

# Case study

Implementation of an inventory management  
model along the entire supply chain under Demand  
Driven MRP

INDUSTRIAS HACEB  
Medellín, Colombia

By

Haceb & Flowing Consultoría  
December, 2018



# Industrias HACEB - location



Copacabana, Antioquia province, Colombia



**+4.000**

Employees

**250.000 m<sup>2</sup>**

Total plant area

**4.5 M un**

Production capacity

**78 years**

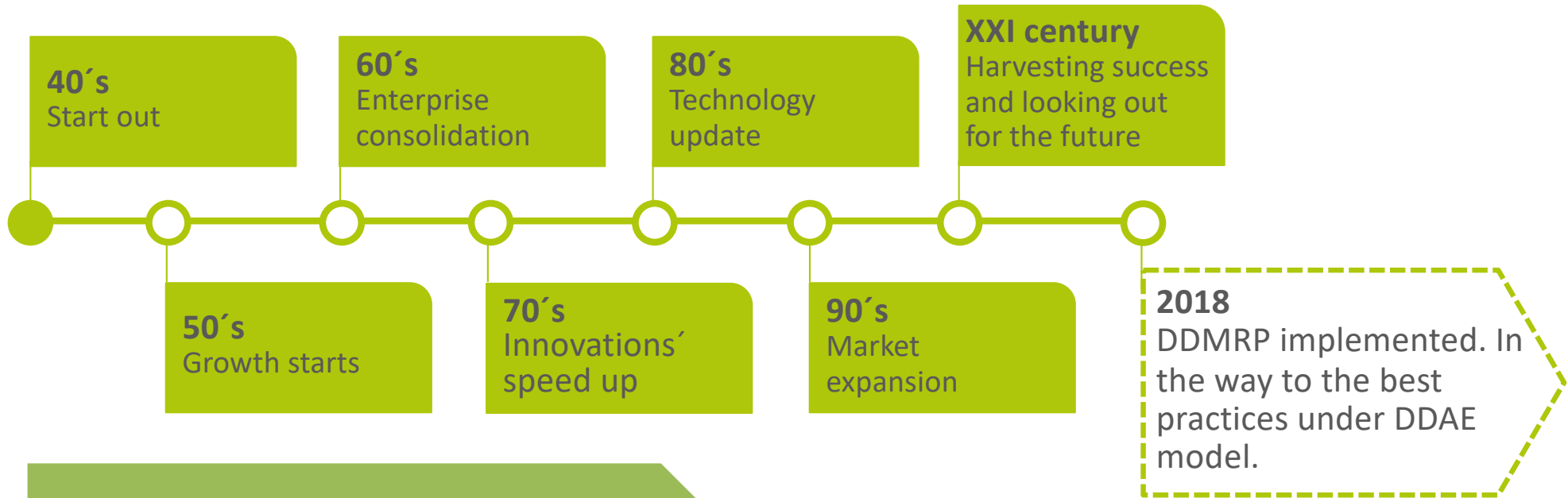
Market presence



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# Company's timeline



78 years competing in the world

1940



2018



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# Founder



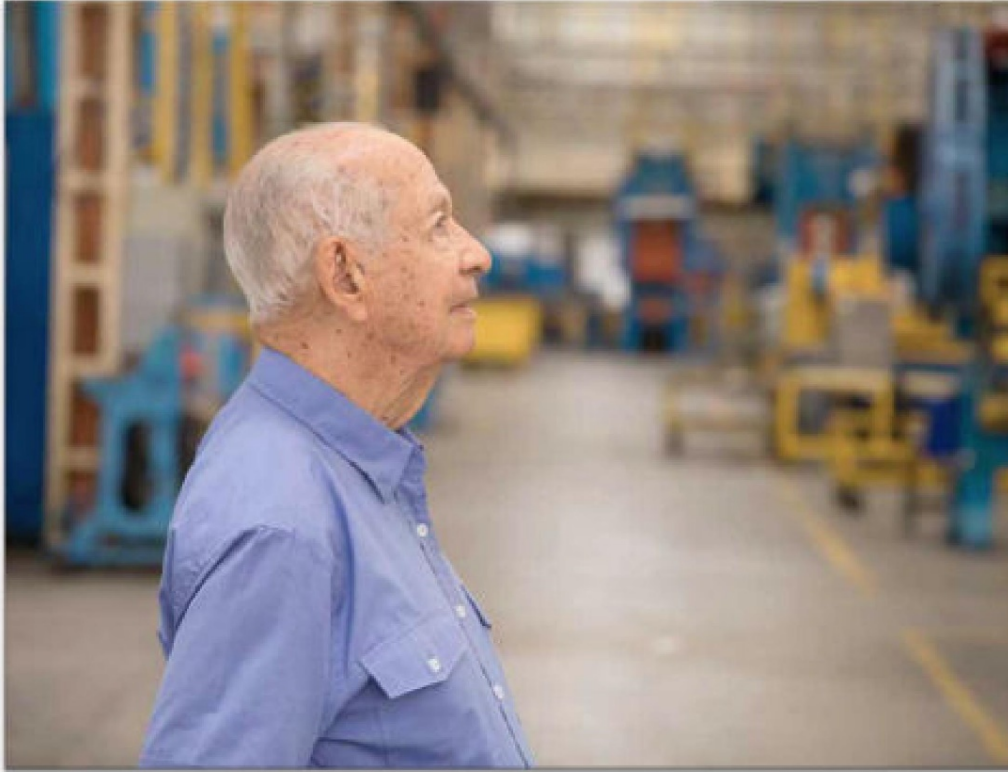
José María Acevedo, Haceb's founder, 99 years old and still goes to the company every day



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# A lifetime of perseverance



“When I got ask if I have had any difficult moment in this whole story, I answer ...

I just have not had any easy moments”.

José María Acevedo

# Main figures

**\$250MM**

**Sales**

Local sales: 91%  
International sales: 4%  
Whirlpool partnership: 5%

**32%**

**Share**

In the Colombian  
market

**12 countries**

**Export markets**

Central America & Ecuador make  
up 58% of the export market

**\$120MM**

**Capital investment**

- New refrigerator manufacturing plant
- Plastic injection plant update and capacity expansion.
- New technology development for injection of plastic parts for HWI alliance
- Warehouse expansion and raw materials management centralization.
- Manufacturing of heating products centralized
- New packaging technology (Clear View).
- SAP
- DDMRP



Whirlpool's partnership for  
manufacturing washing machines  
Starting year: 2016  
Washing machines per year: 85.000



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# Product's portfolio



## Refrigerators

- 35% local market share
- 400.000 units/year
- 6 SKU's in the top 10 in the local market



## Washing machines

- 24% local market share
- 240.000 units/year
- The SKU most sold in local market



## Stoves

- 37% local market share
- 200.000 units/year
- 6 SKU's in the top 10 in local market



## Built – in devices

- 51% local market share
- 415.000 units/year



## Gas water heaters

- 50% local market share
- 70.000 units/year



## Air conditioners

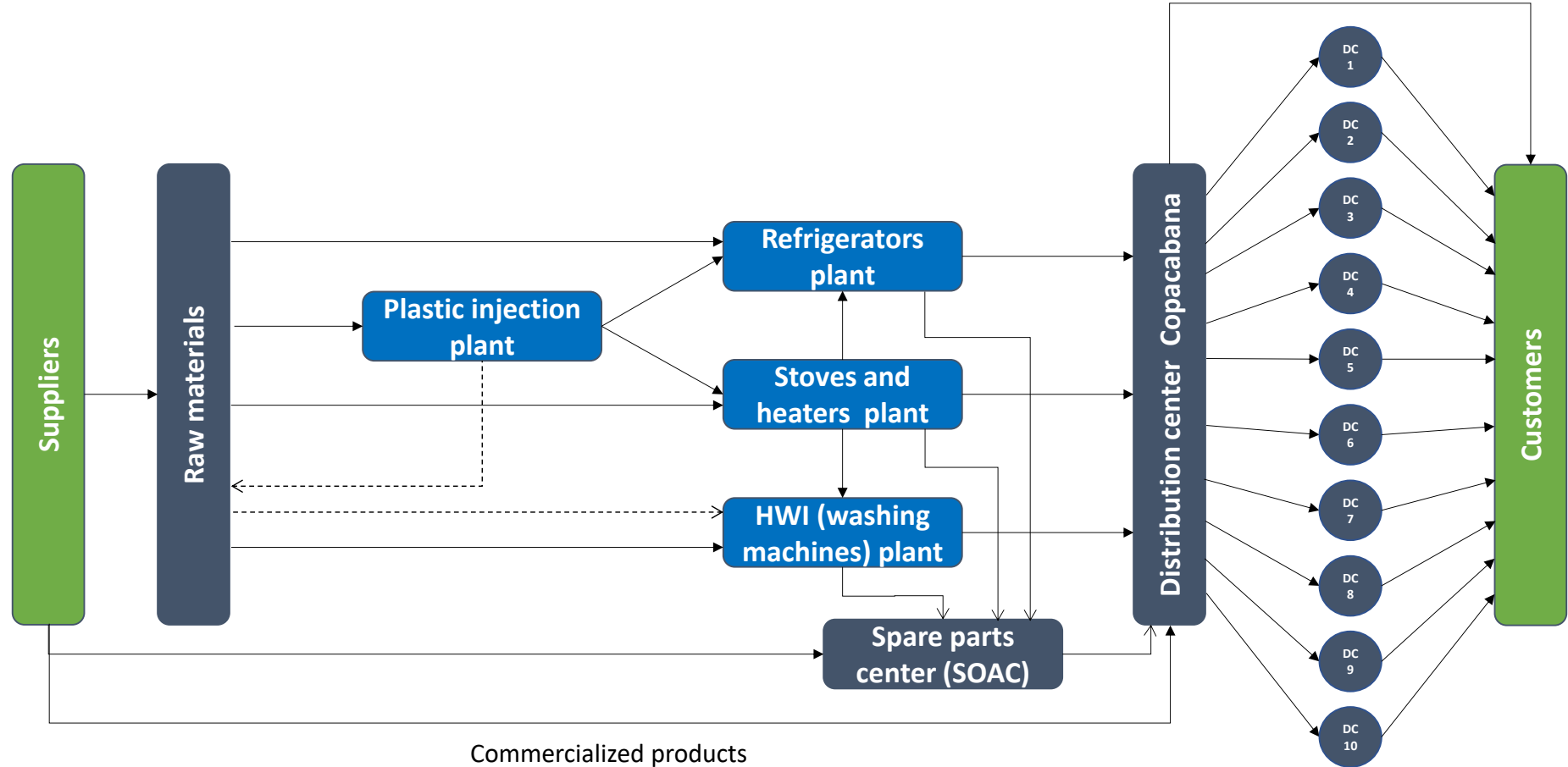
- 6% local market share
- 13.000 units/year



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# Supply chain network



- Suppliers:
  - Local: 70
  - International: 120
- Raw materials:
  - Local: 1800 SKU's
  - International: 400 SKU's
- Customers: 400+
- 500+ finished products: manufactured and commercialized
- More than 10,000 spare parts SKU's



