

# Vale ESG Webinar

## *Risk Management*

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*September 23, 2021*



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Disclaimer

# De-risking Vale

## through Safety and Operational Excellence

### De-risking



- Brumadinho
- **Dam safety**
- Robust ESG practices
- Production resumption

### Reshaping



- Focus on core business
- Control of cash drains
- Growth opportunities

### Re-rating



- **Benchmark in Safety**
- **Best-in-class reliable operator**
- Talent-oriented organization
- Leader in low carbon mining
- Reference in value creation and sharing

Solid cash flow generation

Discipline in capital allocation

# The cultural transformation is keeping pace...

**The Pulse:**  
17,000 employees assessing key behaviors across Vale



<sup>1</sup> D&I stands for Diversity & Inclusion. <sup>2</sup> VPS stands for Vale Production System, Vale's management model.

# ... supported by a strong governance for safety and risk management



## Executive compensation

**35-60%**

of short-term variable compensation tied to Health & Safety, Operational Risk and VPS targets

The Safety and Operational Excellence Office has **NO TARGET** tied to production or financial metrics



## **Risk management model**

*Carlos Medeiros,*

*Executive Vice President of Safety and Operational  
Excellence*

# An integrated risk map supports the decision-making process

## Risk categories

Strategic	People	Sustainability and Reputation	Finance	
<ul style="list-style-type: none"> <li>▪ Demand and competition</li> <li>▪ Budget and Planning</li> <li>▪ Intellectual property</li> <li>▪ Sales/Commercial</li> <li>▪ Projects and investments</li> <li>▪ Associated companies</li> <li>▪ Merges, acquisitions and divestments</li> <li>▪ Innovation and new technologies</li> </ul>	<ul style="list-style-type: none"> <li>▪ Outsourcing and partnership</li> <li>▪ Relationship with Unions</li> <li>▪ Organizational structure and culture</li> <li>▪ Abusive and discriminatory practices</li> <li>▪ Training, recruitment and retention</li> <li>▪ Staff dependency / successions</li> <li>▪ Adherence to Labor Law</li> </ul>	<ul style="list-style-type: none"> <li>▪ Reparation</li> <li>▪ Climate Change</li> <li>▪ Waste, effluents and emissions</li> <li>▪ Socio-Environmental obligations</li> <li>▪ Human Rights</li> <li>▪ Relationship with communities</li> <li>▪ Institutional relationship</li> <li>▪ Disruptions, vandalism and terrorism</li> <li>▪ Image and reputation</li> <li>▪ Communication and disclosure</li> </ul>	<ul style="list-style-type: none"> <li>▪ Exchange and interest rates</li> <li>▪ Commodities</li> <li>▪ Freight</li> <li>▪ Investor Relations</li> <li>▪ Cash flow</li> <li>▪ Capital availability</li> <li>▪ Insurance coverage</li> <li>▪ Credit granting and defaults</li> <li>▪ Financial and accounting reports</li> <li>▪ Compliance, fraud</li> </ul>	
Operational	Geotechnical	Business Continuity	Compliance	Cybernetic
<ul style="list-style-type: none"> <li>▪ Occupational Safety</li> <li>▪ Occupational Health &amp; Hygiene</li> <li>▪ Compliance with H&amp;S Norms</li> <li>▪ Process Safety</li> <li>▪ Production disruption / material losses</li> </ul>	<ul style="list-style-type: none"> <li>▪ Tailings dams</li> <li>▪ Pile</li> <li>▪ Embankments, cuts and slopes</li> <li>▪ Underground mines</li> </ul>	<ul style="list-style-type: none"> <li>▪ Shortage of critical raw materials</li> <li>▪ Water and energy availability</li> <li>▪ Licenses, concessions and mining rights</li> <li>▪ Mine, rail, road and port structure</li> <li>▪ Shipping and inland waterway</li> <li>▪ Waste and tailings disposal</li> <li>▪ Availability and quality of mineral reserves</li> </ul>	<ul style="list-style-type: none"> <li>▪ Anti-corruption</li> <li>▪ Tax and Fiscal</li> <li>▪ Sanctions</li> <li>▪ Antitrust</li> <li>▪ Data Protection</li> <li>▪ Litigation</li> <li>▪ Regulatory changes</li> </ul>	<ul style="list-style-type: none"> <li>▪ Information theft or leakage</li> <li>▪ Unavailability of technology assets</li> <li>▪ Loss of data integrity</li> </ul>

