TATA STEEL

TATA

Survival of the Fittest:
Quality A Key Business Enabler

ISQ 2020 - Quality Month Celebration

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Presentation Flow

A. Ignoring Quality - a recipe for catastrophe

- Case 1: The Space Shuttle Challenger disaster
- Case 2: BP's Deepwater Horizon Oil Spill

B. Total Quality – a strategy for long term competitiveness

- Managing changes in Management Systems
- Quality vis-à-vis Technology infusion - recipe for success
- Competitiveness through Total Quality

C. Embedding Quality Culture in Steel Industry – Tata Steel example

- Challenges in an integrated steel plant
- Building a robust quality foundation - a marathon rather than a sprint
- Tata Steel's TQM framework – integrated though customized across the value chain
- Quality focus – from Inspection to Assurance
- Further strengthening QA – through technology intervention

D. Journey in quest of 'North Star' - Tata Steel example

- Implementation of priority issues

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A. Ignoring Quality – a recipe for catastrophe …(1/2)

Case 1: The Space Shuttle Challenger disaster

The Challenger Space Shuttle exploded on January 28, 1986

- ✓ Caused by failure of O-ring seal [criticality 1 feature] - leading to flames in main liquid fuel tank
- ✓ All 7 crew members perished
- ✓ Financial loss: USD1 Billion

Root cause for O-ring failure:

- ✓ Technical failure
- ✓ Previous warnings and untested conditions
- ✓ Pressure to launch

Cost of re-designing O Ring: few hundred thousand dollars

Quality Rule Broken

- ✓ Critical to Quality (CTQ) analysis considering all failure modes missed
- ✓ Identified risks waived – risk of operating O-ring at very low ambient temperature ignored

A. Ignoring Quality – a recipe for catastrophe …(2/2)

Case 2: BP's Deepwater Horizon Oil Spill

2010: BP's Deepwater Horizon drilling rig explodes - Leading to the **largest environmental disaster in US history**

Quality Failure

- ✓ **Weak cement around the well of the oil rig**
- ✓ **Equipment failures -** Valve failure, gas alarm failure ..
- ✓ **Human error -** misinterpretation of pressure test results

Impact:

Human Loss: 11 people dead
Financial Loss: ~ 10 Billion $
Environmental loss: 4 billion gallons of oil leak into the Gulf of Mexico (wreaking incalculable environmental damage)

Quality Rule Broken

- ✓ **Lack of 'Quality First' mentality** focused on risk prevention
- ✓ **Number of systemic failures** pointing to **erroneous business culture**
- ✓ **Standards** to do a job well the 1st time – **not followed**

