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**RFID SOLUTIONS
FOR INDUSTRY.**

RFID Middleware Implementation considerations

6.5.2008, Odette Seminar
Gothenburg

Antti Virkkunen, CEO

Vilant Systems Oy

Agenda

- Generalization of an RFID system
- Component responsibilities and alternatives
 - With case examples
- Case example process
 - Valtra AGCO Tractor manufacturing



References

NOKIA
Connecting People

Nokia Siemens
Networks

ABB

VALTRA


WÄRTSILÄ

aker
yards.

INCAP
furniture

 FENESTRA

VR CARGO


itella

FINNAIR

**OUTO
KUMPU**

Aimpoint

STORAENSO

 **EKOKEM**

 **PROSEC**
TIETOTURVAPALVELU

HELKAMA

Paperinkeräys Oy
PAPERILLE
UUSI ELÄMÄ 


Carrefour


UPM

INDITEX

Schoeller Arca Systems

tyco / Fire & Security **ADT**

REWE 
GROUP

CRAFT 

TNT

FFBI digital lifestyle imaging

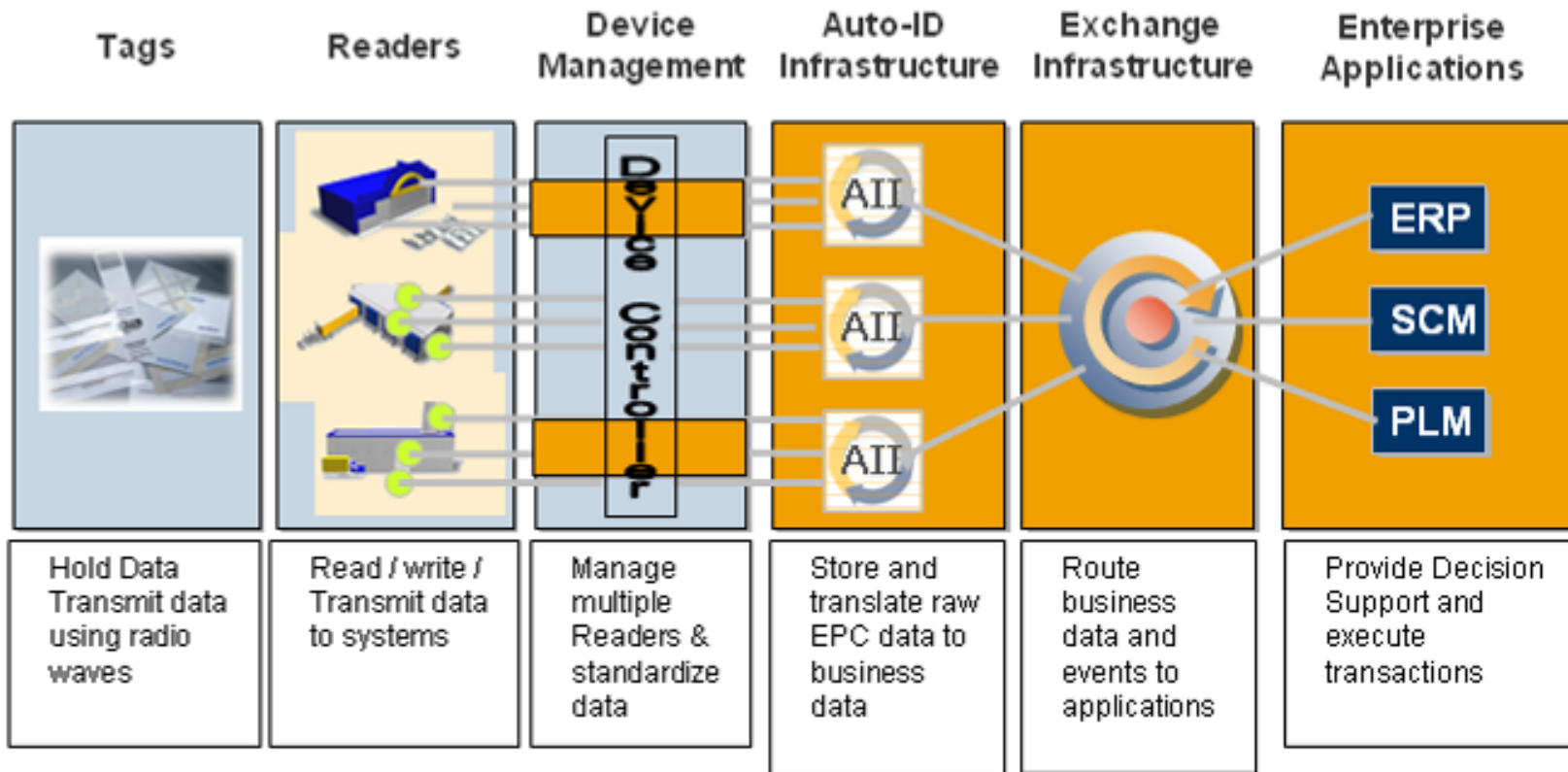

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Vilant facts 2007

- Personnel 19 (R&D + services 15)
- 1,4M€ revenue
- 3 year growth 347% (Deloitte Fast 50: 3. place)
- Market leader in Finland (over 75% of production use logistics RFID systems)
- 200 networked readers in production and supported
- 150 handheld RFID readers in production use
- 50 000 assets tracked
- 300 000 daily events
- Winner of Symbol EMEA Enterprise Mobility Award 2006
- EPC Global solution provider member



SAP-example

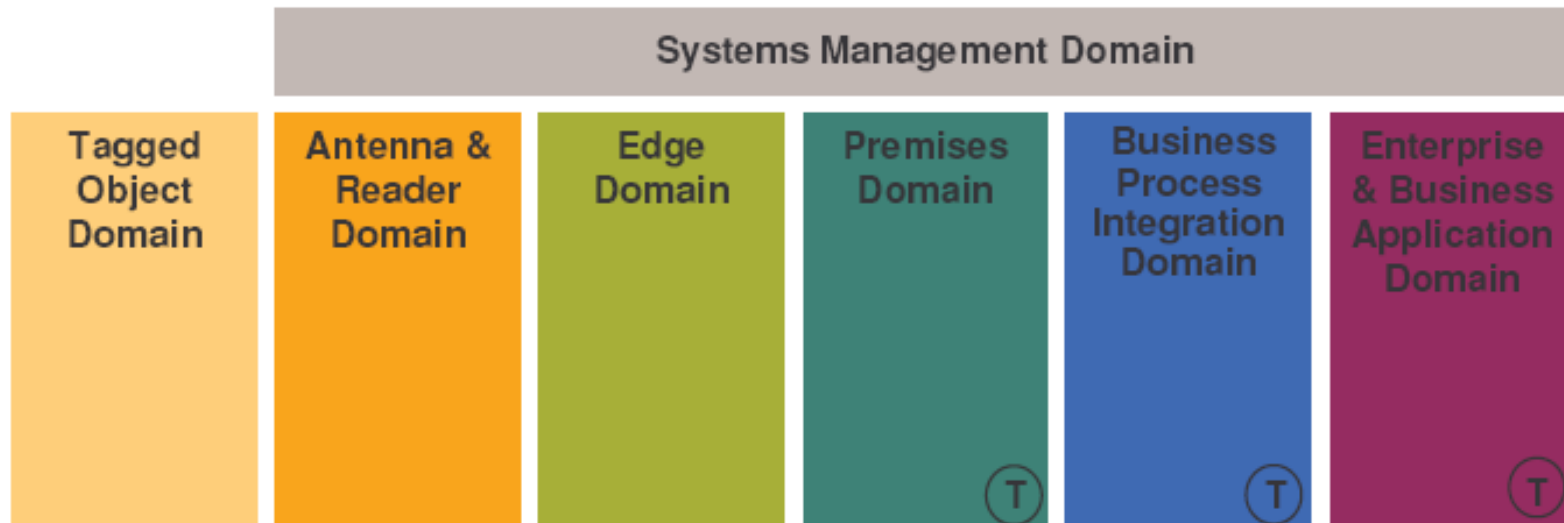


SAP Offering
 Partner Offering




IBM Domain model

–generic system pieces to look for



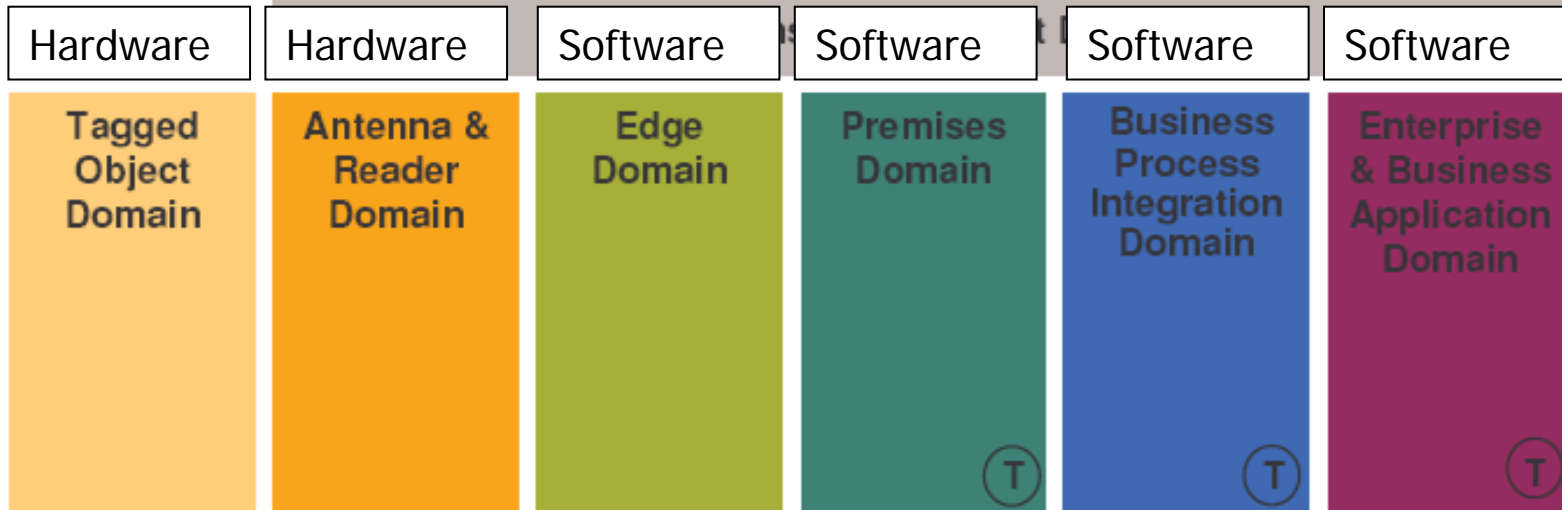
Usual question:

- Microsoft vs. Java
- Current corporate (web-)application server platforms

 Tooling – support for customized business logic

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Functionality



Filtering
Expected tags
User interface
I/O

Concentrating edges
Event repository
RFID applications

Web-Services
Business process integration
EDI

Warehouse mgmt
Purchase mgmt
ERP...

