



Transforming the Sterile Goods Supply Chain  
and  
Introducing Traceability to Legacy Items

# GS1 standards

## - *underpinning Central Denmark Region since 2012*



The Global Language of Business

GS1 Healthcare Provider Advisory  
Council Webinar

Building modern hospitals  
on global traceability standard

How standards helped Aarhus University Hospital  
establish technology agnostic traceability

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December 2016

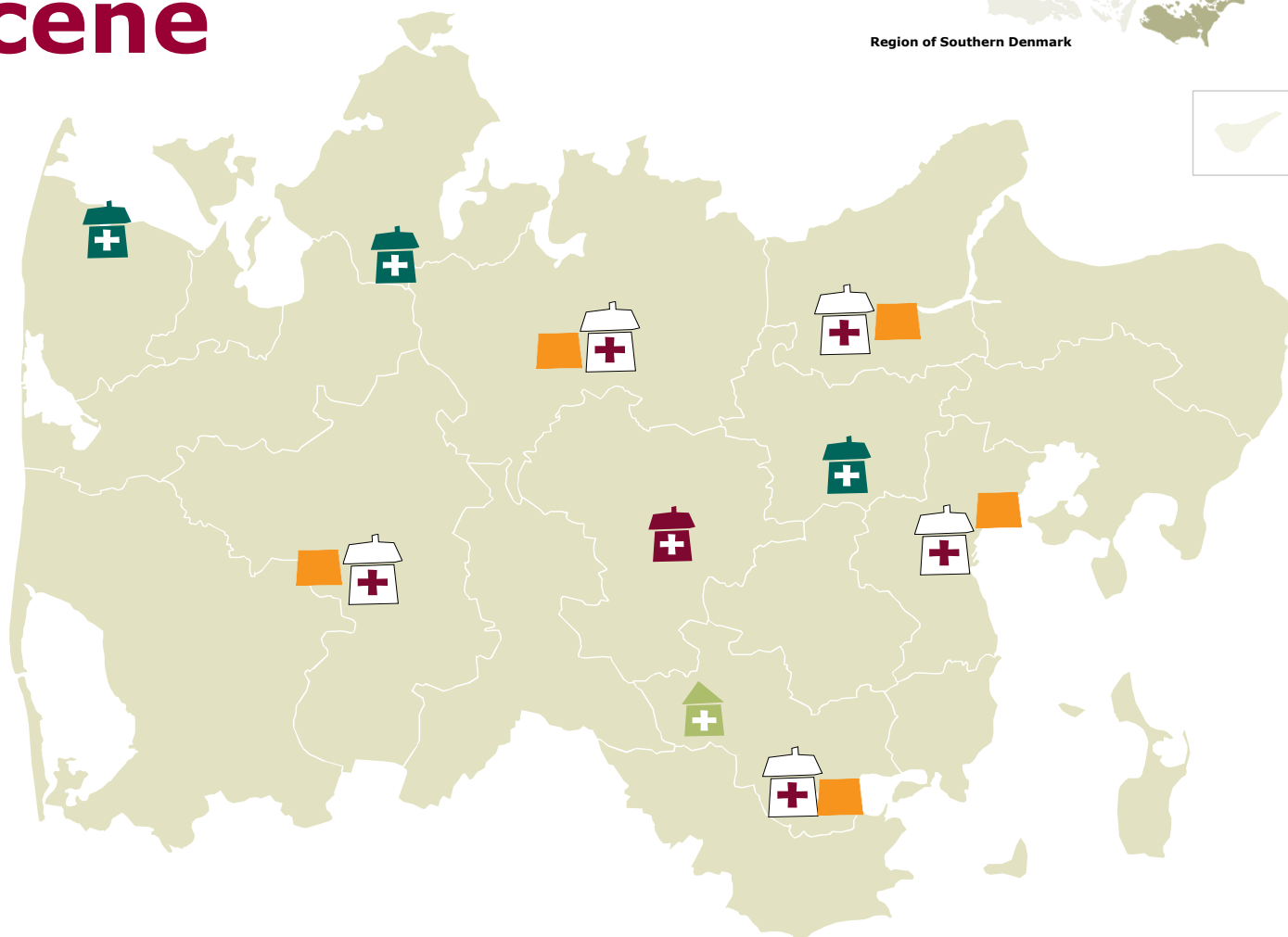


# A small step...



# Setting the scene

-  Emergency