# The Safety and Operational Excellence Executive Office was created in 2019...

Safety and Operational Excellence Executive Office

450 professionals



Health and Safety and Operational Risks



Operational Excellence

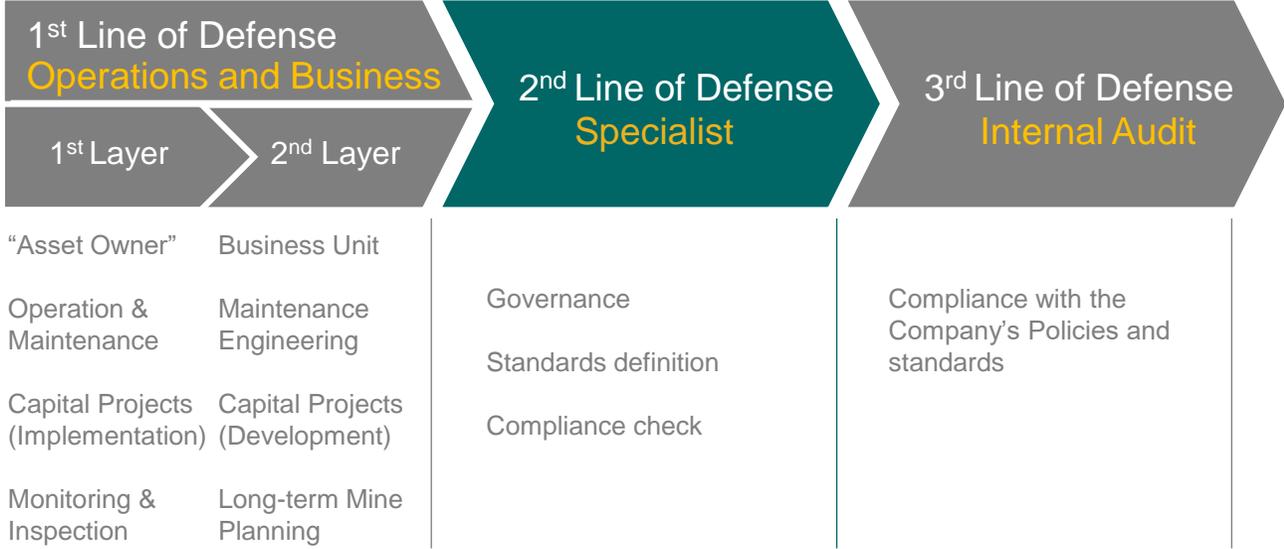


Asset Management



Geotechnical Structures

The risk management model based on **3 lines of defense** supports the office's **independence**



# ... to ensure an effective risk management

## Office's reporting routine

### **Half-year reports**

*to the Board of Directors*

### **Half-year reports**

*to the Fiscal Council*

### **Monthly reports<sup>1</sup>**

*to the Operational Excellence and Risk Committee, which reports monthly to the Board of Directors*

### **Weekly reports**

*to the Executive Board*

### **Ad-hoc reports**

*whenever a risk out of the tolerable limit is identified*

## Operations shutdown<sup>2</sup> as a result of more stringent Health & Safety protocols

- Operations at Sossego
- Operations at Onça Puma
- Operations at Voisey's Bay
- VNC Refinery
- Simões Filho Plant
- Mina Azul
- Project Salobo III
- Project VBME
- Port Colborne Refinery

Non-exhaustive list

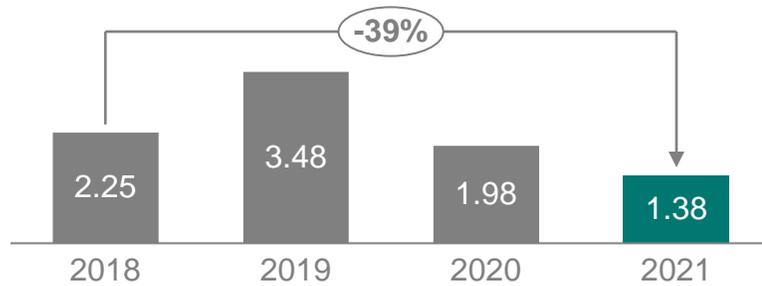
<sup>1</sup>Considers 26 thematic reports in 9 months within a year. <sup>2</sup>In 2020, temporary or definitive shutdown.