The weighting – it is not unusual, that "pure RFID" is only 10 - 20% of the process improvement project...

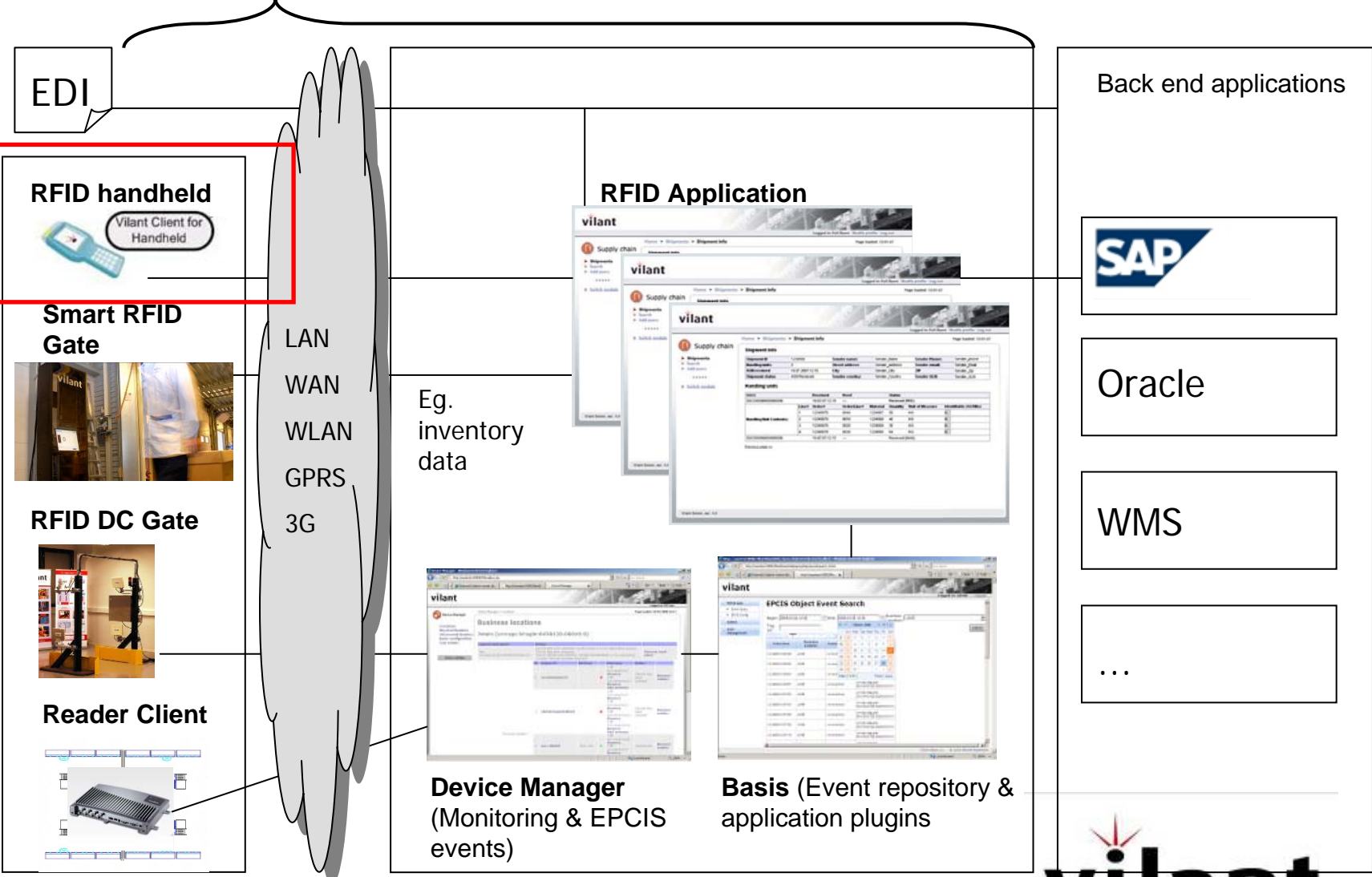


Components



RFID system components

RFID Middleware



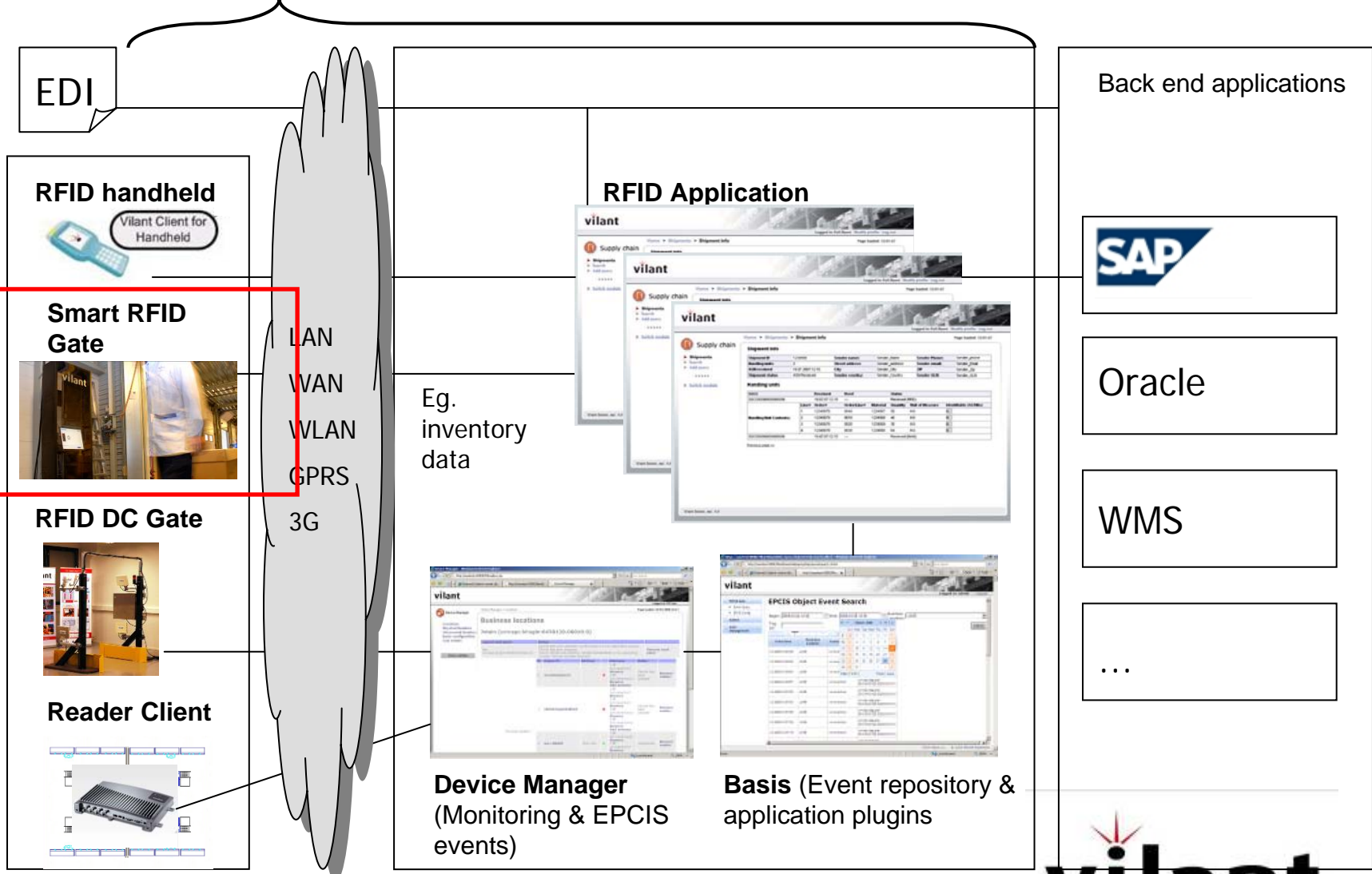


Typical transactions

- Goods receive
- Kanban-order
- Transfer order
- Inventory take
- ...

