



THE STATE OF PLAY

Understanding the nature of strategy and innovation in the primary industries

2019 Survey Data Pack

STATEOFPLAY.ORG

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Overview

1. ABOUT STATE OF PLAY

2. DATA PACK

State of Play – largest mining survey in the world



800+ Respondents to the 2018/19 survey

399 Companies in 2018/19 survey

68% Of respondents were executives in 2018/19

60 Countries represented in 2018/19

13 Commodities represented in 2018/19

70+ CEOs & Board members interviewed since 2013

\$800bn Combined market capitalisation of interviewed companies

'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

Our aspirations for State of Play

We are striving to create an independent, standalone platform to support discussion of innovation at a strategic level, uncover fundamental insights into the industry dynamics and identify trends in how businesses are establishing competitive advantage

What differentiates strategy and innovation in the primary industries...



High capital, long lifecycle investments and significant market risk



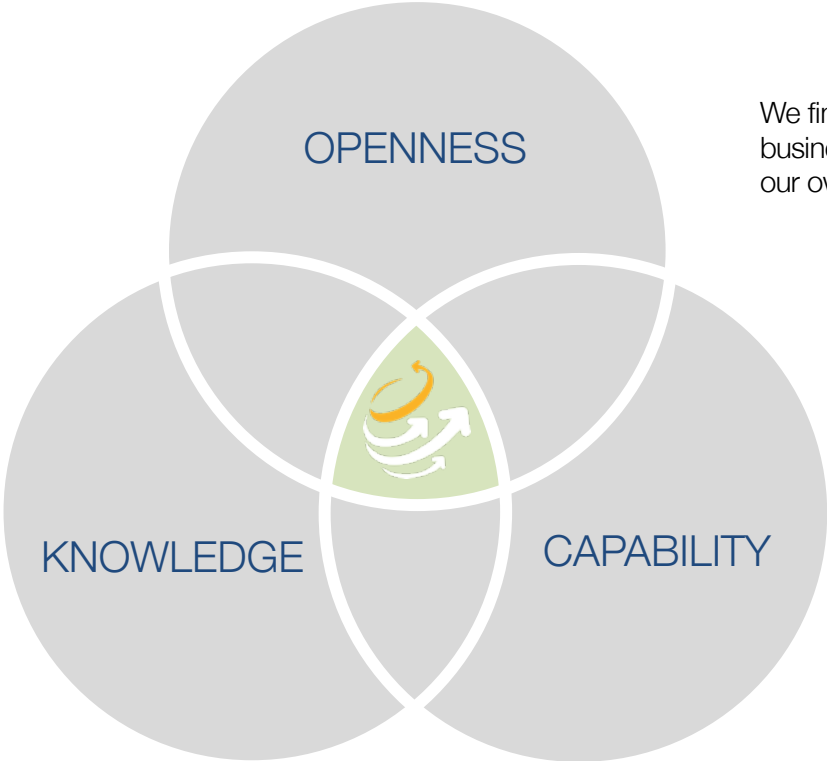
Community integration across countries and regions, often as an alternative to government



Gap in available literature, most of which focuses on consumer or technical innovation

How State of Play consistently produces quality insight

Our roots are in the development of strategy for businesses in the primary industries, giving us a great foundation of knowledge and an extensive network



We find and ask global experts and senior business leaders their perspectives to challenge our own thinking as well as others

We hire the best students from leading universities, train them in our strategy advisory business and give them autonomy

State of Play's innovation return metrics

In a world first, our researchers have uncovered the direct relationship between innovation strategies and total shareholder return in the mining industry.

The rest of the industry relies on flawed approaches:

Mythologies

- Relies on anecdotal evidence and industry “best-practice”
- Skewed by personal experiences of key decision-makers
- Shaped by stakeholders with specific agendas
- Not based on quantitative data over the long-term
- Hard to disprove due to complexity of factors

Academic papers

- Uses R&D spend or patents as measure of innovation
- Doesn't address the methods to execute innovation
- R&D spend often distorted by tax incentives and structures
- Patents is not applicable in natural resources context
- Studies not conducted in mining, limiting applicability

We hand picked
15 global companies
who manage over
17 commodities

and measured their individual innovation perspective

Relationship Analysis

Company Performance
Relative to share market
returns

=

① Total shareholder returns
Share price + dividends

② Over a four year period
Dec 31 2014 – Jan 13 2019

③ Risk adjusted
To account for volatility



State of Play has engaged leaders across the globe

- Alan Bye: Vice-President, Technology, BHP
- Alex Atkins: Non-executive Director, Ausdrill
- Alister MacPherson: General Manager, Caterpillar (Westrac)
- Andrew Harding: CEO, Rio Tinto Iron Ore
- Andrew Melouney: CISO, Woodside Energy
- Andrew Michelmores CEO of MMG
- Andy Munro: General Manager, Rio Tinto Iron Ore
- Barry Fitzgerald CEO of Roy Hill
- Bill Rupp, CEO (former) JBS Beef
- Brad Parsons: CEO and Founder, MOVUS
- Brent Beregon, Vice-President, GoldCorp
- Carl Weatherell: CEO, Canada Mining Innovation Council
- Carla Boehl: Digital Operations Manager, Caterpillar (Westrac)
- Cherie Burgett, Director, MM-ISAC
- Chris Erikson: General Manager, Roy Hill
- Chris Griffith: CEO, Anglo Platinum
- Chris Salisbury: CEO, Rio Tinto Iron Ore
- Chris Sheppard: COO, AngloGold Ashanti
- Daein Cha: Managing Director, Transborder Energy
- Danielle Bull: General Manager, Caterpillar (Westrac)
- Darren Matthews, General Manager, Rio Tinto
- David Martin: Co-founder & Managing Director, Power Ledger
- Davis Cook: CEO, Research Institute for Innovation and Sustainability (RIIS)
- Debby Blakey: CEO, HESTA
- Denise Goldsworthy, Chair, MRIWA
- Diane Smith-Gander: Non-executive Director, Wesfarmers
- Diego Hernández CEO, Antofagasta PLC
- Edward (Eddie) Fry, Chairperson, Indigenous Land Corporation
- Erica Smyth: Chair (former), Toro Energy
- Frank Tudor: CEO, Horizon Power
- Gary Goldberg CEO, Newmont Mining
- Glenn Kellow CEO, Peabody Energy
- Graeme Hunt: Chairman, AGL
- Graeme Speak, Founder & CEO, BankVault
- Graham Kerr: CEO, South32
- Iván Arriagada: CEO, Antofagasta PLC
- Jack Sato: Chairman, Transborder Energy
- James McClements: Managing Partner, Resource Capital Funds
- Jason Waters: CEO, Synergy
- Jimmy Wilson: CEO, CBH Group
- Johan Coetzee: Director, South32
- John de Vries: CEO, Blackrock Mining
- John Voeller: CTO (former), Black & Veatch
- Jon Bell, CEO, Greenfields Exploration
- Kirby Johnson: Global Partner, Cognizant
- Luiz Mello, Executive Manager, Vale
- Mark Woffenden: CEO, MRIWA
- Mark Stickells, Executive Director, Pawsey Supercomputer
- Matt Taylor: CEO, Western Rock Lobster Council
- Michelle Ash: Chief Innovation Officer (former), Barrick Gold
- Mike Lomman: General Manager, Roy Hill
- Mike Neal: Co-founder and CEO, DecisionNext
- Neal Froneman: CEO, Sibanye Gold Limited
- Partha S. Bhattacharyya, Chairman and MD (former), Coal India Limited
- Philip Davies: CEO, Infrastructure Australia
- Prakash Thangamuthu: Managing Director, Thriveni Earth Movers
- Rebbecca Kerr: General Manager, Roy Hill
- Rick Howes: President and CEO, Dundee Precious Metals
- Robert Gray: Chief Commodities Strategist, Resource Capital Funds
- Robert Hough, Deputy Director, CSIRO
- Robert Rodriguez: CEO, Sinet
- Sandeep Biswas: CEO and MD, Newcrest Mining Limited
- Sean Boyd: CEO, Agnico Eagle
- Sietse van der Woude: Chairman, South African Institute of Mining and Metallurgy
- Sharon Warburton: Non-executive Director, Fortescue Metals Group
- Srinivasan Venkatakrisnan: CEO, AngloGold Ashanti
- Stephen McIntosh: Group Executive, Rio Tinto
- Strini Mudaly, CIO, Gold Fields
- Stuart Tonkin: CEO, Northern Star
- Sudip Chaudhuri, Global Practice Head for Mining, WiPro Limited
- Sue Murphy: CEO, Water Corporation
- Tamryn Barker: CEO, CORE
- Terence Goodlace: CEO (former), Impala Platinum
- Thomas Leen: Vice-President, BHP
- Tom Albanese: CEO, Vedanta Resources
- Tom Butler: CEO, International Council on Mining and Metals (ICMM)
- Tom Goerke, Director, CISCO
- Tracey Slatter: Managing Director, Barwon Water
- Vanessa Guthrie: CEO, Minerals Council of Australia
- Vinay Prakash: CEO, Adani Enterprises
- Zane Prickett: Director, Uearthed

State of Play has been supported by a network of global relationships



Overview

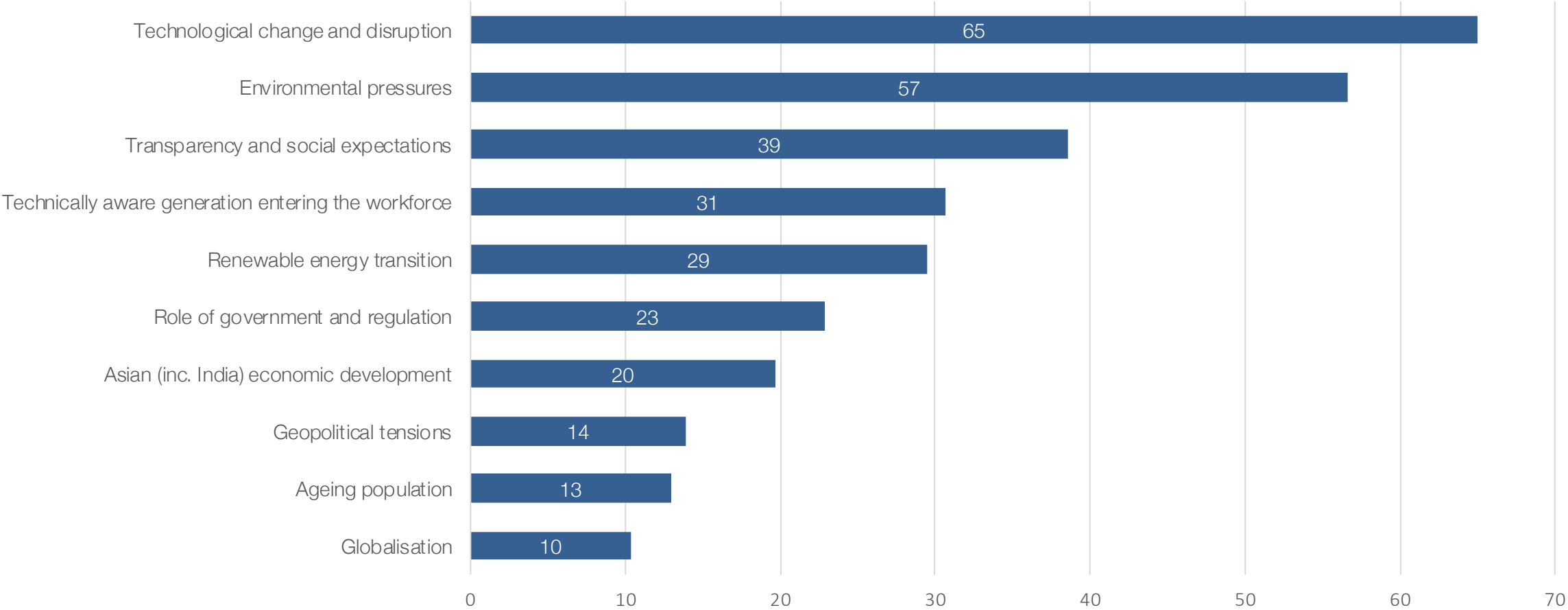
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2. DATA PACK

Global Trends

We asked: Which of the following global trends will have the biggest impact on innovation in mining over the next 15 years?

By % of respondents given three options



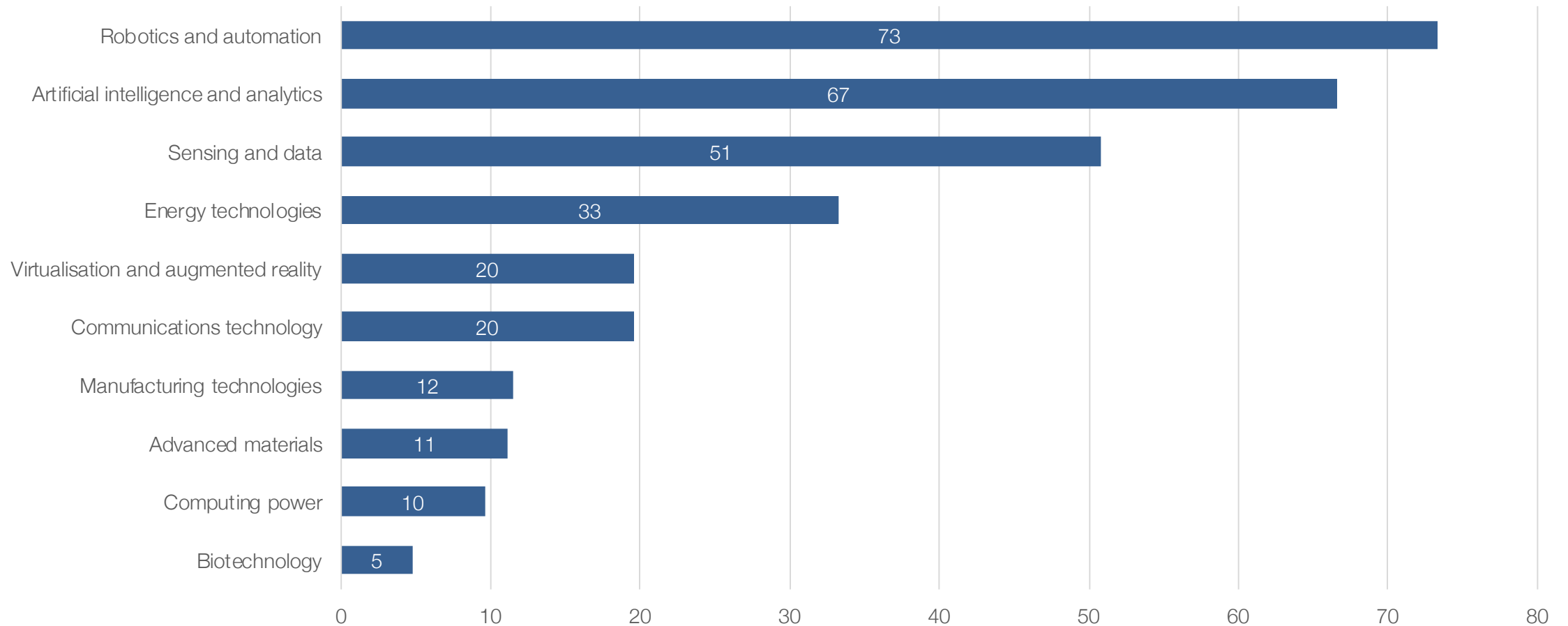
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Technology Areas

We asked: Which underlying technology areas will have the biggest impact on innovation in mining over the next 15 years?