2

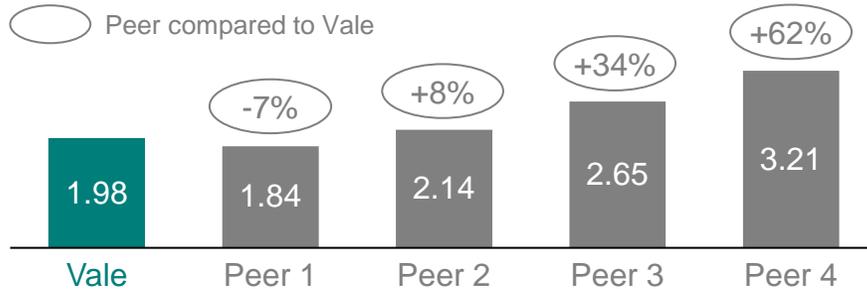
**Occupational Health & Safety**

# We are building a sustainable performance in Health & Safety ...

## TRIFR<sup>1</sup>



## TRIFR - 2020 comparison in mining



## Innovation to reduce risk exposure

- **Digital workforce:**  
Eliminating at-site risks by accelerating remote working
- **Automation:**
  - Brucutu mine's entire fleet is autonomous
  - Remotely controlled equipment for decharacterization of critical dams
  - Unmanned train operation at Timbopeba site



<sup>1</sup> Total Recordable Injury Frequency Rate.

# ... as we are making progress with our commitments



Zero high-potential recordable injuries (N2)<sup>1</sup>

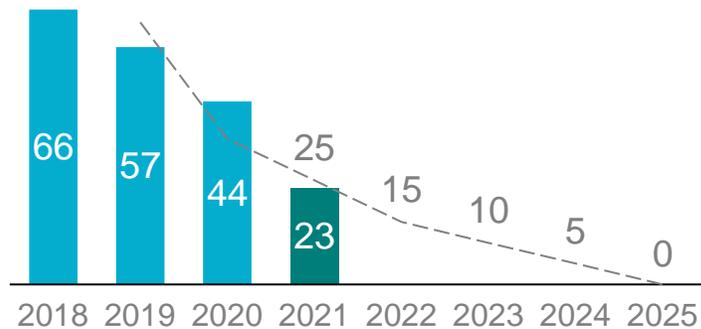


Reduce by 50% employee exposure to key health risks<sup>2</sup>



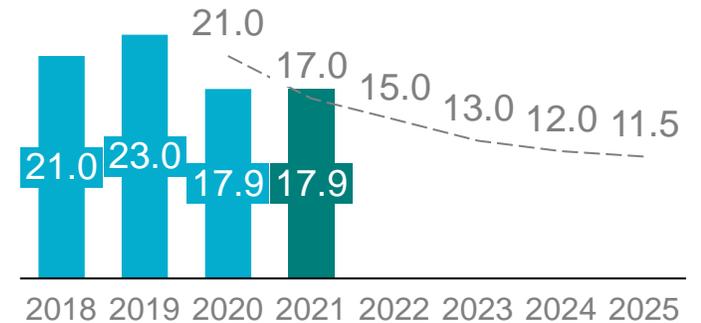
Eliminate very high-risk scenarios<sup>3</sup>

Reduction of high-potential recordable injuries (N2 - absolute values<sup>4</sup>)



-- Target  
 ■ N2  
 ■ N2 (Jan-Sep 2021)

Reduction of exposures above the Occupational Exposure Limit (OEL)



-- Target  
 ■ Exposures  
 ■ Exposures (Jan-Sep 2021)

Note: Commitments by 2025.