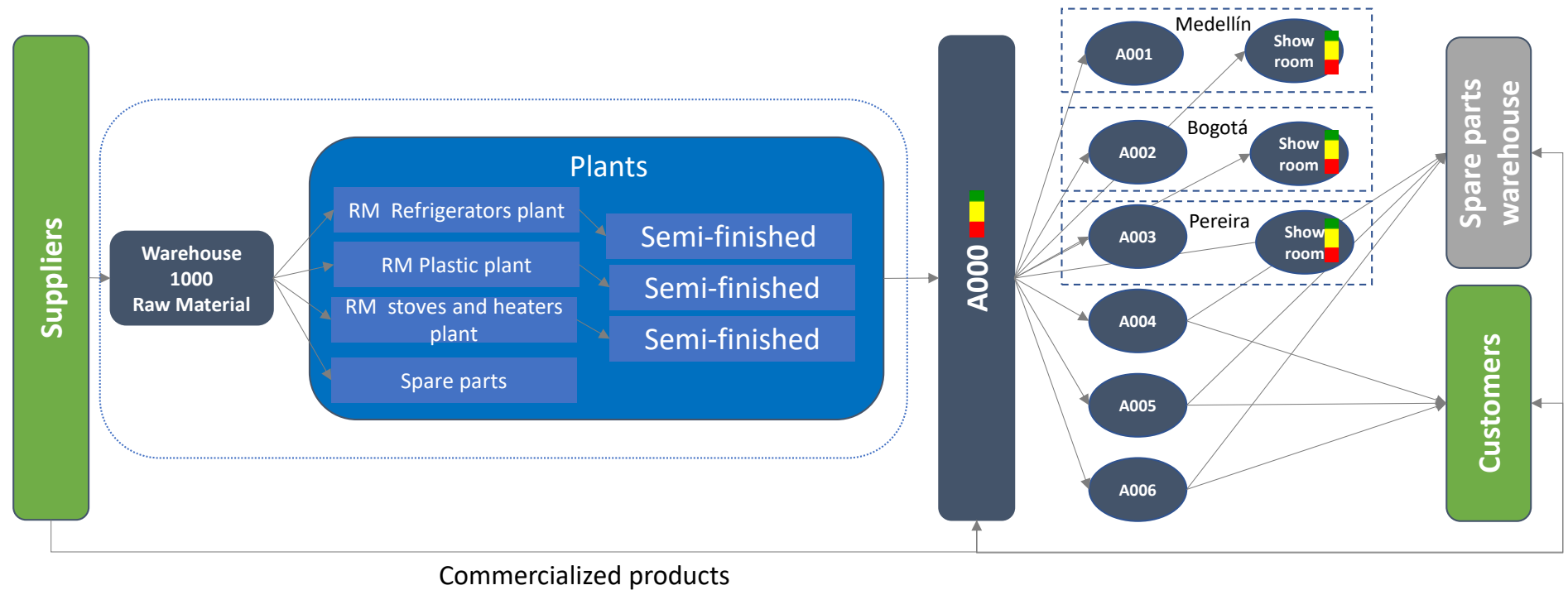
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# Supply chain flow - Appliances

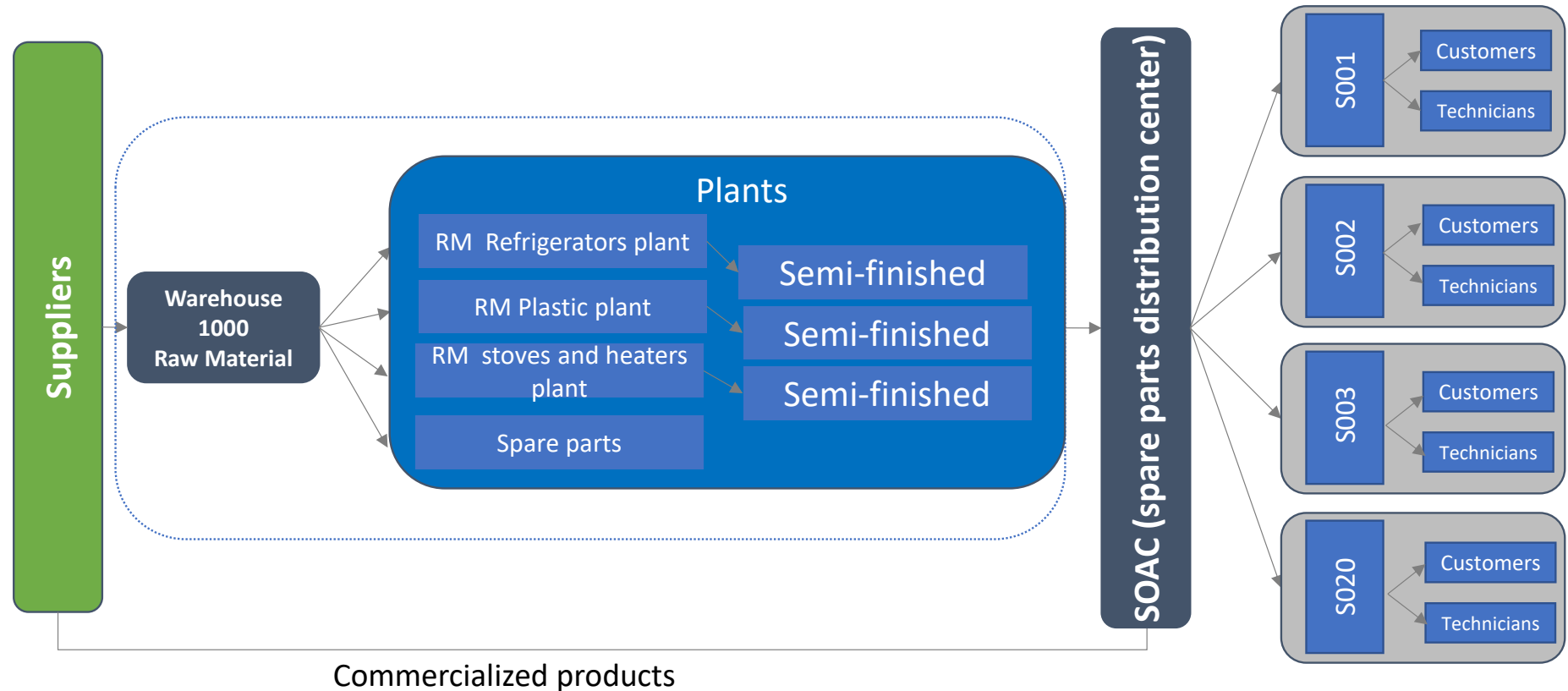
## Manufactured and commercialized



- One national distribution center
- Seven regional distribution centers in Colombia and three specialized sale rooms
- 411 manufactured and 96 commercialized parts

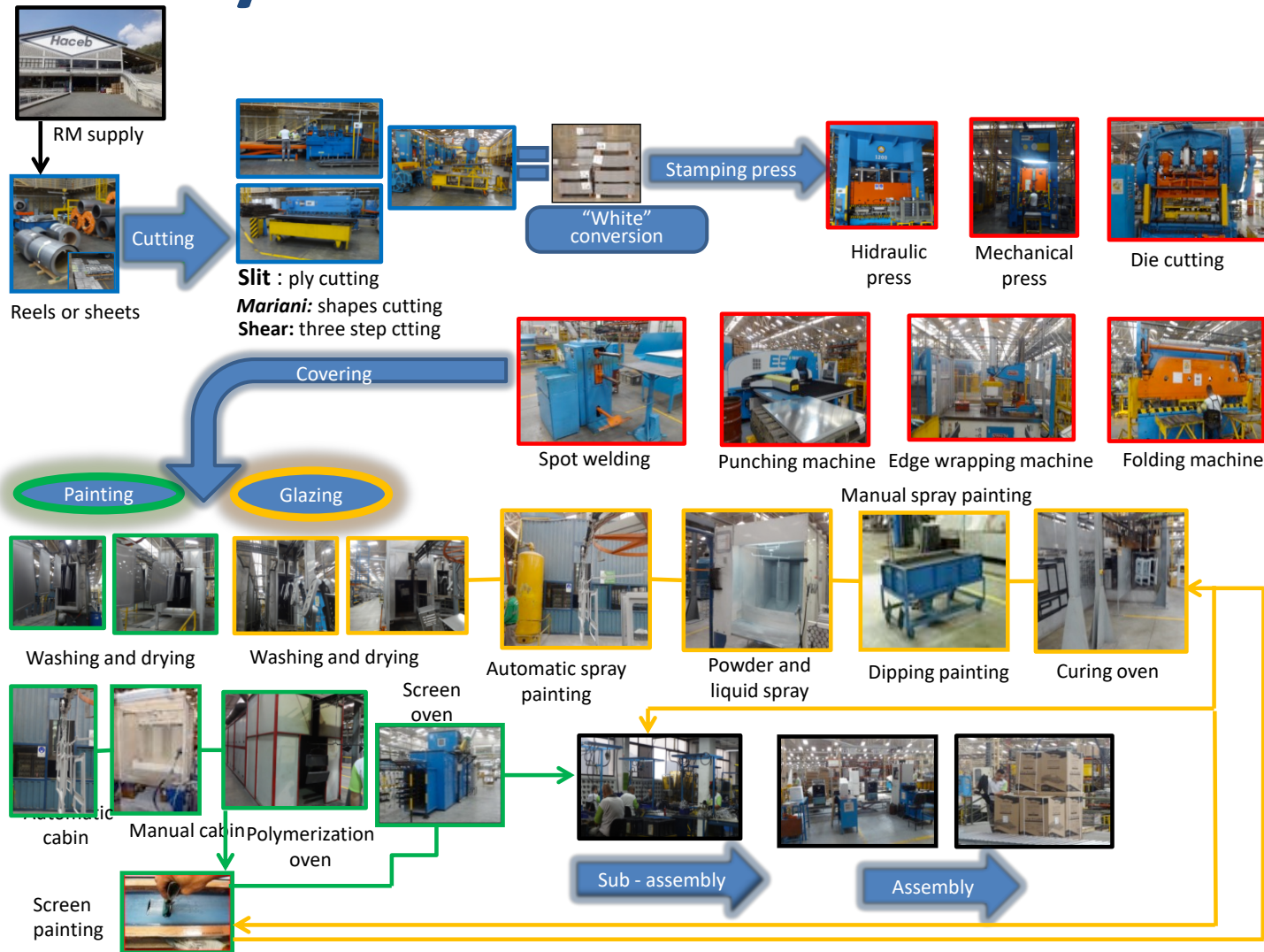
# Supply chain flow- Spare parts

Manufactured and commercialized



- One national distribution center (SOAC)
- Twenty regional distribution centers
- More than 10.000 SKU's
- Service promise: 24 hours delivery after customer request

# Production system



- Stoves and heaters plant: 8 production lines, 3.500 units/day
- Refrigerators plant: 6 product families, 1.300 units/day
- Washing machines plants: 2 product families: Agipeller (spindle) 400 units/day; Impeller (rotating hub) 400 units/day



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# 2014: Improvement base line



## Planning

- Planning was not a important function.
- Priorities: equipment efficiency and costs.
- Inventory excess in order to protect service level.