RFID system components

RFID Middleware



Smart RFID gates

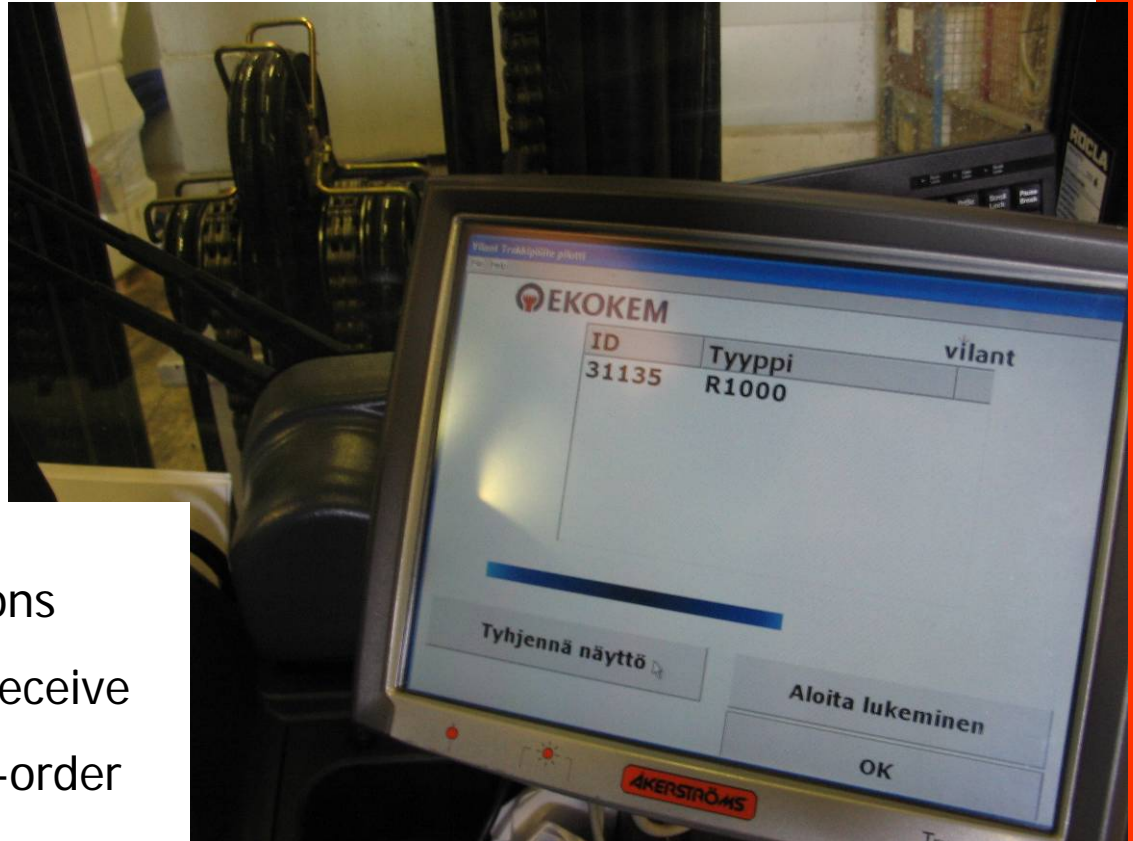


Typical transactions

- Goods receive
- Kanban-order
- Transfer order

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Forklift RFID readers



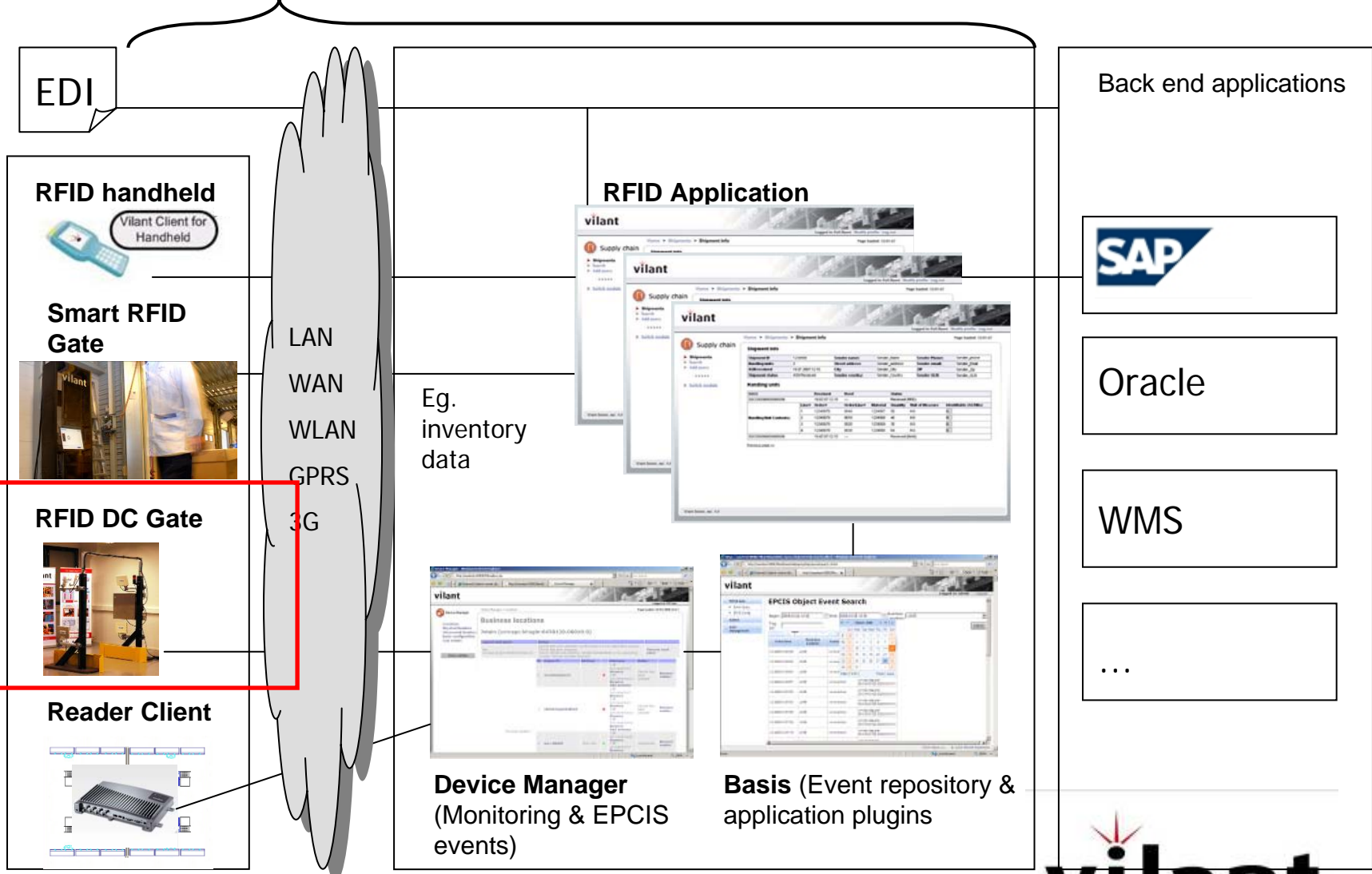
Typical transactions

- Goods receive
- Kanban-order
- Transfer order
- Putaway

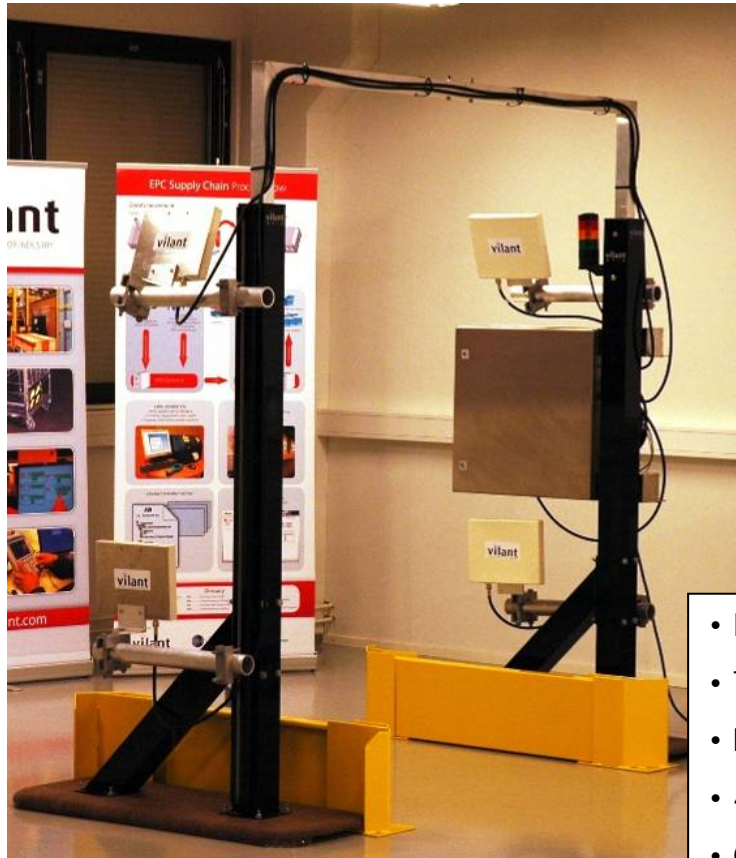
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RFID system components

RFID Middleware



RFID gates for distribution centers



- Reader & I/O unit
- Traffic light stack
- Motion Sensor
- 4 Antennas
- Cables
- Mechanics
- Power supply



ABB outbound gates

Truck loading –
right product in
right truck?



Valtra Inbound gates

Goods receive automation



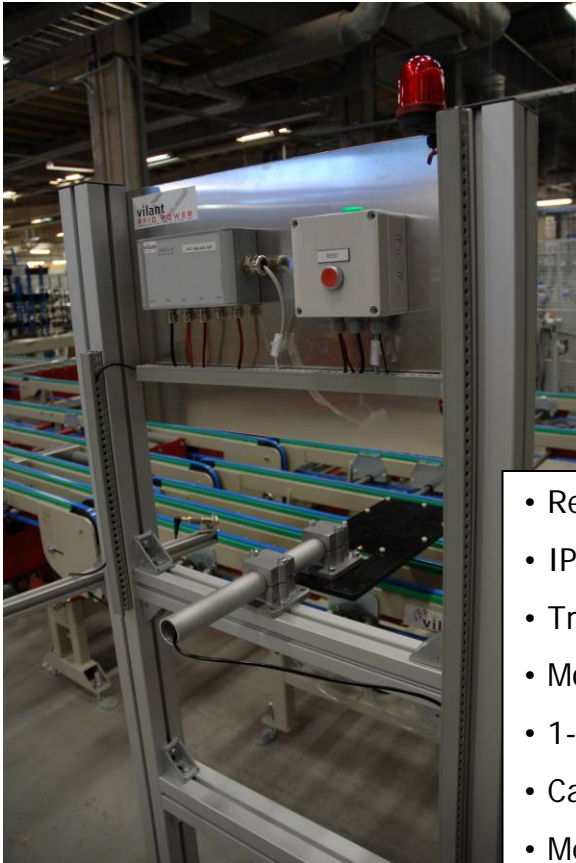
Finnair container tracking (pilot)



Pallet / container
movement
tracking

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RFID gates for automation systems