-  Hospital
-  Rehabilitation
-  Lifestyle
-  Psychiatry



Central Denmark  
Region

North Denmark Region

Capital Region of Denmark

Region Zealand

Region of Southern Denmark



# Setting the scene

-  Emergency
-  Hospital
-  Rehabilitation
-  Lifestyle
-  Psychiatry





# Gødstrup Hospital



## Facts

First patient:  
February 2022

2.000 patients/day  
4.000 Employees

Construction Costs:  
500.000.000 \$

3.750+ Sterile  
goods products

6.000+ Individual  
Serial Numbers



# Gødstrup Hospital



Operating Rooms  
OR

Central Sterile  
Services Department  
CSSD



# Gødstrup Hospital



Central Sterile  
Services Department  
**CSSD**

Operating  
Rooms  
**OR**

Distance  
**~350 meter**

Delivery time KPI  
**~40 minutes**



## Structural



## S.M.A.R.T



# Structured

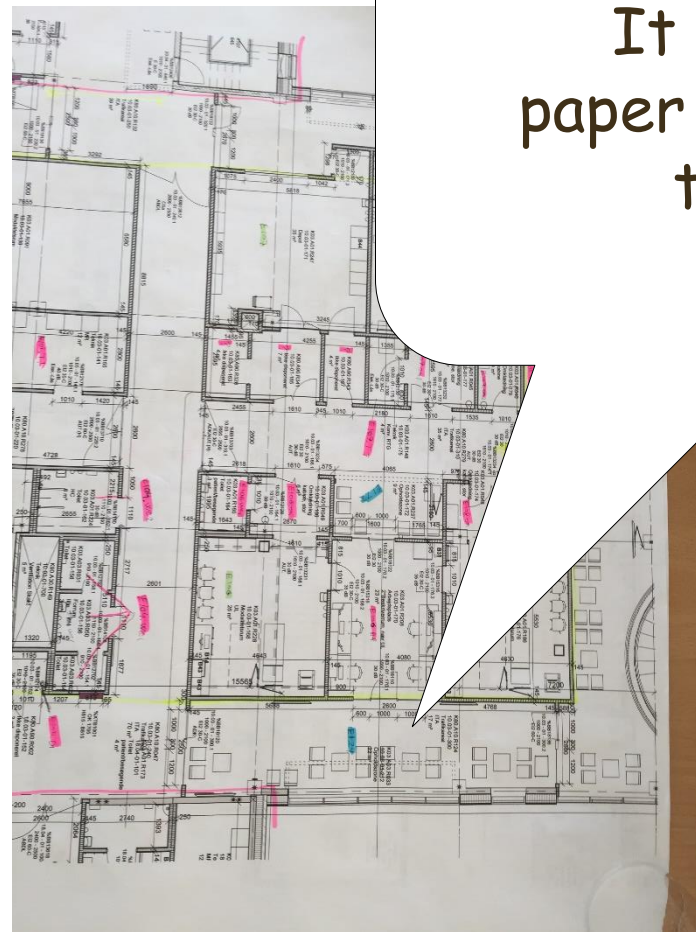




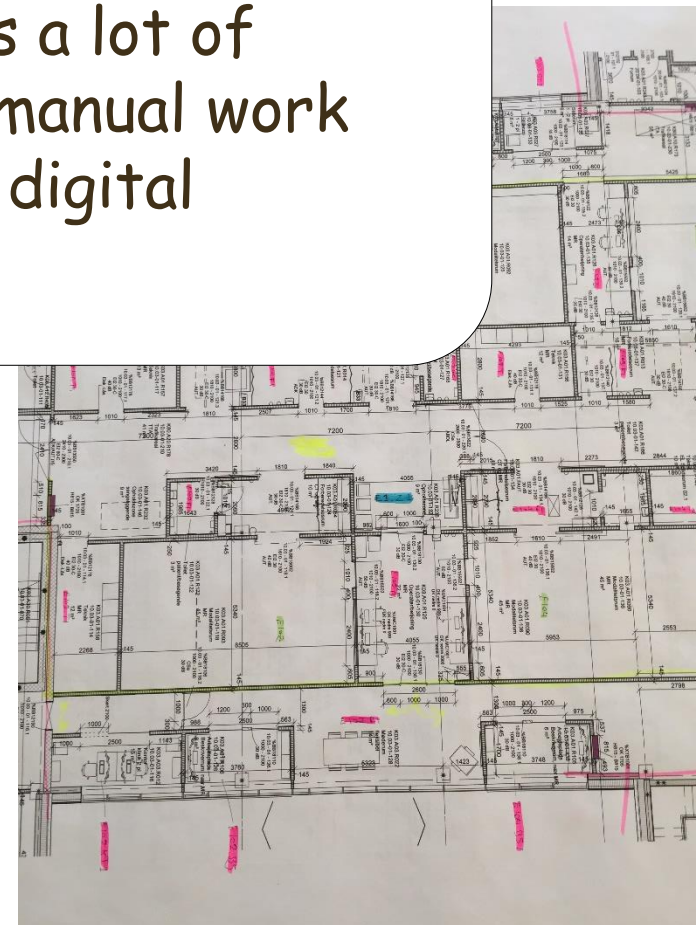
# Information Based



# Information Based



It takes a lot of  
paper and manual work  
to be digital





# Information Based





# Sensor Based

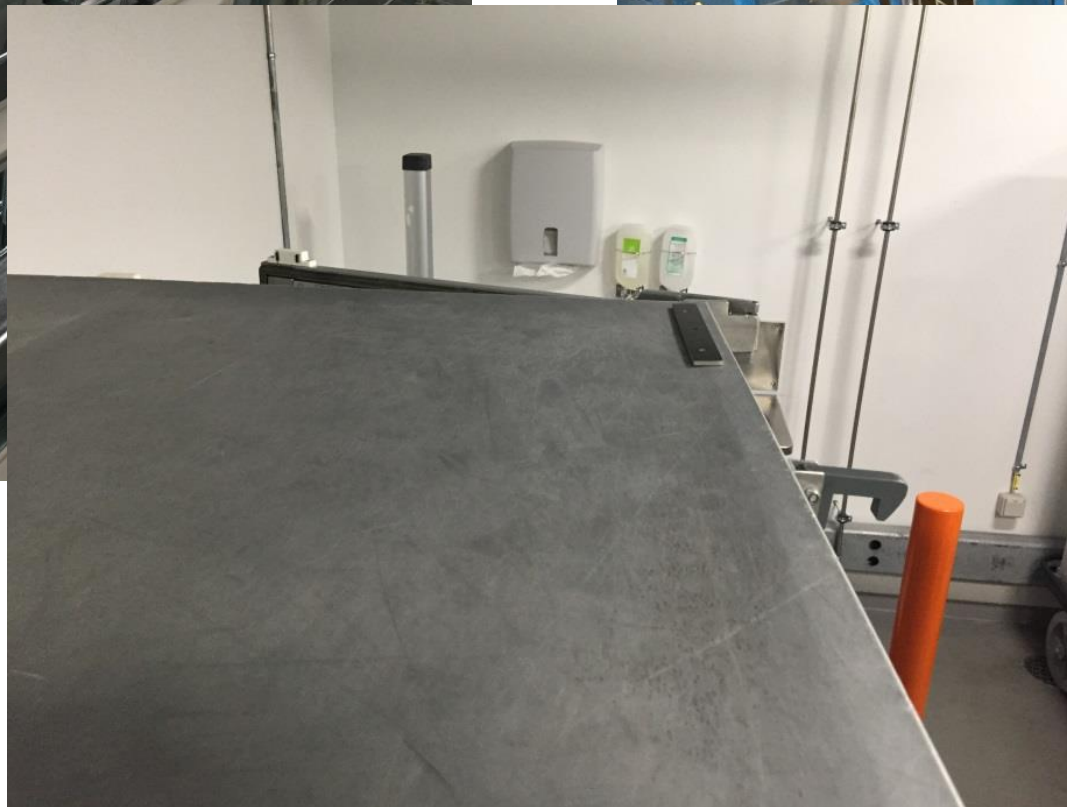
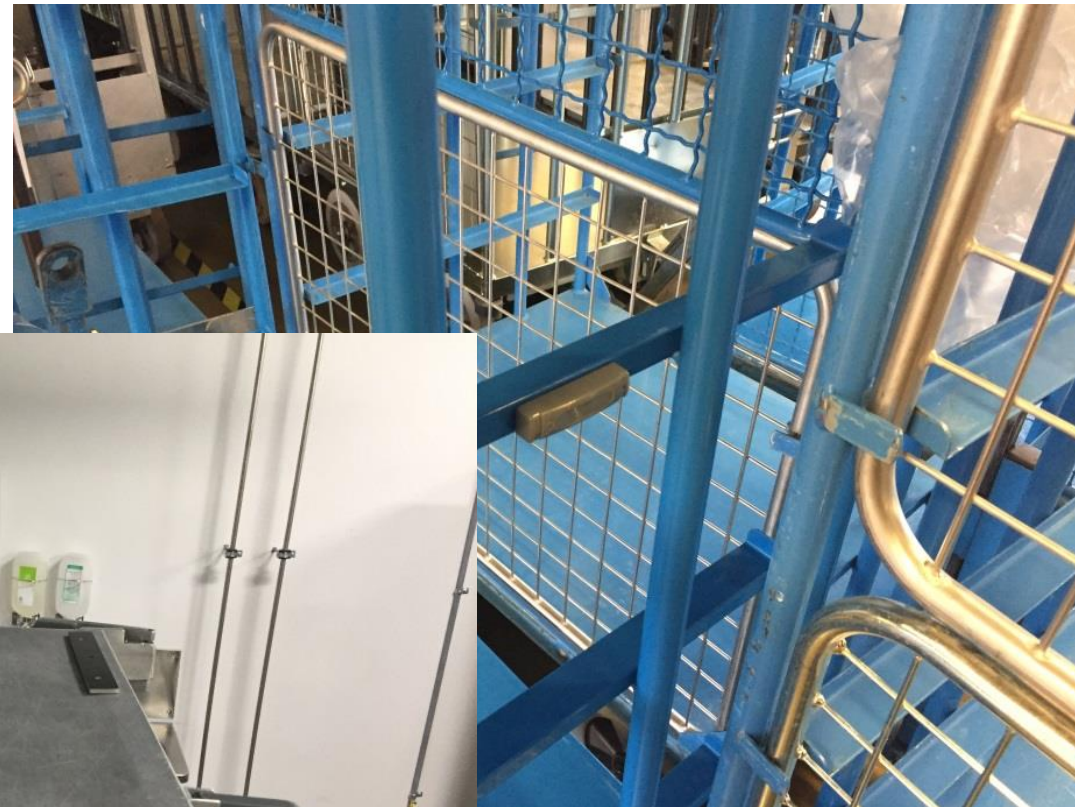




