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LETTER FROM THE CHAIR

A new era for GMG

As I prepare to hand over the reins to incoming chair Michelle Ash, I have been reflecting on the progress GMG has made during my tenure. Of all the accomplishments I have presided over in my two years as chair, I am most proud of the growth of our membership and the resulting high level of engagement in the organization. I see evidence of this greater engagement in the work of our Leadership Council, whose vision is being realized, as well as in the development of our first two Leadership Summits in San Francisco and Stockholm. I see it in GMG’s collaboration with CMIC on the Battery Electric Vehicles in the Underground guideline.

GMG is entering a new era. The name of the organization has undergone a change that will provide more clarity about its purpose. We are more connected than ever to our membership through a variety of online and social media platforms, as well as through our guidelines and project work. This greater connectivity will no doubt lead to even more opportunities for innovation and industry partnerships.

Since we last spoke in January, GMG launched the Interoperability Definitions and Roadmap project and the Implementation of Autonomous Systems project. Both of these projects are great examples of the ways in which GMG and its members are ensuring the global mining industry is moving forward together.

None of this would be possible without the incredible team of GMG employees, who have demonstrated a high level of professionalism and performance. I have enjoyed connecting with the people at GMG and with our members and partners in the mining industry, and I am looking forward to maintaining these connections into the future. I hope that when Michelle takes over as chair, she will continue to count on me as an extension of her team in promoting GMG’s value proposition. I know that under her capable direction, GMG will extend its reach across the global mining community and foster even more collaboration and cooperation within it.

Helius Guimaraes
Chair, GMG
Meet Michelle Ash

In May, Michelle Ash, Chief Innovation Officer at Barrick Gold, begins her term as GMG’s new chair, following in the footsteps of outgoing chair Helius Guimaraes. In assuming the helm, Ash inherits a long legacy of successes and is well-suited to maintain the organization’s trajectory.

As a supporter of GMG, she shares its commitment to collaboration and dynamic member engagement. From her recent contributions as a member of the GMG Leadership Council, to her international experience and qualifications in the mining and manufacturing sectors, Ash brings more than 20 years of leadership augmented by a focus on business improvement and change management – two attributes that will enable the sector to meet the challenges of technological and process changes around the globe. At Barrick Gold since 2016, Ash oversees the company’s innovation program that looks both at how innovation can drive productivity in its existing business as well as how it can be harnessed to deliver alternative business models.

In addition to her commitment to collaborating with GMG’s member companies and working groups, she is aiming to engage global mining powerhouses such as those in China, Africa and South America.

What brought you to the industry?
Originally, I was a civil engineer. There were few roles in construction but I did my honours thesis on Methane Extraction from Coalbeds. Rio Tinto thought that might be useful in their ATD (Research Facility) for the development of explosives. I was then sent to a site as a blasting engineer and had the opportunity to see my work explode in front of me! As a young 20-year-old mining engineer, that was the most amazing job. I was hooked and I loved the mine sites, the people, the scale, and the work. It has been an amazing industry that has taken me to some very unusual parts of the world, allowed me to meet some interesting people and work on some very exciting projects.

How important is diversity to an innovative mining future?
I think diversity in all of its forms is fundamental to the future of the mining industry. We need more women, a mix of nationalities, and more indigenous people who also bring their traditional knowledge and from whom we can learn, but also people who just think differently. We need new solutions and to be able to innovate faster.

What trends do you see coming down the pipe for mining?
There are so many. Some of the largest are collaborations between mining companies and suppliers both big and small, governments and communities, plus companies outside the industry (a greater ecosystem); technology such as digital mining including cyber security, IoT, blockchain, robotics, automation, analytics; even greater environmental protection looking at GHG reductions, land disturbance reductions, energy reduction, water reductions and so forth; and human resources issues such as enabling employees greater quality and balance of life, and more efficient tools to do their work. I am sure there are many more.

What will you bring to GMG from your role overseeing the innovation strategy at Barrick Gold?
A focus on collaboration, some bold targets and thoughts of the future of mining, greater linkages to some of the organizations shaping the technology world, and some links into organizations that may wish to be members of GMG.

You’ve worked all over the world. How is a global perspective important to an industry such as mining and an association such as GMG?
I think mining is global. Even if we are working for a company that is only in one area, our customers are global, people who have opinions about our industry are global, many of our suppliers are global, the social, technical and disruptive trends that impact us are global, so we need to think and act globally but also be cognisant of also thinking and acting locally.

What is your top priority as you take on the role of Chair at GMG? What do you hope to achieve?
To help focus our work and have some member company success stories on the impact of using and implementing the work, increase membership so we are truly global and enhancing the work already done on collaboration.