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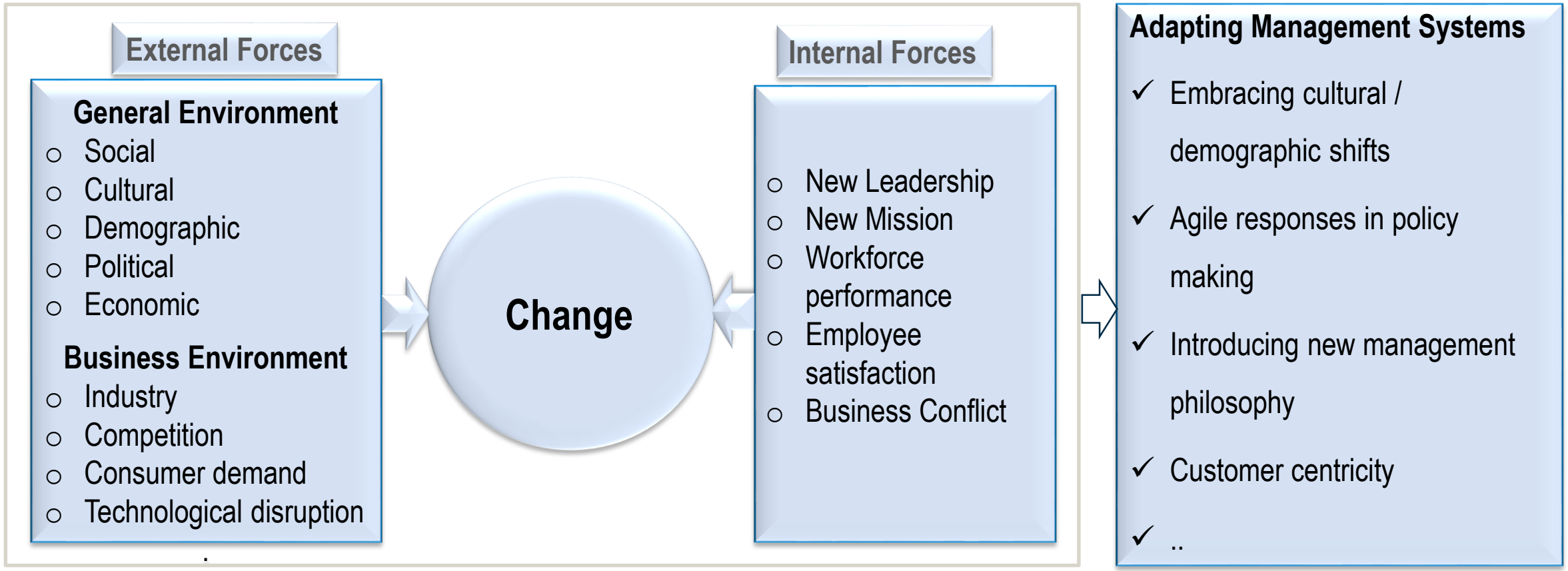
B. Managing changes in Management System



An organization's ability to incorporate quality into every aspect of a change, results in overall product and process quality, with less chance of defects and re-work

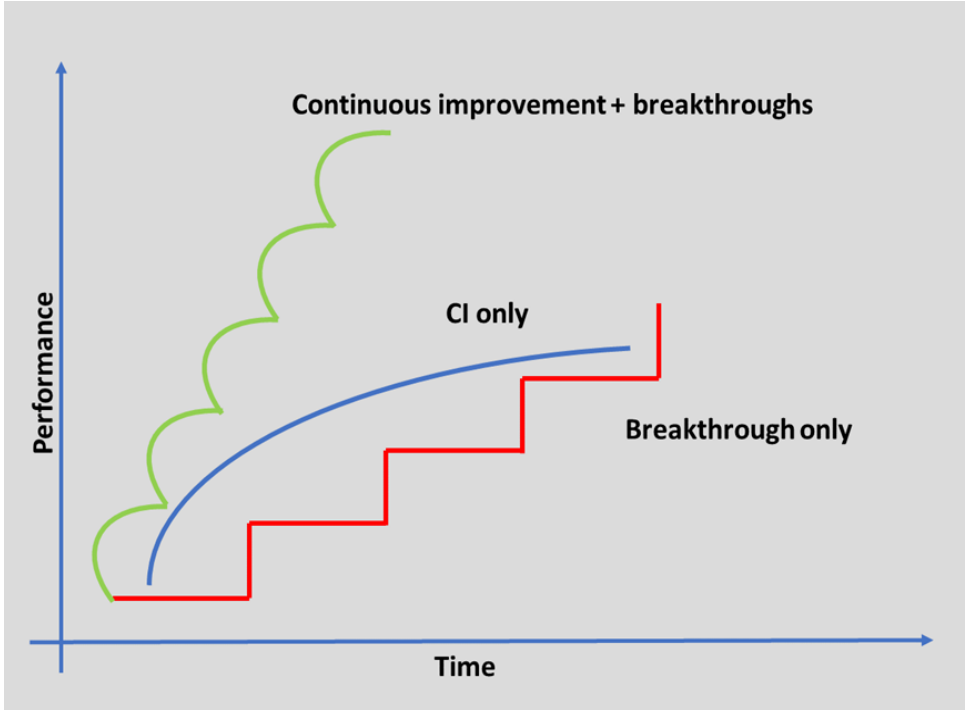
B. Quality Focus vis-à-vis Technology Infusion – striking a balance