# Event Driven



# Event driven





# A System – Not an Application



# Capacity / Demand = Fullfillment

- Storage concepts
  - Central
  - Mobile
  - Local
- An object is an object
  - If you can order it, it is a trade item
  - Assets are grouped by capabilities
- Ordering Requirements
  - Planned
  - Emergency
  - Alternatives
  - Prepared
  - Ever changing
- Quality
  - Flexible
  - Knowledge based



# Inspiration

*applying known terminologies*



# Capacity & Demand



INSTRUMENTSÆT (aktive sæt)	PITOPTAGET	UREN RETUR	UREN SLUSE	INDPAKGODKENDT	RENT RETUR	KLAR AFD	KLAR STC	+/-	BEHOV AFD	BEHOV STC	KRITISKE TIDER (dato)
7463-1 - Quadriceps Bor (Passing Pin) L. 36 cm (8)	3						1	-1		2	12-20 (16), 12:20 (16)
7554-1 - Fenestrated Bipolar Forceps 8 mm (3)		(old: 1 stk)						-1	1		07:10 (16)
7609-1 - Olsentang L. 32 cm (3)								-4			08:00 (16), 09:05 (16), 10:15 (16), 11:45 (16)
7740-1 - Choledochuskop (2)		(old: 1 stk)						-1	1		09:05 (16)
8579-1 - Large Clip Applier Hem-o-lok (Robot) (2)								-2	2		07:10 (16), 07:10 (16)
1502-1 - Clipstang HEM-O-LOK Lilla 10 mm L (12)								-1		1	09:45 (16)
1534-1 - Kumartang i 3 dele (2)								-4			08:00 (16), 09:05 (16), 10:15 (16), 11:45 (16)
2797-2 - Endoeeye 30° Ø: 10 mm (7)	5			1	1 [s978]			-3	3		08:00 (16), 10:15 (16), 11:45 (16)
4015-1 - Boremaskine Medtronic Indigo (5)				2				-1	1	2	11:45 (16)
4112-1 - Udtræk til TEN søm (1)								-2	2		08:00 (16), 08:00 (16)
4168-1 - Bor Ø: 2.5 mm L: 11 cm (2)								-1	1		08:00 (16)
4424-1 - Instrumenter Til Pinnacle Skruer (2)								-1	1		12:20 (16)
4494-1 - Cryo (4)								-1	1		09:45 (16)
4568-1 - Pincet diatemi 12 cm. (21)				2				-2	2		08:15 (16), 12:00 (16)
5082-2 - Fenestreret Anoskop (5)		(old: 1 stk)					1	-4	5		08:00 (16), 09:25 (16), 11:10 (16), 12:55 (16), 14:10 (16)
5246-1 - Sårhæge selvhoidende 11,5 cm (1)								-1	1		11:20 (16)
5715-1 - Knoglekugle spids L: 20.5 (8)	1	3		1				-1	1		14:10 (16)
6035-1 - Suge-skyllerer til robot nyre L: 45 cm (2)								-1	1		09:45 (16)
625-1 - Bipolar Ledning Blå Da Vinci Xi (4)		(old: 1 stk)					2	1	1		08:00 (16)
6586-1 - Nassespekel D. 5 Cm. L.16 Cm. (2)							1	0	1		07:10 (16)
								-1		1	11:25 (16)

