



Steering a Digital Transformation Journey in Mining and Metals: Approach and Recipes



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Vedanta Resources: An Introduction



London Stock Exchange listed, globally diversified natural resource company having interest in Zinc, Lead, Silver, Copper, Iron Ore, Aluminium, Power and Oil & Gas

Foothold spans across India, Zambia, Namibia, South Africa, Liberia, Ireland and Australia

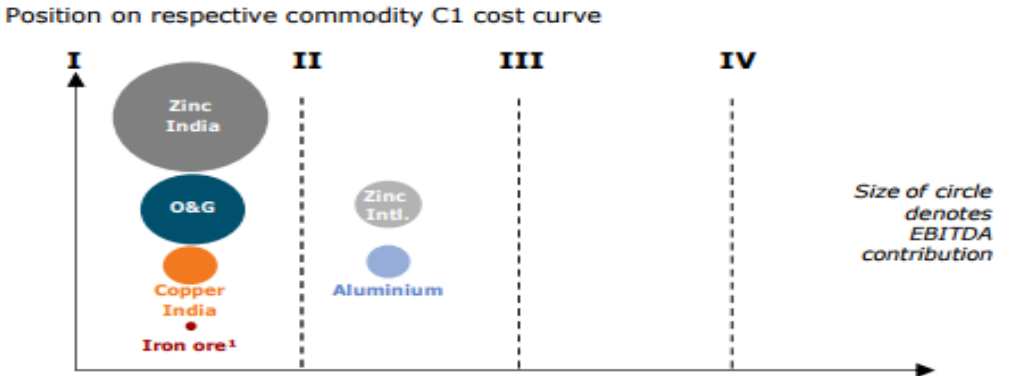
1 Portfolio of large, diversified, low-cost assets geared towards base metals and oil

2 Strong financial profile: Revenue of \$ 11.5 billion, EBITDA of \$ 3.2 billion and Free Cash Flow of \$ 1.5 billion

3 Over 2.25 million beneficiaries of Community Development in India and Africa

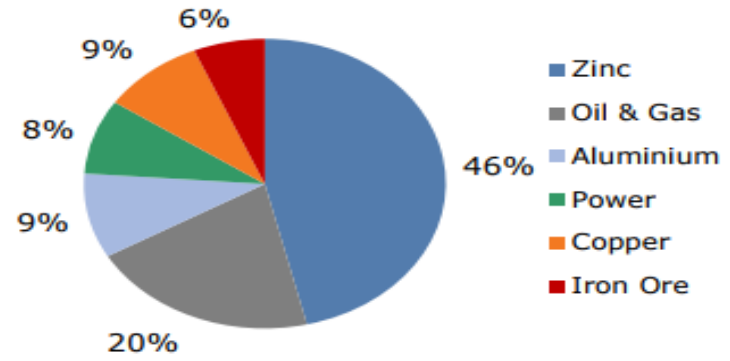
4 One of the Top Companies to work for in Asia (ACES, 2016)

Cost curve positioning



Source: Wood Mackenzie as of Q4 2016, CRU Aluminium business cost curve (2015)
¹ On a 58% Fe cost basis only

EBITDA mix (9M FY2017)



Vedanta Resources: An Introduction (Contd..)



Zinc Business, India



Hindustan Zinc Ltd. India

- **2nd largest Zinc-Lead Miner** globally with annual ore production capacity of **12+ million MT**
- **4th largest Zinc-Lead Smelter** globally with **production capacity of 1+ Million MT of metal**
- **18th largest Silver producer** of the world
- **Ranked 11th globally** in Dow Jones Sustainability Index in Metals & Mining industry group

Zinc International Business, Africa & Ireland



Black Mountain Mine, South Africa

- An underground operation mining Zinc, Lead, Copper and Silver with **R&R of ~65 mT** and **~3.1 mT of contained metal** with LoM of ~5 years

Skorpion Zinc Mine & Refinery, Namibia

- **Largest integrated zinc operations in Africa** with **R&R of ~26 mT**, **contained metal of ~2.7 mT** with LoM of 4 years and refining capacity of **150 KTPA SHG Zinc**

Gamsberg Mine, South Africa

- **One of the world's largest known Zinc deposit** with **R&R of ~215 mT** and **contained metal of ~16 mT** with LoM of over 30 years

Lisheen Mine, Ireland

- **World-class closure** process underway

Iron Ore Business, India & Liberia



Sesa Iron Ore, India

- **India's largest** private sector Ore Exporter
- Capacity of **~7.8 mT** with a potential to go up to **~20.5 mT**
- **One of the lowest cost** Iron Ore producer in the world

Western Cluster Ltd, Liberia

- Wholly owned Iron assets including development rights
- **Feasibility study** underway for exploration and commissioning

Vedanta Resources: An Introduction (Contd..)