Continuous Improvement

- Efficiency enhancement - Quality, Cost, Manpower focus
- Waste reduction - Process, Equipment, Material focus

Breakthrough Improvement

- Throughput enhancement - process automation focus
- Enhanced product/ service quality - advanced and predictive analysis
- New offering (product/ service) through technology focus
- Process Control & Optimization – use of IoT and analytics



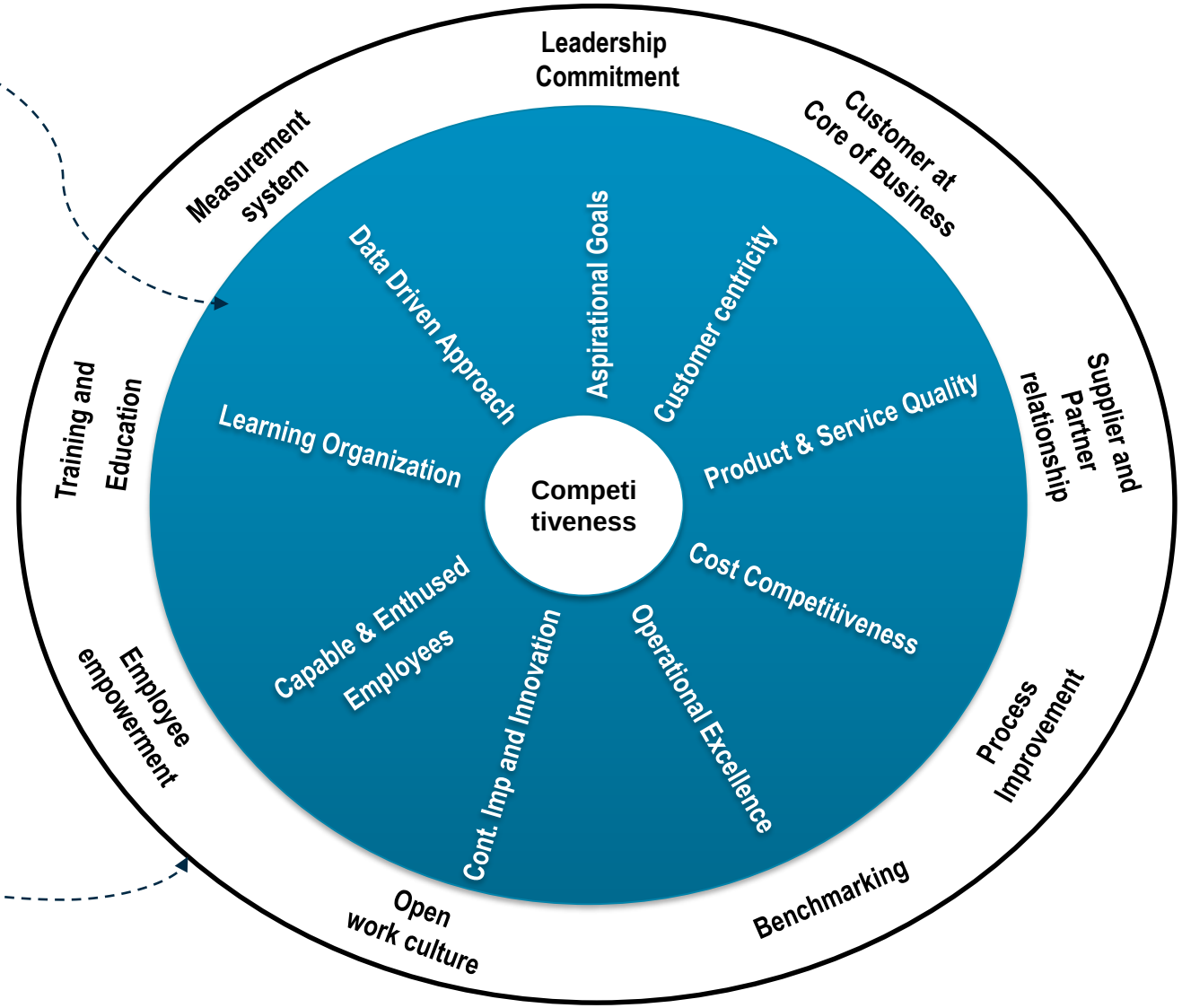
Quality excellence through adoption of available new technologies while ensuring effective management of change to provide decisive competitive edge – a recipe for success