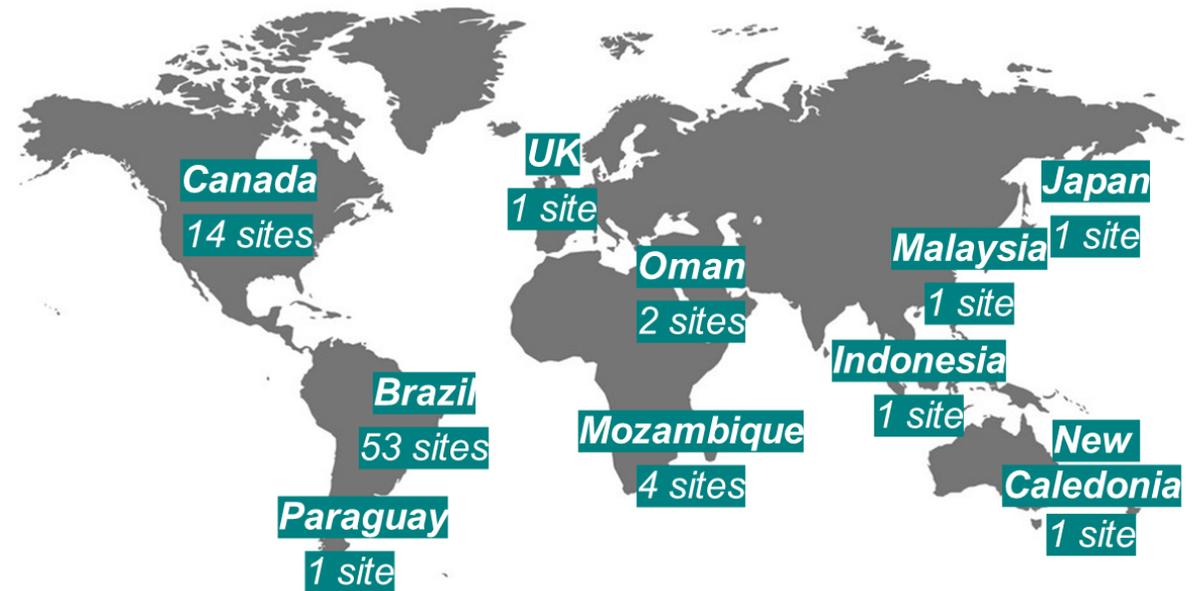
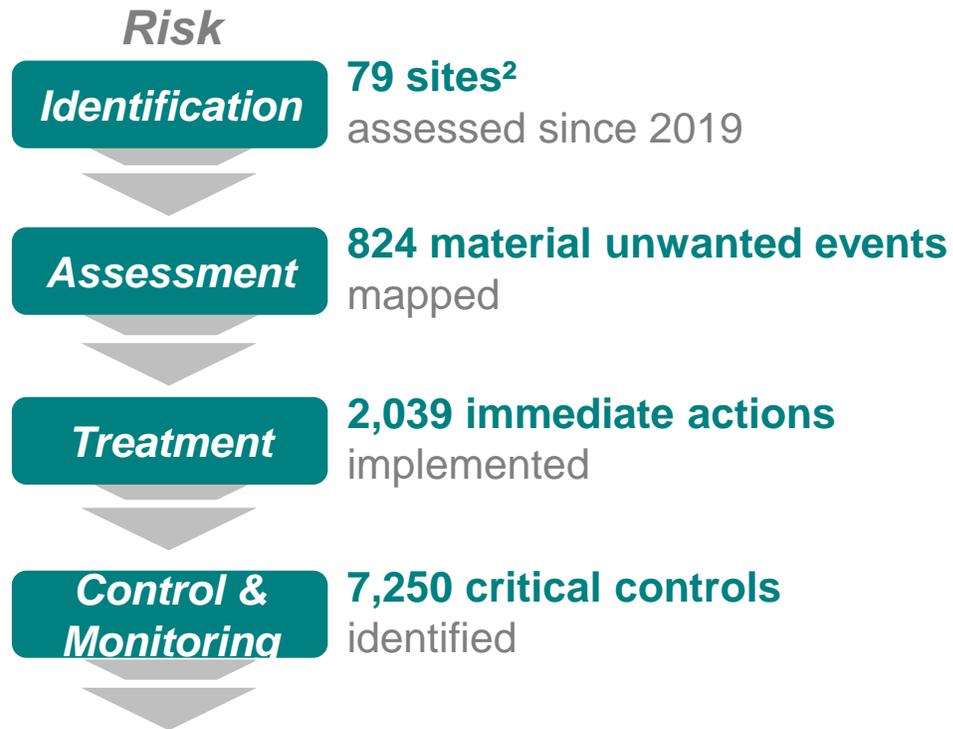
<sup>1</sup> Injuries which are considered a precursor to fatal accidents. <sup>2</sup> Physical, chemical or biological risks. <sup>3</sup> According to Vale's risk matrix, based on 2019. <sup>4</sup> Includes own employees and third parties.