What value does GMG bring to the industry and how can it expand its influence?
GMG can be the organization that helps member companies collaborate on the topics that are important to them – whether it’s related to autonomous mining, cyber security, or interoperability, for example – and the link to the work that has been done, is being done, and then should be done in these areas.
CONFERENCES & CONVENTIONS

CIM Convention 2018
Vancouver May 6-9

AGM & Social
Vancouver May 8

Driving Change: Innovation and Collaboration Day
Vancouver May 9

WORKSHOPS

Implementation of Autonomous Systems
Vancouver May 3-4
Tucson May 22
Denver June 22

Interoperability Definitions and Roadmap
Vancouver May 6
Tucson May 21

AUSTRALIAN ROAD SHOW
Perth May 28
Kalgoorlie May 29
Adelaide May 31
Melbourne June 1
Sydney June 4
Newcastle June 5
June 7 June 7
Mackay June 8

Sudbury June 12
Denver June 21
Johannesburg June 27

Short Interval Control
Toronto June 7

Underground Communication Infrastructure
Toronto June 8
Johannesburg June 27

PARTNERS

FORUMS

SUDBURY
June 13-14

BRISBANE
August 21-22

LULEÅ
September 5-6

EDMONTON
October 2-3

TUCSON
October 17-18

SANTIAGO
November 5-6

SINGAPORE
TBA

SUMMIT

PERTH
TBA

Final dates will be made available on the GMG website.
A new guideline that will prepare and enable global mining companies to adopt and successfully implement autonomous mining systems is underway. It will be a playbook that provides mining companies with the necessary tools to move forward with autonomous mining from planning to final stages. Key areas to be covered by the guideline will include functional capability, functional safety, change management, communications with the workforce and local community, and interactions with regulators.

Outcomes from a workshop held this past February in Perth, Australia, included a content outline for the guideline and established five task groups for volunteers to contribute their expertise:

- Business Case
- Change Management and Planning
- Safety and Regulatory
- Design Architecture
- Data and Human Factors

Additional workshops are likely to be held in Europe, Africa, South America, and the U.S. The complete draft is expected this fall with the guideline to be published by year-end.

A common vision for seamless access to mobile equipment data

Version 2.0 of the Mobile Equipment Open Data Consensus guideline will put forward a common vision around principles, guidelines and policies, for seamless access to mobile equipment data across the mine cycle. It applies a forward thinking approach in order to remain viable as technologies advance.

Participants in the subcommittee are contributing their expertise to a Philosophy of Open/Accessible Data and are working on definitions for open data and intellectual property, acceptable use of data, and the relationships and obligations among parties that are involved. The project group hopes that a broader, briefer guideline on what constitutes consensus for access to data, will be useful as a philosophical reference point for future GMG guidelines.
GMG has stepped up with a unique approach to the interoperability challenge – a universal roadmap.  
**It's important for the industry.**

Interoperability overlaps and impacts other industry subject matter and developments such as data, integrated operations, and autonomous mining. The pressing need for a common enabling approach has spawned a number of interoperability development initiatives by international industry stakeholder groups – but substantial coordinated development and progress in advancing interoperability on the international stage has yet to materialize. The GMG roadmap is to provide guidance “through the maze”.

The GMG Interoperability Definitions and Roadmap project provides common interoperability definitions, principles, terms, scope, and references needed by, and to guide, further interoperability working group initiatives and developments. The result is generating input for the much-needed international roadmap: a landscape of interoperability initiatives, projects, organization, and resourcing which are aligned, collaborative, and supportive with interoperability developments of other organizations.

The project plan has been set and regional project managers confirmed globally, with participants joining three subject matter task groups. A calendar of global workshops is currently in development, working toward project completion by Q3 of this year.

**Meet some of our new project managers**

**MAX NODWELL**  
A metallurgist and chemical engineer by profession, Max Nodwell brings a wealth of knowledge and experience to his role as project manager for two GMG projects: Mobile Equipment Open Data Version 2.0 and Underground Mining Communications Infrastructure. His career spans 15 years, with assignments in water treatment and hydro metallurgy, process engineering and project management as well as work in Canada’s oil sands. To him, the collaborative and communicative nature of the working groups offers a solid framework for harnessing member enthusiasm, experience and knowledge.

**DAVID SANGUINETTI**  
David Sanguinetti became the Innovation Manager of CMIC’s Underground Mining group in March of 2016. In that role, he was the project manager for the creation of the first edition of the Recommended Practices for Battery Electric Vehicles in Underground Mining guideline, a joint project between CMIC and GMG. He is also currently project managing the Short Interval Control project, another joint project between CMIC and GMG. He is a professional engineer with more than 20 years of experience in design, project management and operations. He has a particular interest in helping companies with the development and commercialization of new technologies and has extensive experience both with technical scale-up and with designing engineering and project management systems.
GMG Leadership Council member and Incoming Chair, Michelle Ash

GMG can be the organization that helps member companies collaborate on the topics that are important to them.
Membership Tiers and Benefits

**Leadership Tier**
US $30,000
- Seat on Leadership Council
- Invitation to Future Mining Summit
- Official online member listing
- Recognition in marketing materials
- Corporate Member Report

