DemandDriven MRP implementation

ArcelorMittal Brazil Distribution Network

The Largest Steel Producer In The World

Leading the global steel Market

Crude steel production, 2019

AM	2°	3°	4°	5°	6°	7°	8°	9°	10°
96	67	49	47	43	41	37	29	28	27

A benchmark in the development of innovative, safer and more sustainable production processes.

190.000 employees

Present in **+ 60 COUNTRIES**

+ 1.300 R&D collaborators

Industrial presence in 19 countries:

38% Americas
47% Europe
15% Other countries

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PRODUCTS FOR CONSTRUCTION

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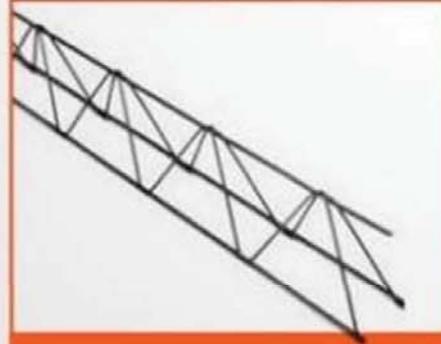Strands for prestressed concrete
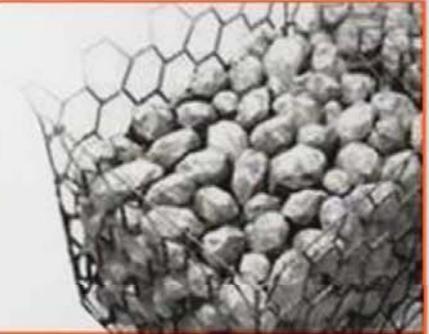
Annealed wire

Cut & bend structures

Rebars

Nails

Truss

Wire mesh

Gabions

PRODUCTS FOR INDUSTRY

Wire rod

Merchant bars

Drawn bars

Round, Square and Hexagonal Rolled Bars

Flat bars
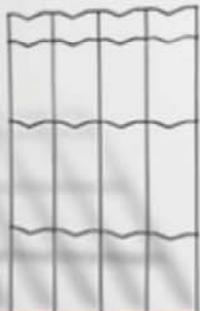
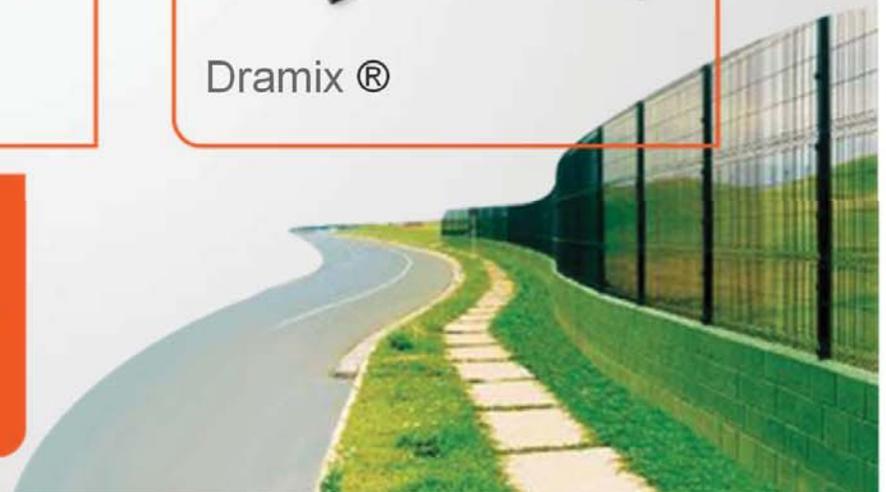ArcelorMittal