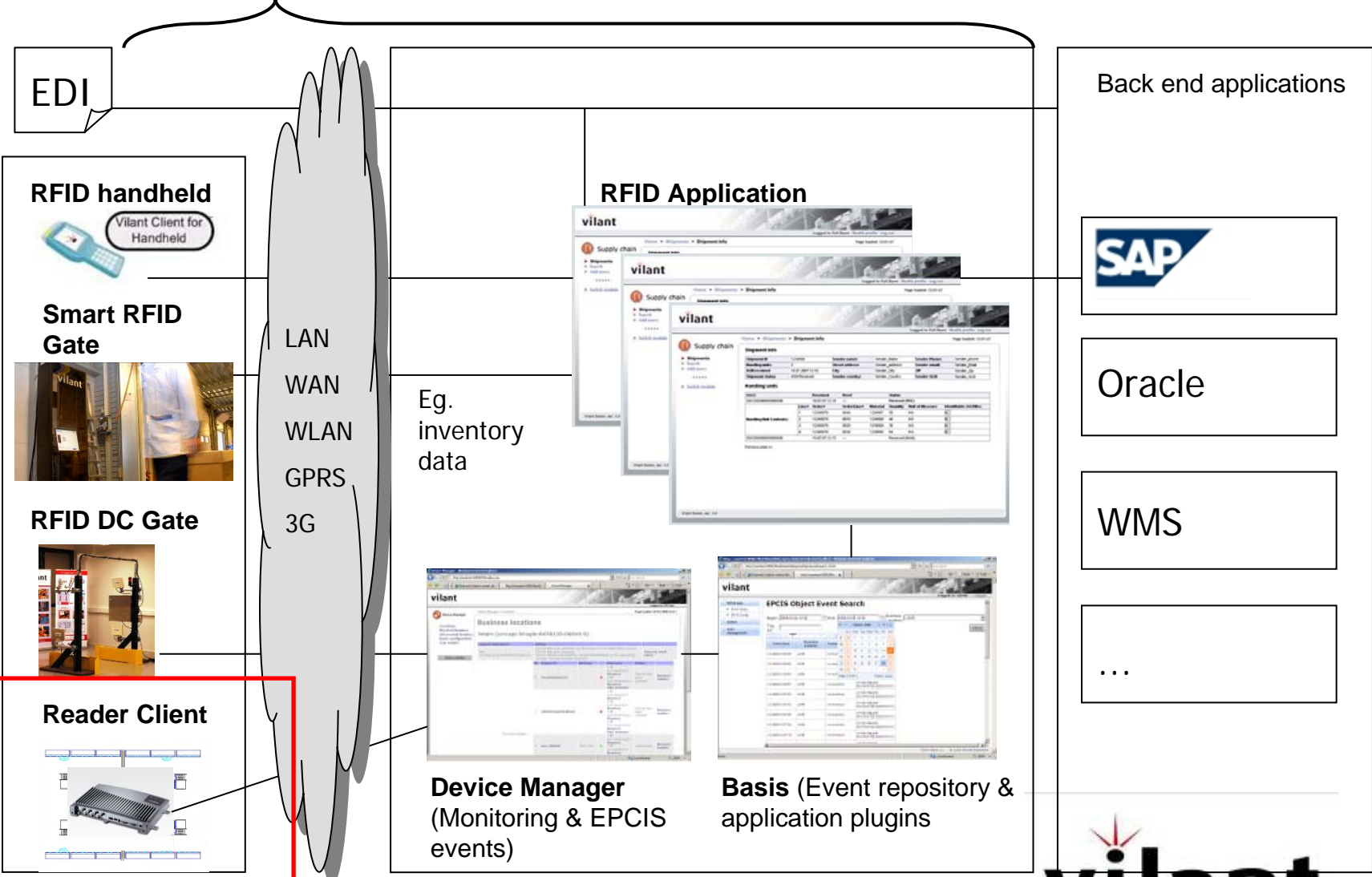


- Reader
- IP65 enclosure
- Traffic light
- Motion Sensor
- 1- 4 Antennas
- Cables
- Mechanics
- Power supplies



RFID system components

RFID Middleware



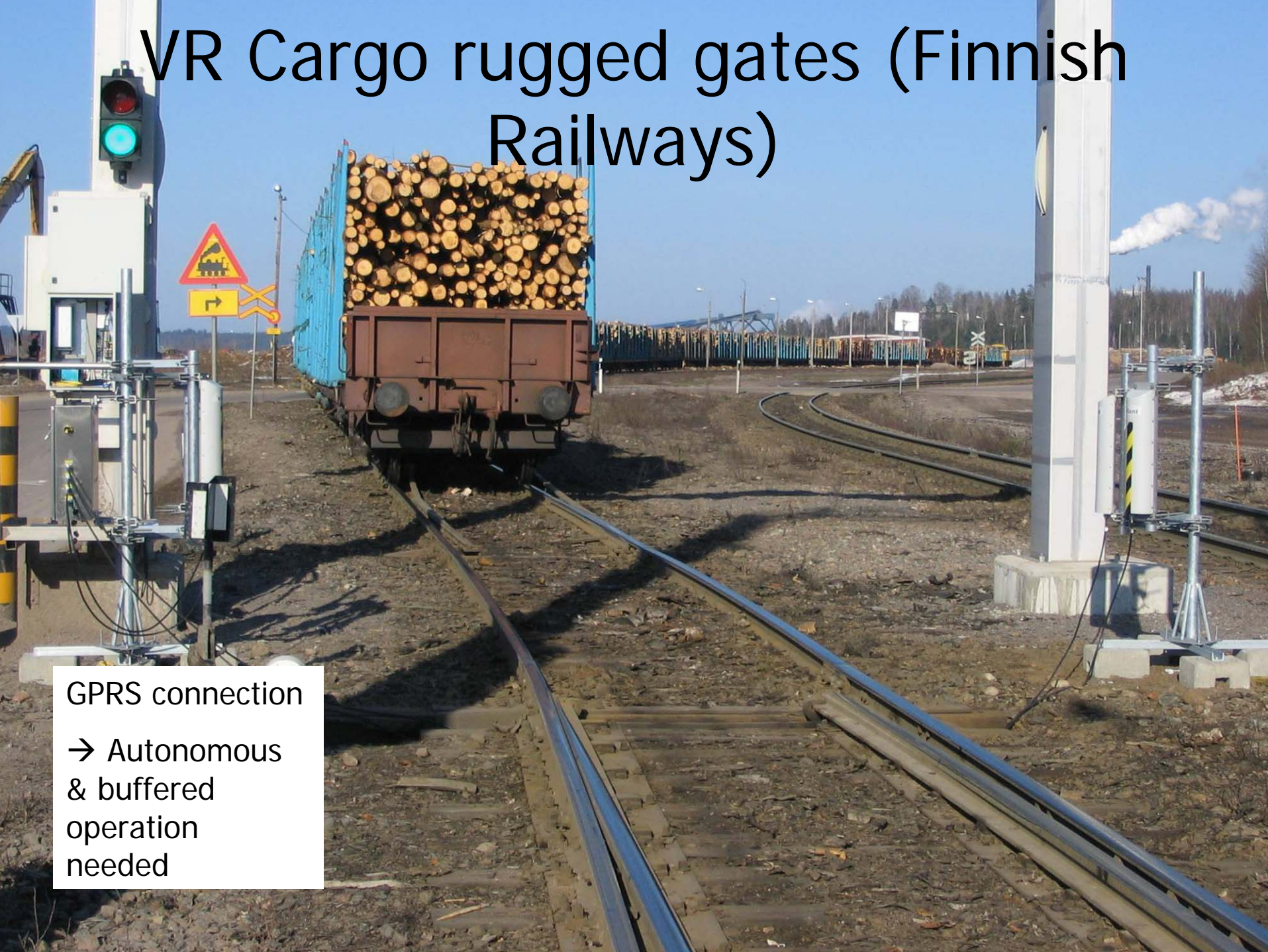
Aker Yards employee tracking

WLAN
connection

→ Autonomous
& buffered
operation
needed



VR Cargo rugged gates (Finnish Railways)

