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**RFID   Activities at Siemens
From Shop Floor to Board Room**

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Corporate Technology

CT SE DM

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RFID Activities at Siemens – An Overview

1. **Definition & Scope**

2. **R&D activities**

3. **Requirements from BU´s (Siemens Business Units)**

4. **RFID Solutions for Industrial Application**

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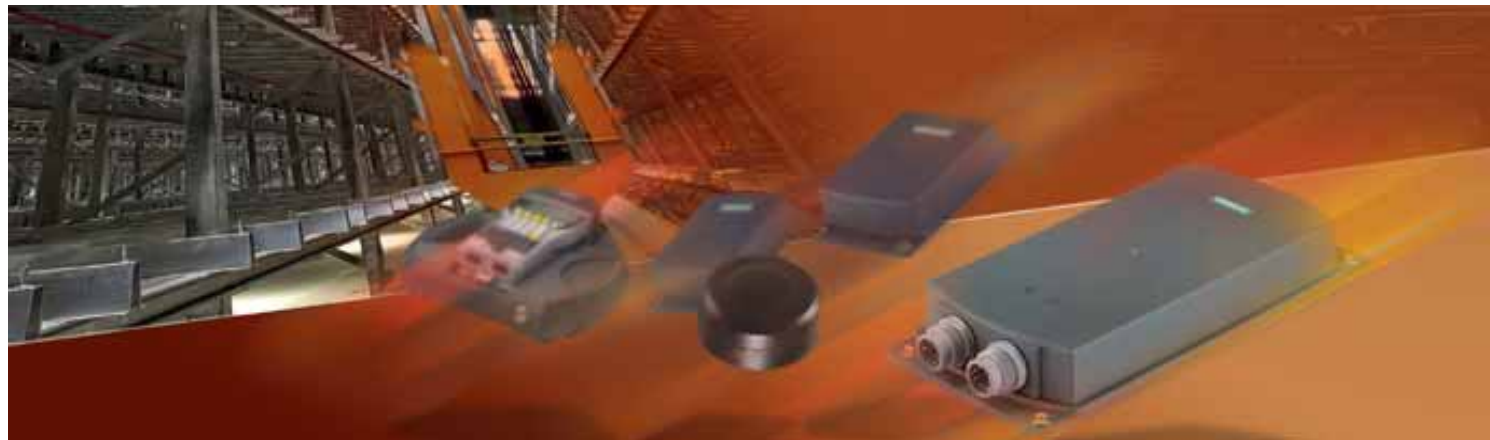
What does RFID bring?

