Plant Management

SEASI Conference, KL
16th November 2022

A path to Industry 4.0 (Digitalisation) for Steel Rebar Manufacturers

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Key Business needs which drive Digitalisation

Capacity Utilisation

Ensure higher capacity utilization to improve profits by reducing conversion costs

Plant Management

Seamless Plant Management by eliminating Human error to improve CUF

Pre Op Management

Improved Pre-Operational Management through SOP, 4P Maintenance and lean supply chain

Energy Costs

A key raw material in Steel Plant. Optimizing the processes to reduce the wastage

Remote Management

Real Time and Actual Data available anywhere. Exception and Escalation management

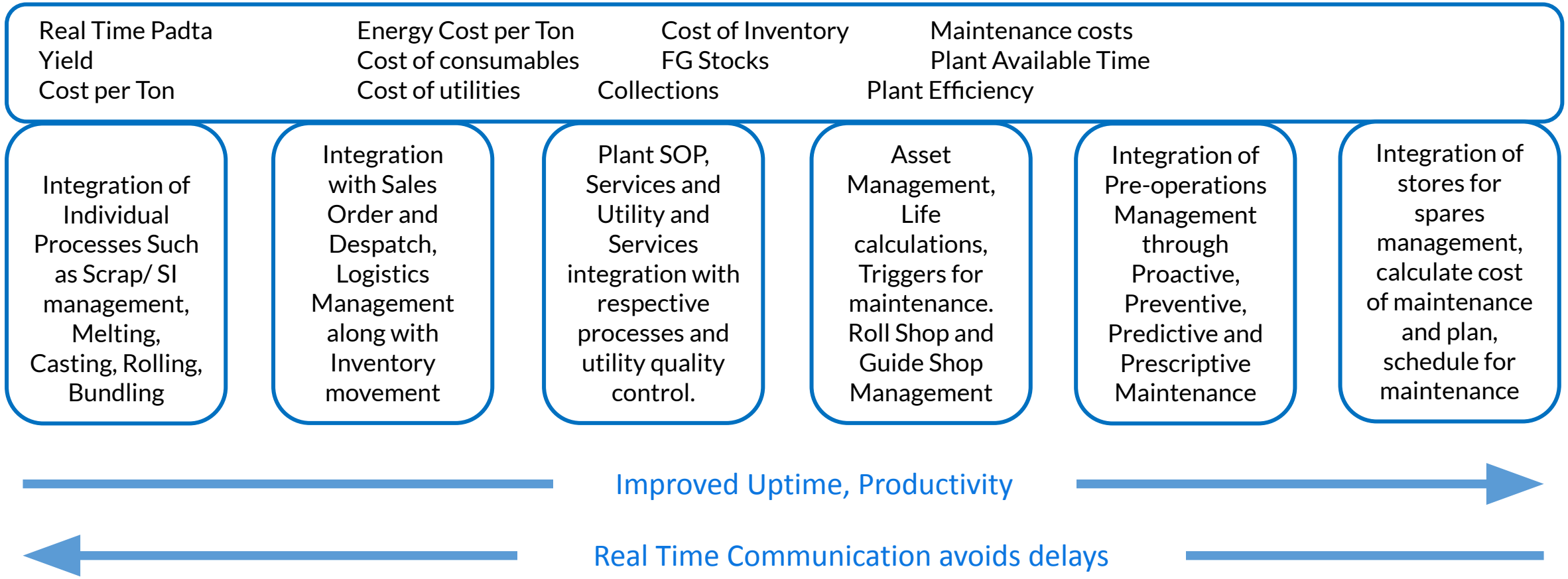
Financial MIS

Real Time Padta to take fast decisions in dynamic supply chain

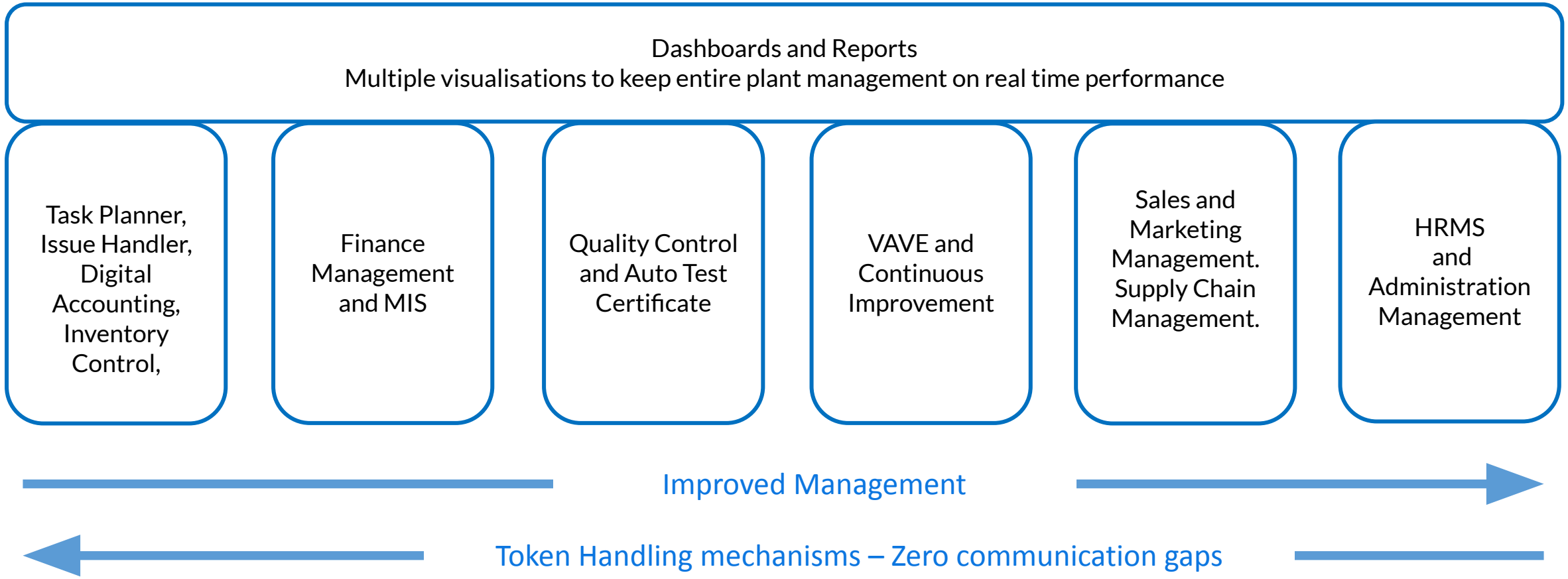
Key Requirements of Digitalisation

Zero Data Entry	Real Time Info	Mobility
No human intervention Actual and true data	Real Time Data converted to relational Information – quick decision making	Data anywhere. Physical presence for decision makers is not required
MIS	**Dashboards**	**Communication**
Automatic routine reports and Real Time exception Reports, Alerts based on actual data	No WhatsApp messaging needed. A continuous update of Plant performance on mobile	Eliminate man to man communication through Token Passing

