A Roadmap for improved mine waste management

Summary report of the workshop on mine waste

December 5-6th 2018
Vancouver Canada

UN environment

Tailings Dam Failure

A term used to describe the accidental release of mine waste from a tailings storage facility (TSF). But failures can also include the failure to prevent and manage environmental risks, failure to communicate risk to local communities, failure to plan for accidents, failure to plan for adequate mine closure, failure to consider future generations and failure to look for innovative solutions to the current problem of mine waste. The roadmap for improved mine waste management has to address all these failures.

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Acknowledgments

This report details the outcomes of a 2-day workshop held at the University of British Columbia 5-6th December 2018. The workshop was led by the United Nations Environment Programme Extractives Hub in partnership with CIRDI and GRID-Arendal. The workshop builds on the recommendations contained in the UN Environment's Rapid Response Assessment Report – Mine Tailings Storage: Safety is No Accident. The workshop participants volunteered their time to kick start the initiative. Thanks go to all participants:

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Dr Elaine Baker, GRID-Arendal at The University of Sydney, Australia
Dr Alex Bastos Universidade Federal do Espírito Santo, Brazil
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Dr Mike Davies, Teck Resources, Canada
Dr Kaiser de Sousa, African Mineral Development Centre, Africa
Mr Charles Dumaresq, Mining Association of Canada, Canada
Mr Skage Hem, FLSmidt, Denmark
Ms Amber Johnston-Billings, KPMG Australia Australia
Ms Janyl Moldalieva, UN Environment Extractives Hub, Kenya
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Dr Luca Zorzi, Stava Foundation, Italy
Dr Colon Velazquez, CIRDI Programme leader, Ecuador

We are also truly grateful to Dr Yannick Beaudoin from the Suzuki Foundation, whose expert facilitation helped us develop a preliminary roadmap for the improvement of mine waste management. And finally, thanks to our two rapporteurs, Luthfi Dhofier and Mikhaela Meznaric from CIRDI for their participation and excellent work.

Introduction

Modern society is highly dependent upon mined materials. A by-product of mining, however, is the generation of large quantities of mine waste. Mining companies, communities and governments recognize that mine waste can damage the environment and impact lives and livelihoods. To facilitate successful mining practices, they are committed to work together to minimise the impact of the industry.

While this report focuses predominantly on the issues associated with tailings storage facilities and their associated failures, the recommendations and other comments also apply to mine waste. Despite many good intentions and investments in improved practice, large tailings storage facilities, built to contain mine tailings can leak or collapse. When such events occur, they can destroy entire communities and livelihoods and remain one of the biggest environmental threats related to mining. These incidents may become more frequent due to the effects of climate change, as extreme weather events become increasingly commonplace. There is also a trend to larger facilities that can increase the impacts if a failure event occurs.

The mining industry has acknowledged that preventing catastrophic tailings dam incidents with zero fatalities and environmental protection is fundamental and achievable. For decades, companies, industry bodies and regulators have been continually improving best practice regulation and guidance for the construction and management of tailings facilities. However, eliminating all catastrophic incidents remains a challenge yet to overcome.

The United Nations Environment Rapid Response Assessment on mine tailings – Mine Tailings Storage: Safety is no Accident looked at why the existing engineering and technical knowhow to build and maintain safe tailings storage facilities isn't always being applied. It examined the ways in which the established best practice solutions in international collaborative governance, enhanced regulations, more resource efficient approaches and innovation could help to ensure the elimination of tailings dam failures. The assessment made two recommendations:

Recommendation 1. The approach to tailings storage facilities must place safety first by making environmental and human safety a priority in management actions and on-the-ground operations. Regulators, industry and communities should adopt a shared zero-failure objective to tailings storage facilities where "safety attributes should be evaluated separately from economic considerations, and cost should not be the determining factor" (Mount Polley expert panel, 2015, p. 125).

Recommendation 2. Establish a UN Environment stakeholder forum to facilitate international strengthening of tailings dam regulation.

Recommendation 1 was taken directly from the expert panel review of the tailings dam failure that occurred at the Mount Polley Mine in British Columbia in 2014, and Recommendation 2 is the action item suggested to envision a zero-failure future for mine tailings' management. The workshop (detailed in this report) is the first step in the response to these recommendations.

The 2-day workshop convened a small diverse group of stakeholders to explore the topic of mine tailings management and creatively develop the beginnings of the road map needed to make zero failures a reality.

The workshop

Objective: The objective of the workshop was to hear viewpoints and concerns from a wide range of stakeholders in an open discussion, and come up with a plan for the activities that need to take place to achieve the ultimate goal of zero failures. It should be noted that the group decided to expand the definition of failure beyond "a release of tailings" to include other failures: Failure to prevent and manage environmental risks, failure to communicate risk to local communities, failure to plan for accidents, failure to plan for adequate mine closure, failure to consider future generations and failure to look for innovative solutions to the current problems associated with mine waste. Consequently, the roadmap for improved mine waste management needs to consider all these potential failures.

To explore what this road map would look like the group sought to:

- Create a social dynamic that could challenge established positions and allow for the unique perspective and experience of each participant to be shared.

- Examine that "the setting of limits is a social process, not a scientific or economic one" and explore if and how collective efforts towards a Global Mine Waste Initiative could lead to the desired change.

- Determine the different voices and perspectives that would need to be included in a more comprehensive, potential larger scale gathering in the future in order to garner the experience of a diversity of stakeholders (e.g. those largely absent from this meeting such as health professionals, faith organisations, youth etc.).

- Reflect on how a process of participation and engagement, that builds significant ownership and commitment to integrated implementation relevant to local contexts and broader desired outcomes, could be developed and embedded in mine waste management worldwide.

- Develop a shared sense of commitment to this work and why it's important at a personal, professional and societal level.

Day 1
The lessons from Stava – Luca Zorzi, Stava Foundation Italy

A recurring theme in the vast majority of tailings storage- facility failures is the failure to recognize and react to an emerging problem, often because of a lack of knowledge and the reluctance to adequately finance tailings management. This was the case in July 1985, when the tailings dam of the Prestavel fluorite mine in northern Italy collapsed, causing the deaths of 268 people. The mine tailings had been stored in two upstream cascading dams, built on steep saturated soils. The upper dam collapsed without warning onto the lower dam, which subsequently also collapsed. Approximately 180 000 cubic metres of semi-fluid tailings were released, burying the downstream village of Stava and partially destroying the village of Tesero.