DRAWN PRODUCTS

Galvanized wire

Wire for agribusiness

Motto Mundial 500m
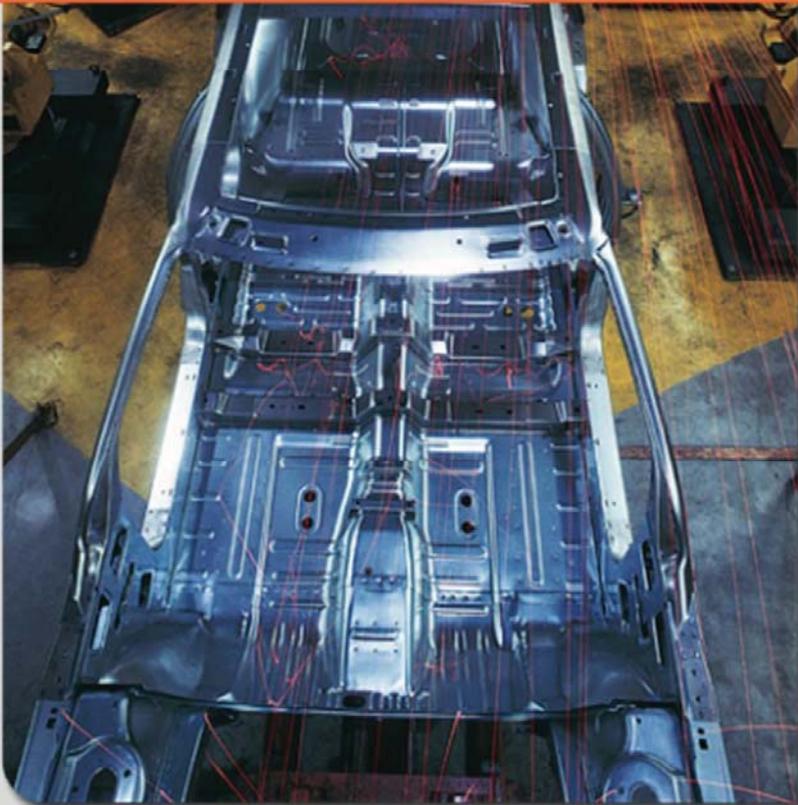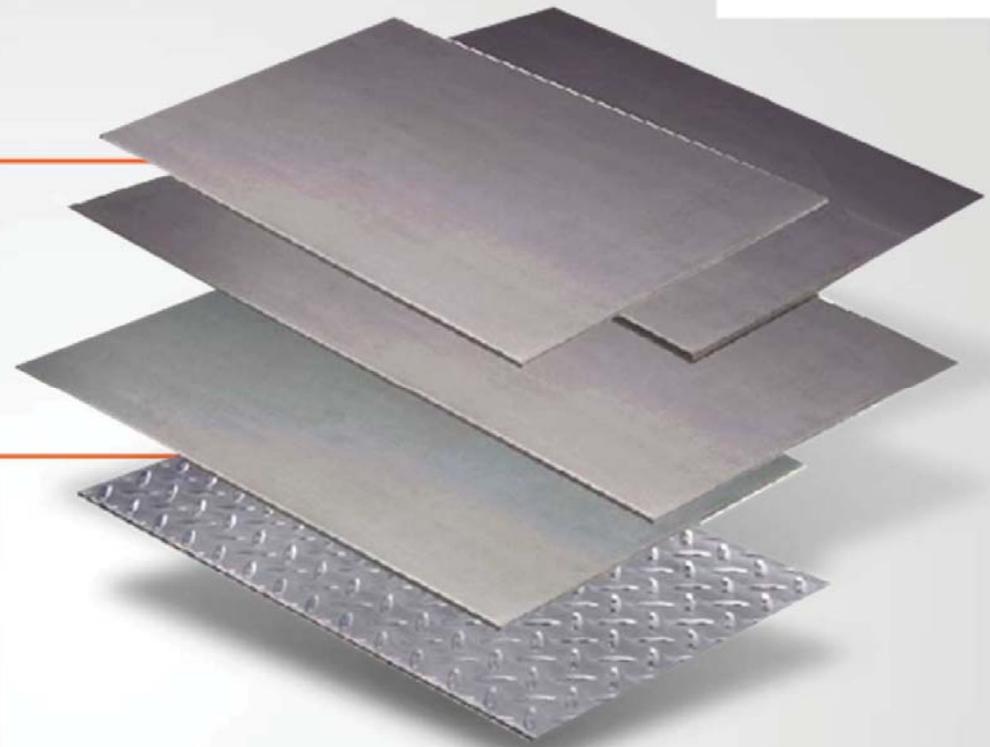
Welding wire