Copper Business, India



Sterlite Copper, India

- Custom smelter, refinery, continuous cast copper rods, sulphuric acid and phosphoric acid facility with **160 MW Coal based power plant**
- **400 KTPA Anode and Cathode production** capacity and **expansion to 800 KTPA underway**
- **250 KTPA CCR** production capacity
- **Holds 36% market share** in Indian Copper Industry
- **Sustained high utilization rate with efficient by-product management**

Copper Business, Africa & Australia



Konkola Copper Mines, Zambia

- **One of Africa's largest integrated copper producer** and one of the **world's highest grade copper mines** situated in Copper Belt of Zambia
- Sinking of **1500 deep shaft** at flagship Konkola Deep Mine Project (KDMP), first time in post-independence era of Zambia
- State-of-the-art Copper Smelters and **concentrators with capacity of 15.5 mTPA**

Copper Mines of Tasmania, Australia

- Under Care and Maintenance at present
- Evaluation underway to restart

Power Business, India



Power Business, India

- **One of the largest power generators in India**, well poised to capitalize on India's economic growth, power deficit and large coal reserves
- Operates **9 GW power portfolio**
- Includes **Captive and IPP power** generation facilities
- Portfolio includes **coal-based power generation and renewable sources of power** like Solar and Wind
- Exploring power opportunities in Africa

Vedanta Resources: An Introduction (Contd..)



Aluminium Business, India



Vedanta Aluminium and BALCO, India

- **Largest producer of Aluminium in India with 2.3 mTPA capacity**, including Mines, Smelting, Refining and Fabrication facilities
- **40% market share** in Indian Aluminium industry
- Located near to richest bauxite deposits and coal reserves
- Established infrastructure and economies of scale

Oil & Gas Business, India



Cairn Energy, India

- **Operating 27% of India's oil production**, largest private sector oil producer
- **Portfolio of 7 blocks**, 6 in India and 1 in South Africa
- **1.3 boe gross** proved and probable reserves and resources
- Strongly positioned on global oil cost curve
- Strong track record and growth pipeline in exploration and development
- Have made more than 50 hydrocarbon discoveries in last decade

Digital as a Trend: Gaining Speed and Traction



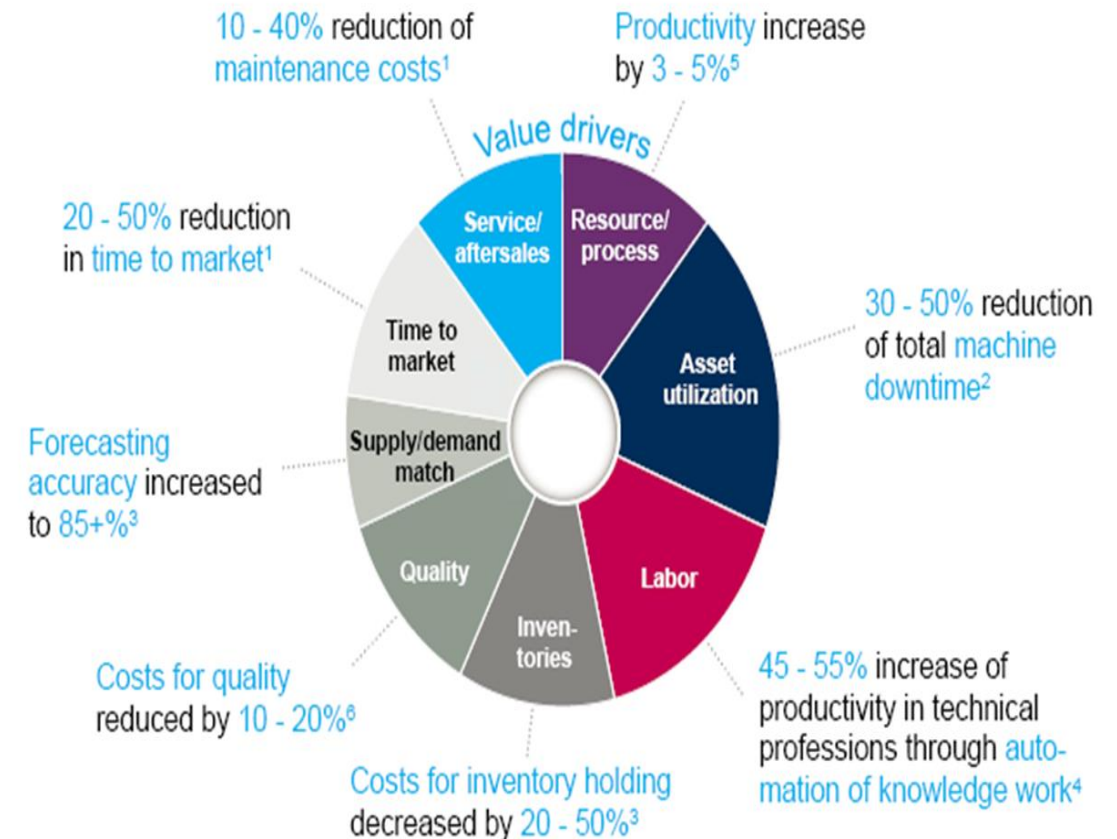
Driving Factors:

- *Market Volatility*
- *Increased Cost Base*
- *Changing Global Demand*

Benefits of Digitalization Adoption:

1. *Real-time visualization of data*
2. *Derive future insights into performance, health & mineral characteristics*
3. *Control mineral characteristics through strategies*
4. *Make more timely process changes*
5. *Schedule dynamically across whole mine operations based on predictive alerts*
6. *Improved safety through people and asset tracking*
7. *Enhance asset health through predictive maintenance*
8. *Simulation and Immersive Employee Training*
9. *Cut cost and improve revenues, provide sustainable and disciplined growth*

Indicative quantification of value drivers



1 Cf. McKinsey Global Institute: Big data: The next frontier for innovation, competition, and productivity
2 McKinsey analysis
3 McKinsey analysis
4 Cf. McKinsey Global Institute: Disruptive Technologies
5 See, for example, ABB case study
6 Cf. T. Bauernhansl, M. ten Hompel, B. Vogel-Heuser (Hrsg.): Industrie 4.0 in Produktion/Automatisierung/Logistik (2014)

SOURCE: McKinsey

Journey So Far.....



Prior to 2007

2007 to 2012

2012 to 2017

- ❑ Core SAP Modules (Non-ECC Versions)
- ❑ Barcoding and Warehouse Automation
- ❑ Weighbridge Automation
- ❑ Mine Technical Systems
- ❑ Plant Technical Systems
- ❑ Core Infrastructure
- ❑ Home-grown SRM
- ❑ Home-grown HRMS

- ❑ Uniform upgrade to SAP ECC
- ❑ SAP HCM Phase 1
- ❑ SAP SRM Phase 1
- ❑ SAP MII Phase 1
- ❑ SAP GRC (Access Controls)
- ❑ SAP SOLMAN
- ❑ Newgen Shared Service
- ❑ LIMS
- ❑ SAP MDM
- ❑ Discrete EHS Systems
- ❑ Custom CRM System

- ❑ SAP SF Phase 1
- ❑ SAP Ariba Phase 1
- ❑ SAP HCM Phase 2
- ❑ SAP SRM Phase 2
- ❑ SAP MII Phase 2
- ❑ SAP VIM Phase 1
- ❑ SAP EHS
- ❑ SAP Treasury Phase 1
- ❑ SAP BIBO Phase 1
- ❑ SAP GRC (Process Controls)
- ❑ SAP Fiori Mobility
- ❑ Integrated Transport Management