**Members**
- Accenture
- AngloGold Ashanti
- Antofagasta Minerals
- Barrick Gold
- BHP
- Caterpillar
- Epiroc
- Freeport-McMoRan
- Glencore
- Hatch
- METS Ignited
- Motorola
- Rio Tinto
- Vale

**Collaborator Tier**
US $15,000
- Invitation to Future Mining Summit
- Official online member listing
- Recognition in marketing materials
- Corporate Member Report

**Members**
- Amazon
- Anglo American
- Boliden
- Dassault Systemes
- Hitachi
- Maclean Engineering
- Newtrax
- Orica
- Seequent
- Teck
- WENCO

**General Tier**
US $5,000 ($2,500 for companies with less than 20 employees)
- Official online member listing
- Recognition in marketing materials
- Corporate Member Report

**Members**
- 3D-P
- Agnico Eagle
- Alight Mining Solutions
- ASI
- CEMI
- Centric Mining Systems
- CheckMark Consulting
- Datamine
- Desert Falcon Consulting
- Deswik
- DetNet
- Flow Partners
- GE Mining
- Global Inspections – NDT Inc.
- Global IO
- Goldcorp
- Guardvant
- Hexagon Mining
- IBM
- Komatsu
- Leica Geosystems
- Liebherr
- Lockheed Martin
- Maptrek
- Metcom Technologies
- Micromine
- Miller Technology
- Minetec
- Mine Vision Systems
- MineWare
- Mining3
- MISOM
- The Mosaic Company
- Motion Metrics
- MST Global
- Newmont
- OSIsoft
- Peck Tech
- Prairie Machine & Parts
- RIGID ROBOTICS
- Rockwell Automation
- RPMGlobal
- Sandvik
- Schneider Electric
- Shell
- Siemens
- SMART Systems Group
- SMS Equipment
- SSR Mining
- Suncor
- Syncrude
- Total
- Trimble
- Vandrico
- Yamana Gold
**GOVERNING COUNCIL**

**CHAIR**
Helius Guimaraes, Rio Tinto

**VICE CHAIR**
Michelle Ash, Barrick Gold

**OUTGOING CHAIR**
Andrew Scott, Symbiotic Innovations

**VICE CHAIR INTERNATIONAL STANDARDS**
Tim Skinner, SMART Systems Group

**TREASURER**
Mark Bartlett, Flow Partners

**SECRETARY**
Peter Becu, Information Systems and Technology Consultant

**MANAGING DIRECTOR**
Heather Ednie, GMG

**SAIMM REPRESENTATIVE**
Jean-Jacques Verhaeghe, South Africa Chamber of Mines and the Mining Innovation Hub

**AUTONOMOUS MINING WORKING GROUP**
Graeme Mitchell, BHP

**COMMON REFERENCE FRAMEWORK WORKING GROUP**
Roy Irvine, Real IRM

**DATA ACCESS AND USAGE WORKING GROUP**
Marcus Thomson, CEMI

**INDUSTRIAL COMMINUTION EFFICIENCY WORKING GROUP**
Aidan Giblett, Newmont

**INTEGRATED OPERATIONS WORKING GROUP**
Laura Mottola, Flow Partners

**INTEROPERABILITY WORKING GROUP**
Marcelo Mosquera, CORFO

**RELIABILITY WORKING GROUP**
Zoli Lukacs, Advisor

**UNDERGROUND MINING WORKING GROUP**
Riaan van Wyk, DetNet South Africa
Russell Kennett, Rio Tinto

**LEADERSHIP COUNCIL**

**GEORGE LONG**
Senior Manager, Resources, Digital Transformation, Accenture

**LIV CARROLL**
Senior Principal, Analytics, Digital Mining, Accenture

**ALEX KENT**
Vice President, Engineering And Projects, AngloGold Ashanti

**VITESH MAHARAJ**
Senior Vice President Engineering, AngloGold Ashanti

**JUAN QUISPE ARANCIBIA**
Vice President, Operations & Maintenance, Antofagasta Minerals

**DENIS GRATTON**
Vice President, Autonomous Mining, Barrick Gold

**MICHELLE ASH**
Chief Innovation Officer, Barrick Gold

**SHARNA GLOVER**
Program Director, Autonomous Operations, BHP

**CHIRAG SATHE**
Principal Risk & Business Analysis Technology, BHP

**MICHAEL MURPHY**
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**RICK GILBERT**
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Operations and Business Technology Lead, Glencore

**KEVIN MCAULEY**
Manager – Sustainable Development And Innovation, Sudbury Integrated Nickel Operations, Glencore

**ALVARO ROZO**
Global Director, Smart Industries, Hatch

**JEANNE ELS**
Regional Director, Hatch Digital, Hatch

**RIC GROS**
CEO, METS Ignited

**LISA BOUTILIER**
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**SCOTT SCHOEPEL**
Vice President, Commercial Markets, Motorola Solutions

