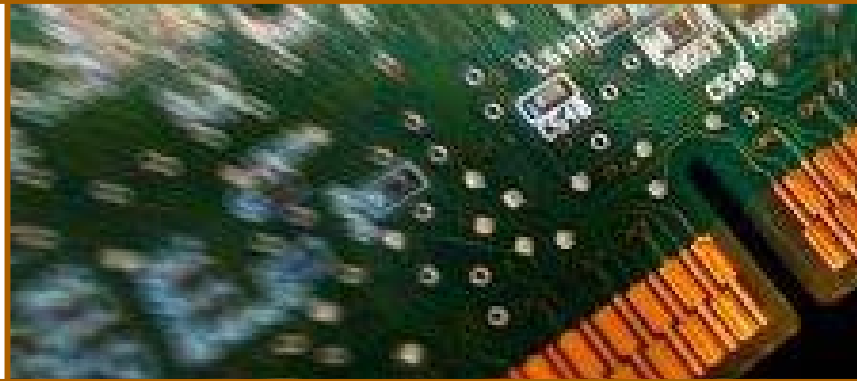


Conceptualization and Design of an Auto-ID System for VCBC



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Purpose

- **Background**

- VCBC's production is shipped primarily by train to its customers in Torslanda and Gent. The goods is loaded on racks and transported in containers in a closed-loop system. The container pool consists of approx. 1500 containers. The container flow system is based on many manual operation and is prone to human errors with regards to delivery notifications, delivery of goods, FIFO, and handling of change orders.

- **Purpose**

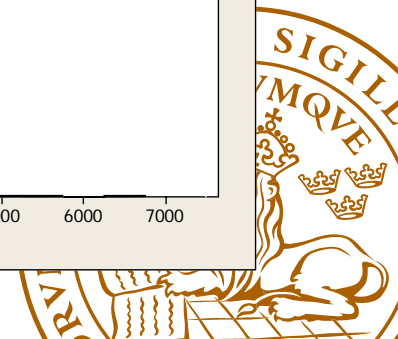
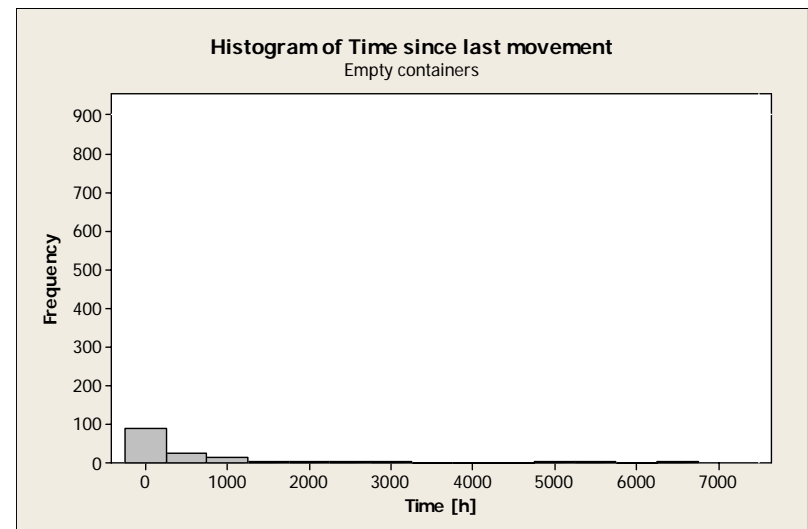
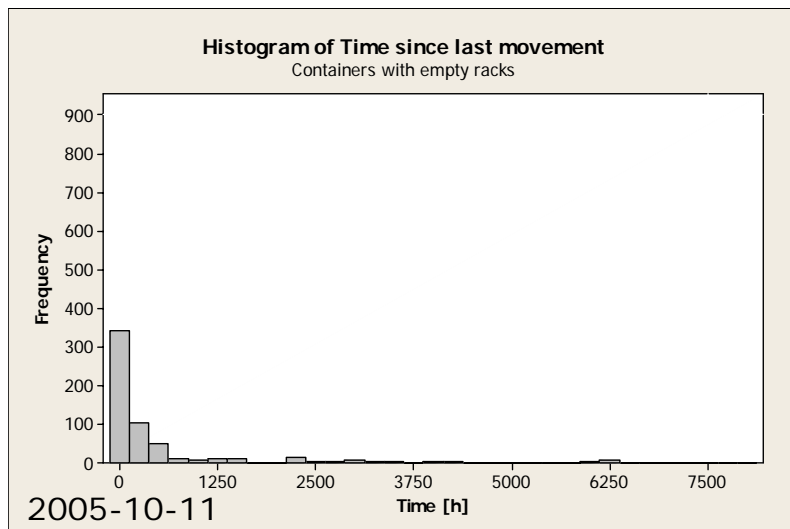
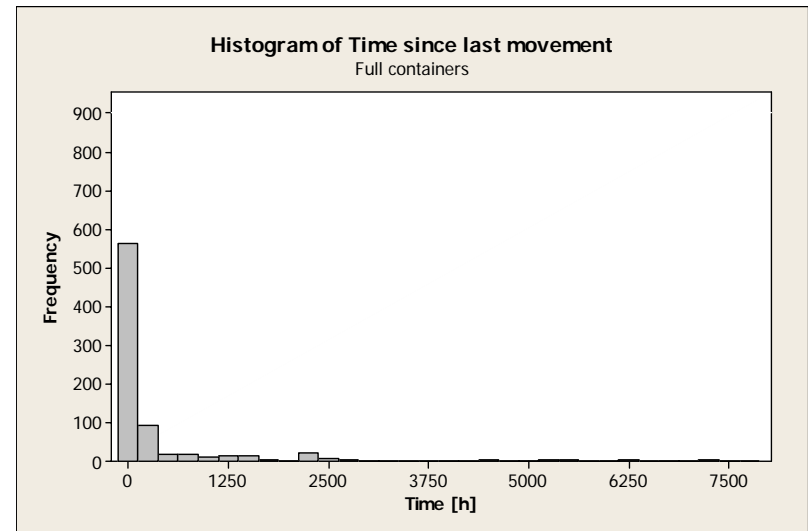
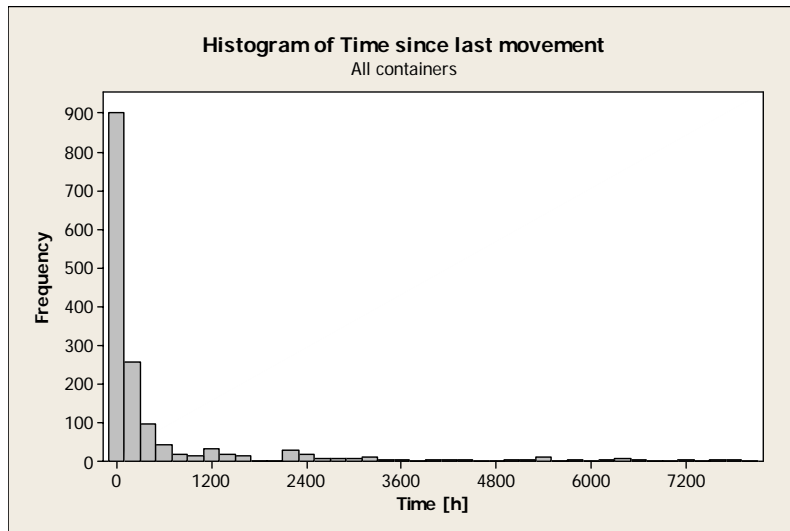
- To study how Auto-ID technology could be used for managing and controlling the container flow between VCBC and its customers.