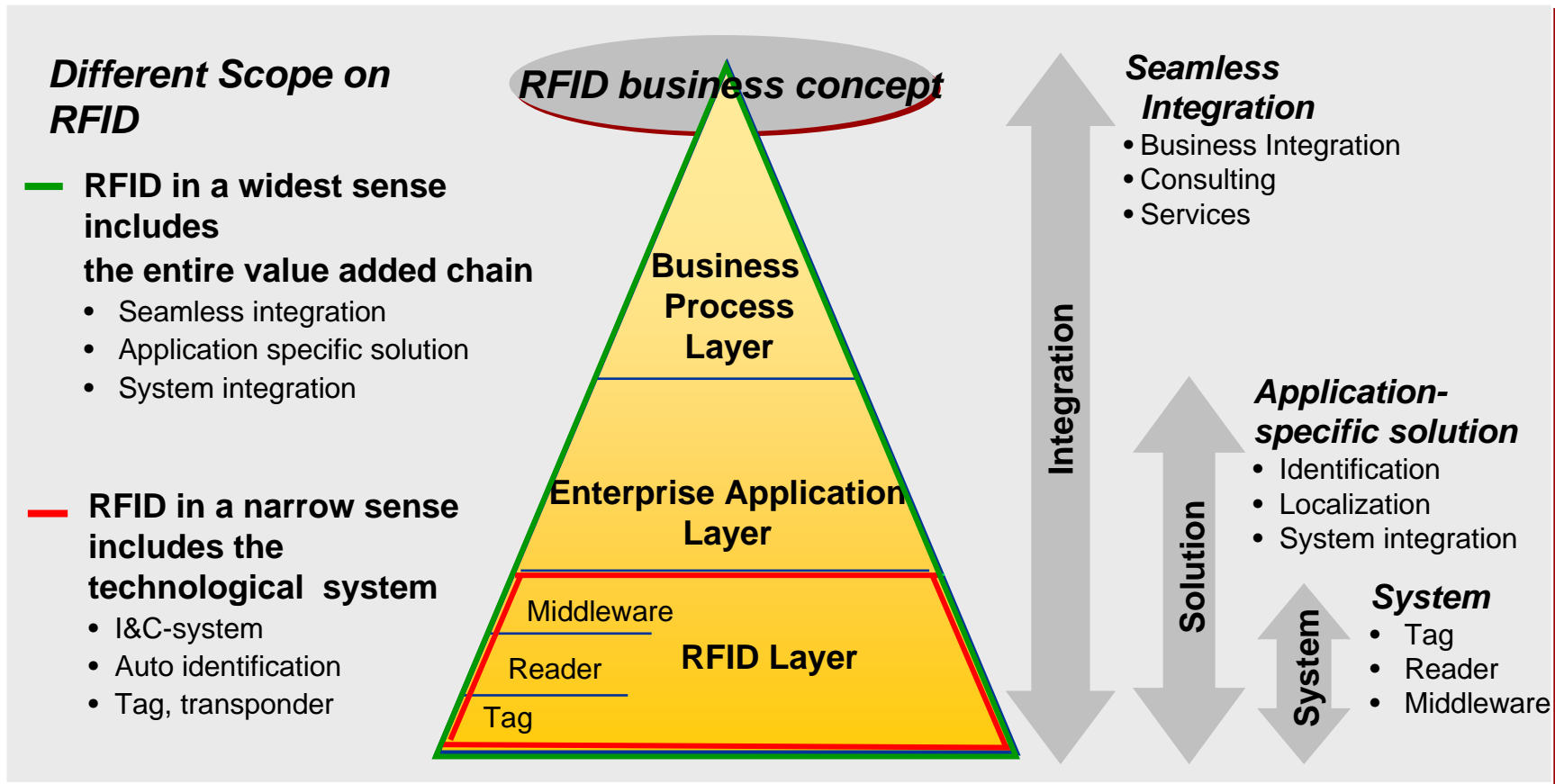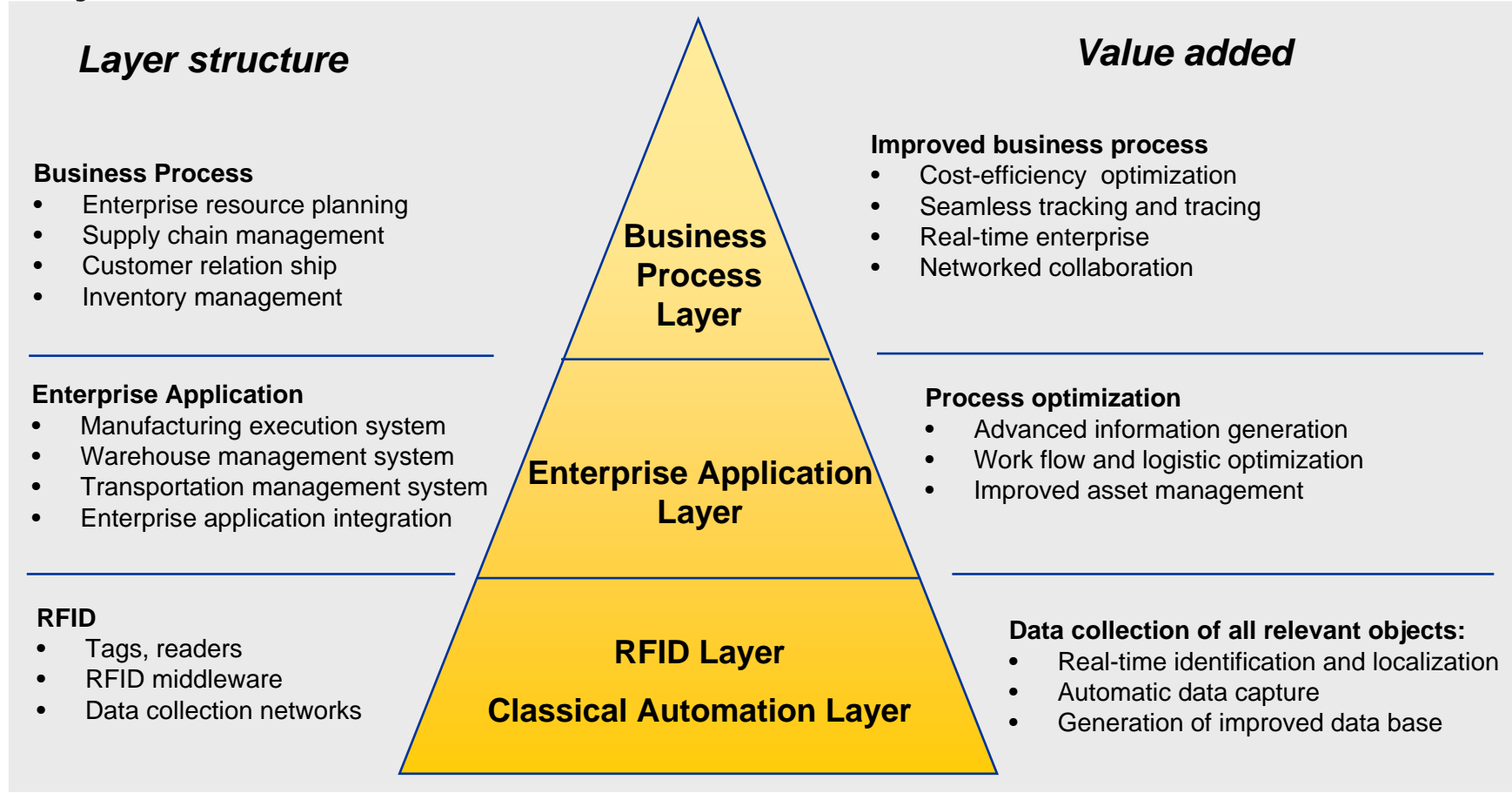|	
Transparency:	**in production, transportation, warehousing, logistics, organized events, information for companies and consumers**
Simplicity:	**in assembly, delivery, stocking, and customer service**
Time saving:	**fast flow of goods, immediate identification, prompt re-stocking, increased productivity, shorter queuing in supermarkets**
Security/Safety:	**less wastage and loss of goods, enhanced data security, increased safety in medicinal drug dosing**
Cost savings:	**falling process costs, better availability, improved brand protection**