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**HIRA implementation**

# All sites are already covered by HIRA<sup>1</sup> first cycle...



Reassessments every 3 years (critical sites)  
or 5 years (non-critical sites)

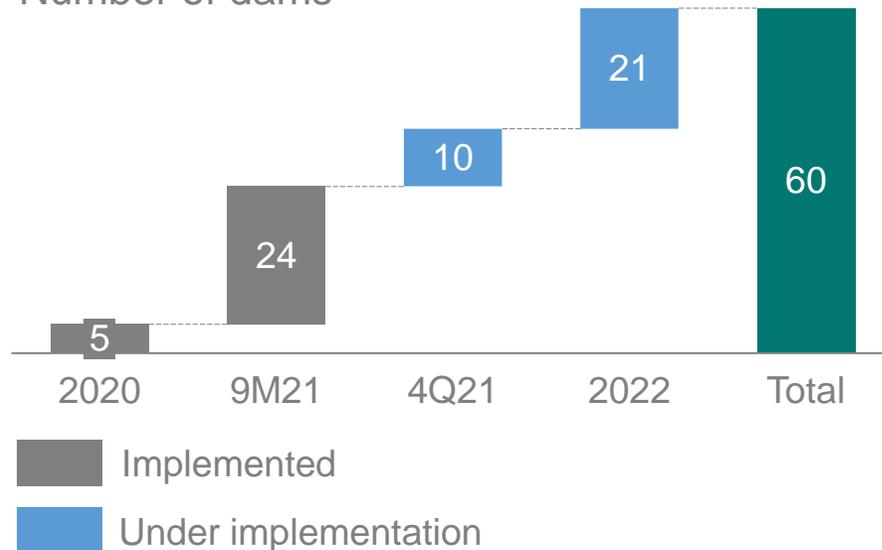


<sup>1</sup>Hazard Identification and Risk Assessment. <sup>2</sup>Includes New Caledonia, as the assessment was performed before Vale's exit from the business.

# ... with rollout to our dam portfolio

## HIRA for Dams and Tailings Storage Facilities

Number of dams



- Focus on **key tailings dams**<sup>1</sup> operated by Vale
- Assess **Material Unwanted Events**
- Identify, design and implement **Critical Controls**
- Prioritize and implement **Immediate Actions** for risk reduction
- Supported by external expert companies

<sup>1</sup> Includes facilities within Vale operations and excludes Non-operated Joint Ventures (JVs). Key tailings storage facilities based on the definition agreed by the International Council on Mining and Metals Tailings Advisory Group in response to the Church of England information request, which may differ from Brazilian National Mining Agency definition.