## Procurement / Inventories

- Suppliers low level service
- High stock - out of finished goods.
- High inventory's level.
- Obsolescence.



## Information for making decisions

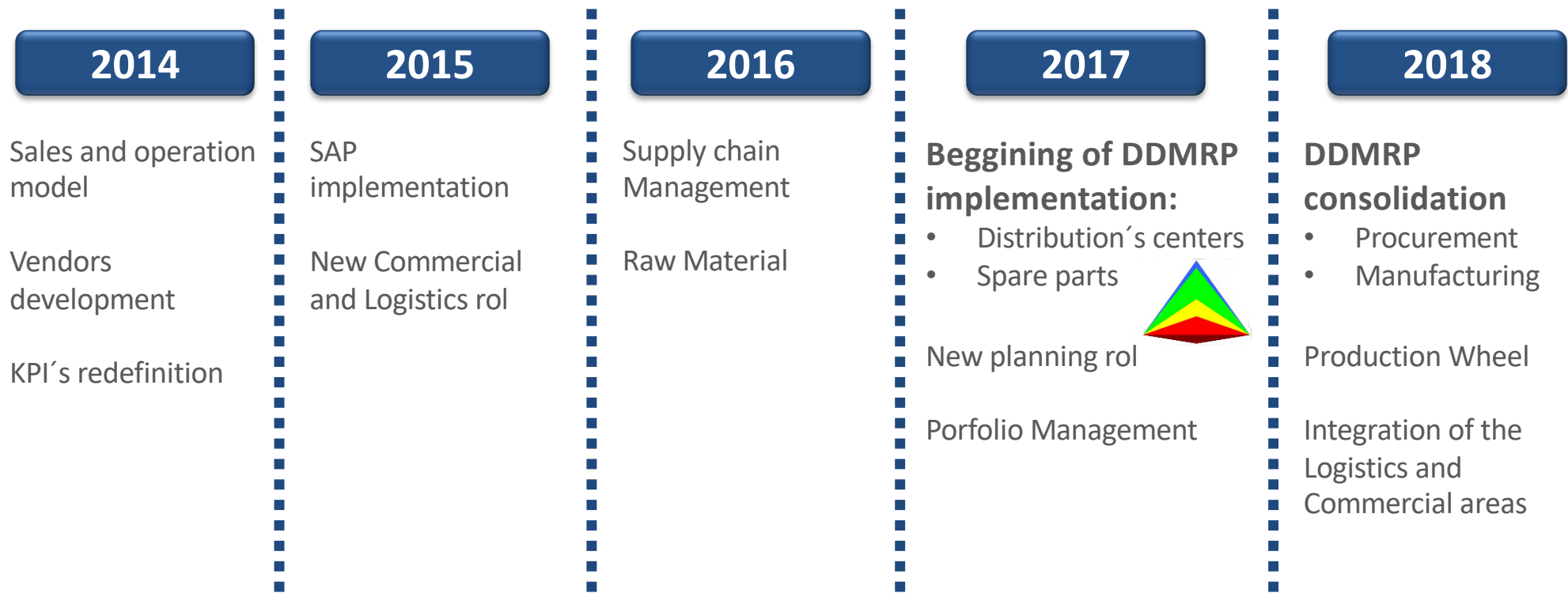
- Lack of key performance indicators for business tracking (just local indicators).
- Planning used to be the only responsible for the forecast.
- Sales were the paramount indicator.

## Results

- High inventories
- Working Capital excess
- Very large Business Operating Cycle
- Bad service level
- High lost sales
- Rising logistics expenses
- Obsolescence



# Supply's model evolution

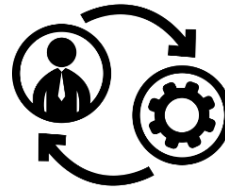


- Sales and operations planning's model, the ERP (SAP) and the design of the supply chain renew the supply model.
- Between 2014 and 2017 the results of the strategic and tactical changes in the supply model were consolidated.
- And there is still possibility to better off those results ... ¿how is it possible?

# Indicators' Snapshot before DMRP



Service level  
Finished goods: 93%  
Spare parts: 82%



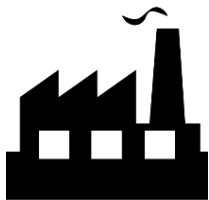
Business Operating  
Cycle: 79 days



Lost Sales:  
3.5%



Warehouse surface:  
28.180 m<sup>2</sup>



Stock outs – finished  
product:  
11%



Sales / net working  
capital: 29%

The results reached between 2014 and 2017 evidenced very good performance, however it was required to improve the system in order to get a world class management:

**DDMRP**

# Planning before DDMRP

Sales forecast at the SKU level (local, exports, services and partnerships)

Demand planning

Production planning

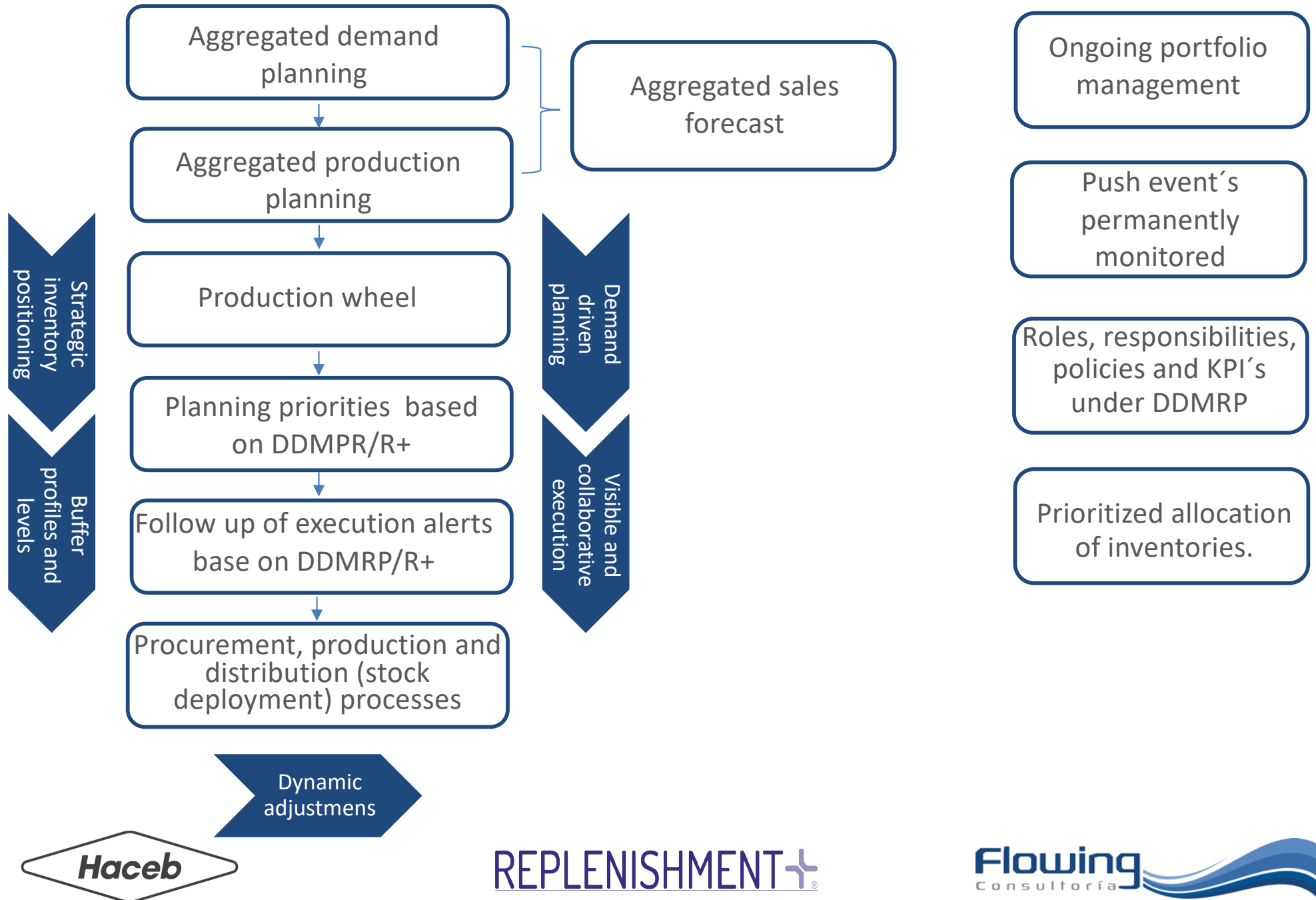
MPS and MRP processes

Execution process: sourcing,  
production, distribution

## Indicators measurement

- Forecast accuracy:
  - Make product: 40%
  - Commercialized product: 30%
- Service level: 88%
- Inventory level: US\$57.000.000
- Business operating cycle: 124 days
- Planning versus production execution: 85%