Digital Vision, Approach & Strategy



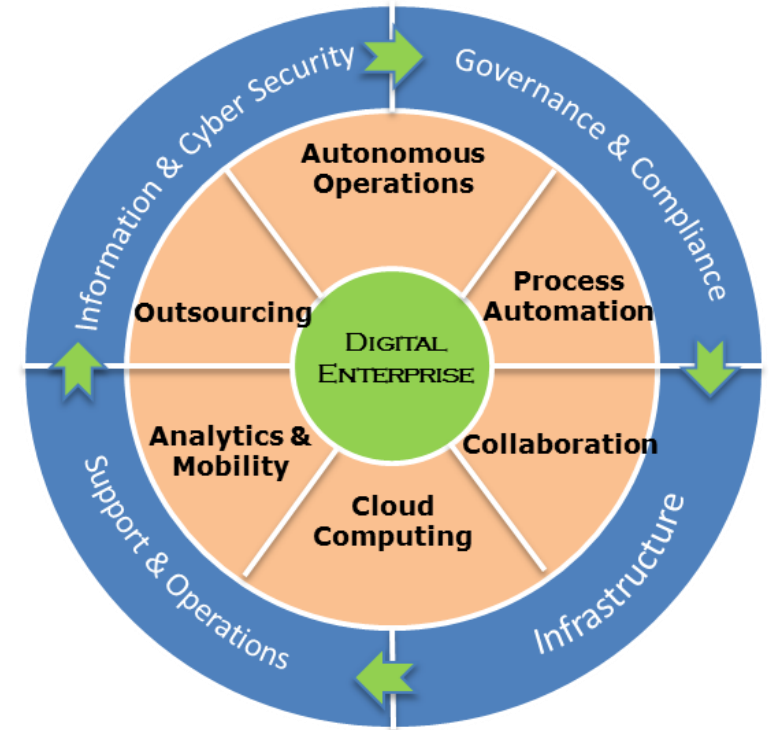
Vision: To make HZL a Digital Enterprise with thrust on Innovation



From issue to outcome..



Focus Areas



Short Term Piloting Digital As a Project

Medium Term Scaling Digital As a Business

Long Term Integration Digital As a Core Value

Digital Transformation Road Map



Mine Planning & Mine/Plant Operations

	3D Numeric Modelling for Stope and Pillar Design		In-situ Stress Measurement		3D Design		Schedule Simulation using 5D planner
	Shaft Sinking Modelling		Integrated Mine Planning Systems		Best in Class Equipment		3D scanning with laser scanner
	Virtual Reality and Simulation based Training		Digital Mining and Asset Optimization		Tele Remote Operations		Electronic Shot Firing
	Centralised Control Room & Smart Laboratory		Safety, Health & Environment Systems		Manufacturing Integration and Intelligence		Blend Planning & Metal Accounting

Completed / Largely Completed

Under Implementation / Pilot Phase Completed

Planned

Digital Transformation Road Map (Contd..)



Procurement & Logistics



Procurement Excellence

- Ariba Vendor On-boarding and Performance Mgmt.
- Ariba Auction Platform
- Ariba Contract Authoring and Monitoring
- Ariba Digital Catalogue Management
- Ariba Commercial Automation
- Ariba Supply Chain Automation (VMI, B2B)
- SAP Commodity Price Engine



Integrated Transport Management

- Driver and Vehicle Registration
- Biometric Authentication
- Transport Planning & Scheduling
- Geo-fencing & Traffic Monitoring
- Man-less weighbridges
- RFID and GPS based real-time tracking
- Auto delivery, goods receipt & invoicing

Human Capital Management



SAP HCM, Successfactors and Central Workforce Management

- Employees Profile and Digital Files Management
- Recruitment Marketing
- Recruitment and On-boarding
- Performance and Goals Management
- Succession Planning
- **Biometric Authentication**
- **Learning Management**
- **Compensation Management**
- **Workforce Analytics**

Finance, Controlling & Marketing



Customer Relationship Management & Online Metal Store



Treasury Management



Business Planning, Monitoring & Control



Management Reporting

Completed / Largely Completed

Under Implementation / Pilot Phase Completed

Planned

Digital Transformation Road Map (Contd..)



Collaboration,
Platform,
Infrastructure &
Services

	<p>S4 HANA Digital Core</p>		<p>Fiori Mobility Platform</p>		<p>Big Data Analytics</p>		<p>Cyber Security, Governance, Risk Mgmt.</p>
	<p>Knowledge Management</p>		<p>Virtual & Immersive Presence</p>		<p>Portfolio Rationalisation</p>		<p>Disaster Recovery & Business Continuity</p>

