

DataDrivenSteel

The Digital Transformation within Tata Steel Netherlands



Energie in Industrie

20 juni 2023 | Hotel Vianen, Utrecht

TATA STEEL

Introduction

- **Carlet Hoes**
 - Programmanager DataDrivenSteel
 - [LinkedIn](#)
- **Tata Steel Netherlands**
 - 11.418 employees
 - 23 countries
 - Top 3 most CO2-efficient steelfactory in the world



Clean Green Circular

Leadership principles

Themes

- Connect
- Change
- Care

- People & Society
- Environment & Community
- Decarbonisation & Sustainability
- Customers & Value



Purpose

Why we are on the journey

Improving how people around the world work, live and move, through sustainable steel

Mission

The route we follow

To continue to play a meaningful role for all our stakeholders as a clean, green, circular steel company that creates value, is an employer of choice, and maintains an ongoing dialogue with our neighbours

Vision

What we expect to find when we arrive

A clean, green and circular steel company that is sustainable in every sense



Blast Furnaces, Tata Steel IJmuiden

0 Current situation

Legend

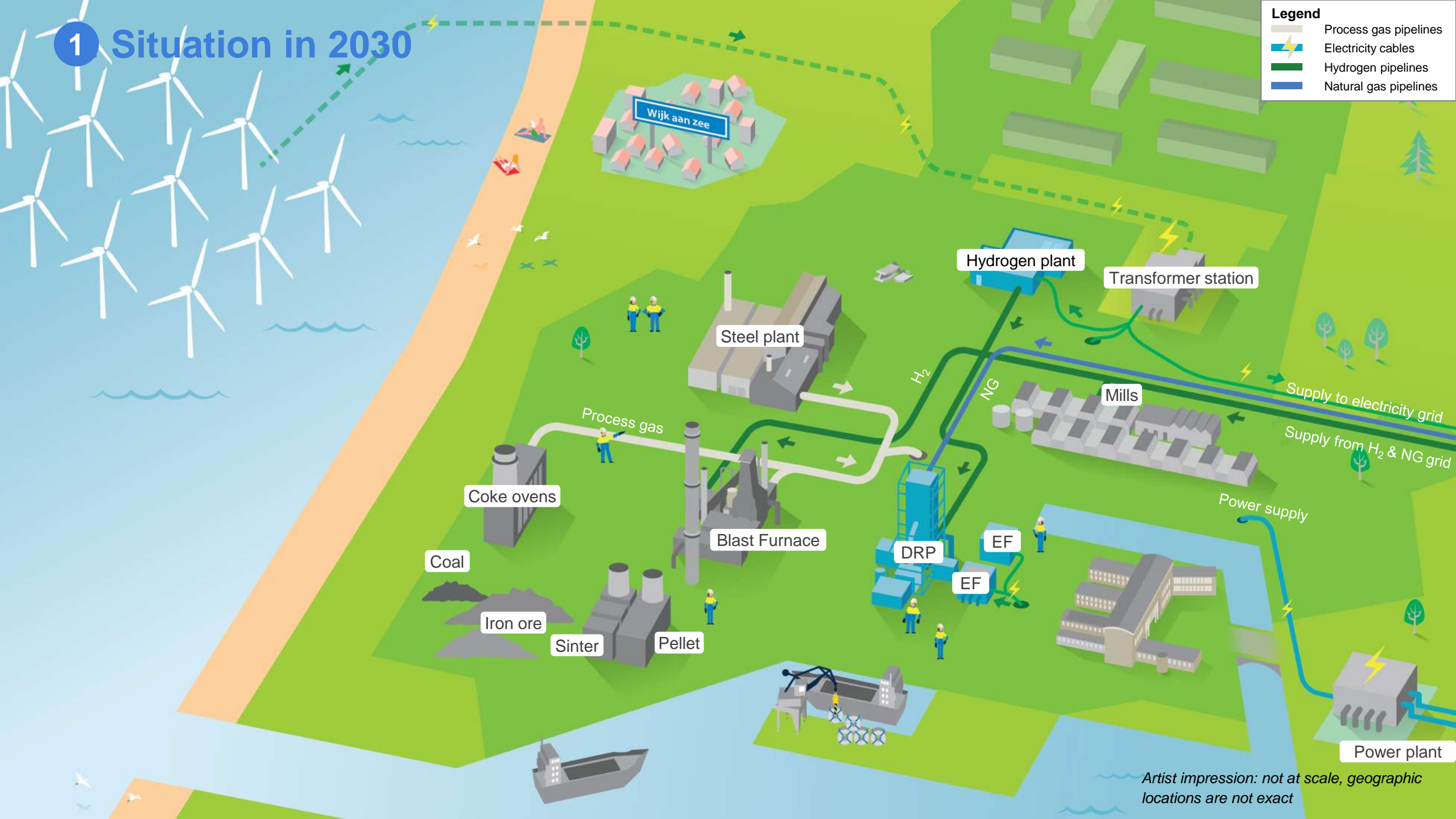
- Process gas pipelines
- Electricity cables