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RFID is used in different scopes, however depending on each other

Different Scope on RFID

— **RFID in a widest sense includes**

the entire value added chain
- Seamless integration
- Application specific solution
- System integration

— **RFID in a narrow sense includes the technological system**
- I&C-system
- Auto identification
- Tag, transponder

RFID business concept

Business Process Layer

Enterprise Application Layer

Middleware

Reader **RFID Layer**

Tag

Seamless Integration
- Business Integration
- Consulting
- Services

Integration

Application-specific solution
- Identification
- Localization
- System integration

Solution

System
- Tag
- Reader
- Middleware

System

➢ **The value-added chain of RFID business ranges along all layers**
➢ **Companies have to realize complete RFID offerings to create high economic benefits**

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For all applications totally integrated RFID solutions are major success factors

Layer structure

Value added

Business Process
- Enterprise resource planning
- Supply chain management
- Customer relation ship
- Inventory management

Business Process Layer

Improved business process
- Cost-efficiency optimization
- Seamless tracking and tracing
- Real-time enterprise
- Networked collaboration

Enterprise Application
- Manufacturing execution system
- Warehouse management system
- Transportation management system
- Enterprise application integration

Enterprise Application Layer

Process optimization
- Advanced information generation
- Work flow and logistic optimization
- Improved asset management

