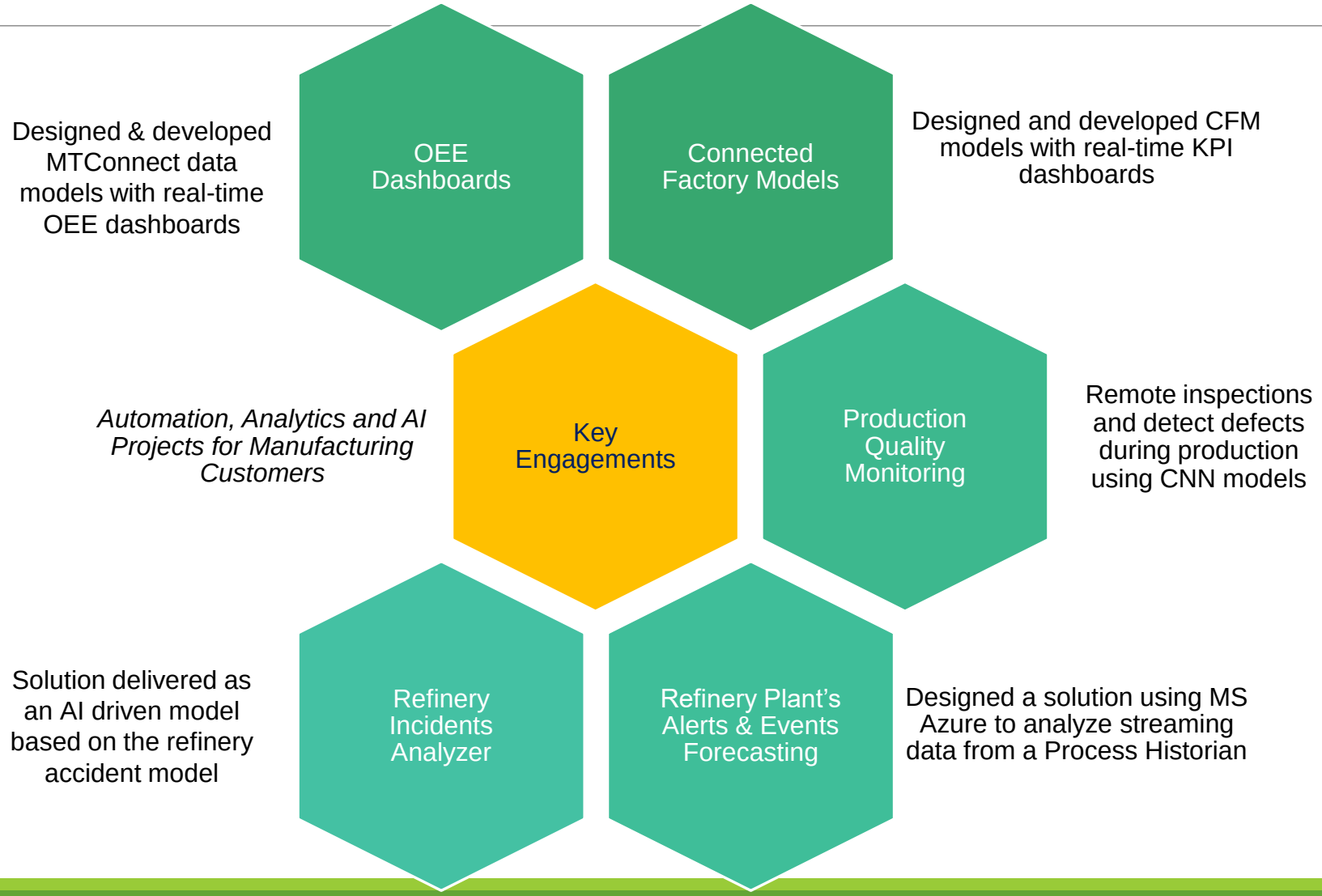
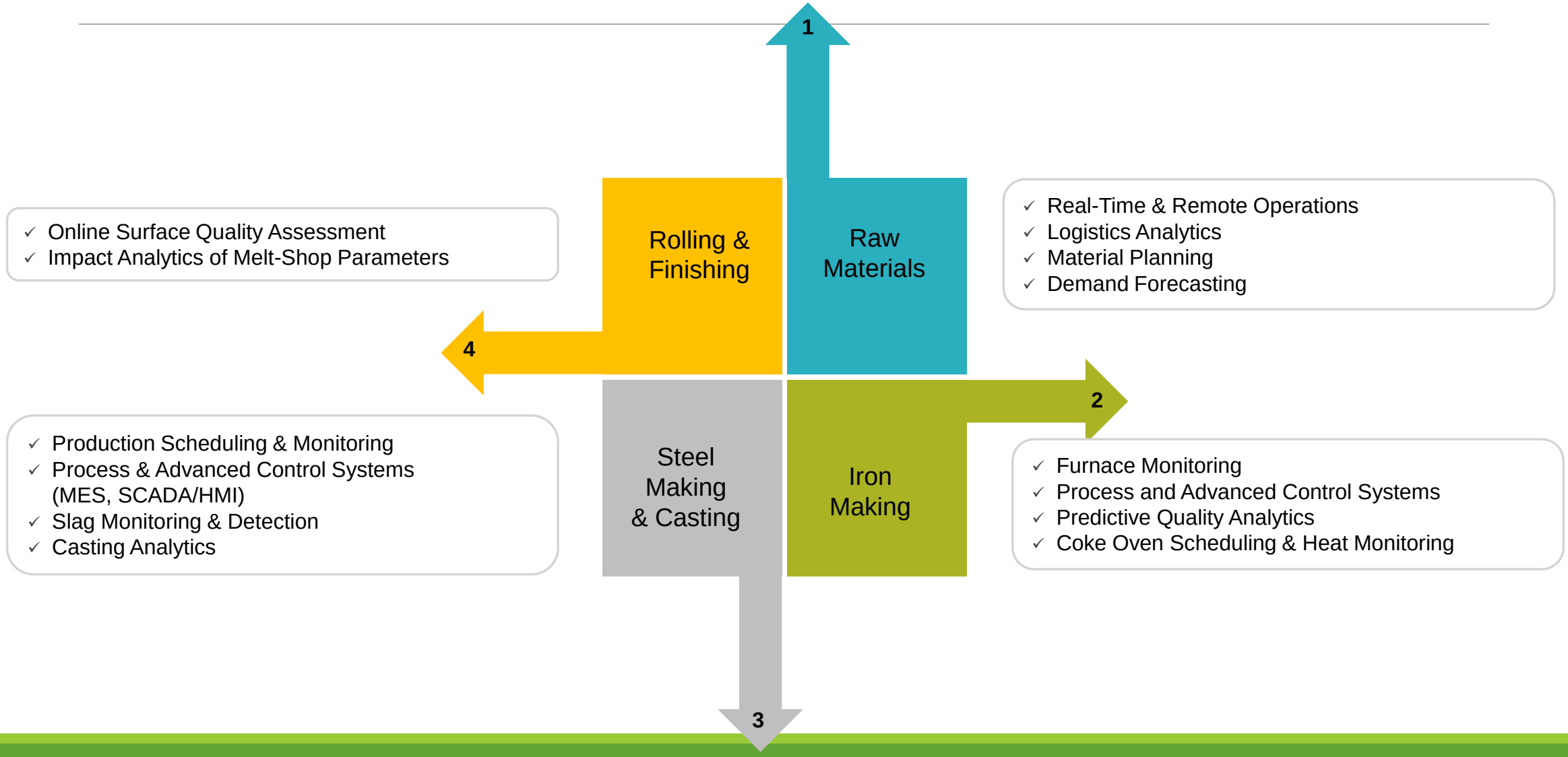
Building Smart & Sustainable Industry 4.0+ Enterprises