**HELIUS GUIMARAES**
General Manager Data Strategy, Rio Tinto

**BRIAN OLDHAM**
Group CIO

**ANDREW SCOTT**
GMG Outgoing Chair and Principle Innovator, Symbiotic Innovations

**TIM SKINNER**
GMG Vice Chair International Standards and President, SMART Systems Group

**SAMANTHA ESPLEY**
Director, Technical Excellence, Vale

**SIMON NICKSON**
Principal, Underground Mining Engineer, Vale
New ISO subcommittee and two ISO projects underway

In February, a major milestone was achieved with the passing of an ISO resolution to approve the SC8 for Advanced Automated Mining Systems subcommittee. The new subcommittee will focus on standards development, knowledge, research, and best practices pertaining to the use and application of advanced and automated systems, technologies and practices specific to the mining sector.

That ISO Technical Management Board Resolution 15/2018, was adopted at the 71st meeting of the Technical Management Board in Seoul (Republic of Korea), for the creation of ISO/TC 82/SC 8 Advanced Automated Mining Systems.

The new subcommittee has received strong support and input from the major mining countries, mining OTMs, and mine operators. Currently, there are nine countries participating on this subcommittee: Australia (SA); Canada (SCC); Chile (INN); China (SAC); Finland (SFS); Germany (DIN); South Africa (SABS); Sweden (SIS); United States (ANSI). Additional countries are expected to join the subcommittee.

The Technical Management Board ratified the decision of ISO/TC 82 to establish a new subcommittee with the secretariat allocated to SCC (Standards Council of Canada). This approval is the culmination of two years of effort. Actions are now underway to communicate to the industry, organize the new subcommittee, initiate immediate standards development activity, prepare for an international organizational and planning meeting, and initiate development of a strategic business plan.

In addition, two ISO projects are underway which require strong mine operator presence and participation. One project is Standards Development for Collision Avoidance for Underground Operations. A project leader has been identified and a number of mine operator experts have come forward, but recruitment continues. At the joint TC 127 Earth Moving Machinery and TC82 Mining working group meeting in February, it was agreed that a second project dedicated to Emergency Remote Stop would be initiated under TC82. Both of these projects will align under the new SC8. GMG is requesting mine operators come forward regarding participation.

If you would like to be involved or would like more information, please contact:

Paul Steenhof (International Secretary to ISO TC 82/SC8):
 paul.steenhof@csagroup.org

Tim Skinner (incoming International Chair to ISO TC 82/SC8):
 timskinner@shaw.ca

ISO TC 251 Asset Management

Members of TC 251 held their fifth meeting in February in Paris. Following the meeting, a ballot on a Draft International Standard (DIS) for the revision of ISO 55002 Asset management – Management systems – Guidelines for the application of ISO 55001 received a majority vote for approval. In addition, a Committee Draft of ISO/TS 55010 Guidance on alignment of asset management, finance and accounting was circulated for review (but not for ballot) and received a number of comments suggesting improvements. It was noted that a number of new experts participated in this meeting, greatly improving the diversity of the membership.

Following further editing, a Final Draft International Standard (FDIS) will be issued for review and ballot by approximately July, provided issues concerning references to legal requirements can be satisfactorily resolved with ISO C/S. Future meeting dates and locations are to be determined.
Working Groups
The Asset Management Working Group is collaborating with mining and other industry organizations to generate best practice guidelines for reliability in mining and to establish common metrics. This will enable organizations to improve asset reliability and increase equipment run-time resulting in increased production and reduced operating costs. To drive this work, the group has created a generic best practice reliability model pyramid that incorporates foundational elements, effective execution, continuous improvement, and leading practices.

2018 PROGRESS
» Operator engagement to determine priorities for workshops
The Implementation of Autonomous Systems project will enable global mining companies and OEMs to adopt and successfully implement autonomous mining systems. Key areas to be covered by the guideline will include functional capability, functional safety, change management, communications with the workforce and local community, and interactions with regulators.

2018 PROGRESS

» Workshop held in Perth, Feb. 22-23, to define guideline contents scope
» First teleconferences held to launch project work

» Five Task Groups formed:
  • business case
  • change management
  • safety and regulatory
  • design/architecture/data
  • human factors

GROUP LEADERS
Glenn Johnson, Teck and Chirag Sathe, BHP

37 PARTICIPATING COMPANIES
ACCENTURE, ANGLO AMERICAN, AUSTROBOTS, BARRICK, BHP, CATERPILLAR, CHECKMARK CONSULTING, CITIC PACIFIC MINING, DE BEERS, DEPARTMENT OF MINES AND PETROLEUM (DMP), EPIROC, ETF MINING EQUIPMENT, FLOW PARTNERS, FORTESCUE METALS GROUP (FMG), GOLD FIELDS, HATCH, ITI SOLUTIONS, KINROSS GOLD, KOMATSU, LIEBHERR MINING EQUIPMENT, MCKINSEY, METS IGNITED, MTGA, ORICA, OSISOFT, PECK TECH, RCT, RIO TINTO, ROY HILL, SIBANYE-STILLWATER, SMART SYSTEMS GROUP, SYMBIOTIC INNOVATIONS, TECK, TRIMBLE, UNIVERSITY OF QUEENSLAND
Data Exchange for Mine Software

This initiative focuses on solving the lack of interoperability between sophisticated mining geology and engineering software programs – in short, the need to export data from one software program then re-import into another – and enable major efficiency gains by eliminating the time currently required for manual and/or convoluted data transfer across the mine site.

