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TRACK AND MANAGE **EVERYTHING**

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APR. 3-5, 2012 | WALT DISNEY WORLD SWAN AND DOLPHIN RESORT, ORLANDO, FLA

RFID Data-Capture Software

Kenneth R. Traub, PhD

Ken Traub Consulting LLC

3 April 2012

Outline for Today

- 11:30: RFID Visibility Data for Business Applications
 - What's the important data, and how do you use it?
- 12:15 (now): RFID Data Capture Software
 - How do you collect the important data?
- Lunch
- 1:45: Putting It Together: Architecture, Product Selection and IT Governance
 - How do you build a complete system for the enterprise?
- 2:30: RFID Tag-Data Standards
- 3:30: RFID Data-Capture Standards: LLRP and ALE



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About the Speaker

- Independent Consultant
- Specializing in EPC/RFID Standards adoption
 - Software architecture for enterprises and solution providers
 - Educational programs on standards tailored to clients' needs
- Actively involved in GS1/EPC standards development
 - Member, GS1 Architecture Group
 - Editor, GS1 System Architecture
 - Editor, EPCIS and CBV specifications
 - Co-chair, Filtering & Collection (ALE) Working Group
 - Editor, EPC Tag Data Standard
 - Contributor to four other software specifications
- Consulting Instructor for Academia RFID



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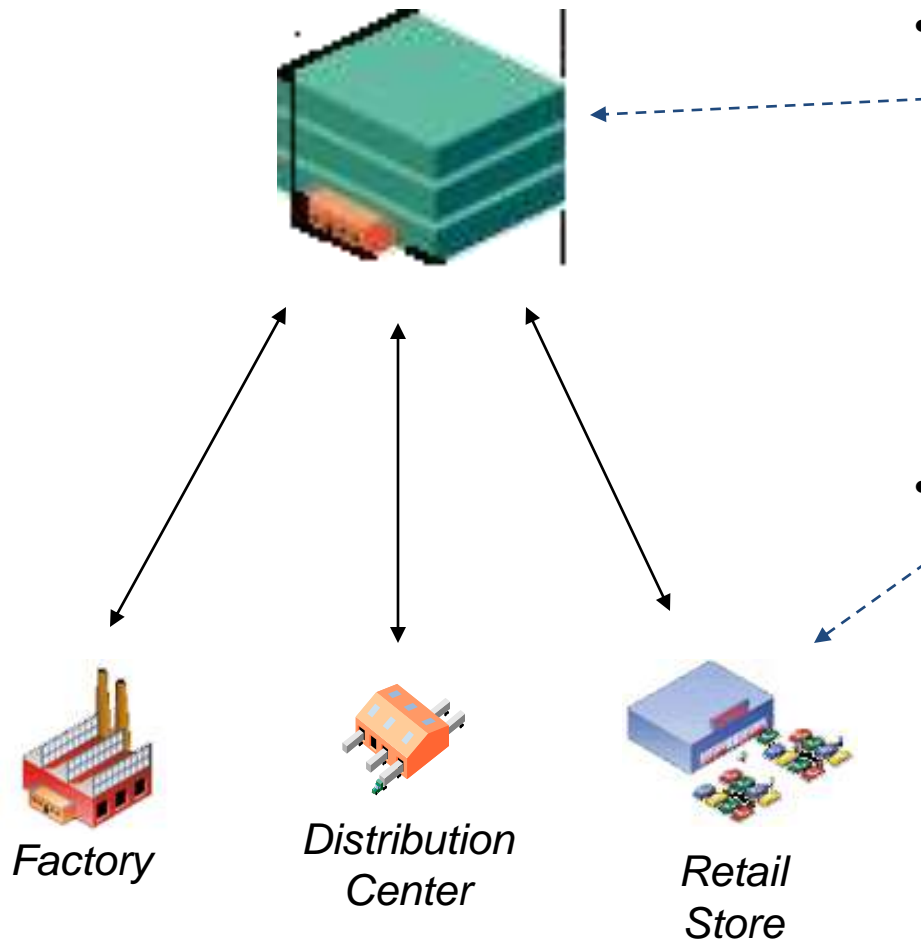
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Visibility into the Physical World



- Business decisions are made here, in the company headquarters data center

- ...but there's an awful lot of important action **here**, in the real world.

➔ Unique identification and RFID technology can bring awareness of the physical world



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What do Unique Identification and RFID do?



- No Unique ID/RFID → No Visibility
- An ID (EPC or other) uniquely identifies the asset
- RFID Tag encodes the ID
- RFID Reader senses presence of asset (no human intervention)
- Information systems now have visibility data
- Business can take action