Total Quality Management

B. Competitiveness through Total Quality Management (TQM)

- Technology is one of the elements in a broader quality transformation.
- To stay competitive and excel in quality management, a multifaceted approach is required that addresses strategic, technological, operational, employee related and cultural, issues.

Total Quality Management gives a strong foundation to address these requirements.



Key enablers of competitiveness and factors of TQM complement and co-exist

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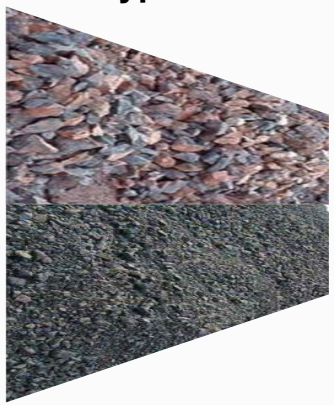
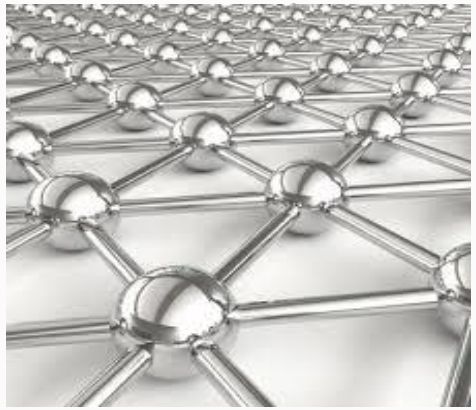
C. Inherent challenges in an integrated steel plant ---

Tata Steel's integrated value chain:

Raw Material Mining	Iron & Steel Making	Rolling	Channel partner	Customer
7 Types of RM	1 Hot Metal	300+ Steel grades	1000+ Distinct products	12000+ Distributors / dealers





Touching over 2.3 Mn end consumers

- B2B
- B2C
- B2ECA

Nos. are for Tata Steel value chain

Key Challenges:

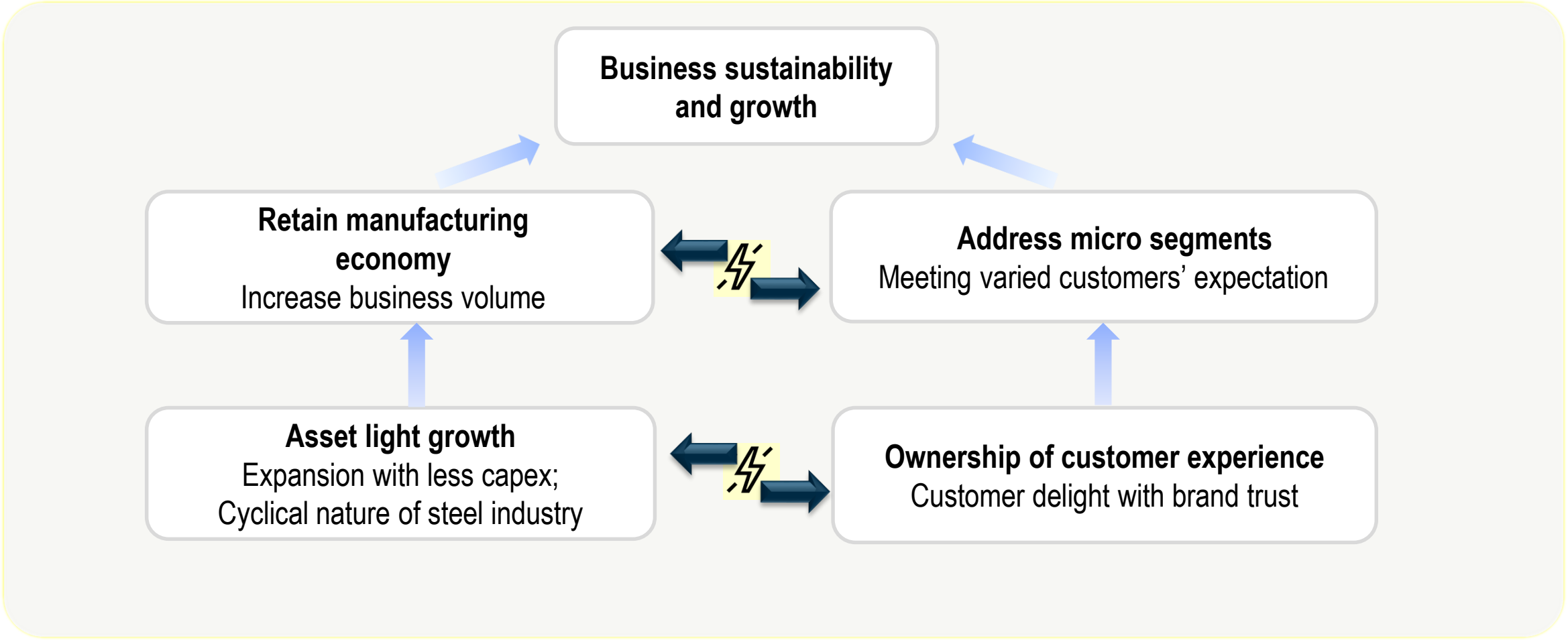
- Heterogeneity -> Homogeneity -> Heterogeneity
- Complex value chain
- Managing **Trilemma**
- Labour intensive operation
- Varied people skill

'Trilemma' – the Quality, Cost and Longevity conflict:

- Stringent **Product & Quality requirements** of the customer
- Economical production to **remain cost competitive**
- Managing input raw material (captive) while **conserving mine life**

B2B: Business to Business; B2C: Business to Customer, B2ECA: Business to Emerging Corporate Account, RM: Raw materials

C. --- coupled with management of conflicting requirements ---



…..Addressed through unwavering focus on Quality…

C. --- building a robust quality foundation - a marathon rather than a sprint ---

TQM Response

Business Need

6	**Seeking world class - reimagining the future** 2013 & beyond	• **Digital Value Acceleration** • **Innovent**: Promoting consumer-in innovation • **Shikhar25**: Accelerating improvement through benchmarking with best-in-class
5	**Seeking world class** 2009 - 2012	• Benchmarking, Expert creation • Quality focus - **Corporate Quality Assurance** • **"KVHS"**: a focused problem solving approach
4	**Global outlook, Growth** 2005-2008	• Integrated **TQM framework** • Customer: awareness to delight: RVM & CVM, Theory of Constraints, Supplier Management
3	Cost competitiveness 1997 - 2004	• Launch of ASPIRE- 6$Sigma$ • Total Operational Performance (TOP) • Measuring effectiveness through TBEM
2	Modernization of mind 1992 - 1996	• Quality Projects, TPM, Value Engineering • Introduction of Tata Business Excellence Model (TBEM)
1	Standardization 1988 - 1991	• ISO, Quality Circles, Improvement groups

Excellence
- Enhancing **customer experience**
- **Value discovery thru' digital, innovation**
- **Codifying the Tata Steel way**

Development
- **Value chain focus**
- **Operational efficiency**
- **Employee involvement**