Many people in the villages had no knowledge of the tailings dam and were totally unaware of the risk it posed. The tailings dams had been constructed without any consideration of then international best practices, on a steep mountain slope with poor foundations and inadequate drainage systems – it was an accident waiting to happen and there were people who understood the risks, but financial considerations stopped them from acting. At the criminal trial which followed the disaster, mine managers, employees of companies contracted by the mine and the local government officials who failed to competently monitor the dams were convicted of manslaughter. However, no one went to jail and the mining company declared bankruptcy and paid no compensation.

People in Stava measure their lives from before and after the disaster – it is their point of reference. Trauma inflicted on communities, like the residents of the Stava Valley, remains long after the event and impacts generations. No-one in the region was spared pain and the part of the healing involves telling the story of loss through the Stava 1985 Museum, in the hope that there will not be another Stava.

In the path of the mud flow (photo Foundation Stava 1985 http://multimedia.stava1985.it/search.html)

KEY POINTS
- the consequence of inaction

- People in positions of authority knew of the risk but kept quite
- Poor governance allowed the construction and operation of an inherently unsafe mine.
- Downstream communities were not consulted, had no awareness of risk and there was no emergency plan in place.
- The company did not have the resources to make any sort of restitution to the people or to clean up the environment.

Stava 1985 Museum (photo Foundation Stava 1985).

Summary of individual presentations and general discussion

This session focused on identifying the key challenges, which can also be considered as the sources of failure, in managing mine waste (see Mind Map 1. in Annex 1)

KEY CHALLENGES

- source of failure in mine waste management

1 CHALLENGE

The nature of mining and the public perception of mining

Extraction of finite resource – inherently un-sustainable in the long term.

Viewed as having a more permanent impact than other sectors, such as agriculture, forestry or fishing, despite a smaller global footprint and lower overall environmental impact.

Historically, poor reputation for transparency and community or future concern.

Seen as powerful lobby group driven by money.

Potential to be environmentally and socially catastrophic.

Associated with corruption and conflict.

Associated with unfair profit distribution and exploitation/-exclusion of local communities.

Mining is seen as just digging up resources, as opposed to part of a system of manufacture.

2 CHALLENGE

Lack of governance and regulation (including of artisanal and small-scale mining)

Very poor regulation in some jurisdictions.

Lack of government involvement.

Abdication of government responsibility to mining companies (schools, hospitals), blurring the lines.

3 CHALLENGE

Poor management and communication

Poor management leading to a broad range of bad practices and cost savings at the expense of environmental and social considerations.

Lack of consideration of alternative value systems – western centric view.

Lack of communication with stakeholders both in conceptualisation and implementation of mining projects.

Limited definition of stakeholders and legitimate role of stakeholders.

Poor risk management. Cynical strategies for avoiding responsibility – sale, bankruptcy, abandonment.

Lack of consideration of alternative value systems leads to narrow definition of failure

4 CHALLENGE

Knowledge sharing and knowledge gaps

Lack of education in mine waste management

Skills are not sufficiently high or standardised particularly when it comes to operators and regulators.

Investment in research for new technology is essential.

Technology needs to be developed and used in an appropriate social, political and cultural context.

Asymmetry of knowledge between stakeholders.

Lack of transparency - Information on a need to know basis only.

Why is this a source of failure?

Fosters a "them and us" mentality which discourages honest discourse and innovation.

Leads to incompatibility and conflict of purpose.

Mining companies take a defensive position, justifying their existence, which can distract from essential communication and collaborative engagement.

Prioritises short term objectives rather than long term sustainability.

Allows the non-compliance or erosion of industry standards of operation.

Mining company engagement in the government domain can cede power to companies and make regulation difficult

Builds an environment where failures are more likely to occur.
Reinforces the poor reputation of mining companies (see 1.).

Concentrates on what the mining company wants, rather than what society needs – limited understanding of indigenous perspective or ethical consideration of the needs of future generations (both indigenous and non-indigenous).

Leads to lack of a level playing field – companies financially penalised for having higher standards.

Tertiary mining courses not holistic and training in mine waste management lacking.

The uneven playing field for companies in different jurisdictions creates a cut price environment where the true cost of operating is not calculated.

This discourages expenditure on innovation and new technology.

Group session: What do we need to do differently to improve waste management in mining?

The groups identified the current blockages and response needed to progress improvements in governance, management and operation.

Current situation	Response
We have the guidance documents (example the MAC guidance) but they are not followed. There is no global "standard" for governance. Most countries are reluctant to follow guidance documents of another country. Good governance is voluntary and there are often limited/no penalties for non-compliance. Good governance and best practice cost good companies – bad companies save money. There is a perception that good governance and application of best practices costs more. In reality, in regulated environments it can save money in the long term. But enforcement of good governance is also necessary.	Need to get companies to follow the guidance: penalties, insurance, exemption for best practice … Increase institutional capacity and knowledge
Lack of cultural competency and local knowledge – exacerbated by distant managers and western corporate culture Each mining location has distinct environment, culture and political and societal characteristics.	Each mining location has distinct environment, culture and political and societal characteristics and these aspect need to be considered. However all companies, big and small, in developed and underdeveloped countries should apply good governance, and be held to the same standards.
Mining is dependent on people and they make mistakes – poor training, poor communication, lack of accountability	Improve management, communication and individual accountability. Develop a culture of safety.
Innovation is expensive, and companies are risk averse, a situation which favours the status quo.	Provide incentives for innovation and best practice
Shareholders are removed from the realities of mining and do not feel accountable – they leave it to the company and just focus on dividends.	Raise the awareness of shareholders to the risks and best practice compliance.
Poor planning – waste management is an afterthought and a sector were costs can be shaved.	Increase individual accountability in the industry. Development of a broader definition and investigation of risks, carried out in consultation with communities and other stakeholders.
Excess consumption in some counties without individual accountability	Outdated economic model – need to adopt a circular economic model to conserve resources.
Lack of knowledge	Post-secondary education institutions must develop programs that will equip mine managers and operators with a better understanding of the mining industry, the drivers and risks and also environmental and societal costs and benefits.