Dramix ®

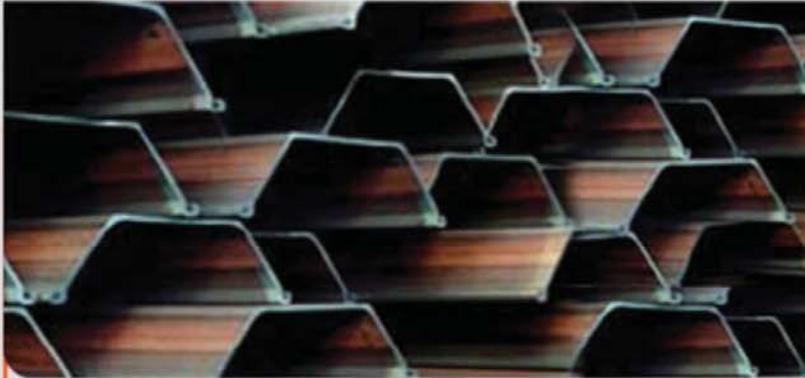Meshes

FLAT PRODUCTS

Heavy plates,
Cold & hot rolled sheets,
coated & uncoated

Tubes and profiles

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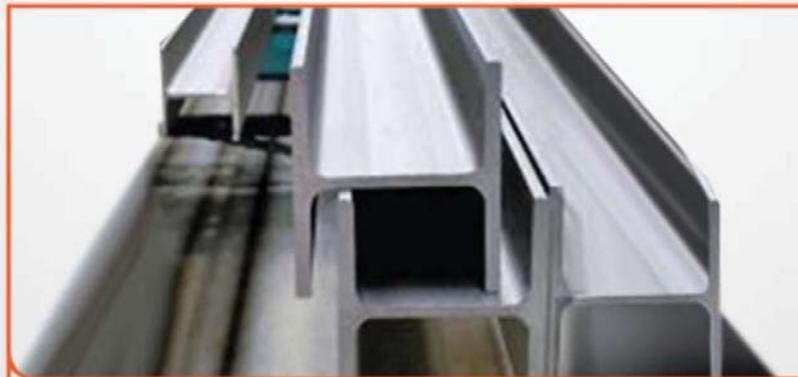# STRUCTURAL PRODUCTS

Sheet piles

Foundation pipes

Heavy sections

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**THE LARGEST STEEL COMPANY
IN BRAZIL AND LATIN AMERICA**

17 000
Employees

149
Sites & service centers

7Mt/year
Iron ore

12Mt/year
Crude steel

LONG STEEL

FLAT STEEL

RENEWABLE FORESTS

MINES

DISTRIBUTION NETWORK
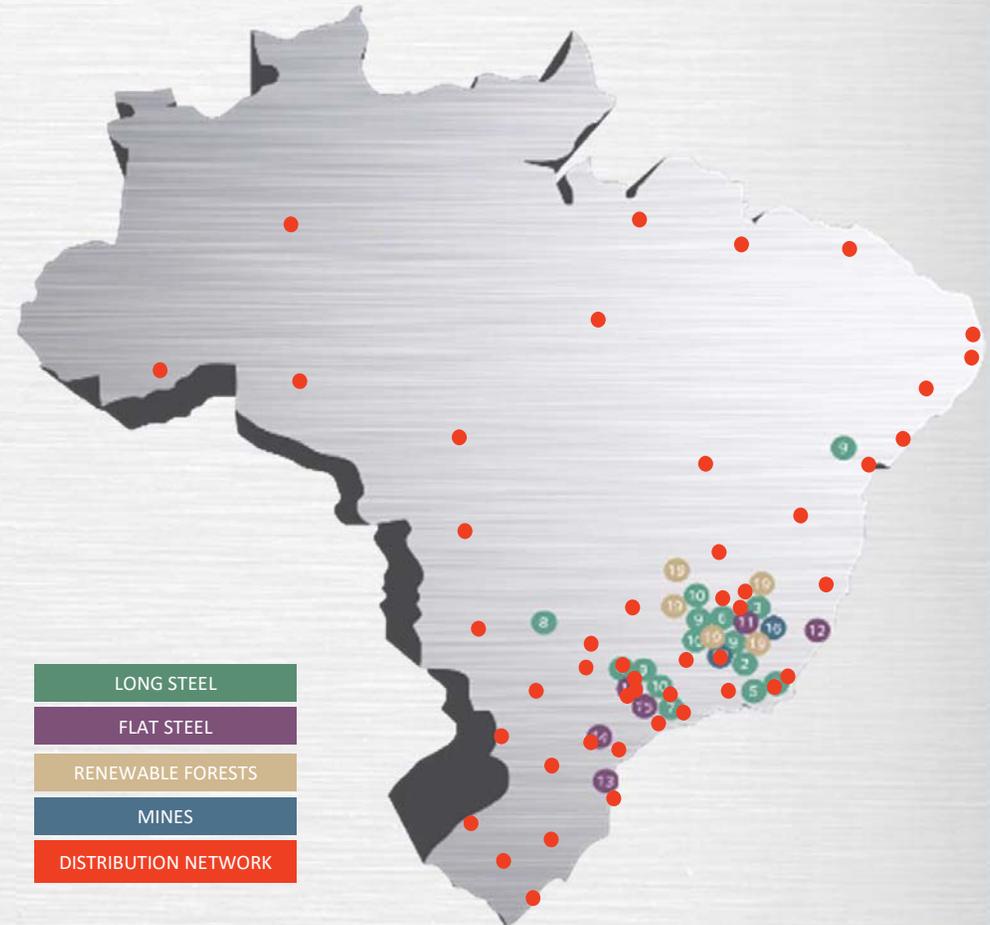
**95% Apparent Consumption
Geographical Coverage**

