



**Building  
Mining's Social  
License to Operate:  
*Embrace the  
Mine of the Future***





# Debra Johnson

Senior ESG Strategist - Mining



**Home:** Phoenix AZ

**Highlights:** Cleantech CEO & Founder ~ 20 Years

**Passion:** Ensuring humans are on Earth longer than dinosaurs





# Seven Levels of Sustainability (Richard Barrett)

## Human Motivations

Service

Making a difference

Internal Cohesion

Transformation

Self-Esteem

Relationship

Survival

## Organizational Motivations

Societal Sustainability

Community Sustainability

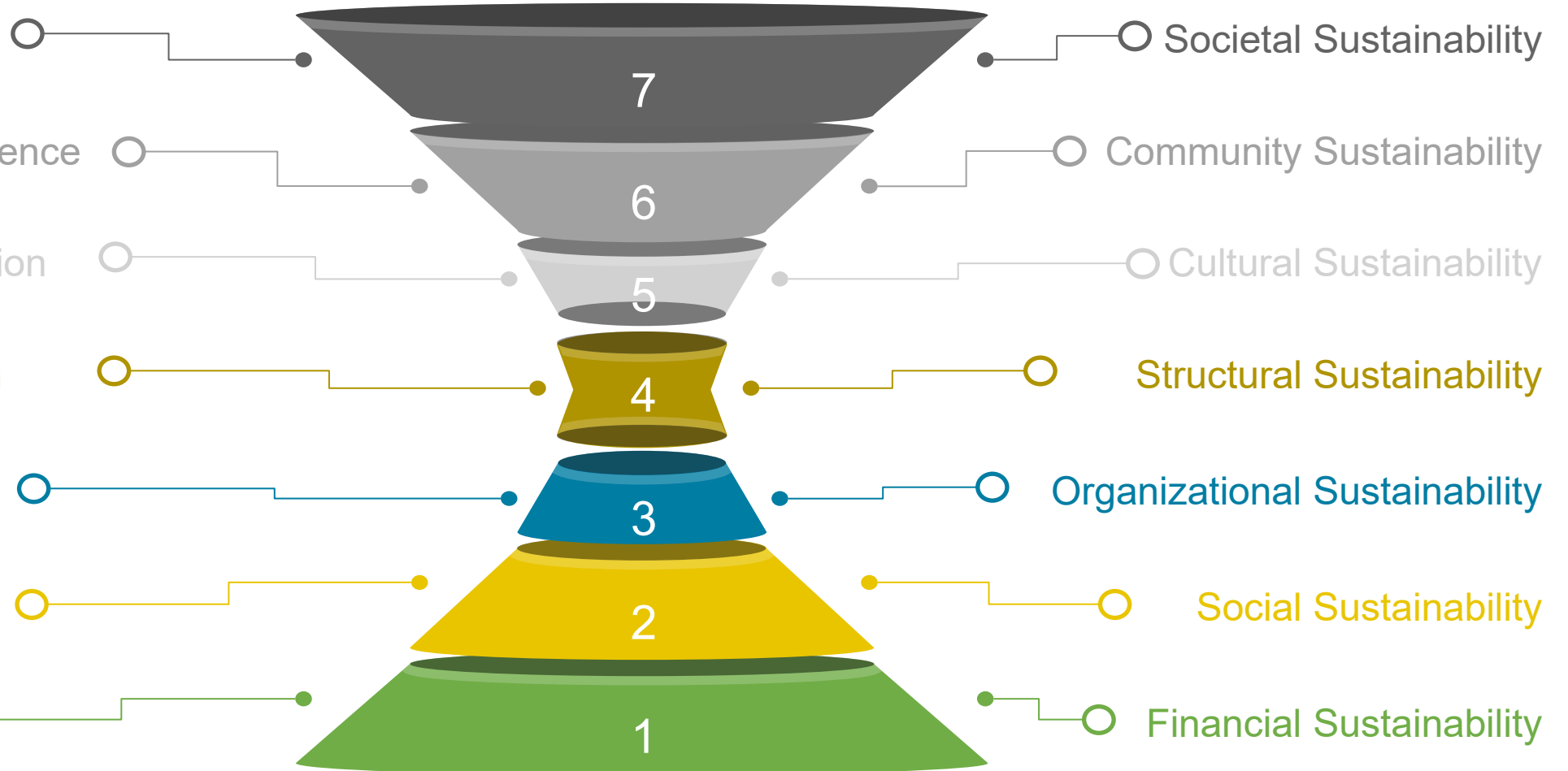
Cultural Sustainability

Structural Sustainability