Our Manufacturing Experience
Leveraging for Metals & Mining Industry

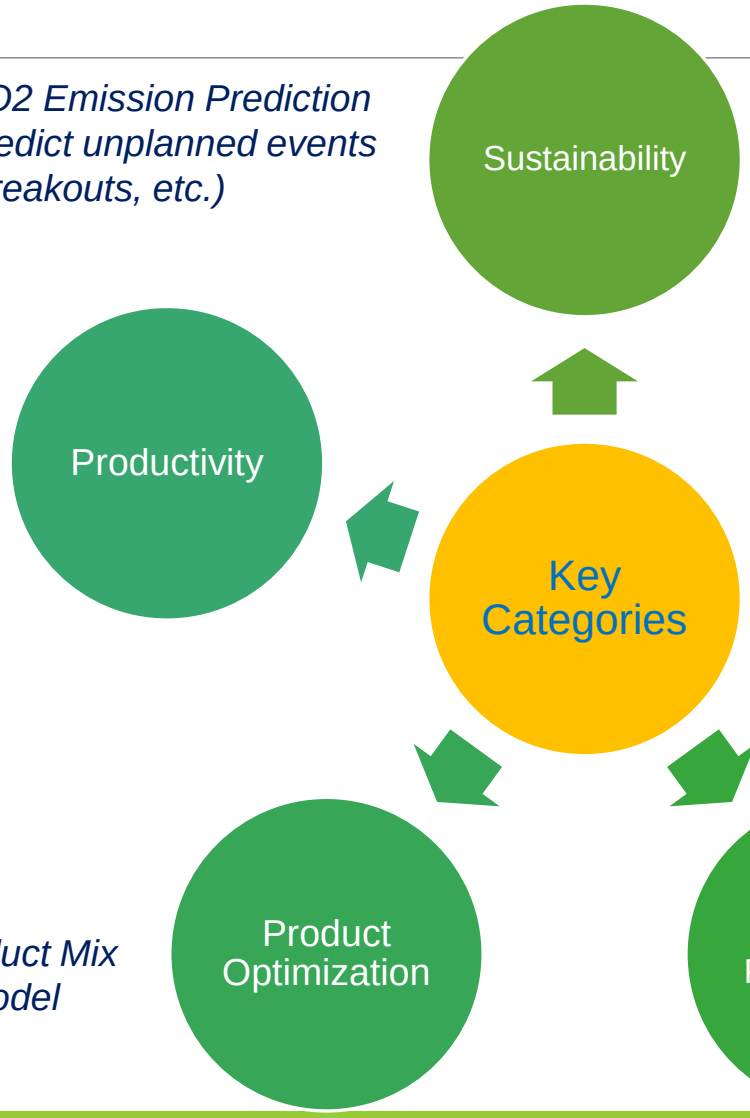


Steel Manufacturing Operations

Applicability of Automation, Analytics and AI



Use Cases for Digital Steel Manufacturing
Automation, Analytics and AI



- ✓ *CO2 Emission Prediction*
- ✓ *Predict unplanned events (breakouts, etc.)*

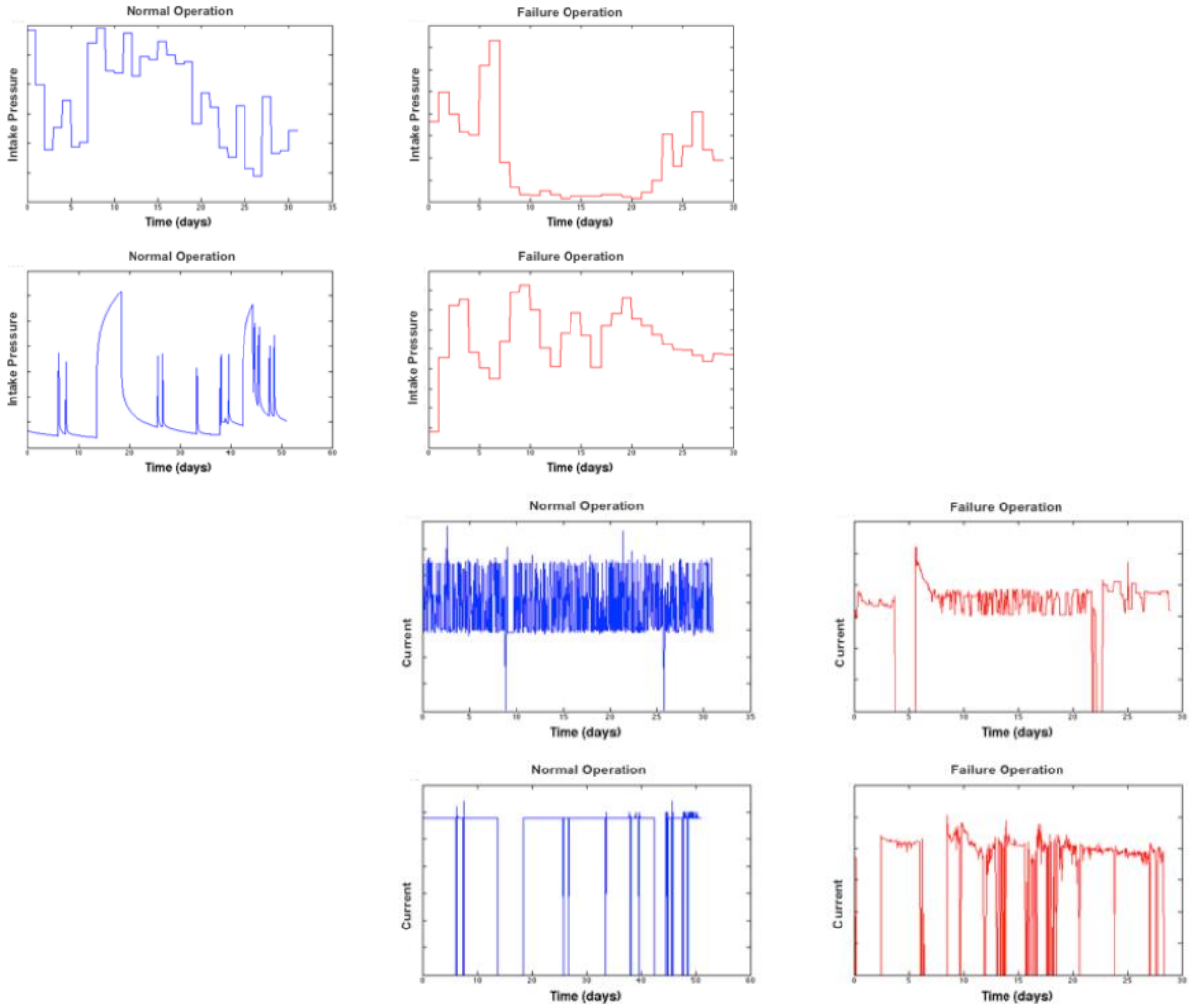
- ✓ *Increase in MTBF and reduction of mean time to repair (MTTR)*
- ✓ *OEE Prediction*

- ✓ *Steel Plates fault diagnosis*
- ✓ *Quality deviations in Steel Coating*
- ✓ *Data Mining on FMEA*

- ✓ *Modelling of Optimum Product Mix*
- ✓ *Ferro-Alloy Optimization Model*

- ✓ *Predict Failures and RUL of Refractory*
- ✓ *Enhancement of Life of Rolls*
- ✓ *Failure Prediction of Critical Equipment*