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Scope of implementation

Long Carbon mills

Long Carbon Service Centres

Flat Carbon Service Centres

External Suppliers

2 Hubs

73 proximity sites

Customers
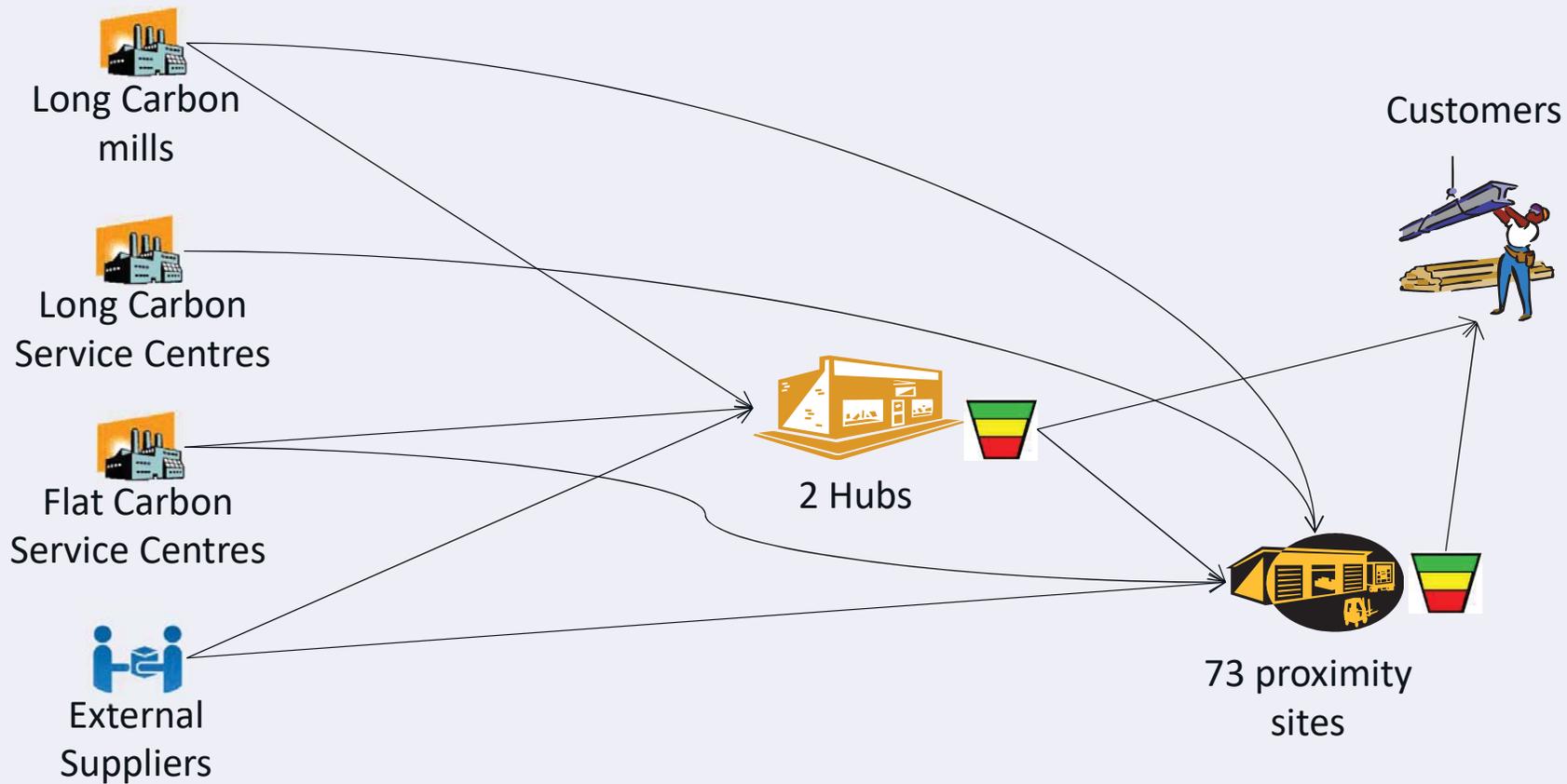
- Buffers in 75 sites
- About 3.200 SKUs
- About 236.000 combinations SKU-sites