Artist impression: not at scale, geographic locations are not exact

1 Situation in 2030

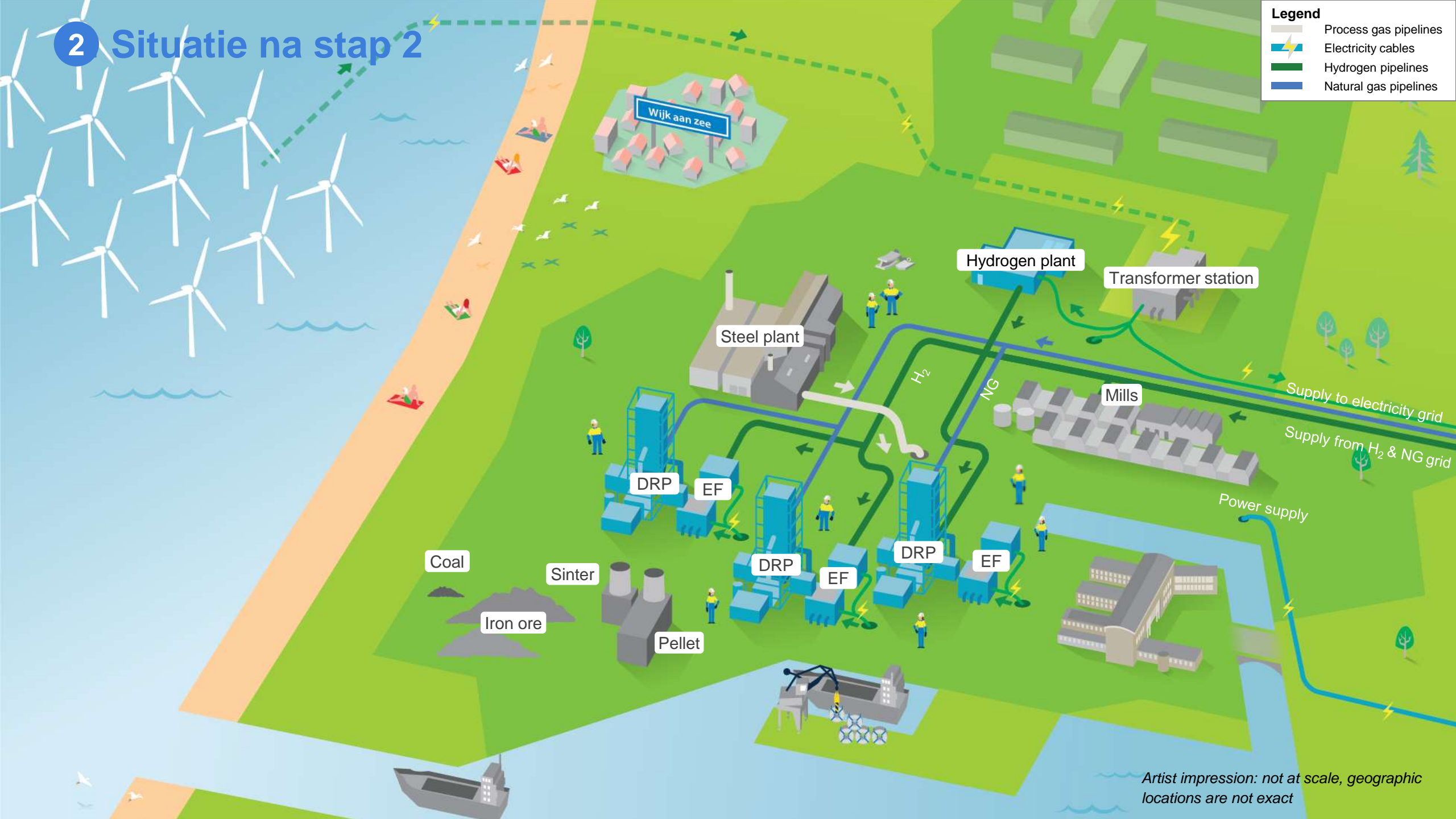
- Legend**
- Process gas pipelines
 - Electricity cables
 - Hydrogen pipelines
 - Natural gas pipelines



Artist impression: not at scale, geographic locations are not exact

2 Situatie na stap 2

- Legend**
- Process gas pipelines
 - Electricity cables
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 - Natural gas pipelines



Artist impression: not at scale, geographic locations are not exact

Our digital journey to date

Vision in 2017

worldsteel ASSOCIATION FOR DISCUSSION

WHAT'S NEW

Press release 1 April 2019

Tata Steel IJmuiden awarded leading advanced analytics steel plant in the world

Today, Tata Steel IJmuiden received the WSA award for the leading advanced analytics enabled steel plant in the world. Hub director Hans vd Berg comments: "as leadership team we embraced the opportunities of advanced analytics and digital early on. Over the past years we build a local Tech community, update our IT architecture and drove an holistic program deploying AA on topics like process and quality control, predictive maintenance, procurement of raw materials and planning optimization"

[CLICK HERE FOR MORE INFO](#)

Success in 2019

fd. Mijn laatste Krant Meer v

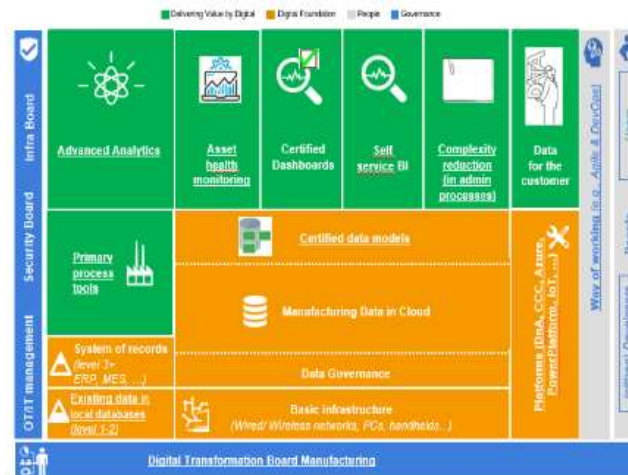
Helko Jessayan 2 min

INDUSTRIE

World Economic Forum roemt Tata Steel IJmuiden om industriële data-analyse

Tata Steel in IJmuiden is door het World Economic Forum (WEF) verkozen tot voorbeeldbedrijf voor de toepassing van zogeheten advanced analytics, een complexe vorm van data-analyse. Tata gebruikt de advanced analytics om de eigen industriële processen te verbeteren.

Roadmap Mfg 2020



2022 →



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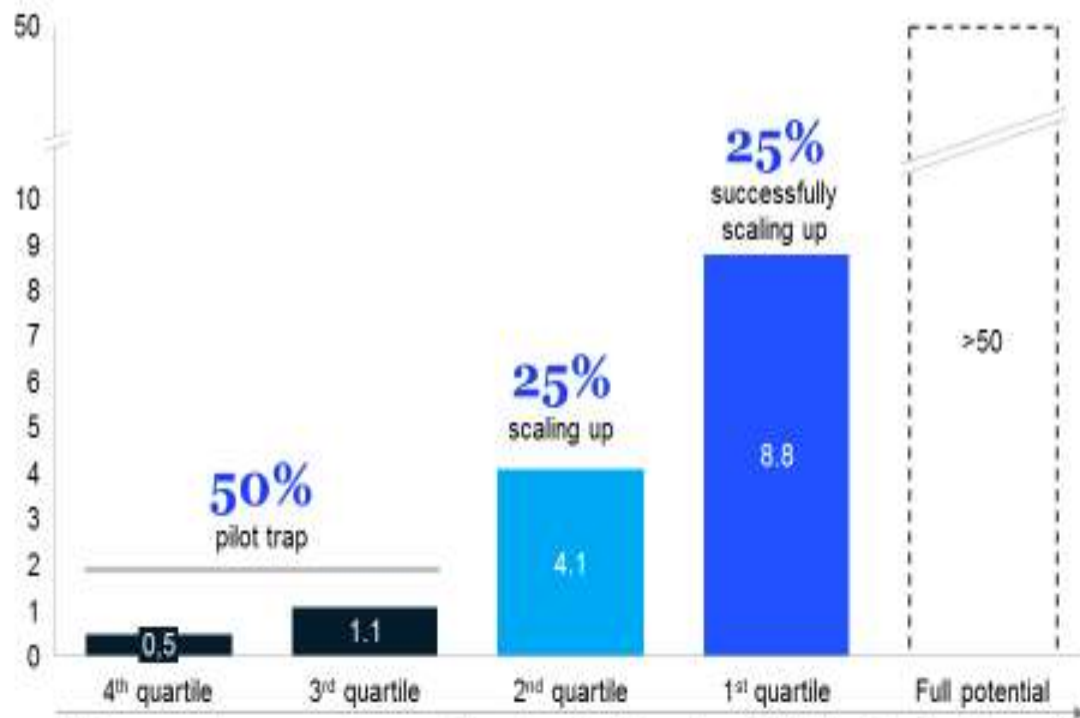
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Tata Steel Nederland has been one of the few players that managed to scale impact from Digital