1985 STAVA VALLEY TAILINGS DAMS FAILURE
EXIT

Conclusions from Day 1 – first bricks in the road map

- There is a gap in understanding between the industry and the community – industry needs to understand, and take account of, the impact of mining initiatives on the community, especially indigenous peoples.
- If society wants to continue to consume products at present day rates, they must understand that mining is an important part of the current global economy "how much tailings waste is in an iphone?"
- No "they" – we are all in this together as a global industry.
- Mining has a negative image, which results in resistance to new mining developments and reluctance of young people to choose a career in mining. This image needs to be improved both by doing the right thing and publicising it.
- Develop long term perspective – operate/develop/regulate to avoid the boom and bust cyclicity of the mining industry
- Develop more holistic thinking about risks and benefits -not just benefits to the shareholders, taxing authorities and direct communities (who owns the resources?) spread the benefits and also include future generations (e.g. Norwegian model of sovereign wealth fund)
- There should be a trial to improve outcomes via the institution of an alternate governance/regulatory model that incentivizes companies who do the right thing and punishes those companies who are irresponsible
- There should be a more coherent and supported international cooperation model that addresses mine waste challenges – a Global Convention?
- The industry needs to redefine what "failure" is, to take it beyond our traditional definition to include any practices that do not produce "maximum" utility for all stakeholders
- Needs to be greater recognition of growing resource scarcity – the true environmental and social cost should be reflected in the price the society pays for the mining products.
- The mining industry should publicly report waste as a part of the Global Sustainability Standards Global Reporting Initiative.

Planning for safe closure

Mine closure considerations	Required outcome
Physical stability of the site - tailings storage facilities, roads, buildings, etc. must not pose any hazard to public health and safety; engineered structures must not deteriorate or fail; erosion from the site must not adversely impact surrounding terrestrial or aquatic environments.	Protect public health and safety.
Geochemical stability - harmful materials must not leach from or erode the site; surface waters and groundwater must be protected against contamination.	Alleviate or eliminate environmental damage.
Land use - the closed mine site should be rehabilitated to pre-mining conditions or conditions that are compatible with the surrounding land or achieve an agreed, alternative, productive use of the land.	Make productive use of the land, return it to its original condition or find an acceptable alternative.
Sustainable development - elements of mine development that impact the sustainability of social and economic benefits, should be maintained and transferred to succeeding custodians.	As far as possible, ensure sustainability of social and economic benefits resulting from mine development and operations.

GRID ARENDAL

Source: adapted from Robertson and Shaw (2002)

From Mine tailings storage: safety is no accident (2017)

Day 2

Focused on exploring the future direction of work on mine waste management and collectively considering establishment of a Global Mining Initiative.

What would a successful global initiative look like?

It would:

- Have the long-term goal of net zero mine waste (the new vision of ICMM is no wet tailings) and new and transformational mining activity
- Achieve the short-term goal of zero tailings storage failures
- Involve all mining companies and regulators in all mining jurisdictions
- Include all mining beneficiaries, such as banks and financial institutions (shareholders)
- Target the underperformers in the industry to bring them up to an acceptable standard
- Be transformative, campaign for new technology and innovation across all sectors
- Require compulsory competent external review of waste management facilities
- Champion ethics over short term profits
- Instigate a new type of cost benefit analysis that incorporates all externalities
- Address legacy waste inclusive of re-use opportunities for these materials

What is needed to achieve success?

The table below details the suggestions collated from the breakout groups that could be incorporated into an initial roadmap.

Suggestions for action

Suggested Actions	Global Mining Initiative (GMI) roadmap
Small steps with extensive consultation with stakeholders – enlarge the forum	Develop and convene the expanded GMI meeting in 2019 to continue discussions as the first step.
Common accepted vision	Develop awareness raising products that support active knowledge transfer, including webpages and articles, networking, development of champions, muster support from ICMM, and other intergovernmental and national mining industry bodies
Development of a global standard for mine waste management – could potentially use the MAC standard as a starting point, involve ICMM and ICOLD. Include standards for governments and community engagement (defined roles).	Document available standards and suggest modification and amalgamation to form a Global Standard template for discussion at the next GMI forum meeting
A Global Convention on Mining	Research limitations and successes of other global conventions
Economic incentives to encourage mining companies to improve management and adopt minimum standards. Expand ethical minerals such as the Aluminium Stewardship Initiative (ASI, see box below) to other minerals across the whole global value chain. Increase consumer awareness for ethical minerals along the supply chain.	Research options
Develop a market for different types of mine waste – link with construction companies etc. Provide enabling incentives to encourage research in to the use of mine waste and the reduction in mine waste (zero mine waste).	Research options
Technological development to reduce waste	GMI forum agenda item
Transparent reporting – data availability	GMI forum agenda item - Ongoing discussion to establish an accessible global data base of mine sites, tailings dams and research priorities

Commitments from the workshop participants towards a Global Mining Initiative

– Industry networking to get increased buy in

– Fundraising to facilitate wider stakeholder involvement in ongoing discussion

– Liaison with industry groups such as ICMM, MAC, ICOLD etc

– Consultation with Governments

– Development of Vision statement, strategy and 2-year action plan

– Development of content for awareness raising and information sharing webpage.

Next steps: following the road map

The workshop participants recommended establishing coordinated working groups to undertake three streams of investigation prior to the next meeting:

1. A stakeholder group, to develop WP 1
2. A "standards" group, to develop WP 2
3. A mine waste as a valuable, marketable product group, to develop WP 3

Work package 1.
Enlarging the stakeholder forum; Communication and awareness raising

The Vancouver meeting participants were a focused subset of stakeholders. A next step would be to engage with ICMM to go over the results of the Vancouver meeting and look for alignment on a road map. It was considered essentially to have ICMM alignment.

Assuming ICMM alignment was reached, the next step would be to enlarge this group in order to capture the viewpoints and ideas of a broader range of stakeholders. It is suggested that this expanded forum would be initiated with a 2-3 day meeting that would take the outcomes of Day 2 as its starting point.

Tasks:
- Compile a list of potential invitees (approximately 200 people taking into account geographical, gender and cultural representation) including theme leaders
- Develop the agenda (with theme leaders) and budget
- Find conference location and conference organizer
- Work with possible sponsors to secure the budget, including support for developing country participants
- Secure facilitators if necessary.

To affect change in the mining industry including our conception of waste, will require a concerted effort to develop a common vision for change.

Tasks:
- Development of awareness raising products including webpages
- Production of articles and development of a social media campaign
- Stakeholder networking
- Identification of champions of change
- Liaising with ICMM, and other intergovernmental and national mining industry bodies.