- **Objectives**

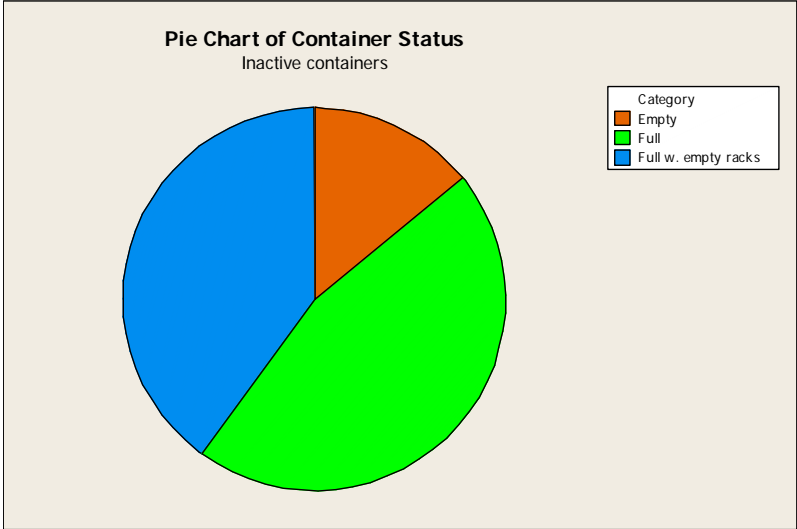
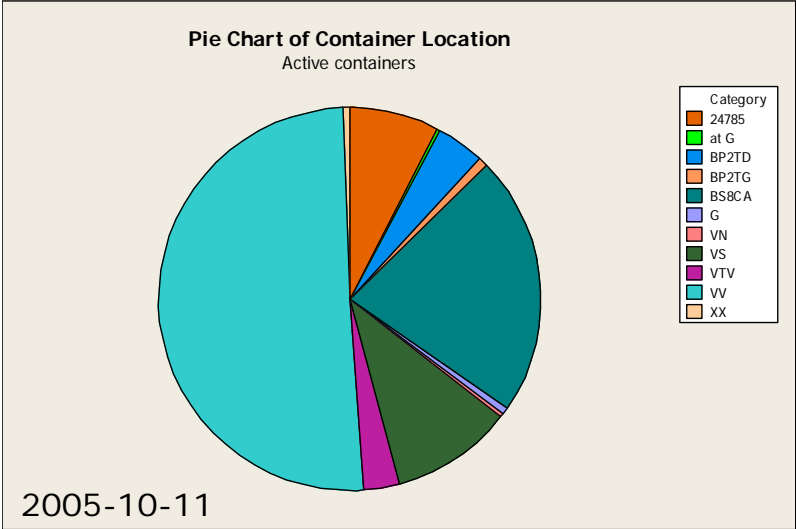
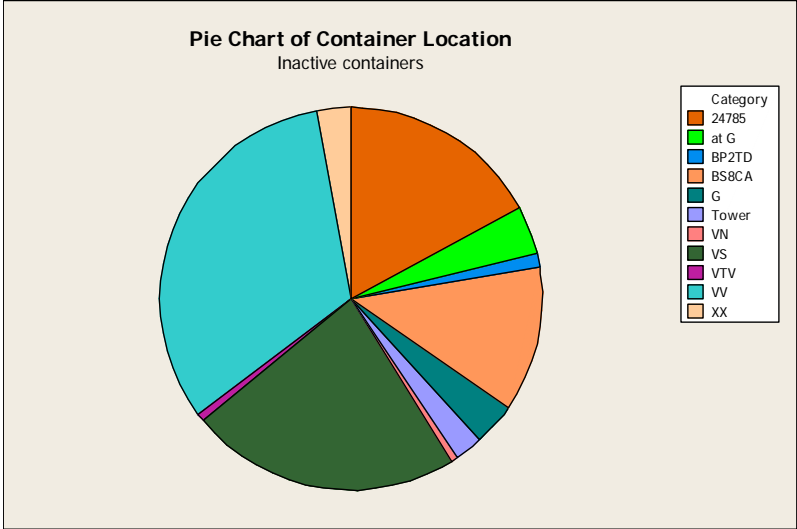
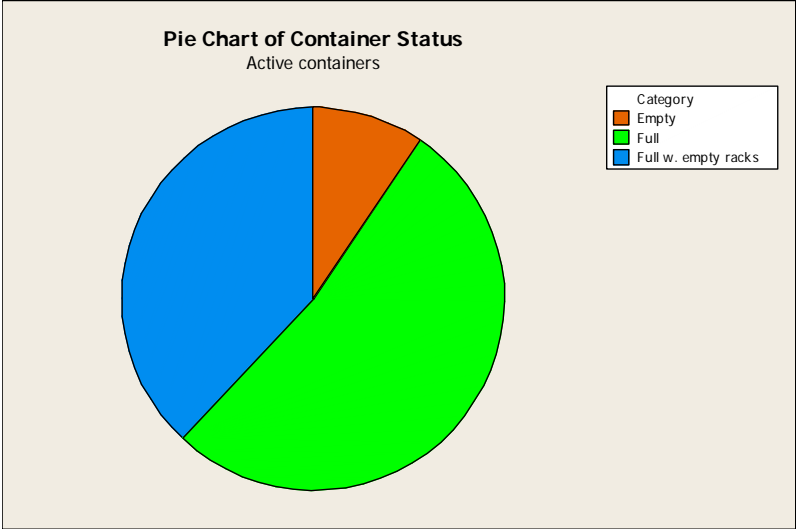
- Analysis of current system
- Conceptualization and system design
- Provide input for technical specification
- Estimate ROI