Steel companies only

EBITDA uplift from Digital & Analytics

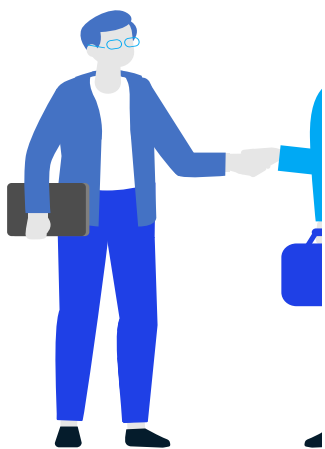
USD/ton



Steel companies grouped per quartile and ranked from lowest to highest realized impact

Source: McKinsey Survey Digital in Metals (06/2020)

Why Data Driven?



25% of surveyed metals players have **successfully scaled** impact from digital technologies

50% of metals players are stuck in the pilot trap, are unable to achieve impact at scale

However, there **remains a significant upside** in Digital & Analytics

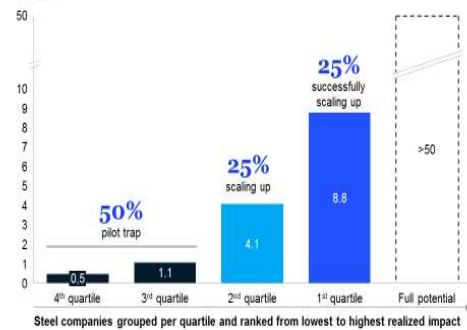




Tata Steel Nederland has been one of the few players that managed to scale impact from Digital

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USD/ton



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Why DataDrivenSteel



Value



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Why
DataDrivenSteel



A screenshot of the Big River Steel website homepage. The background is a photograph of a steel mill with glowing molten metal. At the top center is the BRS logo with 'BIG RIVER STEEL' underneath. To the right are navigation links: 'Become a Customer', 'Join Our Team', and 'Contact'. The main headline in large white text reads: 'AT OUR CORE, WE'RE A TECHNOLOGY COMPANY. WE JUST HAPPEN TO MAKE STEEL.' In the bottom right corner of the screenshot is a white circular arrow icon pointing down.



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How Digitalization Will Enable Completely Different Ways of Working in Steelmaking

- “At H2 Green Steel, we do not draw a line between the physical and the digital world. Fully integrated teams – that’s our secret sauce,”
- "The greatest hurdle when driving digital transformation is an organization's legacy. For H2 Green Steel – whether it’s talent, culture, or technology – there is no such heritage."

Why Data Driven Steel



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INDIA STEEL



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Value

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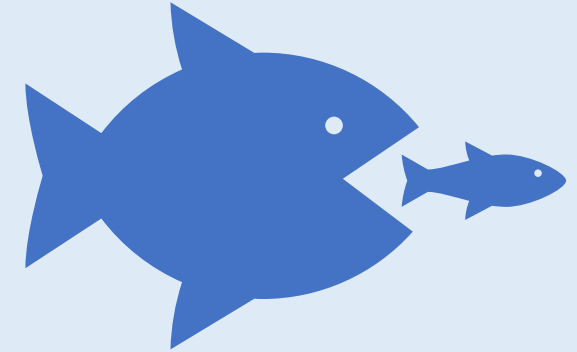


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Value



Competitors

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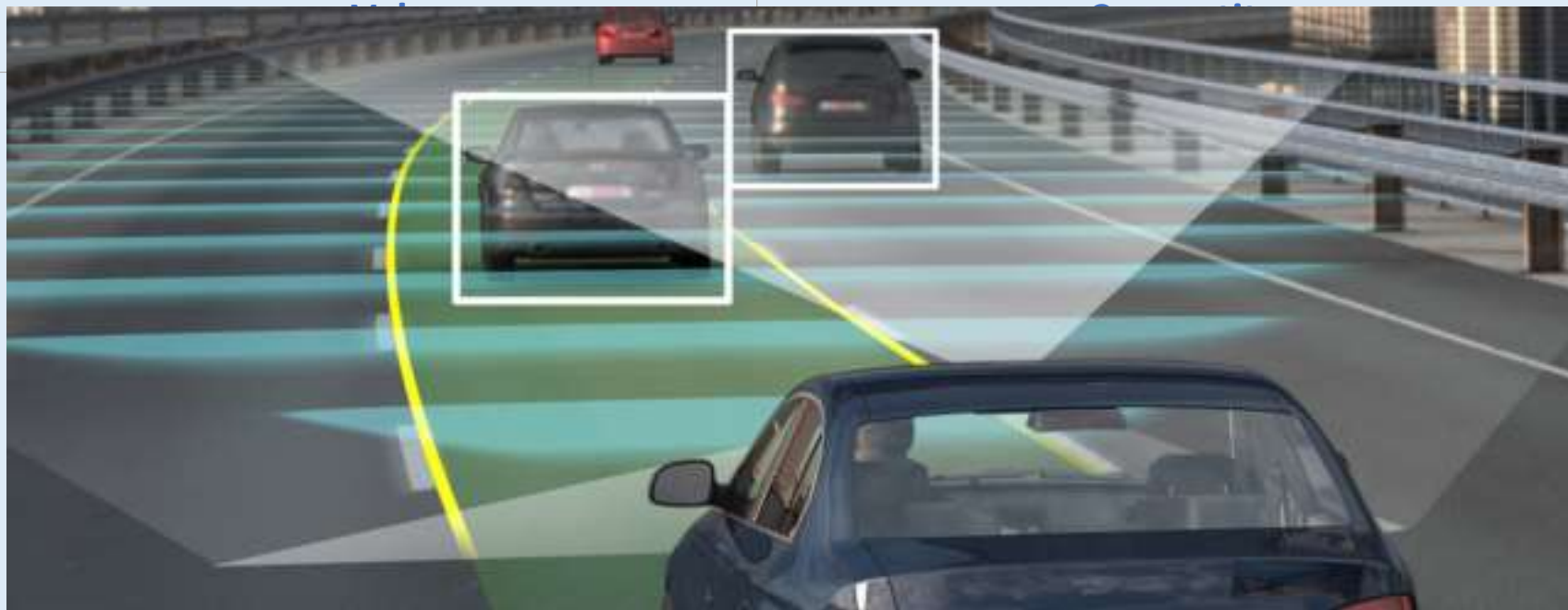
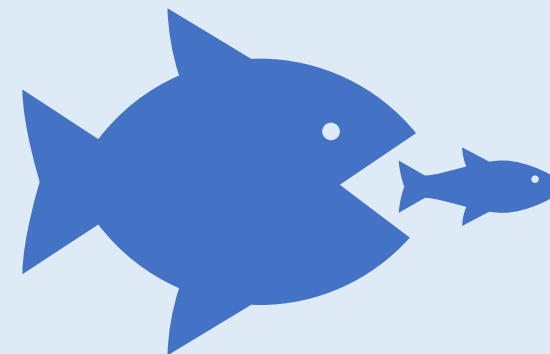