Work package 2.
An assessment of existing standards, conventions, multi-stakeholder initiatives relevant to responsible mine waste management; An assessment of a market for mine waste and economic incentives for better mining

There are a number of standards available (e.g. MAC's TSM) or standards in development (e.g. ICOLD). However, a global standard needs to include not just the environmentally sound physical management of waste but should also include comprehensive consideration of social and economic aspects (the expanded definition of failure). To date, only MAC's TSM includes community impacts in their failure definition – having that expanded to ICMM is one potential progressive move. The standard also needs to be flexible – for use in developing and developed countries and at different scales of mining.

Tasks:
- Examination of the wide range of existing standards
- Development of a summary of essential inclusions in the standard, for discussion at the GMI Forum planned for 2019.

Could a global convention on mining and mine waste management be effective, or would it just be an expensive distraction? Countries have negotiated numerous global agreements, and not all have been successful in bringing about the required changes.

Tasks:
- Look at the successes and failures of global agreements
- Attempt to identify the success characteristics
- Determine if a Global Convention could be achievable and useful.

Better understanding is needed in developing successful multi-stakeholder initiatives.

Tasks:

- Assess the effectiveness of existing multi-stakeholder initiatives
- Identify mechanisms for effective multi-stakeholder engagement

It is understood that mining is not an industry with infinite resources. One unfortunate element that exists is in the current environment is that companies that strive for best practice bear additional costs and companies that have poor practices are not penalised in any way, in fact they are financially rewarded.

Tasks:

- Investigate a range of economic incentives that could contribute to levelling the playing field, so that there is no advantage in a company maintaining poor mining practices including –
  - compulsory contribution to a global financial assurance system, with discounts to the best performing companies and penalties for non-performers.
  - Ethical minerals initiatives such as the ASI (see Figure below), blockchain tracking etc.
  - Working with the London Metals Exchange to incentivize the sale of products branded as "recycled" or "sustainable materials" materials.

Graphic from the Aluminium Stewardship Initiative illustrating the Theory of Change

Mine waste is generally just stored, but there is a growing interest in finding ways to profitably utilize it. A limited number of applications have been commercialized but matching the amount of waste produced annually with a commercial application is a major challenge. Barriers that have been identified, remoteness of many mines, toxicity of the waste, lack of markets and in some cases prohibitive regulation. There are existing activities in reprocessing old tailings for lower grade (now viable) ores. The point was made that it will be important not to "lock up" valuable ore embodied in tailings and other waste by-products, because the technology does not yet exist to extract it.

Tasks:

- Document the current marketable mine waste products. This may be a collation of the existing, incomplete databases on mine waste so that this information can be used to assess market interest and viability.
- Detail the barriers that exist to developing markets
- Suggest ways in which markets for various types of mine waste could be developed.

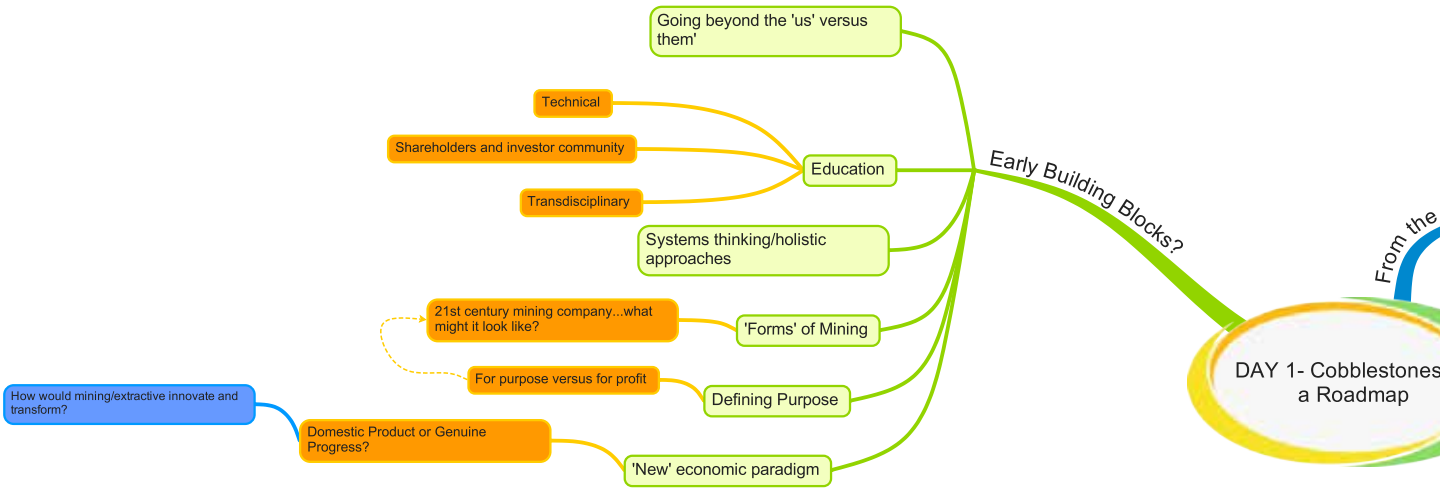
Work package 3.
Global data base of mine sites, tailings dams and mine waste volumes and characteristics