Industry 4.0 Approach – Direct Data Capture

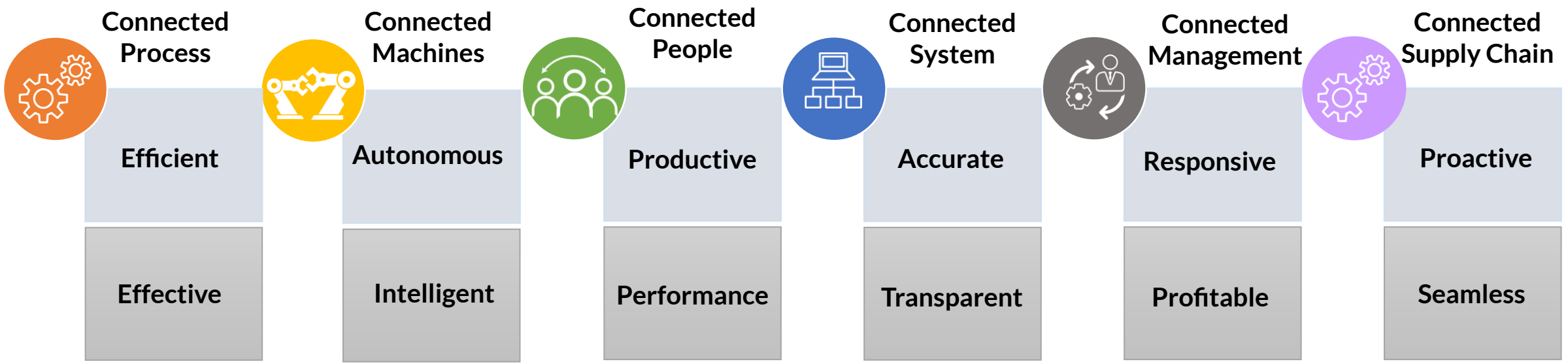


Industry 4.0 expanded - Connected Resource Planning

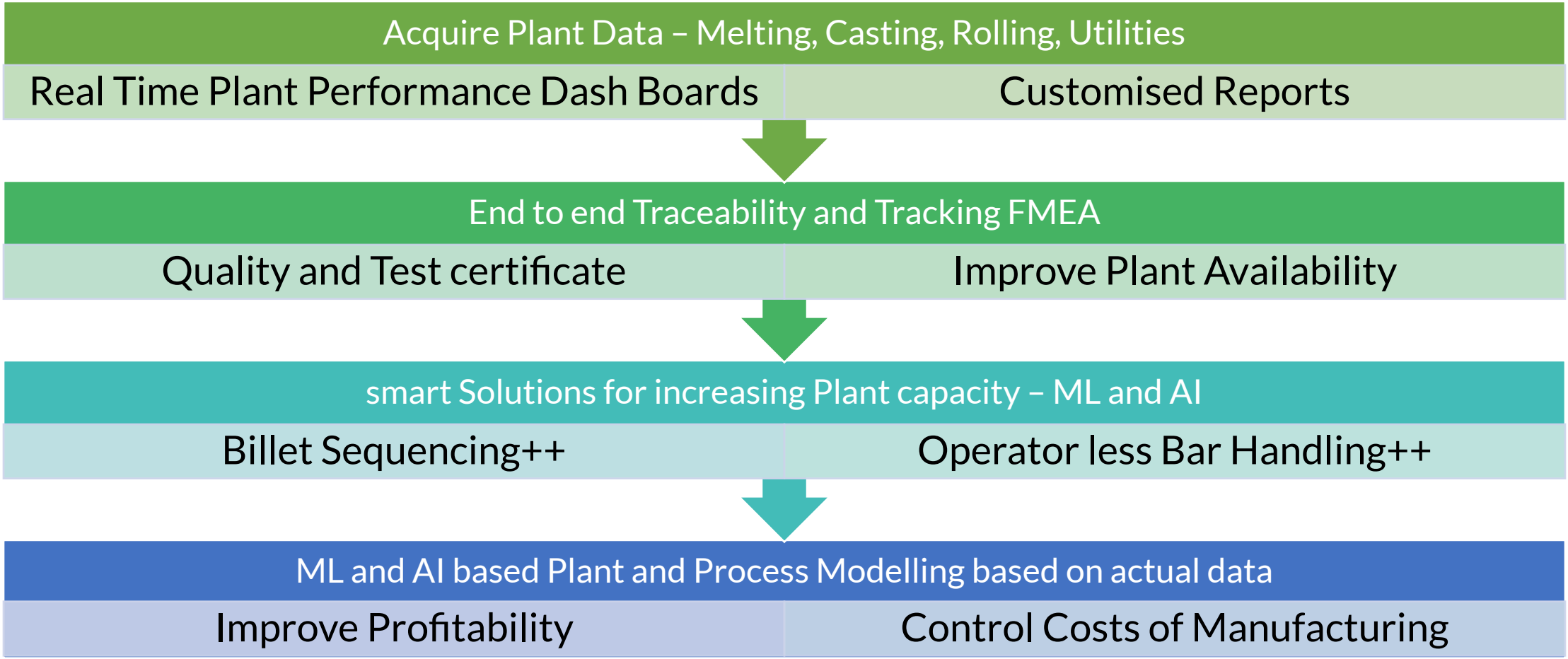


Connected business - CRP®-Foundation path for digitalisation

- CRP® (Connected Resource Planning) is a blueprint by Vega to connect …
  - Processes, Machines, People, Systems, Management and Supply Chain



Plant management Solution - Stages



Data Collection IoT Platform

intelleVIEW

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Vega's Generic IoT Solution

OPTIONAL On Premise Server

MS- Azure Cloud

Dynamic Data Management Platform

OPC

Data Transferrer

Internet

intelleVIEW™

simpliREPORTS™

LAN / WiFi

TCP/IP

MODBUS-TCP

PLC

Vega IIoT

IIoT

RS 485

On demand / Scheduled

Machines and Processes

Sensors

Auxiliary

Energy

Utolity

Operator sets parameters using display unit

Display unit fetches motor parameters at set frequency

SMS

Email

Whatsapp

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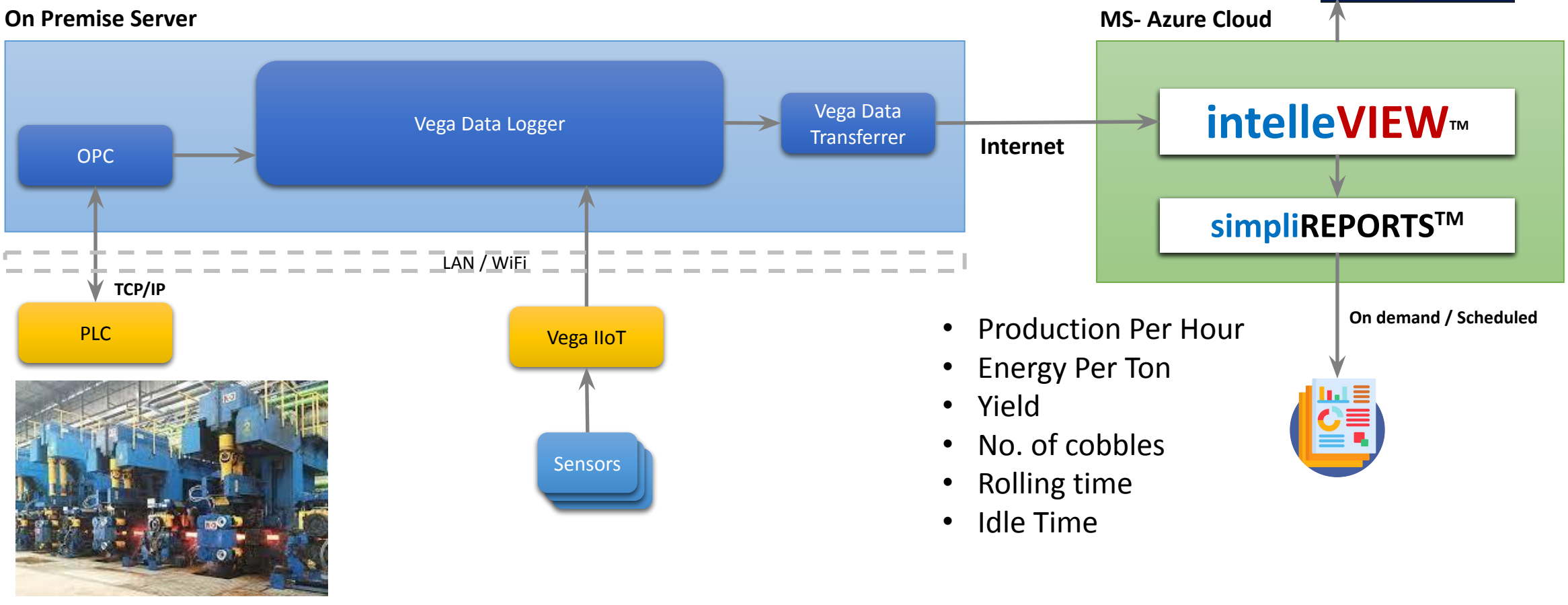
intelleVIEW Modules