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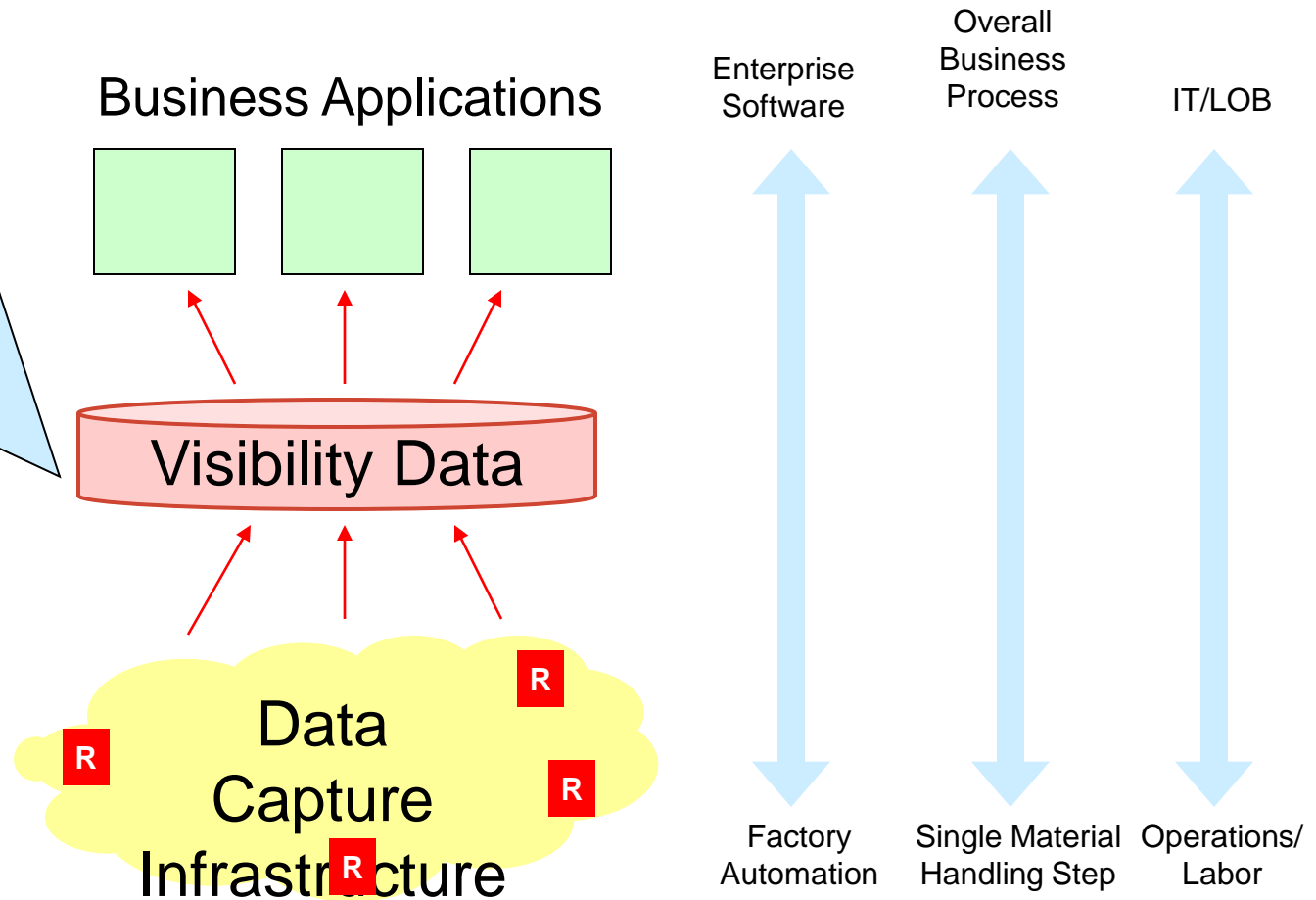
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Visibility Architecture

Single Most Important Design Decision:
This Interface

Key “hinge”
between different
worlds



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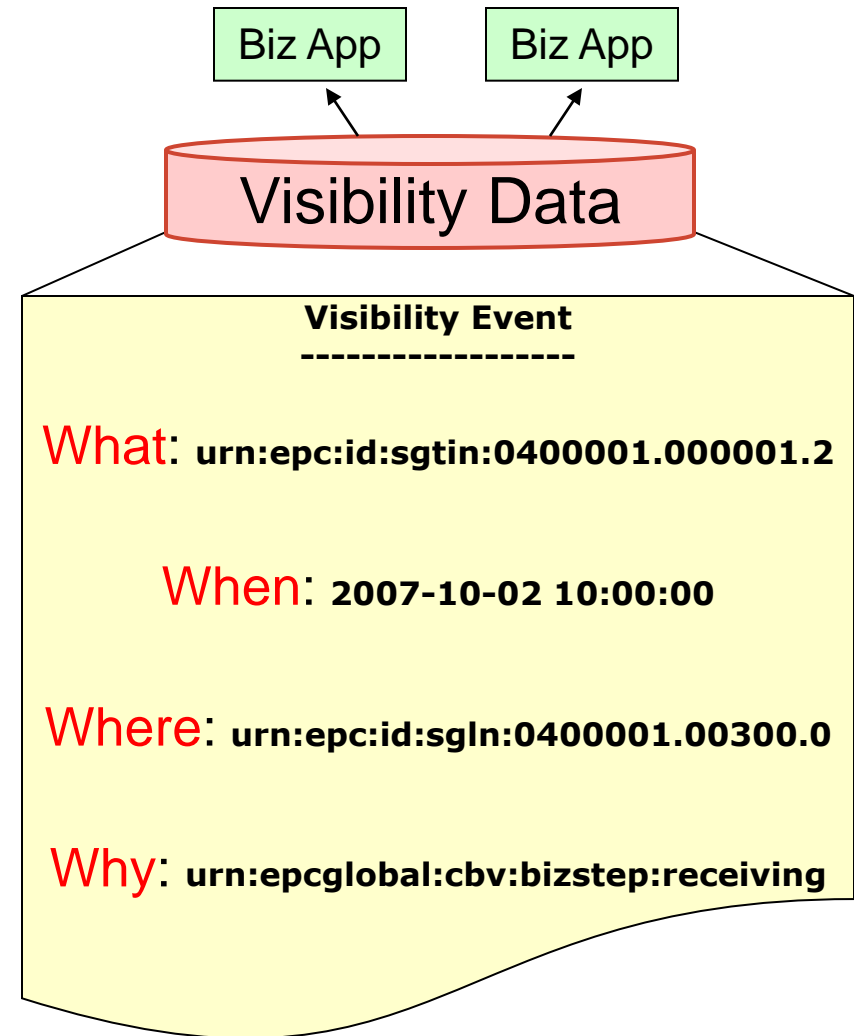
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Data Capture Goal

- Data Capture goal: create **visibility data** for business applications
 - What, When, Where, Why
- **Hide the details** of “how” each process step occurs
- Design this data first, then create the right capture infrastructure



What Leads to Visibility Data?