Example -
Asset Performance Analytics

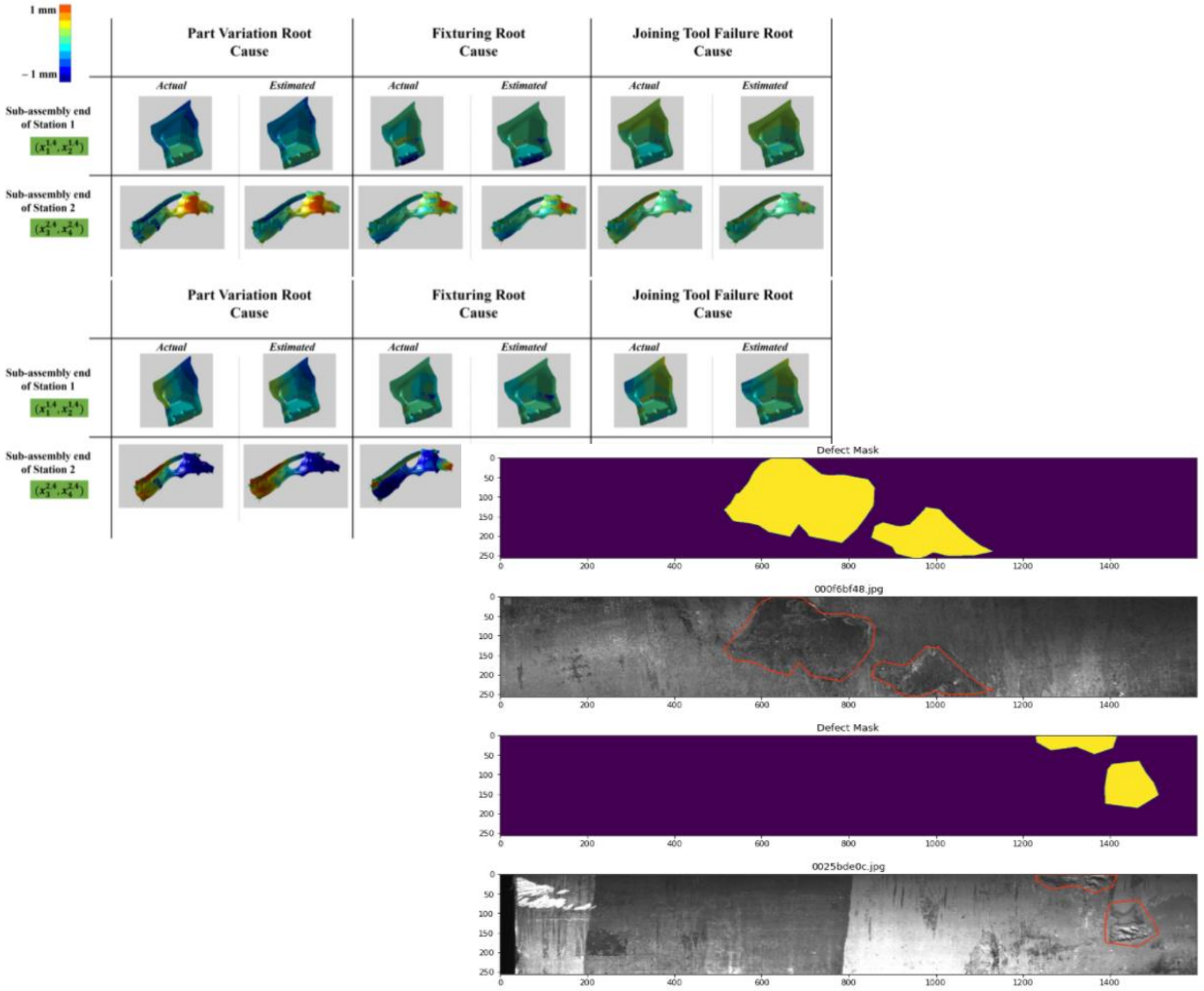


Operational Management – Predictive Maintenance

We can develop on a sandbox model using IBM Watson/KNIME/H20 for asset performance analysis specific to Asset Health Prediction (e.g., ESP, BOP, Boiler, Flowlines, Pipelines, Drill bits, Pipelines, etc.)

- ✓ For the ESP failure prediction, our solution supported a customized ESP Data Template on top of the ESP-RIFTS Dataset
- ✓ Generated Asset Health prediction reports at regular intervals, leverages notification engine for E-mail/SMS for the possible failures,
- ✓ Supported Forecasting/Trends for next 72 hrs. (Planned vs Actuals last 24 hrs.)
- ✓ Solution also supported for What-If Analysis, Reliability Analysis, Mean Time to Failure (MTTF) Prediction, Failure Distribution.

Example -
Defect Detection using Deep Learning Models

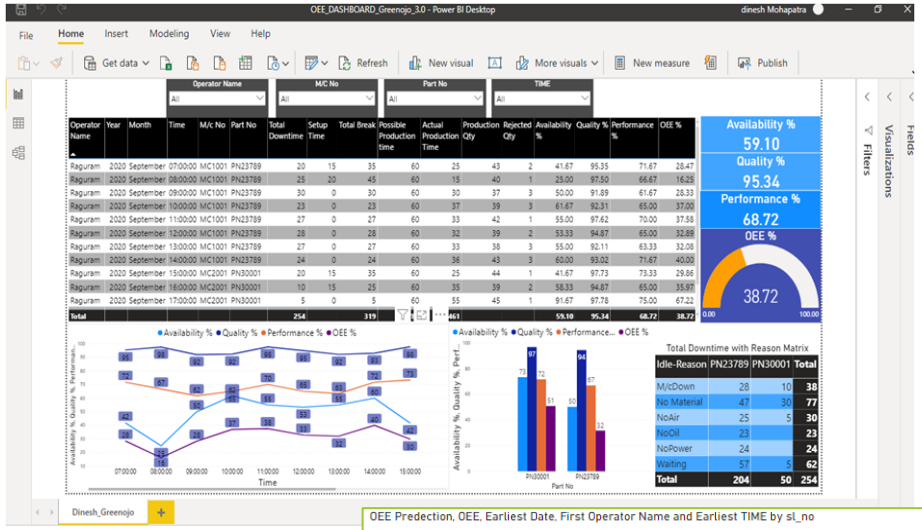


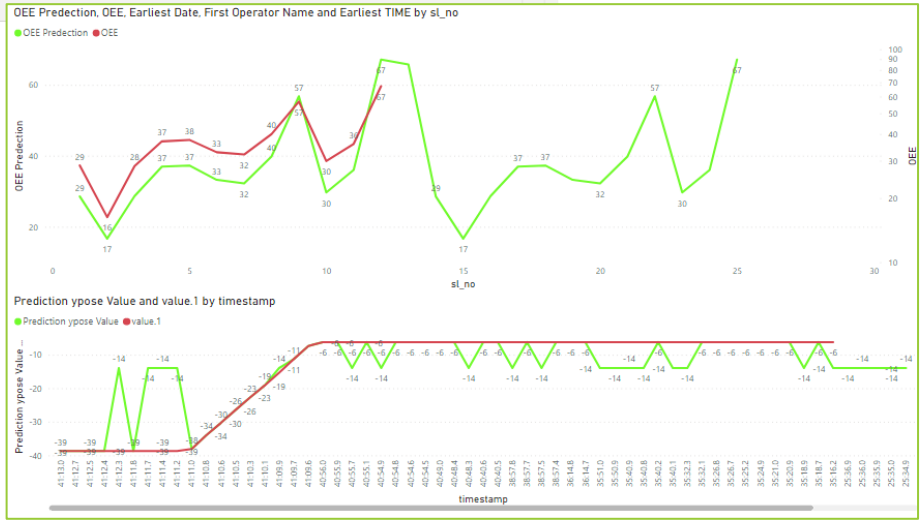
Operational Management – Quality

Solution is built using an open-source computer vision platform to perform remote inspections and detect deviation from specifications (as defects) during production.