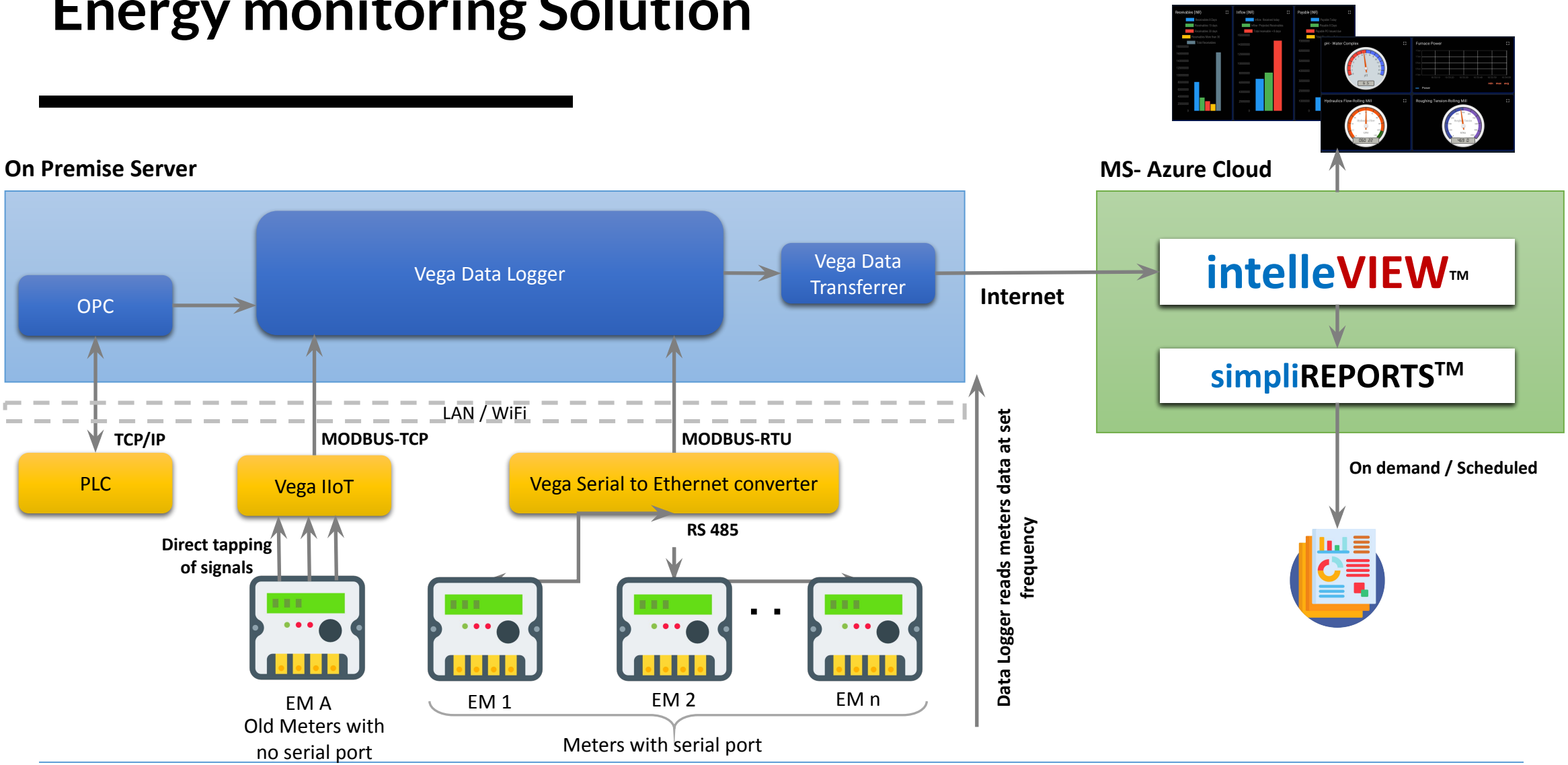
Module	Information
intelleVIEW-ROLL	Production data, energy cost per ton, cobbles, Idle time
intelleVIEW-MELT	Heat Time, Number of heats, Yield, energy cost per ton, Refractory Cycles
intelleVIEW-CAST	Throughput per strand, Hot metal consumption, Cold billets generated
intelleVIEW-PLANT	Combined data of PLANT – All above parameters
intelleVIEW-EMS	Load Factor, Energy consumption per ton, Abnormal consumption
intelleVIEW-AUX	Auxiliary services status and up time, Energy consumption, Idle running
intelleVIEW-UTILITY	Water Quality, Consumption, Energy, Idle run
intelleVIEW-STOCK	Finished Stock v/s Despatch, Average Conversion, Pending Despatches
intelleVIEW-PUF	Section wise Capacity Utilisation Factor, Break. Down time, Idle Time
intelleVIEW	Consolidated information of all above

intelleVIEW-ROLL



- Production Per Hour
- Energy Per Ton
- Yield
- No. of cobbles
- Rolling time
- Idle Time

Energy monitoring Solution



Material Traceability and Tracking

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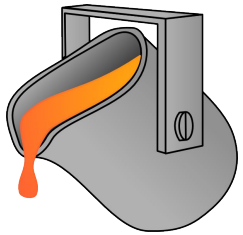
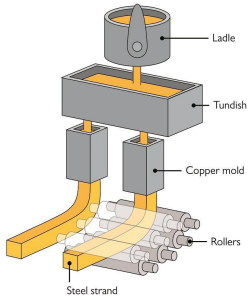
Plant Management – Process Coverage

Utilities – Hydraulics, Pneumatics, Water treatment, …

Scrap Mgmt



Melting



Casting

Reheating

Rolling

Bundling and dispatch

Tracking

Traceability

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Melting - Ladle Tracking

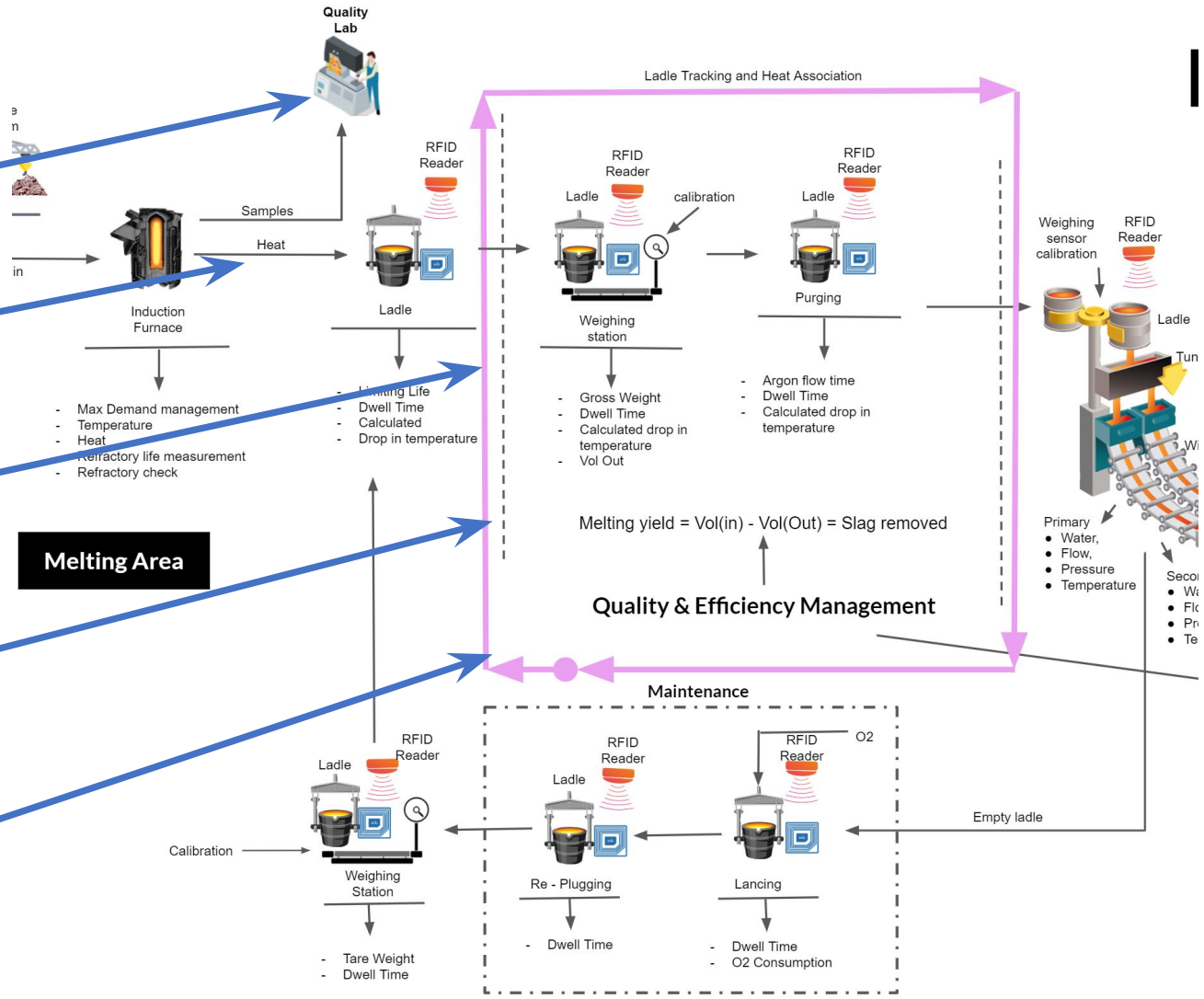
Tracking heat samples taken with bar codes and associating chemical properties to a heat.