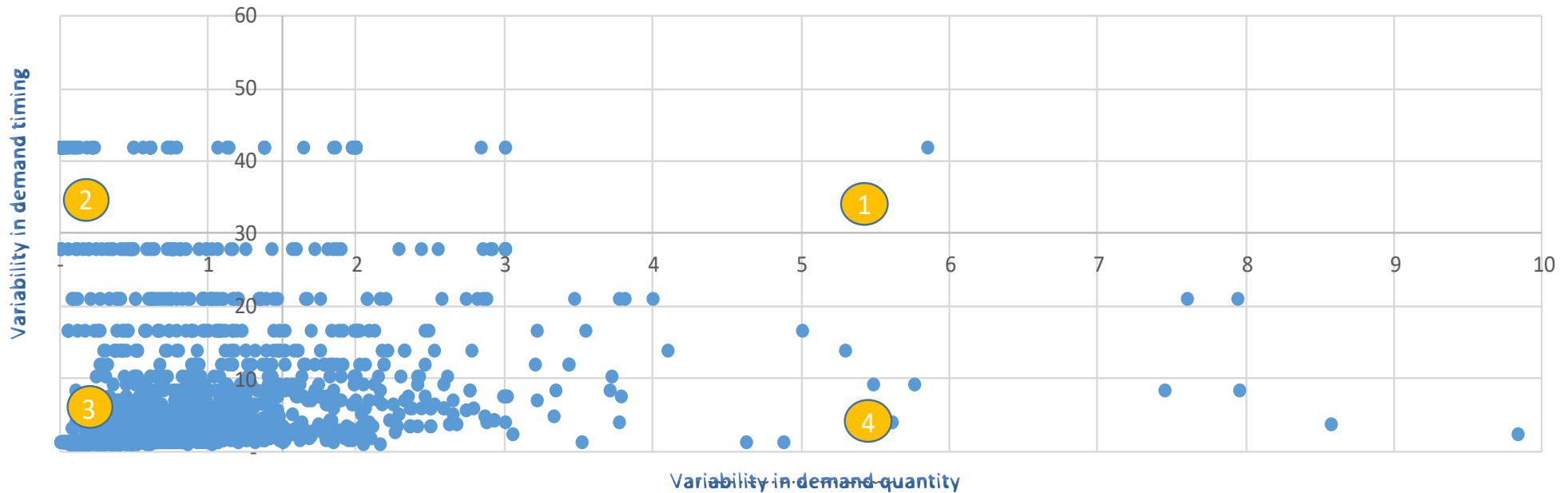
# DDMRP model





# Portfolio management

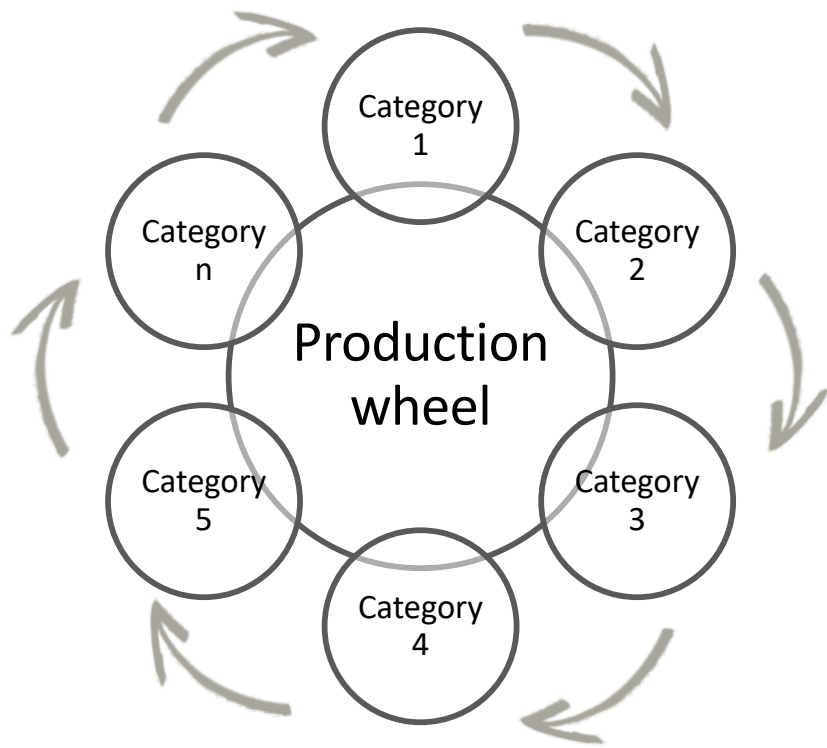
## Demand segmentation



- The DDMRP implementation started with the design of a portfolio management process.
- One of the several tools that were used in this process is the segmentation of products according to their variability in quantity and frequency of sale (four categories).
- Around 57 SKU's (produced and commercialized) withdrawn from the portfolio.
- Each of these categories requires a specific DDMRP buffer design.

# Production wheel

															Days																
Part code	Description	Schedule	To go	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	23	24	25	26	27	28	29	30	31			
9001440	N 222 SE 2P DA TI	3766	0	139	139	139	139	139	94	139	68	77	139	139	139				299	344	277	277	277	277	277	248					
9001447	NEV ASF 222L SE 2P DA TI EX	116	0								71								45												
9001448	NEV ASF 222L SE 2P DA BL EX	62	0									62																			
9001442	N 252 SE 2P DA TI	1580	165													262	129	328							22	415	424				
9001450	NEV ASF 252L SE 2P DA BL EX	16	0															16													
9001449	NEV ASF 252L SE 2P DA TI EX	215	0														215														
9000292	WRW25BKTWW	1350	0			138	138	138	93	138	138	138	138	138	138	15															
9000285	WRL22BKTWW	26	0		26																										
9000291	WRM22BKTWW	250	-203	138	112																										



- Regular production sequence that minimizes change over time and maximizes productivity.
- Adjusting the DDMRP planning to the production wheel
- 8% increase in the productivity of the plant with zero investment.

# Forecasted daily usage

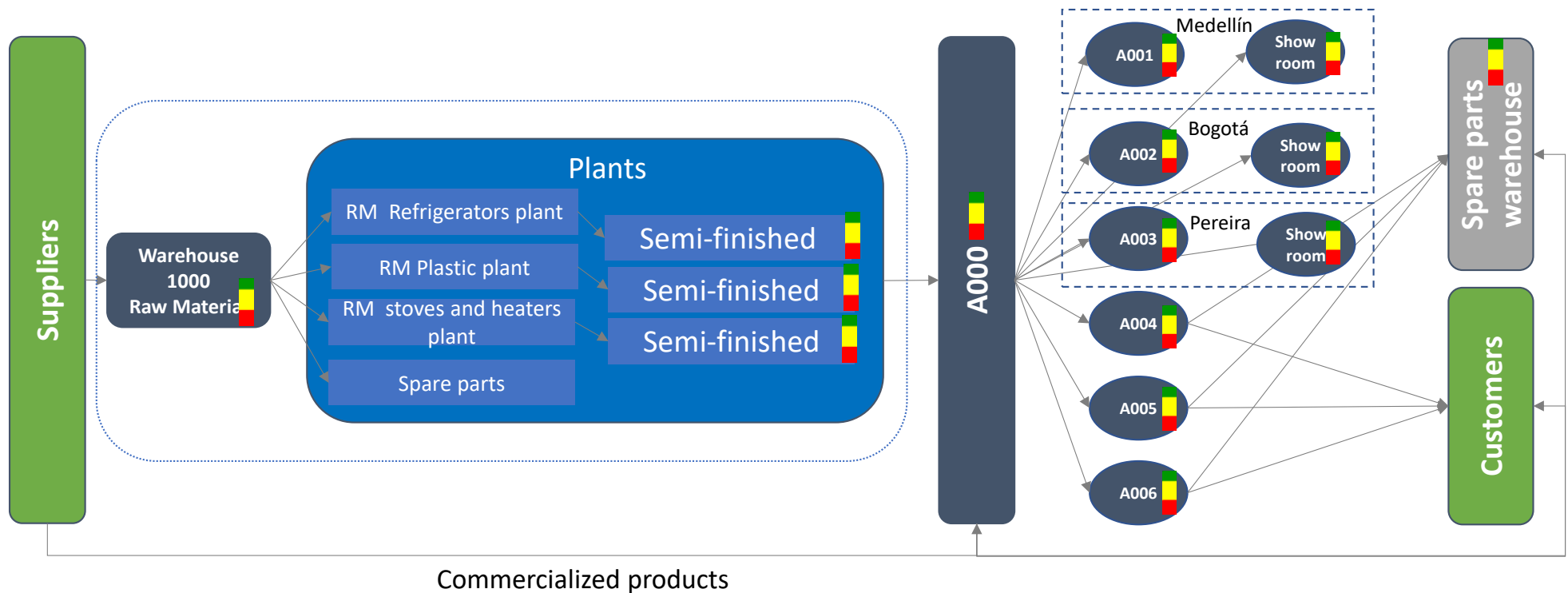
Part Properties		1004342	Inventory Management	
Rev			Buffer Profile	B21C
Location		COPA1000_Copacabana_Almacen Gene	RPlus Lead Time	11
Description		SERPENTIN NEV 611AS LOKR	Fixed Lead Time	11
Unit of Measure		UN	Average Daily Use	579.53
Material Type		ROH_Materias Primas	Forecasted Daily Usage	602.13
OutSourceCost		0.00	Effective Daily Usage	590.83
RawMaterialsCost		4,238.00	OrderCycle	1
Planner		A04_EDISON LUNA	Alert Horizon	2
Part Type		Buy	Minimum Order	10.00
Vendor		INDUSTRIAS FAACA COLOMBIA S.A.S	Maximum Order	0.00
Vendor ID		0860404848	Order Multiple	10.00

Inclusion of future daily usage in order to properly deal with seasonalities and promotional demands (push events)



# Haceb's current DDMRP model - Appliances

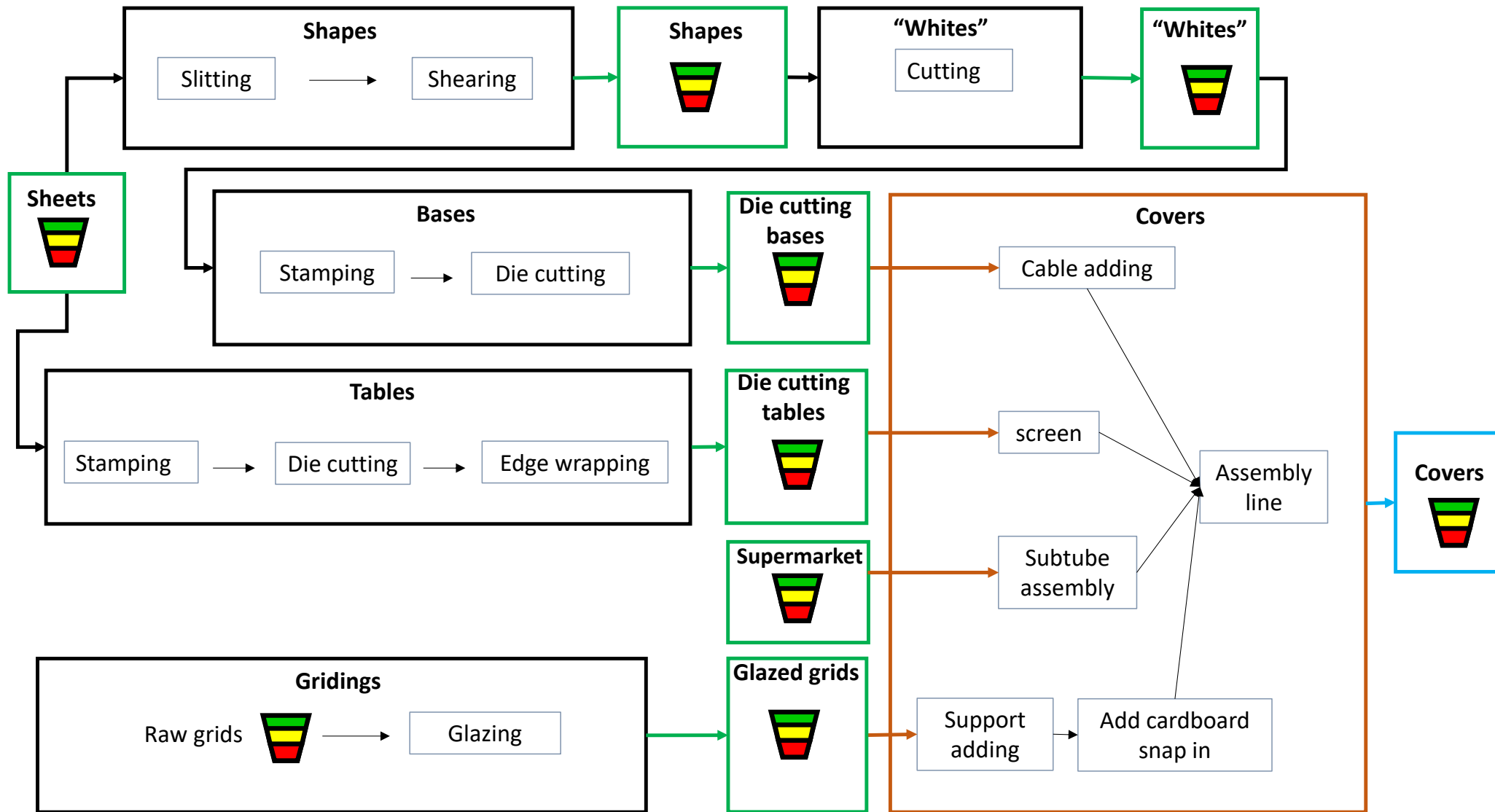
Manufactured and commercialized



Buffer's positioning: raw materials, semi finished products, finished products and regional distribution centers