Snapshot of Container Database



Snapshot of Container Database



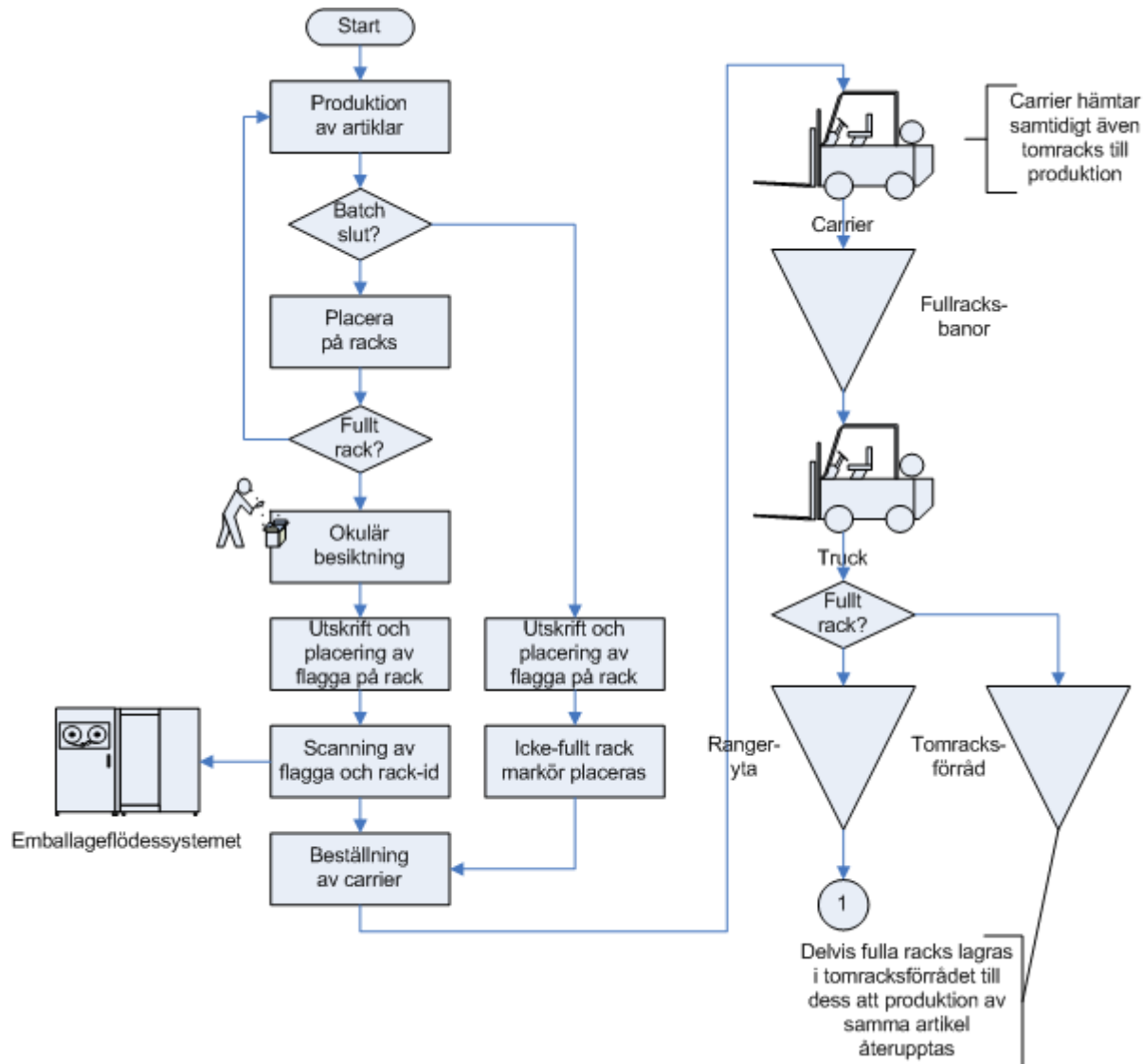
Tracking 2005.10.11 – 10.25

- Tracking of container movements
- Sample frequency: 1/day
- Result
 - 1250 Active containers (moved)
 - 73 Semi-active (moved after 2005.09.11)
 - 203 Passive (not moved after 2005.09.11)