Associating heat with a ladle.

Tracking ladle through different stages using a RFID Tag attached to ladle and RFID Readers installed at each of the stages.

Fault tolerant tracking in case of RFID system failure.

Capturing time spent at each stage and time taken to travel between stages for future analysis and optimization.



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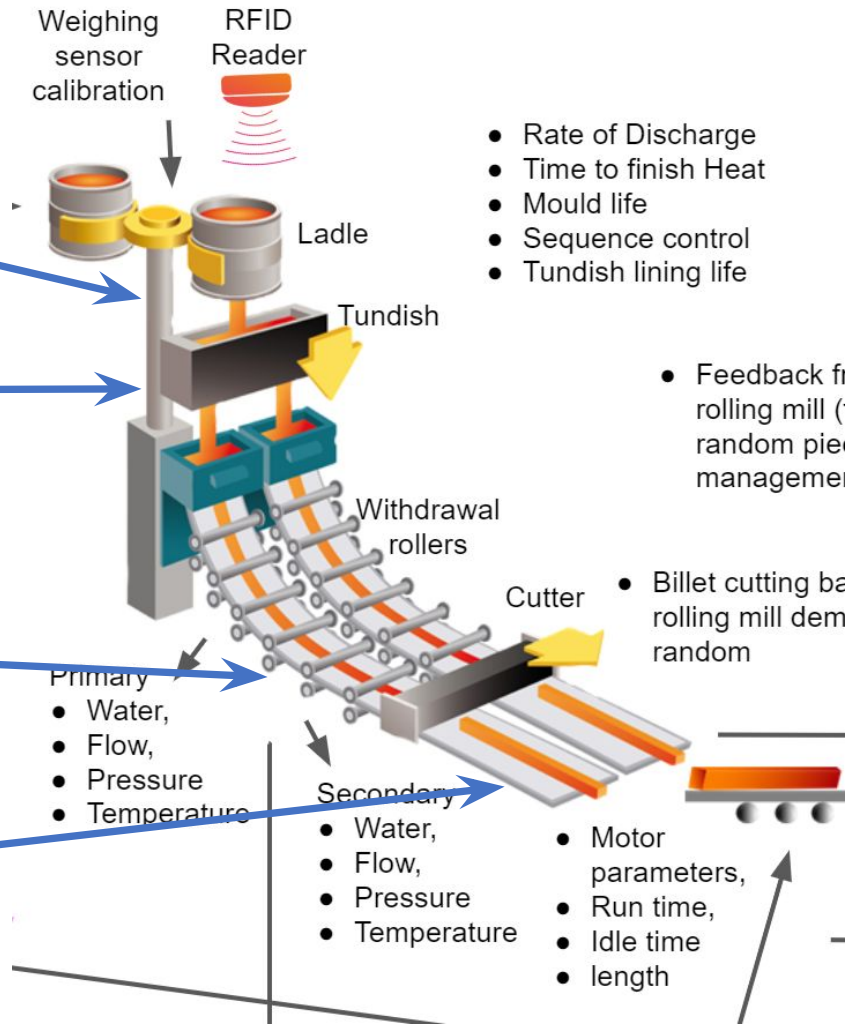
Continuous Casting – Heat tracking & billet sequencing

Tracking which heat is getting poured into Tundish

Using inflow rate and outflow rate, identify when mixed heat and when pure heat is getting poured in casting tubes

Using withdrawal roller speed, casting tube area and length, distance to cutter and other related parameters identify billets and heat association.

Assign billet numbers for billets sequencing and pass on this information to rolling mill automation system for tracking during rolling operation.

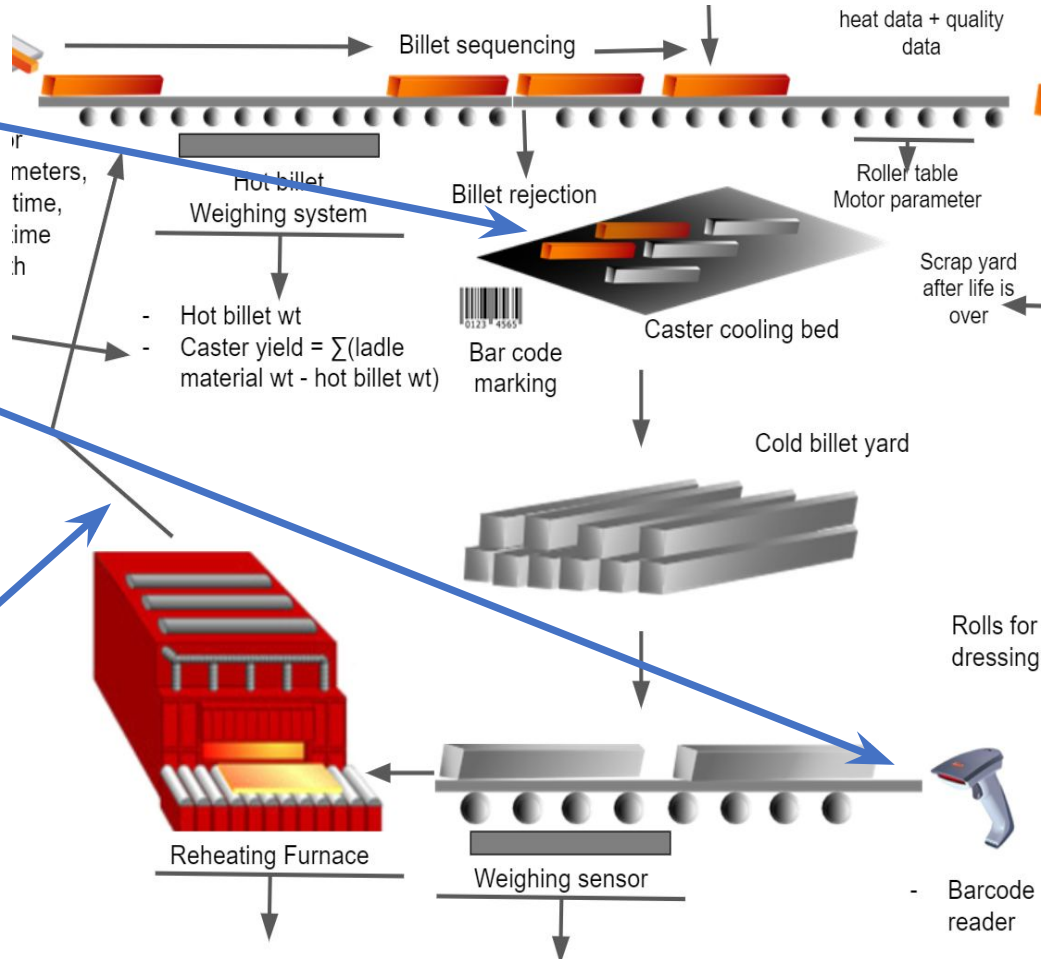


Reheating – Billet identification and heat tracking

Identify billets moved out of the process for later use and tag them with identifier labels.

When the billets come for reheating, identify the billets using their labels.

Identify the billets entering the process after reheating and pass on that information to rolling mill automation system for tacking during rolling operation.