RFID
- Tags, readers
- RFID middleware
- Data collection networks

RFID Layer

Classical Automation Layer

Data collection of all relevant objects:
- Real-time identification and localization
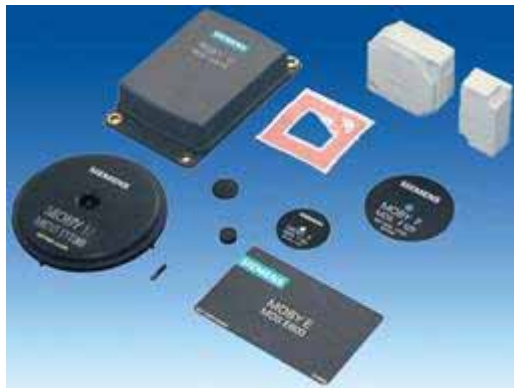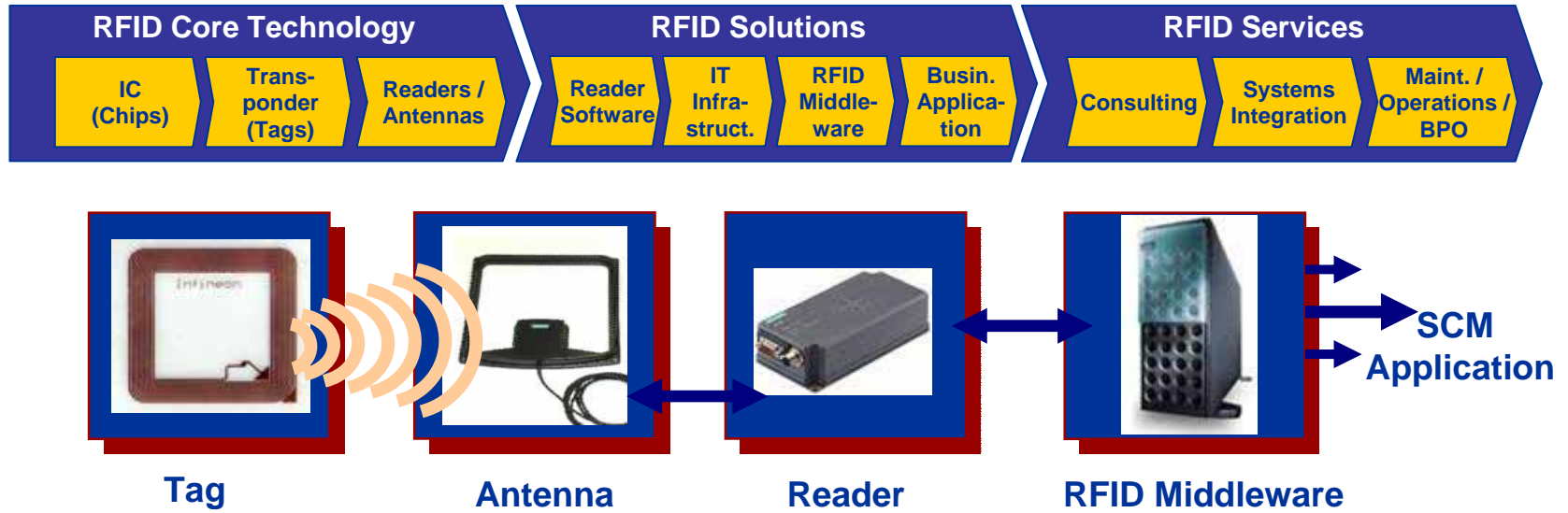- Automatic data capture
- Generation of improved data base

➢**Within the business process layer competitive advantage will be won or lost.**

➢**Enterprise applications have to be upgraded or redesigned as companies change business processes**

➢**RFID layer is the enabling layer and basis of the value added chain**

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Siemens RFID Business along the Value Chain

RFID Core Technology			RFID Solutions				RFID Services		
IC (Chips)	Trans-ponder (Tags)	Readers / Antennas	Reader Software	IT Infra-struct.	RFID Middle-ware	Busin. Applica-tion	Consulting	Systems Integration	Maint. / Operations / BPO

Tag   **Antenna**   **Reader**   **RFID Middleware**

SCM Application

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Thinfilm Ultracapacitors and Batteries -
Power Supplies for Smart-Cards, Sensors and Polytronics