Organizational Sustainability

Social Sustainability

Financial Sustainability

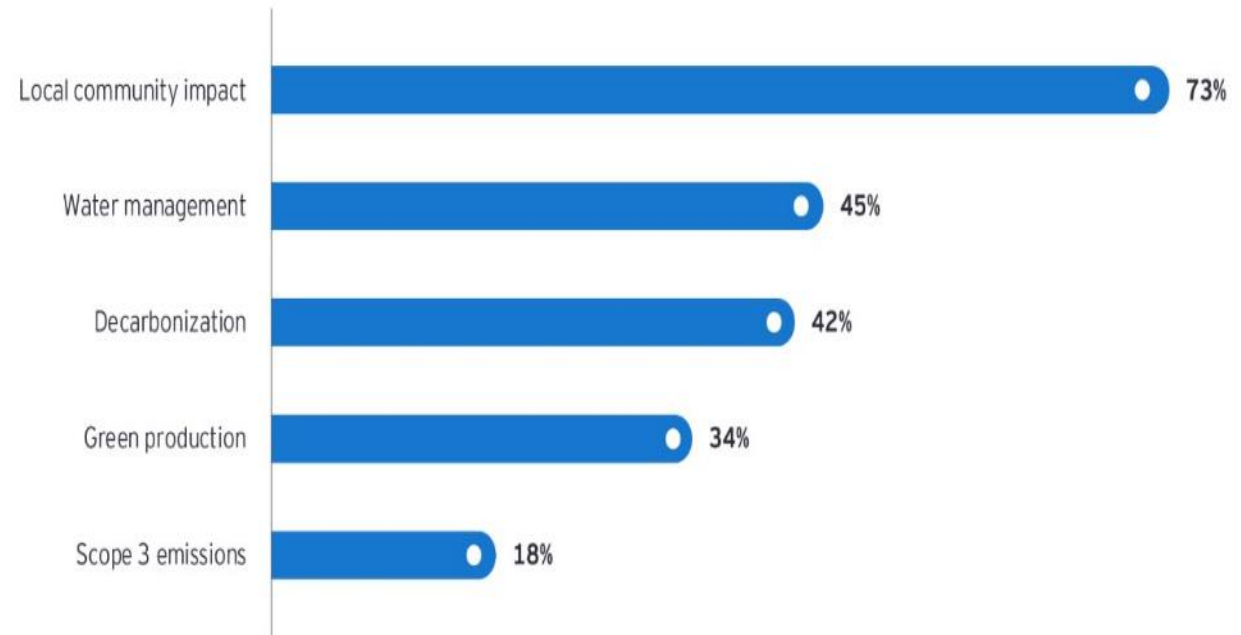




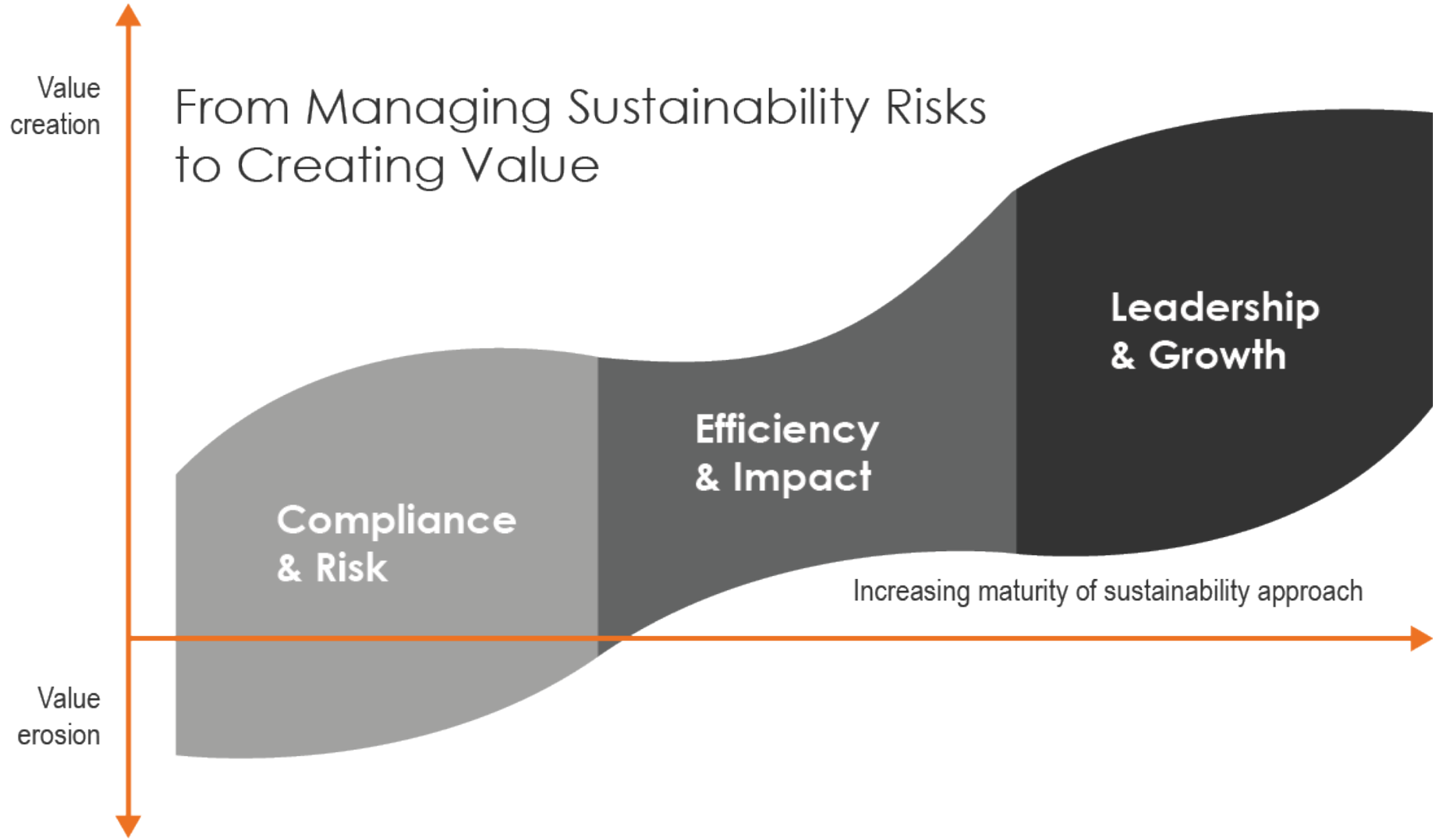
# Interconnected Risks Facing Mining and Metals



What area of mining and metals will face the most scrutiny from investors relating to ESG issues?\*