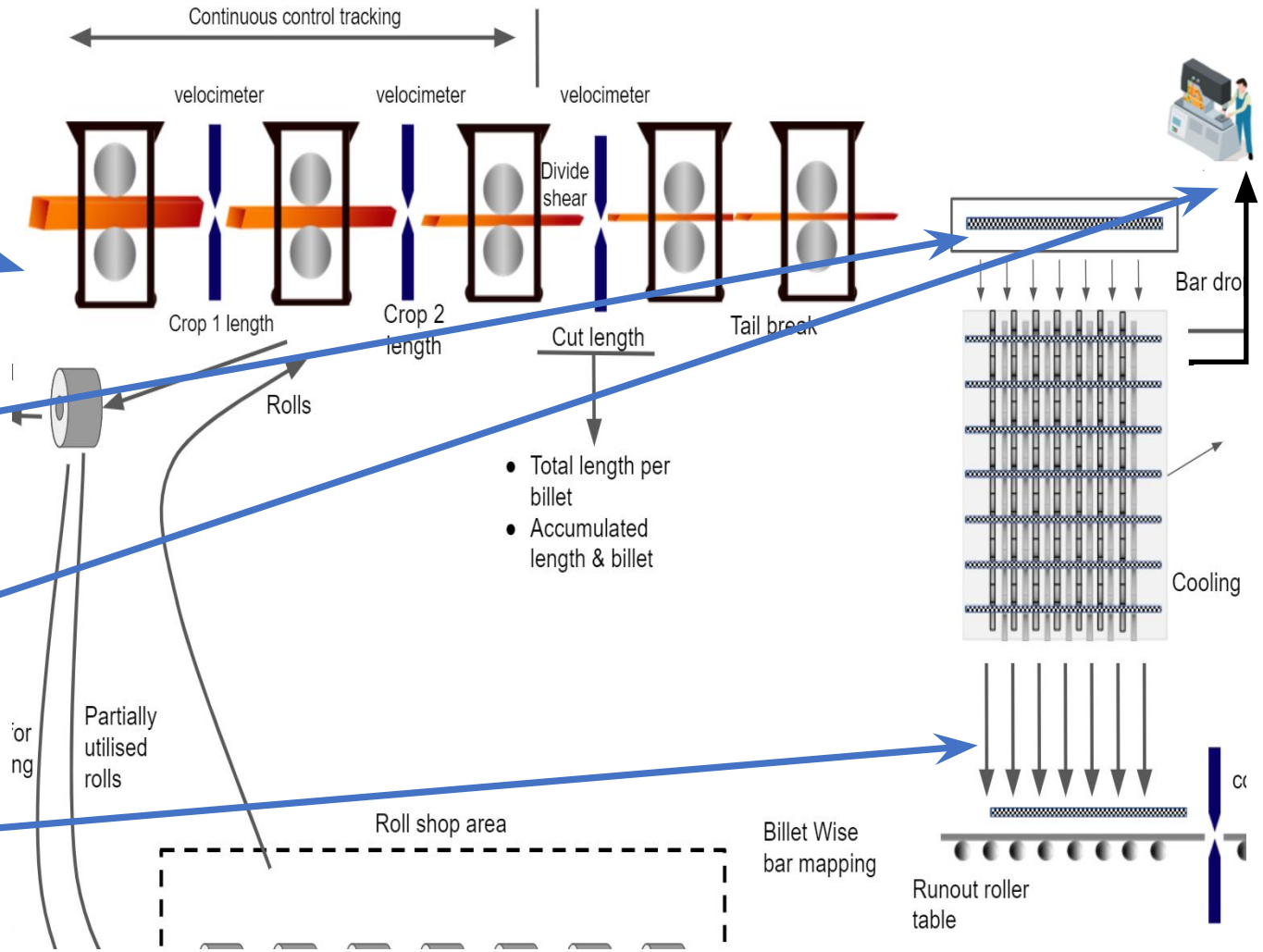
Rolling Mill – Billet tracking

Track the billets and the resulting bars with the billet

Each bar is associated with its parent billet and hence with the heat it belongs to

Associate quality samples results with the billet the bar belongs to.

Keep track of the bar's association when I comes off cooling bed.



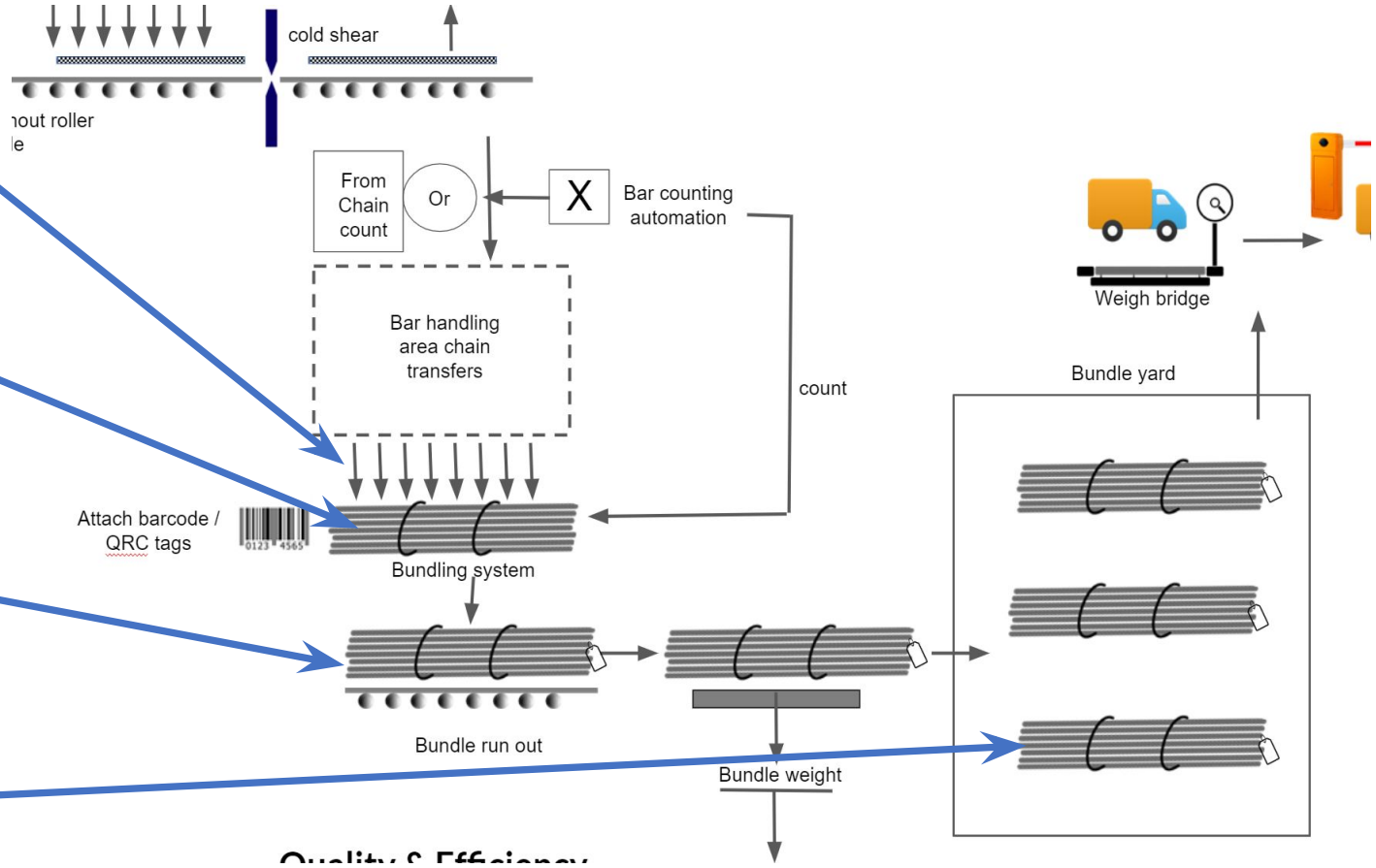
Bundling Section – Billet tracking and tagging

Identify which bars and hence which billets the bundle is made up of.

Generate a Bundle Number and associate it with the Billets and Heats from which the bars in the bundle have come.

Generate a QR Code associated with the bundle number, generate a label for the bundle so that it can be attached to the bundle.

Label is used for variety of purposes, including dispatch accuracy.