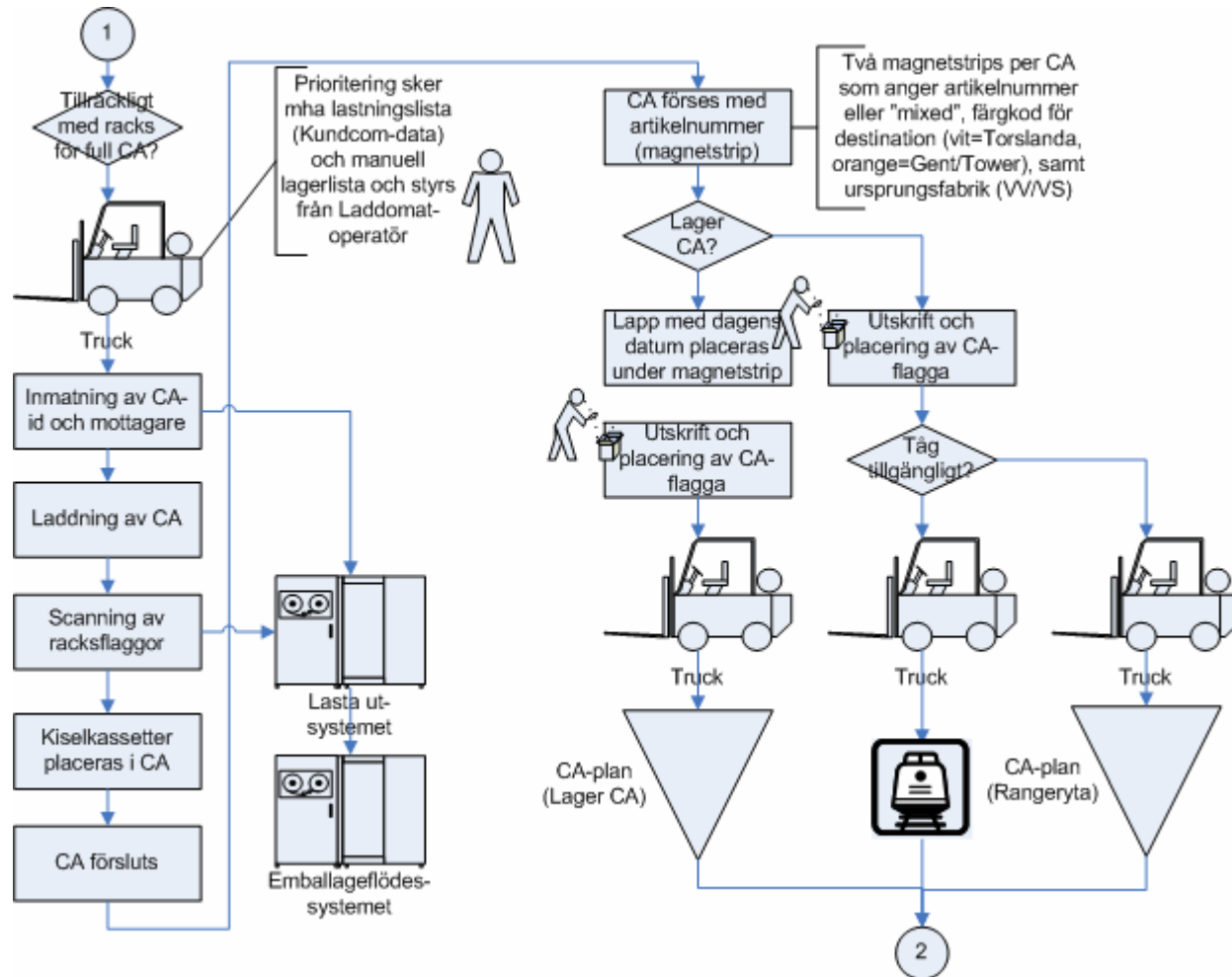
CA-ID Event	Time
7076 Empty package received at VV	2005-10-08 07:01
7076 Full package in container VV	2005-10-12 13:18
7076 Full package shipped from VV	2005-10-13 22:10
7076 Empty package in container BP2TD	2005-10-18 21:32
7076 Empty package received at VV	2005-10-19 16:59
7076 Full package in container VV	2005-10-20 13:26
7076 Full package shipped from VV	2005-10-21 09:56
7076 Empty package received at VV	2005-10-25 04:56



Flowcharts 1(4)