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Why DataDrivenSteel

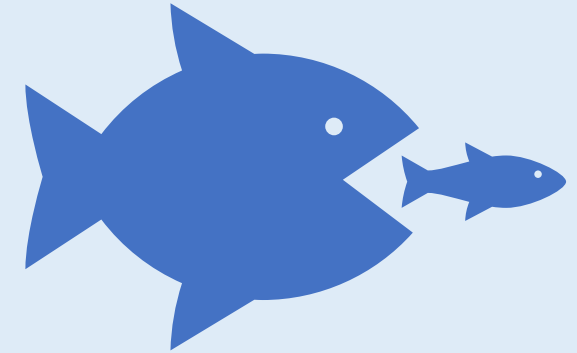


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Value



Competitors



Customers

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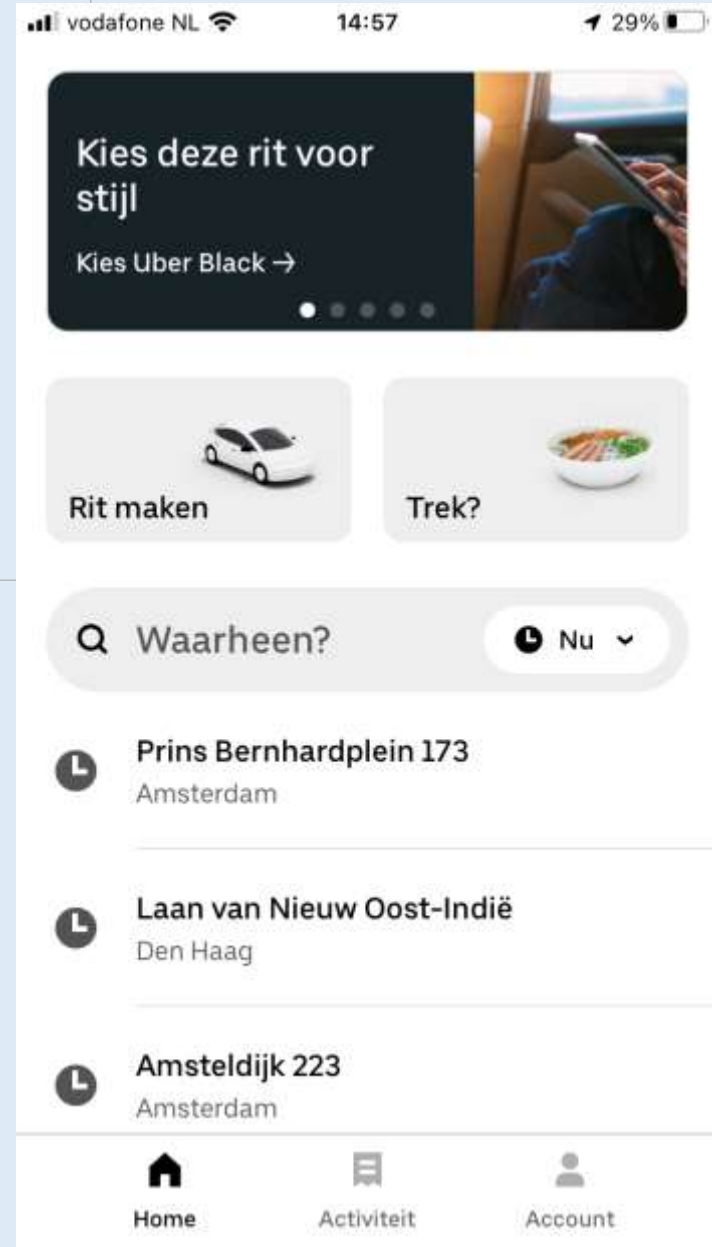


Value



Customers

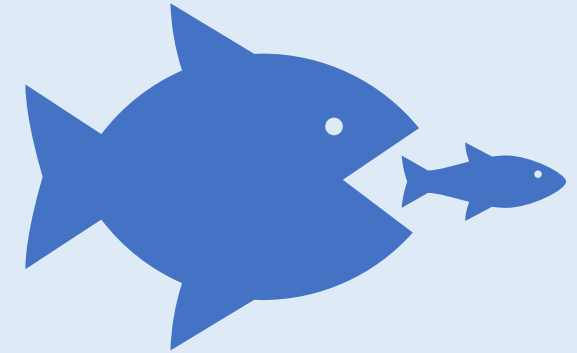
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Why DataDrivenSteel



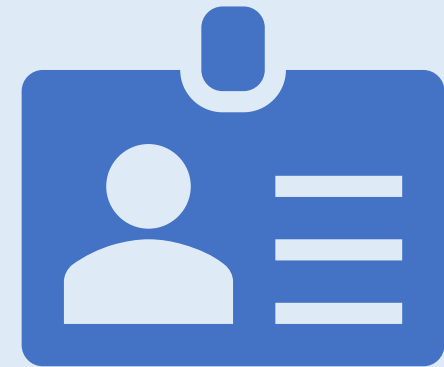
Value



Competitors



Customers



Colleagues

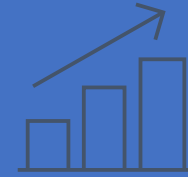


Create immediate value from data



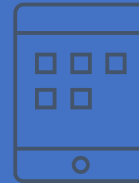
Modelling

Data is used to forecast future behaviour leading to optimised settings (including digital twins)



Dashboarding

Validated data is used for operational decision making through intuitive dashboards



