



## **Sustainability: Future Geoscientists and Minerals Development**

Thank you for the opportunity to speak at meeting.

We are here to both introduce you to the NGEA™ and our association and look for ways that we could collaborate for our future geoscientists and the sustainability of the university ecosystem,

With that, I would like to focus my presentation on the topic of sustainability and how we see it applying to future geoscientists.

## The Frank Arnott - Next Generation Explorers Award (NGEA™)



**Our Vision:** An industry where future geoscientists are proficient to solve tomorrow's mineral exploration challenges.



The 2021 NGEA™ Winning Teams

First, I would like to introduce you to our association.

The Next Generation Explorers Award Association is a registered Canadian-based “Non-Profit” organisation formed to advance education in the field of minerals exploration by providing university-level students with industry relevant learning experiences and awards based on achievement in stipulated minerals geoscience challenges.

Our mission is to build a sustainable global challenge to expose young geoscientists to the collaborative challenges needed to find the next generation of mineral deposits that fosters positive economic, social and environmental benefits to the world.

We strive to accomplish through the Next Generation Explorers Award, an international challenge with the goal of bringing together the education and mineral resource sectors to address key industry challenges around the use and interpretation of mineral exploration data.

The challenge provides a means for geoscience students to “bridge the real-world skills gap” by working collaboratively on an unstructured problem that will hone both their university-acquired and group skill sets on relevant applications used in the mineral

exploration industry. We are actively engaging with over 225 worldwide geoscience universities to participate in the award of which 28 reside within Canada.

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## Our History



The first challenge, called the Frank Arnott Award (FAA) was founded in honour of Frank Arnott (1951-2009) who was an exceptional exploration industry leader. He championed innovative techniques that maximized the value of the multidisciplinary data that underpins exploration campaigns worldwide. Frank was always looking for new and innovative ways to improve data processing methodologies and integrate multi-disciplinary exploration datasets. Seemingly a decade ahead of the industry in his thinking, many of the concepts he was advancing are only now being realised. Frank was never constrained by convention and was just as happy working on global datasets as he was working at the prospect scale. He was equally engaged with academia and industry and often sought innovation in unfamiliar areas. His passion and commitment were infectious.

The Frank Arnott Award (FAA) is where the top two teams from both the university and industry categories were invited to present at the Exploration 17 Decennial Conference held in Toronto, Canada, October 23–26, 2017. During the gala event, the top three teams in each category were acknowledged and presented with awards and cash prizes for the top two. This was a highly regarded event, recognized for its value in “Integrating the Geosciences”.

Based on feedback from industry and academia, we decided that the Frank Arnott - Next Generation Explorers Award (NGEA™) would focus exclusively on the university sector as there are already many well-funded challenges available to industry exploration geoscientists. We reorganised the FAA into the NGEA™ with the inaugural 2021 NGEA™ competition held during the 2021 virtual PDAC.

## The Frank Arnott - Next Generation Explorers Award (NGEA™)



### Opportunities and Challenges:

- An increasing demand from worldwide consumers along with a transition to a low-carbon and digital economies of the future.
- Many countries are looking to minerals development to provide economic growth opportunities while incorporating sound and sustainable environmental and societal goals.
- In EY's "Top 10 Business Risks and Opportunities – 2020" report, the "Future of Workforce" was the #2 risk, up from #7 the previous year.

From worldwide minerals development perspective, we see the following opportunities and challenges:

An increasing demand from worldwide consumers along with a transition to a low-carbon economy is expected to bode well for the long-term future of the minerals and metals industry.

Many countries are looking to minerals development to provide economic growth opportunities or security of supply with the challenge being to do this in a socially and environmentally responsible manner..

The EY report noted that companies are trying to understand the skillset requirements of the future workforce and how best to acquire these future skillsets. There is a growing desire and commitment from the mining industry to hire and develop their future workforce locally.