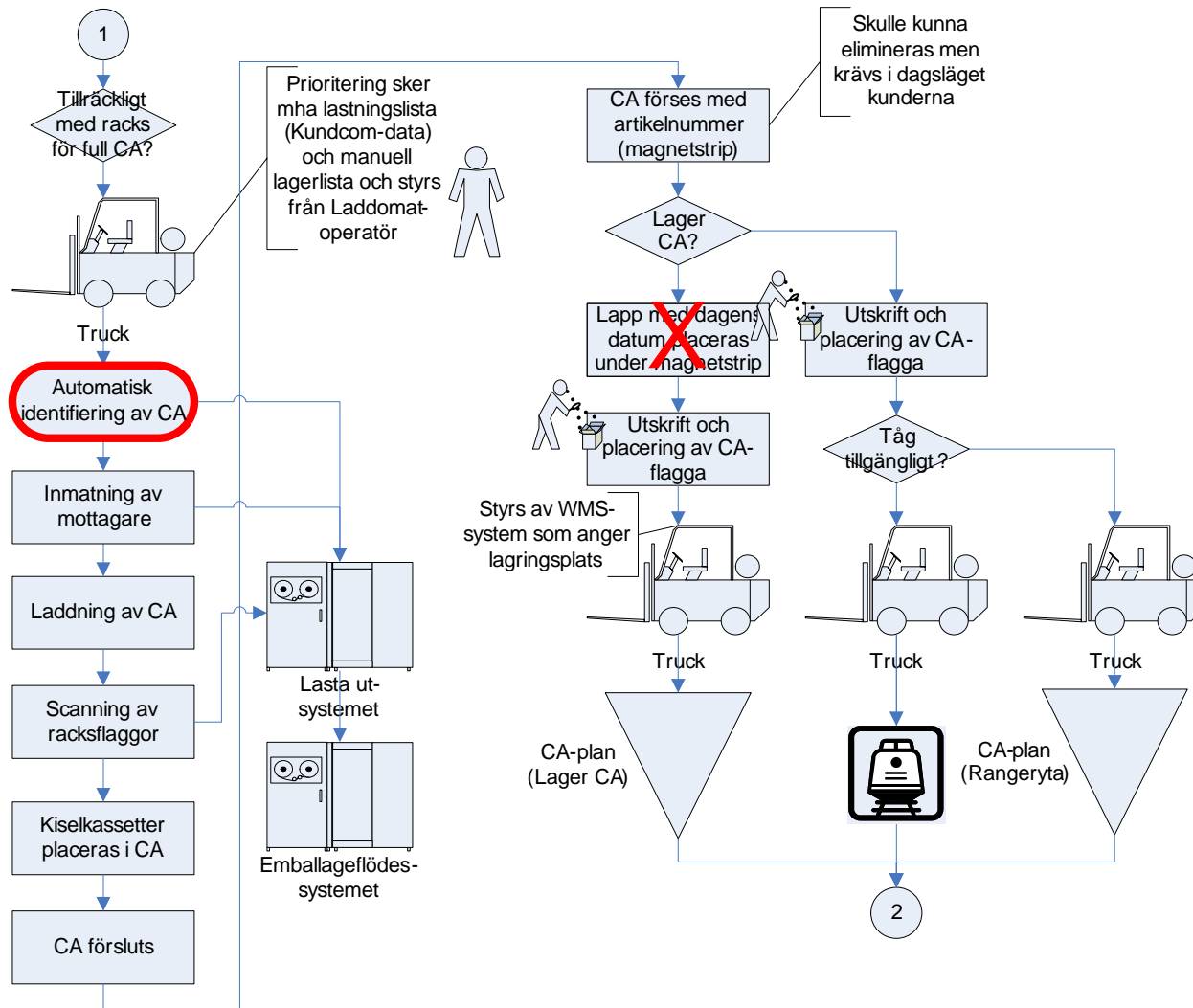


Flowcharts 2(4)