Background and challenges

OLD MODEL

Production against forecast

Forecast at SKU level

Push replenishment based on forecast

Direct sales channels

Distribution network

Direct customers

Distribution customers

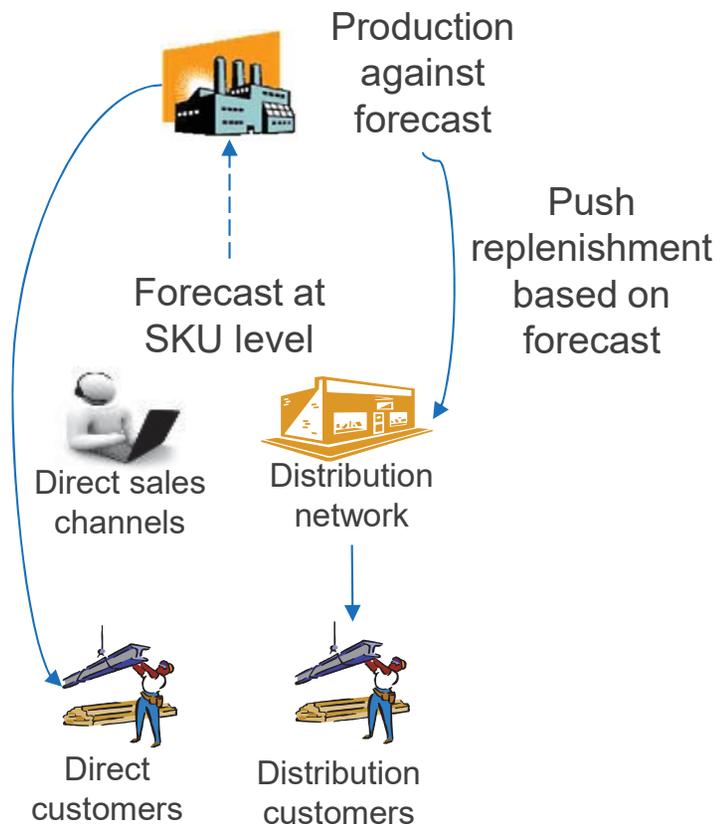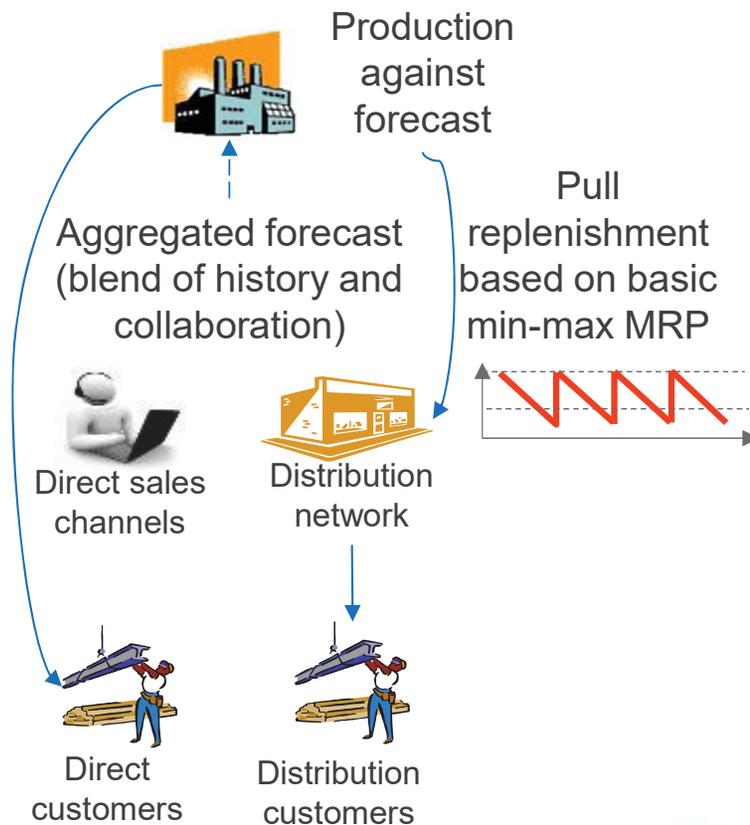- Solution and methodology in line with available solutions at the time
- SAP SNP until 2015
- Time-consuming process
- Each site/channel replenishment was constrained to its forecast (no pooling)
- Monthly forecast with low accuracy at SKU-Site level
- Lost or delayed sales
- Excess stock as well as stock outs

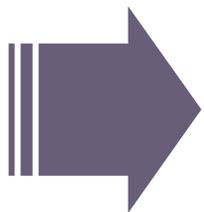*Low forecast accuracy resulting in stock outs, excess stock and constrained replenishment*

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Background and challenges

MIN-MAX BROUGHT SOME IMPROVEMENTS...

Production against forecast

Aggregated forecast (blend of history and collaboration)