By % of respondents given three options

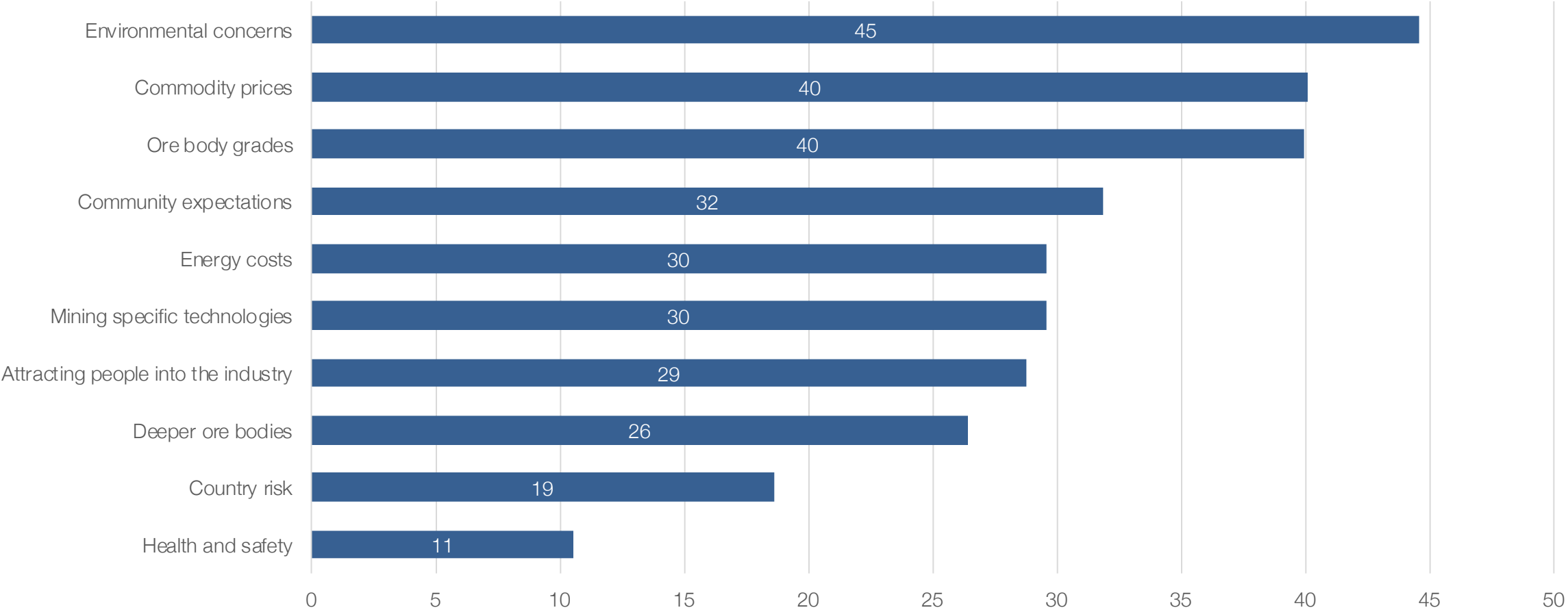


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Industry Trends

We asked: Which of the following industry trends will have the biggest impact on innovation in mining over the next 15 years?

By % of respondents given three options



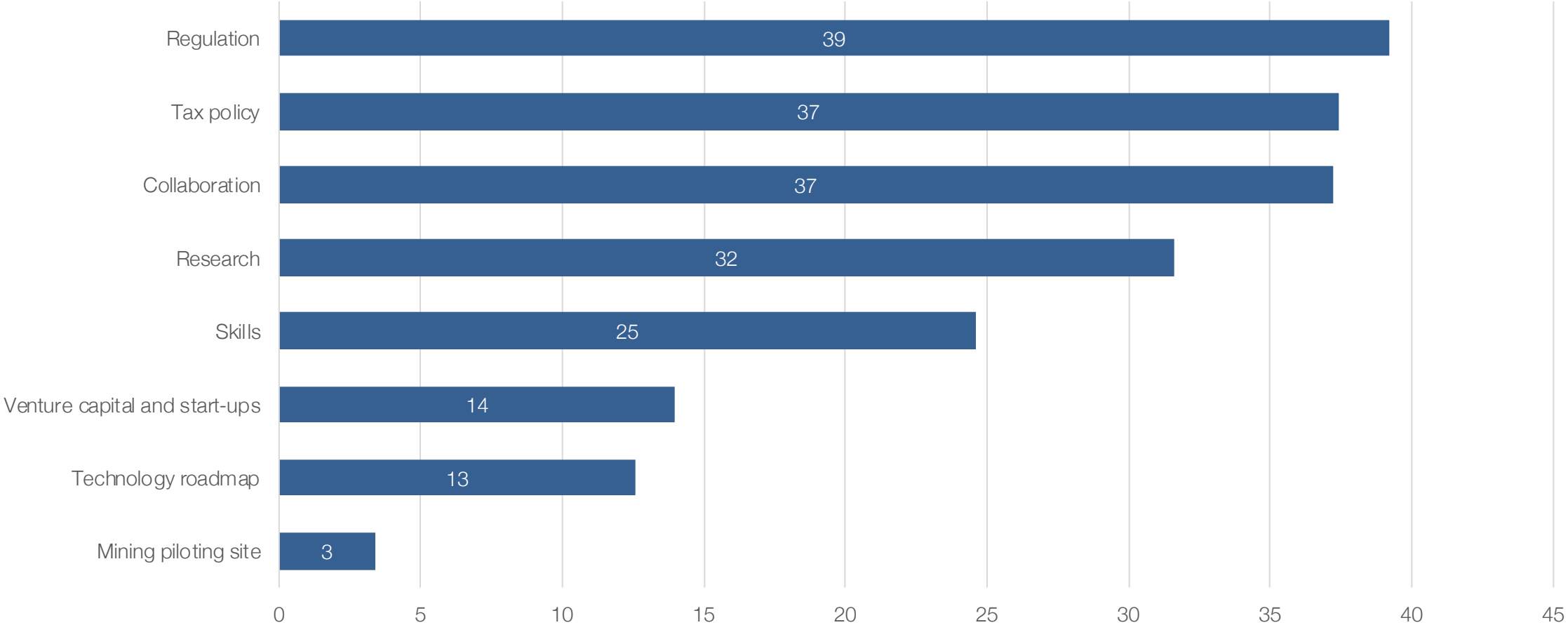
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Government and industry bodies

We asked: Where can government best intervene to support innovation in mining?

By % of respondents given two options

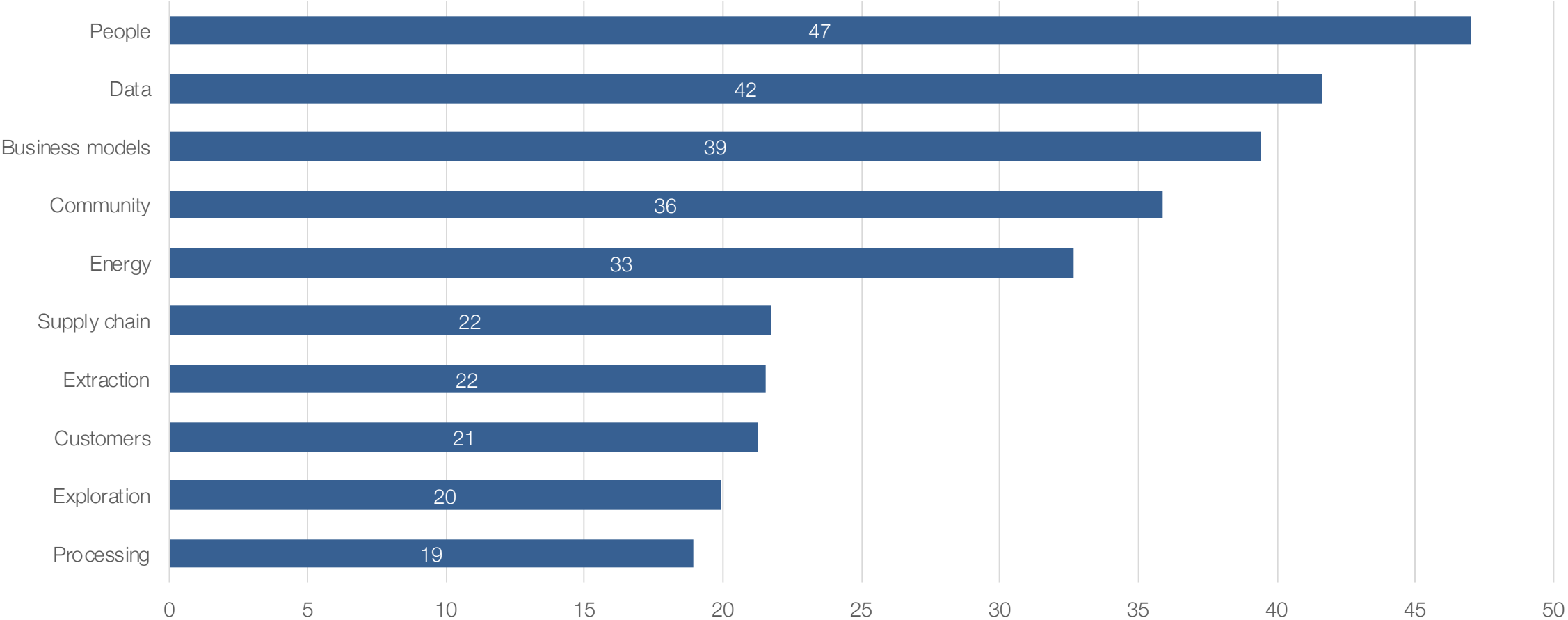


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Potential Disruption

We asked: Where is disruption in the mining industry most likely to come from?

By % of respondents given three options



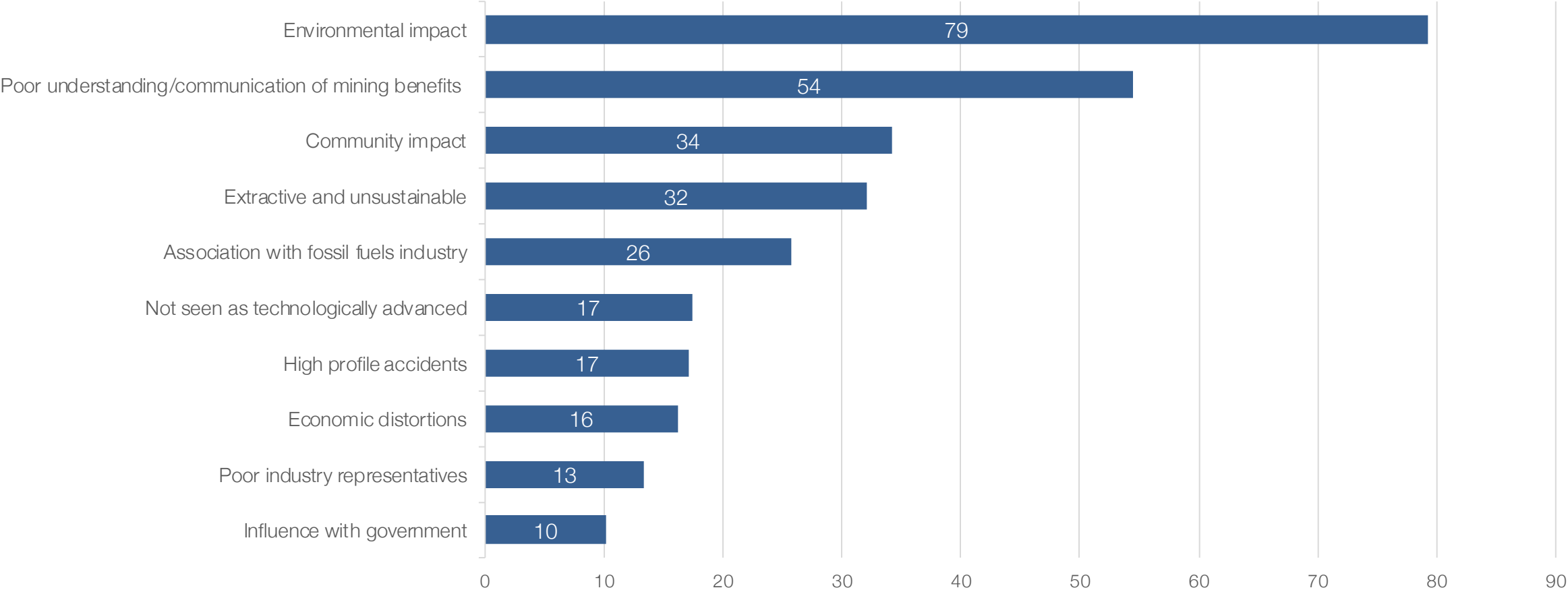
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Mining perception

We asked: Why is mining perceived negatively in society?

By % of respondents given three options



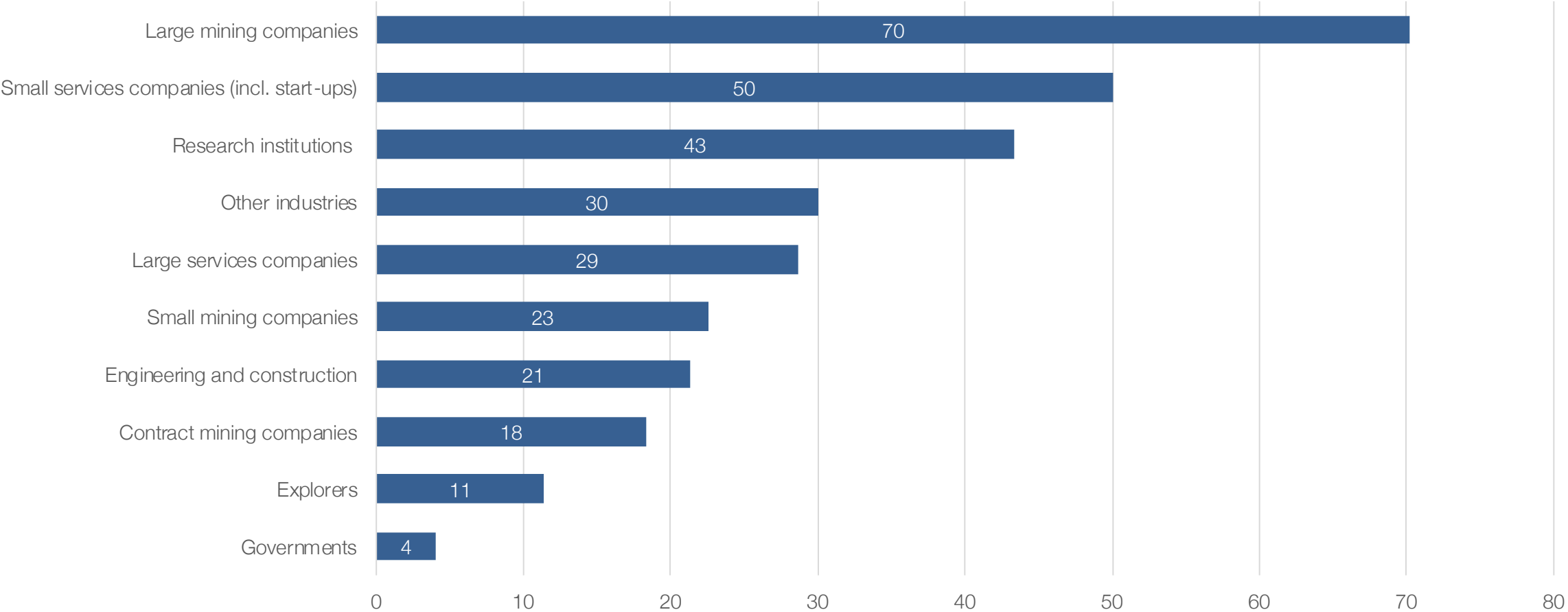
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Who is impacting innovation

We asked: Who is driving innovation in the mining industry the most?