- Asset Storage
 - Monitoring assets on a shelf, in a bin, etc
- Asset Flow
 - Entry/Exit through doors, choke points, etc
- Lifecycle Events
 - Manufacturing new products, product end-of-life, etc.
- Warehouse/Logistics Operations
 - Picking to order, packing, unpacking, etc
- Shipping/Receiving Operations
 - Verifying order against PO, ASN, etc
- In-Store Operations
 - Stocking, replenishment, point-of-sale, etc



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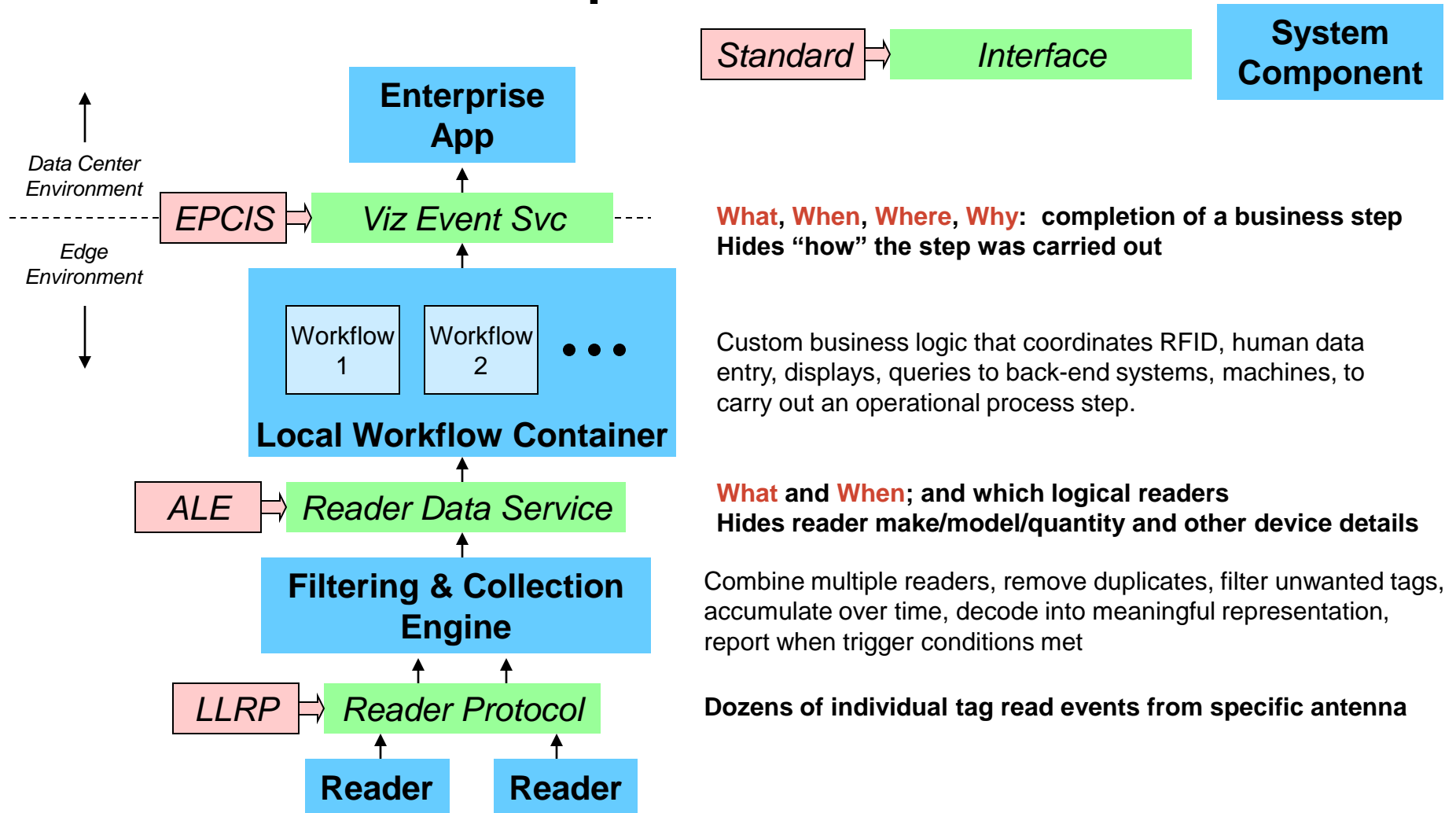
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Data Capture Architecture



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Data Capture Paradigms

- Simple passive observations
 - Room or shelf reader
- Complex synthesis from passive observations
 - Bi-directional door
 - Virtual read zones via multi-antenna triangulation system
- Business step with human, machine, and/or back-end interaction
 - Forklift operations
 - Automated palletizer
 - Shipment verification tunnel
 - Handheld operations



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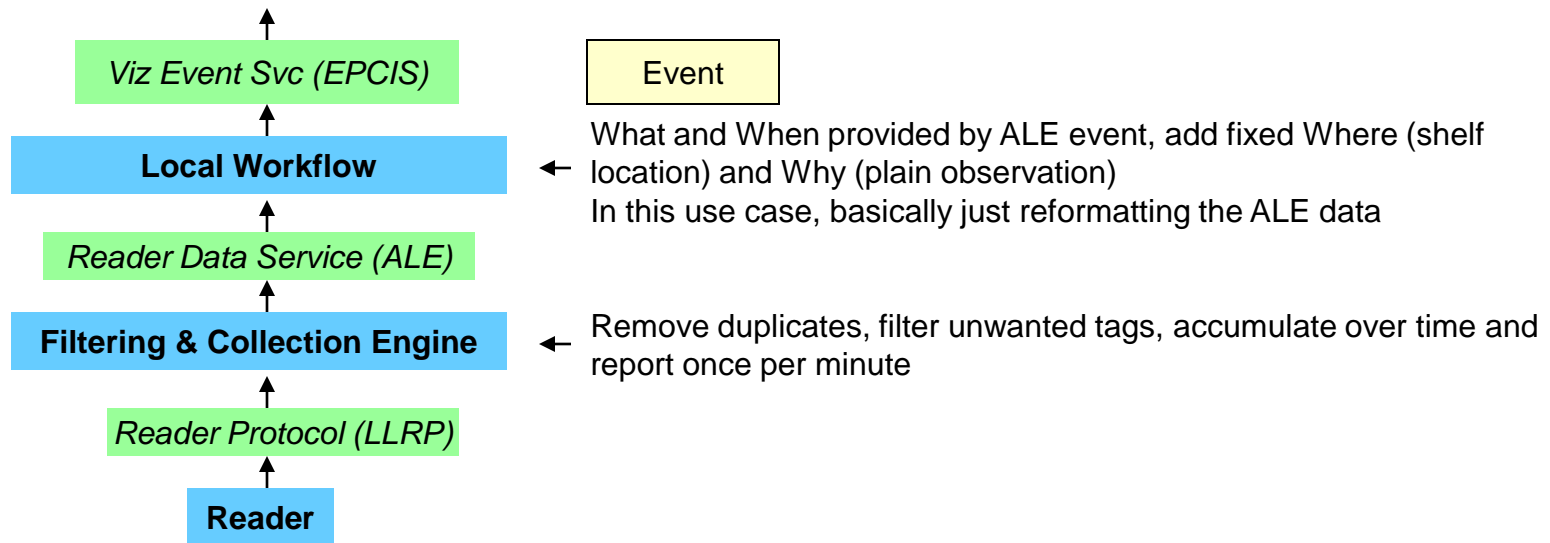
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Simple Passive Observation