Pull replenishment based on basic min-max MRP

Direct sales channels

Distribution network

Direct customers
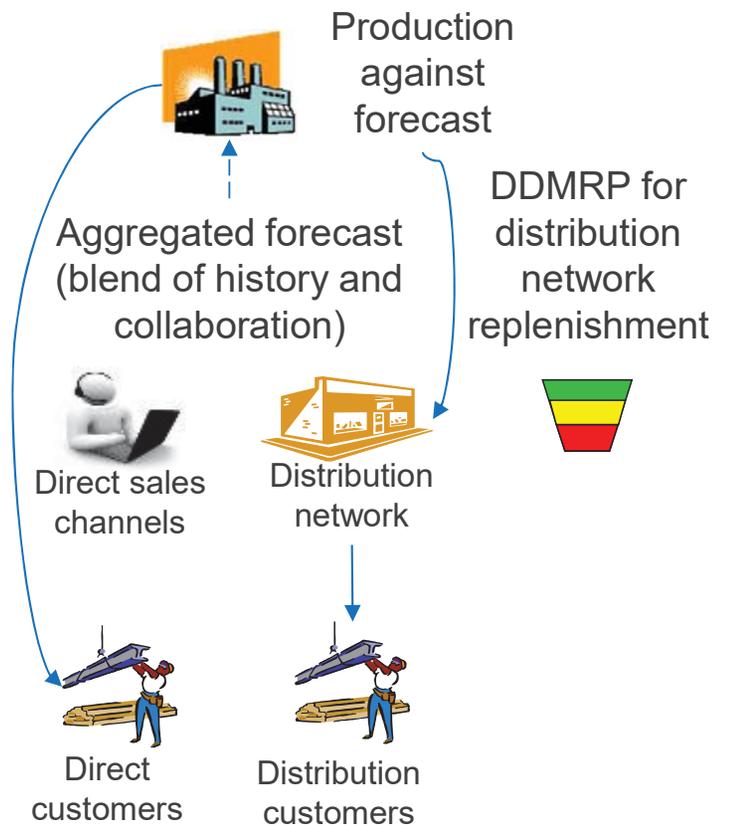
Distribution customers

- Standard SAP MRP until 2019 for the distribution network

- Min-max parameters calculated in spreadsheets, updated every 1 to 3 months

- Low visibility and responsiveness

- Time-consuming process, subject to spreadsheet errors and limitations

- Lack of basic planning and execution tools

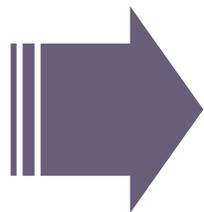*Significantly better, but still a lot of room for improvements...*

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Background and challenges

...DDMRP SIGNIFICANTLY IMPROVED OUR PERFORMANCE

Production against forecast

Aggregated forecast (blend of history and collaboration)