Type	OP stue	OP start	Fremstillingskort	Prioritet	Ordrenummer	Pluk status	Pakket	Plukket	Mangler	Vognnr	Vogn lokation	Bruger	Afdeling
-	-	-	RHG-AKUTSecdo	Normal	168885	Plukket	86%	0 (8)	0	s833	Ojenklinikken Gedstrup B, Gang B201.D		GYN
E224	17-09-2023 08:00	18-09-2023 08:00	RHG-ORER20, RHG-ORER44, RHG-ORER63	Normal	168451	-	80%	18 (22)	1	s825	Stericentral X, Rengering X022		ØNH
E224	17-09-2023 08:00	18-09-2023 08:00	Instrumentsets/materiater	Normal	169195	-	0	0 (1)	0	-	-		ØNH
Akuvir	17-09-2023 08:00	18-09-2023 08:00	RHG-HO-OPORT101	Normal	169649	-	89%	9 (10)	0	s836	Stericentral X, Rengering X022		ORT
E248	17-09-2023 08:00	18-09-2023 08:00	RHG-HO-OPORT102	Normal	169162	-	85%	24 (28)	3	s811, s861	Stericentral X, Rengering X022, Stericentral X, Rengering X022		ORT
E222	17-09-2023 11:30	18-09-2023 11:30	RHG-ORER48	Normal	168463	-	94%	16 (17)	0	s824	Stericentral X, Depot X030		ØNH
P214	17-09-2023 11:30	18-09-2023 11:30	RHG-OPUR08	Normal	160059	-	96%	27 (28)	0	s836	Stericentral X, Rengering X022		KIR
E252	17-09-2023 12:00	18-09-2023 12:00	RHG-HEOPORT391	Normal	169446	-	83%	16 (19)	2	s832	Stericentral X, Rengering X022		ORT
P218	17-09-2023 14:10	18-09-2023 14:10	RHG-HODKORT34	Normal	157980	-	80%	4 (5)	0	s883	Stericentral X, Rengering X022		ORT
E226	17-09-2023 08:00	18-09-2023 08:00	RHG-ORER03	Normal	168694	-	0	0 (10)	0	-	-		ØNH
P220	17-09-2023 08:00	18-09-2023 08:00	RHG-HEDKORT004	Normal	155541	-	0	0 (7)	0	-	-		ORT
P214	17-09-2023 08:00	18-09-2023 08:00	RHG-OPUR24	Normal	154862	-	0	0 (5)	0	-	-		KIR
E244	17-09-2023 08:00	18-09-2023 08:00	RHG-OPUR15	Normal	163867	-	0	0 (17)	0	-	-		KIR
E248	17-09-2023 08:00	18-09-2023 08:00	RHG-HEOPORT74	Normal	159641	-	0	0 (13)	0	-	-		ORT
P210	17-09-2023 08:00	18-09-2023 08:00	RHG-URO062	Normal	168800	-	0	0 (18)	0	-	-		URO
E222	17-09-2023 08:00	18-09-2023 08:00	RHG-ORER06	Normal	166220	-	0	0 (4)	0	-	-		ØNH
P218	17-09-2023 08:00	18-09-2023 08:00	RHG-HODKORT29	Normal	169142	-	0	0 (5)	0	-	-		ORT
E242	17-09-2023 08:00	18-09-2023 08:00	RHG-OPUR01	Normal	169459	-	0	0 (8)	0	-	-		KIR
E240	17-09-2023 08:00	18-09-2023 08:00	RHG-OPGYN50	Normal	168811	-	0	0 (31)	0	-	-		GYN
P212	17-09-2023 08:00	18-09-2023 08:00	RHG-URO095	Normal	168795	-	0	0 (13)	0	-	-		URO



# Events

- Picked
- Ship to
- Observed
- Arrived
- Commissioned

The trained eye might have spotted a correlation with the Core Business Vocabulary by now

