COLLABORATION WITH TANGIBLE RESULTS

Throughout my first few months as GMG chair I have been impressed with our organization’s output and growth, and our members’ continual level of engagement. During the “slow” summer months we’ve still managed to hold two successful forums – in Sudbury and Brisbane – and several exceptionally well-attended and productive workshops.

It has been wonderful to witness the amount of progress our workshop participants have made on guidelines and to experience their enthusiasm. You can feel that a real change is underway with GMG playing a leadership role in bringing the industry together to identify common pain points and work together on solutions.

A hot topic at both our Sudbury and Brisbane forums was interoperability. Which is such an important topic because we not only need to have a platform that is equipment agnostic, but we also need to agree the protocols that govern the safety and productivity of autonomous systems, because as we have seen from Google when one of us have an issue the industry has an issue. Both forums featured engaging presenters – experts from within the industry as well as outside of it – whose talks fostered fruitful and at times heated discussions during the breakout sessions. I look forward to seeing what the next forums will bring.

The high level of interest in the topics we are covering is a testament to the member companies’ openness and successful collaborative efforts and the GMG management team’s wonderful ability to harness and organize those efforts. To this point, we are on track to publish seven guidelines by year’s end. This will be an important milestone for the industry to then start implementing and allow for the acceleration of change. I eagerly anticipate hearing further case studies as companies implement these guidelines into their operations.

We are continuing to work on expanding our organization’s global reach and growing our membership steadily. To this end, I would like to welcome ABB, Combitech Finland, CSIRO and Thiess to the GMG community – I look forward to collaborating with you.

And finally, welcome Andrea Nichiporuk, Blaine Sullivan and David Sanguinetti to the GMG staff team – I am sure you are already adding to GMG’s capability and professionalism.

We have a bright future ahead.

Michelle Ash
Chair, GMG
DON'T TAKE OUR WORD FOR IT

Cailli Knievel
Newmont Mining Corporation—Director of Underground Mine Engineering

Why is GMG an important part of today’s mining landscape?
Newmont’s approach to assessing and integrating new technologies is focused on improving safety, profitability and responsibility to create long-term value for all of our stakeholders. We also work collaboratively with our peers in the industry to share lessons that advance sustainable mining practices across the globe. Mining companies, along with our suppliers, can accelerate step changes in software and hardware by identifying common needs and requirements across a variety of operation types. The collaboration that the GMG group has fostered is fundamental to helping us arrive at this consensus sooner, and is driving our industry further along the technology curve than we could have otherwise hoped for as individual companies.

Owain Morton
Glencore’s Global Mining Lead – Business Transformation

How do the GMG Forums provide value?
The forums bring some of us who get stuck in the weeds of projects and site-based tunnel vision up to a wider perspective and help provide a more open viewpoint of the services and technologies being utilised and tested in some of the more pioneering elements of the mining fraternity. An example would be LTE, a tech not widely considered within the Glencore circles except at its Raglan mine. The Sudbury forum opened up the eyes of the Sudbury-based colleagues of our Raglan Nickel pioneers; this message has now spread further inside Glencore where other elements in some of the other commodity departments with underground operations are now actively researching its applicability.

Gertjan Bekkers
Goldcorp’s Mining & Operations Readiness Manager – Project Century

Why are the GMG Future Mining Forums important?
With the decline in reserve grades and increasingly remote locations of mineral deposits, technology is the key enabler for continued sustainable operations. But the mining industry has traditionally been slow to implement new technology, unless it has been proven before at another operation. The Future Mining Forums allow professionals in the mining industry to collaborate by sharing their considerations, concerns and more importantly their successes on the topic of mine modernization. At the same time, it allows equipment and service providers to listen to the needs of the industry and develop accordingly.
**UPCOMING EVENTS**