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### Key Challenges:

- Developing the Next Generation of Geoscientists
- Utilization and Interpretation of Data
- Successful Collaborative Explorers
- Diversity



Our association summarised the key challenges as follows:

Studies show that the recruitment and retention of skilled geoscientists in the mineral resource sector continues to be problematic.

Recognising that effective data integration and visualisation of data remains a key requirement particularly as we explore deeper and under cover. While technology is important, skilled geoscientists are key to the utilisation of data and problem solving.

It is imperative that we develop a sustainable source of enthusiastic and skilled geoscientists with the ability to collaborate and integrate multidisciplinary knowledge and approaches with the soft skills necessary to foster positive community and stakeholder engagement.

We still must do more to increase diversity in the minerals industry. Diversity has many facets of which gender, capacity-building and creative thinking are key focuses.



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### Sustainability in Mineral Development



Source: <https://blackboardminerals.com/>



Sources: 17 Sustainable Goals (United Nations), Sustainability Accounting Standards Board, Sustainability in the Minerals Industry: Seeking a Consensus on Its Meaning (COPPE/UFRJ), The Investor Revolution (HBR)

I would now like to speak to sustainability and how we see it applying to future geoscientists and minerals development

The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, has put forward 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all.

Examining sustainable or sustainable development (SD) from a worldwide context and in particular the minerals industry, we are all aware of the growing emphasis of companies to focus on sustainability, in particular ESG (Environment, Social and Governance). Investors are getting serious about sustainability with global institutional investing firms and the biggest asset managers integrating sustainability issues into their investing criteria.

Also, the circular economy will significantly impact the mining sector and we have seen exciting examples where teams are integrating environmental and social impacts as part of their team submissions. Geoscience and auxiliary data is increasing in importance and along with technologies such as blockchain, artificial intelligence and the Internet of Things will factor into managing a sustainable, circular economy.



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### Knowledge Sustainability in Mineral Development



Source: <https://blueskytechnologies.com/>

Sources: 17 Sustainable Goals (United Nations), Sustainability Accounting Standards Board, Sustainability in the Minerals Industry: Seeking a Consensus on Its Meaning (COPPE/UFRJ), The Investor Revolution (HBR)



So, we ask ourselves, has enough thought been given on the role of Quality Education (Knowledge) that can play in sustainable development. Knowledge, in particular geoscience tacit knowledge, plays a key role in the exploration phase the mining life cycle and can be argued, influences decision-making further along the mining life cycle.

The sustainability position we put forward is that governments need to focus on the knowledge development along with the technological/innovation dimensions of sustainable development so to be able to ensure that minerals resource development is truly sustainable within their respective countries. Both these aspects can be accomplished through supporting the university ecosystems, in particular geosciences. Universities provide the ideal environment for “home-grown” innovation through the establishment of research facilities and/or centres of excellence. The youth population needs to be encouraged and supported by both government and industry that the minerals industry does offer the career opportunities that provides sustainability through knowledge.

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### How Can We Help!

#### Skills and Job Outcomes

1. Graduate employment earnings
2. Experiential learning
3. Skills and competencies
4. Graduate employment rate in a related field

#### Economic and Community Impact

9. Community/local impact of student population
10. Economic impact (institution-specific)



The world that future generations will inherit will be one highly dependent on meeting a growing demand for metals and minerals. With new deposits being more difficult to discover, innovative new exploration strategies are required to meet this demand. The mining exploration industry is facing its most significant skills shortage in decades and the global talent pool is having trouble keeping up. If mining exploration is to meet the challenges of tomorrow, it must be active in preparing and training the geoscientists of today.

To accomplish this, educational institutions, government, associations and industry need to work together to address the key knowledge and innovation challenges for sustainable minerals development.

We also recognize the importance that the NGEA™ align, as best as possible, with the performance metrics for universities. We feel that we can help against six of the performance metrics of Ontario universities.