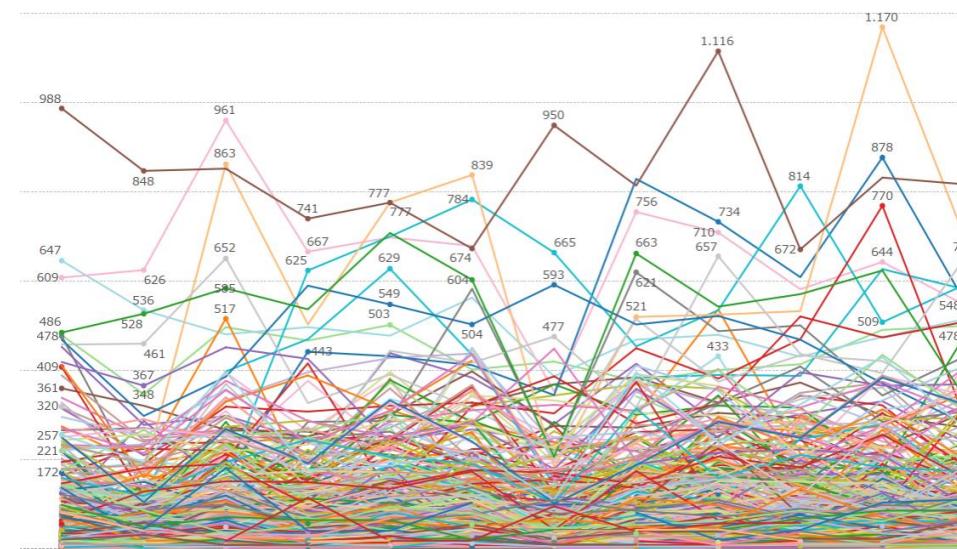
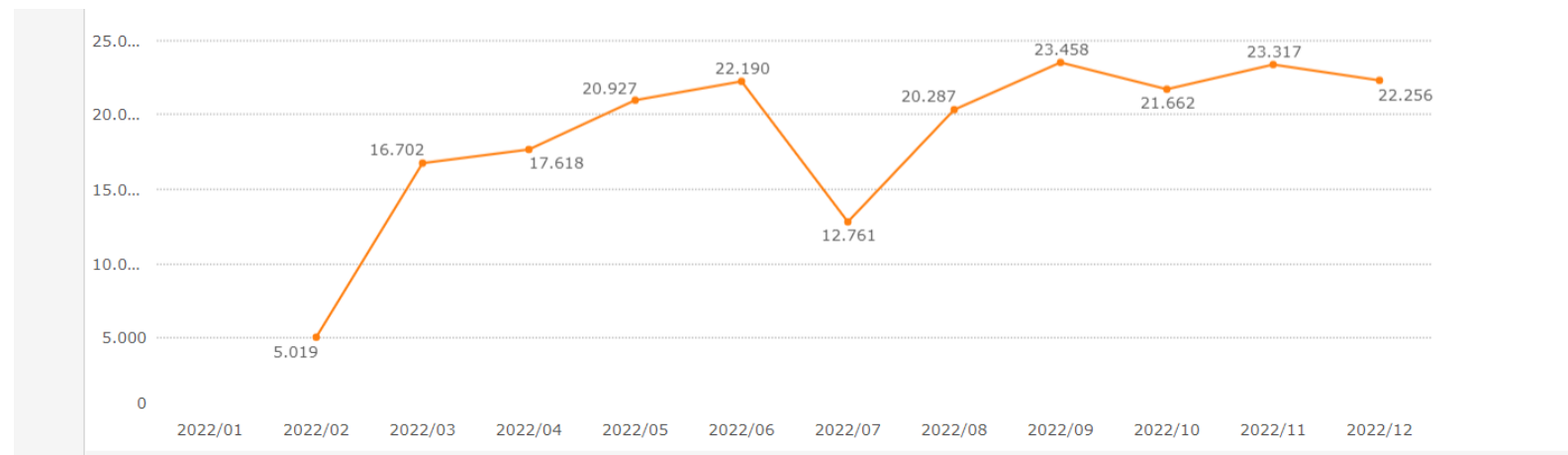
Central Denmark Region regards EPCIS as the preferred interoperability method in the supply chain

# Events + Rules = Required Action





# Transparency



# Where is...





# Where is...









# Digital twins

- Booking
- Picking
- Transporting
- Preparing
- Fast Track!

Each of the above mentioned use cases only has a digital relation to the instruments involved. Some cases involve the container, the wrapping or the trolley as an observable physical objects. Other use cases eg. activating FastTracking the flow through the CSSD is done entirely on a data level

# Identification requires reusable ID's

## Marking requirements

- No harm to physical properties of instruments
- Scalable
- Global and Unique
- Easy to use
- Applicable to existing inventory