Apps

Administrative tasks are automated where useful



Digital with Stakeholders

Share data with customers / suppliers / stakeholders in a governed and secure way

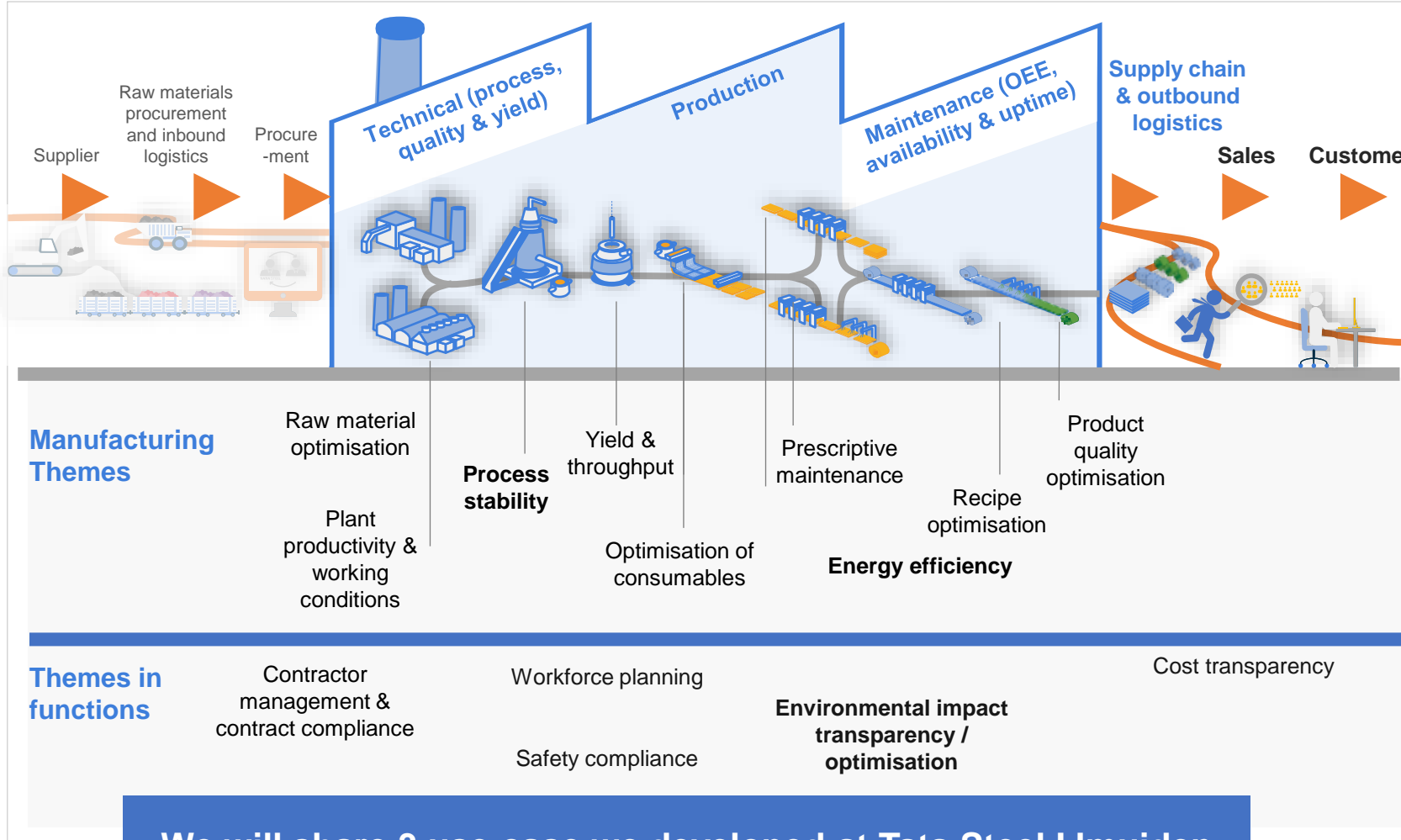


Data is governed and easily accessible

All digital products meet our security standards



Today we have 70+ waves implemented and realized 15-20% EBITDA uplift yoy



We will share 3 use-case we developed at Tata Steel IJmuiden

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1 of the first 17 of now 90 WEF selected Lighthouse sites for 4IR



CO2 Transparency Dashboard



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Why Carbon Transparency Dashboard

Having a daily dashboard on a deep level of detail will enable:



Environment & Community

- Transparent reporting
- Including scope 3 emissions

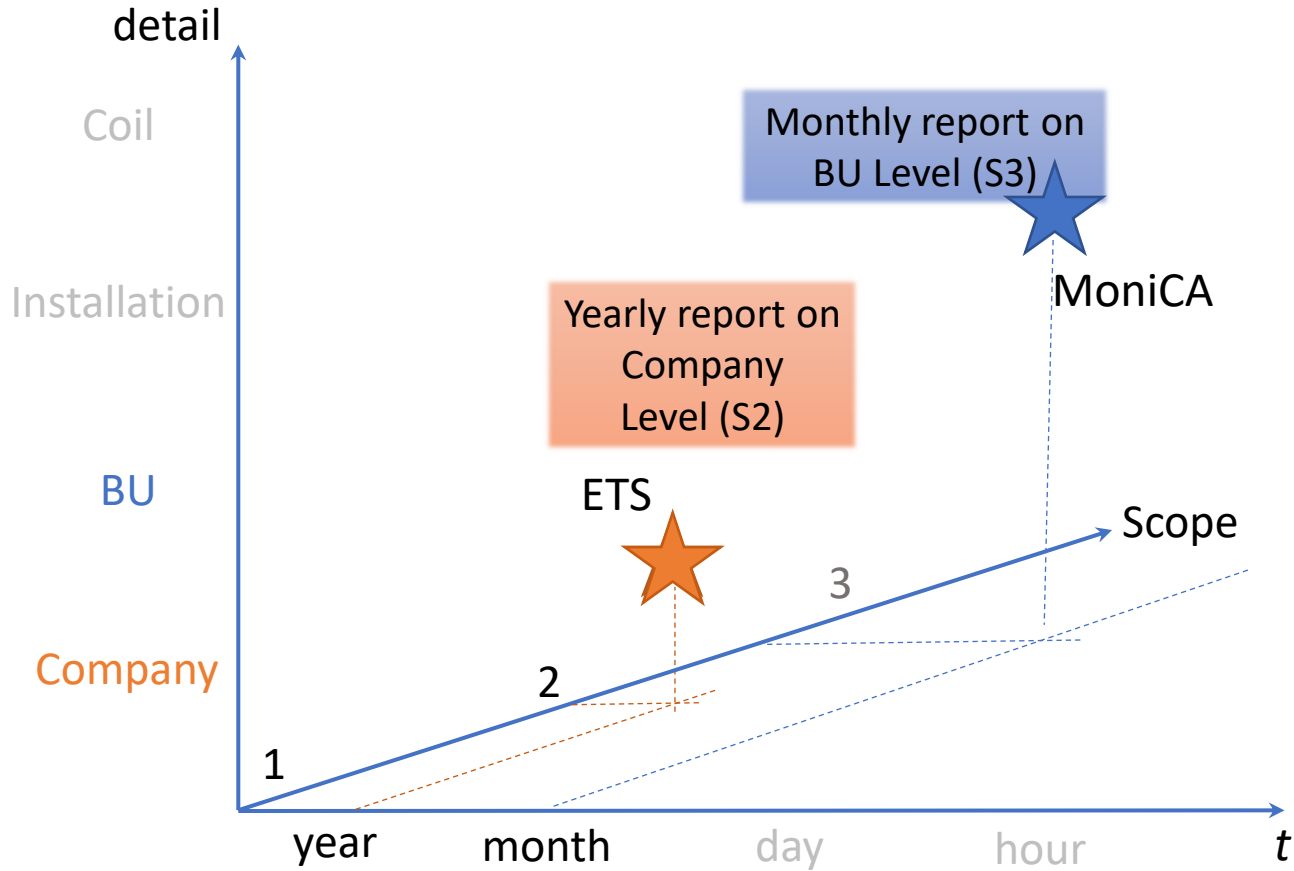


Decarbonisation & Sustainability

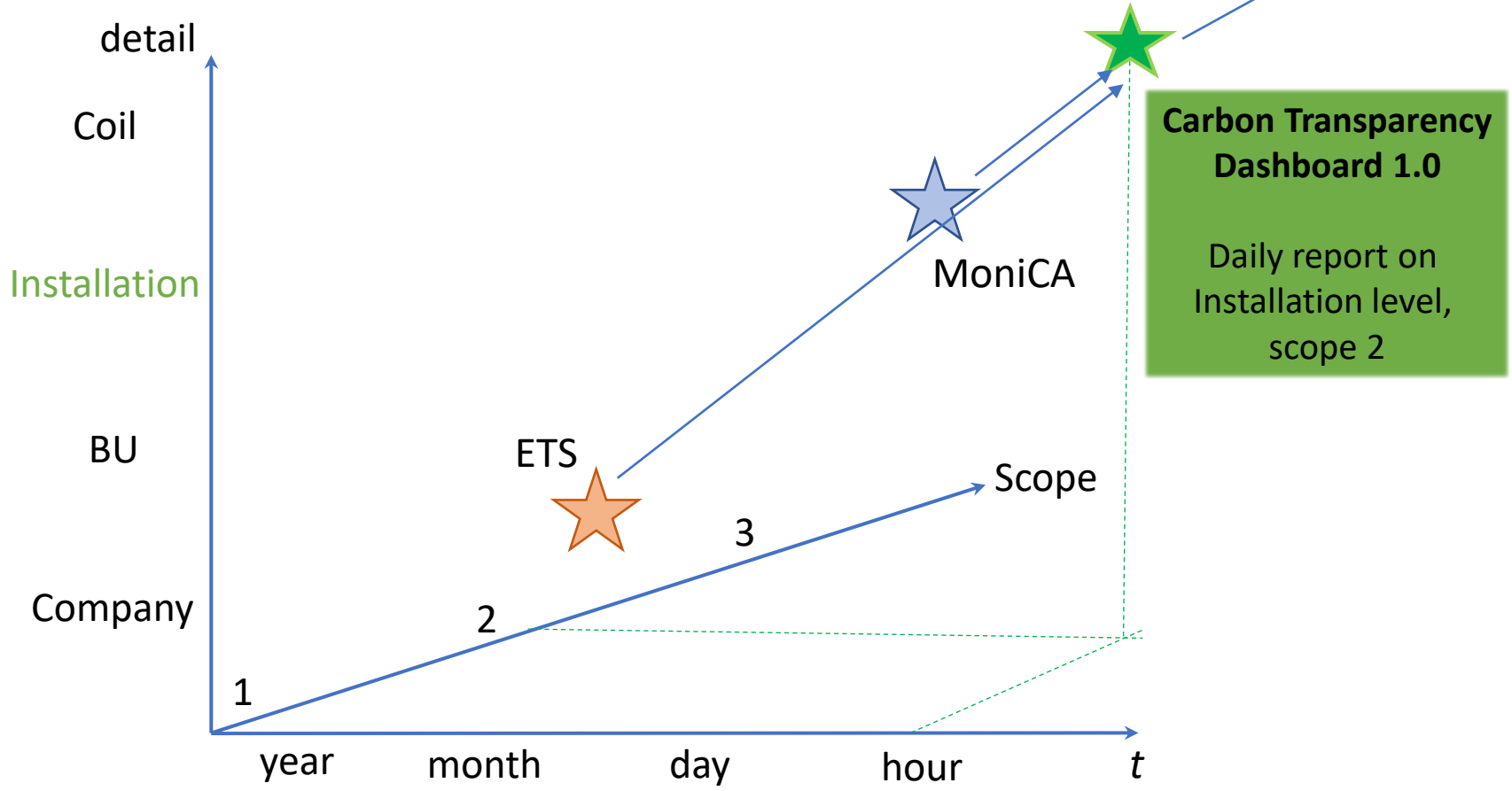
- Tracking of CO₂ reduction projects
- Identifying new reduction opportunities
- Optimizing TSN-wide CO₂ reduction
- Catching adverse events early



Roadmap Carbon Transparency



Roadmap Carbon Transparency



Supporting CO₂-neutral steel

- TSN wants to be CO₂-neutral by 2045 and considers green steel to be the steel of the future.
- The carbon transparency dashboard will visualize the journey to CO₂-neutral steel.
 - Short term CO₂ reduction for Zeremis™ carbon lite
 - Step changes (BF → DRI)
- The dashboard will allow **everyone** – from operator to (works) manager - to embark on this journey.