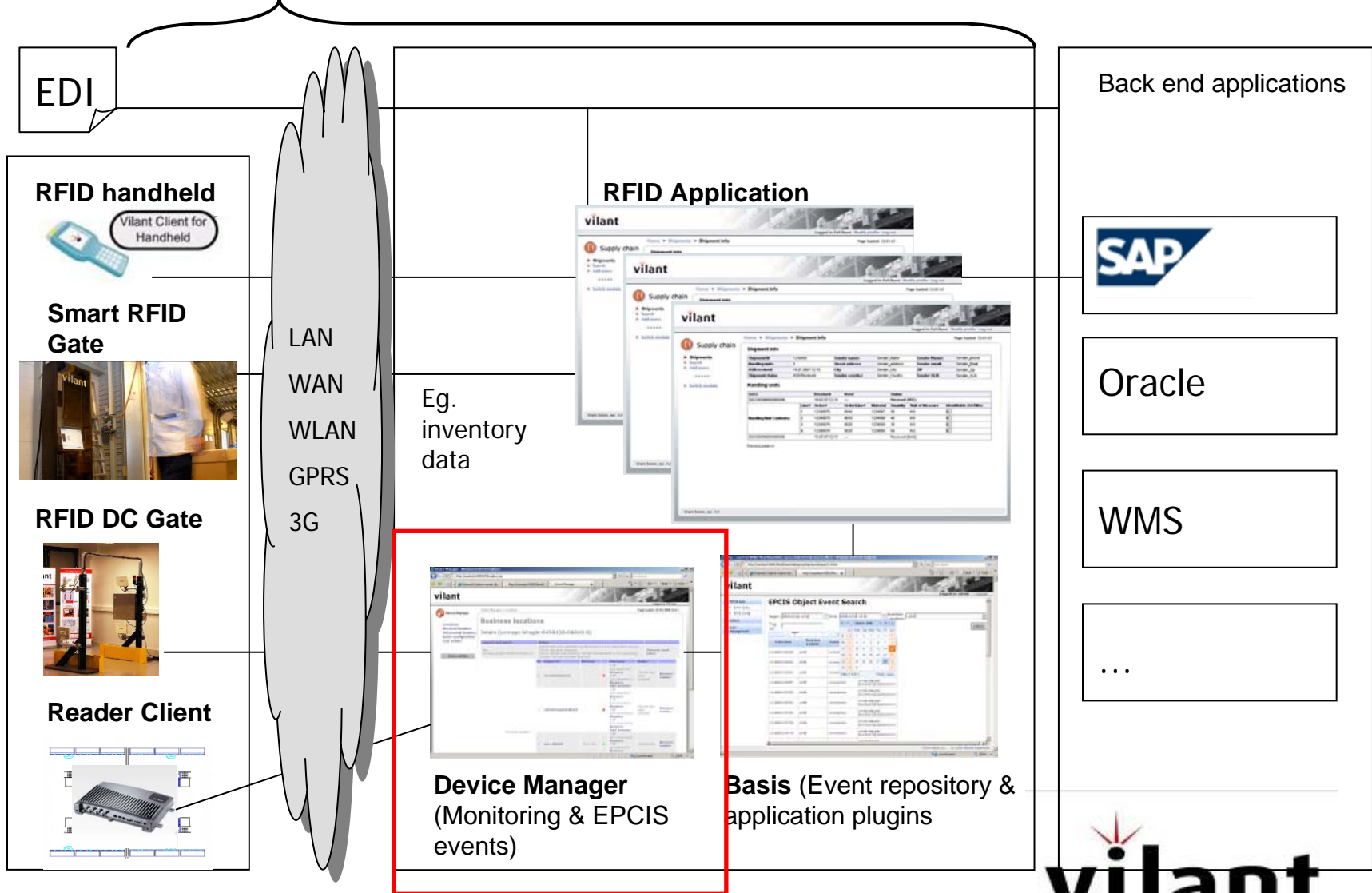


GPRS connection

→ Autonomous
& buffered
operation
needed

RFID system components

RFID Middleware

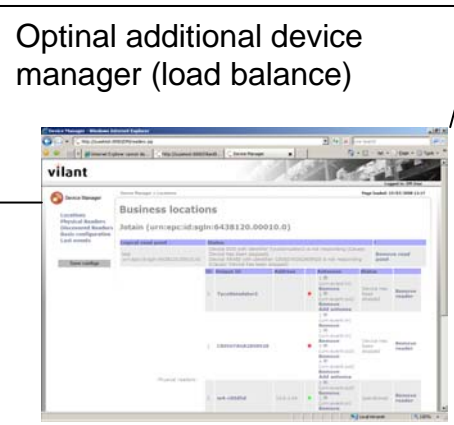
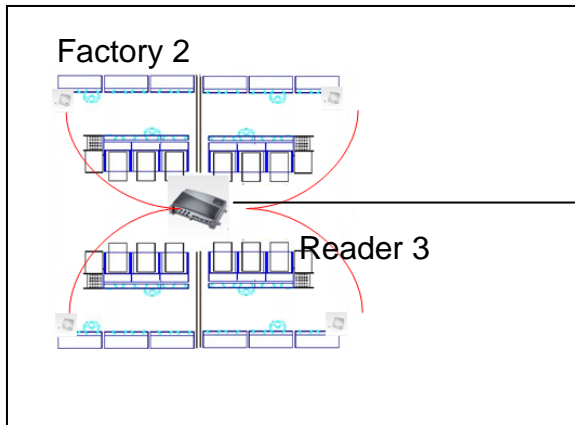
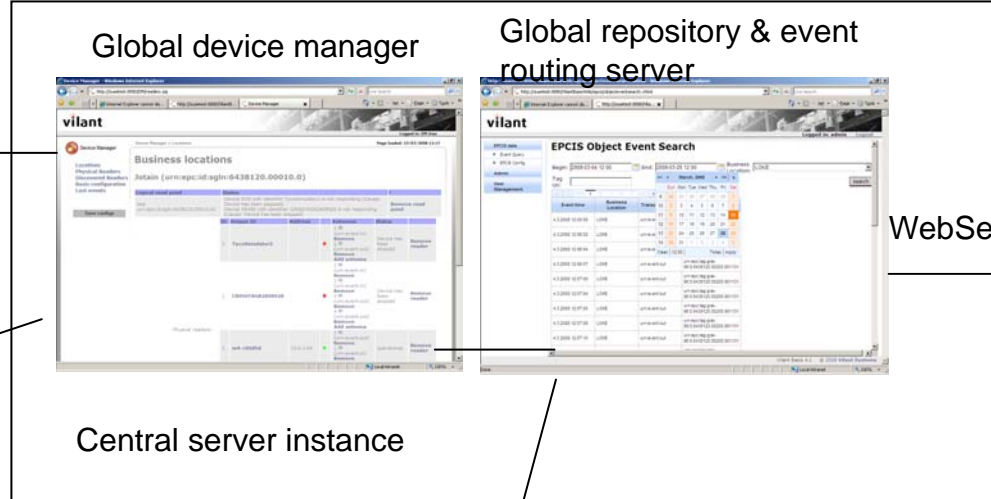
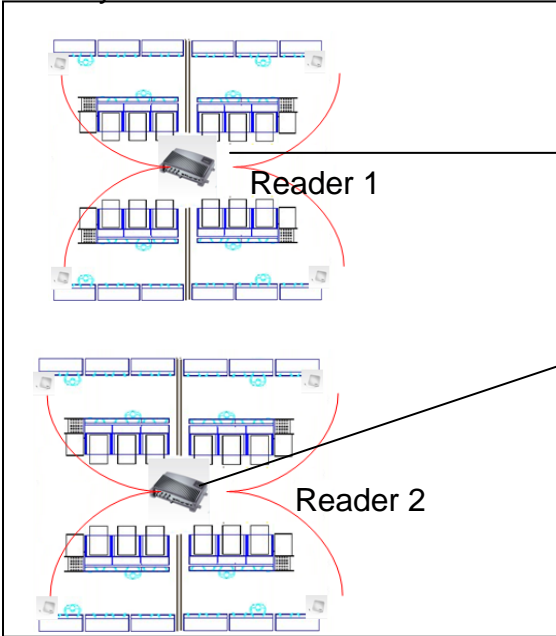


Screenshots Device Manager



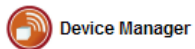
Example why device management is not same as central event repository

Factory 1



Device Management can be decentralized to other sites





- Locations
- Physical Readers
- Discovered Readers
- Basis configuration
- Last events

Save configs

Device Manager > Locations

Business locations

LOKE (urn:epc:id:sgln:6438120.00000.0)

Logical read point	Status					
Portti 2 urn:epc:id:sgln:6438120.00000.6	ALL OK	Remove read point				

ID	Unique ID	Address	Antennas	Status		
Physical readers:	0	C80507AG828088D0	10.80.13.70	1 (urn:event:in) Remove 2 (urn:event:in) Remove 3 (urn:event:out) Remove 4 (urn:event:out) Remove Add antenna	operational	Remove reader

Add reader

Portti 3 urn:epc:id:sgln:6438120.00000.7	ALL OK	Remove read point				
---	--------	-------------------	--	--	--	--

ID	Unique ID	Address	Antennas	Status		
Physical readers:	1	C80507AG8280885F	192.194.41.110	1 (urn:event:in) Remove 2 (urn:event:in) Remove 3 (urn:event:out) Remove 4 (urn:event:out) Remove Add antenna	operational	Remove reader

Add reader

Portti 4 urn:epc:id:sgln:6438120.00000.8	ALL OK	Remove read point				
---	--------	-------------------	--	--	--	--

ID	Unique ID	Address	Antennas	Status		
Physical readers:	2	Speedway-00-36-6B	10.80.13.94	1 (urn:event:in) Remove 2 (urn:event:out) Remove Add antenna	operational	Remove reader

Add reader

Portti 27 urn:epc:id:sgln:6438120.00000.9	ALL OK	Remove read point				
--	--------	-------------------	--	--	--	--

ID	Unique ID	Address	Antennas	Status		
Physical readers:	3	C80507AG8280894E	10.80.13.76	1 (urn:event:in) Remove 2 (urn:event:in) Remove 3 (urn:event:out) Remove 4 (urn:event:out) Remove Add antenna	operational	Remove reader

Add reader

VIRKATIE (urn:epc:id:sgln:6438120.00001.0)

Logical read point	Status					
Portti 1 urn:epc:id:sgln:6438120.00001.10	ALL OK	Remove read point				

ID	Unique ID	Address	Antennas	Status		
Physical readers:	4	Speedway-00-35-92	10.80.16.107	1 (urn:event:in) Remove 2 (urn:event:out) Remove Add antenna	operational	Remove reader

Add reader



Logged in: DM User

- Device Manager**
- Locations
 - Physical Readers
 - Discovered Readers
 - Basis configuration
 - Last events

Save configs

Device Manager > Physical Readers > ID:1 Page loaded: 14/04/2008 16:12

Physical Readers

Reader ID	1
Unique ID	C80507AG8280885F
IP address	192.194.41.110
Firmware Version	XR480 3.2.6
Type	XR480
Is Accepted	true
Command Channel Port	1
Is Active Monitoring	true
Type of Address	IP
Total Tags Read	78569
Up Time	675h 43min.
Taken to use	Thu Feb 14 13:12:42 EET 2008

Antennas

- 1 Read Point 1-1-1-1-1, urn:event:in
- 2 Read Point 1-1-1-2-1, urn:event:in
- 3 Read Point 1-1-1-3-1, urn:event:out
- 4 Read Point 1-1-1-4-1, urn:event:out

Admin password	<input type="text" value="v1ewer"/>
Admin username	<input type="text" value="viewer"/>
Command channel port	<input type="text" value="1"/>
Operating mode	<input type="text" value="1"/>
Polling interval	<input type="text" value="1000"/>
Monitoring interval	<input type="text" value="30000"/>
Unique identifier	<input type="text" value="C80507AG8280885F"/>
Reader specific arguments	<input type="text" value=":8080/queryEvents"/>

[Remove reader](#)

[Add Antenna to reader](#)

Save changes

Device Manager - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://10.253.5.4:8080/DM/addDevice.jsp

Device Manager

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Logged in: DM User

Device Manager > Add Physical reader Page loaded: 14/04/2008 16:09

Add new physical reader

Reader type: EOS

Admin password:

Admin username:

Command channel port:

Operating mode:

Polling interval:

Monitoring interval:

Unique identifier:

Reader specific arguments:

Add

Save configs

Locations
Physical Readers
Discovered Readers
Basis configuration
Last events

(c) Vilant Systems - Vilant Device Manager, 4.1.133

Device Manager - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://10.253.5.4:8080/DM/addAntenna.jsp

Device Manager

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Logged in: DM User

Device Manager > Add antenna Page loaded: 14/04/2008 16:11

Add new antenna

Logical readpoint: Portti 2

Reader ID: 0

Antenna Number: 1 (Reader internal number)

Antenna Name: Read Point 1- (Reader internal name)

Direction: In

Add

Save configs

Locations
Physical Readers
Discovered Readers
Basis configuration
Last events

Add existing antenna

Name	Number	Direction
Read Point 1-1-1-1-1	1	urn:event:in
Read Point 1-1-1-2-1	2	urn:event:in
Read Point 1-1-1-3-1	3	urn:event:out
Read Point 1-1-1-4-1	4	urn:event:out

(c) Vilant Systems - Vilant Device Manager, 4.1.133

Device Manager - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://10.253.5.4:8080/DM/discovered_devices.jsp