Awareness


Industry leader TBEM2015, 2018


DGP 2012

DAP 2008


JRD QV Award 2000


PM's Trophy

(11 times since inception; back to back for 2014, 15, 16, 17)

Tata Steel, Kalinganagar – **India's first and only Industrial Lighthouse** *(World Economic Forum, 2019)*

KVHS: Kar Vijay Har Shikhar, RVM: Retail Value Management, CVM: Customer Value Management, TPM: Total Productive Maintenance, ISO: International Organization for Standardization

C. --- enabled through the TQM framework - a common lexicon across the value chain

Focused Methodologies	TQM Vehicles	Review & Assessment
• Problem Solving & Task Achieving • Kar Vijay Har Shikhar (KVHS) / Shikhar 25# • Theory of Constraints (TOC), CCPM • Knowledge Management • Retail Value Management • Supplier Relationship Management	Policy Management Daily Management Cross Functional Management *[Quality Assurance]* Small Group Activities & Suggestion Management	• Tracking & review mechanism • Periodic assessments

Standardization *(Systems& Processes)*

Education & Training

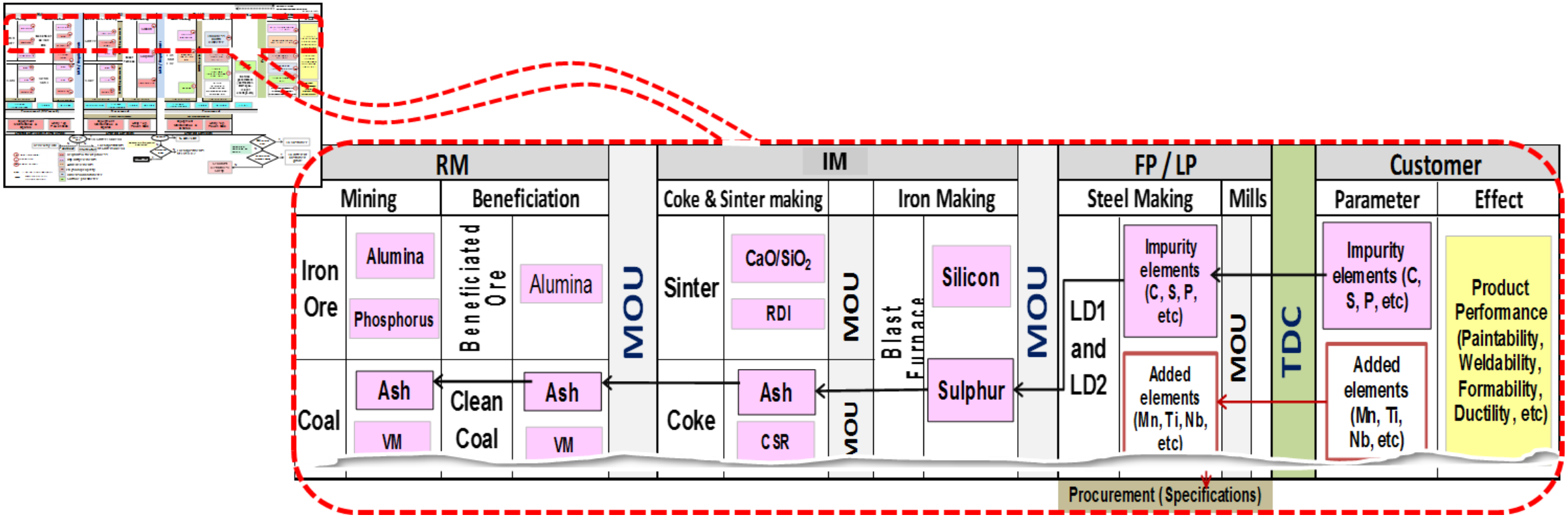
A common lexicon for all to understand and speak the same language across the diverse and long value chain – the binding glue from mining to finished products and from Board Room to Shop Floor