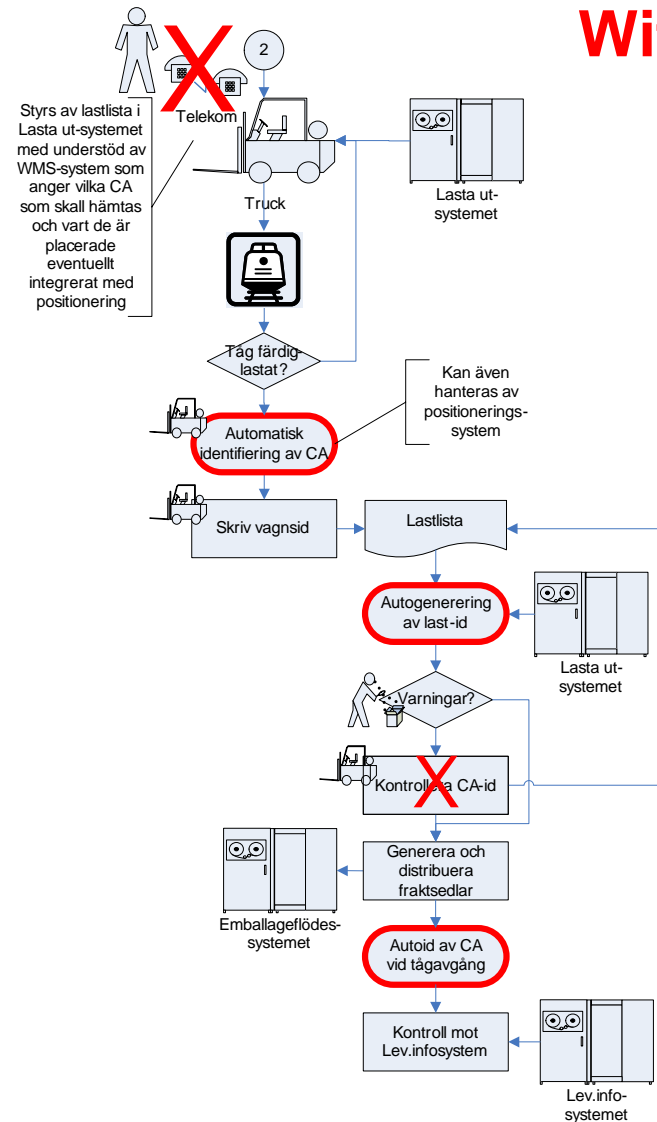
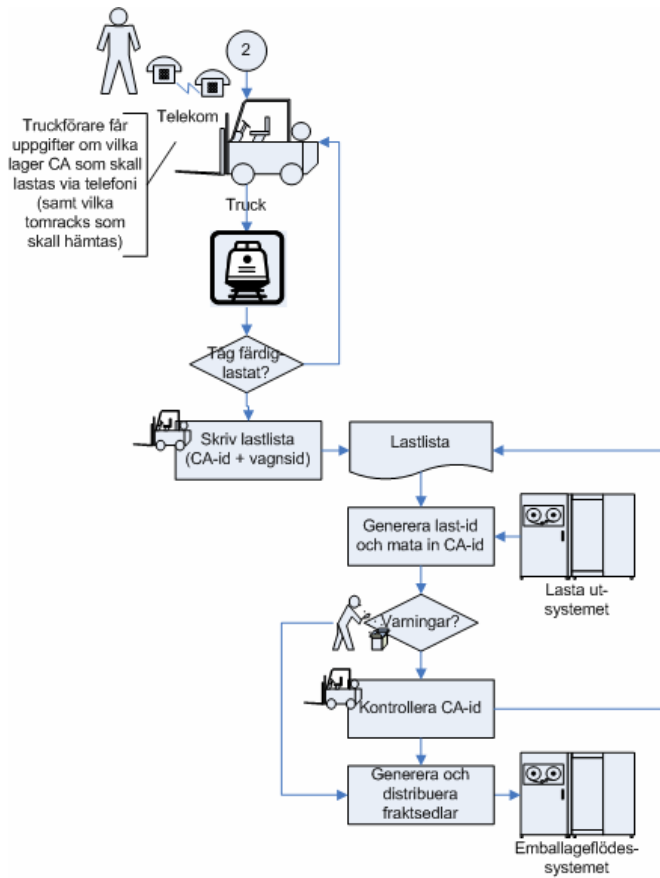