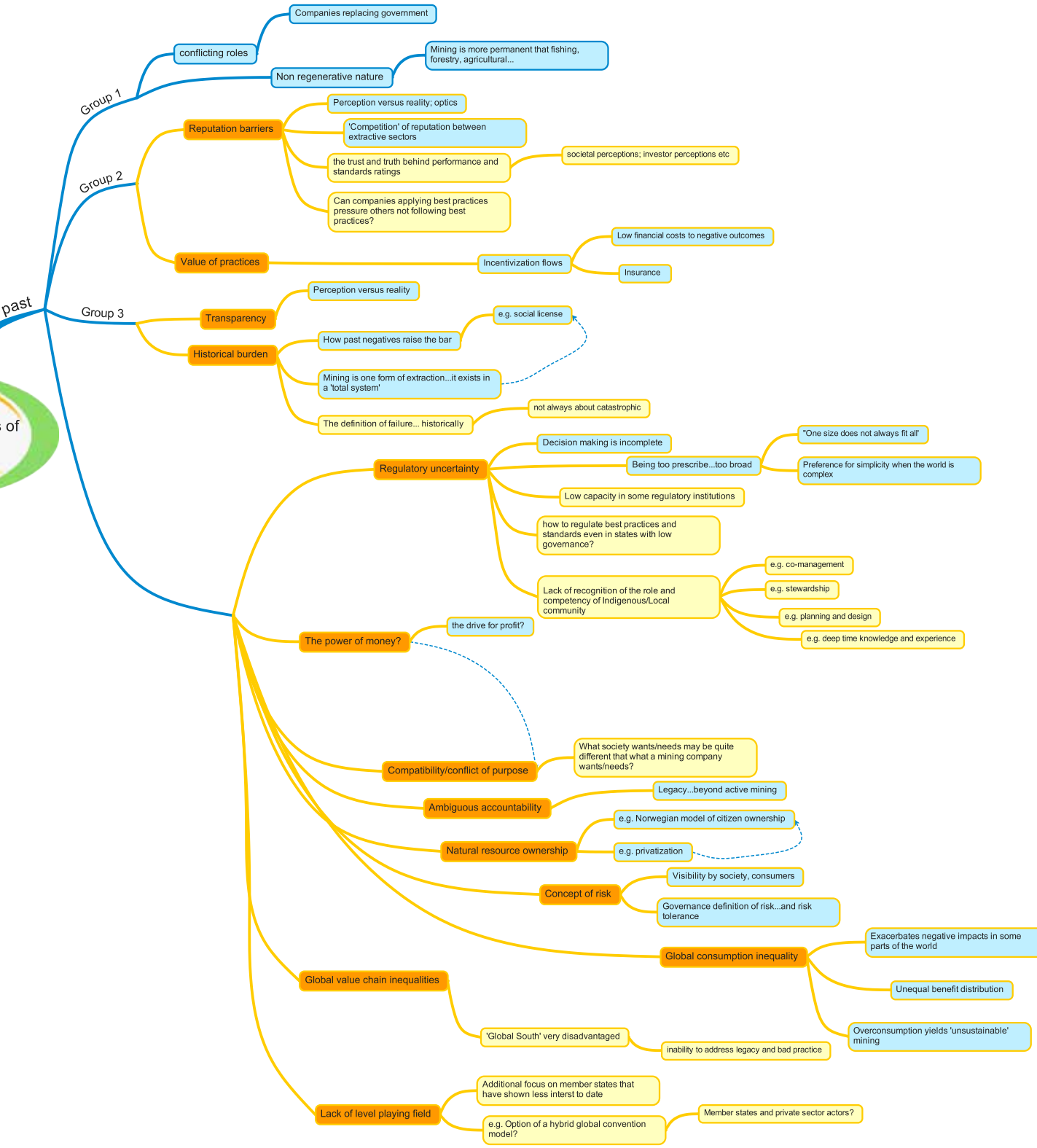
At present it is not possible to access information on the amount or type of mine waste being generated, the location of all active mine sites and tailings dams or legacy sites. There are some initiatives in this area being undertaken by individual researchers and some companies report waste but there is no standardised reporting at present.

Tasks:

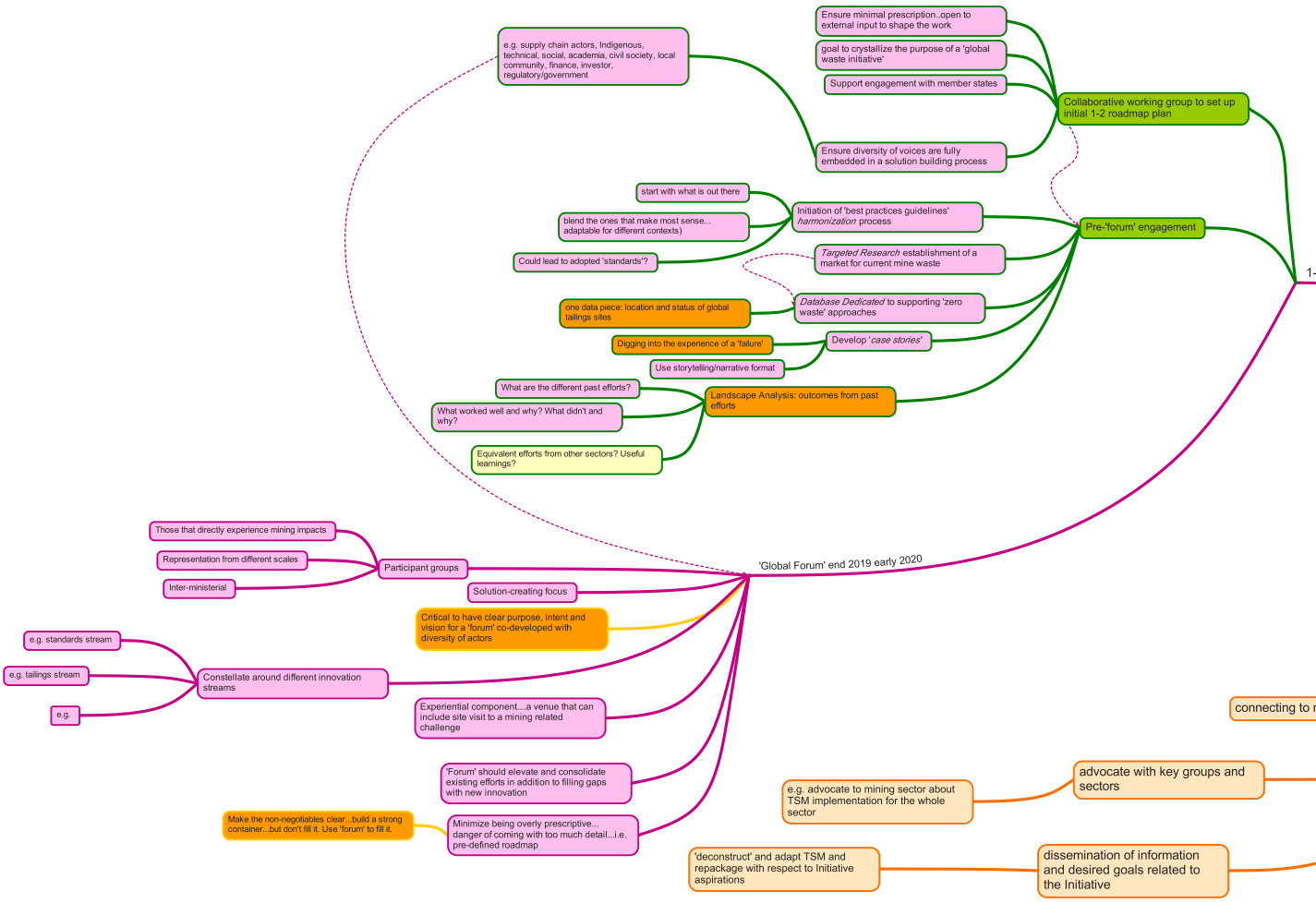
- Support the development of a global data base of mine sites and tailings dams
- Investigate a standardized format for reporting mine waste volumes and waste characteristics.