**MARK YOUR CALENDARS**

**September 2018**

18

**Workshop: Autonomous Systems**
Sudbury, Ontario, Canada

**November 2018**

5-6

**GMG Future Mining Summit**
Perth, Australia

7

**Workshop: Battery Electric Vehicles in the Underground**
Perth, Australia

13-14

**Future Mining Forum Series: Santiago**
Santiago, Chile

**October 2018**

1

**Workshop: Interoperability Definitions and Roadmap**
Edmonton, Alberta, Canada

2-3

**Future Mining Forum Series: Edmonton**
Edmonton, Alberta, Canada

8-10

**Workshop: Autonomous Mining**
Perth, Australia

17-18

**Future Mining Forum Series: Tucson**
Tucson, Arizona, USA
LEADERSHIP TIER

Accenture
AngloGold Ashanti
Antofagasta Minerals
Barrick Gold
BHP

Caterpillar
Epiroc
Freeport-McMoRan
Glencore
Hatch

METS Ignited
Motorola
Rio Tinto
Vale

COLLABORATOR TIER

Amazon
Anglo American
Boliden
Dassault Systèmes

Hitachi
IBM
Maclean Engineering
Newtrax

Orica
Seequent
Teck
WENCO

New this period
CSIRO

GENERAL TIER

3D-P
Agnico Eagle
ASI
Aveva
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
Komatsu
Leica Geosystems
Liebherr
Lockheed Martin
Maptek
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
Riivos
Rockwell Automation
RPMGlobal
Sandvik
Shell
Siemens
SMART Systems Group
SMS Equipment
SSR Mining
Suncor
Syncrude

New this period
ABB Mining
Combitech
Thiess Mining

Total
Trimble
Vandrico
Yamana Gold
### Governing Council

**Chair**
Michelle Ash, Barrick Gold

**Outgoing Chair**
Helius Guimaraes, Rio Tinto

**Vice Chair International Standards**
Tim Skinner, SMART Systems Group

**Vice Chair Working Groups**
Andrew Scott, Symbiotic Innovations

**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 Communion 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

**Juan Quispe Arancibia**
Vice-President, Operations & Maintenance, Antofagasta Minerals

**Michelle Ash**
Chief Innovation Officer, Barrick Gold

**Lisa Boutilier**
Corporate Account Manager, N.A. Mining, Motorola Solutions

**Liv Carroll**
Senior Principal, Analytics, Digital Mining, Accenture

**Jeanne ELS**
Regional Director, Hatch Digital, Hatch

**Samantha Espley**
Director, Technical Excellence, Vale

**Erika Fretheim**
Manager, Mine Technology, Freeport-McMoRan

**Rick Gilbert**
Vice-President, Technology, Freeport-McMoRan

**Sharna Glover**
Program Director, Autonomous Operations, BHP

**RIC Gros**
CEO, METS Ignited

**Helius Guimaraes**
General Manager, Data Strategy, Rio Tinto

**Karin Jirstrand**
Product Manager Interoperability, Epiroc

**Alex Kent**
Vice-President, Engineering And Projects, AngloGold Ashanti

**Don King**
Vice-President, Global Strategic Customers, Epiroc

**George Long**
Senior Manager, Resources, Digital Transformation, Accenture

**Vitesh Maharaj**
Senior Vice-President Engineering, AngloGold Ashanti

**Alastair Mathias**
General Manager, Automation & Analytics, Productivity & Technical Support, Rio Tinto

**Michael Murphy**
Chief Engineer, Mining Technology Enabled Solutions, Caterpillar

**Owain Morton**
Global Mining Lead – Business Transformation, Glencore

**Simon Nickson**
Principal, Underground Mining Engineer, Vale

**Alvaro Rozo**
Global Director, Smart Industries, Hatch

**Chirag Sathe**
Principal Risk & Business Analysis Technology, BHP

**Scott Schoepel**
Vice-President, Commercial Markets, Motorola Solutions

**Andrew Scott**
Principal Innovator, Symbiotic Innovations

**Tim Skinner**
President, SMART Systems Group
WORKING GROUP PROJECTS
ARE YOU INTERESTED IN ARTIFICIAL INTELLIGENCE AND CYBER SECURITY?

We are launching Working Groups in Q4 2018. Contact us to get involved.