- ✓ Defects detection using CNN (Convolution Neural Networks)
- ✓ App-based streaming on inspected items is shared in real-time to the QC team at production site
- ✓ Solution also supports for 3D and AR (Augmented Reality) models

Example -
Real-Time OEE Prediction



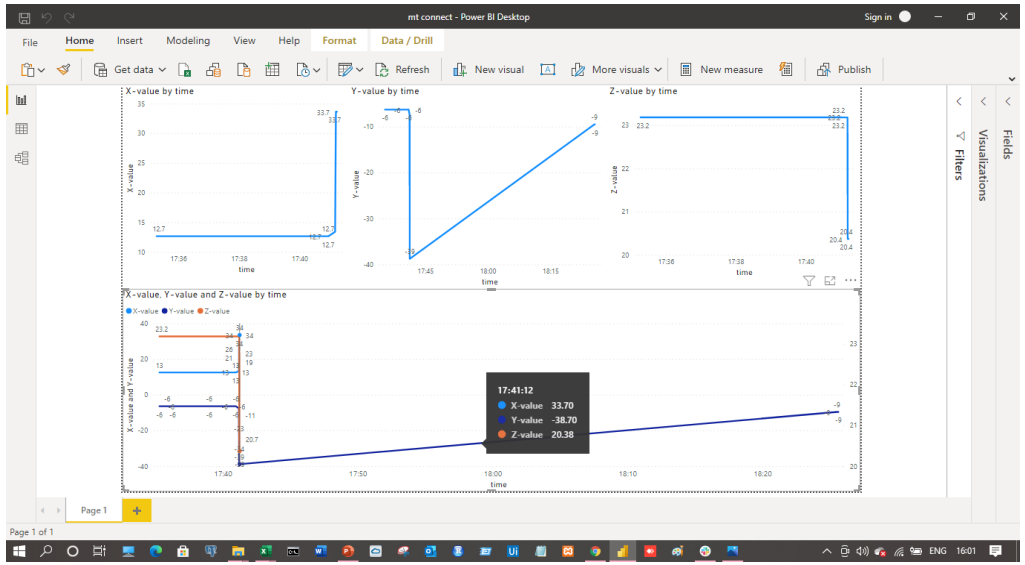


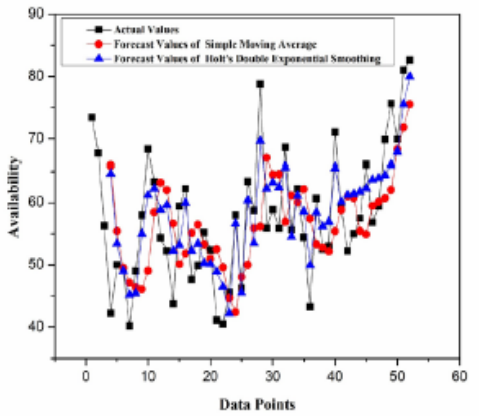
Operational Management – Productivity

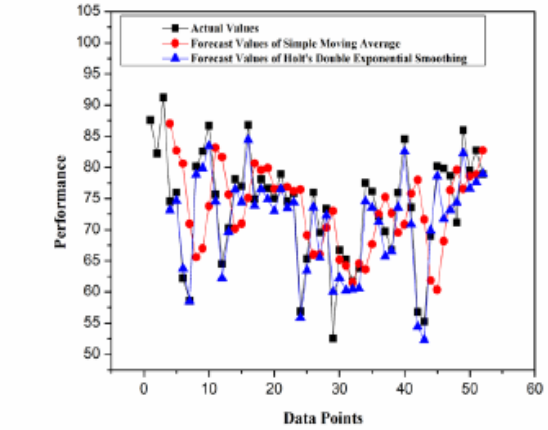
Solution is built on Microsoft PowerApps which helps in instant visualization as well as predictive analysis of production runs at customized intervals.