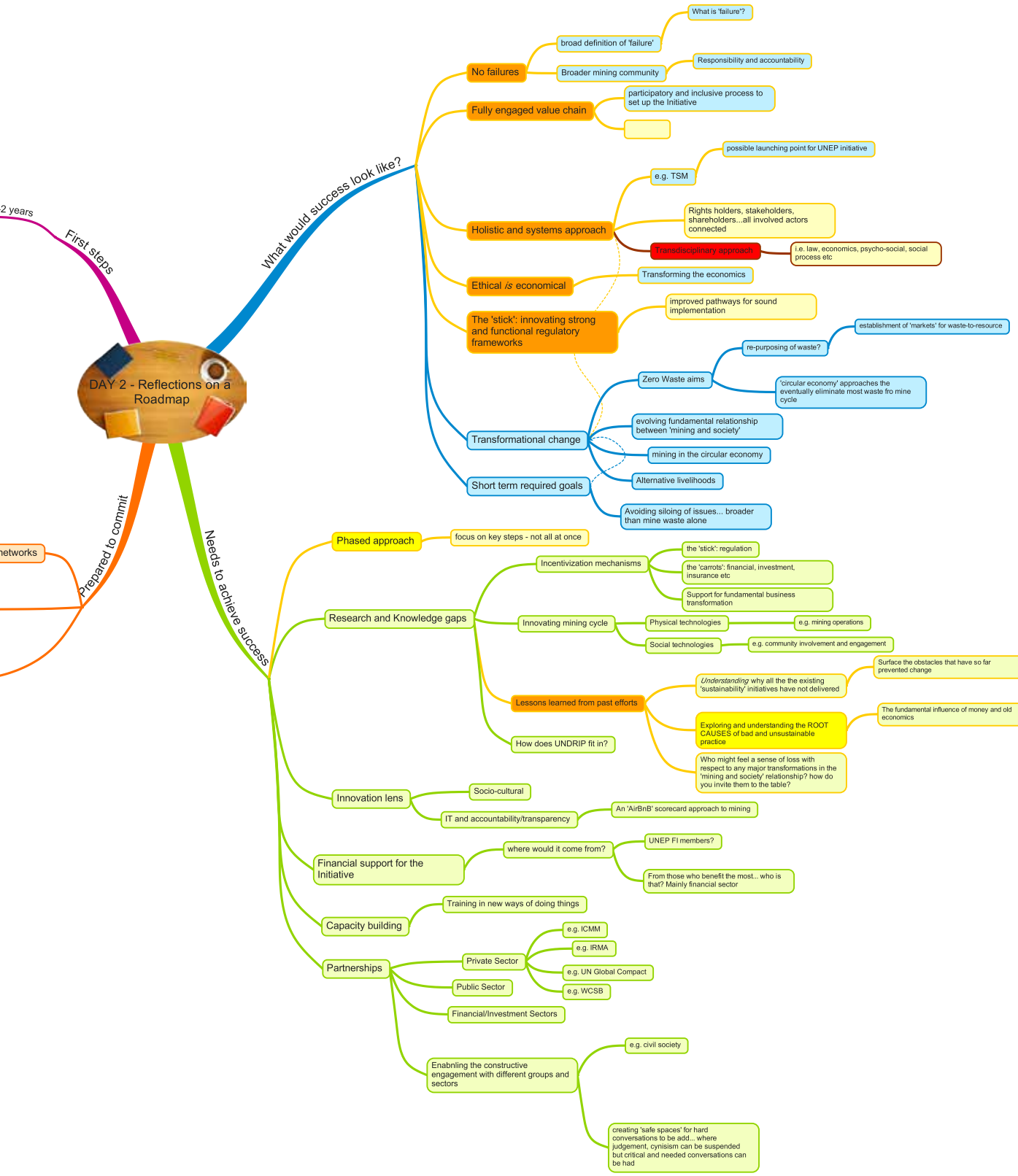
Annex 1. Mind Map Day 1




past
of
Group 1
conflicting roles
Companies replacing government
Non regenerative nature
Mining is more permanent that fishing, forestry, agricultural...
Group 2
Reputation barriers
Perception versus reality; optics
'Competition' of reputation between extractive sectors
the trust and truth behind performance and standards ratings
societal perceptions; investor perceptions etc
Can companies applying best practices pressure others not following best practices?
Value of practices
Incentivization flows
Low financial costs to negative outcomes
Insurance
Group 3
Transparency
Perception versus reality
Historical burden
How past negatives raise the bar
e.g. social license
Mining is one form of extraction...it exists in a 'total system'
The definition of failure... historically
not always about catastrophic
Regulatory uncertainty
Decision making is incomplete
Being too prescribe...too broad
"One size does not always fit all'
Preference for simplicity when the world is complex
Low capacity in some regulatory institutions
how to regulate best practices and standards even in states with low governance?
Lack of recognition of the role and competency of Indigenous/Local community
e.g. co-management
e.g. stewardship
e.g. planning and design
e.g. deep time knowledge and experience
The power of money?
the drive for profit?
Compatibility/conflict of purpose
What society wants/needs may be quite different that what a mining company wants/needs?
Ambiguous accountability
Legacy...beyond active mining
Natural resource ownership
e.g. Norwegian model of citizen ownership
e.g. privatization
Concept of risk
Visibility by society, consumers
Governance definition of risk...and risk tolerance
Global consumption inequality
Exacerbates negative impacts in some parts of the world
Unequal benefit distribution
Overconsumption yields 'unsustainable' mining
Global value chain inequalities
'Global South' very disadvantaged
inability to address legacy and bad practice
Lack of level playing field
Additional focus on member states that have shown less interst to date
e.g. Option of a hybrid global convention model?
Member states and private sector actors?