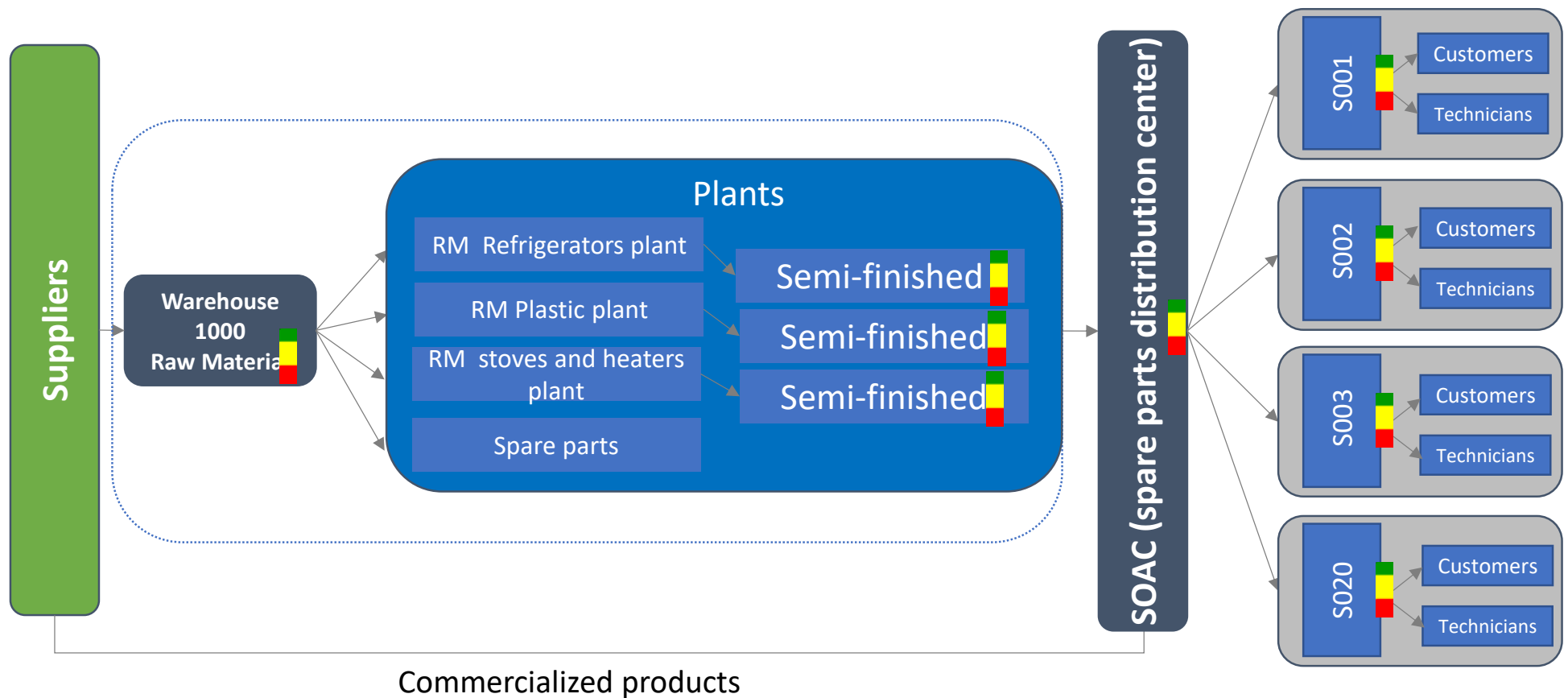
# Semi finished DMRP model



Strategic buffers positioning in both semi finished stoves and heaters plants

# Haceb's current DDMRP model – Spare parts

Manufactured and commercialized



Buffers in raw material, semi finished products and distribution center of spare parts as to attend all regional warehouses

# Current DDMRP roles

## Planning roles

- Review and daily generation of suggested orders in R+.
- Ongoing follow up of DDMRP buffers performance and settings review:
  - Buffers profiles
  - Variability category
  - Lead times factors
  - MOQ's
  - Order frequency
- Identification of push events and modeling them in R+.

## Execution roles

- Daily review of execution alerts:
  - Current inventory
  - Material synchronization
  - Projected stock out
  - Lead time managed parts
- Updating alerts notes and confirming promised supply order dates in R+.
- Contacting vendors in order to expedite orders/make partial delivery agreements.

Software tool

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# Buffer management

Critical0

High0

High (NB)0

Medium0

Low131

OToG280

Custom1,909

Priority

+ Priority

Planner

+ Planner

Location

+ Location

Alert Severity

+ Alert Severity

Alert Type

+ Alert Type

Material Type

+ Material Type

Part Type

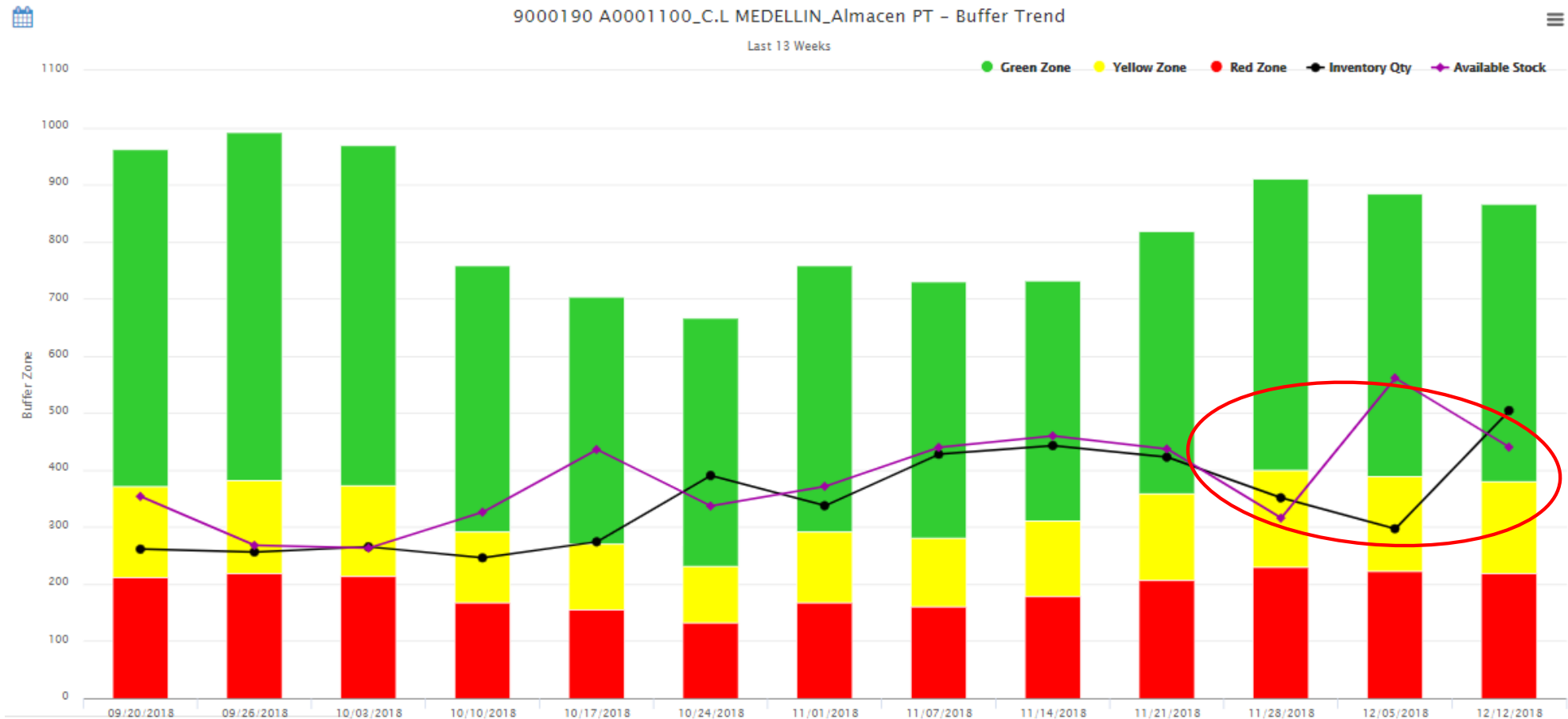
+ Part Type

12345678910...40items per page1 - 40 of 4

Part N...	Descrip...	Locat...	Prio...	Alert Status	Alert Type	On Hand	Suppl...	Deman...	Available S...	% of Bu...	ToR	ToY
9000145	NEV ARF 248...	A0011100_...	Low			3.00	0.00	0.00	3.00	100.00 %	1.00	2.00
9001624	N HIMALAYA ...	A0011100_...	Low			14.00	8.44	10.00	12.44	100.00 %	7.03	10.64
9001622	N HIMALAYA ...	A0011100_...	Low	STOCK OUT	Current Inve...	17.00	61.00	41.00	37.00	87.94 %	23.78	35.98
9001445	N 300 SE 2P ...	A0011100_...	Low			3.00	0.00	0.00	3.00	100.00 %	1.00	2.00
9001443	N 272 SE 2P ...	A0011100_...	Low			4.00	0.00	1.00	3.00	100.00 %	1.00	2.00
9001618	N 240L SE 2...	A0011100_...	Low	STOCK OUT	Current Inve...	12.00	35.11	28.00	19.11	100.00 %	10.80	16.34
9001440	N 222 SE 2P ...	A0011100_...	Low			19.00	12.01	18.00	13.01	100.00 %	7.35	11.12
9001617	N 220L SE 2...	A0011100_...	Low	12/24/2018	Projected St...	20.00	15.00	11.00	24.00	86.96 %	15.60	23.60
9001075	MESON AR 1...	A0011100_...	Low			1.00	0.00	0.00	1.00	100.00 %	0.00	0.00
9001761	LAV M1305 OX	A0011100_...	Low			21.00	9.00	15.00	15.00	89.61 %	9.46	14.31
9001178	LAV M1305 BL	A0011100_...	Low			3.00	2.00	2.00	3.00	100.00 %	1.00	2.00
9001524	LAV D1800 PL	A0011100_...	Low	STOCK OUT	Current Inve...	0.00	3.00	0.00	3.00	100.00 %	1.00	2.00
9001759	LAV D1400 OX	A0011100_...	Low			13.00	4.35	9.00	8.35	100.00 %	4.86	7.35
9001758	LAV D1300 OX	A0011100_...	Low			12.00	19.21	13.00	18.21	100.00 %	10.29	15.57
9001641	LAV D0850 PL	A0011100_...	Low			10.00	15.40	9.00	16.40	100.00 %	9.27	14.02
9001884	HX MASALA ...	A0011100_...	Low	STOCK OUT	Current Inve...	0.00	3.00	0.00	3.00	97.15 %	1.09	2.09
9001885	HX MASALA ...	A0011100_...	Low	STOCK OUT	Current Inve...	0.00	3.00	0.00	3.00	100.00 %	1.00	2.00
9001850	HX CASIA 60...	A0011100_...	Low			3.00	0.00	0.00	3.00	100.00 %	1.00	2.00
9001260	HORNO AR ...	A0011100_...	Low	STOCK OUT	Current Inve...	5.00	3.00	5.00	3.00	100.00 %	1.00	2.00
9002019	ESTUFA SP-...	A0011100_...	Low	STOCK OUT	Current Inve...	2.00	28.61	20.00	10.61	100.00 %	6.04	9.61
9001707	ESTUFA SP-...	A0011100_...	Low			4.00	3.16	2.00	5.16	100.00 %	2.75	4.16
9001746	ESTUFA ARC...	A0011100_...	Low			3.00	0.00	0.00	3.00	100.00 %	1.00	2.00
9001578	ESTUFA 76-V...	A0011100_...	Low			3.00	0.00	0.00	3.00	100.00 %	1.00	2.00
9001576	ESTUFA 76-V...	A0011100_...	Low			5.00	0.00	2.00	3.00	100.00 %	1.00	2.00
9001904	EST ROMER...	A0011100_...	Low			3.00	1.02	1.00	3.02	100.00 %	1.02	2.02