Business Scenario	RFID Data Capture	Visibility Event Data
Monitoring goods in room or shelf	Single fixed reader 	Item arrives Item departs



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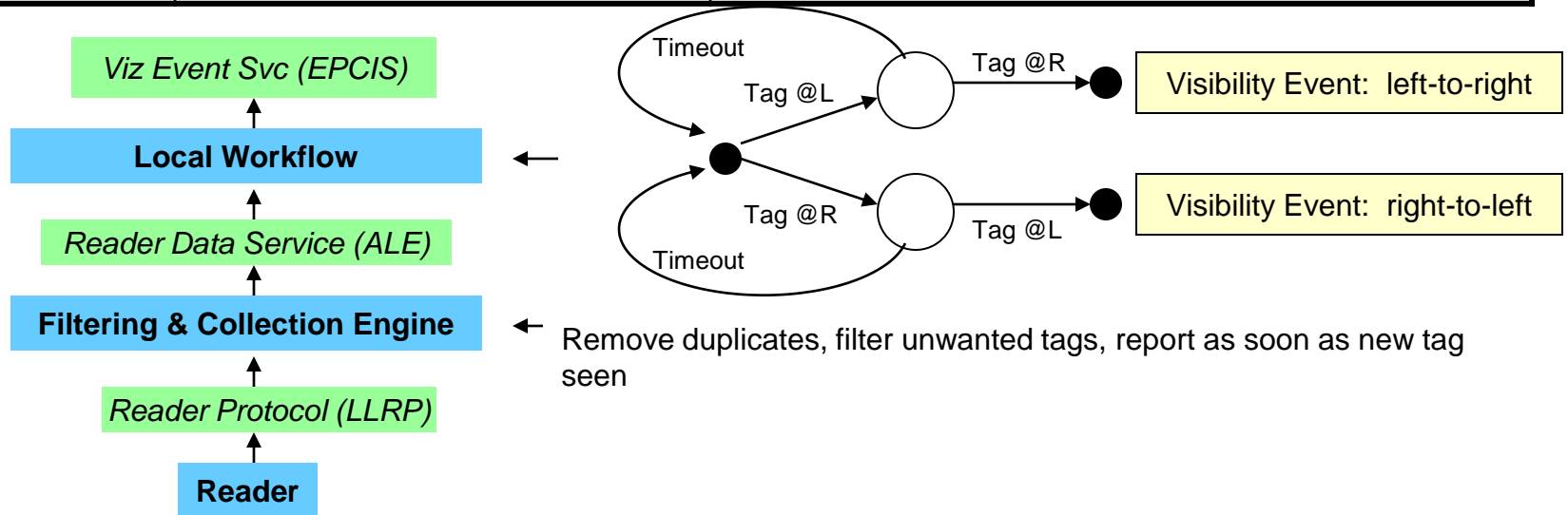
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Synthesis from Passive Observations

Business Scenario	RFID Data Capture	Visibility Event Data
Assets moving through door	Directional reader pair or reader with motion sensor 	Asset passes through left-to-right Asset passes through right-to-left <i>Calculated from pattern of reads</i>



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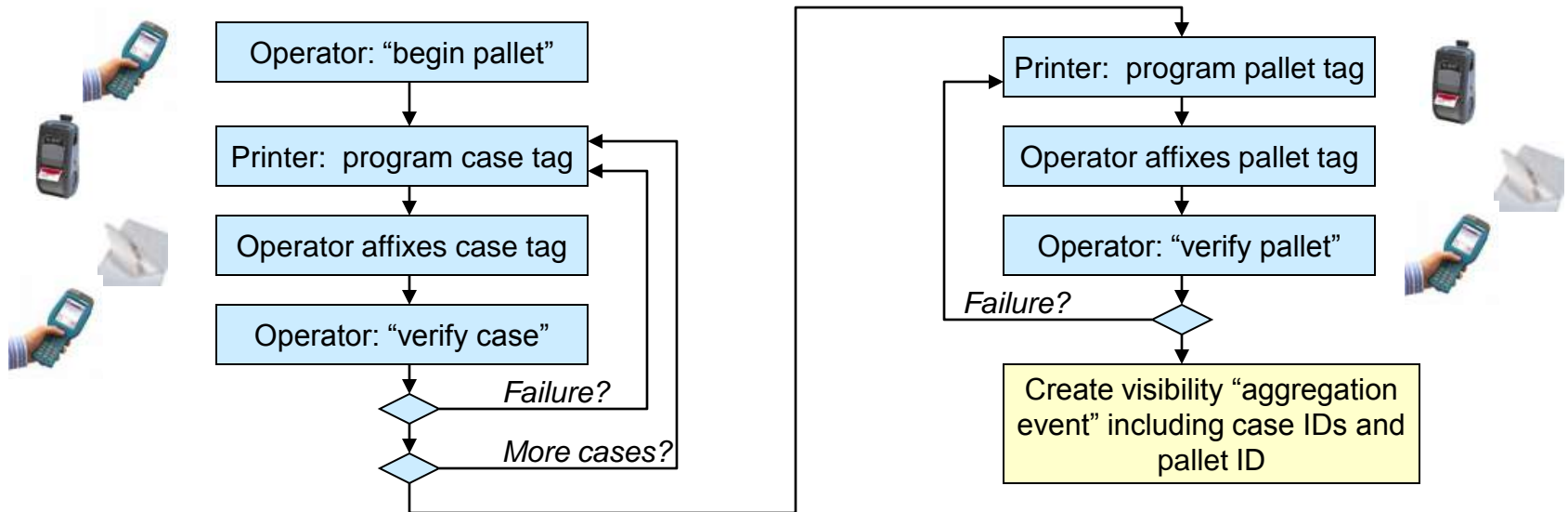
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Business Step with Human Interaction

