INNOVATION: STATE OF PLAY
MINING INDUSTRY SURVEY 2017

SUMMARY INSIGHTS
The 3rd biennial survey of more than 800 global mining leaders reveals the impact of a rapidly changing international marketplace and its effect on innovation.
Global mining leaders share their views on innovation

Our 2017 survey of innovation across the global mining industry is the third major survey of its kind undertaken by VCI in conjunction with platform partners The University of Western Australia and METS Ignited.

The survey, conducted between August and December 2016, received more than 800 responses from industry executives, across 60 countries. While the 2016 survey sought to build on data gathered in the 2013 and 2015 surveys, its main objective was to assess the impact of the changing global mining market and its effect on innovation.

The 2017 survey also takes more in-depth look at key industry drivers including social pressures, collaboration across the ecosystem and digitisation.

VCI worked closely with the Chamber of Mines South Africa and Chamber of Mines India on this year’s survey. They provided input to the survey and helped in its distribution.

VCI would like to thank the many mining and associated services companies that took part in the survey. Research such as this is an important part of the development of the sector and will contribute to a robust future.
‘What this survey really does is drive an arrow through the major mining innovation issues. I hope people pay a great deal of attention to it.’

MINING CEO
The mining industry is marked by cyclicality

Note: Prices listed in chart are 2016 World Bank forecasts published on July 26th, 2016.
We are at a pivot point

WE ASKED:
Which of the following macro trends will have the biggest impact on mining over the next 15 years?

<table>
<thead>
<tr>
<th>Macro Trend</th>
<th>BY % OF RESPONDENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technological change and disruption</td>
<td>62</td>
</tr>
<tr>
<td>Environmental pressures</td>
<td>59</td>
</tr>
<tr>
<td>Technically aware generation entering the workforce</td>
<td>37</td>
</tr>
<tr>
<td>Asian (Inc. India) economic development</td>
<td>26</td>
</tr>
<tr>
<td>Global integration</td>
<td>22</td>
</tr>
<tr>
<td>Transparency and regulation</td>
<td>21</td>
</tr>
<tr>
<td>Geopolitical tensions</td>
<td>15</td>
</tr>
<tr>
<td>Ageing population</td>
<td>14</td>
</tr>
<tr>
<td>Income inequality</td>
<td>10</td>
</tr>
<tr>
<td>Urbanisation</td>
<td>6</td>
</tr>
</tbody>
</table>

‘The Market, Moore’s Law and Mother Nature are the three biggest forces shaping the world today.’

THOMAS FRIEDMAN
The risk of technological disruption is real

Areas most subject to disruption over the next 15 years.
Different regions have different needs

WE ASKED:
Where in the value chain do you see the greatest value over the next 15 years?
Society’s expectations are increasing

WE ASKED:
Why is mining perceived negatively in society?

HIGH PROFILE ACCIDENTS: 31%
COMMUNITY IMPACT: 46%
ENVIRONMENTAL IMPACT: 76%
Systemic design is required for sustained success

WE ASKED:
How should investment in innovation achieve the best overall social, environmental and economic outcomes?

Companies should focus on 2 key areas of outside the fence investment for the highest return:

- 37% Invest in local services and infrastructure
- 30% Focus on low footprint design

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Innovation is more critical than ever before.

Companies that claim innovation is critical to their company’s survival in the long term.

- 37% in 2013
- 41% in 2015
- 62% in 2017
Being a follower is not an option

WE ASKED:

What is your company’s approach, and how successful have you been introducing new innovations into your business?

Less than a half of mining companies describe themselves as leaders, compared to followers.
Ecosystem health drives innovation

Actions and relationships that **drive innovation in the ecosystem.**
Ecosystem health drives innovation

Actions and relationships that drive innovation in the ecosystem.

- 48% Believe that Governments should facilitate collaboration platforms
- 57% Believe that mining companies should involve suppliers in their innovation process
- 24% View CEOs as drivers of innovation in mining companies
- 33% Of services companies say that all employees drive innovation
A cultural shift to embrace innovation is required

A shift in industry culture as well as new skills are required to leverage technological change.

Technological change and disruption (robotics, automation, AI) are expected to impact innovation over the next 15 years.

Resistance to change and skill availability are considered the greatest people challenge to implementing new technologies.

One in five respondents reported industry culture as the biggest impediment to innovation in mining.
Business leaders shape this culture

**WE ASKED:**
Who is the driving force of innovation in your company; and how do you incentivize your workforce to innovate?

<table>
<thead>
<tr>
<th>Role</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All - it is core to our culture</td>
<td>30%</td>
</tr>
<tr>
<td>Chief executive officer</td>
<td>20%</td>
</tr>
<tr>
<td>Business unit heads</td>
<td>20%</td>
</tr>
<tr>
<td>Head of technology</td>
<td>10%</td>
</tr>
<tr>
<td>Head of operations</td>
<td>10%</td>
</tr>
<tr>
<td>Frontline leaders (eg. Supervisors)</td>
<td>10%</td>
</tr>
<tr>
<td>The board</td>
<td>0%</td>
</tr>
<tr>
<td>Head of strategy</td>
<td>0%</td>
</tr>
<tr>
<td>Head of information technology</td>
<td>0%</td>
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</tbody>
</table>

**Communicate success stories**

- 30%

**Demonstrated leadership**

- 20%

**Public recognition**

- 20%

**Individual incentives**

- 10%

**We don't**

- 0%

**Set stretch goals**

- 0%

**Career promotions**

- 0%

**Create a burning platform**

- 0%

**Employee share schemes**

- 0%

**Company-wide bonuses**

- 0%
Key skills are required to foster acceptance

WE ASKED:

When implementation programs of new innovations fail, what is generally the reason?

- Change management: 24%
- Project complexity: 11%
- Budget: 10%
- Impatience: 9%
- Unforeseen impacts: 9%
- Insufficient benefits: 9%
- Technology integration: 8%
- Technology maturity: 8%
- Skills: 6%
- Schedule: 3%
- Partner relationships: 2%

‘Many lead operators hate automation. They struggle to imagine a world where they are not leading large groups of people’
Diversity could be the answer

WE ASKED:
Which parts of the mining industry are most subject to potential disruption over the next 15 years?

EXTRACTION

<table>
<thead>
<tr>
<th>Responders</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>61%</td>
<td>39%</td>
<td></td>
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</tbody>
</table>

NEW BUSINESS MODEL

<table>
<thead>
<tr>
<th>Responders</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>40%</td>
<td>60%</td>
<td></td>
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</table>
What’s next?

**INNOVATION: STATE OF PLAY IN 2017**

**RELEASE REPORT**
Mining Innovation: State of Play 2017 report will be released for sale in Q2

**PRESENT AT CONFERENCES**
Present results at selected events throughout the year

**DRILL DOWN INTERVIEWS**
Interviews with select participants on leading themes from the survey report

**INDUSTRY ROUND TABLES**
Series of round tables throughout the year exploring key themes from the survey report.

**BENCHMARK**
Benchmark companies against peers in the industry.
Contact us for more information

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