Reliability Best Practices

This group is creating guidelines and tools to enable operators to adopt leading practices in asset management, increasing equipment productivity, reliability and lowering operating costs. Mining industry leaders and outside organizations can leverage their collective knowledge in developing and applying global asset management practices to improve asset performance, reliability, safety and lower operating cost. The name change from Reliability Working Group to Asset Management is intended to reduce the confusion among potential participants relating to the scope of the working group. The term “Asset Management” incorporates the entire scope of the asset lifecycle, which may be addressed by various sub-groups.

The immediate focus of the group is to develop a common taxonomy and KPIs for asset management.

2018 PROGRESS

» Created a generic best practice reliability model that incorporates key elements of success in developing a reliability strategy.

MEETING ACTIVITIES AT A GLANCE

3 TELECONFERENCES
1 MEMBER SURVEY
This guideline offers tools for mining companies to implement autonomous mining from planning to final stages. Key focus areas include functional capability, functional safety, change management, interactions with regulators, and communications with the workforce and the local community. To the industry’s benefit, this guideline will increase collaboration and communication with regulators, provide input into innovation and development strategies, and serve as a framework to assist with the integration of new suppliers from parallel industries.

**2018 PROGRESS**
- Multiple workshops held in Australia, North and South America, Africa
- Guideline structure is in place and most of the content has now been written
- Task groups getting together via conference call to complete the final material
- Final workshops are planned for Sudbury (September 18) and Perth (October)

**PROJECT DASHBOARD**

**PROJECT TIMELINE**

1. Project plan development
2. Completion of a first draft
3. Working Group review and approval
4. Guideline publication

**GROUP LEADERS**
Glenn Johnson, Teck and Chirag Sathe, BHP

**93 PARTICIPATING COMPANIES**
This project seeks to resolve the existing pain points in interoperability with solutions that enable major efficiency gains by eliminating the time currently required for manual and convoluted data transfer across the mine site. It aims to enable different information technology systems and software applications to connect, communicate, exchange and apply data across the mine. Work on developing version 2.0 of the Open Mining Format (OMF) file specification is currently underway.

2018 PROGRESS
- Presentations were given at four separate conferences to raise awareness of the project
- Survey of users completed by more than 250 people, 70+% mine operators

57 PARTICIPATING COMPANIES
ACQUIRE TECHNOLOGY SOLUTIONS, ALFORD MINING SYSTEMS, ANGLO AMERICAN, ANGLOGOLD ASHANTI, ARCELORMITTAL, AUSTMINE, AVEVA, BARRICK GOLD, BHP, CANADIAN NATURAL RESOURCES, CHECKMARK CONSULTING, DASSAULT SYSTÈMES, DATA MINE SOFTWARE, DESWIK, EPIROC, FLANDERS ELECTRIC, FLOW PARTNERS, FREEPORT-MCMORAN, GEOMODEL, GEOSOFT, GLOBAL IO, GLOBAL MINING DESIGN, GOLDCORP, HEXAGON MINING, IBM, IGS (INTERNATIONAL GEOSCIENCE SERVICES), IMAGO, JVA, KINROSS GOLD, LOCKHEED MARTIN, MAPTEK, MASTERCONTROL, MINE VISION SYSTEMS, MINERA YANACOCHA, MINERP, MINING INFORMATION SYSTEMS, NEWMONT, OBJECTIVITY, ORICA, OSISOFT, PBE GROUP, PEABODY ENERGY, PRAIRIE MACHINE & PARTS, RIO TINTO, RPM GLOBAL, SEEQUENT, SIBANYE-STILLWATER, SIEMENS, SSR MINING, SYMBIOTIC INNOVATIONS, TECK, TRACKVIA, TRIMBLE, UNIVERSITY OF QUEENSLAND, VALE, VERTEX BLAST, VUMA 3D, WIPRO

GROUP LEADER
Rob Ferguson and Samuel Baine, Seequent
This guideline aims to establish consensus between owner/operators and OEMs for open access to onboard data for open pit and underground mobile equipment. Version 2.0 will replace the multiple datasets referring to particular pieces of equipment with a set of principals that are applicable to all mobile equipment, ensuring that the Consensus is valid for new types of equipment (e.g., battery electric).