Business Scenario	RFID Data Capture	Visibility Event Data
Pick and tag mixed pallet of cases	Handheld tag printer / reader, with integrated display 	When pallet is completed, "aggregation event" indicates case tag IDs plus pallet tag ID



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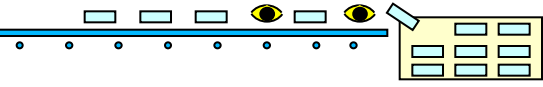
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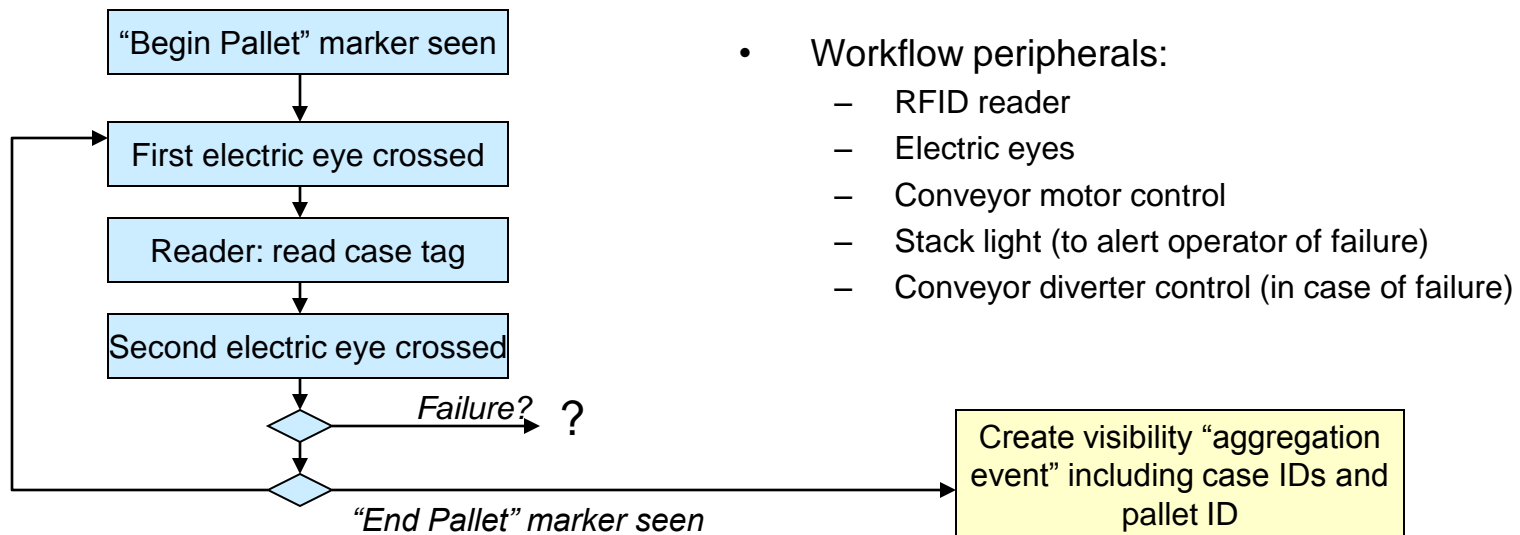
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Business Step with Machine Interaction


Business Scenario	RFID Data Capture	Visibility Event Data
Build pallet from tagged cases	Automated conveyor system with readers 	When pallet is completed, "aggregation event" indicates case tag IDs plus pallet tag ID

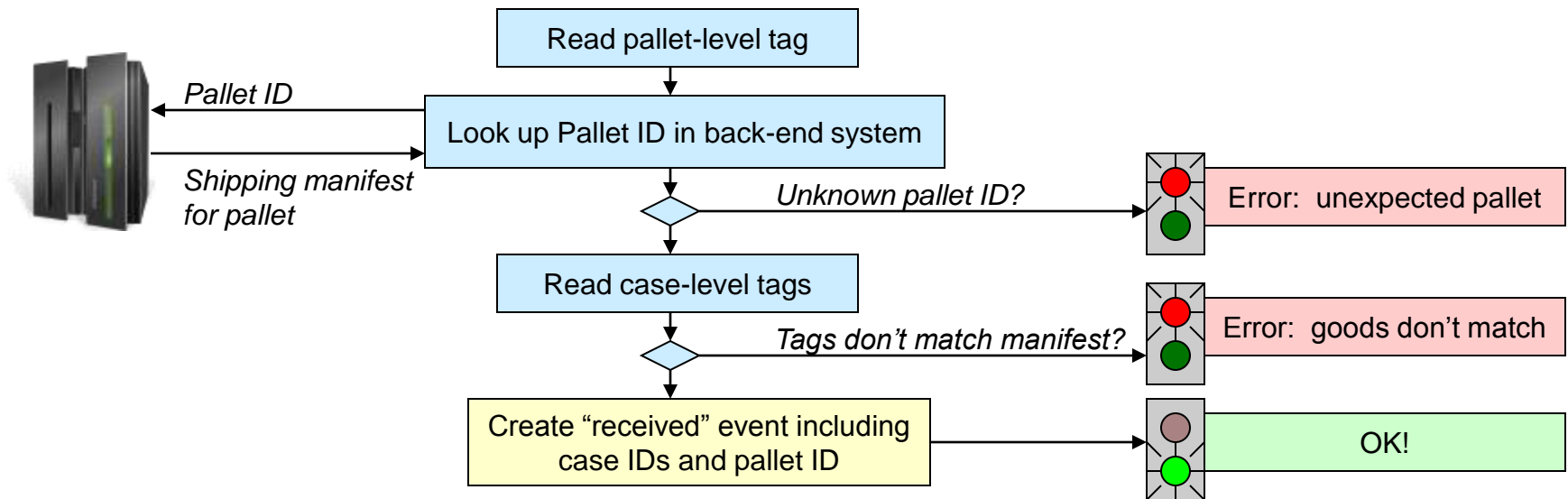


- Workflow peripherals:
 - RFID reader
 - Electric eyes
 - Conveyor motor control
 - Stack light (to alert operator of failure)
 - Conveyor diverter control (in case of failure)