Completed / Largely Completed

Under Implementation / Pilot Phase Completed

Planned

Benefits Envisaged in the Digital Journey



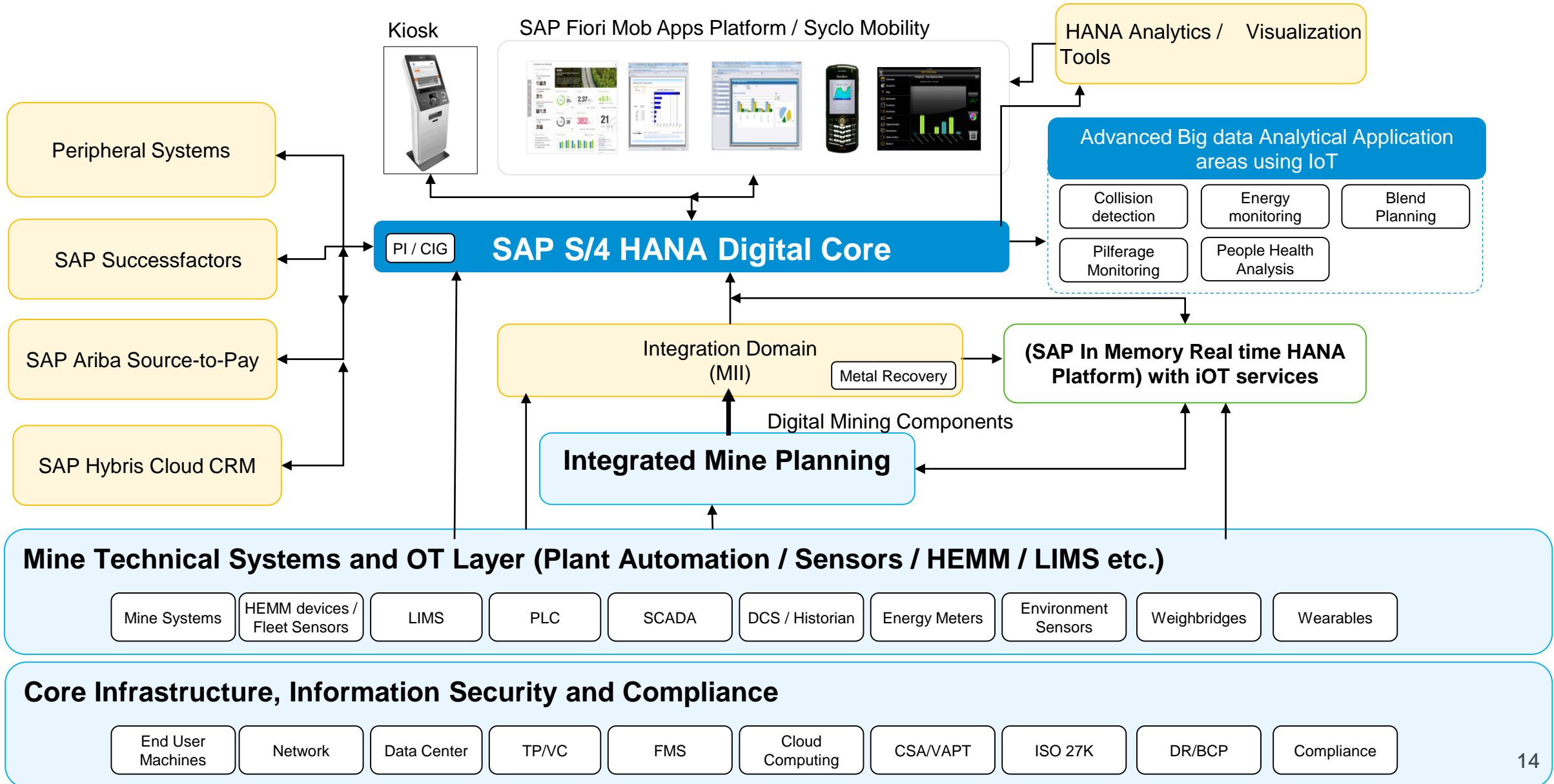
Quantitative

- | | |
|-------------------------------------|------|
| 1. Increase in Mine Productivity | ~15% |
| 2. Improved Asset Utilization | ~10% |
| 3. Improved Asset Availability | ~10% |
| 4. Reduction in Operating Cost | ~5% |
| 5. OEE Improvement | ~5% |
| 6. Reduction in procurement Cost | ~10% |
| 7. Reduction in PR to PO Cycle Time | ~30% |
| 8. Reduction in Logistic TAT | ~20% |
| 9. Energy Optimization | |
| 10. Recovery Improvements | |

Qualitative

1. Improved Safety, Health and Environment
2. Better Decision Making with real insight into the information
3. Enhanced Business Controls and Compliance
4. Better Stakeholder Collaboration – Vendors, Customers, Employees
5. Structured Talent Management
6. Reduction in Business Process Cycle Time, Improved Efficiency

Landscape in a Digital Environment





- 1** *Benchmarking and Prioritization*
- 2** *Should address a Problem Statement*
- 3** *Top Level Sponsorship, Right Organization Structure*
- 4** *Comprehensive Approach, phased deployment*
- 5** *Strategic Partnership with Solution Providers*



Thank You