Silicon Forecasting Model



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Shaping a sustainable society for generations to come



Determines costs and CO₂ to a large extent

- **6.4 million ton** hot metal production
- Largest reactor in the world, higher than the **Statue of Liberty**

Difficult to strike the right balance

- **>2000 simultaneous** reactions
- Temperatures **>2200°C**

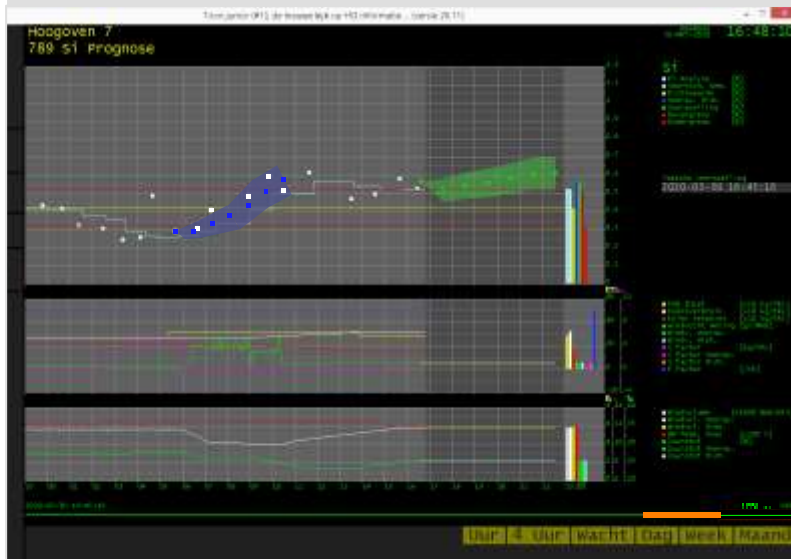
Craftmanship, excelled with computing power

- Significantly **improved stability**
- Lowers **CO₂** and decreases operational **costs**



World's-first model enables operators to pro-actively control Silicon levels and avoid outliers

Look ahead



Silicon forecasting model

gives insight in how Silicon levels will develop within the next 6 hours

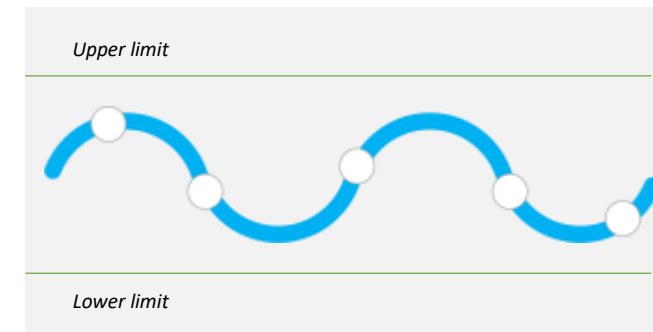
Decide your route



Scenario management

enables to test and refine control actions before executing them

World-class stability



Operators now **base control actions on forecasted Si levels** instead of solely on current Silicon levels and trends

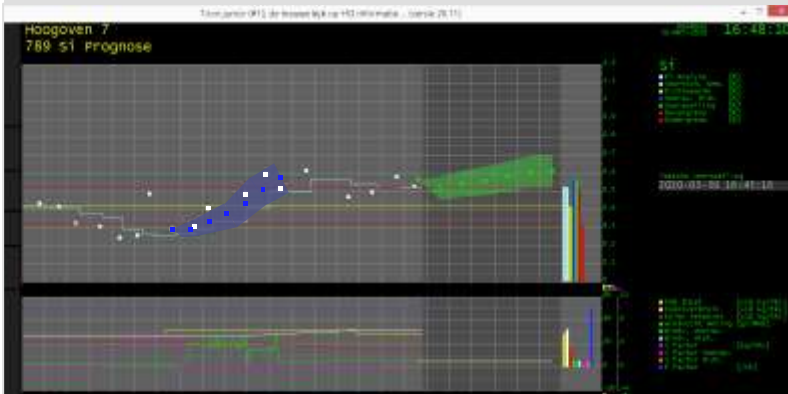


World's-first model enables operators to pro-actively control Silicon levels and avoid outliers

Look ahead

Decide your route

World-class stability



Upper limit



Lower limit



How was your ride?



100k+ reviews



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World-class stability in BF7 and BF6

CO₂↓

33%



Benefits

- Significant **decrease in CO₂** emissions
- **Major cost reduction** in both Blast Furnace and Steel plant

Improved stability

- **Improved thermal control** leading to **record stability of Blast Furnace 7**
- **Lower coke rate** with **all-time monthly record** in coke rate

Together we make the difference

- **Blast Furnace 6 model implemented as well**, after Blast Furnace 7 success
- **Deeper understanding of thermal control**



Product Quality Analysis

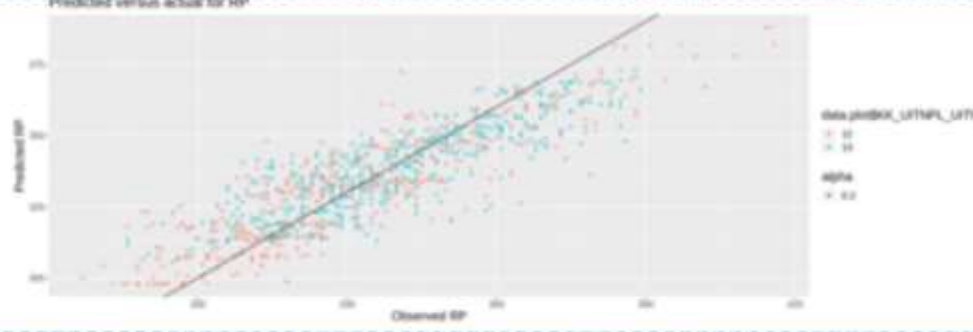
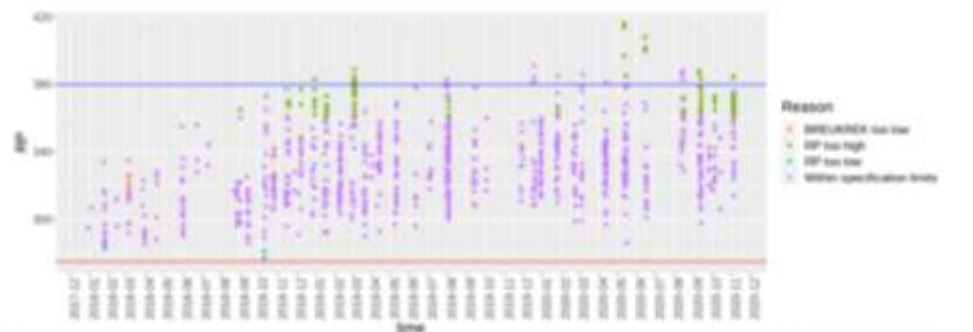
Tool utilisation