Business Step with Back-end Interaction

Business Scenario	RFID Data Capture	Visibility Event Data
Verify correct goods received	Archway reads pallet and case tags 	If case tags match Advance Ship Notice, "received" event; else error



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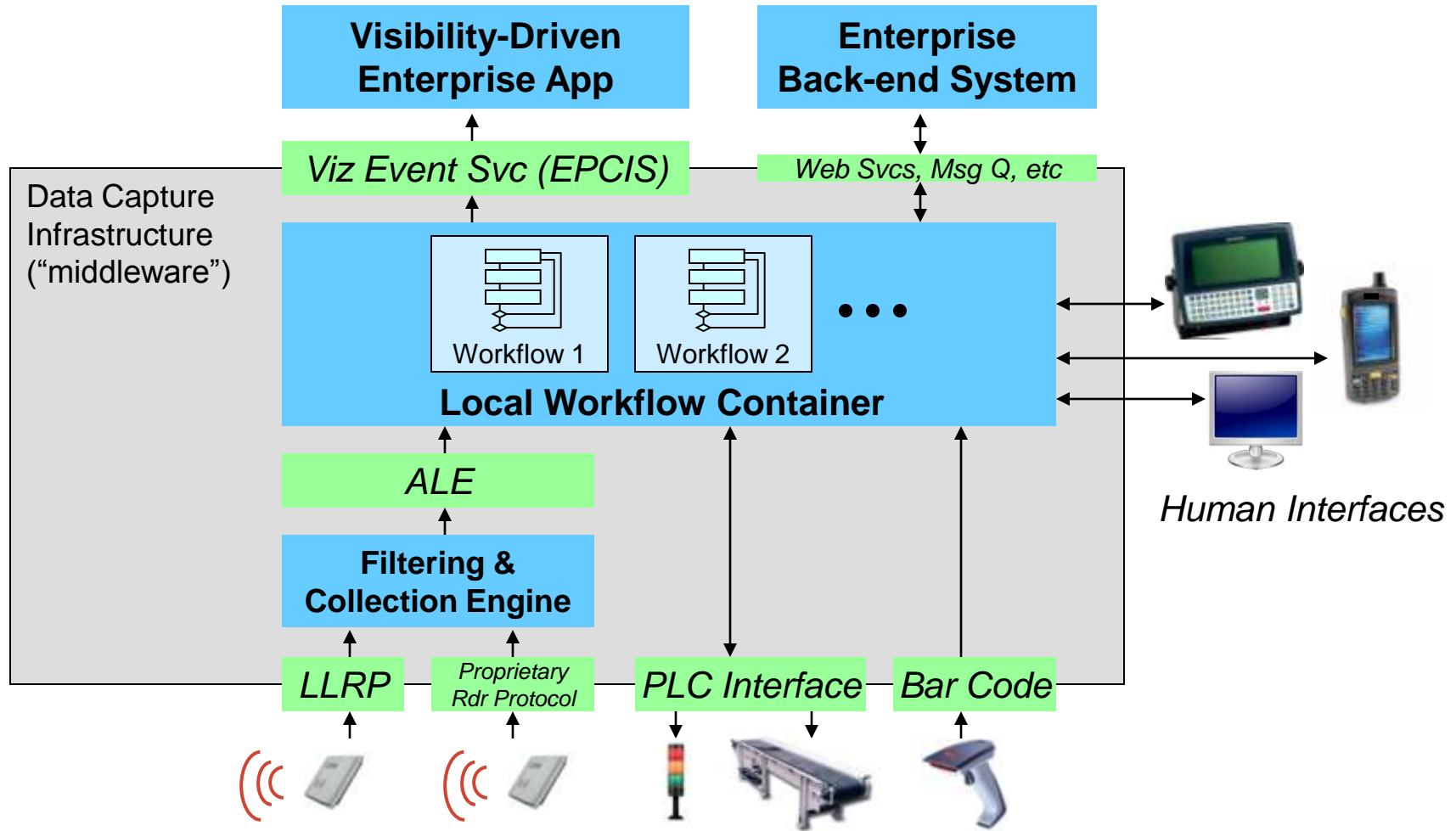
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Data Capture Architecture