2018 PROGRESS

- Partnerships in development with a number of organizations such as the International Tunneling Association, Open Geospatial Consortium and many others.
- A survey is in development, the results of which will help inform definitions.
- A global outreach program among mining organizations is expanding, supported by an open call for champions to promote the initiative within their organizations.

PROJECT DASHBOARD

PROJECT TIMELINE

1. OMF V1.0 launch
2. OMF use case report publication
3. OMF V2.0 development
4. Partnership agreements
5. Survey

1 – OMF V1.0 launch
2 – OMF use case report publication
3 – OMF V2.0 development
4 – Partnership agreements
5 – Survey

GROUP LEADER
Rob Ferguson, Seequent

53 PARTICIPATING COMPANIES
ALFORD MINING SYSTEMS, ANGLO AMERICAN, ANGLOGOLD ASHANTI, ARCELORMITTAL, AUSTMINE, BARRICK, BHP, CANADIAN NATURAL RESOURCES, DASSAULT SYSTEMES, DATA MINE SOFTWARE, DESWIK, D-WAVE SYSTEMS, EPIROC, FLANDERS ELECTRIC, FLOW PARTNERS, FREEPORT-MCMORAN, GEOMODELR, GEOSOFT, GLOBAL MINING DESIGN, HEXAGON MINING, IBM, IGS (INTERNATIONAL GEOSCIENCE SERVICES), IMAGO, JVA, KINROSS GOLD, LOCKHEED MARTIN, MAPTEK, MASTERCONTROL, MINE VISION SYSTEMS, MINERP, MINESENSE TECH, NEWMONT, OBJECTIVITY, ORICA, OSISOFT, PEABODY ENERGY, PRAIRIE MACHINE & PARTS MFG., RIO TINTO, RUNGE PINCOCK MINARCO (RPM), SCHNEIDER ELECTRIC, SEEQUENT, SIBANYE-STILLWATER, SIEMENS, SSR MINING, SYMBIOTIC INNOVATIONS, TECK, TRACKVIA, UNIVERSITY OF QUEENSLAND, VALE, VERTEX BLAST, VUMA 3D, WIPRO CONSULTING
Mobile Equipment Open Data Consensus Version 2.0

This guideline will define guiding principles, definitions and a consensus framework for access to onboard data from mobile equipment. Accessing operating data from mobile equipment offers opportunities for superior analysis and increased operational efficiencies.

2018 PROGRESS
- A workshop was held in Minneapolis on February 28
- A new scope and direction were defined for Version 2.0
- Draft development underway

PROJECT TIMELINE
1 – Workshop
2 – Draft development
3 – Working Group review and stakeholder engagement
4 – Guideline publication

58 PARTICIPATING COMPANIES
ABB, AGNICO EAGLE, AMAZON, AMC BAUXITE, AMTC, ANGLO AMERICAN, ANGLOGOLD ASHANTI, ARCELORMITTAL, AUTOMATED SYSTEMS ALLIANCE, BARRICK, BHP, CANADIAN NATURAL RESOURCES, CATERPILLAR, CHECKMARK CONSULTING, CMAC-THYSSEN MINING MANUFACTURER, DEPARTMENT OF MINES AND PETROLEUM (DMP), DESWIK, EARTHSOFT, ENDEVA, EPIROC, FLOW PARTNERS, FORTESCUE METALS GROUP (FMG), FOUNTAIN TIRE, FREEPORT-MCMORAN, GE MINING, GLENCORE, GOLDCORP, HAULTRAX, HITACHI, IBM, INDIGO, INNOVATIVE WIRELESS TECHNOLOGIES, JVA, KGHM INTERNATIONAL, KOMATSU, LIEBHERR MINING EQUIPMENT, MACLEAN ENGINEERING, METS IGNITED, MICROMINE, NEWTRAX, OSISOFT, PEABODY ENERGY, PRAIRIE MACHINE & PARTS MFG., RCT, RIO TINTO, ROY HILL, SANDVIK, SIBANYE-STILLWATER, SMART SYSTEMS GROUP, SYMBIOTIC INNOVATIONS, SYMBOTICWARE, TECK, THE CYEST, THE ELECTRUM GROUP, UNIVERSIDAD DEL DESARROLLO, VALE, WECO, WESTMORELAND COAL COMPANY
Operational KPIs and Definitions

The Operational KPIs and Definitions project’s objective is to develop common definitions and terminology for production data and operational KPIs and guidelines for reporting and classifying operational activities for surface mining. Developing common definitions and terminology enables reporting consistency between operators, allowing effective comparison of performance data.