By % of respondents given three options

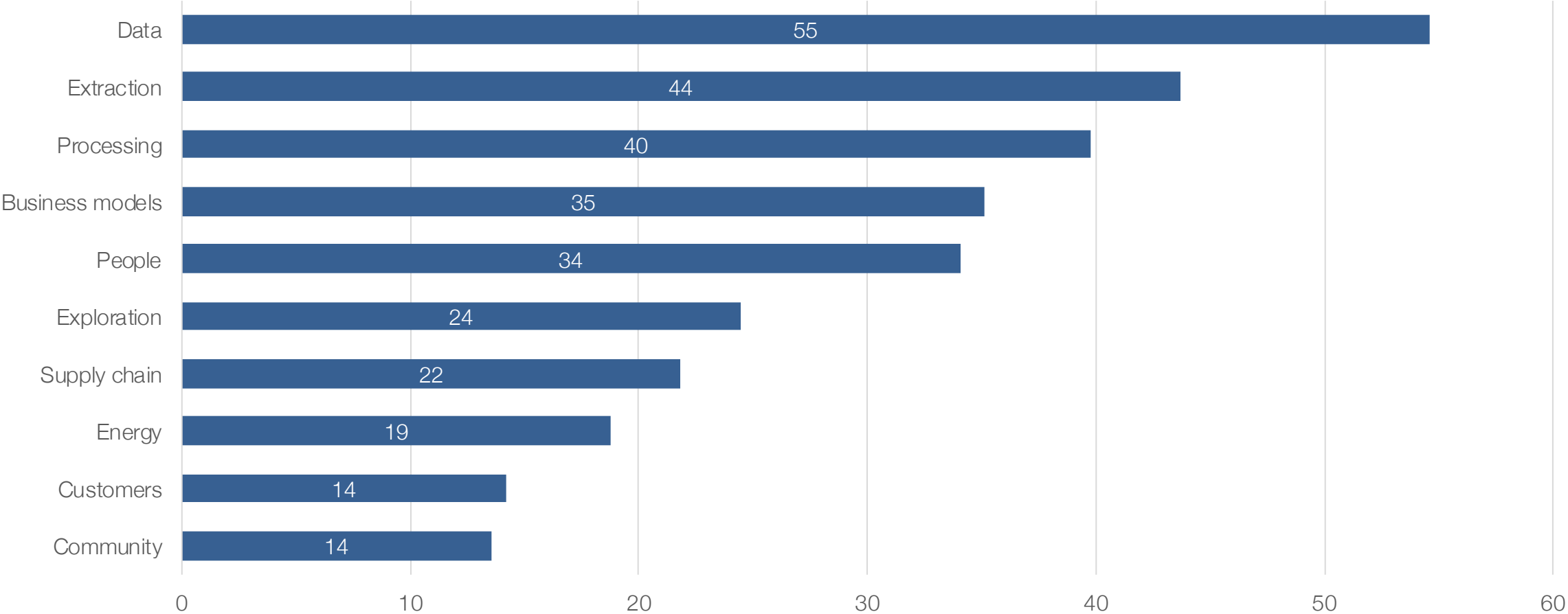


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Value chain

We asked: Where in the value chain are your innovation efforts primarily focused today?

By % of respondents given three options



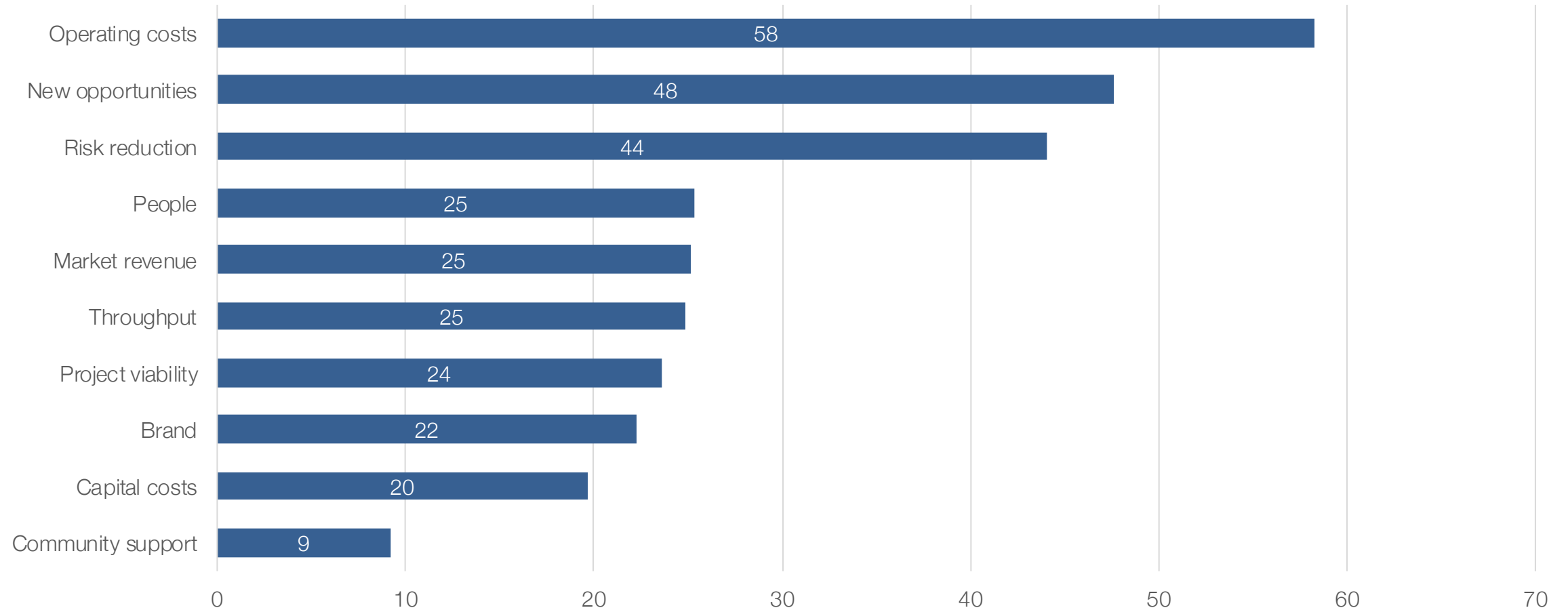
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Value source

We asked: What are your company's main sources of value from innovation?

By % of respondents given three options

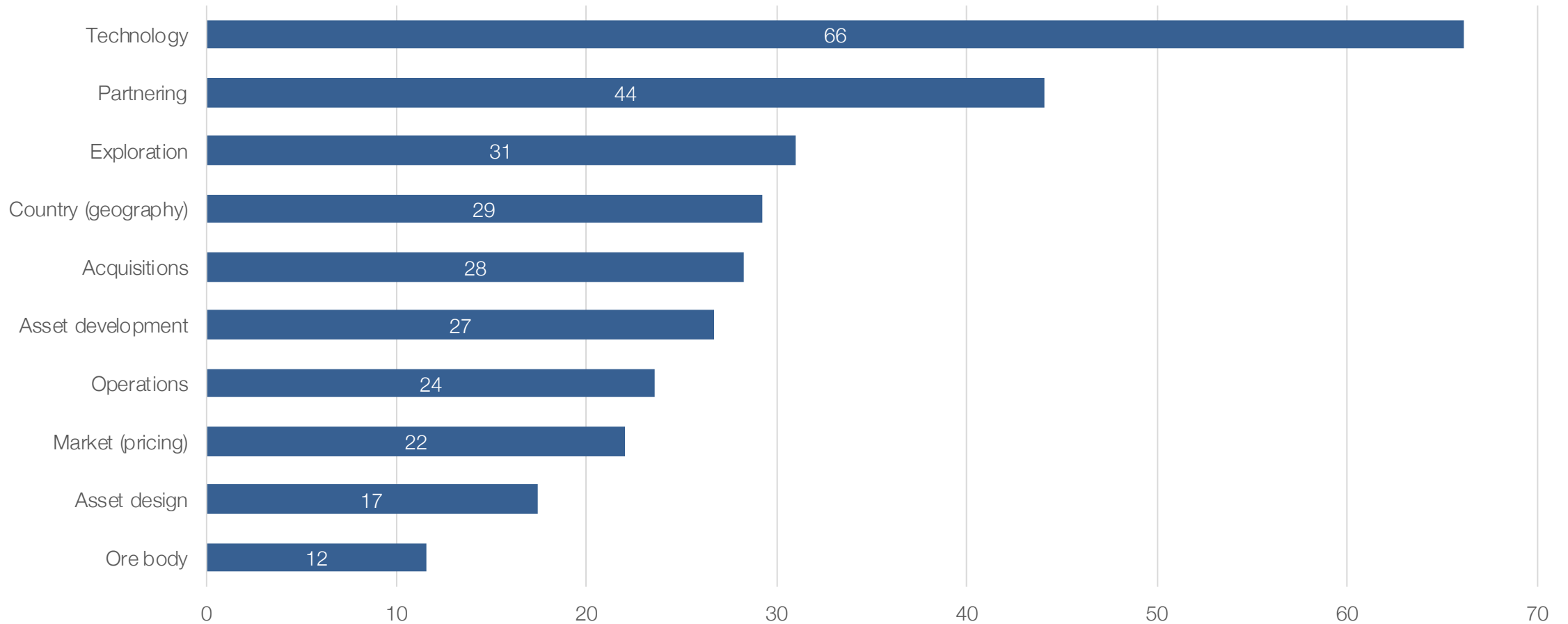


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Acceptable risk

We asked: As a mining business, where would you accept risk in order to increase financial returns?

By % of respondents given three options

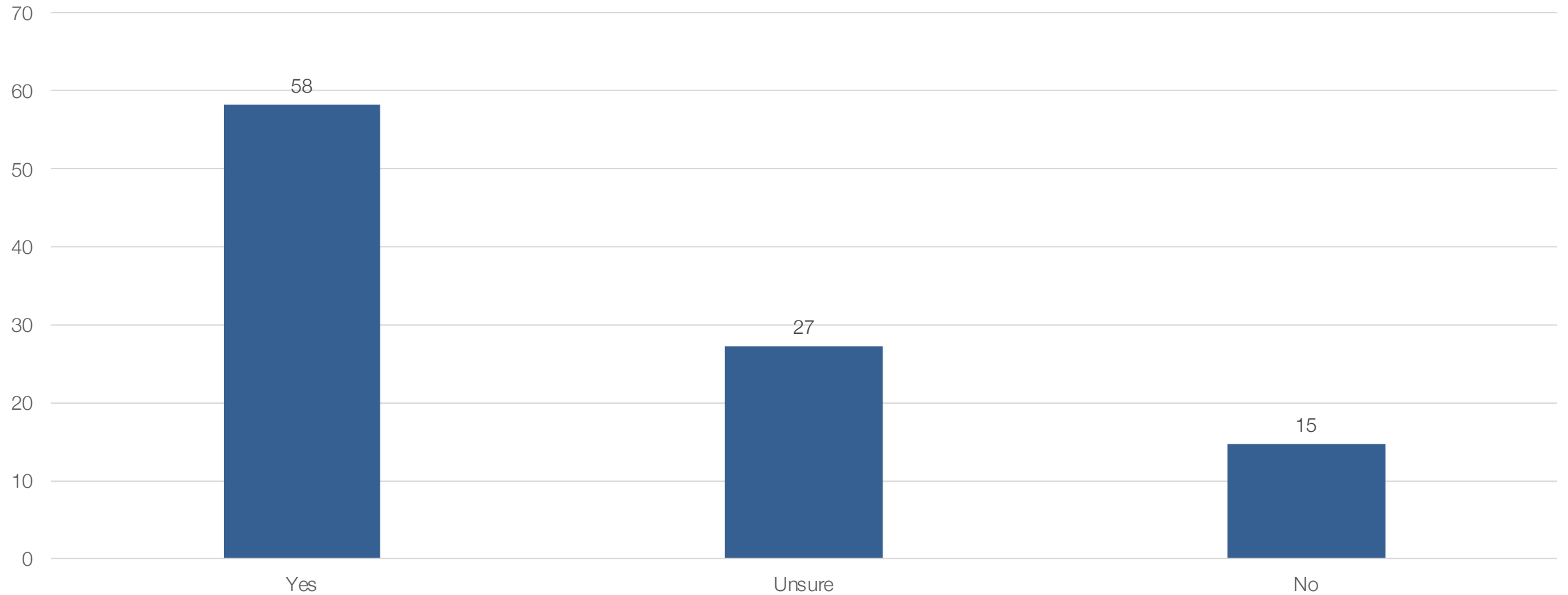


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Transparency as a driver of value

We asked: Will transparency of the source of raw materials become a significant driver of value for mining companies?

By % of respondents

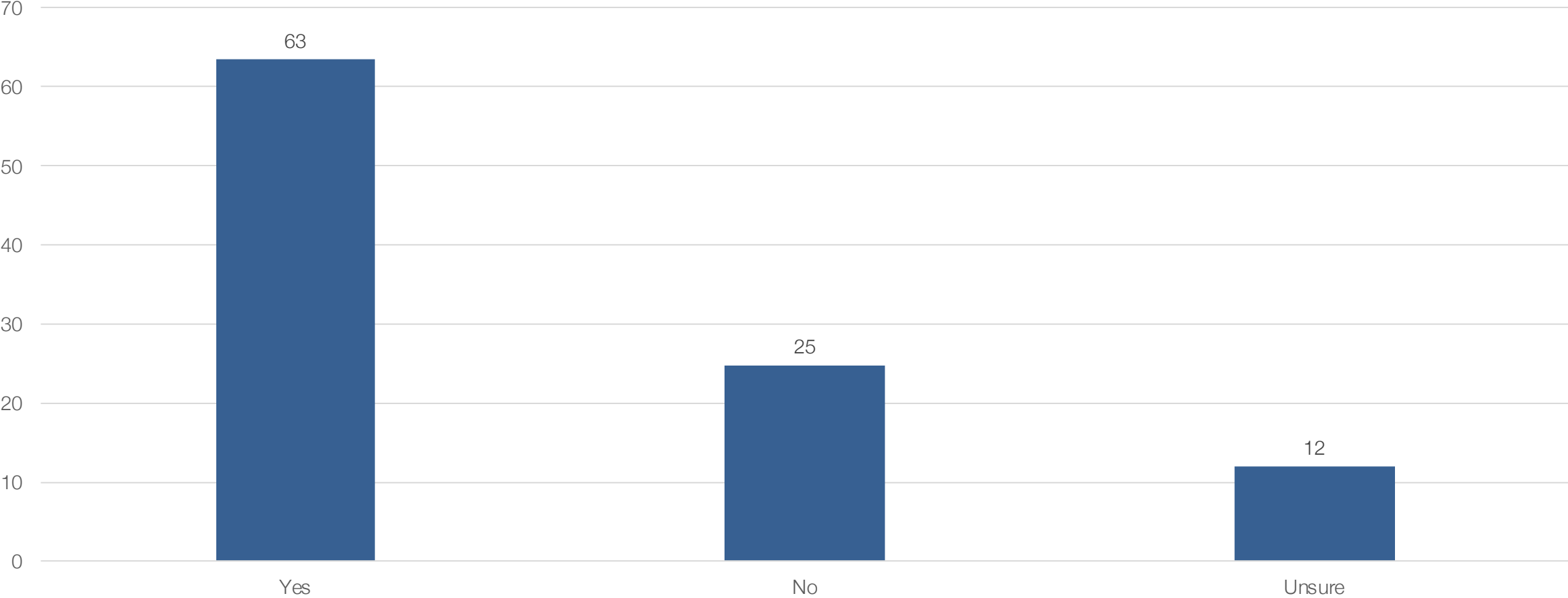


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Cyber security

We asked: Does your company place sufficient emphasis on cyber security?