Annex 2. Mind Map Day 2




DAY 2 - Reflections on a Roadmap
What would success look like?
No failures
broad definition of 'failure'
What is 'failure'?
Broader mining community
Responsibility and accountability
Fully engaged value chain
participatory and inclusive process to set up the Initiative
Holistic and systems approach
e.g. TSM
possible launching point for UNEP initiative
Rights holders, stakeholders, shareholders...all involved actors connected
Transdisciplinary approach
i.e. law, economics, psycho-social, social process etc
Ethical *is* economical
Transforming the economics
The 'stick': innovating strong and functional regulatory frameworks
improved pathways for sound implementation
Transformational change
Zero Waste aims
re-purposing of waste?
establishment of 'markets' for waste-to-resource
'circular economy' approaches the eventually eliminate most waste fro mine cycle
evolving fundamental relationship between 'mining and society'
mining in the circular economy
Alternative livelihoods
Short term required goals
Avoiding siloing of issues... broader than mine waste alone
Needs to achieve success
Phased approach
focus on key steps - not all at once
Research and Knowledge gaps
Incentivization mechanisms
the 'stick': regulation
the 'carrots': financial, investment, insurance etc
Support for fundamental business transformation
Innovating mining cycle
Physical technologies
e.g. mining operations
Social technologies
e.g. community involvement and engagement
Lessons learned from past efforts
Understanding why all the the existing 'sustainability' initiatives have not delivered
Surface the obstacles that have so far prevented change
Exploring and understanding the ROOT CAUSES of bad and unsustainable practice
The fundamental influence of money and old economics
Who might feel a sense of loss with respect to any major transformations in the 'mining and society' relationship? how do you invite them to the table?
How does UNDRIP fit in?
Innovation lens
Socio-cultural
IT and accountability/transparency
An 'AirBnB' scorecard approach to mining
Financial support for the Initiative
where would it come from?
UNEP FI members?
From those who benefit the most... who is that? Mainly financial sector
Capacity building
Training in new ways of doing things
Partnerships
Private Sector
e.g. ICMM
e.g. IRMA
e.g. UN Global Compact
e.g. WCSB
Public Sector
Financial/Investment Sectors
Enabnling the constructive engagement with different groups and sectors
e.g. civil society
creating 'safe spaces' for hard conversations to be add... where judgement, cynisism can be suspended but critical and needed conversations can be had
2 years
First steps
Prepared to commit
networks

Annex 3. Workshop Agenda

Mine Waste Initiative: Vancouver Session

Facilitation Design

Context

Mining companies, communities and governments recognize that mine waste, contaminated water and land pollution damage lives and livelihoods and also threaten the development of the mining sector. For this reason, they are committed to work together to reduce the industry's footprint.

Despite many good intentions and investments in improved practices, large storage facilities, built to contain mine tailings can leak or collapse. When they occur, they can destroy entire communities and livelihoods and remain the biggest environmental threat related to mining. And these incidents may become more frequent due to the effects of a changing weather pattern with more extreme weather events.

The mining industry has acknowledged that preventing catastrophic tailings dam incidents with zero fatalities and environmental protection is fundamental and achievable. For decades, companies, industry bodies and regulators have been continually improving best practice guidelines for the construction and management of tailings dams. However, eliminating all catastrophic incidents remains a challenge yet to overcome.

The United Nations Environment Rapid Response Assessment on mine tailings – Mine Tailings Storage: Safety is no Accident looked at why existing engineering and technical knowhow to build and maintain safe tailings storage facilities is insufficient to meet the target of zero catastrophic incidents. It examined the ways in which the established best practice solutions in international collaborative governance, enhanced regulations, more resource efficient approaches and innovation could help to ensure the elimination of tailings dam failures.

Convening

This Mine Waste Initiative: Vancouver Session is being convened by UN Environment Extractives Hub, which supports positive change in the extractive sector's governance and business practices, aiming to make minerals, oil and gas work for all, with minimal harm and many benefits.

The United Nations Environment Programme (UN Environment) is the leading global environmental authority that sets the global environmental agenda, promotes the coherent implementation of the environmental dimension of sustainable development within the United Nations system, and serves as an authoritative advocate for the global environment.

Hosting

The meeting is being hosted by UN Environment along with key partners

The **Canadian International Resource and Development Institute (CIRDI)** is a center of expertise in natural resource-led development. CIRDI works at the request of national governments that seek to strengthen their capacity to govern and manage their natural

resources for the benefit of their people. With Canadian and international partners, CIRDI provide leading- practice advice, technical support, training and applied research as well as a platform for innovative thinking, knowledge mobilization and shared learning. The focus areas are improving public sector capacity and governance, strengthening integrated resource management, transforming artisanal and small-scale mining.

GRID-Arendal is a Norwegian Foundation and an official centre collaborating with the UN Environment Programme. GRID-Arendal was commissioned to undertake the rapid response assessment of mine tailings storage. GRID-Arendal works with partners around the world, to provide scientific research and communicate knowledge that strengthens management capacity and motivates decision-makers to act. In conjunction with the GRID-Arendal office at the University of Sydney, our focus in extractive industries is on improving social, economic and environmental outcomes for communities and helping to ensure mining benefits all stakeholders. We do this by providing scientific data and information, capacity building and awareness raising.

Facilitation

The meeting will be facilitated by the Yannick Beaudoin, Director General, Ontario and Northern Canada for the David Suzuki Foundation (DSF), a Canadian non-profit charity that promotes evidence-based research, education and policy analysis. The David Suzuki Foundation works to conserve and protect the natural environment, and help create sustainable societies. DSF regularly collaborates with non-profit and community organizations, all levels of government, businesses and individuals.

What do we seek to achieve in two days?

The Vancouver Session will involve ~15-20 participants who will inform the early development of the global Mine Waste Initiative. The participants bring in depth of understanding, commitment and foresight, creating an opportunity to bring together many perspectives in a collaborative endeavour for the collective good.

Objective: The primary objectives of the two-day meeting is to explore the building blocks of a Roadmap for improving mine waste management. To best achieve this objective, the two-day Vancouver Session will seek to:

- Create a group social dynamic that enables high quality collaboration challenging established stakeholder positions;
- Explore how the potential global Mine Waste Initiative could affect desired change from the perspective that “the setting of limits is a social process, not a scientific or economic one”.
- Explore the different voices and perspectives that would need to be intentionally included in the large scale gathering and that often make up ‘blind spots’ with respect to convening groups to enable tangible and impactful solutions and change.
- Reflect on how a process of participation and engagement, that builds significant ownership and commitment to integrated implementation relevant to local contexts and broader desired outcomes, could be developed and embedded in mine waste management worldwide.
- Develop a shared sense of commitment to this work and why it’s important at a

personal, professional and societal level

- Establish a collaborative space and group dynamic that supports each to bring forth their voice/perspective and the challenging conversations that are inevitable.
- Provide a roadmap of next steps (or clarity on how we get to them).