- Daily orders approval suggested by R+.
- Immediate actions based of the R+ alerts and follow up notes
- Continuous review of buffer's percentage level.

# Buffer behavior

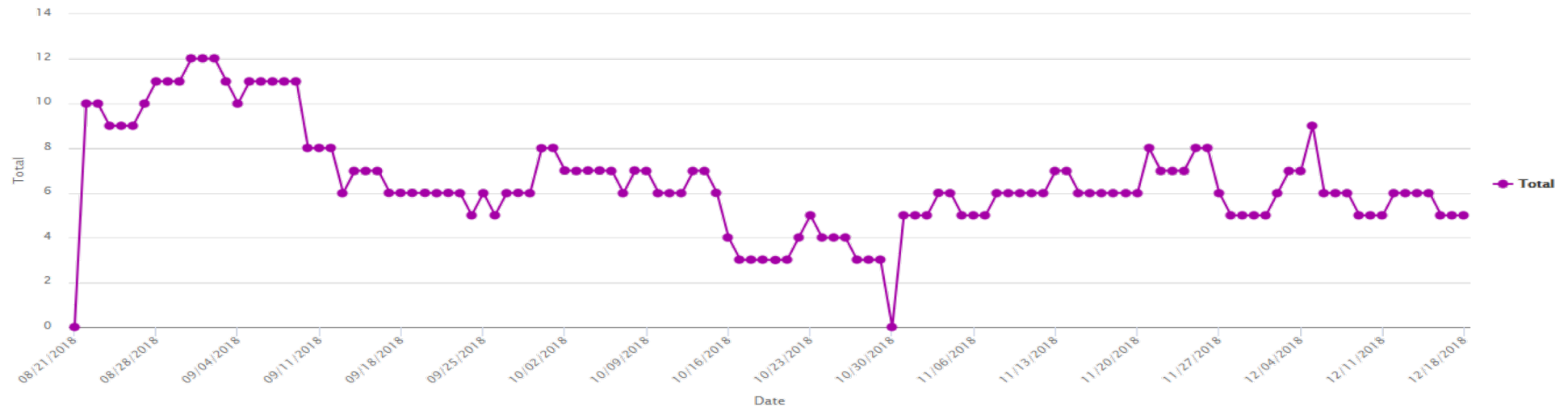


- Available and on hand inventories in the ranges estimated by DDMRP.
- Buffer sizes decreasing without compromising service levels.
- Dynamic adjustments, both recalculated and planned, based on demand variability and push events.

# Buffer management results

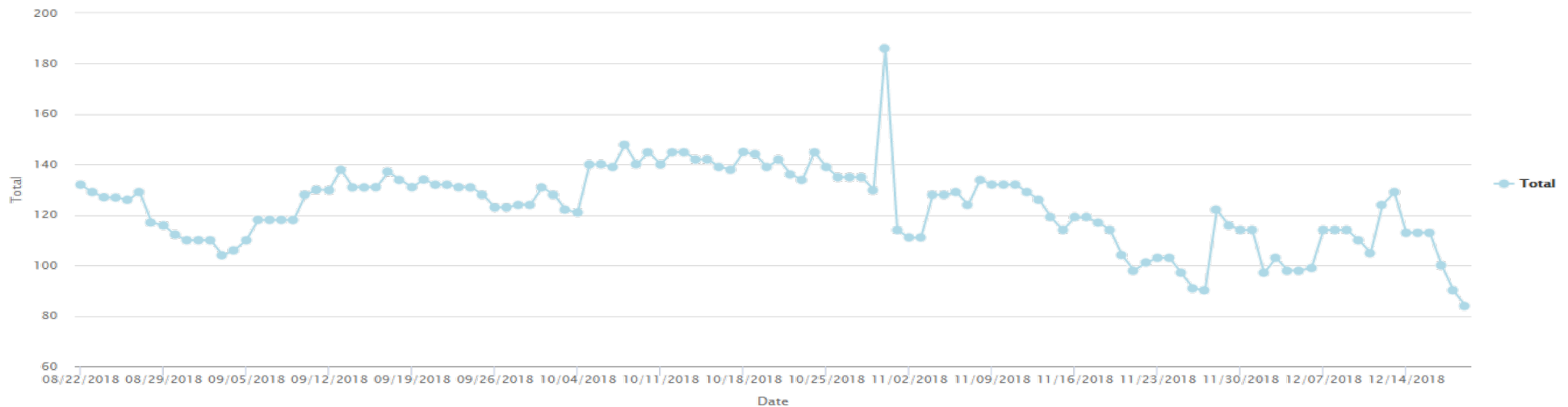
Stock Out with Demand

Source: Replenishment +



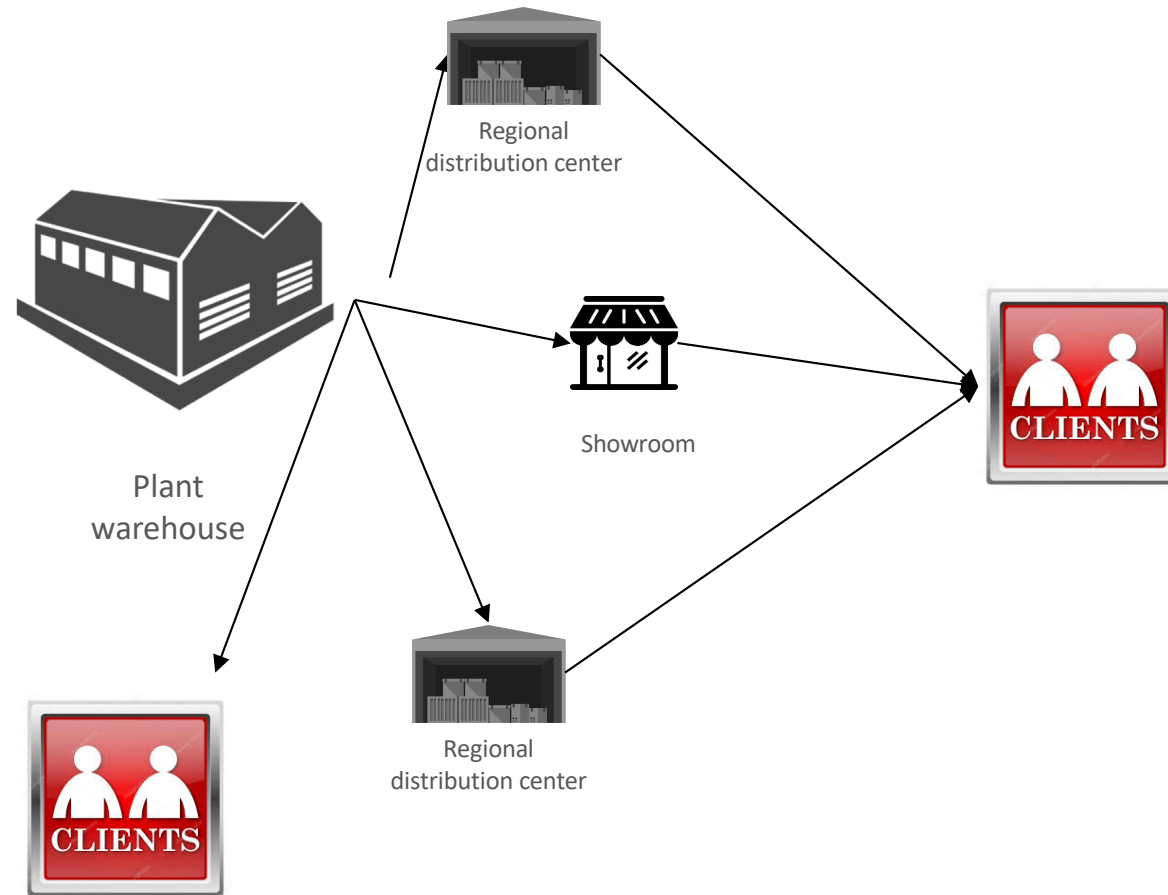
Sum of OTOG

Source: Replenishment +



- Steady reduction of the finished product in excess.
- Decreasing trend for finished products stock out with demand.

# Prioritized shared in distribution



- Hub and spoke deployment mode: one main distribution center and 7 regional centers.
- Minimum holdback percentage in the distribution center: 50%
- Demand window (days): 7.

# Stock deployment module

1

2

3

4

5

6

7

20

items per page

61 - 80 of 129 items

Part Number	Location	Rev	Description	Deployme...	Avail...	Total ...	After	After % ...	Shortfall
9001232	A0001100_C....		CAMPANA AS CER 60 SLM-3...	Hub	108.26	0.00	465.00	36.67 %	
9001445	A0001100_C....		N 300 SE 2P DA TI	Hub	114.91	0.00	155.00	98.18 %	
9001534	A0001100_C....		ESTUFA 50-V GAS EE GRT/L...	Hub	116.20	0.00	167.00	170.73 %	
9001482	A0001100_C....		AA FS09 INV 220 BL	Hub	121.73	0.00	170.00	42.11 %	
9000833	A0001100_C....		CUB ASL CG 66 INOX ML GN	Hub	122.11	0.00	204.00	96.94 %	
9001759	A0001100_C....		LAV D1400 OX	Hub	125.99	0.00	1,299.00	60.15 %	0.00
9001885	A0001100_C....		HX MASALA 60 INX-NE GN	Hub	128.73	0.00	244.00	91.04 %	

Summary

Detail

		On Hand			Qualified Demand			Holdback			Available To-Deploy
		270.00	-		37.00	-		104.27	=		128.73

Location	Before	Before % of G...	Total Deployed	After	After % of Green	
A0011100_C.L PEREIR...	3.00	100.00 %	0.00	3.00	100.00 %	<div><div></div></div>
A0121100_C.L CALI - Y...	17.94	100.00 %	0.00	17.94	100.00 %	<div><div></div></div>

- Regional buffers with available inventory in the green zone.
- Rightly distribution in order to meet both, the centralized and decentralized requirements (main and regional distribution centers).
- Regularly closing orders in the main and regional distribution centers.