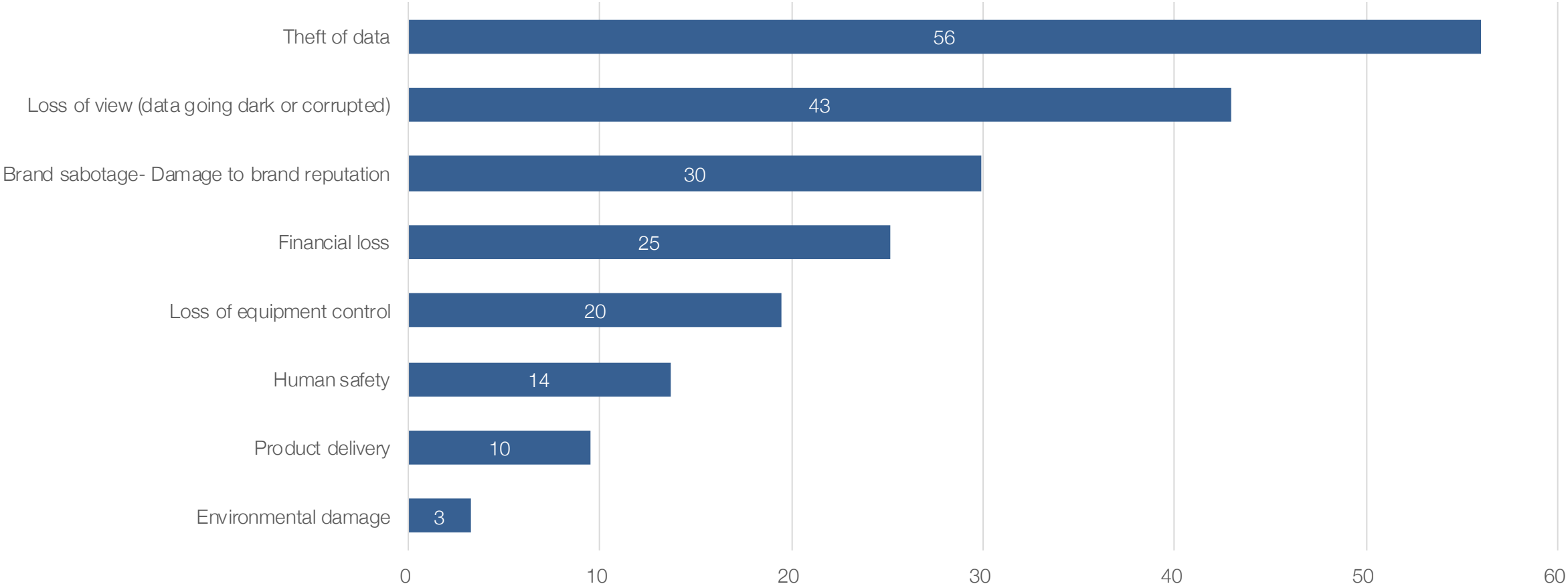
By % of respondents



Cyber security risk

We asked: What is the biggest risk from cyber security for your business?

By % of respondents given two options

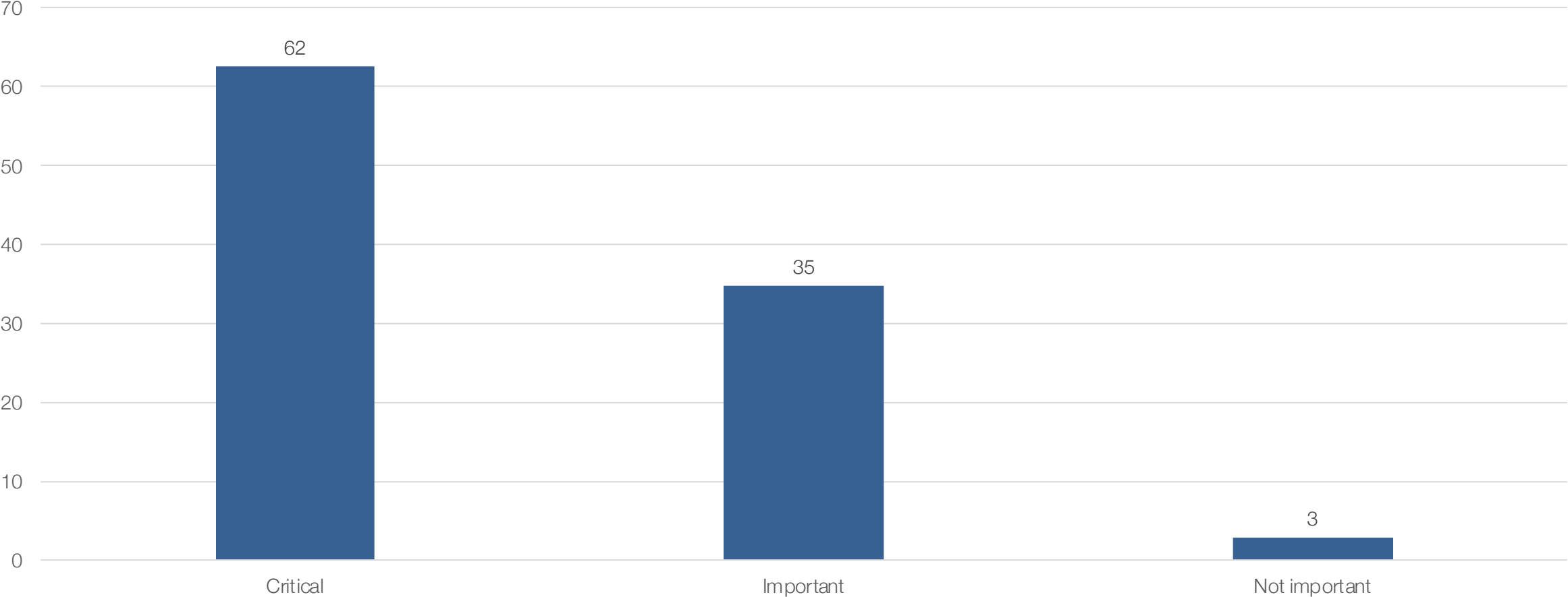


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Importance of innovation

We asked: How important is innovation to the success of your long-term business strategy?

By % of respondents

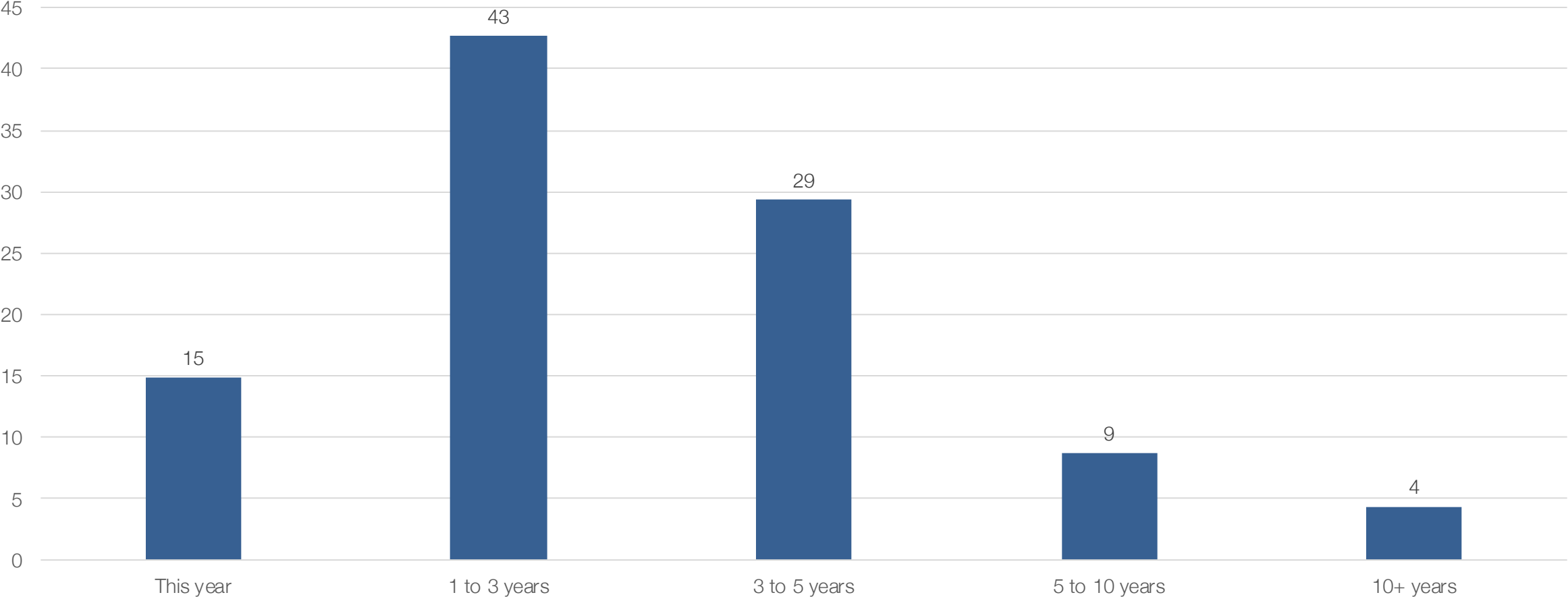


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Innovation timeframe

We asked: What is the key time frame for innovation focus in your company?

By % of respondents



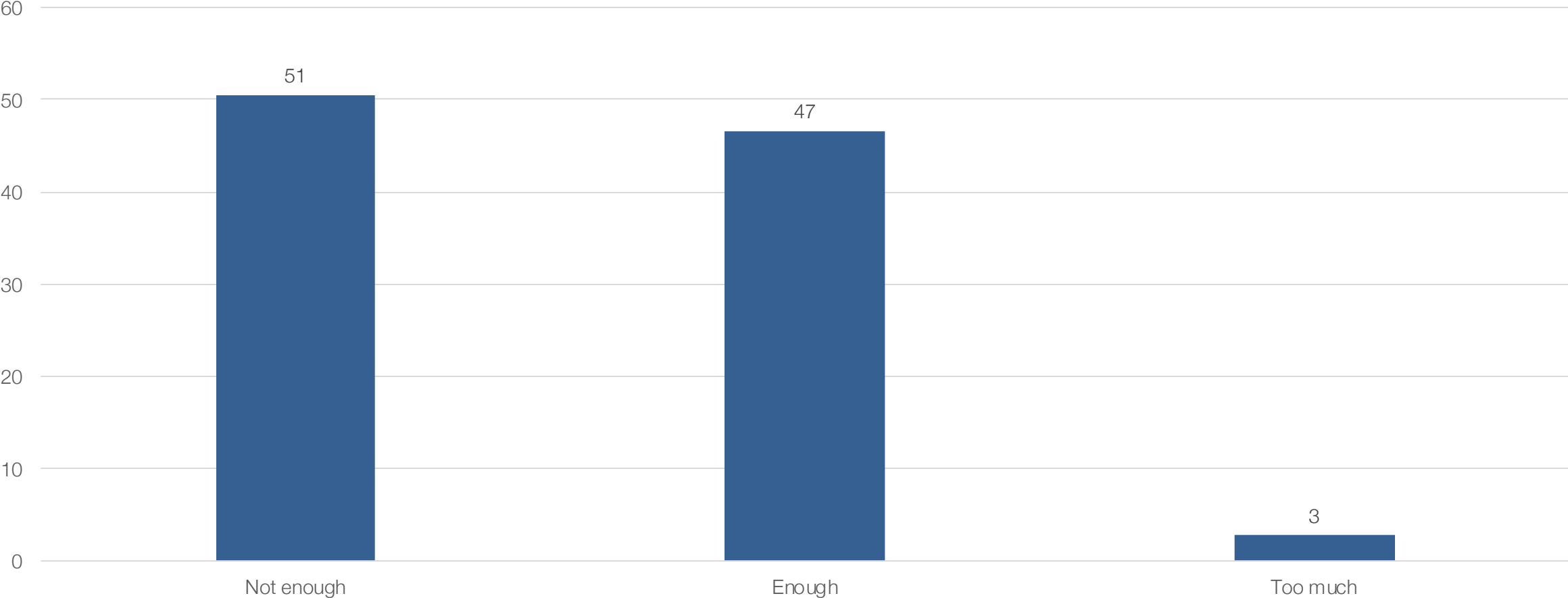
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Innovation spend

We asked: Do you think your company spends enough on innovation?