Value Addition
Improved Profits

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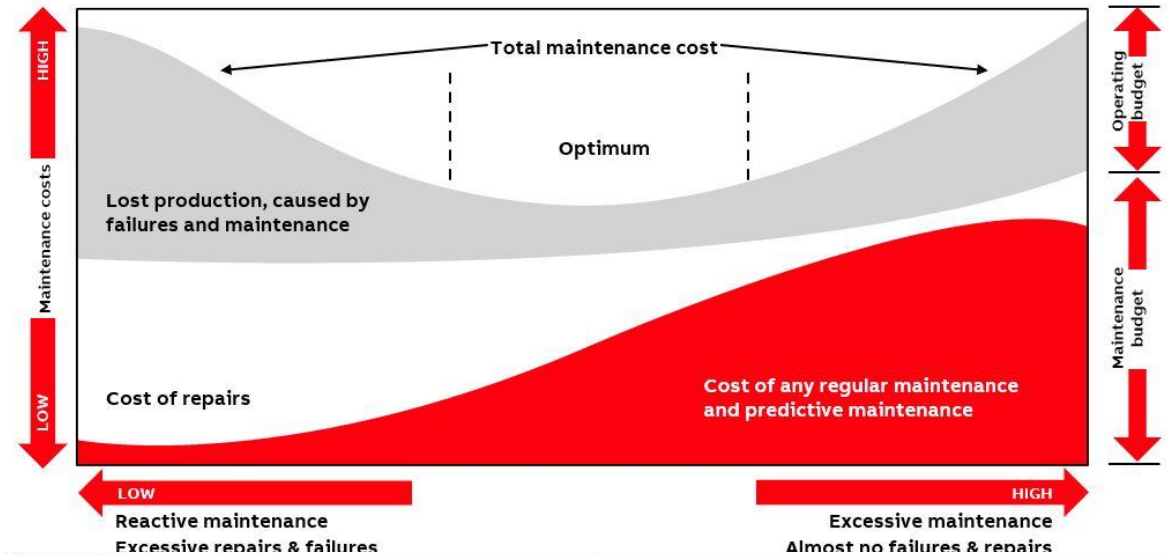
Asset Manager and Maintenance Management

- Auto life calculation
- Trigger Maintenance schedule
- Monitor extended life
- Supplier Quality Analysis

- Maintenance Planner
- Spares inventory management
- Root Cause Analysis
- Maintenance Job Planner



Roll and Guide Shop Management

- Roll Machining schedule
- Roll Life management
- Pairing rolls for optimized utilization

- Guide Shop Manager
- Guide setting and check
- Guide life manager

Yard Management

- Relate Delivery Order to Yard and despatch
- Right bundle to right Customer
- Customer App to download Documents,
  Test certificates
- Traceability for Quality complaints
- Augmented Reality Cloud for mistake proof despatch

Optimisation

- Energy -
  - Fuel
  - Electricity
- Rolling Production -
  - Cobble
  - Crop
  - Random
- Caster Flow –
  - nozzle position with reference
  - To ladle volume
- Melting –
  - Grade Mix and Additives

Smart
Solutions

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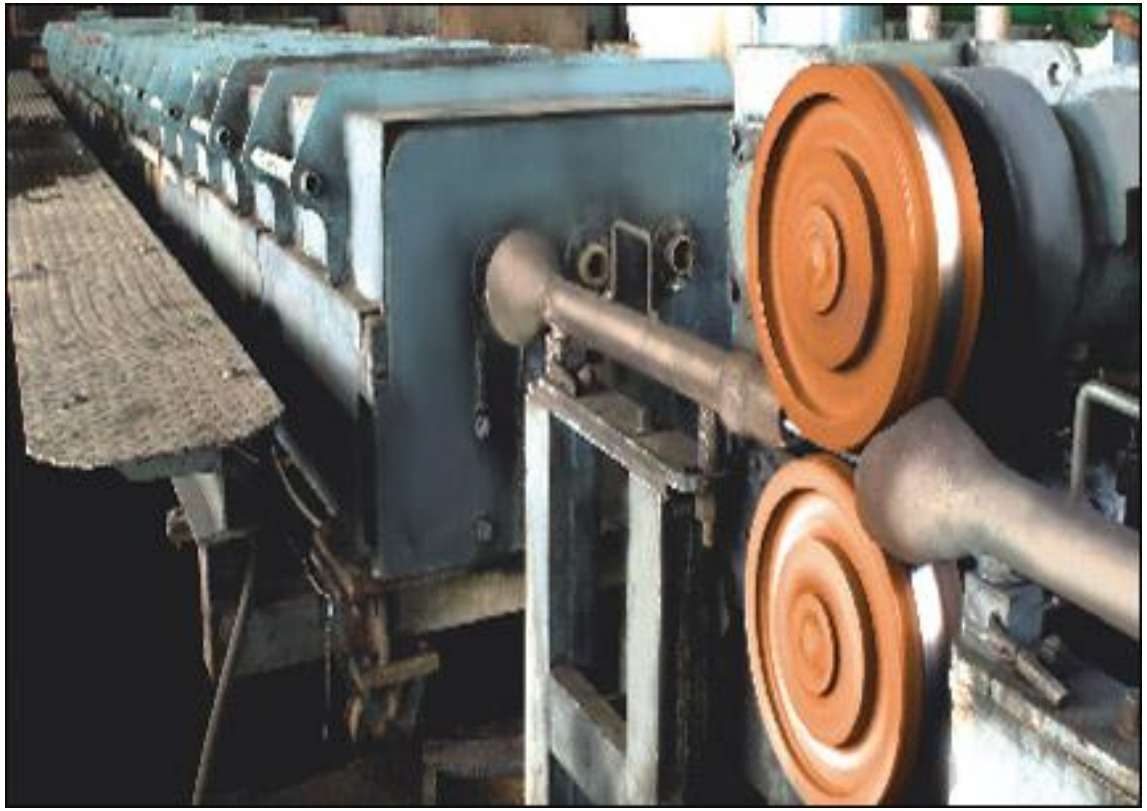
Smart Solutions – smartSEQUENCE

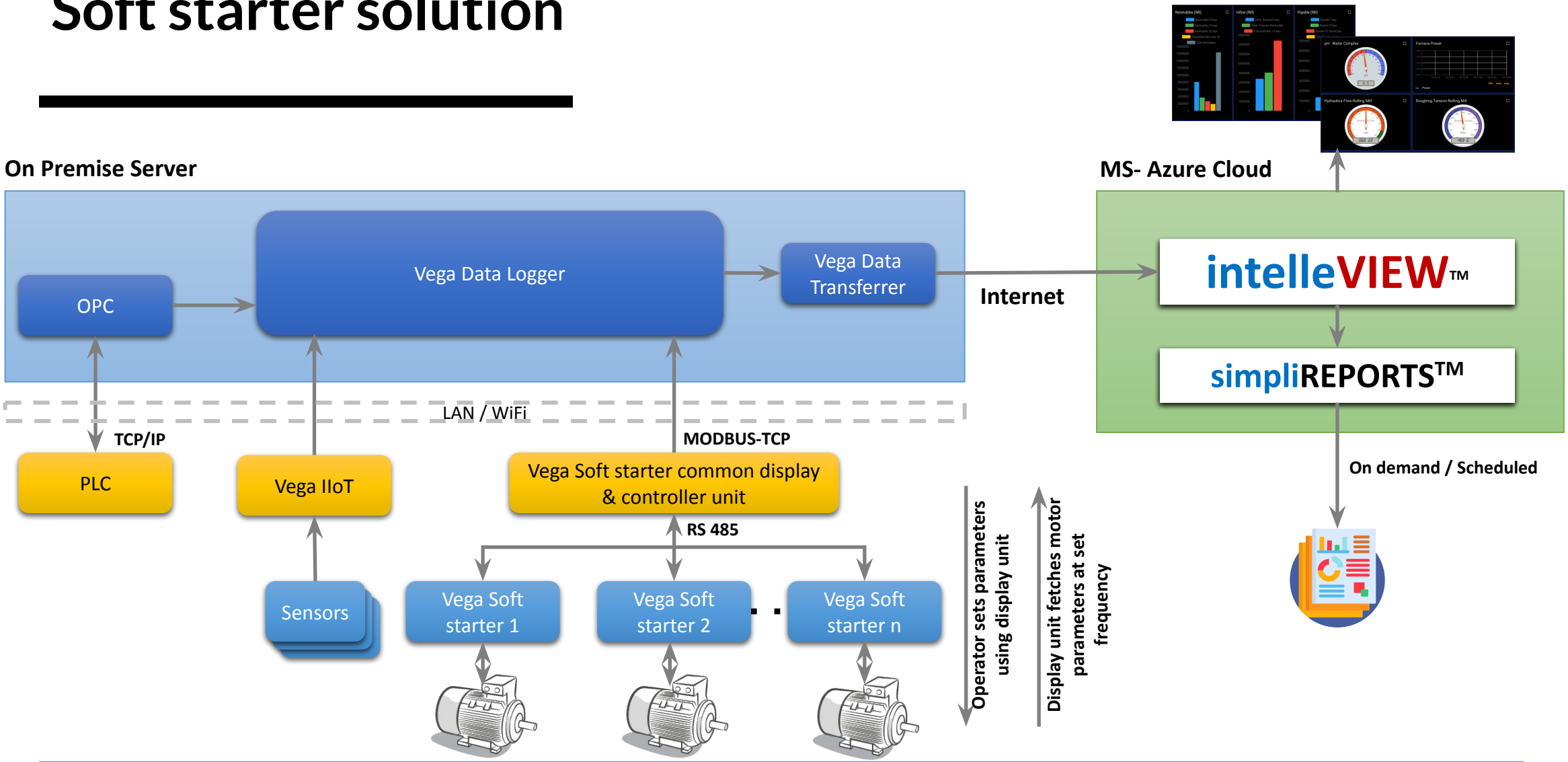
- Billet Sequencing –
  - Optimize Rolling Capacity
  - Minimize cold billets
  - Maximize hot metal use
  - Multiple Casters, RHF inputs
- Benefits –
  - Hot metal consumption increased by 3%
  - Rolling Capacity utilized optimally to increase finished production by 20%
  - Zero manual intervention