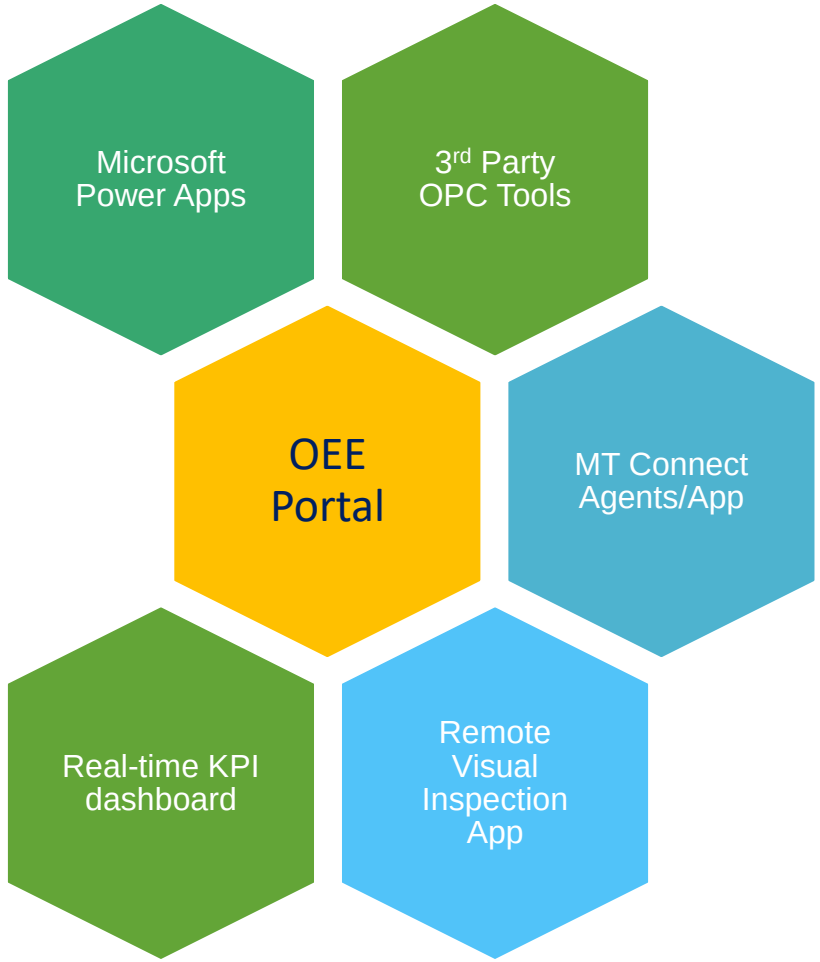
- ✓ The real-time dashboard shows availability, quality, and productivity by - Machine, Product, Order, Shift, and Operator
- ✓ Solution supports for OEE analytics – for trends/outliers, forecasts by Machine, Product, Order, Shift, and Operator between any production period.
- ✓ Solution also supports for MT Connect application using Agents to analyze machine/component health status.
- ✓ We also assist in floor improvement projects using tools as Six Sigma, Lean and TOC