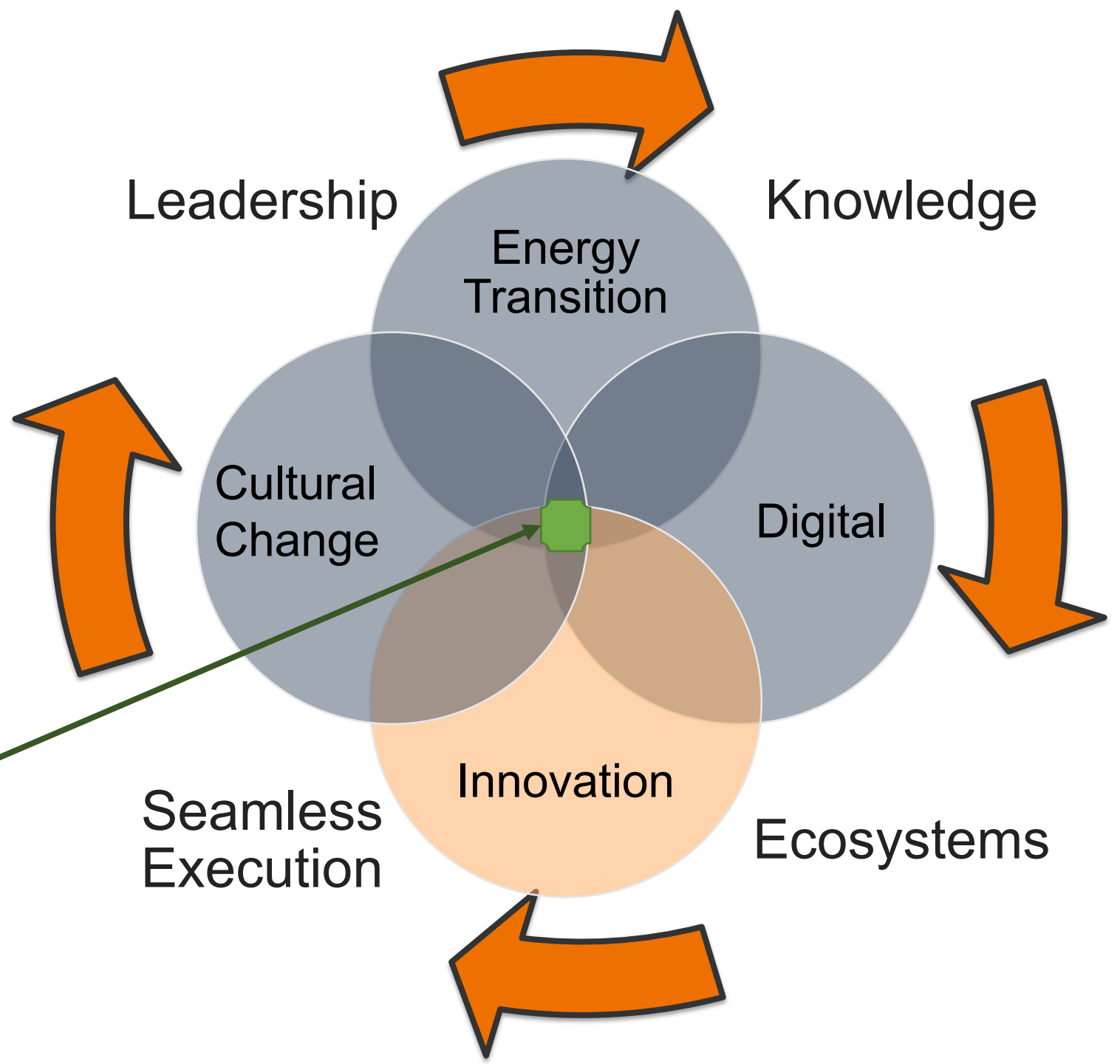
\*Respondents were allowed to choose more than one option.





# How can Mining achieve ESG & Decarbonization goals?

*ESG / Net Zero Sweet Spot*





# ESG & Smart Solutions

## SMART SOLUTIONS FOR SMART MINES

Smart mines produce the minerals and metals needed for our evolving economy. With highly engineered technologies and the application of artificial intelligence, Internet of Things and Big Data, the modern mine is digitally connected and operations are optimized in all aspects, including productivity, safety, accountability, environmental performance and local community support.

PRODUCTIVITY
 SAFETY
 ACCOUNTABILITY
 ENVIRONMENT
 COMMUNITY

**1 ALTERNATIVE AND RENEWABLE POWER**

Renewable energy production such as wind, solar and bio-energy can reduce emissions, conserve water and increase resilience. Development of its capacity and generation capacity, along with incentives, will stimulate investment and create promising scenarios.

**2 AUTOMATION**

The integration of automation, virtualized and automated control systems, and intelligent machines and sensors will increase productivity and reduce the risk of human error.

**3 ORE SORTING**

Ore sorting reduces the quantity of waste that ends up in the environment, reduces the amount of waste that needs to be treated and helps to reduce the carbon footprint.

**4 VENTILATION ON DEMAND**

The use of sensors in underground mines allows for the detection of air quality issues. This technology can be used to optimize the amount of air that is needed for the infrastructure.

**5 HIGH ACCURACY GPS**

High accuracy GPS technology is used in mining to track the location of equipment and vehicles. This technology can be used to optimize the efficiency of operations and reduce the risk of accidents.

**6 DRONE TECHNOLOGY**

Drone technology is used in mining to inspect the condition of infrastructure, to monitor the environment and to collect data. This technology can be used to improve safety and reduce the risk of accidents.