Smart Solutions – smartBRAKE

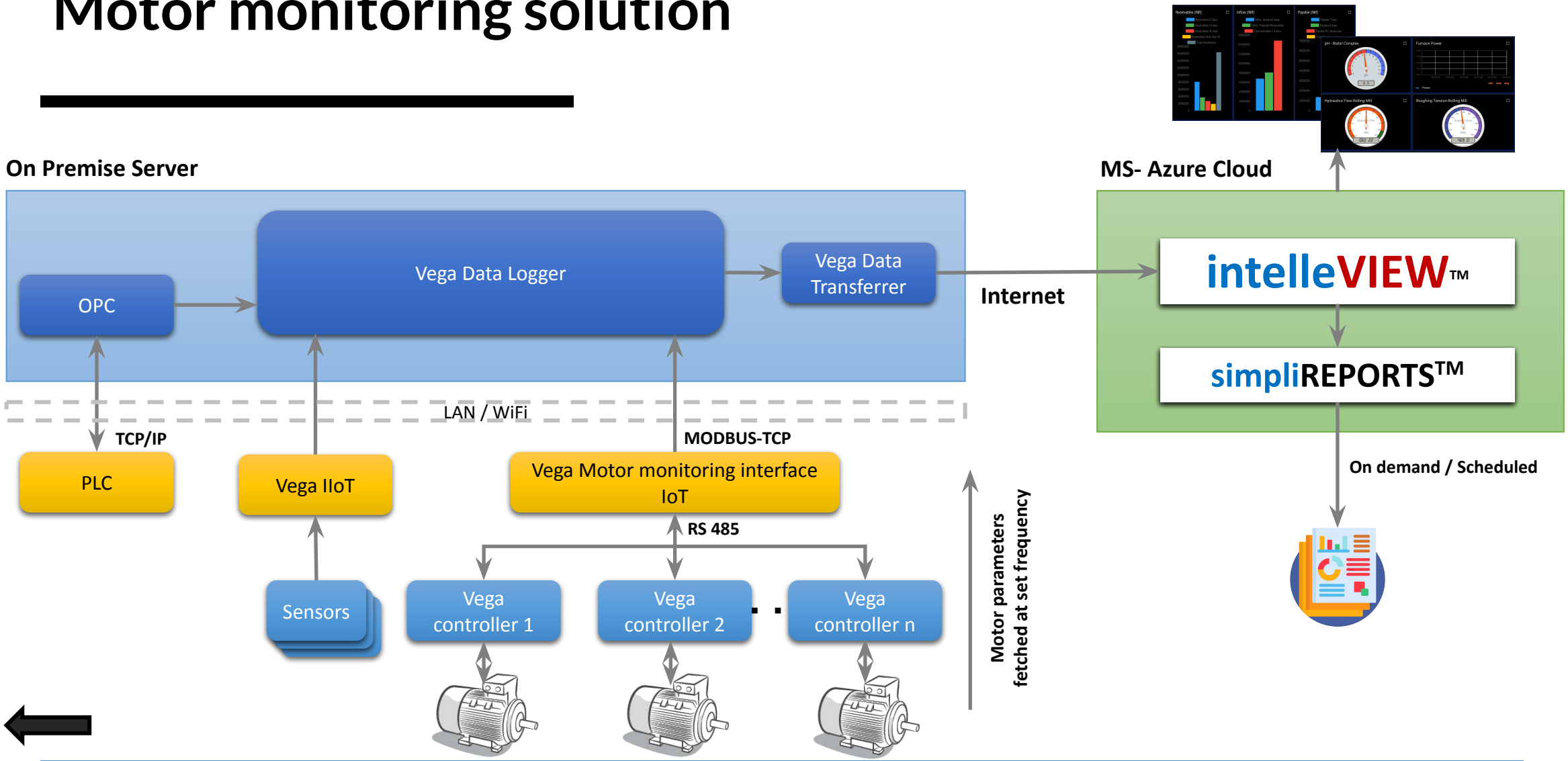
- Bar Handling Automation –
  - Operator free
  - Ensures dynamic corrections
  - Avoids cobbles
  - Ensures ease of handling on cooling bed.
- Benefits –
  - 8 mm speed increased from 18 MPS to 23 MPS
  - Avoided cobbles in Shear to Cooling Bed area