Device Manager

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Logged in: DM User

Device Manager > Discovered readers Page loaded: 14/04/2008 16:09

Discovered Readers

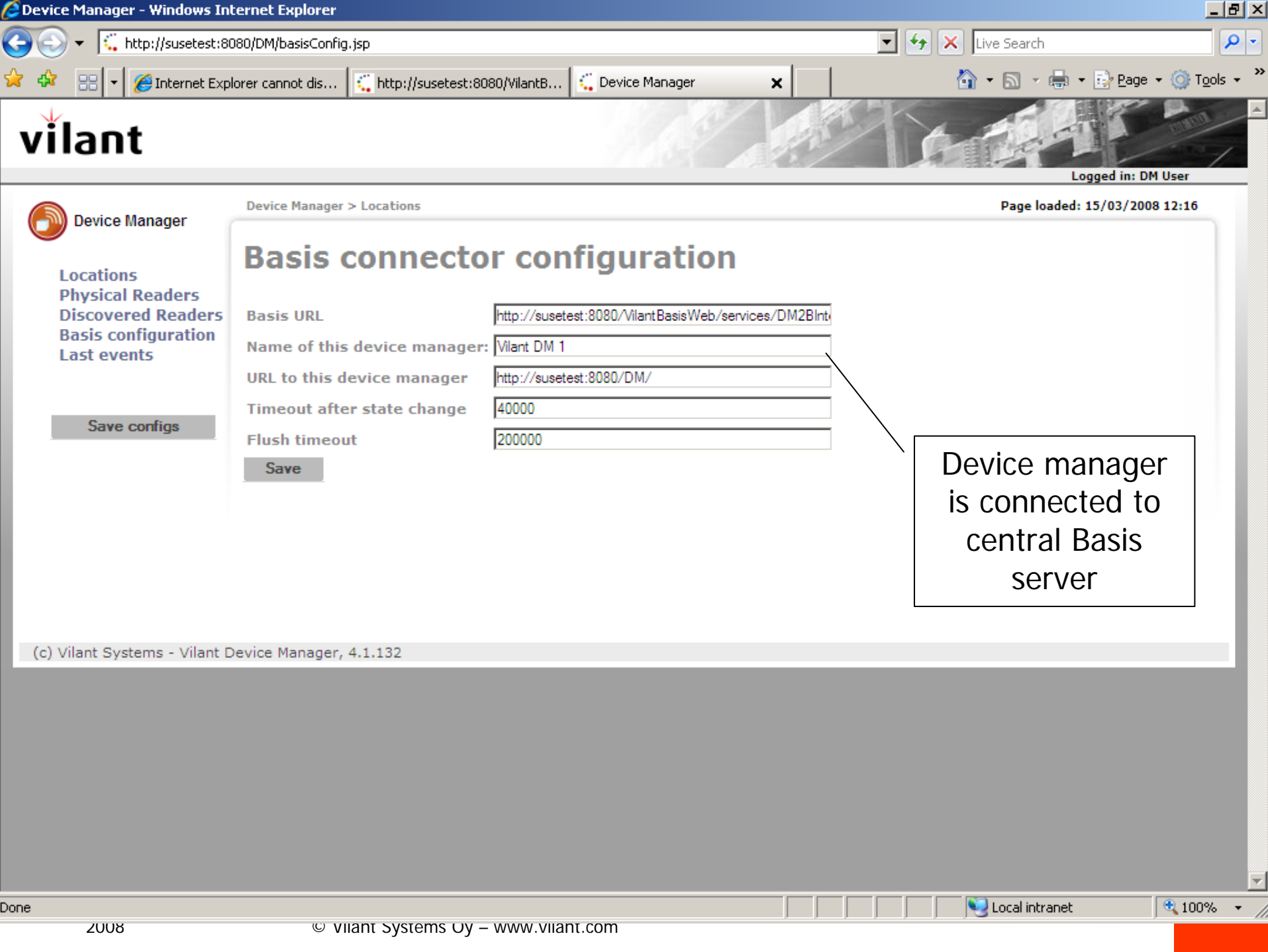
ID	Hostname	Address	ID	Accept
5				Accept

Save configs

Locations
Physical Readers
Discovered Readers
Basis configuration
Last events

(c) Vilant Systems - Vilant Device Manager, 4.1.133





- Locations
- Physical Readers
- Discovered Readers
- Basis configuration**
- Last events

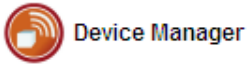
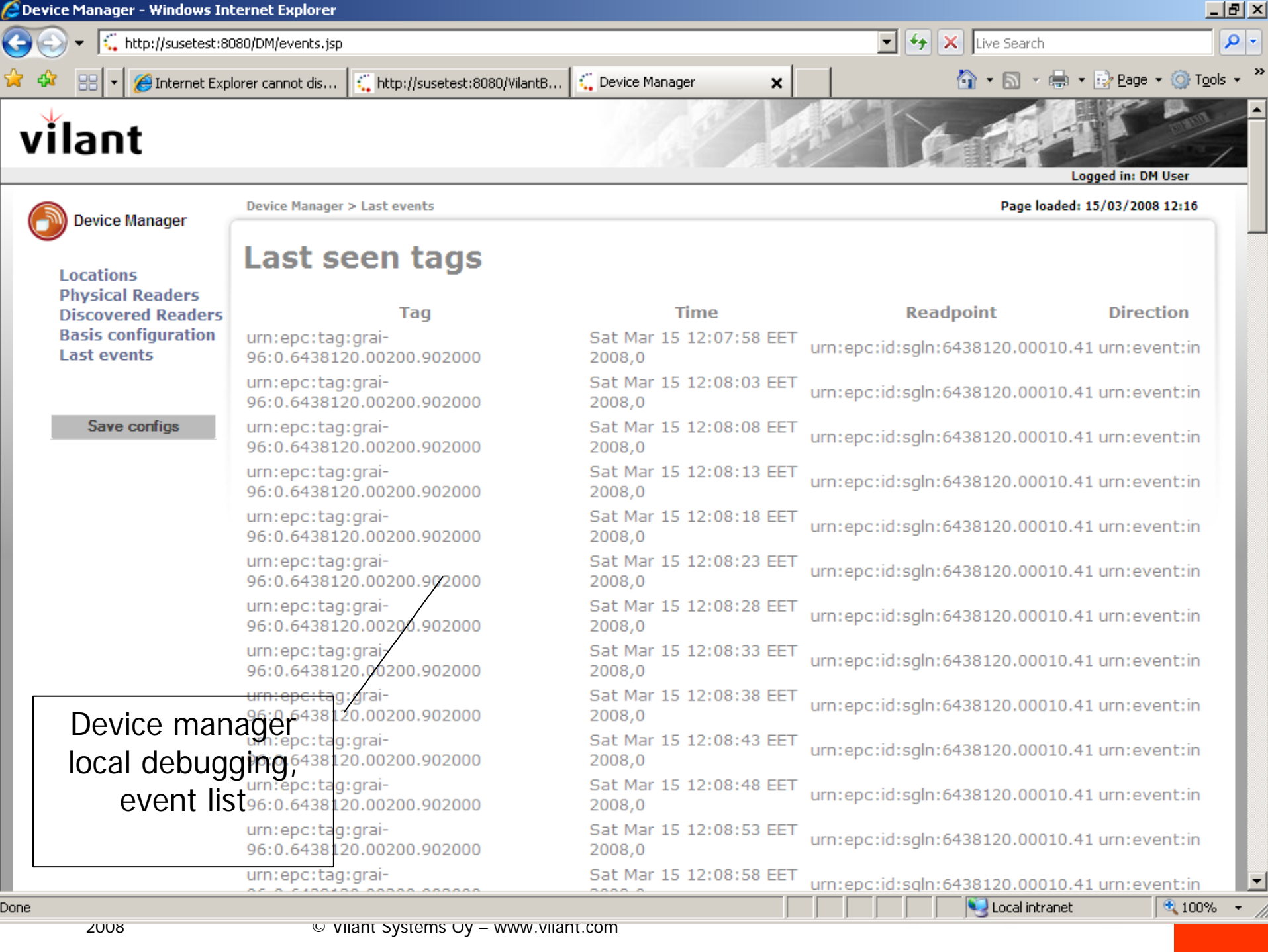
Save configs

Basis connector configuration

Basis URL	<input type="text" value="http://susetest:8080/VilantBasisWeb/services/DM2BInt..."/>
Name of this device manager:	<input type="text" value="Vilant DM 1"/>
URL to this device manager	<input type="text" value="http://susetest:8080/DM/"/>
Timeout after state change	<input type="text" value="40000"/>
Flush timeout	<input type="text" value="200000"/>

Save

Device manager
is connected to
central Basis
server



- Locations
- Physical Readers
- Discovered Readers
- Basis configuration
- Last events