Cathode side
+

Electrolyte
Paper
Anode side
Conductors
−
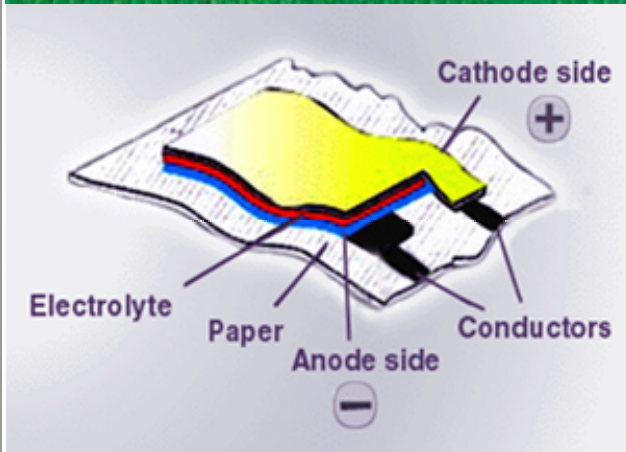
Specification:

easy to manufacture (screen printing)

thicknesses below 150µm possible, flexible cells

easy and fast design to product:

- flexible design of shape
- space-saving, integration into existing housings
- wide adjustable range of technical characteristics (capacity, current, package)

Possible applications:

smart-cards

wireless sensors

safety labels (ID-Tags, etc.)

. . . . .

typical energy density:

battery: 2 - 5 mAh/cm² at 1.2 - 1.5 V
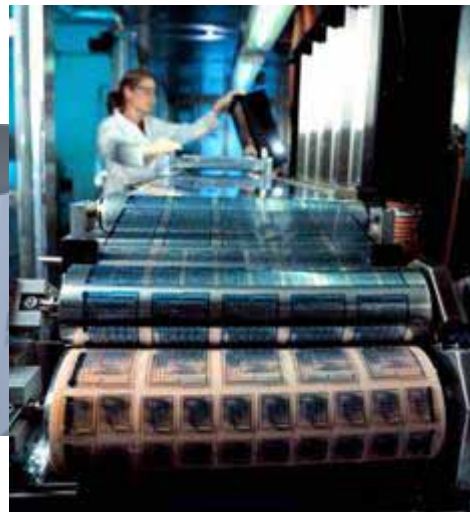**capacitor:** 0.1 - 0.5 F/cm² (0.4 mAh/cm²) at 2.3 - 3V

Flexible and very thin Ultracapacitors and low-cost-batteries open new applications in safety, security and commodity markets.

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RFID – R&D Activities at PolyIC

Printing of Polymer Electronics in large quantities

Costs

Silicon

Price gap

Polymer

Performance
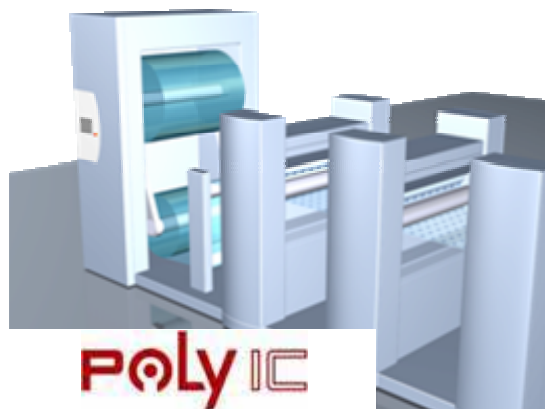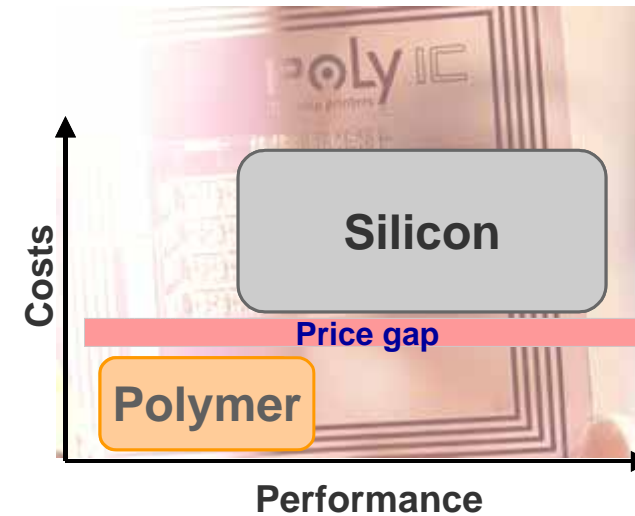
POLY IC

The chip printers

PolyIC GmbH a joint venture of Siemens AG and Leonard Kurz KG was founded in 2003.