**7 3D PRINTING AND MODULAR EQUIPMENT**

3D printing and modular equipment are used in mining to create custom parts and components. This technology can be used to reduce the cost of production and to improve the efficiency of operations.

**8 3D IMAGING**

3D imaging is used in mining to create detailed models of the mine site. This technology can be used to improve the accuracy of planning and to reduce the risk of accidents.

**9 DATA OPTIMIZATION & MACHINE LEARNING**

Collecting data collected from equipment and sensors can be used to optimize the efficiency of operations and to reduce the risk of accidents. Machine learning can be used to analyze this data and to identify patterns that can be used to improve operations.

**10 EQUIPMENT MANAGEMENT**

The use of sensors in mining allows for the detection of equipment issues. This technology can be used to optimize the amount of air that is needed for the infrastructure.

**11 WEARABLES ON WORKERS**

Wearable devices are used in mining to monitor the health and safety of workers. This technology can be used to reduce the risk of accidents and to improve the efficiency of operations.

**12 ALTERNATIVE POWERED VEHICLES**

The use of alternative powered vehicles in mining can reduce emissions and conserve water. This technology can be used to improve the efficiency of operations and to reduce the risk of accidents.







# Accelerated Adoption Methodology™





**How  
will you  
make  
an  
impact?**



# Thank You!

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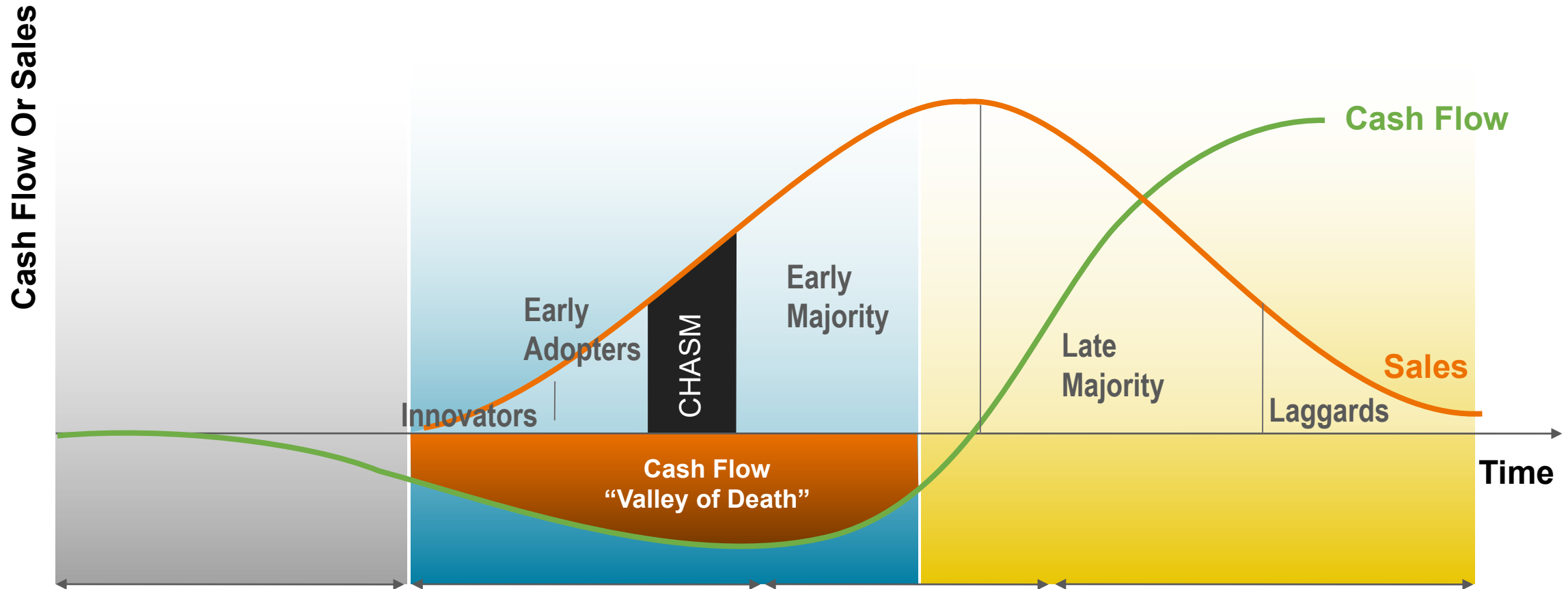




# Appendix



# Understanding Mining's Digital Divide - "Crossing the Chasm"



"A large and growing number of project failures are a direct result of the inability to deal successfully with the combination of environment, community and social" concerns, said former Mining, Minerals and Sustainable Development project administrator, Luke Danielson.