Flowcharts 2(4)

With Auto-ID



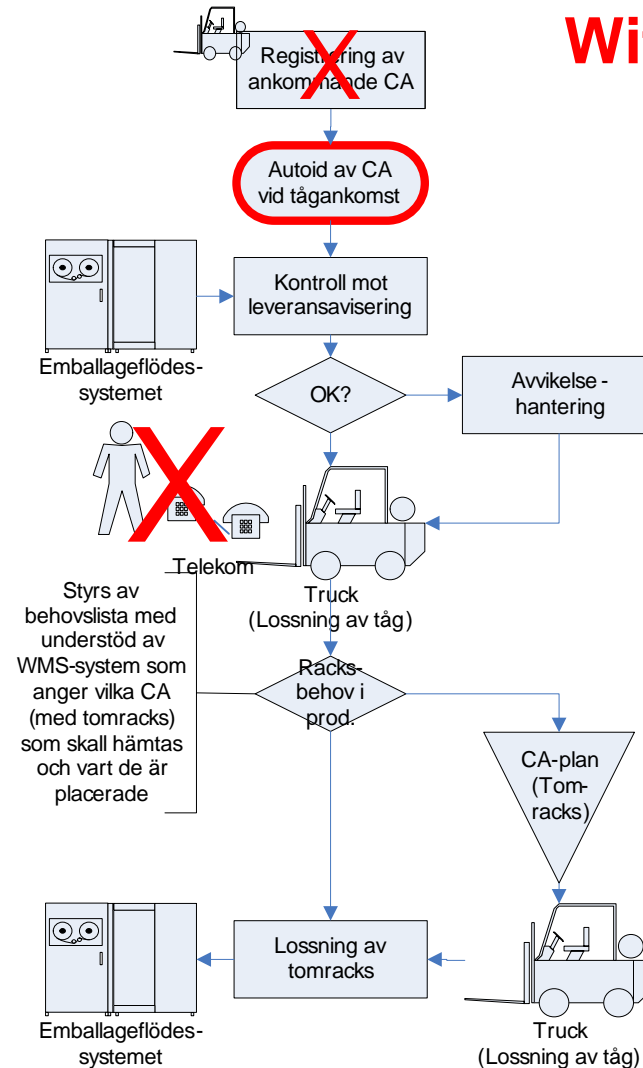
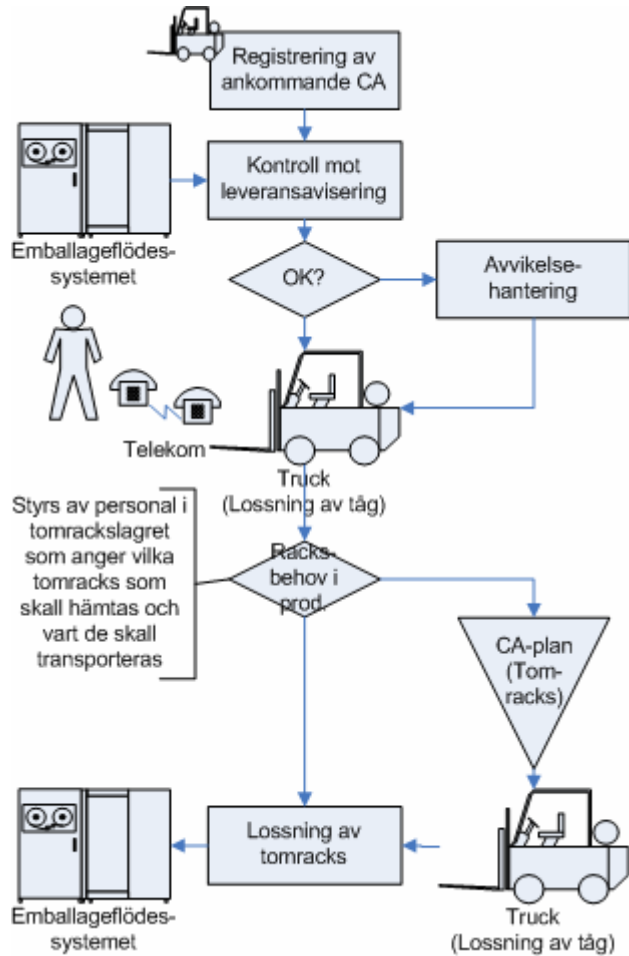
Flowcharts 3(4)