Save configs

Device Manager > Last events

Page loaded: 15/03/2008 12:16

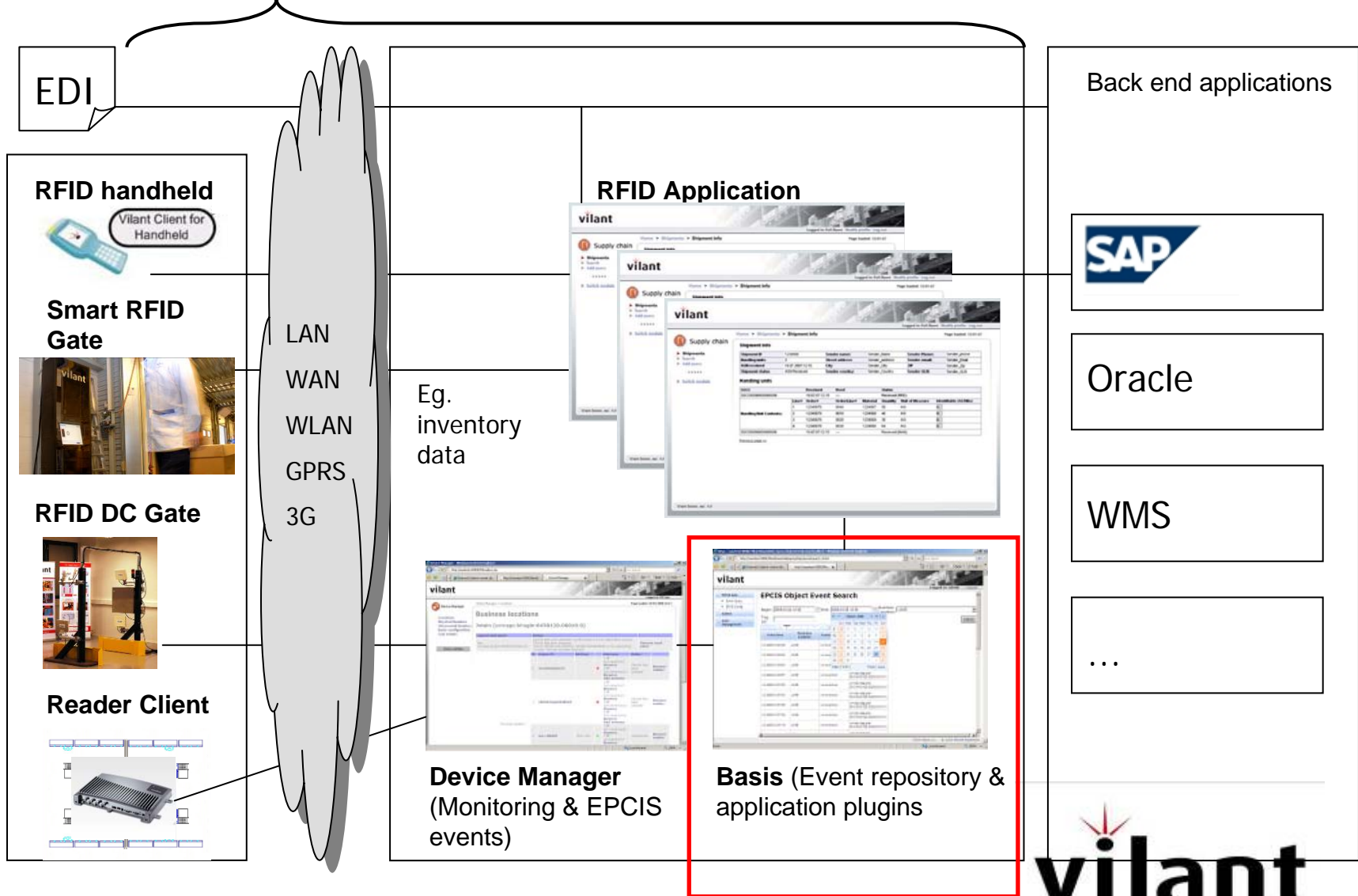
Last seen tags

Tag	Time	Readpoint	Direction
urn:epc:tag:grai-96:0.6438120.00200.902000	Sat Mar 15 12:07:58 EET 2008,0	urn:epc:id:sgln:6438120.00010.41	urn:event:in
urn:epc:tag:grai-96:0.6438120.00200.902000	Sat Mar 15 12:08:03 EET 2008,0	urn:epc:id:sgln:6438120.00010.41	urn:event:in
urn:epc:tag:grai-96:0.6438120.00200.902000	Sat Mar 15 12:08:08 EET 2008,0	urn:epc:id:sgln:6438120.00010.41	urn:event:in
urn:epc:tag:grai-96:0.6438120.00200.902000	Sat Mar 15 12:08:13 EET 2008,0	urn:epc:id:sgln:6438120.00010.41	urn:event:in
urn:epc:tag:grai-96:0.6438120.00200.902000	Sat Mar 15 12:08:18 EET 2008,0	urn:epc:id:sgln:6438120.00010.41	urn:event:in
urn:epc:tag:grai-96:0.6438120.00200.902000	Sat Mar 15 12:08:23 EET 2008,0	urn:epc:id:sgln:6438120.00010.41	urn:event:in
urn:epc:tag:grai-96:0.6438120.00200.902000	Sat Mar 15 12:08:28 EET 2008,0	urn:epc:id:sgln:6438120.00010.41	urn:event:in
urn:epc:tag:grai-96:0.6438120.00200.902000	Sat Mar 15 12:08:33 EET 2008,0	urn:epc:id:sgln:6438120.00010.41	urn:event:in
urn:epc:tag:grai-96:0.6438120.00200.902000	Sat Mar 15 12:08:38 EET 2008,0	urn:epc:id:sgln:6438120.00010.41	urn:event:in
urn:epc:tag:grai-96:0.6438120.00200.902000	Sat Mar 15 12:08:43 EET 2008,0	urn:epc:id:sgln:6438120.00010.41	urn:event:in
urn:epc:tag:grai-96:0.6438120.00200.902000	Sat Mar 15 12:08:48 EET 2008,0	urn:epc:id:sgln:6438120.00010.41	urn:event:in
urn:epc:tag:grai-96:0.6438120.00200.902000	Sat Mar 15 12:08:53 EET 2008,0	urn:epc:id:sgln:6438120.00010.41	urn:event:in
urn:epc:tag:grai-96:0.6438120.00200.902000	Sat Mar 15 12:08:58 EET 2008,0	urn:epc:id:sgln:6438120.00010.41	urn:event:in

Device manager local debugging, event list

RFID system components

RFID Middleware



Basis – event repository





Logged in: admin Logout

- EPCIS data
 - Event Query
 - EPCIS Config
- Admin
- User Management

EPCIS Object Event Search

Begin: End: Business Location:

Tag Uri:

Calendar for March 2008. The 15th is highlighted in orange. Below the calendar are controls for 'Clean' (12:00) and 'Today' (Apply).

Event time	Business Location	Transa
4.3.2008 12:00:58	LOKE	urn:eve
4.3.2008 12:06:52	LOKE	urn:eve
4.3.2008 12:06:54	LOKE	urn:eve
4.3.2008 12:06:57	LOKE	urn:event:out
4.3.2008 12:07:00	LOKE	urn:event:out
4.3.2008 12:07:04	LOKE	urn:event:out
4.3.2008 12:07:05	LOKE	urn:event:out
4.3.2008 12:07:09	LOKE	urn:event:out
4.3.2008 12:07:10	LOKE	urn:event:out

Event list for local debugging



- EPCIS data
- Admin
 - Business Locations
 - Device Managers
 - Plugins
- User Management

Device Managers

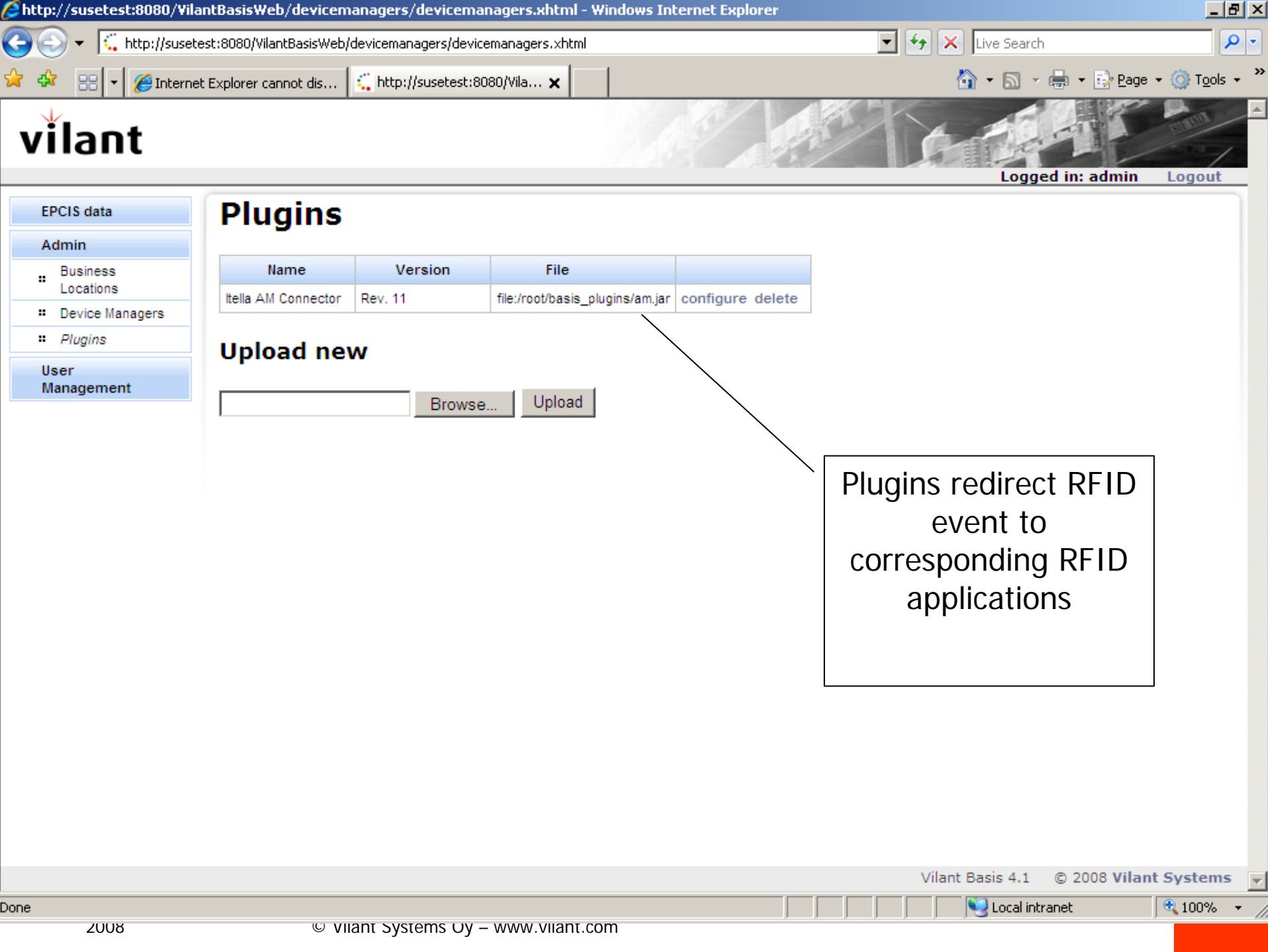
Enabled device managers

Name	Management URL	Status	Latest IP	
Vilant DM 1	http://susetest:8080/DM/	OK	127.0.0.2	disable delete

Disabled device managers

Name	Management URL	Status	Latest IP	
Vilant DM 1	http://localhost:1234/foo/bar	?	127.0.0.2	enable delete
DM1	http://susetest:8080/VilantBasisWeb/	?	10.6.1.239	enable delete
DM3	http://susetest:8080/1VilantBasisWeb/	?	10.6.1.239	enable delete
DM4	http://susetest:8080/1VilantBasisWeb/	?	10.6.1.239	enable delete
DM1	http://susetest:8080/1VilantBasisWeb/	?	10.6.1.239	enable delete
DM2	http://susetest:8080/VilantBasisWeb/	?	10.6.1.239	enable delete

Device managers can be added and removed



- EPCIS data
- Admin
 - Business Locations
 - Device Managers
 - Plugins
- User Management

Plugins

Name	Version	File	
Itella AM Connector	Rev. 11	file:/root/basis_plugins/am.jar	configure delete