2018 PROGRESS
» Model and definition complete and under review

PROJECT DASHBOARD

PROJECT COMPLETION
PROJECT PERFORMANCE
STAKEHOLDER ENGAGEMENT
MEETING ACTIVITIES AT A GLANCE

PROJECT TIMELINE

1 – Circulate draft guideline
2 – Industry draft review and update
3 – Working Group review and approval
4 – Guideline publication

GROUP LEADER
Zoli Lukacs, Advisor

30 PARTICIPATING COMPANIES
3D-P, ACCENTURE, ANGLOGOLD ASHANTI, BARRICK, BHP, CANADIAN NATURAL RESOURCES, CENTRIC MINING SYSTEMS, DASSAULT SYSTEMES, DESWIK, FLOW PARTNERS, FREEPORT-MCMORAN, GLOBAL IO, HEXAGON MINING, IBM, JVA, NEWMONT, OSIsoft, PEABODY ENERGY, PT UKU TECH INDONESIA, RIO TINTO, SCHNEIDER ELECTRIC, SIBANYE-STILLWATER, SIEMENS, SMART SYSTEMS GROUP, SSR MINING, SYMBIOTIC INNOVATIONS, TECK, THE ELECTRUM GROUP, TRIMBLE, UNIVERSITY OF SAO PAULO
Business Case and Research Development

Business Case Development: Developing an adaptable IO business case for mining company executives, to help ease the transition for companies seeking to shift their production processes.

Research Development: A collaborative effort between industry and academia to develop and implement a research project with a specific focus on identifying and aggregating both new and existing IO knowledge and research to inform an assessment of the current state of the mining industry’s operating model. The end goal is a more effective and cost-efficient model.

2018 PROGRESS
» A survey was conducted in March-April

GROUP LEADERS
Laura Mottola, Flow Partners – Working Group
Saad Hameed, ArcelorMittal – Business Case
Fiona Campbell, CGM – Research Collaboration

25 PARTICIPATING COMPANIES
ABB, ACCENTURE, ALIGHT, ANGLO AMERICAN, APEX AUTOMATION, ARCELORMITTAL, BHP, CAMBORNE SCHOOL OF MINES, CGM, DELOITTE, ERNST & YOUNG, FLOW PARTNERS, GLOBAL IO, HATCH, IBM, JVA, NEXTGENOPX, RIO TINTO, SANDVIK, SCHNEIDER ELECTRIC, SIBANYE-STILLWATER, SYMBIOTIC INNOVATIONS, TECK, UNIVERSITY OF TORONTO, VISAGIO
A universal roadmap that enables greater coordinated efforts and industry-wide alignment in achieving mining interoperability is the focus of the Interoperability Definitions and Roadmap project. It will provide common definitions, principles, terms, scope, and references that will enable the interoperability working group to advance its work on the guideline.

2018 PROGRESS
» Project Plan has been confirmed
» Canadian government grant received
» Regional partners have been confirmed
» Regional project managers have been appointed
» A matrix of workshops is being set for the next three months
» Three task groups have formed
» Meeting held in Santiago, Chile in April as part of Expomin 2018