With Auto-ID



Flowcharts 4(4)



With Auto-ID



System Design

- **RFID readers**
 - **Points of loading and unloading of containers (10)**
 - **Arriving and departing containers by train at VCBC (3)**
 - **Arriving and departing containers by train at customers (4)**
 - **Container forklift-trucks (5-6)**
- **In total 22-23 readers are required depending on the IT-system**



Estimated savings

Estimerad besparing vid Auto-ID på containernivå

Förutsättning:

Auto-ID utnyttjas endast av VCBC

Tidsbesparing	tim/tågset	SEK/tim	#tågset/år	Total
Containerlastning ¹	0.5	500	1 500	375 000
Truckförare ²	2.5	500	1 500	1 875 000
Utlastare ³	0.5	500	1 500	375 000
Delsumma				2 625 000
Kvalitetsbristkostnader				
Korrigera fel ⁴	3 tim/mån x 500 SEK x 12			18 000
Transporter ⁵				75 000
Containerpool ⁶	10% reduktion av containerflotta			100 000
Delsumma				193 000
Total				2 818 000

1: Inget behov av manuell inmatning av container-id, manuell lagerlista och skrivande av lagerlappar. Minskat behov av telefonkontakt med truckförare på containerplan.

Höjd kvalitet på container-id i system och lager-containers.

2: Minskad tid för ankomstkontroll, lossning, lastning och slutkontroll av tåg. Minskad telefonkontakt. Höjd kvalitet på att containrarna hamnar rätt, dvs till lager eller på tåg (inga lagerlappar som blåser bort), bättre FIFO-hantering.

3: Utlastarnas arbete kan i stort sett automatiseras. Fel på container-id bör ej förekomma.

4: Minskad korrigerings av felavviseringar

5: Minskning av extratransporter pga att fel container skickats till kund (8/11 kSEK till Torsland och 29 kSEK till Gent)

6: Höjd kvalitet på spårbarhet bör leda till att containerflottan kan användas effektivare och därmed minska



Estimated costs

	Active RFID system			Passive RFID system		
	Amount	Cost		Amount	Cost	
Hardware						
Tags	3000	300	900 000	3000	15	45 000
Readers						
Process unit	23	10 000	230 000	23	10 000	230 000
Antenna	46	5 000	230 000	46	5 000	230 000
Servers	6	9 000	54 000	6	9 000	54 000
Cables		100 000	100 000		100 000	100 000
System Integration						
Man-hours; hardware installation	750	200	150 000	1500	200	300 000
Software development	1350	1 200	1 620 000	1350	1 200	1 620 000
Man-hours; software implementation	450	1 200	540 000	450	1 200	540 000
Trial			200 000			200 000
Cost of investment (SEK)			4 024 000			3 319 000
Replacing hardware						
Tags						
Platform	300	300	90 000	10	15	150
Readers						
Process units	1	10 000	10 000	4	10 000	40 000
Antennas	10	5 000	50 000	20	5 000	100 000
Man-hours; hardware replacement	20	400	8 000	40	400	16 000
System maintenance						
Software development			100 000			100 000
Operating the system			150 000			200 000
Running costs (SEK)			408 000			456 150
Running profit (SEK)			2 818 000			2 818 000
Payback period (years)			1.7			1.4



Conclusions

- **The current system is error prone and the data in the material flow system is unreliable**
- **The suggested system could potentially solve the identified problems**
- **The RFID system however is only one component and relies on the integration a the existing material flow systems, and a new WMS-module.**





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