2018 PROGRESS
Draft has been developed and is ready for stakeholder review

PROJECT DASHBOARD

PROJECT COMPLETION

MEETING ACTIVITIES

TELECONFERENCES

3

WORKSHOPS

1

AT A GLANCE

PROJECT PERFORMANCE

70%

STAKEHOLDER ENGAGEMENT

60%

PROJECT TIMELINE

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

DATA ACCESS AND USAGE

Mobile Equipment Open Data Consensus Version 2.0

PROJECT

PERFORMANCE

STAKEHOLDER

ENGAGEMENT

START

END

65%

66 PARTICIPATING COMPANIES

ABB, AGNICO EAGLE, AMAZON, AMTC, ANGLO AMERICAN, ANGLOGOLD ASHANTI, ARCELORMITTAL, AUTOMATED SYSTEMS ALLIANCE, BARRICK GOLD, BHP CANADIAN NATURAL RESOURCES, CATERPILLAR, CHECKMARK CONSULTING, CMAC-THYSSEN MINING, DATAMINE SOFTWARE, DEPARTMENT OF MINES AND PETROLEUM (DMP), DESWIK, EARTHSOFT, ENDEVRA, EPIROC, FLOW PARTNERS, FORTESCUE METALS GROUP (FMG), FOUNTAIN TIRE, FREEPORT-MCMORAN, GE MINING, GIBRALTAR MINE, GLENCORE, GLOBAL IO, GOLDCORP, HASTINGS DEERING, HAULTRAX, HITACHI, IBM, INDIGO, INNOVATIVE WIRELESS TECHNOLOGIES, JVA, KGHM INTERNATIONAL, KOMATSU, LIEBHERR, METS IGNITED, MICROMINE, MINERA YANACOCHA, NEWMONT, NEWTRAX, ORICA, OSISOFT, PBE GROUP, PEABODY ENERGY, PRAIRIE MACHINE & PARTS, RCT, RIO TINTO, ROY HILL., SANDVIK, SHELL CANADA, SIBANYE-STILLWATER, SMART SYSTEMS GROUP, SYMBIOTIC INNOVATIONS, SYMBOTICWARE, TECK, THE CYEST, THE ELECTRUM GROUP, UNIVERSIDAD DEL DESARROLLO, VALE, WENCOR, WESTMORELAND COAL COMPANY
Operational KPIs and Definitions

2018 PROGRESS
» Model and definitions are complete and feedback from participating operators is incorporated.

WHAT’S NEXT
» The next phase is to identify and validate event triggers with dispatch system providers and identify participating mines willing to test the model under operating conditions.

PROJECT DASHBOARD

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, Asset Optimization

35 PARTICIPATING COMPANIES
3D-P, ACCENTURE, ANGLO AMERICAN, ANGLOGOLD ASHANTI, AVEVA, BARRICK GOLD, BHP, CANADIAN NATURAL RESOURCES, CENTRIC MINING SYSTEMS, CHECKMARK CONSULTING, DASSAULT SYSTÈMES, DATA MINE SOFTWARE, DESWK, FLOW PARTNERS, FREEPORT-MCMORAN, GIBRALTAR MINE, GLOBAL IO, HEXAGON MINING, IBM, JVA, MINERA YANACOCHA, NEWMONT, OSIsoft, PEABODY ENERGY, PT UKU TECH INDONESIA, RIO TINTO, SIBANYE-STILLWATER, SIEMENS, SMART SYSTEMS GROUP, SSR MINING, SYMBIOTIC INNOVATIONS, TECK, THE ELECTRUM GROUP, TRIMBLE, UNIVERSITY OF SAO PAULO
Earlier this year, a worldwide industry survey identified focus areas of greatest value and confirmed priorities for the working group in creating a roadmap for collaboration in the development of guidelines and tools that support Integrated Operations (IO). The working group will craft an adaptable IO business case for mining company executives to help ease the transition for companies seeking to shift their production processes. This group will also work on a joint industry and academic literature review as a basis for assessing the current operating model in the mining industry and identifying a more effective and cost-efficient model. A white paper on integrated operations was begun.