Upload new

Plugins redirect RFID event to corresponding RFID applications



- EPCIS data
- Admin
- User Management
 - User management
 - User settings

User management

Manage users Manage groups

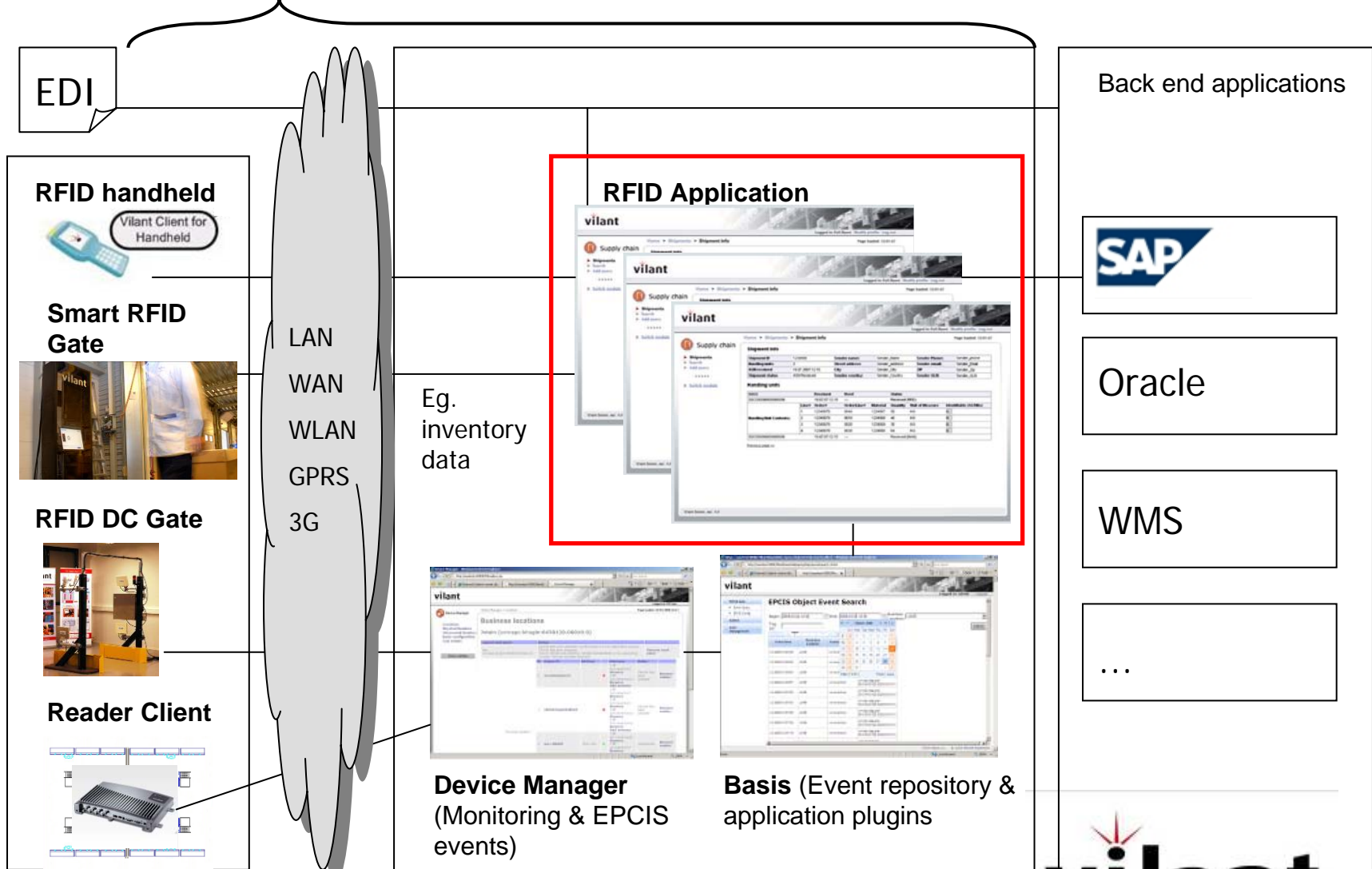
Navigation: << < > >>

Selected	Name
<input type="checkbox"/>	admin
<input type="checkbox"/>	dm-admin
<input type="checkbox"/>	user

Back Delete selected groups Add group

RFID system components

RFID Middleware



Example goods receiving with pallet tags



Supply chain

▶ **Shipments**

▶ Search

▶ Add users

▶ Switch module

Shipment Info

Shipment ID	1234569	Sender name:	Sender_Name	Sender Phone:	Sender_phone
Handling units	2	Street address	Sender_address	Sender email:	Sender_Email
ASN received	19.07.2007:12.15	City	Sender_City	ZIP	Sender_Zip
Shipment status	ASN Received	Sender country:	Sender_Country	Sender GLN:	Sender_GLN

Handling units

SSCC	Received	Used	Status				
SSCC000000000000005	19.07.07:12.15	---	Received (RFID)				
Handling Unit Contents:	Line#	Order#	Order Line#	Material	Quantity	Unit of Measure	Identifiable (SGTIIIs)
	1	12345678	0040	1234567	50	KG	<input type="checkbox"/>
	2	12345678	0010	1234568	40	KG	<input type="checkbox"/>
	3	12345678	0020	1234569	30	KG	<input type="checkbox"/>
4	12345678	0030	1234565	64	KG	<input type="checkbox"/>	
SSCC000000000000006	19.07.07:12.15	---	Received (MAN)				

[Previous page >>](#)

The application framework allows the use of standard components and custom reports

Case example



Case Video – Valtra AGCO



The logo for Vilant Systems Oy, featuring the word "vilant" in a bold, black, sans-serif font. Above the letter "i" is a stylized red graphic consisting of three lines radiating upwards from a central point, resembling a star or a signal light.

Conclusions

- 100 projects and no one-size-fits-all
- Analysis of process parts
- → Leanest possible solution (KISS)



RFID project process



Step 1:
Site survey
1 day, most of the answers & process blueprint

Step 2:
Feasibility testing
2 - 5 days, is it doable with RFID

Step 3:
Pilot
3 months, to put the system to a real life stress test

Step 4:
Production
Includes ERP / warehouse system integration and full scale roll out

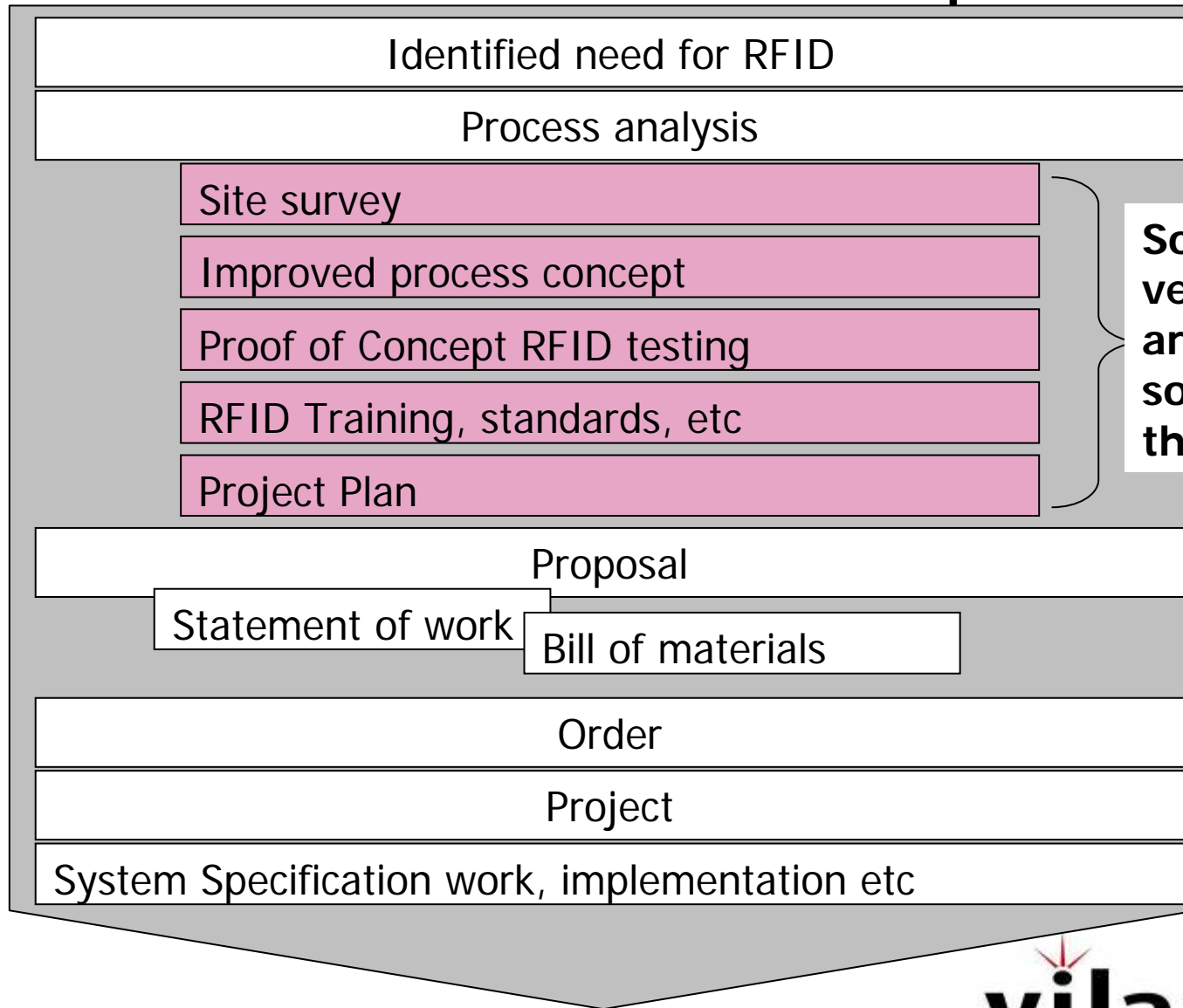
Step 5:
Support
On going, starting from pilot with site support and system maintenance



Step 1.



Phases 1 and 2 work components



Solve and verify the architecture solution before the project!





Thank you!

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References



Vilant installations



References: Industry



- ABB Drives SAP-integrated system (since 2004 in production)
- Automated reorder, shipping and goods receipt
- ISO18000 and EPC G2 UHF RFID
- 10 RFID portals, 16 supplier shipping stations



- Nokia SAP-integrated system (since 2007 in production)
- Automated shipping and goods receipt
- 20 000 EPC G2 UHF RFID tags per month
- Bea / Oracle –based ERP integration



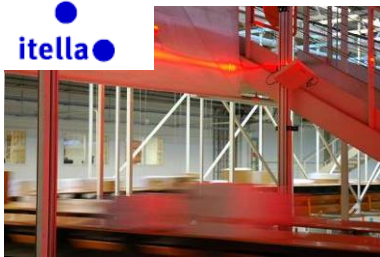
- Valtra Agco tractor manufacturing (since 2007 in production)
- ERP-integrated system
- EPC G2 UHF RFID
- Automaattinen goods receipt, warehouse level and reorder point
- Portals (16 in full rollout), conveyor and forklift readers



References: Industry



- Paper bin tracking (since 2003 in production)
- 10 plants / 40 RFID handhelds / 30 000 assets tracked / HF
- 1000 daily events
- Bea/Oracle based ERP integration



- Itella (Finnish post) logistics centre briefcase tracing (pilot 2007 ongoing)
- EPC G2 UHF RFID
- Bea/Oracle –based system



- Finnair cargo container tracking (pilot 2006)
- EPC G2 UHF RFID
- Tracking of international air freight containers



- Finnish railways cargo wagon tracking (pilot 2007 ongoing)
- EPC G2 UHF RFID
- GPRS connected reader systems, tracking of wagons

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References: Industry



- Fenestra window frame identification in production (in production 2007)
- 45 portal readers in production (HF)
- 22 Million read events yearly



- AkerYards employee safety tracking system
- 5000 EPC G2 UHF RFID tags in helmets
- 15 000 events per day
- 23 UHF portals



References: Apparel



- NP Naisten pukutehdas
- Product tracking G2 RFID from production over DC to store
- Printers, labels, packing stations, portals, RFID system
- Pilot ongoing in 2007



- Apparel RFID Solution Centre
- Whole supply chain demonstration centre
- Boxed and hanging garments from production to store
- 2007