Example -
MT Connect with OEE Prediction Models

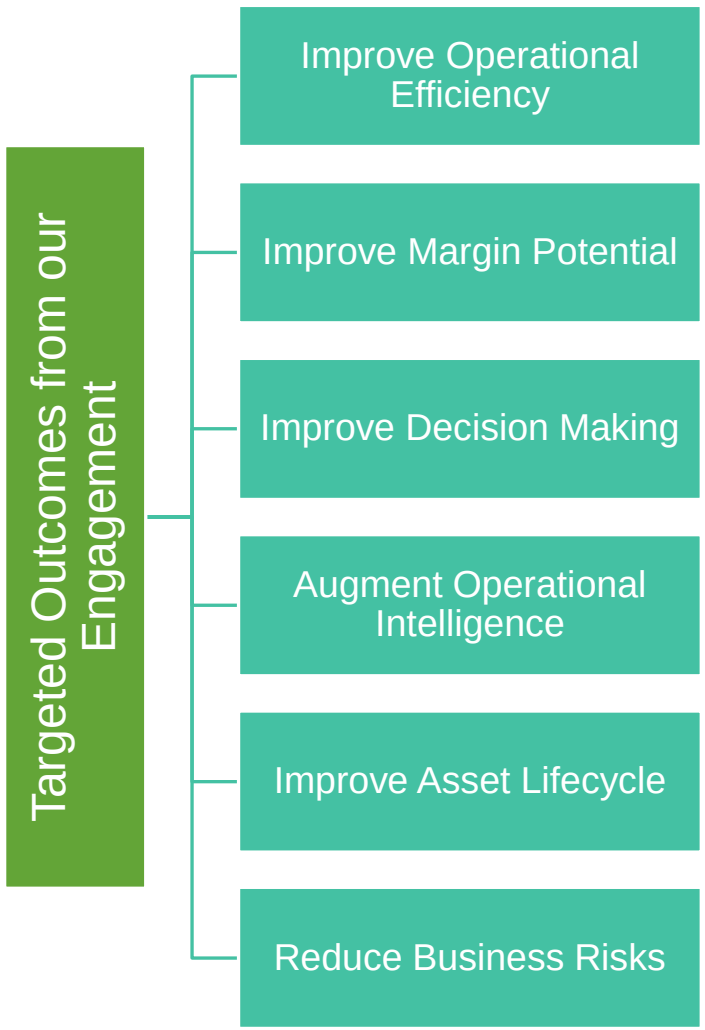


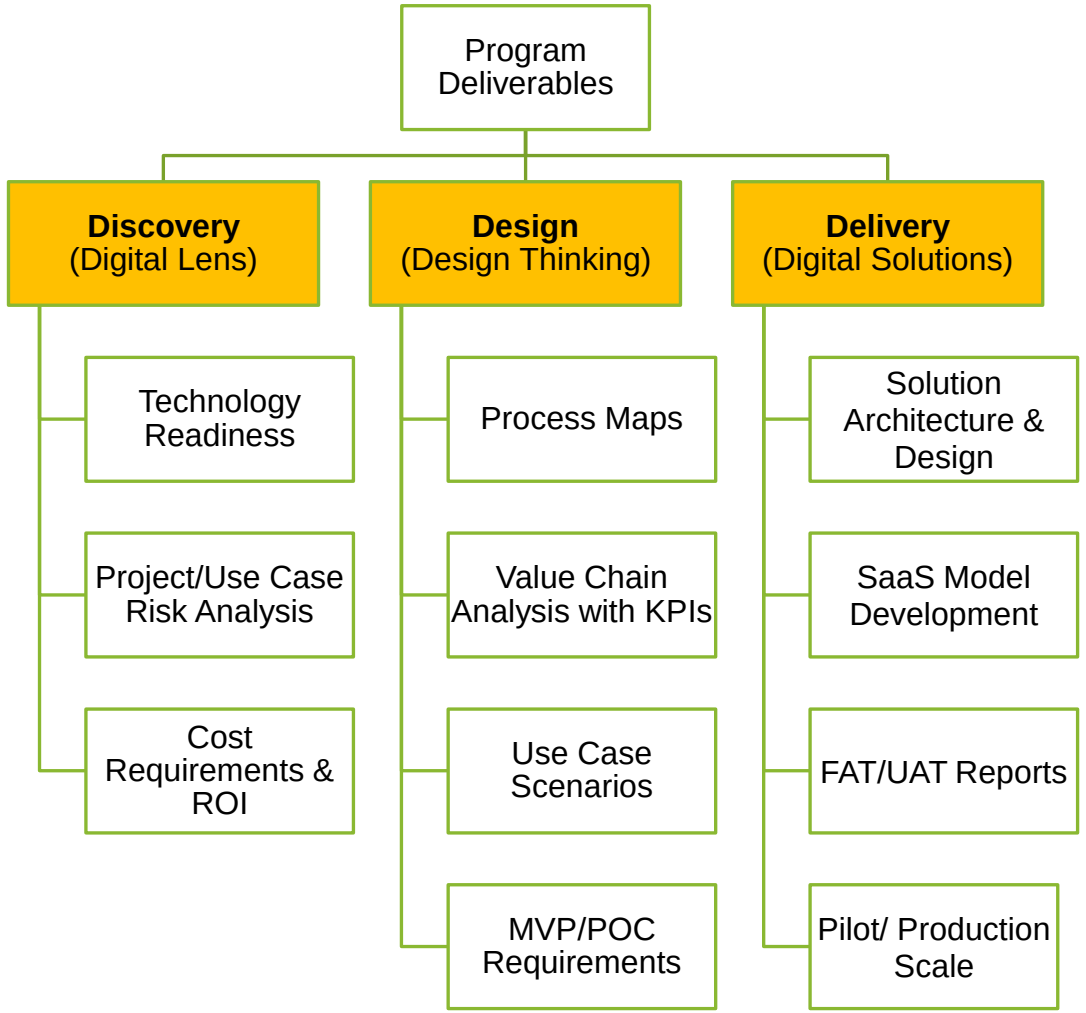






Deliverables
Linking with Program Outcomes





Steel Making Balance Score Card

Linking Use Cases to KPIs/Business Metrics

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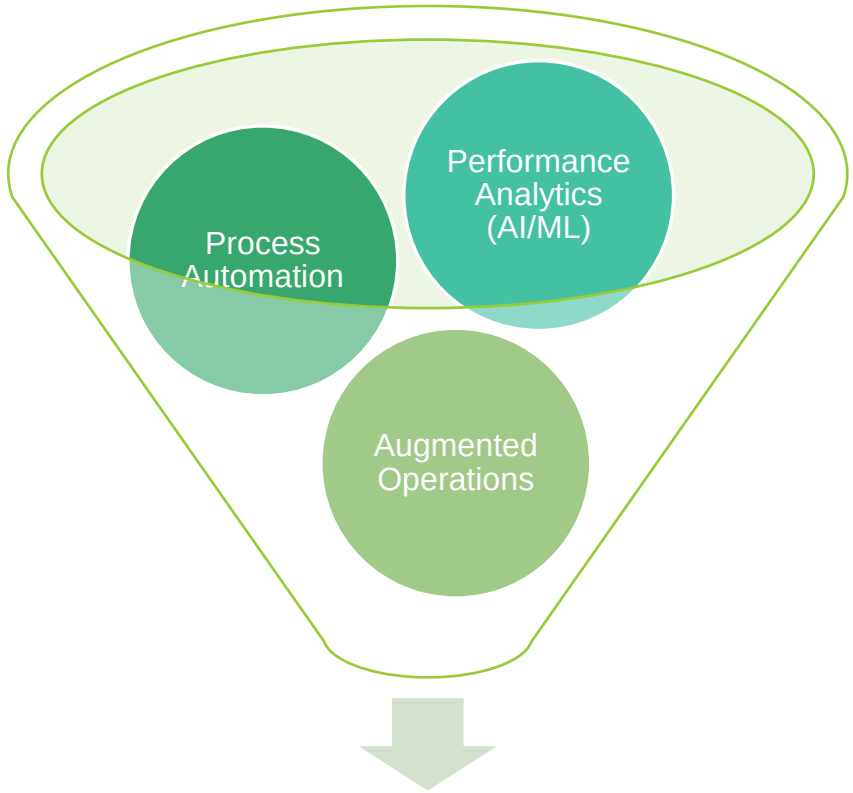
Perspective	Goal	Weight (x of 10)	Description	Performance (%)	Measure unit	Target Values
Process Perspective		3		43.16%		
	Corrosion Decline Ratio	2	This KPI helps in following the attempts taken to minimize the deterioration of the metal	0,7	#	1
	Processes Range	2	It is necessary to know the number of methods which the concerned organization can handle	3	#	5
	Reduction in Process Costs	3		15%	%	100%
	By-products usage Index	3		0,6	#	1
Total Performance in group			**Process Perspective**	**43.16%**		
Properties Perspective		3		35.71%		
	Hardness	3	This parameter gives the degree to which the material can stand penetration	160	kgf/mm?	190
	Ductility	3	This is the property of a metal to know the ease with which it can be rolled in cylindrical structures	0,7	#	1
	Yield Stress	2		50	ksi	100
	Poisson Ratio	2		0,33	Score	0,4
Total Performance in group			**Properties Perspective**	**35.71%**		
Employee Perspective		2		0.452380952		
	% drop in accidents	2	This is a quantitative way of knowing the extent to which the efforts have paid in providing the work-force a safer place to work at	0.6	%	100%
	Number of training sessions held	3	This parameter will go into making the employees aware of safe procedures to handle the equipments and situations. This can be calculated on yearly basis	4	#	6
	Number of Health Check-ups	2		2	#	4
	Labor Turnover due to Safety Problems	3		0.05	%	0%
Total Performance in group			**Employee Perspective**	**45.24%**		
Growth Perspective		2		19.57%		
	Volume Enhancement Ratio	3	This KPI too is an indicator of the way things are operating in the manufacturing process, on an yearly basis.	0,3	#	1
	% contribution to nation's total steel production	2	This parameter gives the position held at the national level.	0.2	%	100%
	Expertise Level	3		8	#	1
	% rise in the operating revenues	2		0.4	%	150%
Total Performance in group			**Growth Perspective**	**19.57%**		
	Total Performance in Steel Making BSC			37%		