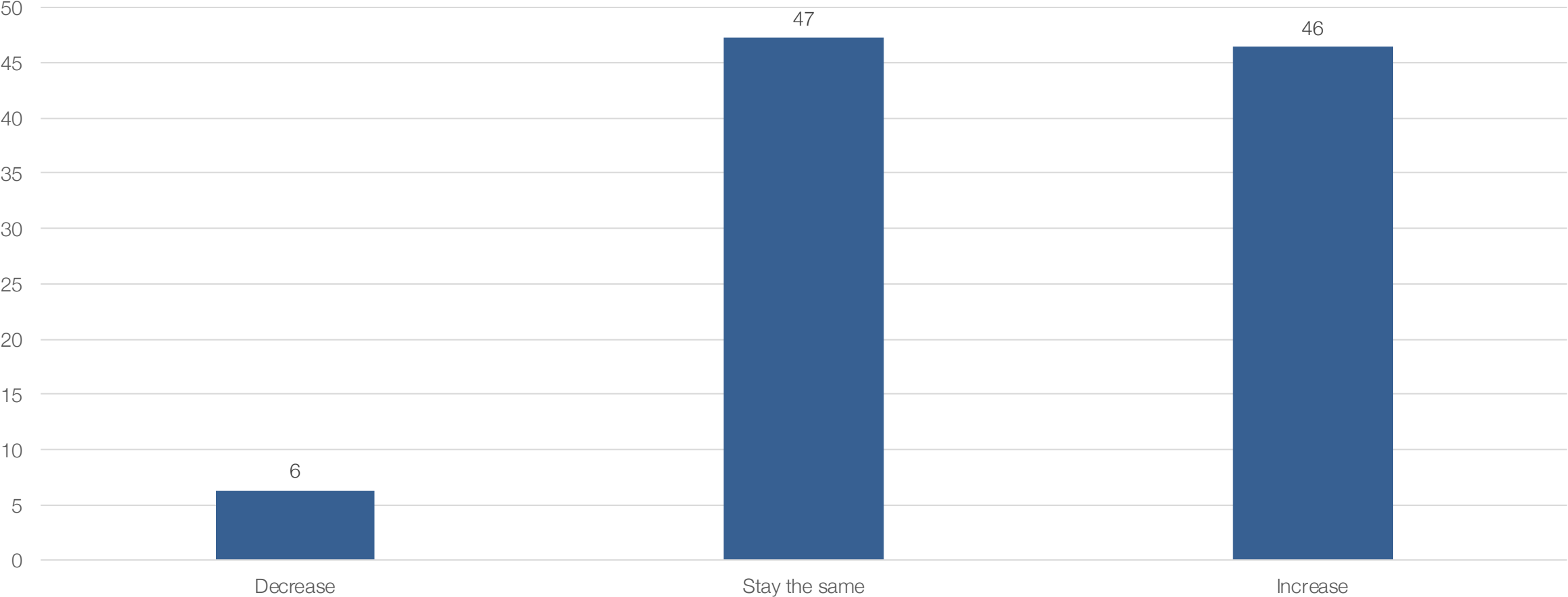
By % of respondents



Change in innovation spend

We asked: How do you expect spending on innovation to change next year?

By % of respondents

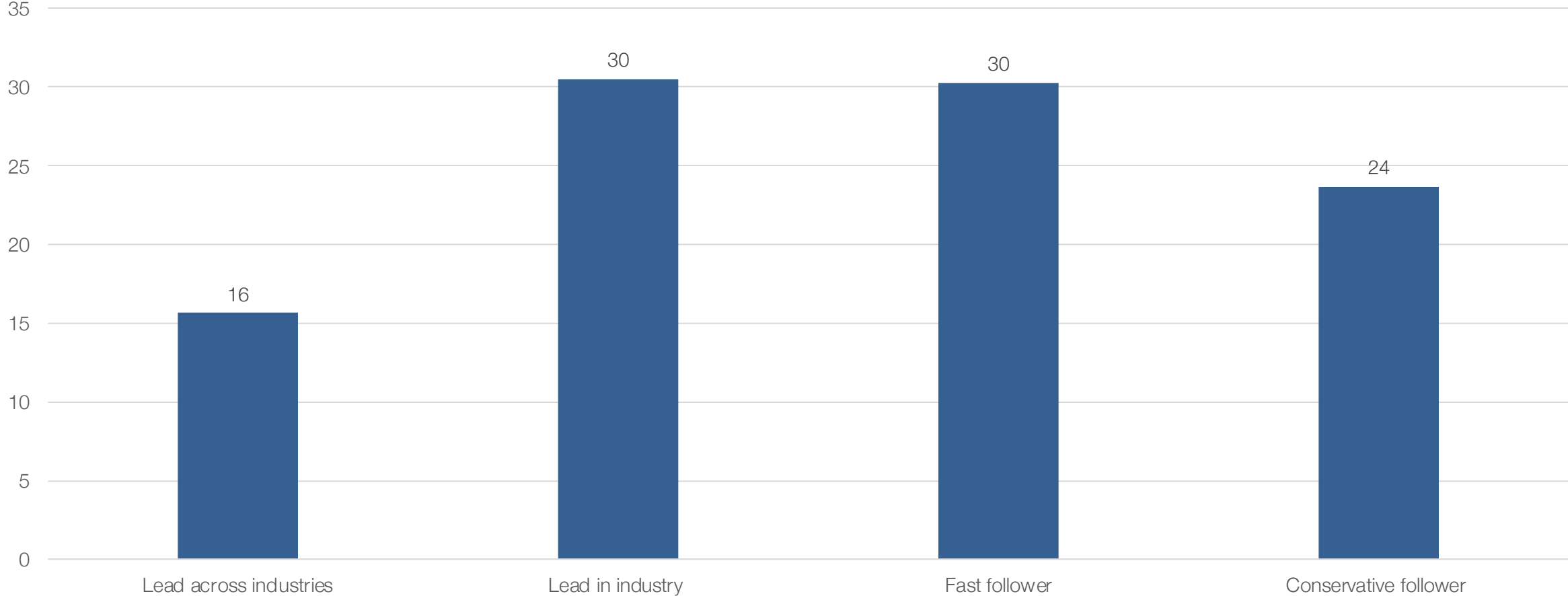


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Approach

We asked: Which phrase best represents your company's approach to technology based innovation?

By % of respondents



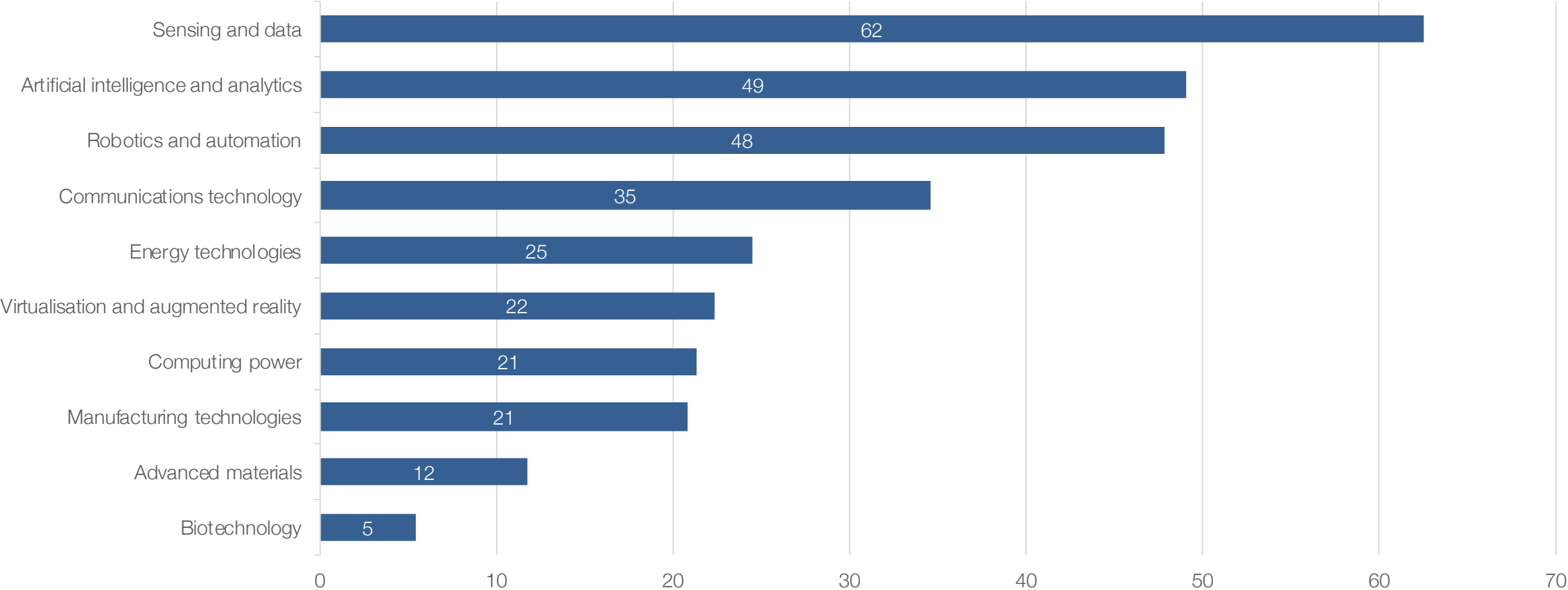
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Technology focus areas

We asked: Which underlying technology areas receive the most innovation focus in your company?

By % of respondents given three options

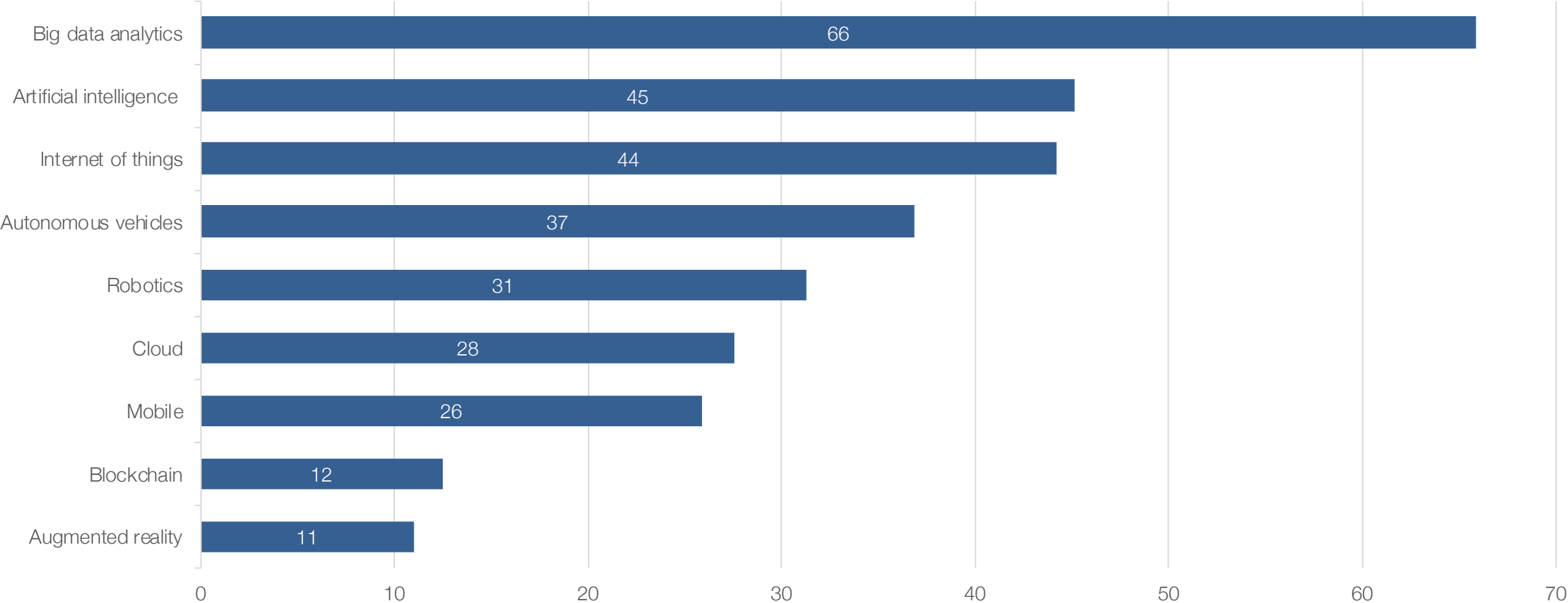


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Digital technology

We asked: Which of the following digital technologies will have the biggest impact on your company over the next 5 years?

By % of respondents given three options

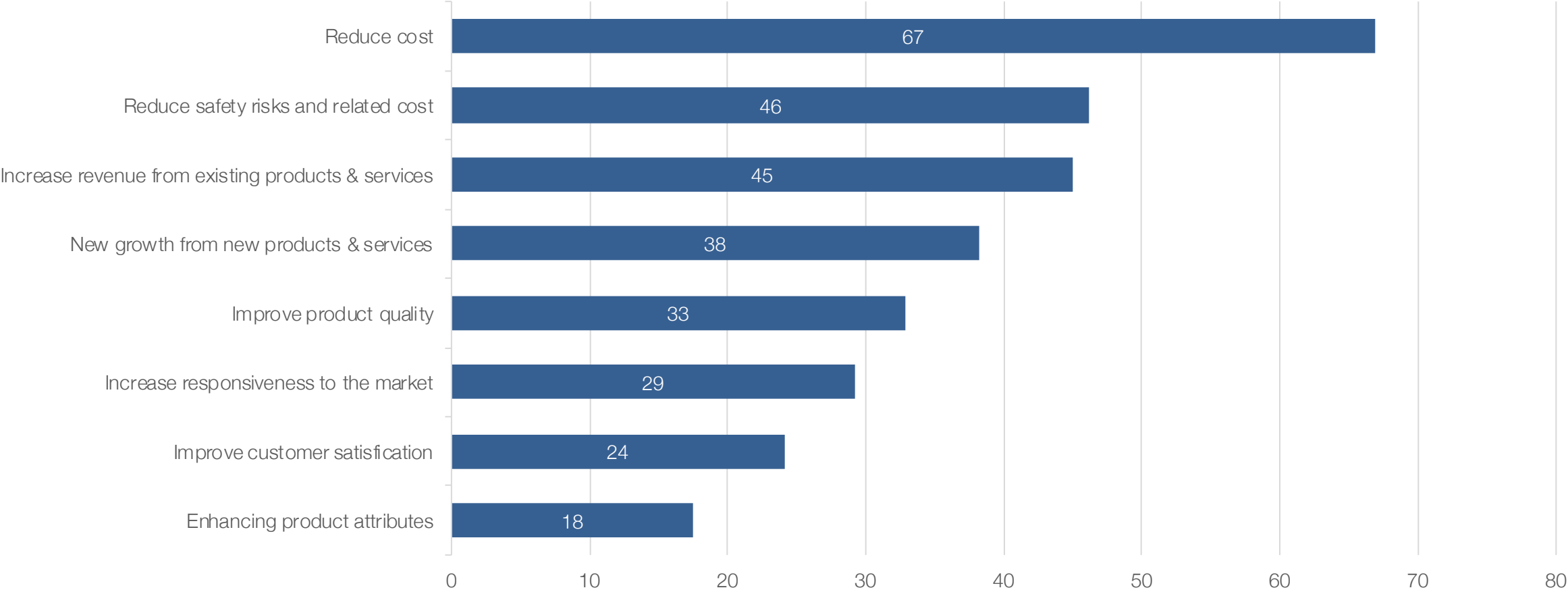


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Business value of digital technologies

We asked: How could digital technologies create business value for your company over the next 5 years?

