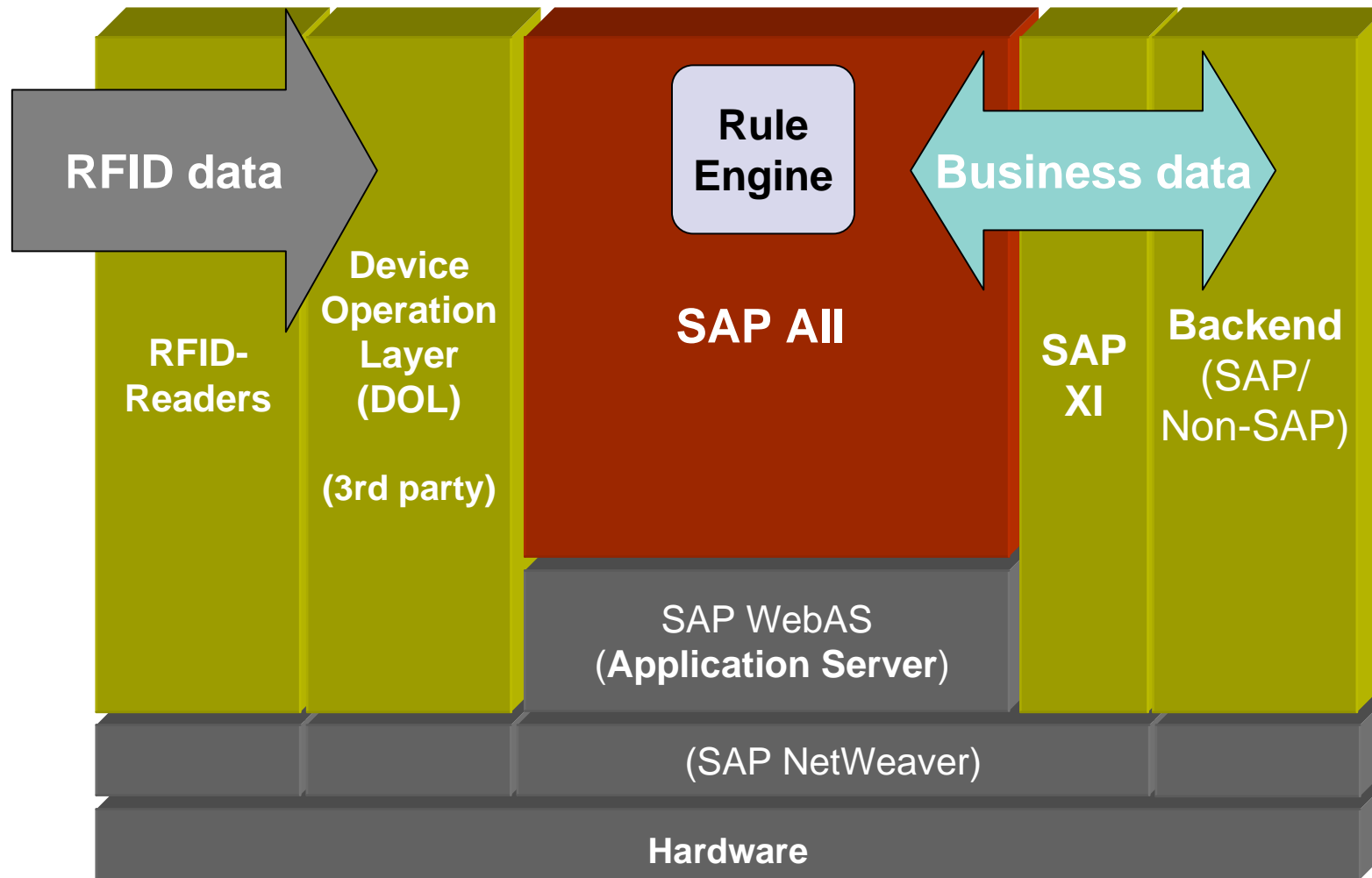   - Market position and reliability of vendor

SAP's Auto-ID-Infrastructure (AII)

- Leader of the market regarding business intelligence software and large scale infrastructures

- SAP was a founding-member of the Auto-ID Center (now called EPCglobal) in 1999

- SAP offers an RFID-solution called SAP Auto-ID-Infrastructure (AII)

- SAP's AII technology has become quite a quasi-standard itself regarding business intelligence

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SAP AII Implementation

RFID data

Rule Engine

Business data

RFID-Readers

Device Operation Layer (DOL)

(3rd party)

SAP AII

SAP XI

Backend (SAP/ Non-SAP)

SAP WebAS (**Application Server**)

(SAP NetWeaver)

Hardware

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Applying Technical Criteria

- **Scalability**
  - Several DOLs connected with IS, DCs combined at DOL
  - First-level error-handling by RuleEngine ➔ reduction of traffic, balancing work-loads

- **Commitment to Standards**
  - Support for EPC-tags: GTIN, EPC number range, EPC-tag generation

- **Data Processing Capabilities**
  - Level of filtering: DOL and RuleEngine. Meta-data via Local Repository

Applying Technical Criteria

- **Sharing of System Functionality**
  - Connected AINs share information via Integration Services
  - Access to components via underlying WebAS (J2EE, .NET, ABAP)

- **Performance**
  - Experiments show a well scaling even under heavy traffic
  - Traffic Generators for simulation of traffic
  - Other tools part of NetWeaver or Backend

Applying Integration Criteria

- **Application Integration**
  - Using SAP NetWeaver, SAP XI, custom adapters or underlying WebAS (certificated J2EE)
  - Strong dependencies on SAP-systems

- **Customizability**
  - Configuration of adapters, modules and Traffic Generator via web based Auto-ID-Cockpit or NetWeaver

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Applying Economic Criteria

- **IT-Landscape**
  - Depends on given guidelines
  - SAP supports all standard platforms and DB-systems
- **License Models and Hardware Costs**
  - Depends on given estimation of costs
- **Training Operators**
  - Full training or workshop
- **Safety of Investment**
  - Leader of the market
  - Member of EPCglobal
  - All quasi-standard infrastructure

Conclusions & Outlook

- ## Standards and certificates mean comparability
  - For RFID infrastructures to come (EPCglobal)

- ## Benchmarks help to distinguish
  - E.g. SPECjAppServer
  - For RFID infrastructures to come

- ## Criteria for evaluation needed
  - We provided a basic framework for evaluating RFID infrastructures based on three dimensions
  - Criteria have to be refinded
  - Testing...

- ## Still a lot to do...

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Questions & Answers

Any questions left?