Striving for excellence at every touch point

CCPM: Critical Chain Project Management

 # - KVHS and Shikhar 25 are later additions to the integrated TQM framework

C. Integrated Quality Assurance process for enhanced customer centricity ---



- ❑ End customer linkage with all upstream process – Customer to Mines
- ❑ Inter/ Intra -Divisional control mechanism through MOU and COA

MOU: Memorandum of Understanding COA: Charter of Agreement TDC: Technical Delivery Conditions

C. --- which has matured over years to address product & service needs ---

Implementing the basics

- Focus on **Product related complaints**
- **Standardization** through ISO, Quality Circles, Improvement groups, Apex Quality Council

Standardization

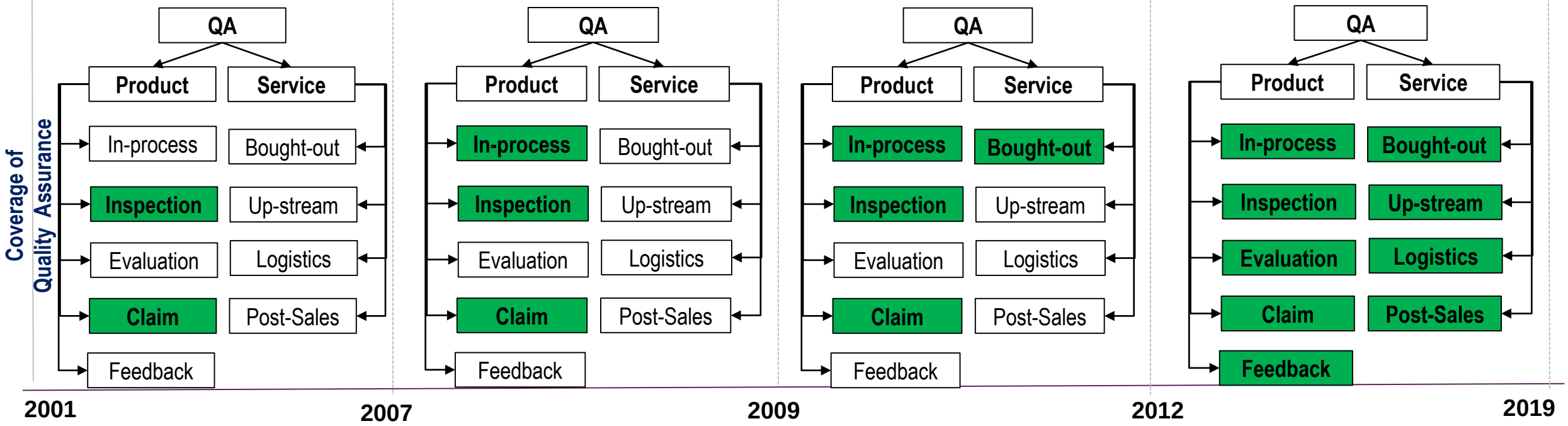
- **Corporate Quality Assurance (QA)** set up
- Certification to **Automotive Standards** and other QMS standards (ISO)

Integration

- **QA integration** at Corporate level initiated
- Systematic capturing of **customer needs and analysis**

Sustenance

- Involvement of **cross functional groups**
- **Automation/ Digitization** with m/c based inspections, decisions, data capturing, monitoring and analysis



A Tata Steel example

Journey from Inspection to Quality Assurance

C. Technology led excellence in Quality Assurance – the next frontier

	A	B	C
			
	Process Visualization	**In-Process Quality Assurance & Control**	**End Product Quality Verification**
Objective	**'Visualization by soft & hard sensing enable in-process Quality checks'**	**'Optimal set points through process models across the value chain'**	**'Products & Solutions to measure specification non-conformities and defects'**
Through	Mathematical Modelling Visualization & Sensing	Mathematical Modelling Data driven models	IMAGING/ RADAR/ LASER Technologies
Collaboration	Home grown, R&D, TG & Academia	Home grown, R&D, TG & Academia	Mostly home grown solutions