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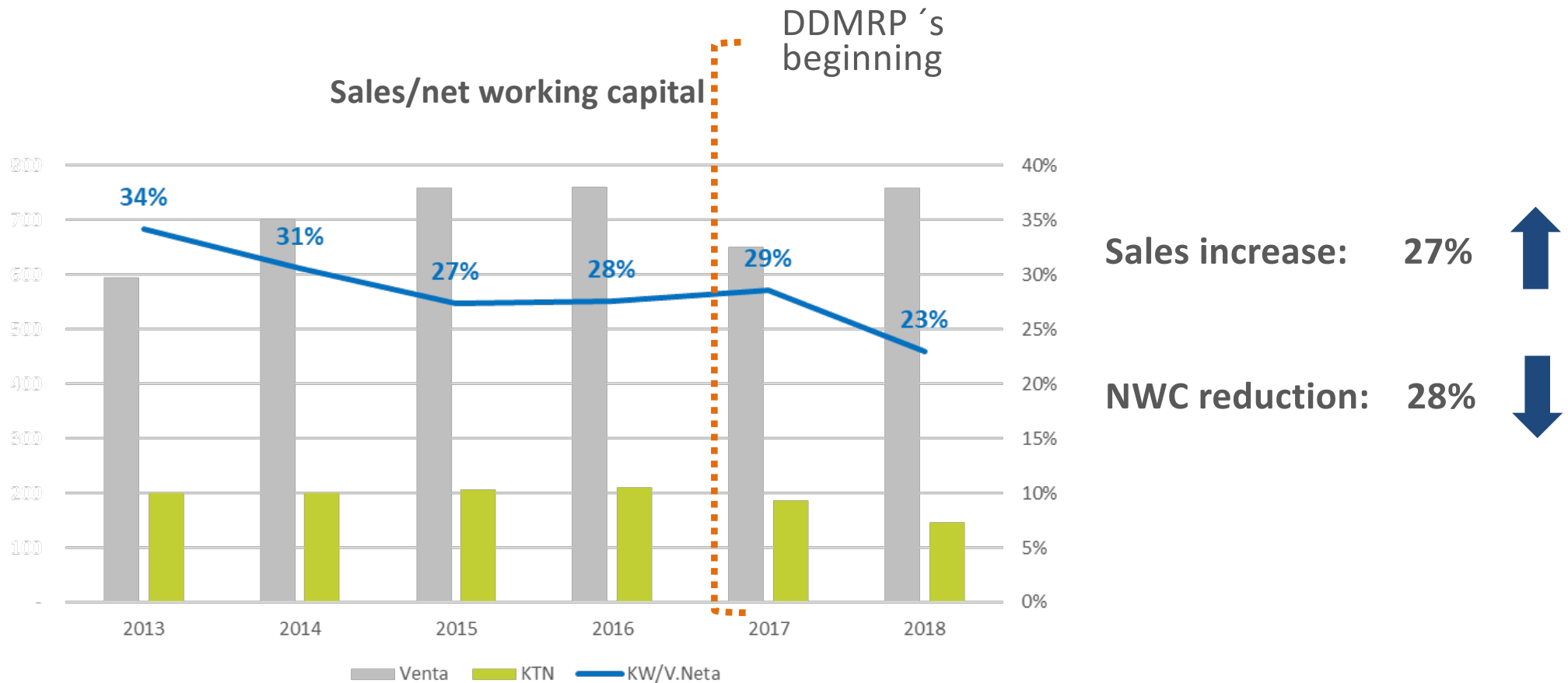