In a speech to the 2014 Mining and Land Resource Institute in Reno, Nevada, attorney Danielson observed, "(Mining) Project failure and conflict resolution resulting from lack of social license is extraordinary expensive."

"Lengthy conflicts are all too frequent and debilitating" for companies, governments, communities, shareholders and other stakeholders, he said.

Danielson, now the president and co-founder of the Sustainable Development Strategies Group highlighted several major mining projects which have had difficulty with issues stemming from social license to operate.

For instance, Freeport-McMoRan Copper & Gold's Grasberg project in Indonesia has experienced 51 incidents since July 2009, which resulted in 17 fatalities and 59 injuries, Danielson noted. He estimated that the company has incurred \$352.3 million in direct security costs from 2001-2012.

Plans by Rosemont to build North America's largest new copper mine were dealt a major blow in November when congressional supporters of the project canceled their vote after Native American tribes through the United States lobbied against the Arizona mining project.

The difficulties of securing a social license to operate also proved a headache for Pebble Project partner Anglo American, which eventually wrote off \$300 million on the project, he observed.

The stalled Newmont Conga Project may be headed for the same fate of the Cerro Quilish project, which was suspended in 2004, Danielson suggested.

### [Skip to main content](#)

Among the other stalled projects highlighted by Danielson are the Lucky Jack Molybdenum project in Colorado, Ascendant Copper's Junin project in Ecuador, along with Glencore-Xstrata's intent to sell its ownership in the controversial Tampakan copper-gold mine in the Philippines.

Meanwhile, as global populations grow, so does the demand for minerals to support their economic development, Danielson noted. Ironically, securing a social license to operate has become even more challenging for mining companies because it is becoming "harder and harder to find places to mine that don't have people living in them."

He observed that the top five countries for mining investment also have low populations. Even in the gold mining state of Nevada, the percentages of persons employed by the mining industry have declined dramatically, although the Nevada population has increased 17-fold since 1950, according to Danielson.

Danielson, who has served as a legal and sustainable development consultant to a number of hardrock mining companies, highlighted what he viewed as the questionable tactics of mining companies, including major mining companies, to secure a social license to operate. Among the tools utilized by miners is using high-tech software to identify and track members of anti-mining project groups; or buying hundreds of radio spots which promote the message that the Bible says minerals are good, while the Catholic Church is wrong to oppose mining projects.

Mining companies have hired detectives to track opposition, while other miners have doubled campaign contributions in an effort to buy project approval, Danielson alleged.

A chairman of a mining company once reportedly declared, "We'll give 10% of our stock to the Army and then see how long these [community] protests last," said Danielson.

Yet, another company has been engaging in a highly technical debate of what constitutes a glacier. "Engaging in technical debates...with a bunch of local farmers doesn't work," Danielson declared.

Meanwhile, most banks now subscribe to the Equator Principles, a credit risk management framework for determining, assessing and managing environmental and social risk in project finance transactions.

"The negotiation of community development agreements is now expected in much of the world," Danielson said. "We are headed toward of system in which some form of community consent in the norm."

"In Canada it's almost impossible to develop a (mining) project without a community development agreement," he added.

Another potential problem involves first contact between mining and exploration employees and community members. Studies show community attitudes are highly impacted by the actions and attitudes of the first company representatives on the ground," said Danielson. "How many drill crew chiefs are trained in community relations?" he asked.

Nevertheless, Danielson is confident that mining will make the same kind of strides in community consent for mining operations that the industry has already made in environmental and health and safety issues.

Observing that in the past the mining industry has often employed highly trained experts to analyze problems and devise solutions, "Today, mining can lead the way in pioneering new and more effective social relationships," Danielson advised.

"These issues are extremely important to the future of the industry," Danielson concluded, adding they can become "very expensive when things go wrong."

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