By % of respondents given three options

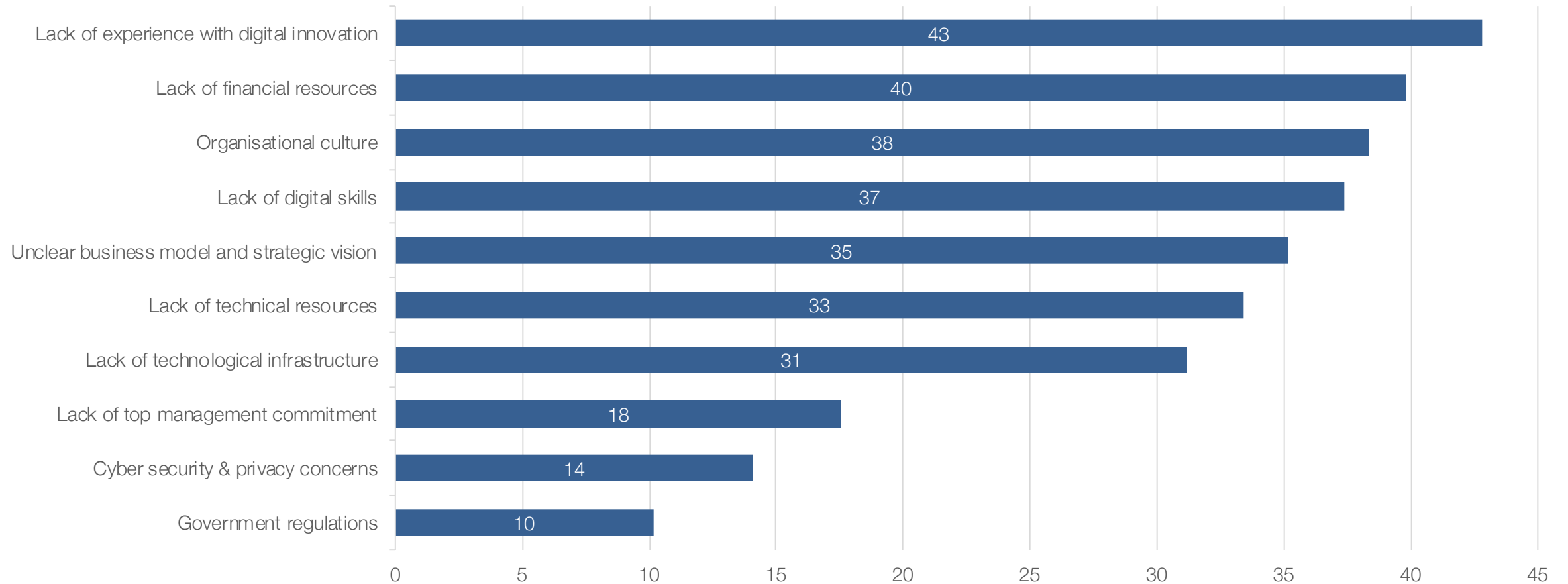


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Barriers to digital innovations

We asked: Which barriers are most important for implementing digital innovations in your company?

By % of respondents given three options

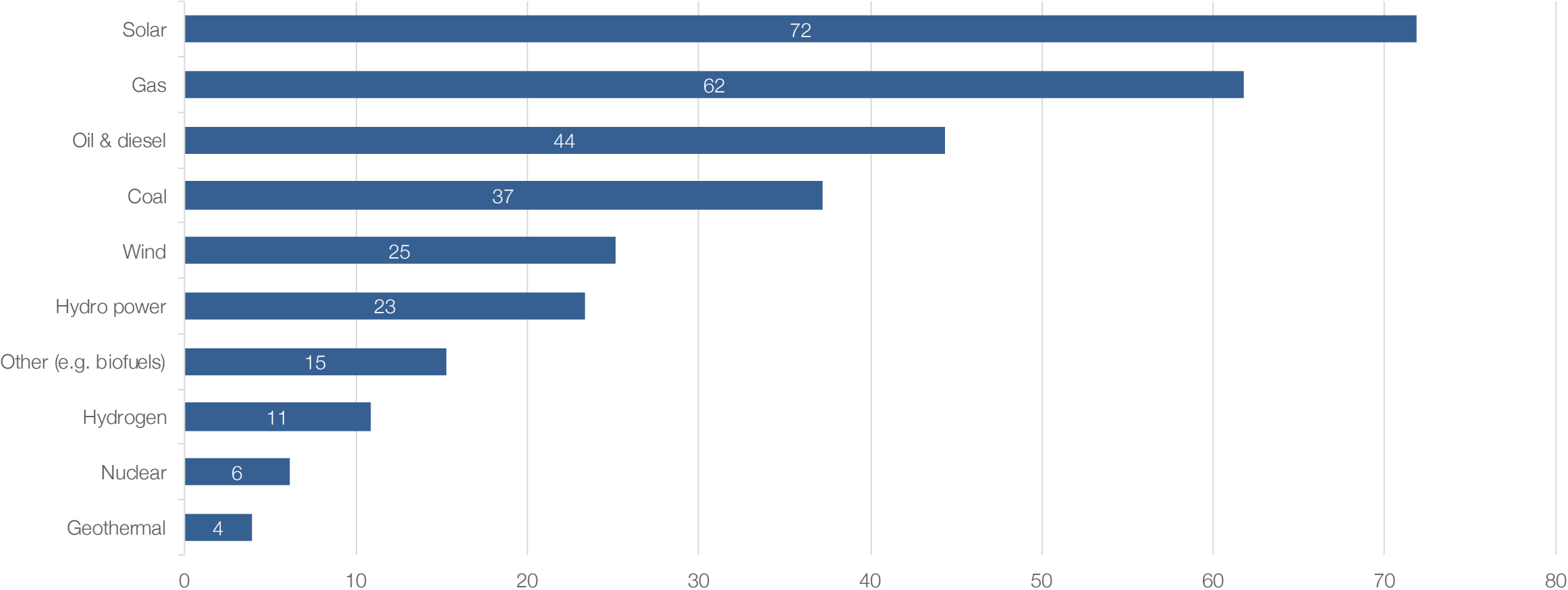


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Energy sources

We asked: What energy sources will become the most widely used in your country's mining companies over the next 15 years?

By % of respondents given three options

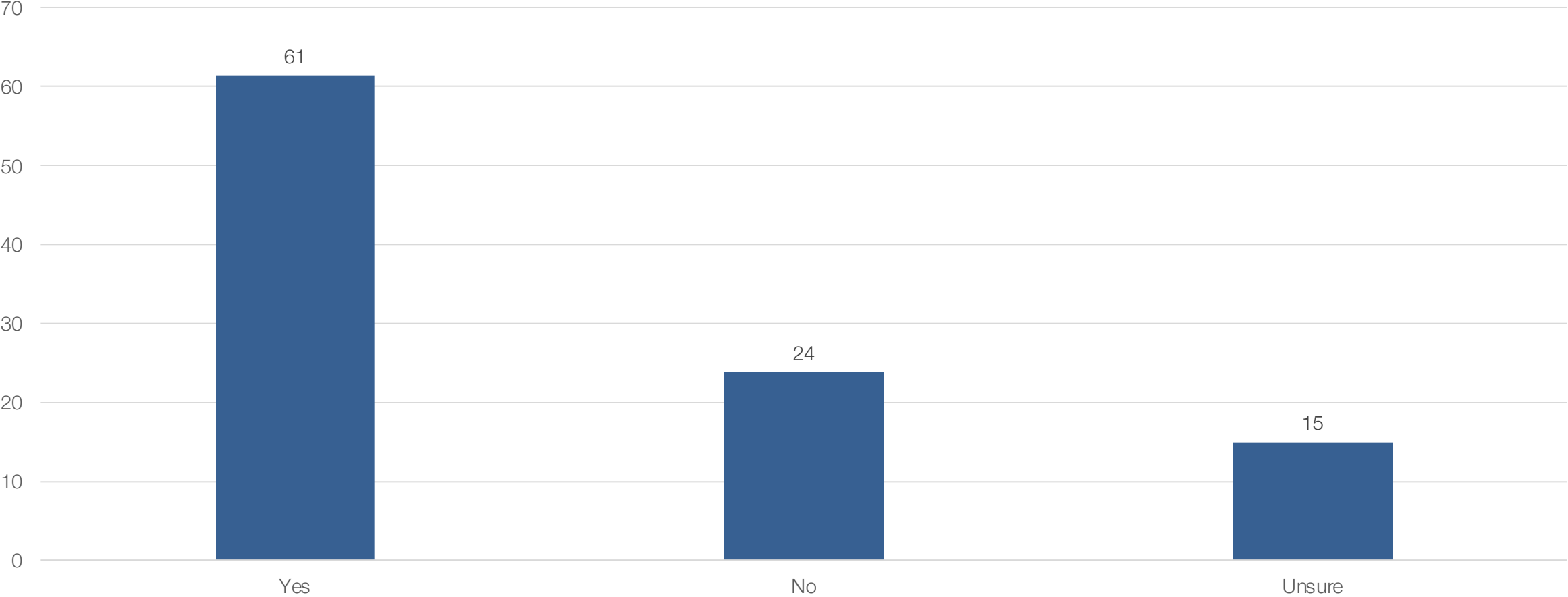


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Renewable energy technologies

We asked: Will renewable energy technologies significantly change mining operations in your country over the next 15 years?

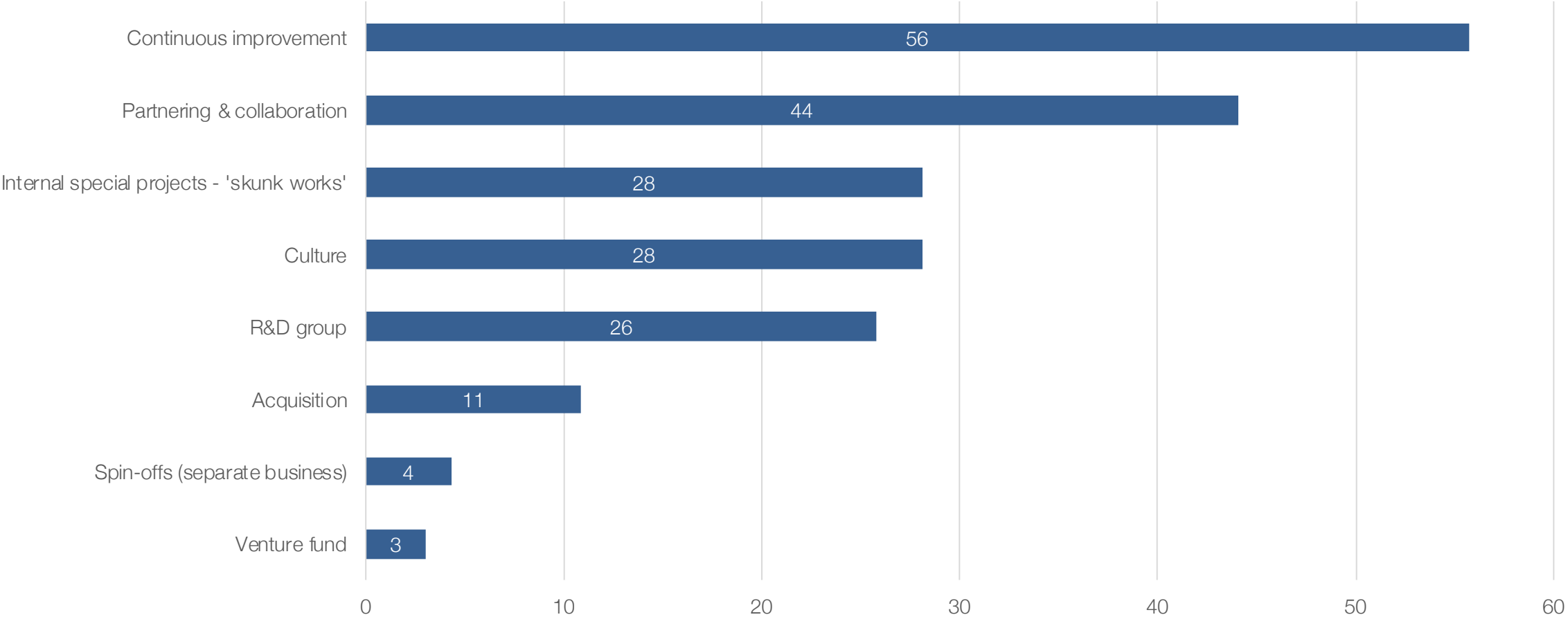
By % of respondents



Structures

We asked: What structures does your business use to innovate?

By % of respondents given two options

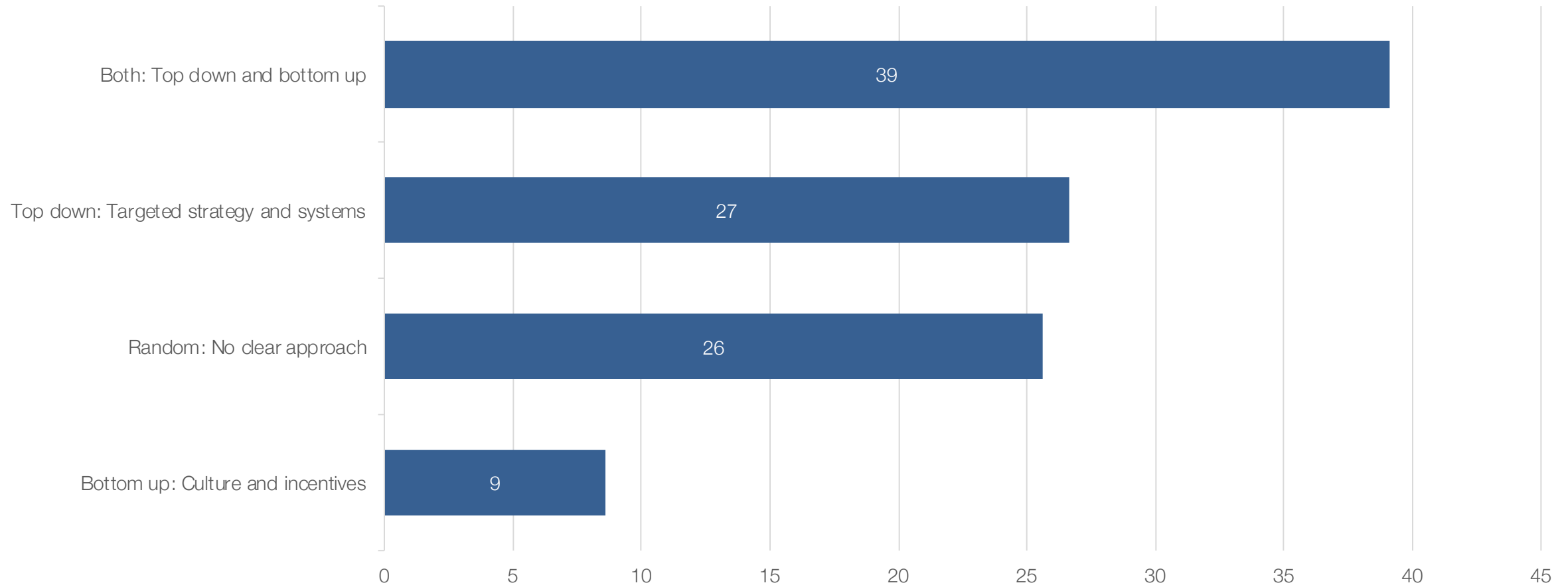


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Approach

We asked: How would you characterise your company's approach to innovation?