Milestone (Dec 2005)
13,56 MHz RFID Tag, Rectifier and Pwr supply operating with 1Bit

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Paradigm Shift: Real Time Enterprise
Supply Chain Intelligence comes to the Material Flow

Siemens Global Network of Innovation transfers Technology trends …

#1 Trend:	**Decreasing Tag Price**	(e.g. Silicon ➜ Polymer)
#2 Trend:	**Increasing Tag Functionality**	(Read ➜ Read/Write, Sensors, etc.)
IT Trend:	**More powerful Hardware**	(RFID, PLC, Servers, Networks)

… into trendsetting Solutions

Automated Tracking & Tracing → **Objects interact with machines** → **Autonomous Logistics Systems**
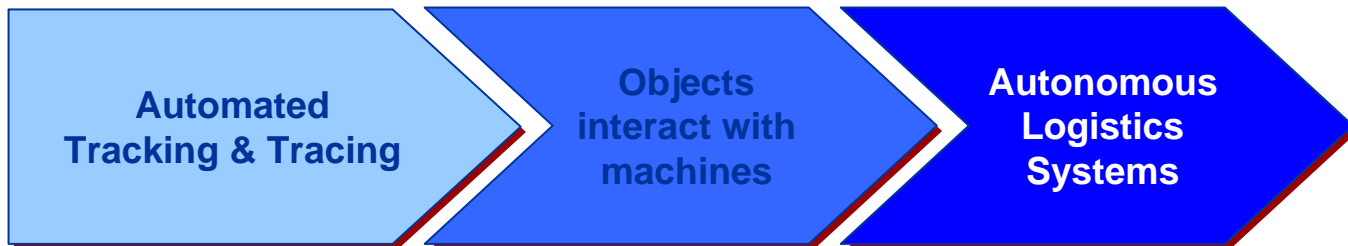
Siemens Vision
Route Material like Data

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RFID Market Requirements (selected examples)

Automation & Control

- Warehouse applications (Metro, WalMart)
- Internet of things – research cooperation (FhG IML)
- Pharma industry - for drug authentification (FDA, Pfizer)
- Event support - tracking & tracing (World Expo, Olympic games)
- Mobile passenger services, baggage handling and airport security solutions (I&S AL)

Transportation

- Electronic ticketing (SBB)
- Freight wagon tracking (DB)
- Refurbishment of rolling stock (Combino, ICE1)

Medical Solutions

- Tracking of medical equipment
- Support of wireless hospital solutions

➢ **Actual requests for ready to run solutions are emerging**

➢ **Long term paradigm changes in logistic (Internet of things)**

EasyAccess

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RFID activities of Siemens Business Units (examples)

Supply chain optimization through RFID

Implementation of an end-to-end stock management pilot system integrating Radio Frequency Identification technology (RFID) at all levels – from production to the stores

Impact: Accelerated logistics processes and improved stock-level availability of 14%, handling costs for incoming goods down by 22%

Mobile workflow management for hospitals

Implementation of a pilot program with RFID wristband for patients and PDAs/Tablet PCs for physicians to enable them to identify patients and access their medical history

Impact: Easy, fast and paperless access to patient data

RFID Technology Centre in Munich, Germany

Establishment and operation of a RFID test lab together with Intel providing a variety of RFID-based application scenarios based on SAP applications (e.g. NetWeaver, Mobile Asset Manager)

Impact: Leading-edge test facility for innovative logistics processes and IT infrastructures

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Efficient processes applied to logistics

Kühne + Nagel (D) (shipping company)

First practical transatlantic RFID trial along the supply chain from Munich to New York with the printing systems manufacturer Océ and Lufthansa Cargo.

Impact: Automated parcel tracking, development of global RFID standards

Airports in Dubai, Paris, and Madrid

RFID-based baggage conveying system.