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**Operational Excellence**

# The VPS<sup>1</sup> is the vehicle of our cultural transformation...



**3 dimensions,  
17 elements**  
with the minimum  
compliance requirements

## Structuring

- ✓ Simplification of the management model
- ✓ Publication of the VPS Manual and Rulers
- ✓ Structuring performance cycles
- ✓ Training of employees in VPS

**2019-2020**

## Back to basics

- 5S, routine management
- Technical capacitation
- Maintenance strategy
- Structuring maintenance plans and control
- Basic guidelines (maintenance, operation, geotechnical)
- VPS Assessment

**2021-2022**

## Continuous improvement and operational stability

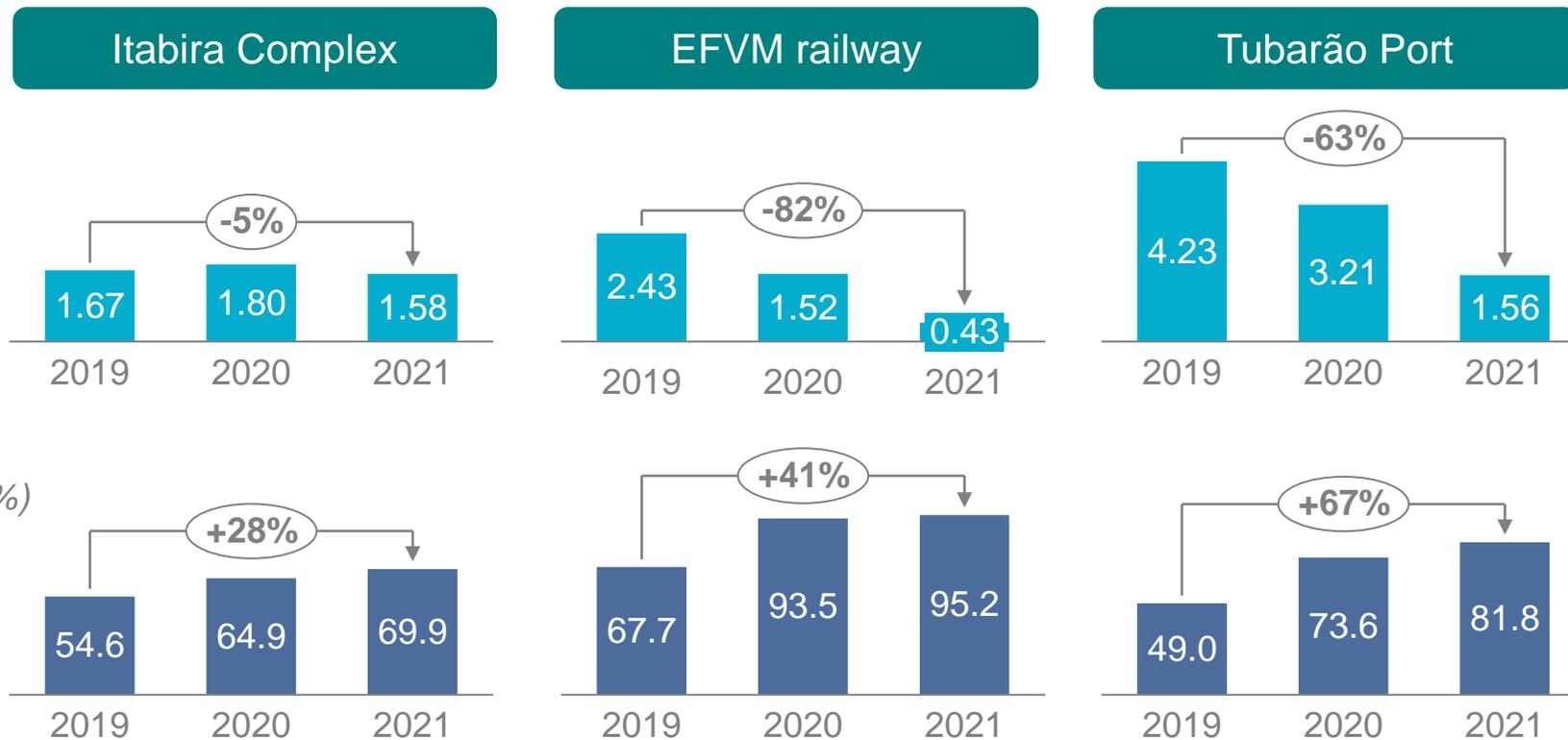
- Standardization of priority tasks
- MICT<sup>2</sup> technical training
- Waste reduction and increased productivity
- Problem exposure culture and continuous improvement
- Consolidation of maintenance and operation processes

**2023-2025**



<sup>1</sup>Vale's integrated management system. The acronym stands for "Vale Production System". <sup>2</sup>Vale's integrated MICT stands for Integrated Model of Technical Training.