129 PARTICIPATING COMPANIES
3D-P, ACQUIRE TECHNOLOGY SOLUTIONS, AIKLOGIC, AKROM, ALIGHT, AMAZON, AMIRA, AMTC, ANGLO AMERICAN, ANTOFAGASTA MINERALS, AUSTMINE, AUTOMATED SYSTEMS ALLIANCE, AUTONOMOUS SOLUTIONS, BARRICK, BHP, BOLIDEN, CANADIAN NATURAL RESOURCES, CATERPILLAR, CHECKMARK CONSULTING, CISCO, CMDIC, CODELCO, CORFO, CSA GROUP, CSIRO, D&V ELECTRONICS, DASSAULT SYSTEMES, DECENT, DHEMAX SPA, DISCOVERY LEARNING, DRAEGER, EATON, EMERSON ELECTRIC, ENDEVEA, ENERGETICS, EPIROC, ETP, EY CHILE, FARELLONES INGENIERIA, FIE / MINISTRY OF ECONOMY, FLANDERS ELECTRIC, FLOW PARTNERS, FMP GROUP, FREEPORT-MCMORAN, FREEWAVE TECHNOLOGIES, FUNDACION CHILE, GE MINING, GENERAL DYNAMICS, GLOBAL IO, GODELIUS, GOLDCORP, GS1, GUARDVANT, HATCH, HEXAGON MINING, HONEYWELL, IBM, ICONO ADVISORY, IDS GEORADAR, IMPERIAL OIL, INDUSTRIAS INTELIGENTES, INNOVATIVE WIRELESS TECHNOLOGIES, INSTITUTO NACIONAL DE NORMALIZACIÓN, ITELECOM, JONES DAY, JVA, KOMATSU, LESS INDUSTRIES, LIEBHERR MINING EQUIPMENT, LKAB, LOCKHEED MARTIN, MATRIKONOPC, MCKINSEY, METS IGNITED, MICROMINE, MINE VISION SYSTEMS, MINERP, MINETEC, MINWARE, MINING3, MINNOVEX A.G., MISOM TECHNOLOGIES, MODULAR MINING SYSTEMS, MOTION METRICS INTERNATIONAL, MOTOROLA, MST GLOBAL, NATURE UNLIMITED C.I.C., NEWTRAX, NHP ELECTRICAL ENGINEERING, OCTAGON SYSTEMS, OLIO TECHNOLOGY SOLUTIONS, OPTALERT, OPTIMISA S.A., OSISOFT, PECK TECH, PRAIRIE MACHINE & PARTS MFG., PROGRAMA ESTRATÉGICO DE INDUSTRIAS INTELIGENTES, PSA INTEGRATION, RAJANT CORPORATION, REAL IRM, RIGID ROBOTICS, RIO TINTO, ROCKWELL AUTOMATION, RUNGE PINCOCK MINARCO (RPM), SCHNEIDER ELECTRIC, SIBANYE-STILLWATER, SILENT SOFTWARE, SMART SYSTEMS GROUP, SPARHAWK SOFTWARE, S/C SIMPLEX GRINNELL, SYMBIOTIC INNOVATIONS, SYNERGISTICS, TECK, TECNOEXPLORA, THE CYEST, THE OPEN GROUP, TRIMBLE, TYCO SIMPLEX GRINNELL, UNEARTHED SOLUTIONS, UNIVERSIDAD CHILE, UNIVERSIDAD DEL DESARROLLO, UNIVERSITY OF ADELAIDE, VALE, VANDRICO, VISAGIO, VISUAL INTELLECT, WIRELESS SENSOR NETWORKS
The Underground Communications Infrastructure subcommittee is developing a guideline suite to assist improved communication and network infrastructure. It will empower mine operators to understand the communications and IT requirements, options, limitations for better decision making, and enable system providers to communicate the requirements to implement their solutions underground.

2018 PROGRESS

» Virtual collaboration and multiple teleconferences have taken place by seven task groups:

- Administration
- General Best Practices
- General Topology

- Control Room
- Underground Best Practices

- Security
- Remote Management

PROJECT DASHBOARD

PROJECT TIMELINE

PROJECT COMPLETION

PROJECT PERFORMANCE

STAKEHOLDER ENGAGEMENT

MEETING ACTIVITIES AT A GLANCE

1 – Project plan development
2 – Guideline draft development
3 – Review and approval
4 – Publication

GROUP LEADERS
Dave Fry, Granite Technology Group and Russel Kennett, Rio Tinto

59 PARTICIPATING COMPANIES
AGNICO EAGLE, AKROM, ALPHA TECHNOLOGIES, AUSTROBOTS, BARRICK GOLD, BESTECH, BHP, CISCO, DELTITE, DETNET SOUTH AFRICA, DEXCENT, DRAEGER, ECM NETWORKS, EPIROC, FLOW PARTNERS, GLENCORE, GLOBAL IQ, GRANITE TECHNOLOGY GROUP, HATCH, HEXAGON MINING, HINTEC, INNOVATIVE WIRELESS TECHNOLOGIES, IREDES, IVOLVE, JVA, KOMATSU, LAIRD, LITTELFUSE, METSTECH, MICROMINE, MINE SITE TECHNOLOGIES, MINE VISION SYSTEMS, MINERP, MINETEC, MOBILARIS, MOTOROLA, MST GLOBAL, NEWMONT, NEWTRAX, NHP ELECTRICAL ENGINEERING, NORTHERN LIGHT TECHNOLOGIES, PSA INTEGRATION, RAMJACK, RCT, RIO TINTO, ROCKWELL AUTOMATION, RUNGE PINCOCK MINARCD (RPM), SANDVIK, SCHNEIDER ELECTRIC, SIBANYE-STILLWATER, SIEMENS, STANTEC, STRATEGY FOCUSED INNOVATION, SYMBIOTIC INNOVATIONS, TETHERCO, UNSW, VALE, YAMANA GOLD, YOURPACE
Enabling the adoption of short interval control will give the industry the required processes to optimize shift time and use of assets in underground mines. This will allow for better planning, quicker decisions, increased production, and lower costs. The draft guidelines will be informed by case studies that offer insights into a range of issues from change management to technological requirements.