By % of respondents

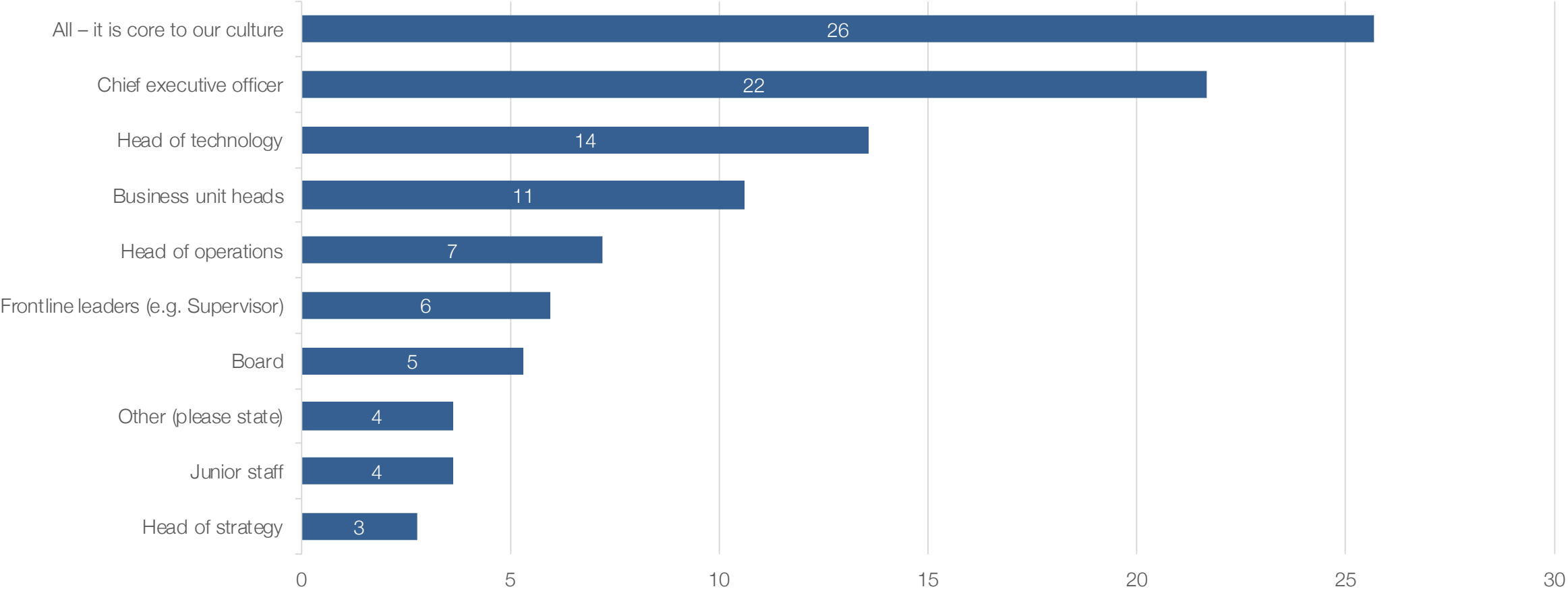


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Driver of innovation

We asked: Who is the biggest driving force for innovation in your company?

By % of respondents

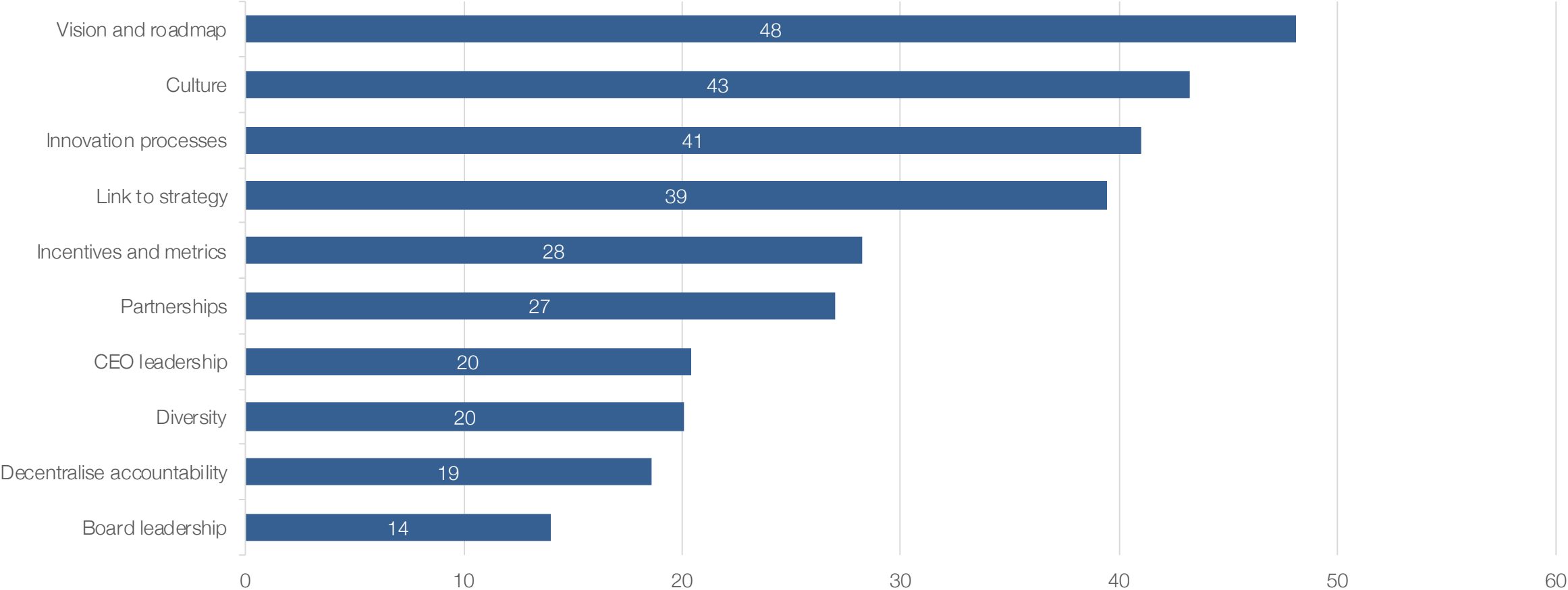


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Improving innovation

We asked: How could you best improve innovation in your company?

By % of respondents given three options

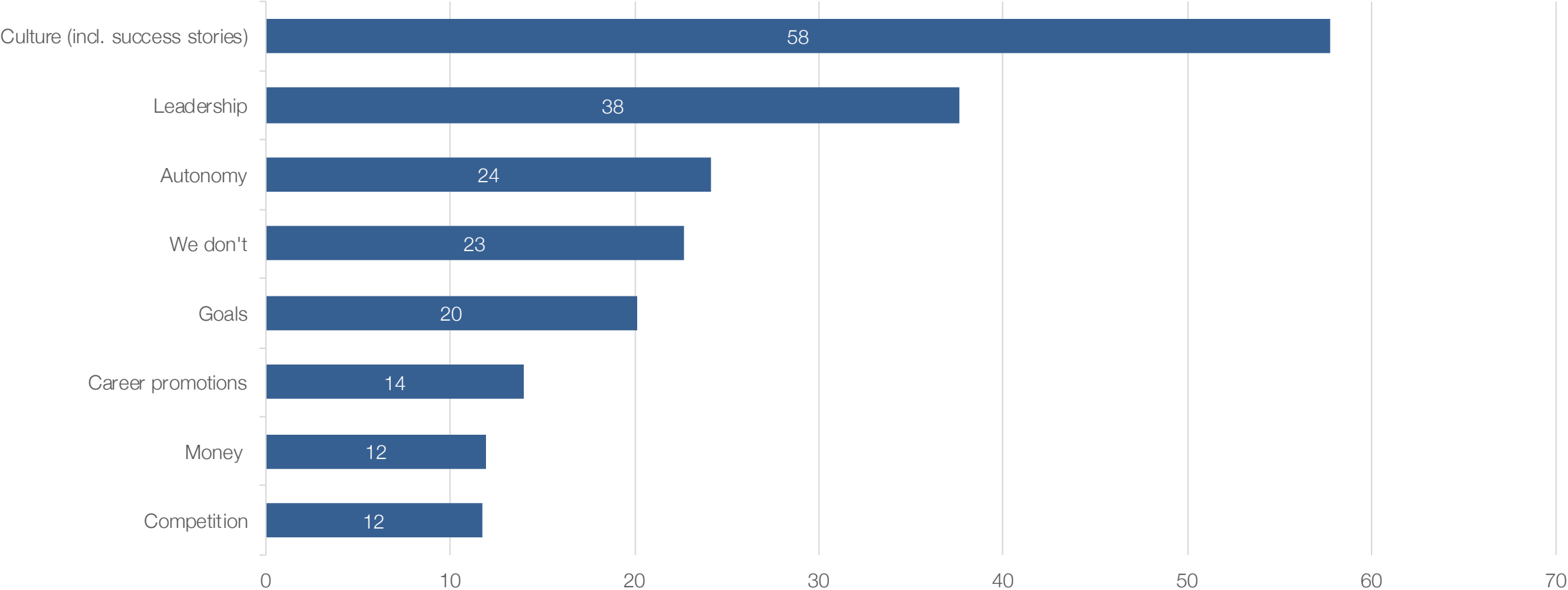


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Incentive to innovate

We asked: How do you incentivise your workforce to innovate?

By % of respondents given two options

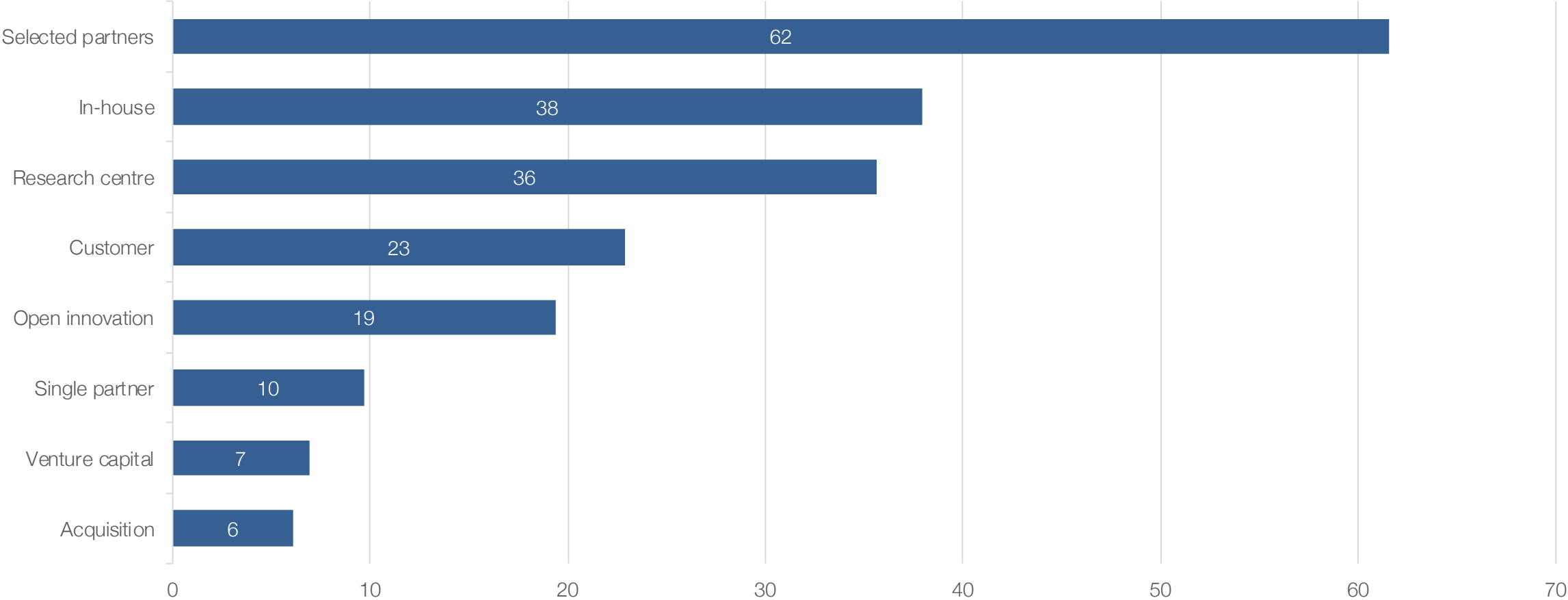


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Partnering

We asked: When aiming for a breakthrough innovation, what partnering approaches would you use?

By % of respondents given two options

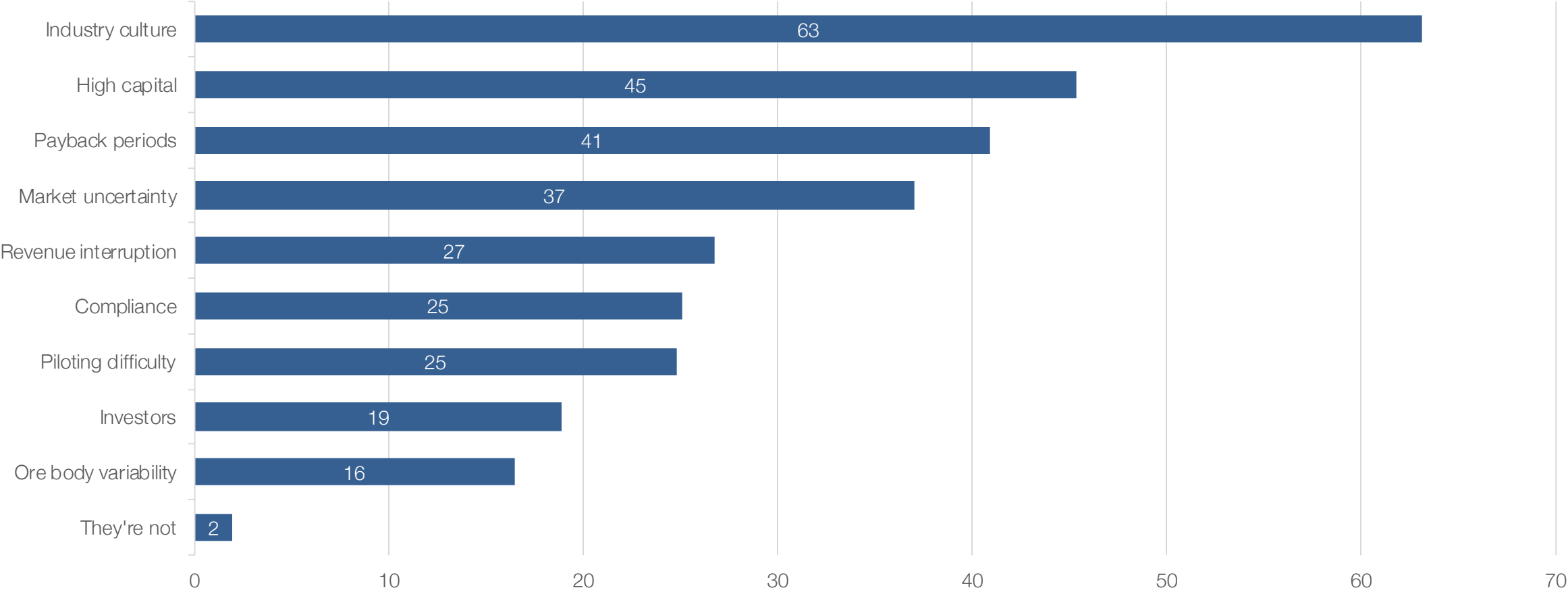


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Perception of risk

We asked: Perceptions of risk can be an impediment to innovation in mining – What do you believe is the primary reason for this?