Impact: Faster transportation times, precise information on where the baggage is located, less lost bagggage.
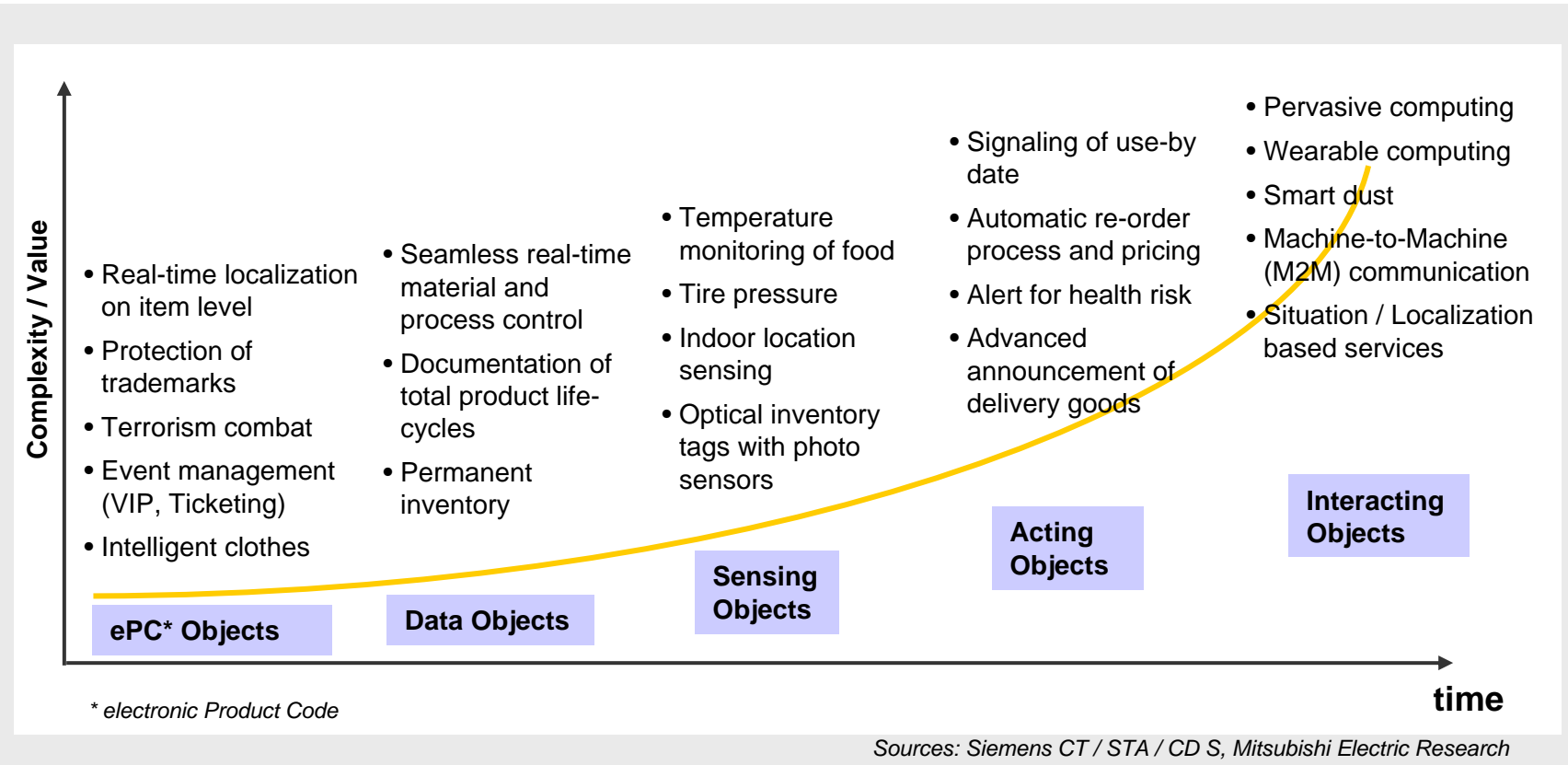
Quelle AG (department store chain and mail-order company)

Quelle is using RFID in its Leipzig mail-order center for warehousing, order-picking, packaging, and dispatching goods from all over the world.

Impact: 600,000 items are dispatched to up to 180,000 customers on peak days.