2018 PROGRESS
» First draft of the white paper was completed
» The Integrated Operations Working Group is under review for potential closure due to low stakeholder participation

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

25 PARTICIPATING COMPANIES
ABB, ACCENTURE, ANGLO AMERICAN, APEX AUTOMATION, ARCELORMITTAL, BHP, CAMBORNE SCHOOL OF MINES, CGM, DELOITTE, ERNST & YOUNG, FLOW PARTNERS, GLOBAL IO, HATCH, IBM, JVA, NEXTGENOPX, RIO TINTO, RIIVOS, SANDVIK, SCHNEIDER ELECTRIC, SIBANYE-STILLWATER, SYMBIOTIC INNOVATIONS, TECK, UNIVERSITY OF TORONTO, VISAGIO
Interoperability Definitions and Roadmap

This guideline is a universal roadmap for mining automation and integration that prepares companies to readily and effectively adopt and integrate systems and new technologies. It aims to prevent patchwork implementation processes that cause misaligned systems to hamper effective communication. Global discussions are fostering collaboration on a shared end-state and on common definitions supported by experiences of organizations that are currently leading in interoperability solutions development.

2018 PROGRESS
» Held workshops on four continents
» A definition was drafted, principles are being finalised, a landscape and roadmap are in progress
» A GMG Interoperability Current Landscape Survey is currently underway

PROJECT DASHBOARD

PROJECT COMPLETION

MEETING ACTIVITIES AT A GLANCE

PROJECT PERFORMANCE

STAKEHOLDER ENGAGEMENT

PROJECT TIMELINE

166 PARTICIPATING COMPANIES
3D-P, ACQUIRE TECHNOLOGY SOLUTIONS, AIKLOGIC, AKROM, AMAZON, AMIRA, AMTC, ANGLO AMERICAN, ANTOFAGASTA MINERALS, AUSTMINE, AUTOMATED SYSTEMS ALLIANCE, AUTONOMOUS SOLUTIONS, AVEVA, BARRICK GOLD, BBE, BESTECH, BHP, BOLIDEN, CAMBRIAN COLLEGE, CANADIAN NATURAL RESOURCES, CATERPILLAR, CEMI, CHECKMARK CONSULTING, CIA MINERA QUECHUA S.A., CIA MINERA PODEROSA S.A., CISCO, COMPANIA MINERA DOÑA INÉS DE COLLAHUASI, CODELCO, CORFO, COSMOS TECHNOLOGIES, CS yogroup, CSIRO, D & D ELECTRONICS, DASSAULT SYSTÈMES, DEXCIENT, DHEMAX SPA, DRAEGER, EATON, EMERSON ELECTRIC, ENDEVEA, ENERGETICS, ENVIRO INTEGRATION STRATEGIES, EPIROC, ESCO, ETP, FARELLOINES INGENIERIA, FIE / MINISTRY OF ECONOMY OF CHILE, FLANDERS ELECTRIC, FLOW PARTNERS, FMP GROUP, FOSTERGY, FREEPORT-MCMORAN, FREESWAVE TECHNOLOGIES, FUNDACIÓN CHILE, GE MINING, GENERAL DYNAMICS, GEOSYSTEMS ANALYSIS, GLENCORE, GLOBAL IO, GODELIUS, GOLDCORP, GS1, GUARDVANT, HATCH, H-C GROUP, HEXAGON MINING, HONEYWELL, IBM, ICONO ADVISORY, IDS GEORADAR, IMPERIAL OIL, INDUSTRIAS INTELIGENTES, INNOVATIVE WIRELESS TECHNOLOGIES, INSTITUTO NACIONAL DE NORMALIZACIÓN, IREDES, ITI, JANICE FINGLER & ASSOCIATES, JONES DAY , JVA, KOMATSU, LESS INDUSTRIES, LIEBHERR, LOCKHEED MARTIN, MACLEAN ENGINEERING, MAPIKONOPC, MCKINSEY, MINE VISION SYSTEMS, MINEWARE, MINING3, MINNOVEX A.G., MODULAR MINING SYSTEMS, MOTION METRICS, MOTOROLA, MST GLOBAL, NATURE UNLIMITED C.I.C., NEWMONT, NEWTRAX, NHP ELECTRICAL ENGINEERING, NIOSH, NOTIFORM, NRC-IRAP, OBJECT MANAGEMENT GROUP, OCTAGON SYSTEMS, OLIO TECHNOLOGY SOLUTIONS, OPC FOUNDATION, OPTALERT, OPTIMISA S.A., ORBCOMM INC., OSISOFT, PECK TECH, PIVOT INDUSTRIES LIMITED, PRAIRIE MACHINE & PARTS, PROGRAMA ESTRATEGICO DE INDUSTRIAS INTELIGENTES, PSA INTEGRATION, RAJANT CORPORATION, REAL IRM, RIGID ROBOTICS, RIIVOS, RIO TINTO, ROCKWELL AUTOMATION, RPM GLOBAL, SEEQUENT, SHYFT, SIBANYE-STILLWATER, SIEMENS, SILVER SOFTWARE, SKYMINEAVU, SMART SYSTEMS GROUP, SPARHAWK SOFTWARE, SPLIT ENGINEERING, SPOKANE MINING RESEARCH DIVISION, STRATA WORLDWIDE, SUNCOR ENERGY, SYMBIOTIC INNOVATIONS, SYNERGISTICS, SYSENE CONSULTING, TEC, TECNOEXPLORA, THE CYEST , THE OPEN GROUP, THIESS, TRIMBLE, TYCO SIMPLEXGRINNELL, UNEARTHED SOLUTIONS, UNIVERSIDAD CHILE, UNIVERSIDAD DEL DESARROLLO, UNIVERSITY OF ADELAIDE, VALE, VANDRICO, VISAGIO, VISUAL INTELLECT, WENCO, WIPRO CONSULTING, WIRELESS SENSOR NETWORKS
This five-part guideline suite will support underground operations in planning and designing their underground communications infrastructure into robust, cost-effective and user-friendly installations. It aims to provide an overview of current best practices for electronic communications across a mine’s lifespan. The five sections are: positioning and needs analysis; scenarios and applications; general guidelines; business case development; planning, deploying and support considerations. Work on the third section is currently underway.