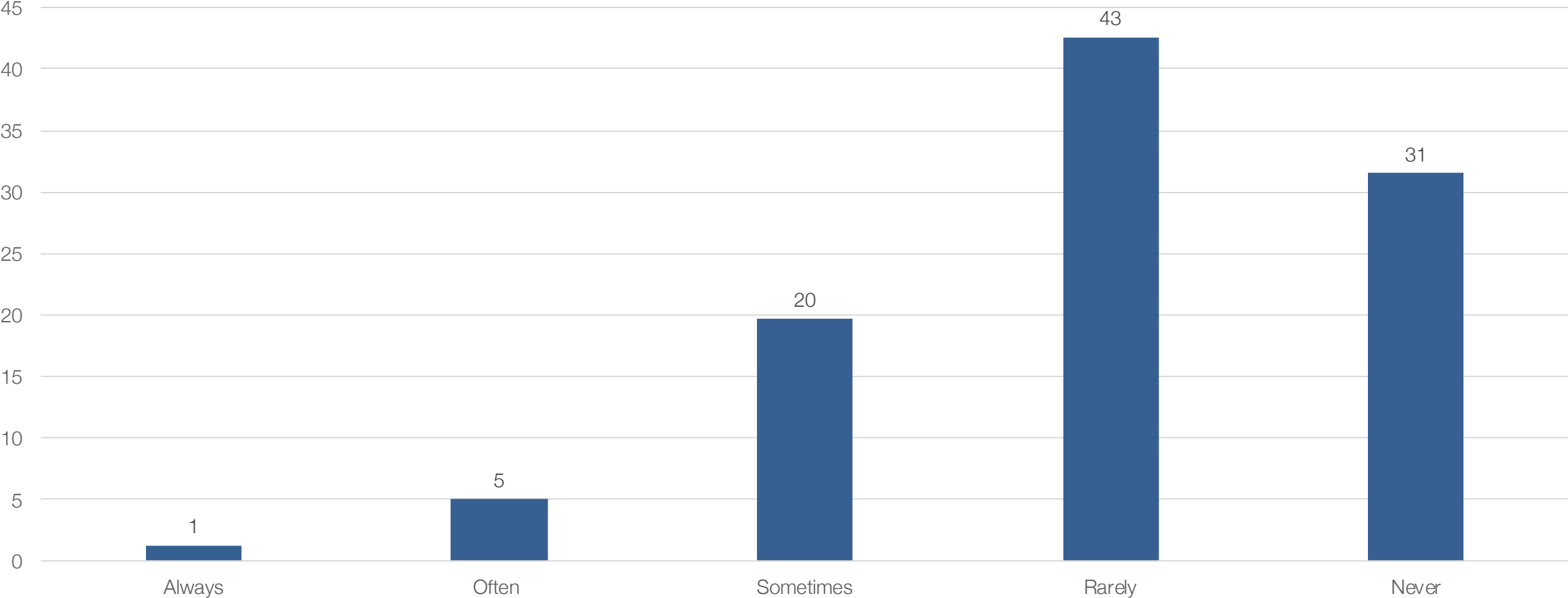
By % of respondents given three options



Corruption

We asked: How often do you encounter corruption in your job?

By % of respondents



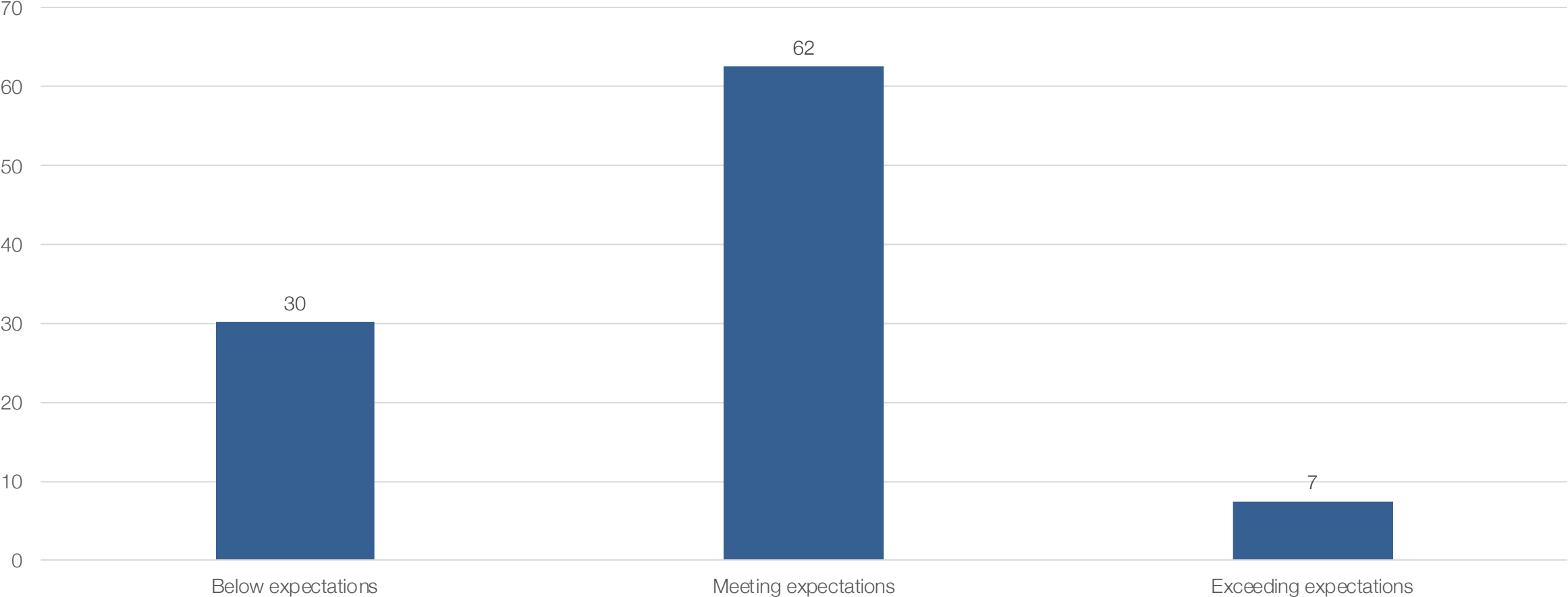
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Innovation performance

We asked: How are your innovation programs performing?

By % of respondents

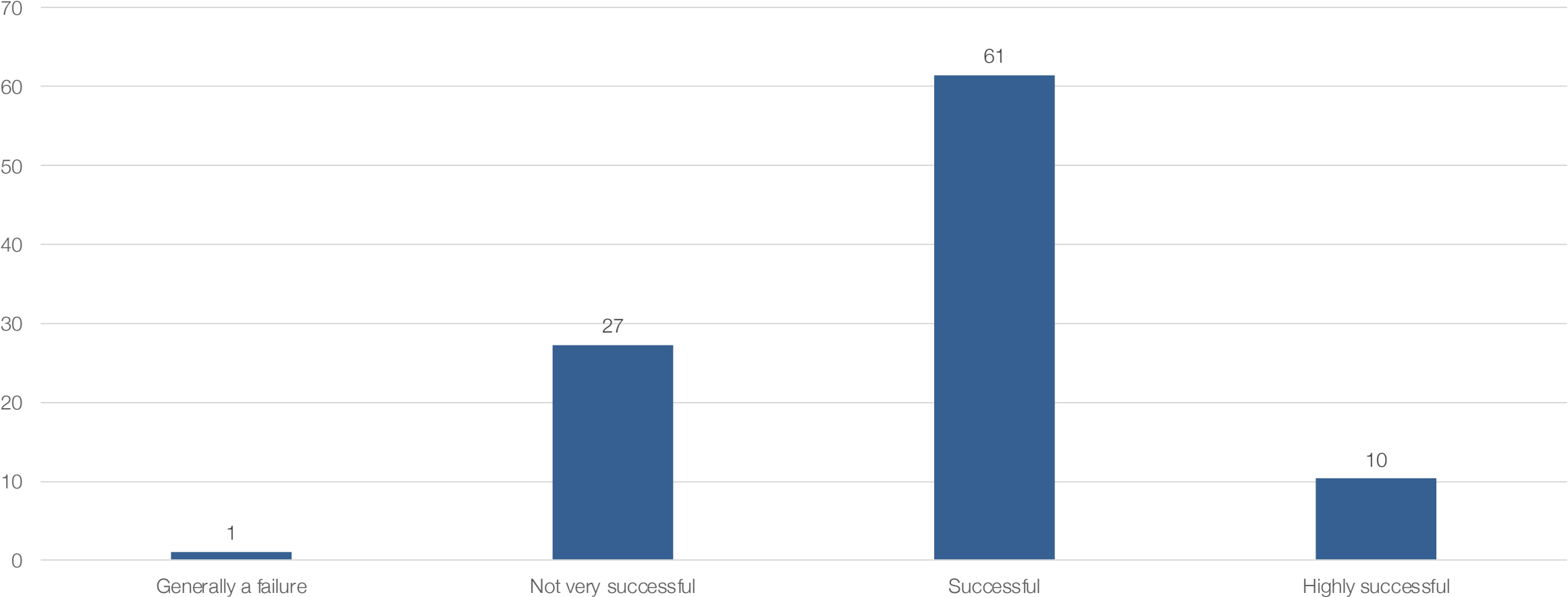


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Innovation success

We asked: How successful have introductions of new innovations been into your business?

By % of respondents



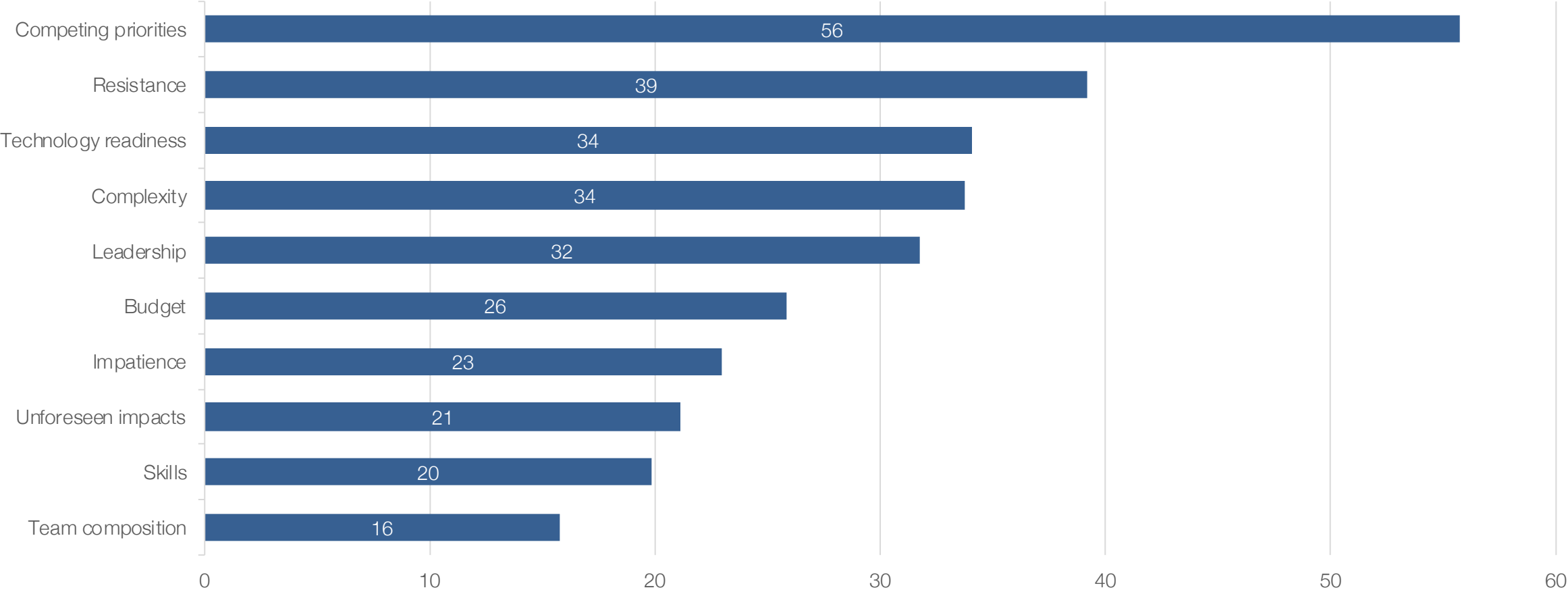
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Implementation failure

We asked: When implementation programmes of new innovations fail, what is generally the reason?

By % of respondents given three options

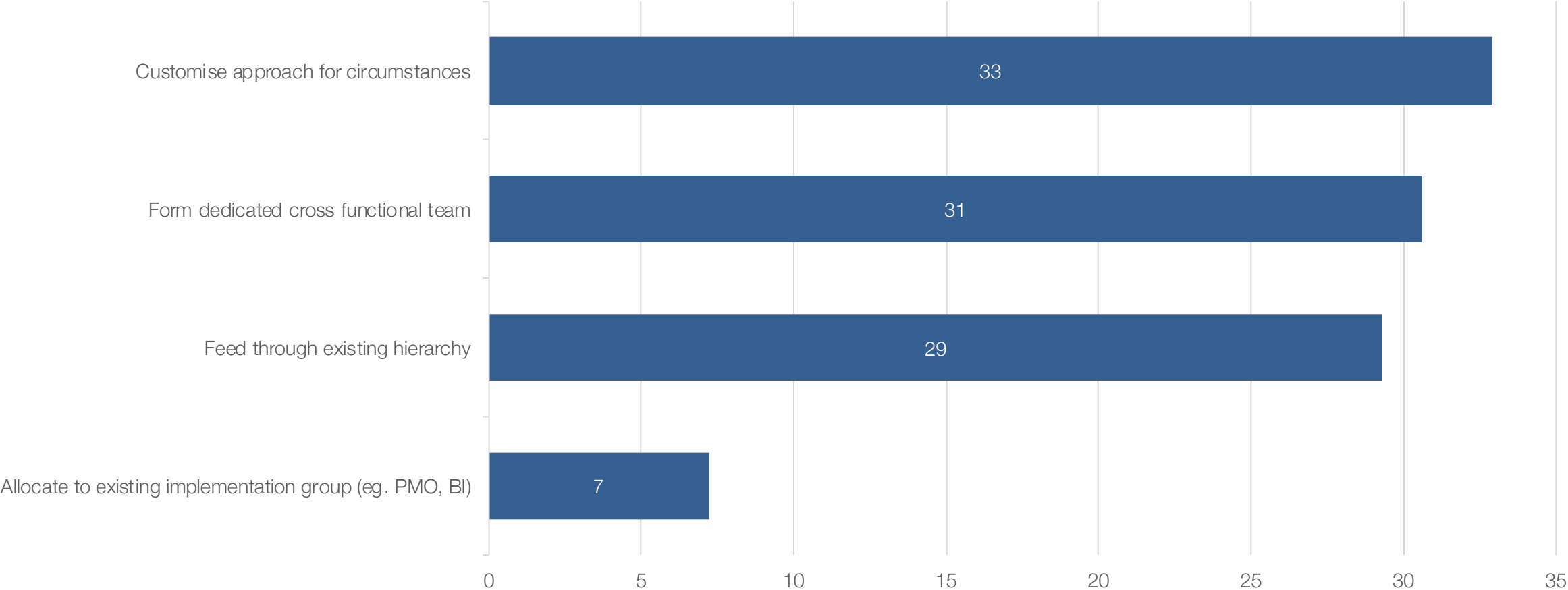


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Team structure

We asked: What team structure do you use for implementing new innovations?

By % of respondents



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