For example:

For the 2021 NGEA™ challenge, we had 19 global teams and over 100 students

participate, and their submissions were judged by six esteemed judges from industry, academia and government. From the 19 teams, six teams made the finals that presented at the March 2021 PDAC virtual convention that was viewed by 600 delegates.

In collaboration with our sponsors, all 19 teams had an opportunity to virtually meet with one or more of our industry and government sponsors so that our sponsors could learn more about the individual team members and their goals and future career aspirations. This gave the students an ideal opportunity to network and build relationships that could potentially lead to future employment opportunities. The GSC asked that all Canadian teams submit their CVs to them so they can be considered for future employment opportunities.

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## 2022 NGEA™ - Canadian Teams



4D Integration - Univ of Saskatchewan



Team Create - Univ of Ottawa



Quartzifical Intelligence - UQAM



Terradus - Queens Univ

## Geological Surveys



## Mentors



For this year's challenge, we are collaborating with Geological Surveys and Mentors to support students from worldwide mineral geoscience universities to participate in the 2022 NGEA™ challenge.

We currently have four Canadian universities participating in the 2022 NGEA™ challenge; an increase of one team from the 2021 challenge. Univ Saskatchewan is a return participant from 2017 and unfortunately, UofT just recently dropped out. We do want to discuss ways in how we can get more participation from Canadian universities as the support of Canadian companies and institutions has been tremendous, but the difficulty of getting Canadian University participation. Our biggest growth in participation has been from international universities.

We have 10 Geological Surveys as data sponsors. We asked them to provide high-quality data selected from one of their regional terranes that has both a high likelihood of mineral endowment and supports a broader socio-economic mandate of their respective country.

Mentoring is a highly rewarding process and an important part of the NGEA™. Mentors provide participants with encouragement, guidance, perspective,

access to industry experts and opportunities to review the team's progress and outcomes. Aligning student teams with government and industry mentors is another example of supporting the future employment opportunities and the performance metrics of the universities.

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### Conclusions:

- The world future generations will inherit will be one highly dependent on meeting a growing demand for metals and minerals
- We are engaging with governments to consider knowledge development (quality education) along with the technological/innovation as part of their sustainability strategy.
- We are doing our little part to help develop the future generation of geoscientists by:
  1. Working towards aligning with the performance metrics of universities
  2. Aligning with the mining industry's strong commitment to support the communities in jurisdictions they operate, including a desire to continue hiring a local workforce

### In conclusion

The world that future generations will inherit will be one highly dependent on meeting a growing demand for metals and minerals. With new deposits being more difficult to discover, innovative new exploration strategies are required to meet this demand. The mining exploration industry is facing its most significant skills shortage in decades and the global talent pool is having trouble keeping up. If mining exploration is to meet the challenges of tomorrow, it must be active in preparing and training the geoscientists of today.

We are engaging with governments to consider knowledge development (quality education) along with the technological/innovation as part of your sustainability strategy so to be able to ensure that minerals resource development is truly sustainable within your respective countries.

We are doing our little part to help develop the future generation of geoscientists that supports both the sustainability of geoscience university programs and the mining industry's strong commitment to support the communities in jurisdictions they operate, including a desire to continue hiring a local workforce.



## Thank You From Our Committee and Sponsors!



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## The Frank Arnott - Next Generation Explorers Award (NGEA™)



### Discussion Points:

- What are your “top of mind” opportunities and challenges facing Canadian geoscience universities?
- What would promote higher participation amongst Canadian Universities?
- Is there an opportunity to embed the NGEA™ into your curriculums like that of the Imperial Barrel Award?
- Are you aware of data sets or potential partner organizations that could strengthen the NGEA™ by making it more fully representative of mineral sustainability (i.e., environmental geoscience aspects)?

### Discussion Points

We want to get your inputs on supporting the university geoscience ecosystem along with the knowledge development/experience, innovation and leadership of the student participants?