# Results





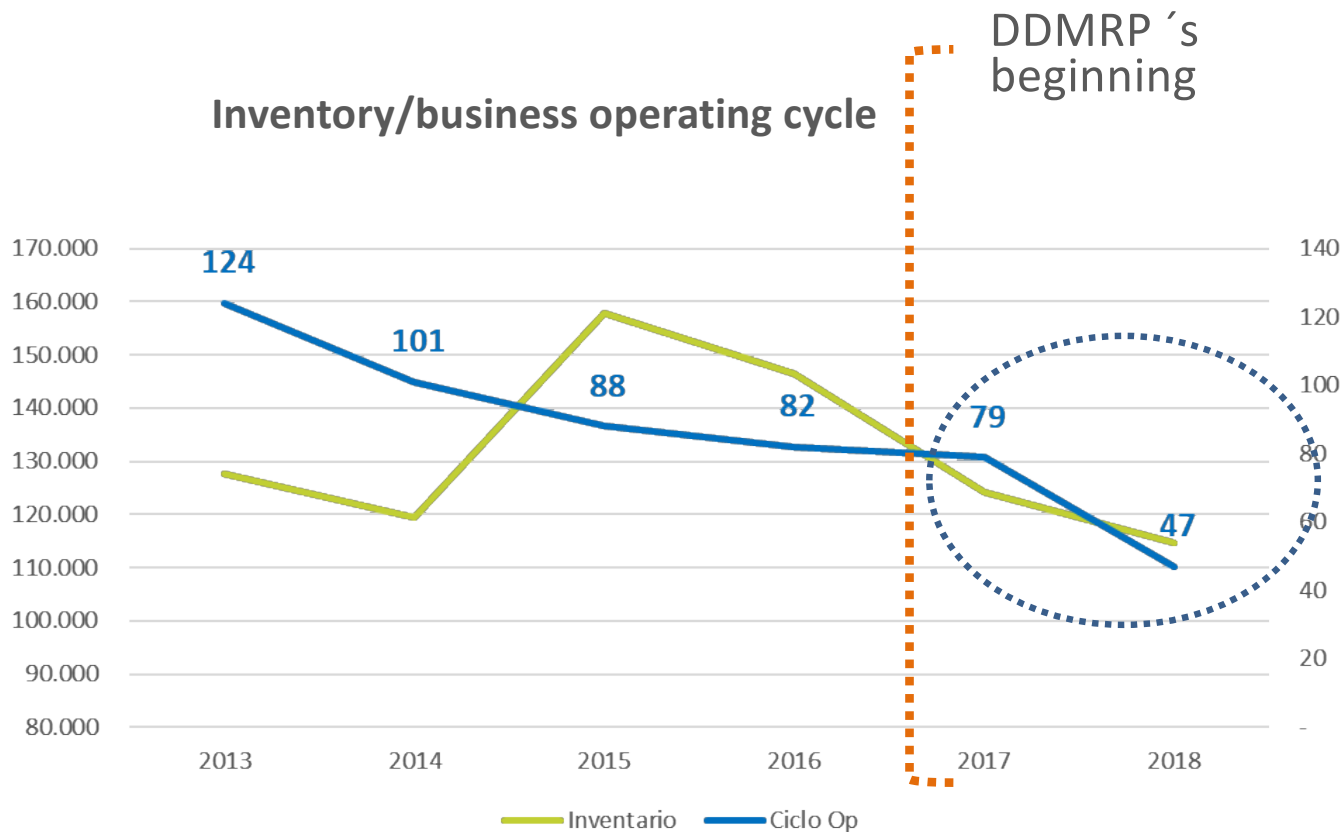
# Sales & Working Capital



Five points in less working capital for each dollar sold



# Inventory & Business Operating Cycle



Inventory reduction: 12%



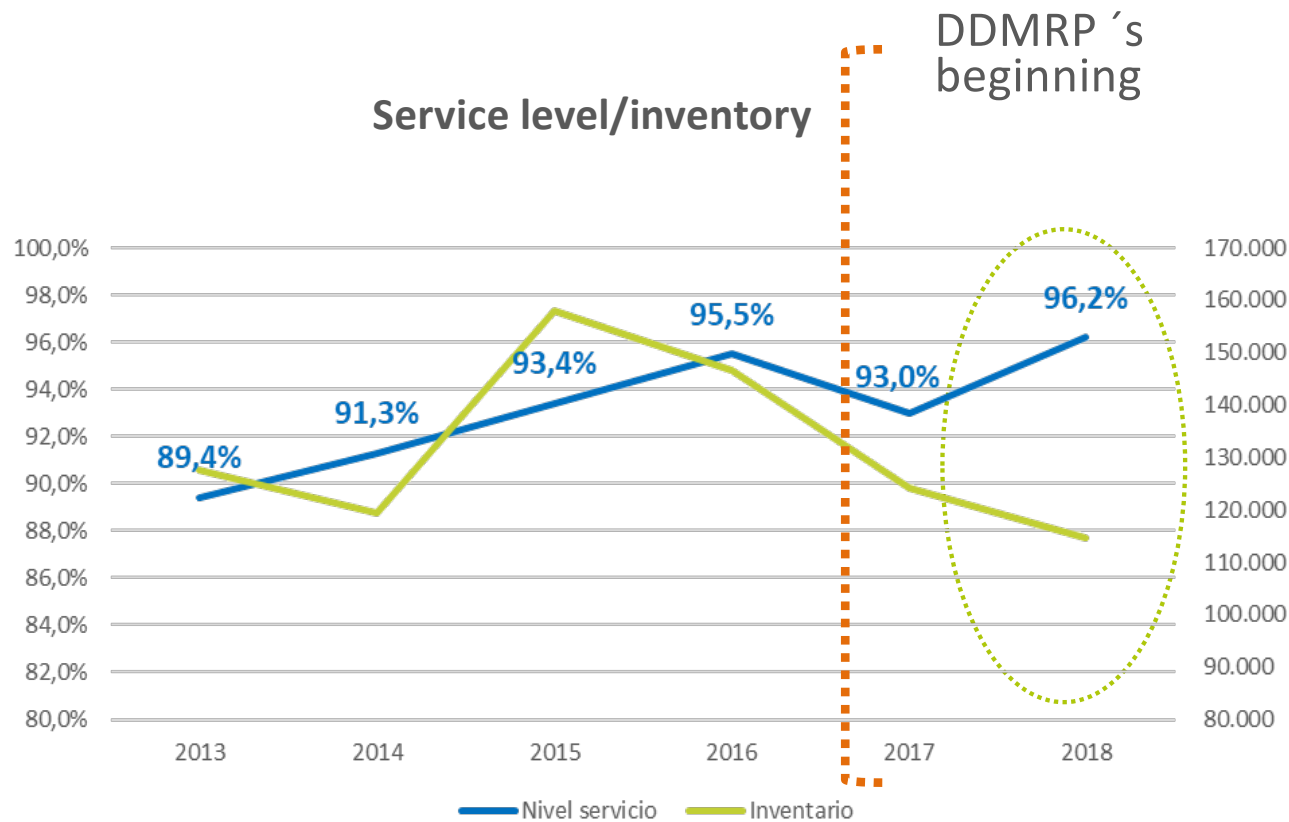
Business operating cycle reduction: 40%



**Significant positive impact on cash flow**



# Service Level & Inventory

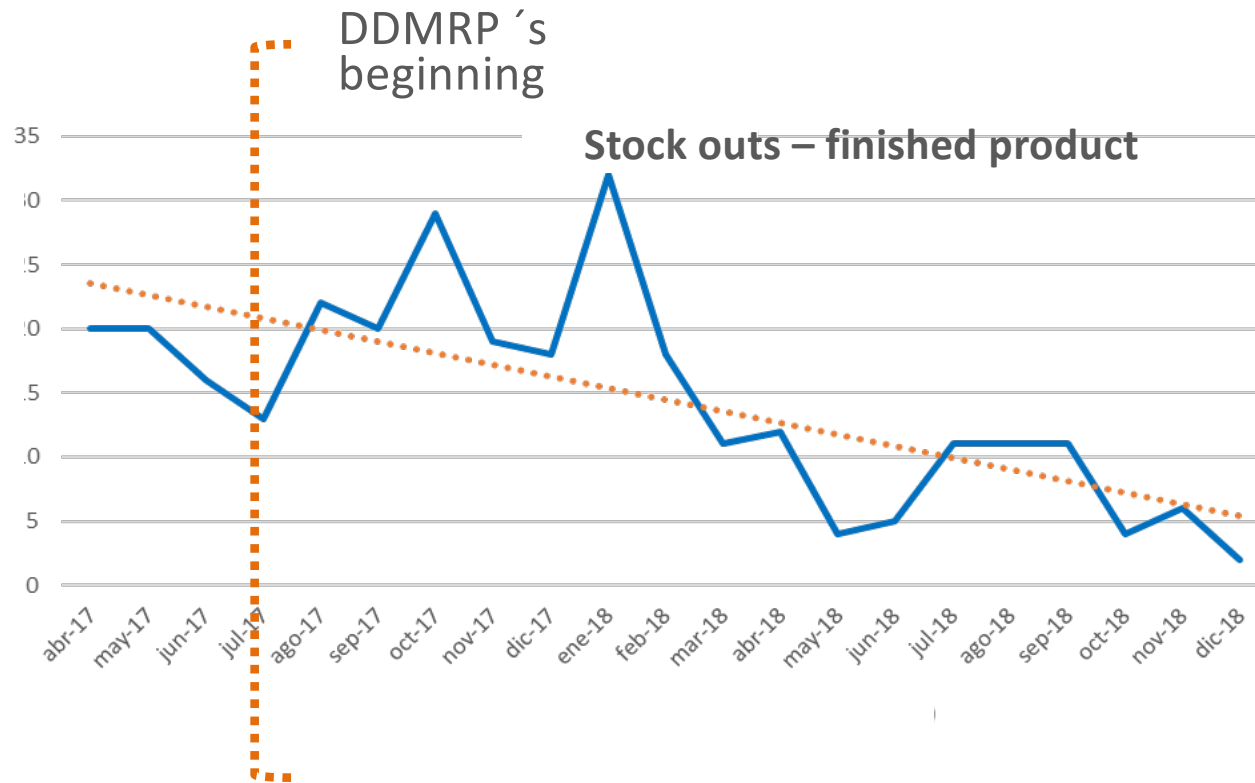


New service level: 96,2% ↑

Inventory reduction: 12% ↓

3.2 additional points in service level with half of inventory

# Stock Outs



Stock outs reduction: 80%



Inventory reduction: 12%



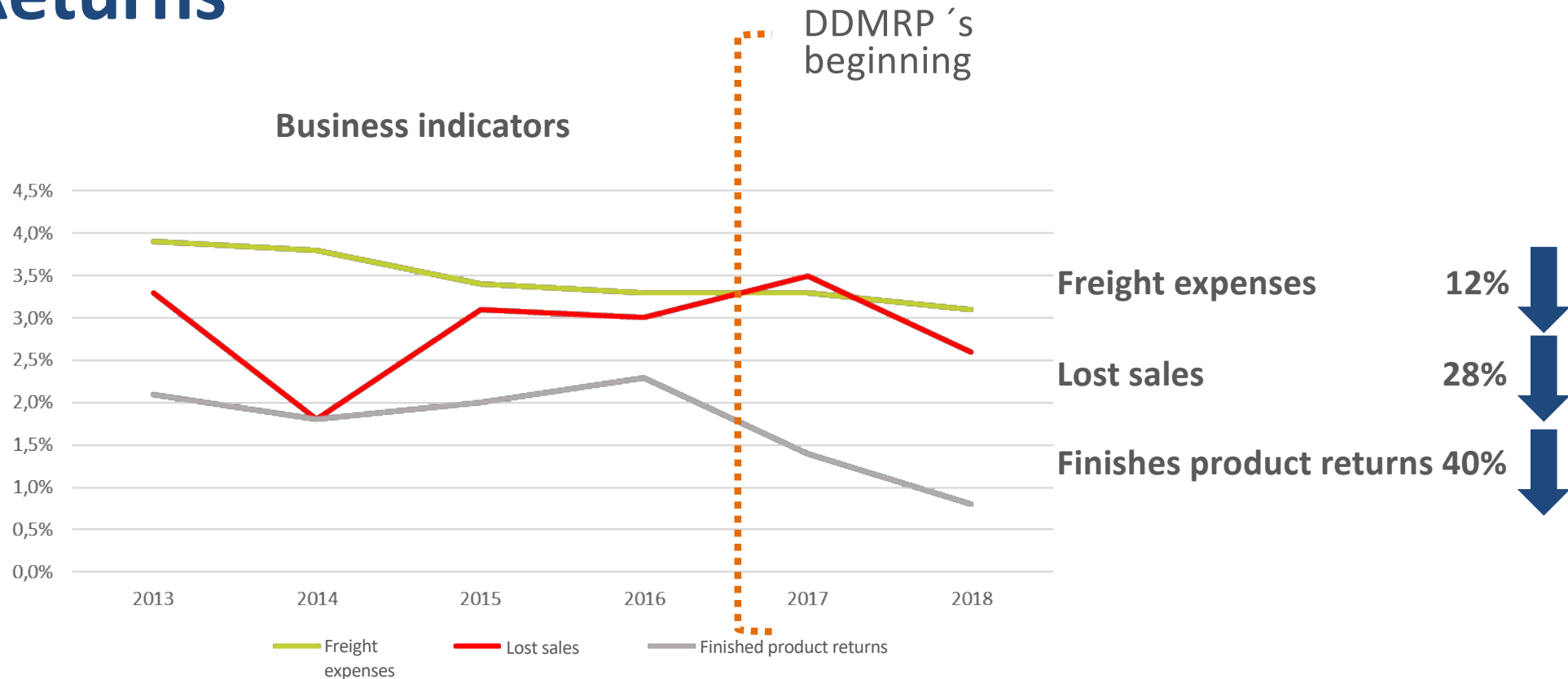
About 80% less stock out with 12% less of the inventory



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# Lost Sales – Expenses – Finishes Product Returns



**Bigger sales, better service level,  
less inventory, lower expenses**



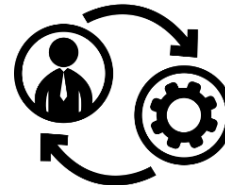
REPLENISHMENT<sup>+</sup>



# Indicators' Snapshot after DMRP



Service level  
Finished goods: 96,2%  
Spare parts: 97 %



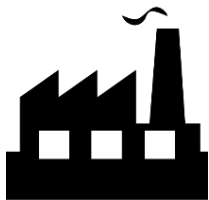
Business Operating  
Cycle: 47 days (12%  
less inventory)



Lost Sales:  
2.5%



Warehouse surface:  
12% lower



Stock outs – finished  
product:  
2.0%



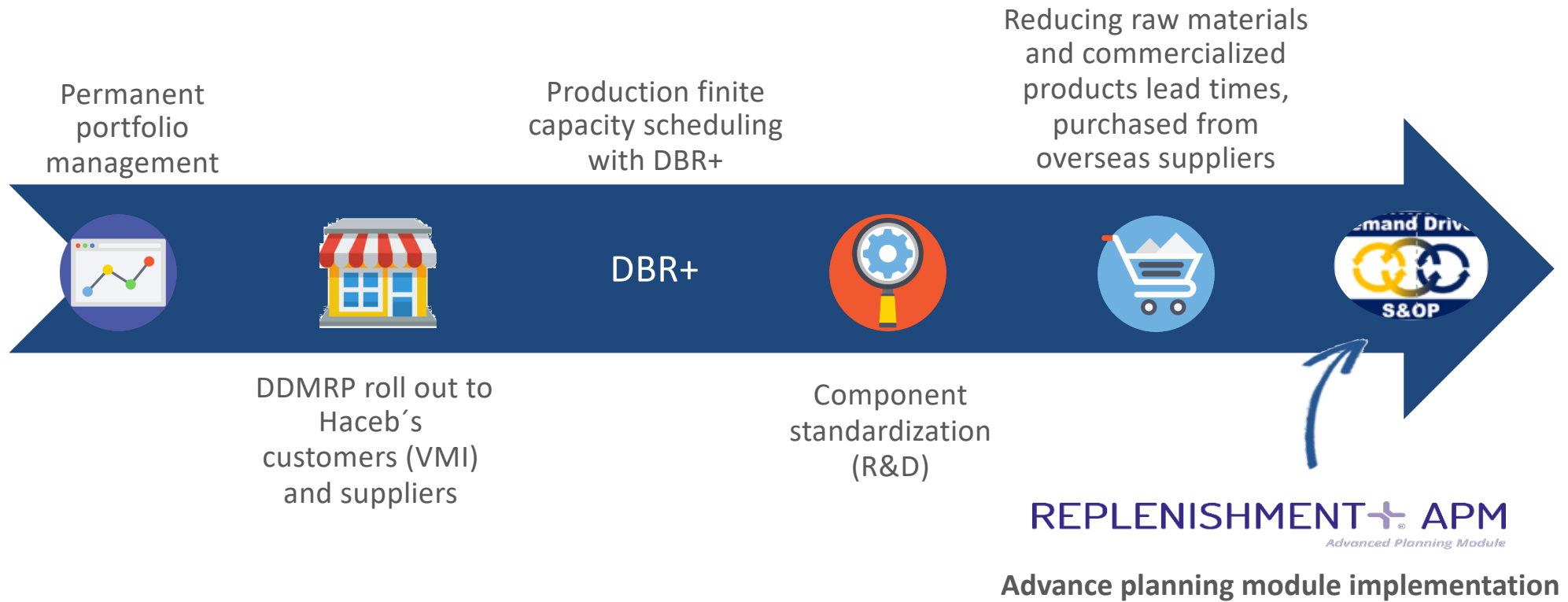
Sales/net working  
capital: 23%

**And also:**

**98% adherence to production plan**



# Future challenges: The road to the Demand Driven Adaptive Enterprise model (DDAE)



**“None decision should affect the service's level”**  
**Santiago Gómez, Logistic's Director**



# THANKS