# Marking technologies

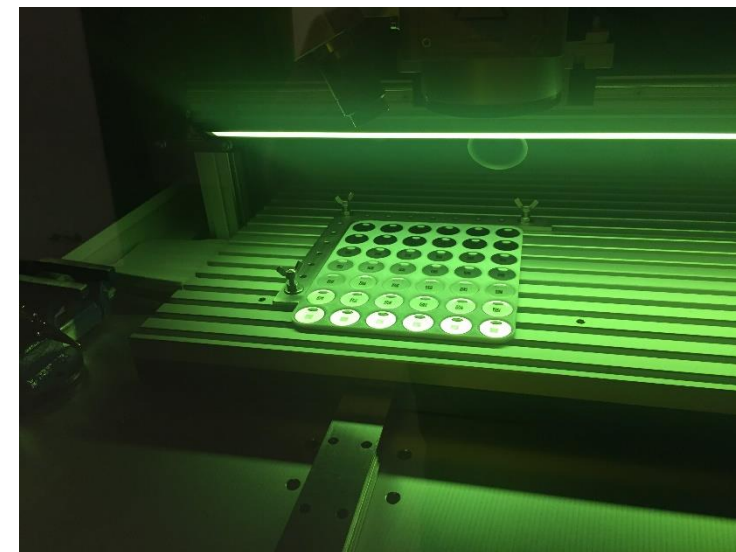
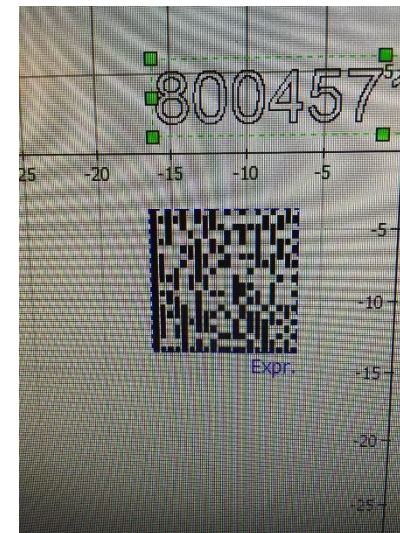
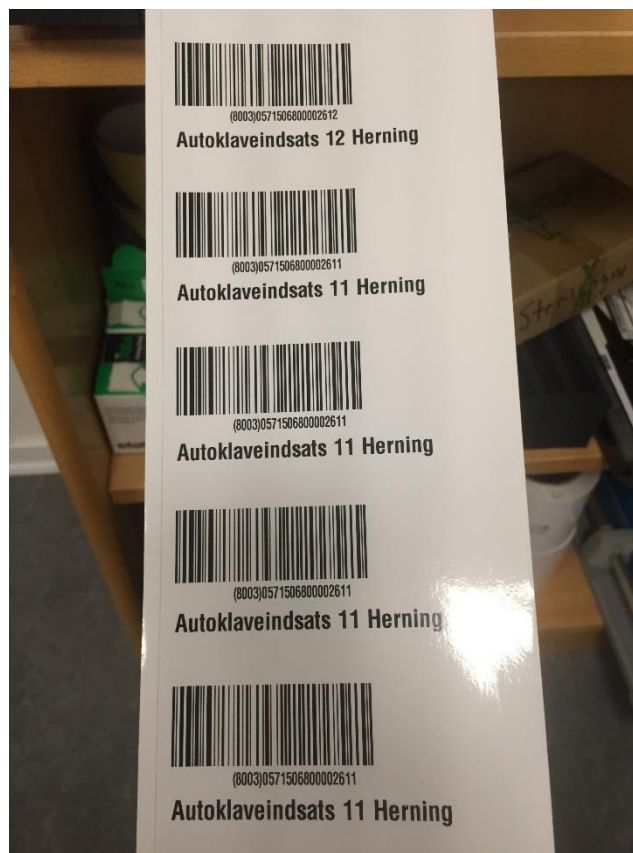
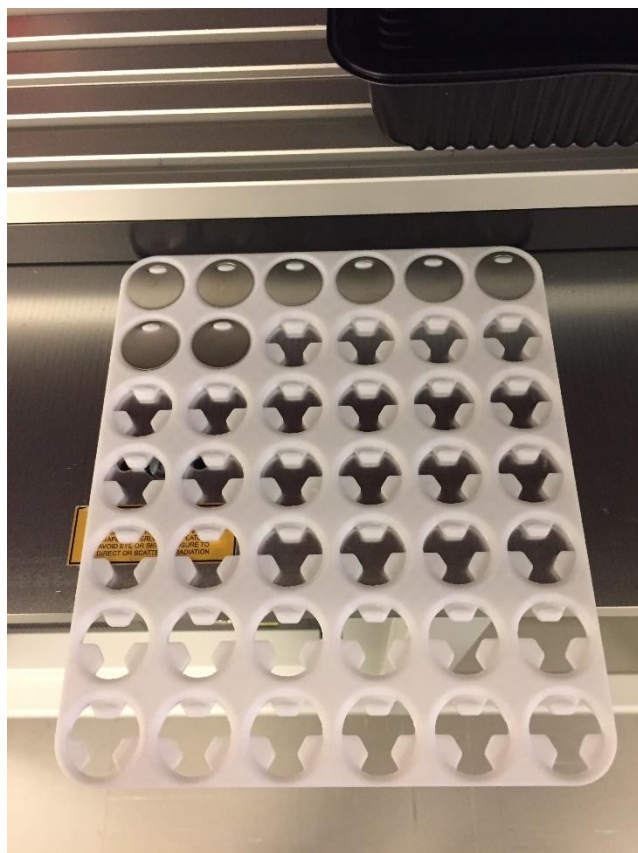
- Engraving
- Electrostatic
- Attached RFID
- Printing
- Laser annealing