DDMRP for distribution network replenishment

Direct sales channels

Distribution network

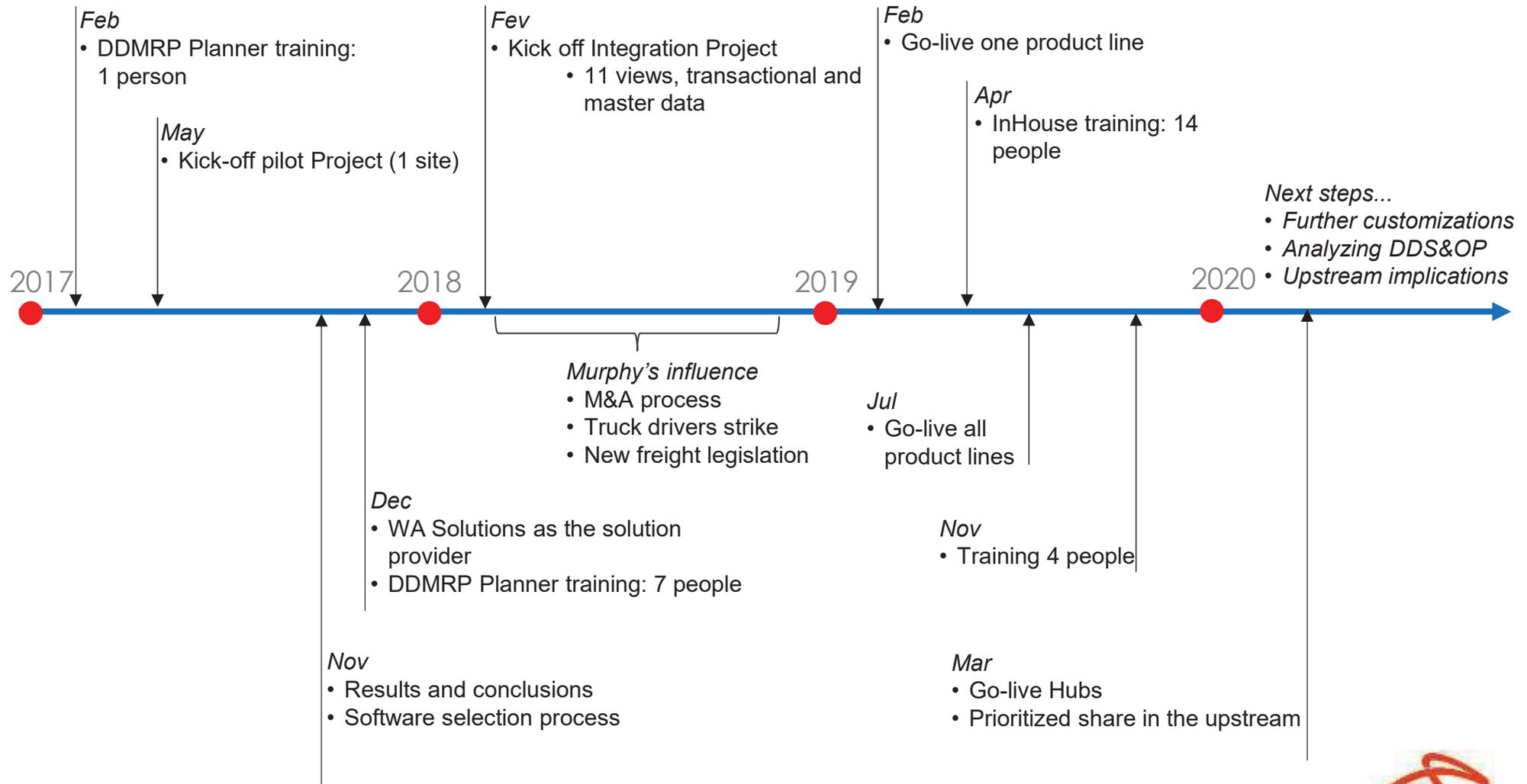Direct customers

Distribution customers

- Noticed about DDMRP methodology as an evolution of MRP, TOC, Six Sigma & Lean

- Little information available about implementations in heavy industries

- Pilot project in one site, with many lessons learned

- Software selection (no companies were present in Brazil at the time)

- WA Solutions software as the DDMRP engine integrated with SAP, where the transactional processes remain
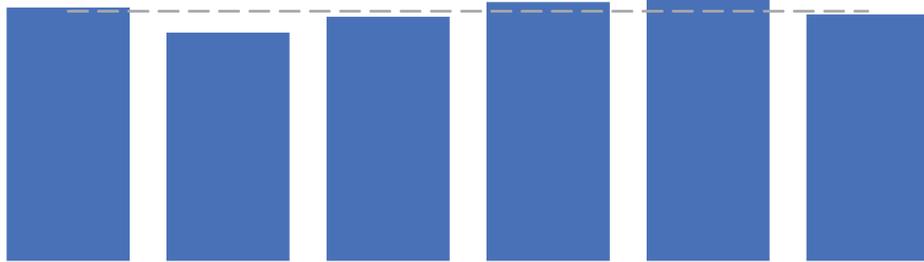
Great results very quick, with further room for improvement!

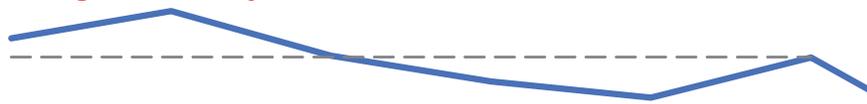ArcelorMittal

Timeline

Feb
- DDMRP Planner training: 1 person

May
- Kick-off pilot Project (1 site)

Fev
- Kick off Integration Project
  - 11 views, transactional and master data

Feb
- Go-live one product line

Apr
- InHouse training: 14 people

Next steps...
- *Further customizations*
- *Analyzing DDS&OP*
- *Upstream implications*

2017   2018   2019   2020

Murphy's influence
- M&A process
- Truck drivers strike
- New freight legislation

Jul
- Go-live all product lines

Dec
- WA Solutions as the solution provider
- DDRMP Planner training: 7 people

Nov
- Training 4 people

Nov
- Results and conclusions
- Software selection process

Mar
- Go-live Hubs
- Prioritized share in the upstream

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Results

Market conditions favoured sales increase, coincident with DDMRP Go-Live...

Go-Live all product lines

13% sales increase

...which allowed a decrease of stock coverage in days...

19% reduction of stock coverage

...and a reduction in lost sales simultaneously!

17% reduction of lost sales
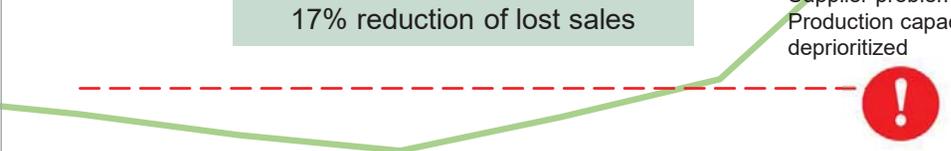
Forced maintenance
Supplier problems
Production capacity
deprioritized

jan/19   fev/19   mar/19   abr/19   mai/19   jun/19   jul/19   ago/19   set/19   out/19   nov/19   dez/19