Understand product & behaviour

Model product properties

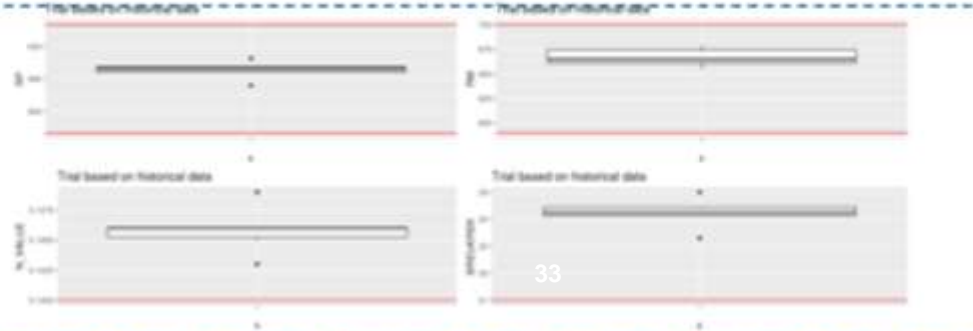
Optimise all relevant properties

Implement solution

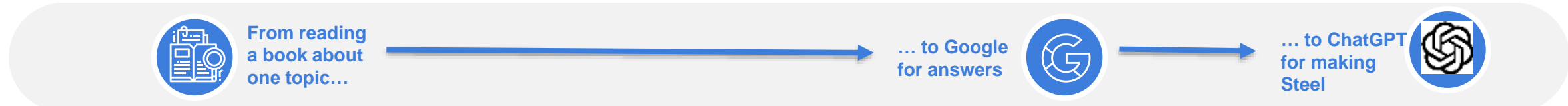
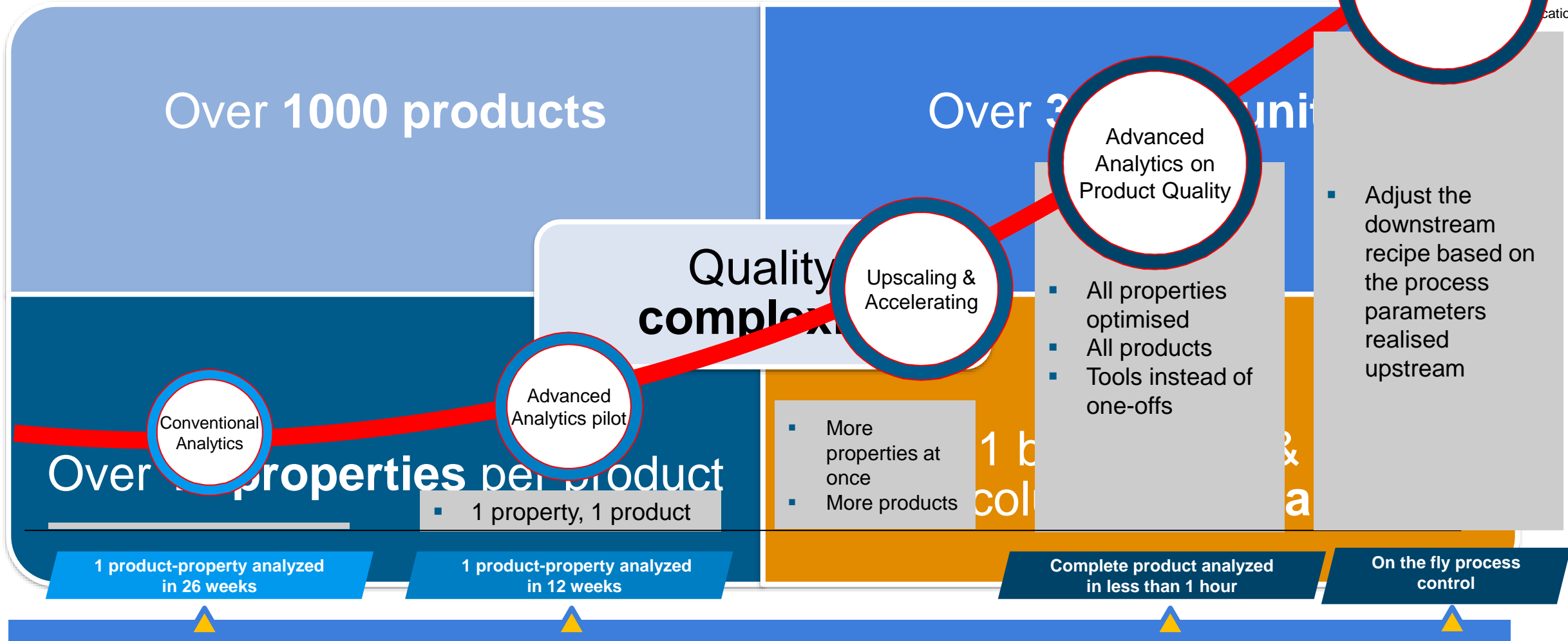


a) Optimized recipe parameters:

Parameter	Recipe	Optimized value	Difference Recipe vs Optimized	Average Historical diff in samples	Significant in Top 5 by Importance	RP_V1	RP_V2	SPREKURK_V1	%_VALUE_V1
FDL_T04	0	620	620	620	Y	0.1	0.24	0.0	0.0
FDL_T06	0	640	640	620		0.17	0.1	0.0	0.0
FDL_T08	0	690	690	690		0.24	0.19	0.0	0.0
FDL_T10	0	664	664	660		0.26	0.26	0.0	0.0
SP_VALUE	1	9504	9501	4800		0.1	0.14	0.0	0.0



We produce over 1000 different products, emphasizing the need of a scalable approach to cover all products & all properties



CO2 Summary

- TSN will become CO2-neutral by 2045
- The transition to the DRI is our long-term strategy
- DataDrivenSteel will help to reduce CO2 on the short term

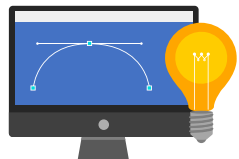
Questions?



Back-up



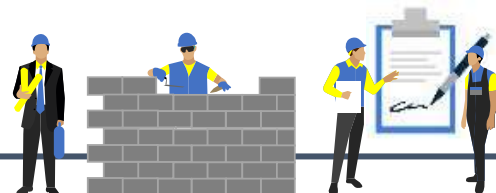
The transition to DRI technology falls into five phases



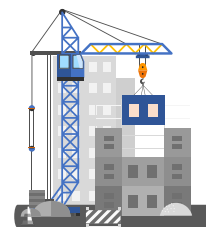
Design Phase
(Up to and including summer 2022)



Engineering phase
(Summer 2022 - early 2024)



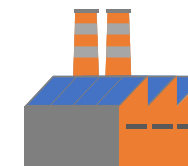
Construction preparation phase
(2022-2026)



Construction phase
(2026-2028)



Start-up phase
(2029)



Closure of plants