2018 PROGRESS

» Multiple meetings held by six task groups established to address separate sections in the guideline including:

- Introduction
- Business Case
- Methodology
- Data Enablement
- Risk and Critical Success Factors
- Use Cases

PROJECT DASHBOARD

PROJECT COMPLETION

START

END

PROJECT PERFORMANCE

STAKEHOLDER ENGAGEMENT

MEETING ACTIVITIES AT A GLANCE

31

TELECONFERENCES

0

WORKSHOPS

PROJECT TIMELINE

1 – Project plan development
2 – Guideline draft development
3 – Review and approval
4 – Publication

55 PARTICIPATING COMPANIES

ABB, ACCENTURE, ACORN, ALPHA TECHNOLOGIES, APEX AUTOMATION, BOLIDEN, BUSINESS SWEDEN, CAMBORNE SCHOOL OF MINES, CAMIRO, CEMI, CENTRIC MINING SYSTEMS, COMMIT WORKS, CORFO, DASSAULT SYSTEMES, DELoitTE, DESWIK, EPIROC, ERICSSON, FLOW PARTNERS, FLUIDMESH NETWORKS, FREEPORT-MCMORAN, GLENCORE, GLOBAL IO, HATCH, HEXAGON MINING, HINDALCO, IBM, JVA, KOMATSU, LUNDIN MINING, MACLEAN ENGINEERING, MICROMINE, MINERP, MINETEC, MOBILARIS, MST GLOBAL, NEWGOLD COM, NEWTRAX, NORTH AMERICAN PALLADIUM [NAPI], PRONTOFORMS, PT UKU TECH INDONESIA, QVARTZ, RUNGE PINCOCK MINARCO [RPM], SANDVIK, SCANIA, SCHNEIDER ELECTRIC, SIEMENS, SKF, SYMBIOTIC INNOVATIONS, TECK, VALE, VOLVO, WEST ARM CONSULTING GROUP, WIPRO CONSULTING, YOURPACE
Providing operators and OEMs with the tools to solve the challenges associated with the transition from diesel to Battery Electric Vehicles (BEVs), Version 2.0 will address a number of issues such as emergency response requirements for BEVs underground; guidelines on required skill sets and training for maintenance technicians; as well as recommendations on charger standardization, new material on different battery chemistries, and alternate charging methods.

**2018 PROGRESS**

» A workshop was held on April 4 in Chicago, hosted by Motorola
» Multiple meetings were held by four task groups each reviewing different sections of the guideline including:
  - Group A – Design and Energy Storage Systems
  - Group B – Operations, General Background and Charging Philosophy
  - Group C – Charging Systems
  - Group D – Mine Design and Performance Standards

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**PROJECT DASHBOARD**

**PROJECT COMPLETION**

**PROJECT PERFORMANCE**

**STAKEHOLDER ENGAGEMENT**

**MEETING ACTIVITIES AT A GLANCE**

- **TELECONFERENCES**: 21
- **WORKSHOPS**: 1

**PROJECT TIMELINE**

1 – Project plan development
2 – Guideline draft development
3 – Review and approval
4 – Publication

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**GROUP LEADER**

Craig Harris, Glencore

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**87 PARTICIPATING COMPANIES**

ABB, ACCENTURE, ADRIA, AGNICO EAGLE, ALEX ATKINS & ASSOCIATES, AMEC FOSTER WHEELER, AMQ, ANGLOGOLD ASHANTI, ARAMINE, ARTISAN VEHICLE SYSTEMS, AUTOLINE, BARMINGO, BARRICK, BATTERY SOLUTIONS, BESTECH, BHP, BOLIDEN, CAMECO, CATERPILLAR, CMI, CORFO, CSA GROUP, DELOTTE, EDVIRT, EFACEC, ELECTROVAYA, ENERGETIQUE, ENERGO, EPIROC, FD 4X4 CENTRE, FLOW PARTNERS, FOSTERG, FRANKLIN EMPIRE, FVT RESEARCH, GE MINING, GLENCORE, GOLDCORP, HATCH, HELIX AUTOMOTIVE, HERMANN PAUS MASCHINENFABRIK, IREQ – HYDRO QUÉBEC, IVOLVE, JVA, KOMATSU, LAURENTIAN UNIVERSITY, MACLEAN ENGINEERING, MARCOTTE, MCEWEN MINING, MEDIATECH, MICROMINE, MICROVAST, MILLER TECHNOLOGY, MINECAT, NATURAL RESOURCES CANADA / GOVERNMENT OF CANADA, NEWCASTLE, NORMET, NORONT RESOURCES, NORTH AMERICAN PALLADIUM [NAPI], ONTARIO MINISTRY OF NORTHERN DEVELOPMENT AND MINES, OSISOF, PARKER, PRAIRIE MACHINE & PARTS MFG, RAIL-VEYER, RDH MINING EQUIPMENT, RIO TINTO, ROCK BREAKERS IRBI, ROCKWELL AUTOMATION, SANDVIK, OSCANIA, SCHUNK, SDMT, SIEMENS, SSR MINING, STABILI, STRATEGY FOCUSED INNOVATION, SYMBIOTIC INNOVATIONS, SYMBOLICWARE, TECK, TM4, TOROMONT, TRANSPOWER USA, UMICORE, VALE, WAINBEE, YAMANA GOLD
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