Use Cases as Enterprise Assets Repository

Use it as a Sandbox/STEM Lab as part of the Digital Factory

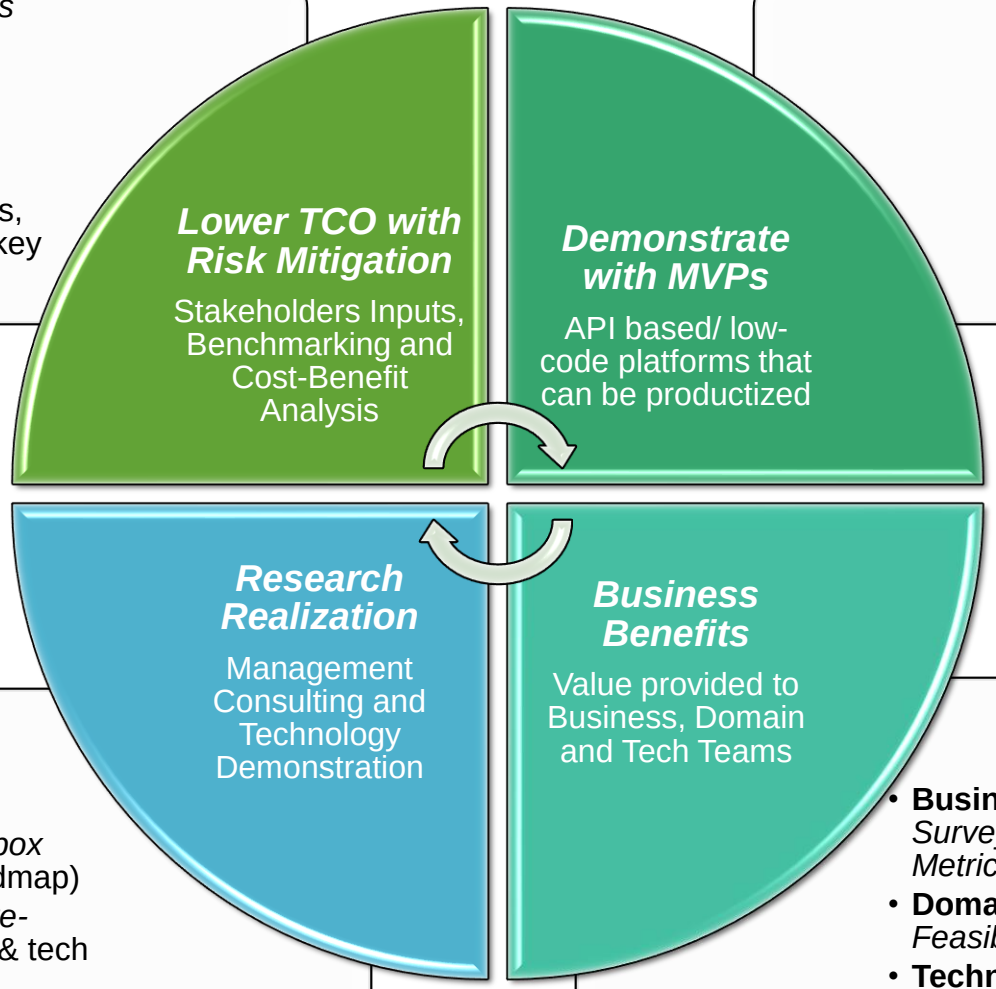


Digital & Connected Factories

Benefits from our Use Case Design Program

Leveraging Digital in Steel Manufacturing Operations

- *Taking feedback from internal as well as external stakeholders* during business assessment, research and surveys
- *Doing benchmarking to find variance in Operations* (Quality, Procurement, Logistics, Vendors, Supply Chain, etc.) will be the key guiding task



- *API Based MVPs* on enterprise no-code/low-code platforms – Microsoft/ Google
- Agile/Sprint based parallel development
- MVPs can be productized as *scale and flexibility will be key in design and development*

- *Management consulting and Technology Design in a single box* (leading to implementation roadmap)
- *All assets can be re-used and re-deployed* by business, domain & tech teams

- **Business** *(Assessment/Research, Surveys, Gap Studies, Performance Metrics)*
- **Domain** *(Process Maps, Use Cases, Feasibility Studies)*
- **Technology** *(Requirement Specs, Tech Stack, MVPs, Roadmap)*

Applied Analytics for Digital Enterprises

Thank You

Greenojo provides Automation, Analytics and AI solutions to enterprise customers

For RFPs, Solutions and Sales/Partner enquiries, connect us at - sales@greenojo.com

Sales Offices

- US/Canada - Houston, TX, USA |Burlington, ON, Canada
- EMEA - Bucharest, Romania| Dubai, UAE | Lagos, Nigeria

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