2018 PROGRESS

» Held workshops in Toronto, Johannesburg and Brisbane
» Draft sent to technical editor for layout and preparation for final review

PROJECT DASHBOARD

MEETING ACTIVITIES AT A GLANCE

TELECONFERENCES 63
WORKSHOPS 3

PROJECT TIMELINE

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

GROUP LEADERS
Dave Fry, Granite Technology Group

84 PARTICIPATING COMPANIES

ABB, AGNICO EAGLE, AKROM, ALPHA TECHNOLOGIES, AMBRA SOLUTIONS, ANIXTER, AUSTROBOTS, AVEVA, BARRICK GOLD, BBA, BESTECH, BHP, BOGE BOGE, CHECKMARK CONSULTING, CISCO, DELOITTE, DETNET SOUTH AFRICA, DEXCENT, DRAEGER, ECM NETWORKS, EPIROC, FLOW PARTNERS, GLENCORE, GLOBAL IO, GRANITE TECHNOLOGY GROUP, GROUNDPROBE, HATCH, HEXAGON MINING, HINTEC, INNOVATIVE WIRELESS TECHNOLOGIES, IREDES, ITOVLE, JVA, KOMATSU, LAC DES ILES MINE LTD, LAIRD, LUNDIN MINING, MAESTRO DIGITAL MINE, METSTECH, MICROMINE, MINE VISION SYSTEMS, MINERA YANACOCHA, MINERP, MINETEC, MOBILARIS, MOTOROLA, MST GLOBAL, NEWMONT, NEWTRAX, NHP ELECTRICAL ENGINEERING, NORTHERN LIGHT TECHNOLOGIES, NORTHERN STAR RESOURCES, ORBCOMM, PA SPATIAL, PBE GROUP, PRAIRIE MACHINE & PARTS, PSA INTEGRATION, RAMJACK, RAPIDBIZAPPS, RCT, RIO TINTO, ROCKWELL AUTOMATION, RPM GLOBAL, SANTA, SIBANYE-STILLWATER, SIEMENS, STANTEC, StockdaleS ELECTRIC MOTOR, STRATEGY FOCUSED INNOVATION, SYMBIOTIC INNOVATIONS, TECHNICAL UNIVERSITY OF MADRID, TELSTRA, TERRATIVE DIGITAL SOLUTIONS, TETHERCO, THYSSEN KRUPP, TOREX, TUNNEL RADIO, UNIVERSITY OF THE WITWATERSRAND, UNSW, VALE, WEST ARM CONSULTING GROUP, YAMANA GOLD, YOURPACE
This guideline will be a roadmap outlining possible paths from an “analog” mine to short interval control, a development necessary for creating best practices in shift time and use of assets in underground mines. Implementing this guideline will allow for better planning, quicker decisions, increased production and lower costs.