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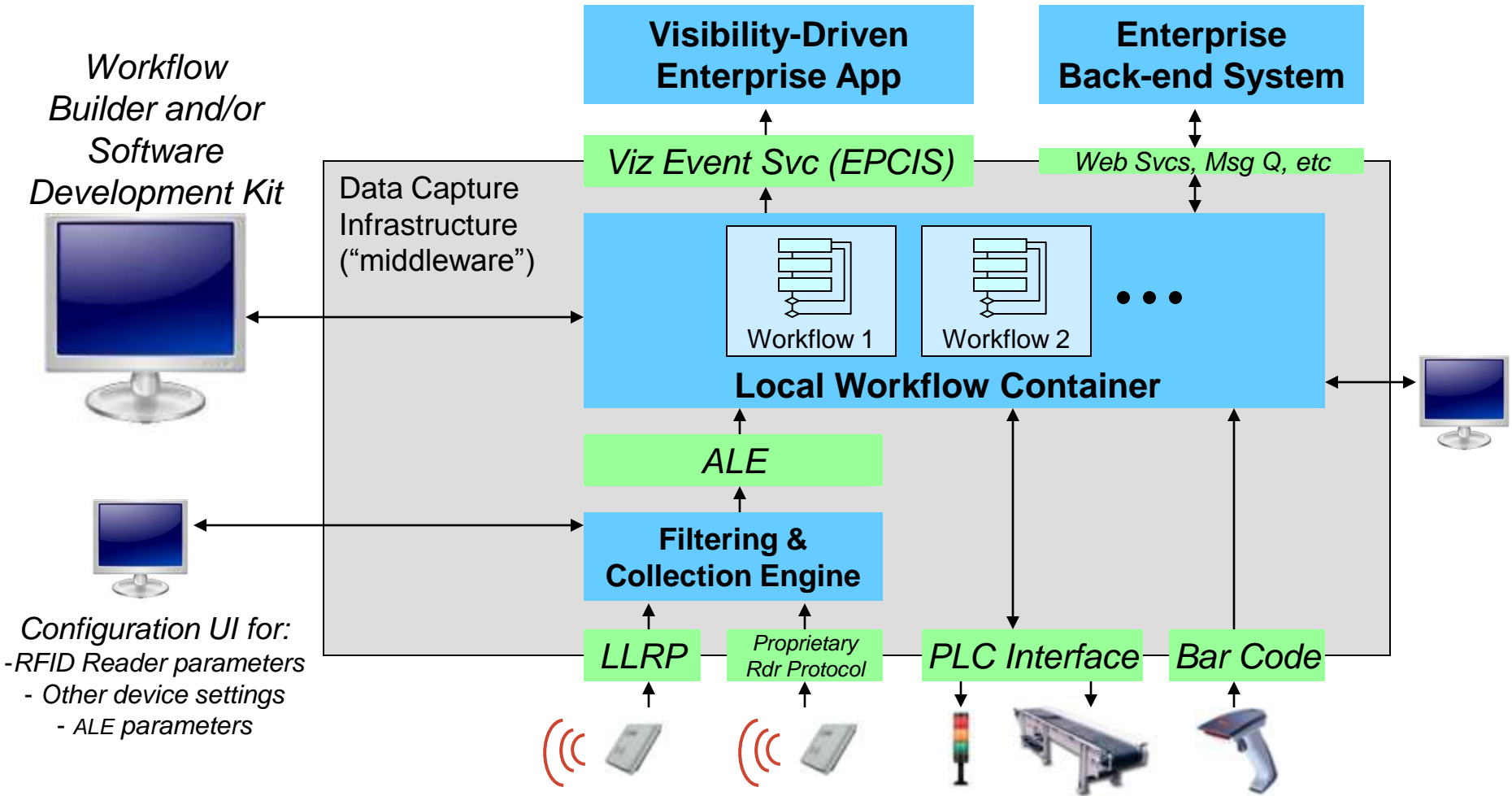
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Developer-facing Interfaces



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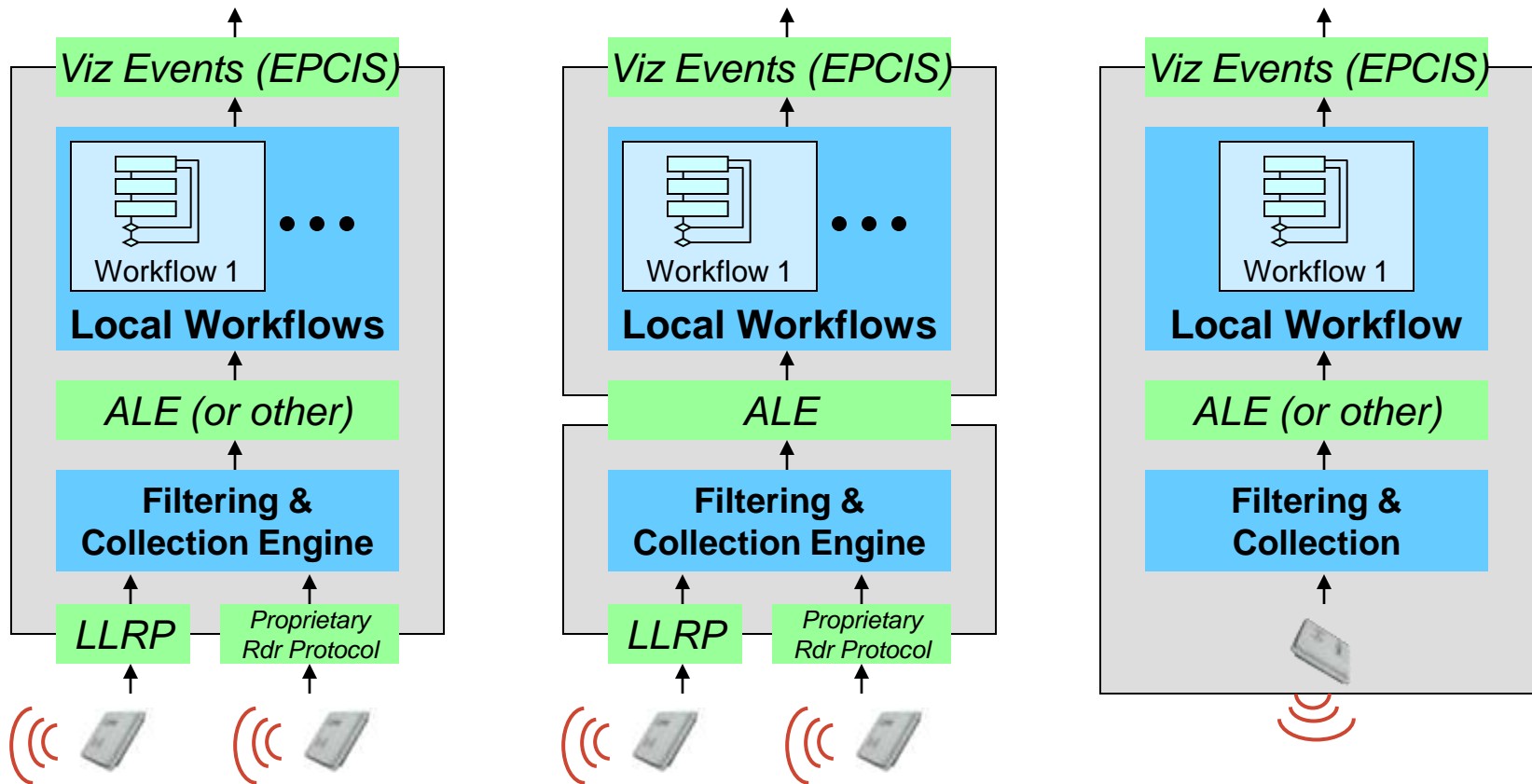
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Deployment Options