Innovation, design and bridging the implementation gap

Decision makers and implementers tend to learn more effectively through discovery - testing an approach, reflecting on what seems to be happening, abandoning what doesn't seem to work, and focusing in on what seems to be taking hold. Ongoing responsiveness and collective problem definition, redefinition and 'intervention' require new levels of personal and collective awareness. This innovation session, which is based on change processes developed by MIT's Presencing Institute, aims to facilitate a learning journey where participants move forward with insight, tapping collective capacities and illuminating blind spots. On our journey, we will explore together the complexities of economic, social and cultural aspects of the mining industry and how people and planet can be impacted (positively and negatively).

The Presencing Institute describes the innovation session as *Engaging in change initiatives that enable business, governments and civil society to respond to the disruptive challenges of our time*. What is our disruptive challenge? A starting point could be, **how can we stop mine waste from having any negative impact on people and our environment.**

A key question could be - Is it wise to continue storing increasingly larger volumes of mine tailings, believing that they are safely locked away, or can society demand more sustainable practices in the design and planning of tailings management, including zero (or minimal) mine waste and turning mine waste into secondary resources?

"If you want to build a ship, don't drum up people to collect wood and don't assign them tasks and work, but rather teach them to long for the endless immensity of the sea."
Antoine de Saint-Exupery

PROPOSED RUNNING ORDER – TWO DAY VANCOUVER SESSION

This workshop aims to help:

- *Develop a shared sense of commitment to this work and why it's important at a personal, professional and societal level*
- *Establish a collaborative space and group dynamic that supports each to bring forth their voice/perspective and the sometimes challenging conversations that are inevitable.*
- *Provide clarity of the next steps (or clear how we get to them) for the potential Global Mine Waste Initiative (longer term) and the intended 2019 large scale gathering (short term)*

DAY 1

8:30 **Opening session**
Main plenary room

9:00 **Introductions: Why are we here today?**
Main plenary room

9:30 **Defining the purpose and format of the workshop.**
Main plenary room

The core purpose of the two days is to explore how we can collectively a) establish a successful and impactful 'global mine waste initiative and b) best convene a creative, collaborative and solution-oriented large scale gathering of actors, stakeholders, researches and affected voices that could propose innovations that transform the mining cycle in societally and environmentally beneficial ways.

The current meeting is not intended to come up with detailed ideas and explicit solutions directly related to mining and mine waste. The focus is the design and informing of valuable building blocks for a roadmap and discuss the possibility of organizing a large scale 2019 forum.
How can we best move forward together towards a 'global mine waste initiative', including a gathering that can have the highest possible potential for enabling tangible, collectively supported and impactful solutions and change?

10:00 **Session 1: Bringing in our own narratives**
Main plenary room

Who is here today and what connects you to mining?

10:30 TEA/COFFEE

11:00 WORKSHOP PART 1 – SETTING THE FOUNDATION FOR A ROADMAP TOWARDS A GLOBAL MINE WASTE INITIATIVE
Main plenary room

Session 2: Personal and collective challenges that we face

What are the key challenges that need addressing the realm of 'mining and society', and what is the role of scientific and other knowledge and understanding in addressing these challenges? What might we (as a community of experts and people with experiences) need to do differently to really engage society at large on this issue?

12:00
Session 3: Knowledge exchange – setting the stage
Main plenary room

Short presentations by some participants

What are some of the latest innovations and thinking that could inform opportunities and challenges related to the mining cycle and mine waste?

13:00 LUNCH

14:00 **Dialogue walk: What key question(s) still sit with you after the morning?**

14:30 **Session 4: Exploring in groups 1 – FIRST STEPS TOWARDS A ROADMAP**
Breakout rooms

Group work and reflection: open discussion of possible themes that would make up the main building blocks of a Roadmap towards a 'global mine waste initiative'

15:30 TEA/COFFEE

16:00 **Sharing in plenary – from Session 4**
Main plenary room

17.00
Closing comments; housekeeping announcements.

DAY 2

8:30 **Opening**
Main plenary room

9:00 **Remarks/impressions of day 1**
Main plenary room

9:30 **Session 5: Exploring in groups 2 – FIRST STEPS TOWARDS A ROADMAP**
Breakout rooms

Group work and reflection: open discussion of possible themes that would make up the main building blocks of a roadmap towards a 'Global Mine Waste Initiative'

10:30 TEA/COFFEE

11:00 **Plenary: surfacing some concrete building blocks for a roadmap towards a 'Global Mine Waste Initiative'**
Main plenary room

12:00 LUNCH

13:00 **Dialogue walk: What key question(s) still sit with you after the morning?**

13:30 WORKSHOP PART 2 – FIRST STEP ON A ROADMAP TOWARDS A GLOBAL MINE WASTE INITATIVE: 2019 GLOBAL FORUM
Main plenary room

Setting the stage – a 2019 global forum

14:00 **Session 6: Exploring in groups 3 - FIRST STEPS TOWARDS A 2019 GLOBAL FORUM**
Breakout rooms

Group work and reflection: Exploration of possible themes that would make up the main building blocks of the 2019 gathering

15:30 TEA/COFFEE

16:00 **Plenary: surfacing possible prototypes for how the 2019 large scale gathering could be structured**
Main plenary room

16:30 **Closing Plenary**
Main plenary room

Modern society is highly dependent upon mined materials. A by-product of mining, however, is the generation of large quantities of mine waste. Mining companies, communities and governments recognize that mine waste can damage the environment and impact lives and livelihoods. To facilitate successful mining practices, they are committed to work together to minimise the impact of the industry.

While this report focuses predominantly on the issues associated with tailings storage facilities and their associated failures, the recommendations and other comments also apply to mine waste. Despite many good intentions and investments in improved practice, large tailings storage facilities, built to contain mine tailings can leak or collapse. When such events occur, they can destroy entire communities and livelihoods and remain one of the biggest environmental threats related to mining. These incidents may become more frequent due to the effects of climate change, as extreme weather events become increasingly commonplace. There is also a trend to larger facilities that can increase the impacts if a failure event occurs.

UN environment

CIRDI Canadian International Resources and Development Institute
ICIRD Institut canadien international des ressources et du développement

GRID ARENDAL