# Yes we can!



# Some things can't be marked





# Some things can't be marked



A barcode **ALWAYS** identifies the object it is placed/printed on

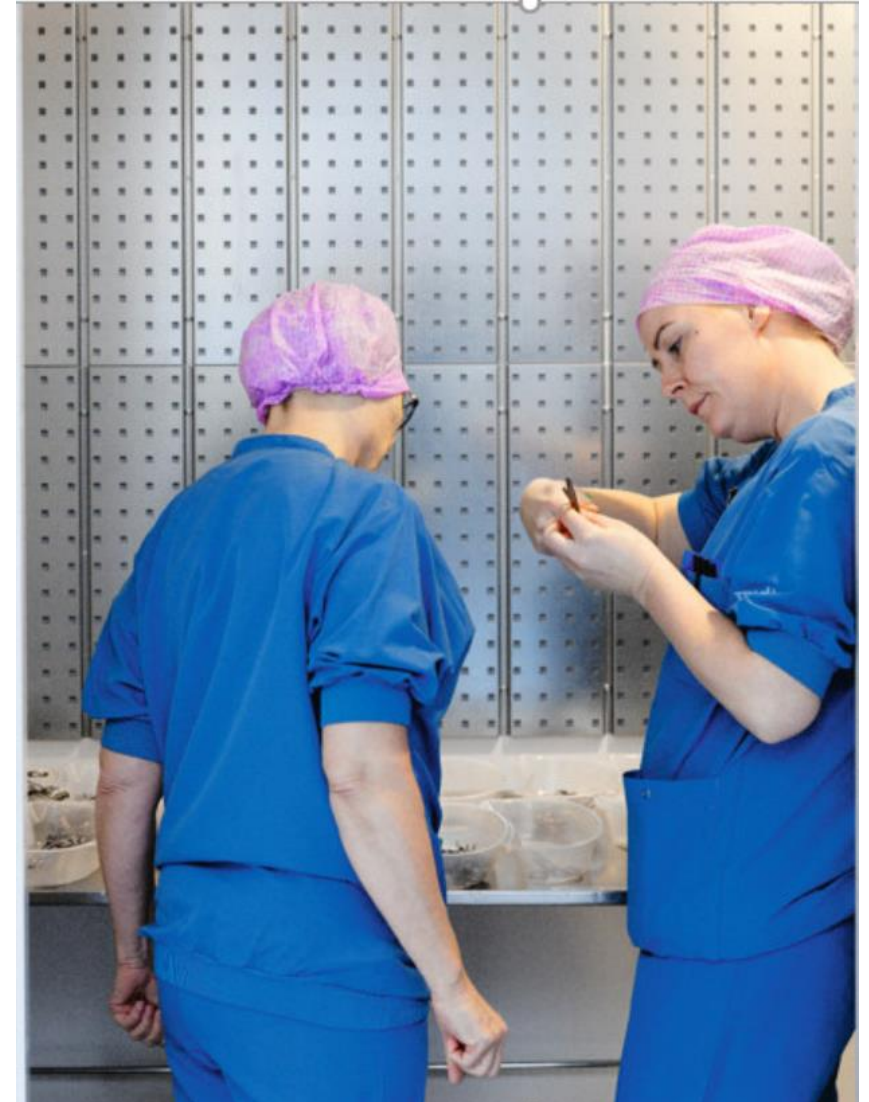
An ID Brick placed in a set identifies itself and should never have data encoded specifik to the set it's placed in



Robustness is achieved through a strict regime governing the contents of each set

## It's hard work

- Patient centricity also requires adding value away from the patient
- CSSD does a lot more now
- It's a new language
- Transparency and honesty go hand in hand
- 6.259 marked instruments in use





# Moving in one day

Each of the two original hospital sites were vacated in a single work day each.



# Moving in one day – with standards

- Data was prepared months in advance
- Staff planned an intermediate flow to consolidate assets from the two sites into one dataset
- One simple scan of an item and a 'Ship to' location number transferred the item from the capacity pool of the old site to the new site
- Scanning a 'Physical' location number on arrival finished the transfer initiating the flow at the new site









# Is this just running up CSSD costs?

- No, and yes. But it is an investment in better care
- Replicability becomes a capability
- The learning curve flattens.
  - A scan returns product information
  - A visual inspection sometimes lead to identification failure
  - REF – Reference numbers ar ambiguous
- The scans and RFID tracking events paints a clear picture af the state of single instruments, sets and orders. A picture shared between surgery and CSSD



# At the end of the day

- It's all about the patient
- The flow is basically orchestrating logistic standards
- A scan is just pushing a button, a small step
- Handling thousands of scans and RFID events a day is a giant leap
- Inspecting your data is easily forgotten. Go there and you'll learn and improve nothing. Don't just do take time to reflect
- It's all about the patient





# Whats next



- Global Master Data
- Weeding out workarounds
- We are not at the desired level of transparency
- Continous evaluation of the instrument pool
- Single Cycle Items
- Better support for mobile storage