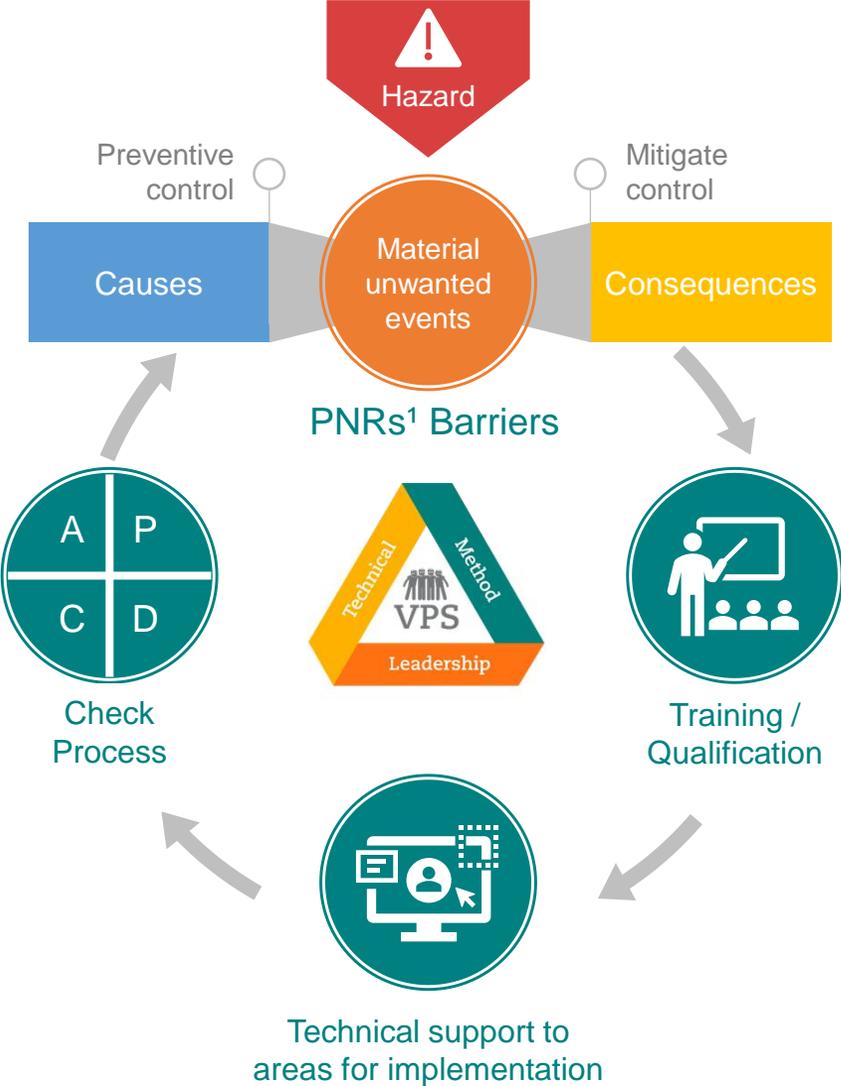
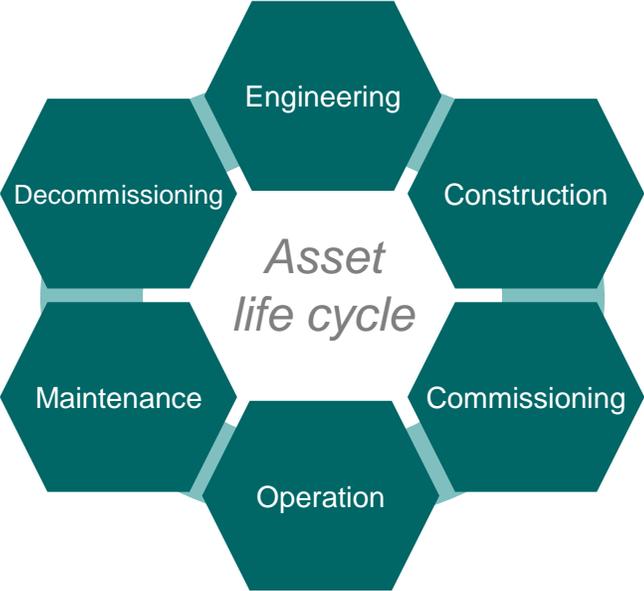
# ... and drives Vale to become the best-in-class reliable operator