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Evolution of RFID applications

Complexity / Value

- Real-time localization on item level
- Protection of trademarks
- Terrorism combat
- Event management (VIP, Ticketing)
- Intelligent clothes

ePC* Objects

- Seamless real-time material and process control
- Documentation of total product life-cycles
- Permanent inventory

Data Objects

- Temperature monitoring of food
- Tire pressure
- Indoor location sensing
- Optical inventory tags with photo sensors

Sensing Objects

- Signaling of use-by date
- Automatic re-order process and pricing
- Alert for health risk
- Advanced announcement of delivery goods

Acting Objects

- Pervasive computing
- Wearable computing
- Smart dust
- Machine-to-Machine (M2M) communication
- Situation / Localization based services

Interacting Objects

time

* electronic Product Code

Sources: Siemens CT / STA / CD S, Mitsubishi Electric Research

➢ **RFID applications will increase in future. Key applications are open automated solutions**

➢ **RFID is a pacemaker technology from object-related wireless communications to autonomous cooperative computer and communication systems**
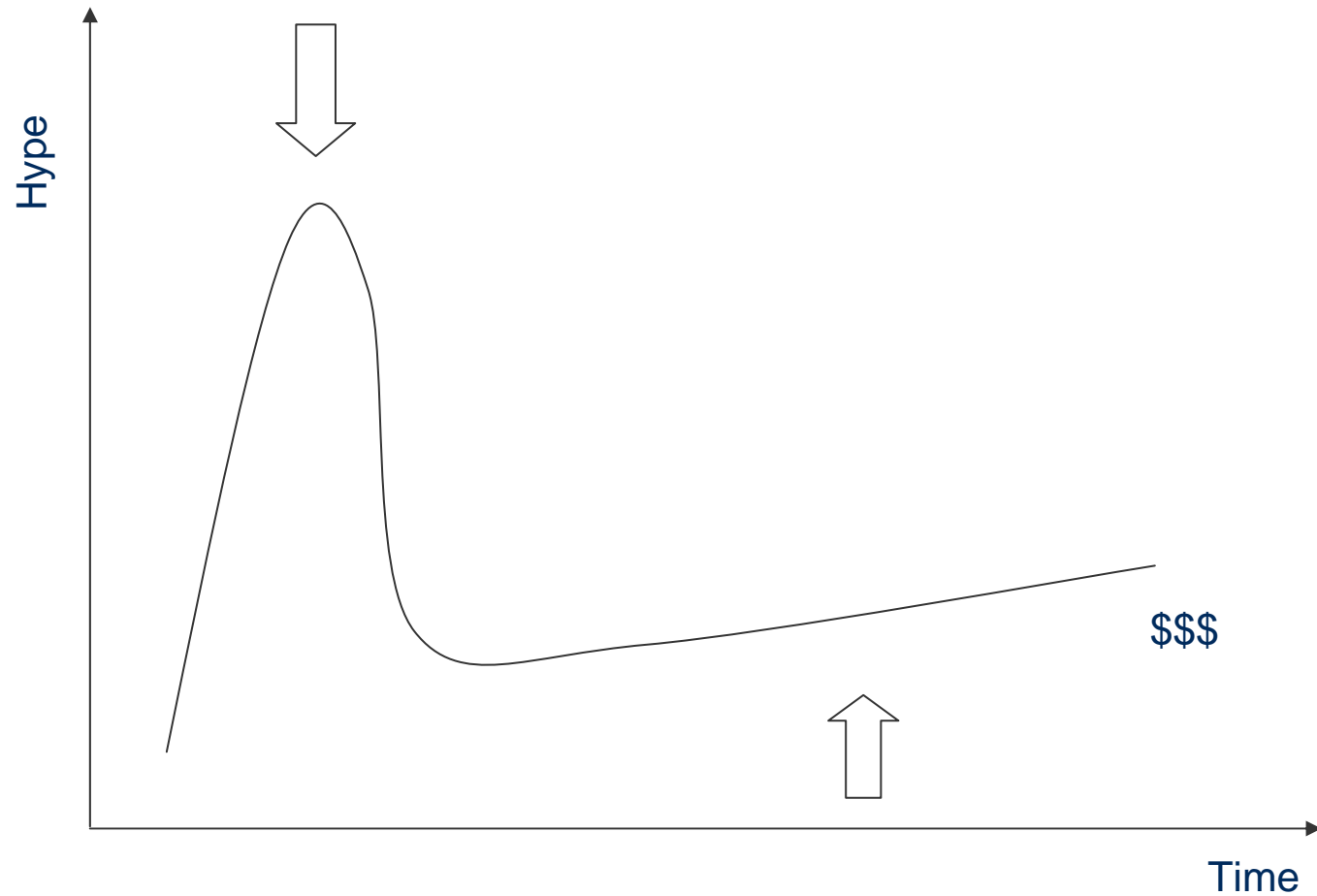
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