**2018 PROGRESS**
- Content divided into: Value Proposition; Conceptual Operations; People and Process; Data Enablement; Implementation
- Multiple groups are working virtually to write and refine the content
- Held workshops in Toronto and Brisbane
- Draft content of most sections nearing completion

**PROJECT DASHBOARD**

**PROJECT TIMELINE**

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

**77 PARTICIPATING COMPANIES**
ABB, ACCENTURE, ACORN, ALEX ATKINS & ASSOCIATES, ALPHA TECHNOLOGIES, APEX AUTOMATION, AVEVA, BARRICK GOLD, BHP, BOLIDEN, BUSINESS SWEDEN, CAMBORNE SCHOOL OF MINES, CAMIRO, CENTRIC MINING SYSTEMS, COMMIT WORKS, CORFO, DASSAULT SYSTÈMES, DATAMINE, DELLOITTE, DESWIK, ECM NETWORKS, EPIROC, ERICSSON, FLOW PARTNERS, FLUIDMESH NETWORKS, FREEPORT-MCMORAN, GLENCORE, GLOBAL IO, GOLD FIELDS, GRIPTION, HATCH, HEXAGON MINING, HINDALCO, IBM, JVA, KOMATSU, KPMG, LAC DES ILES MINE, LUNDIN MINING, MACLEAN ENGINEERING, MAESTRO DIGITAL MINE, MICROMINE, MINERP, MINETEC, MOBILARIS, MST GLOBAL, NEWMONT, NEWTRAX, NORTH AMERICAN PALLADIUM (NAP), NORTHERN LIGHT TECHNOLOGIES, NORTHERN STAR RESOURCES, ORBCOMM, PA SPATIAL, PRONTOFORMS, PROUDFOOT CONSULTING, PT UKU TECH INDONESIA, QUARTZ, ROCKWELL AUTOMATION, RPM GLOBAL, SANDVIK, SCANIA, SDMT, SIEMENS, SITECH, SKF, SYMBIOTIC INNOVATIONS, TECHNICAL UNIVERSITY OF MADRID, TECK, TERRATIVE DIGITAL SOLUTIONS, THIESS, TITAN MINING CORP, UNIVERSITY OF QUEENSLAND, 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), the second edition of this guideline offers updated commentary on several issues. These issues include emergency response requirements, required skill sets and training for maintenance technicians, and charger standardization recommendations. It also presents new material on different battery chemistries and alternate charging methods.