Lost sales due to low stock relative to sales

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Results

Favourable evolution of On-Hand status, as combinations of SKUxSite

August   December
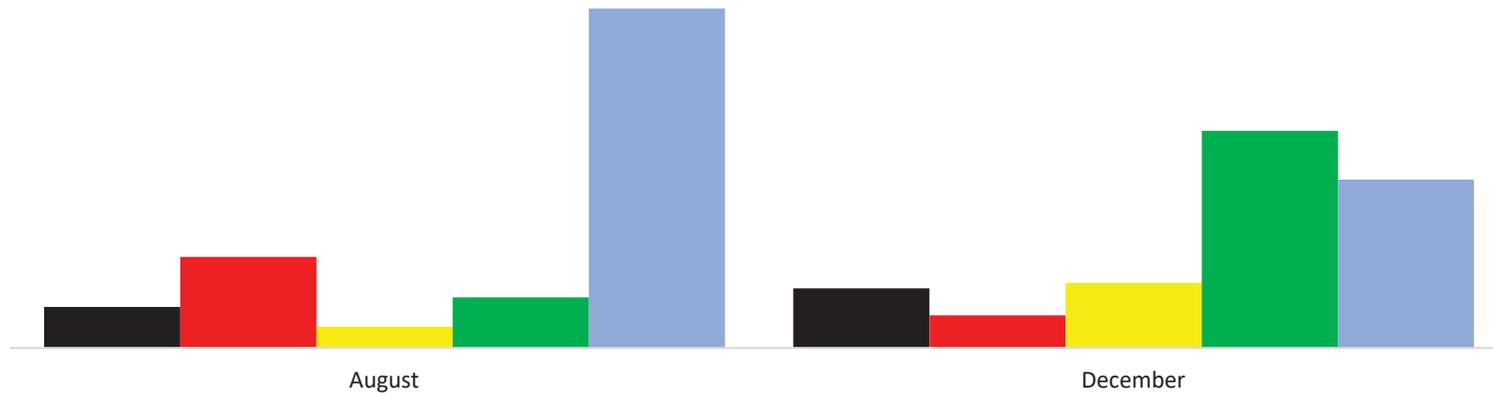
- 50% reduction on excess (blues)
- 25% increase on on-hand Ok's (yellows+greens)
- 30% reduction on dangerously low (blacks+reds)
- And still a lot of room to improve!

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Some interesting customized features

- Buffer equations split for regular and sporadic SKUs consumption pattern, with automatic detection

- Prioritized share beyond the scope of DDMRP implementation: release of orders considering GATP and block planning availability (SAP)

- Master buffers: several identical SKUs under different codes affecting the same buffer, with alternative BOM's for replenishment

- Automatic flagging of causes of deviations (shortages and excess)

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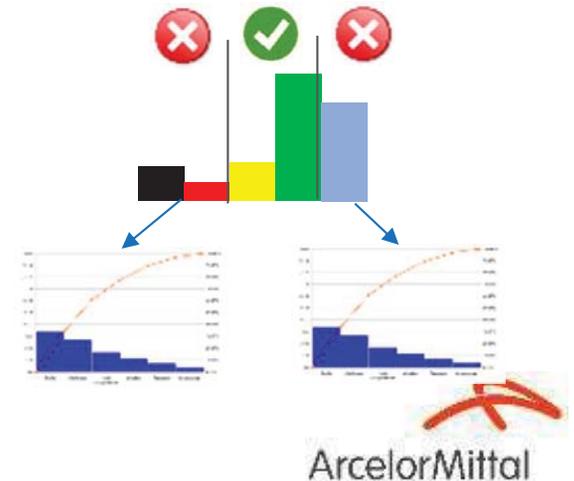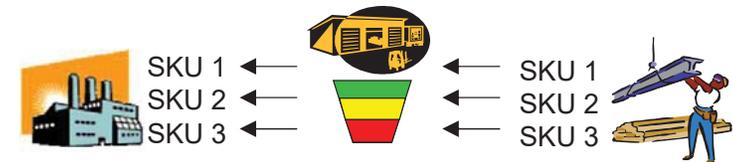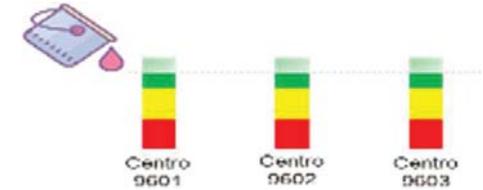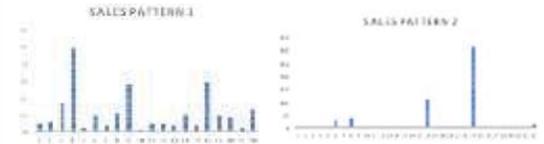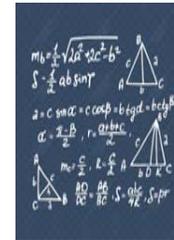
Next steps

- Deepen the methodology into the routine of planners, focusing on causes of deviations instead of transactional tasks (continuous improvement)

- Analyse the implications of DDS&OP in the upstream, in an environment of constrained capacity, low speed of reaction and high CAPEX involved

- Expand the scope to flat products finishing lines (steel service centres) and flat distribution network

- Analyse the utilization of machine learning algorithms to automate warnings and buffer parameters (demand, variability, lead times, alternative BOM, etc.)

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