Soft starter solution



Motor monitoring solution



Wrap Up

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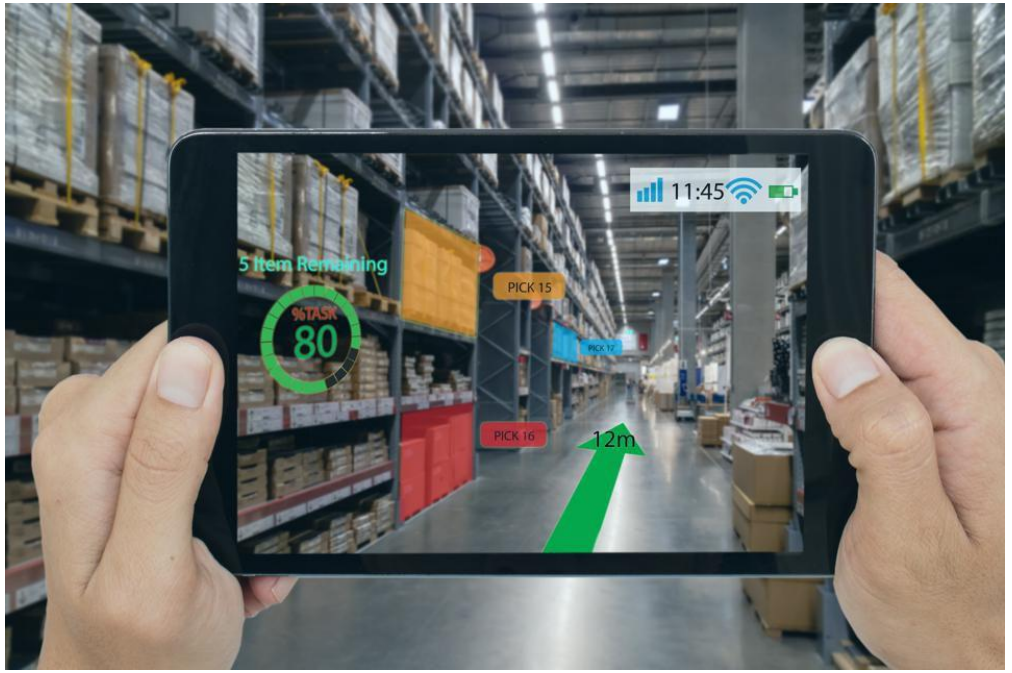
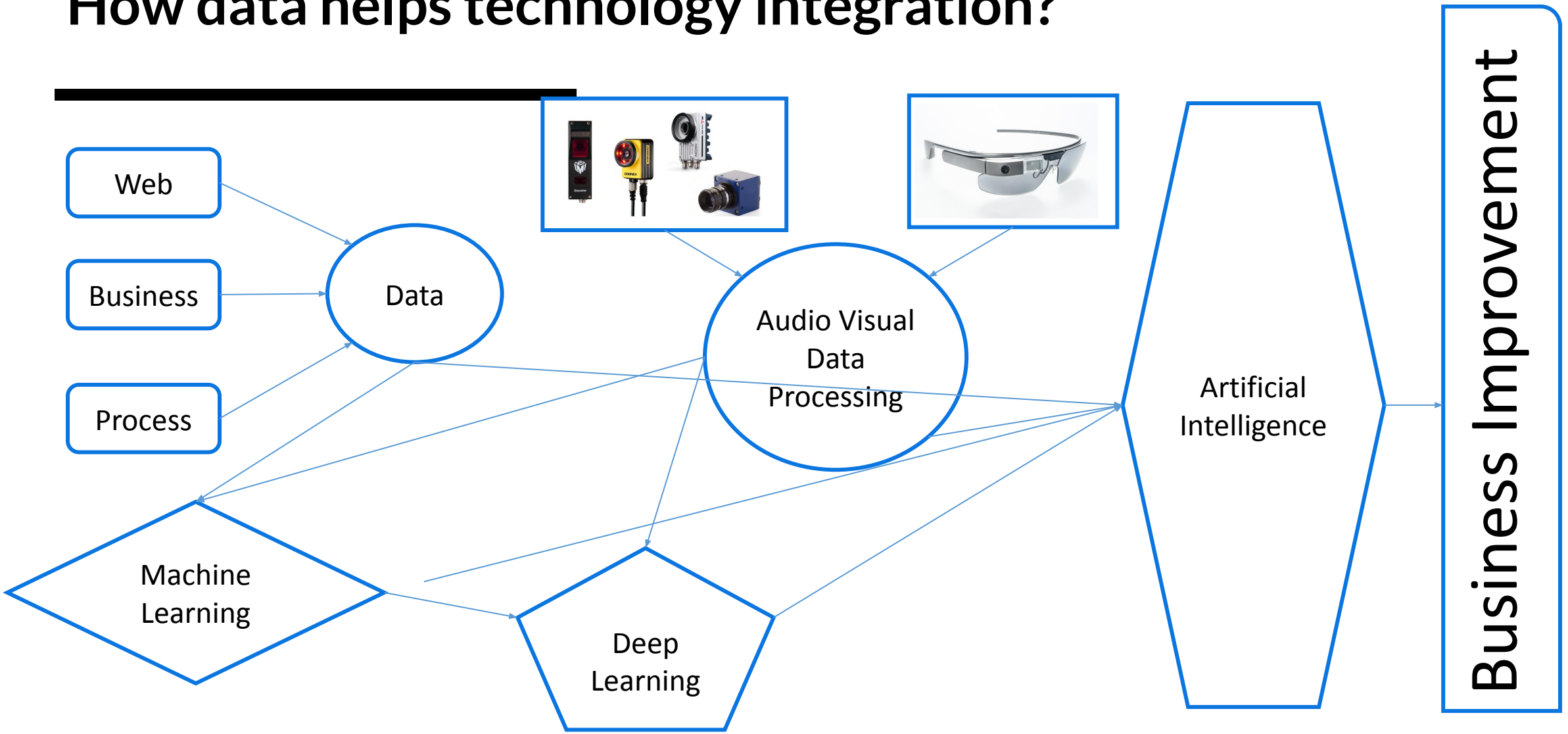
Plant Management Today - Integrated Technology

- Three key areas to drive technology integration
  - Data
  - Vision
  - Sound
- These replace fundamental Human Sensory systems
- Using technologies such as Deep Learning, Machine Learning and Artificial Intelligence will be changing the ball game
- Augmented Reality is going to reduce errors in operation with online guidance and corrections to improve performance



How data helps technology integration?



Key takeaways

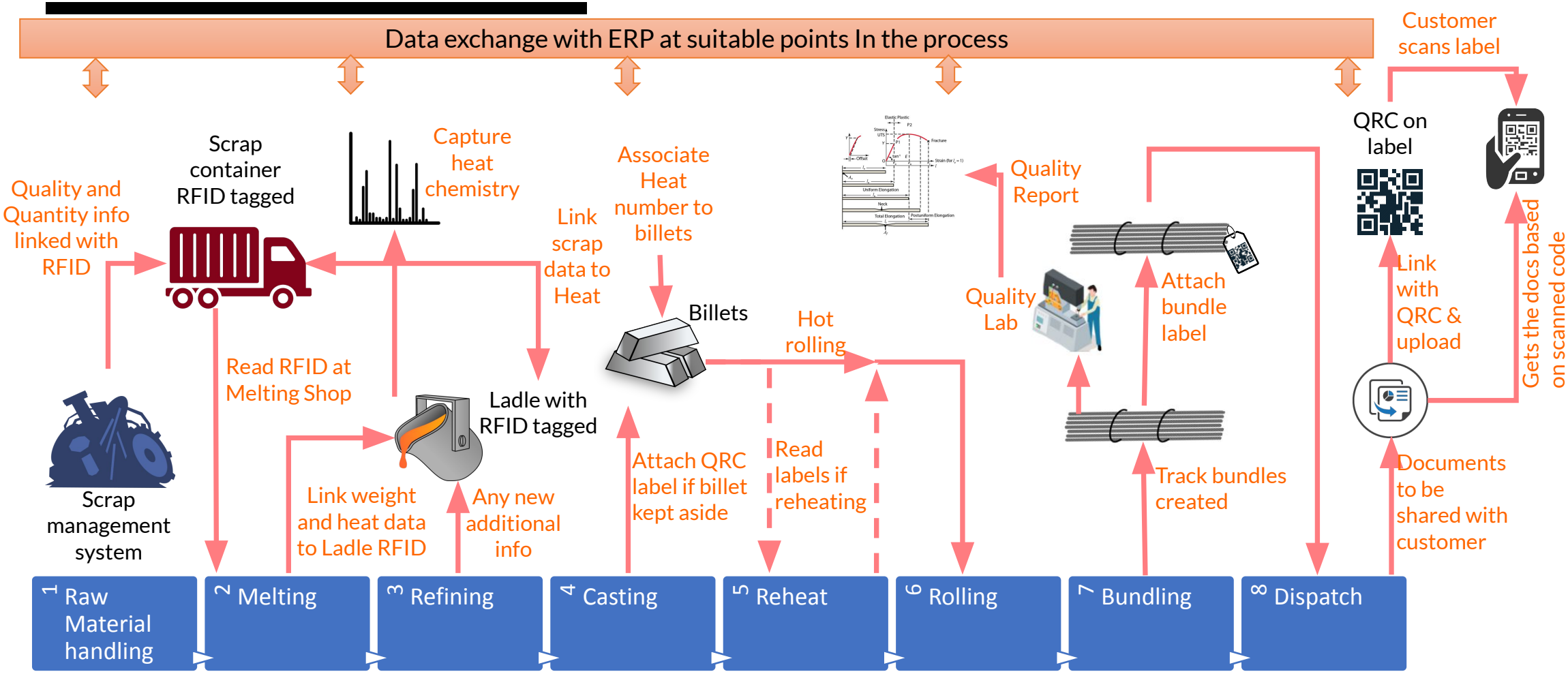
- Zero data entry. Collect all Data from current Process Automation or IIoT.
- Connect all Weighing Machines, Crane weighing systems to central platform through IoT.
- Use temperature, pressure, flow, pH sensors to get on-line values and adjust the processes to ensure uniform quality.
- Link Business Automation with Industry 4.0 to get a complete **Connected Resource Planning – CRP™** - A future step to overcome conventional ERP.
- 360 Degree Business Information

Benefits to Manufacturer - Gist

Ease	Error avoidance	Records
Ease of complying with customer demands	Human error elimination	Quickly accessible digital records

Data mining	Parameter correlation	Customer centric
Patterns & related process improvements	For frequent campaign changes	Avoidance of wrong process and practices

Solution – Plant View



Let us begin the journey together

THANK YOU

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The Vega Group, Pune, India

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