2018 PROGRESS
» Held final workshop on June 27 in Montreal
» Draft guideline prepared for final review and approval

PROJECT DASHBOARD

MEETING ACTIVITIES AT A GLANCE

PROJECT TIMELINE

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

GROUP LEADER
Craig Harris, Glencore

91 PARTICIPATING COMPANIES
ABB, ACCENTURE, ADRIA MANUFACTURING, AGNICO EAGLE, AKATA GROUP, ALEX ATKINS & ASSOCIATES, AMEC FOSTER WHEELER, AMQ, ANGLOGOLD ASHANTI, ARAMINE, ARTISAN VEHICLE SYSTEMS, AUTOLINE, BARMINCO, BARRICK GOLD, BATTERY SOLUTIONS, BESTECH, BHP, BOLIDEN, CAMECO, CATERPILLAR, CMI, CORFO, CUMMINS, DELIOTTE, EBF, EFACCE, ENERGETIQUE, ENERGIGO, EPIROC, FLOX PARTNERS, FOSTERY, FRANKLIN EMPIRE, FVT RESEARCH, GE MINING, GLENCORE, GLOBAL IO, GOLDCORP, HATCH, HELIOX AUTOMOTIVE, HERMANN PAUS MASCHINENFABRIK, IDTECHEX, IREQ - HYDRO QUEBEC, IVOLVE, JVA, KIRKLAND LAKE GOLD, KOMATSU, LAURENTIAN UNIVERSITY, MACLEAN ENGINEERING, MARCOTTE MINING, MCEWEN MINING, MEDATECH, MICROMINE, MICROVAST, MILLER TECHNOLOGY, MINECAT, NATURAL RESOURCES CANADA / GOVERNMENT OF CANADA, NEWCASTLE, NEWMONT, NIOSH, NORMET, NORONT RESOURCES, NORTH AMERICAN PALLADIUM (NAP), ONTARIO MINISTRY OF NORTHERN DEVELOPMENT AND MINES, OSISOF, PARKER, PRAIRIE MACHINE & PARTS, PREIS & STEYN, RAIL-VEYOR, RDS MINING EQUIPMENT, RIO TINTO, ROCK BREAKERS (RBI), ROCKWELL AUTOMATION, SCANIA, SCHUNK, SDMT, SIEMENS, SSR MINING, STAUBLI, STRATEGY FOCUSED INNOVATION, SYMBIOTIC INNOVATIONS, SYMBOTICWARE, TECK, TM4, TOROMONT, TRANSPOWER USA, UMICORE, VALE, WAINBEE, YAMANA GOLD
ISO TC 251 Asset Management

Two ISO TC 251 Asset Management committee drafts have been out for review since July. One that is available is Committee Draft 55011 Guidance for developing and adopting public policy for asset management, an informative document that applies to national, provincial, or local governments and their agencies. The other, Committee Draft 55010.2 Guidance on the alignment of financial and non-financial functions in asset management, aims to improve internal control as part of the organization’s management system and enhance the value derived from the assets for both the organization and its stakeholders. This document can influence the relationship between finance and asset management within an organization. Though commenting closes shortly, the next draft versions will circulate later this year.

The Final Draft International Standard (FDIS) was issued for review on August 20, and ballots close on September 18. At this stage, it cannot be circulated freely. Members may purchase it, though changes made at this stage will be insignificant.

The next ISO TC 251 meeting will be in Amersfoort, the Netherlands, from October 15 to 18. Subsequent meetings are planned for China in May 2019 and Ecuador later in the year. Specific dates and locations are to be determined.

ISO TC82/SC8 Advanced Automated Mining Systems

Since May, the new ISO committee established for Advanced Automated Mining Systems (ISO TC 82/SC8) has been taking shape. This subcommittee’s scope is to standardize “advanced automated and autonomous processes, technologies, equipment, and systems in the mining sector, including both surface and underground mining.” They are aiming for strong mine operator participation to ensure the standards plan supports operators’ needs as well as those of the mining industry as a whole.

The subcommittee will hold its first plenary meeting on September 13 in Vancouver, Canada, to review and discuss a possible work program and identify priorities. It also plans to initiate a process to help develop their strategic business plan. A draft of the possible work program and the original proposal for the standards program are available.

Three projects are underway:
- Two standards development projects under a joint working group of ISO TC82 (Mining) and ISO T127 (Earth Moving Machinery): Collision Avoidance and Autonomous Machine System Safety. Shortly, these will be moved from TC82 to SC8 and SC8 will then represent TC82 for both. Project meetings were held in Calgary, Canada in July to continue standards development for Collision Avoidance.
- The short-term revision of the standard for Autonomous Machine System has completed its committee stage and will go to committee member vote in 2019. Additionally, the subcommittee has also agreed to initiate a joint TC127 and SC8 standards development project for an Operational Remote Equipment Stop. The subcommittee is actively recruiting national experts for all three of these projects.

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