TG: Technology Group, R&D: Research & Development

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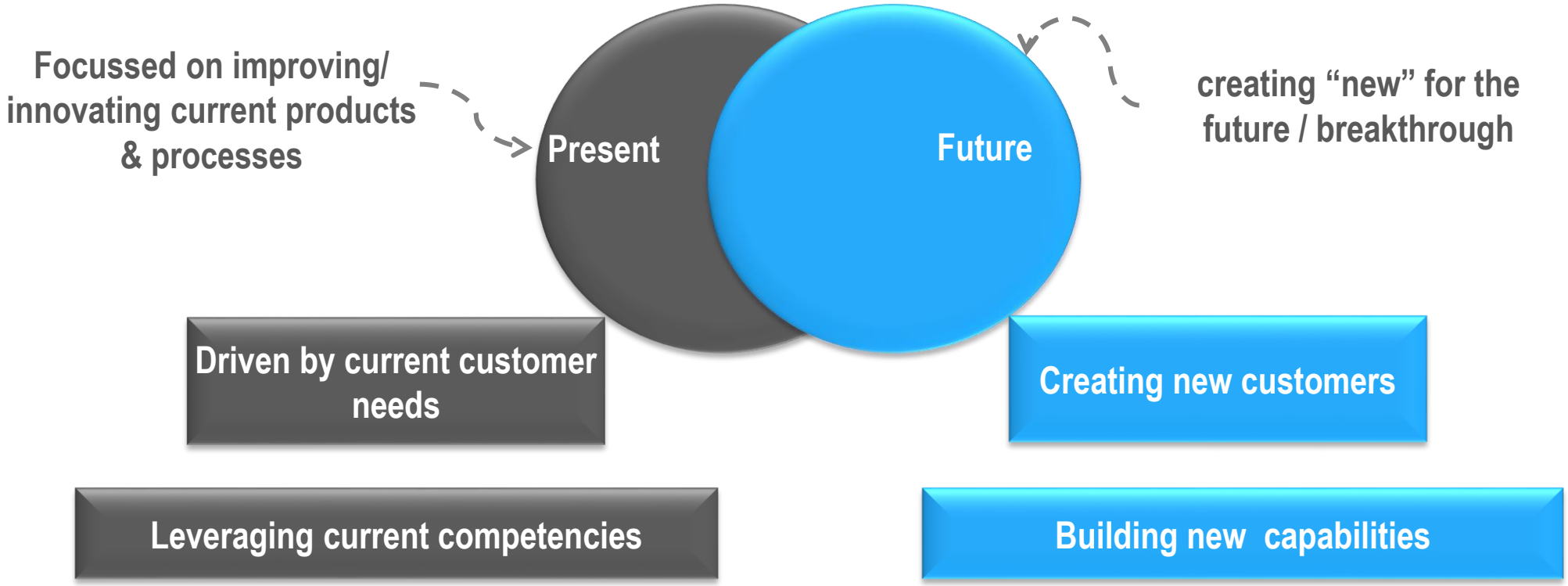
D. In quest of North Star – implementation of priority issues --- (1/2)

…while managing the present, selectively forgetting the past and creating the future

..In rapidly changing environment, TQM is necessary to identify priority issues that are well suited and helps promote activities necessary for tackling new issues… practice TQM that supports innovative business management through continued implementation of priority issues.. - DGP 2012



* Reference "Three-Box Solution: A Strategy For Leading Innovation" by Prof Vijay Govindarajan

D. In quest of North Star – implementation of priority issues … (2/2)

The next paradigm shift – Innovation and Digitalization

1. **Disruptions** are real and will hit every industry sooner or later including the steel industry

   Tata Steel's response - ***Business model innovation / non-linear innovation***

2. Use **digitalization** to achieve exponential improvements in productivity and value creation

   *Tata Steel's response – **multi-year digital transformation journey** to be the leader in digital steelmaking by 2025*

Thank You