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**Asset Integrity**

# We promote the Safety and Integrity of our assets throughout their life cycle



<sup>1</sup> Normative standards.

# Our Asset Integrity technical standards are global for critical assets

**~50%**

*of standards defined by the end of 2021*

- Risk assessment
- Benchmarks
- International standards
- Best engineering practices
- Accident history
- Engineering companies

**+17,000**

*employees trained in Asset Integrity standards*

Systems, layout and structures	Rail Ports and bridges Pumping systems Hazardous material handling Explosives Combustible dusts and solids Plant layout, escape route
Fire Protection & Fighting	Protection and firefighting systems Detection and alarm systems
Equipment	Material handling systems Structural integrity Furnaces, reactors, off-gas systems
Electrical, Automation, Instrumentation	Instrumentation and control Incident energy Power station protection systems

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**Dam management**

# Progress with TDMS and the Decharacterization Program

## Tailings & Dams Management System

### Routine

- New dam management policy
- Responsibility assignment matrix revised
- 25 requirements and guidelines
- Periodic assessment by the assurance team

### Performance

- 100% of dams<sup>1</sup> with Engineer of Record
- Continuous monitoring and inspections
- Periodic and immediate reports to upper management

### Risk assessment

- 100% tailings dam portfolio covered by risk assessment (HIRA) by the end of 2022
- Rigorous enforcement of updated emergency level requirements

## Upstream<sup>2</sup> Dam<sup>3</sup> Decharacterization Program

- **6 upstream dam eliminated since 2019**
- 24 upstream dam to eliminate:

Emergency level	# of dams
3	3
2	4
1	4

- Back-up dams for all level-3 dams
- No dam at emergency level 3 by 2025
- Program's completion by 2029



<sup>1</sup>In Brazil. <sup>2</sup>Same raising method deployed at B1 dam, collapsed in Brumadinho. <sup>3</sup>Includes dams, dikes and waste piles.

# Commitment to comply with the GISTM

Tailings storage facilities (TSF) operated by Vale will be in conformance with the GISTM:

- Those with “Extreme” or “Very high” potential consequences, by August 5<sup>th</sup>, 2023
- All other, not in a state of safe closure, by August 5<sup>th</sup>, 2025

## 1<sup>st</sup> step – Self-Assessment

By the 1<sup>st</sup> Line of Defense

*Completion by October 2021*

A form-based tool for the assessment of each TSF (with supporting evidence). Cover all 77 auditable requirements.

## 2<sup>nd</sup> step – Gap Assessment

By 2<sup>nd</sup> Line + external consulting

*Completion by February 2022*

Re-assessment of select TSFs for full compliance

*Key findings in December 2021*

## 3<sup>rd</sup> step – External Audit

By independent, external party

*Deadline for completion to be defined*

Depending on further guidance by the ICMM



*Decharacterization of  
8B dam  
Nova Lima (MG)*

2019



*Decharacterization of  
Dique Rio do Peixe  
Itabira(MG)*



***Decharacterization of  
Fernadinho dam***  
*Vargem Grande Complex (MG)*



***Sul Superior  
back-up dam***  
*Barão de Cocais, MG, Brazil*



***Forquilhas and Grupo  
back-up dam***  
*Ouro Preto and Itabirito (MG)*



**B3/B4**  
**back-up dam**  
Nova Lima (MG)



**Closing remarks**

**We are building  
a safer and more reliable Vale**



***Geotechnical Monitoring Center***  
*Parauapebas (PA)*



VALE