1. *Middleware Software (on PC)*
 2. *Middleware "Appliance"*

3. *"Unbundled" Middleware*
 4. *Reader Array (e.g., Mojix®)*

5. *"Smart" Reader*



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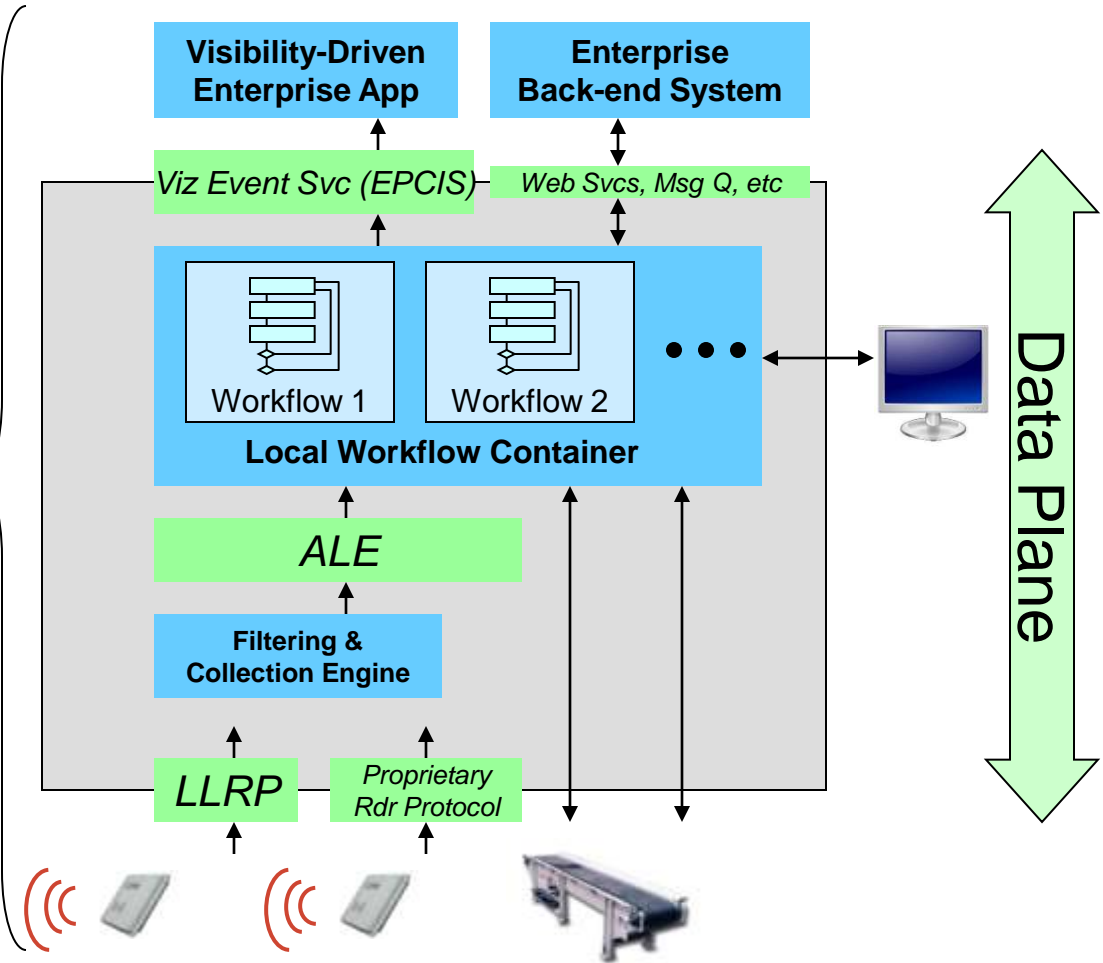
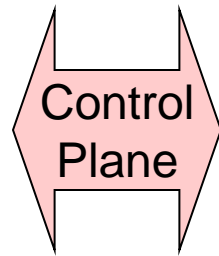
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Control Plane

- Monitoring:
 - Readers up/down
 - Throughput
- Configuration:
 - Firmware
 - Network addresses
- Management
 - Config changes
 - Enable/disable



Control Plane Standards

- EPCglobal Reader Management (**RM**)
 - Data model and interface for monitoring the status and health of RFID readers
 - Via SNMP or XML
- EPCglobal Discovery, Configuration, Initialization (**DCI**)
 - Addresses large-scale RFID deployments
 - Standardized means to allow RFID system components (Readers, Clients and Middleware) to:
 - Discover the presence of one another on a network;
 - Exchange identity information and authenticate that identity information;
 - Authenticate their communications and operations;
 - Also provides standardized means to:
 - Configure Readers, including a means to update the software and/or firmware on the Reader;
 - Initialize Readers, providing parameters necessary for the Reader to begin operation.



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Summary

- Data Capture goal: **create visibility data for business applications**
 - **What, When, Where, Why**
 - **Hide the details** of “how” each process step occurs
- Data Capture architecture needs **flexibility**:
 - Variety of RFID reader makes/models
 - Other devices: bar code, stack light, PLC, etc
 - Custom business logic for operational workflow
 - Human interaction
 - Interaction with back-end systems
- Variety of **deployment options**
 - But sharing common standard interfaces
- Relevant EPCglobal **standards**
 - Data plane: LLRP, ALE, EPCIS
 - Control plane: RM, DCI



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Thank You

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