Remote mining assistance

Practical off-site support

Jurgen Fuykschot – SRK UK

17 September 2020

srk consulting

To bring solutions for problems encountered on remote sites

- Difficulty in recruiting professional personnel, and the services of highly experienced personnel in specific disciplines are not always required full-time
- Travel restrictions such as recently have been experienced increase the requirements for remote co-operation with Cloud based data
- Not just meant as an ad-hoc solution for Covid-19 times, but to change the way mining professionals work in a sustainable manner

Definition of RMA

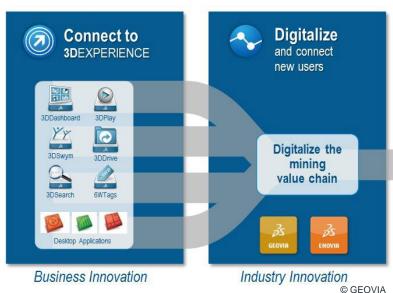**The use of off-site personnel to assist the on-site personnel with:**

- Co-operation, review and advice
- Training
- Data gathering / Inspections

Options

- Internally – within a company
- Externally – using external consultants & contractors

Main requirement

- Transition from local/server to Cloud based data
- "Digital transformation" strategy and implementation plan

Connect to 3DEXPERIENCE

3DDashboard 3DPlay
3DSwym 3DDrive
3DSearch 6WTags
Desktop Applications

GEOVIA ENOVIA

Digitalize and connect new users

Digitalize the mining value chain

Business Innovation *Industry Innovation*

© GEOVIA

Digital transformation

Keep the long term aspiration/goal/direction in mind, but implement a staged approach. People tend to polarise and either collect data (because they can) OR have a high-level strategy

Start with the green boxes

Sustainability/Security/Safety
- Less air and road travel required
- Fewer personnel on remote sites in possibly less secure locations

More efficient and effective use of personnel
- Only use specialists when required
- Less time required as site visits eliminated/reduced, with reduced costs
- Cross fertilisation between mines, as off-site assisting personnel has more exposure to different techniques (such as mining methods/blasting/backfill)
- Share data/ resources within a company when running multiple mines – less required overall, less overhead on site
- More flexibility in fly-in/fly-out rosters for professionals, avoiding traffic jams when working, be available for family commitments, etc

Productivity
- Continuous processes: design/schedule/operations – reduction of interruptions
- Possible usage of time zones – get results overnight from non-site based teams
- Software sharing (pending software supplier)
- Different levels of control/modification for different people when using specific platforms

© GEOVIA

First part of digital transformation

- **Get all data required for decision taking in digital form (in stages) and into a platform**
  - **Managing a mine / exploration programme is about managing data**
  - This will assist/improve any operation and increase safety (e.g. mines' rescue)
  - Changing from a paper/Excel based system to a mining software solution will allow far greater flexibility and shorter response time to changing economic circumstances (commodity prices), options and sensitivity analysis and reconciliation

- **"Mind-mining"**
  - Get the information from the minds of the on-site personnel into the system
  - Develop a corporate memory ("Why was this decision taken")
  - Reduces loss of knowledge with personnel turnover

- "End to end digital connectivity" (GEOVIA) – holistic view of a company and the data and material flows in three areas (capital, resources, day-to-day operations)
- Data verification – Prevent "Garbage in – Garbage out"

Second - Develop a staged digital transformation programme

- What is the aim?
- How much interaction is required? How many and which communication channels do you intend to use?
- What proprietary formats is your mine site using and what can be accepted off-site?
- What platform will you use?

Get the right data into the right form

- **(Mobile) Computer power**
  - Processor speeds, graphics power (from simple wireframes to live ray-tracing), on-board sensors in mobile devices (GPS, compass, accelerometers)
- **Internet connection speed**

© NASA

  - From 3G to 5G and open pit/underground implementation
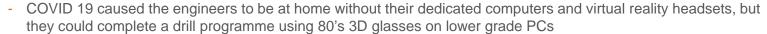- **Cloud data storage**
  - Cloud drives(ad hoc) – Google Drive/Dropbox/MS OneDrive/etc
  - General platform - Teams
  - Dedicated platforms – GEOVIA 3DEXPERIENCE /Deswik.MDM/Seequent/ArcGIS
- **Eyes on the ground**
  - Drones / Lidar / Action cameras / Webcams
- **Back-up**
  - Have a fall-back option available like NASA: Curiosity on Mars
    - One remote controlled machine - 2.5 Billion USD project
    - COVID 19 caused the engineers to be at home without their dedicated computers and virtual reality headsets, but they could complete a drill programme using 80's 3D glasses on lower grade PCs
- The system chosen will depend on the size of the company and mines managed, personnel, on- and off-site level of technology available and the data sharing platform chosen: continuous, no-lag processes require higher connection and processing speeds

"What has enabled this revolution?"

Possible issues with RMA

- **Fragmentation and duplication of data**
  - Lack of direction, unclear decisions caused by split in communication methods
  - **Use centralized platforms** such as offered by GEOVIA, ArcGIS, Deswik, etc. with incorporated workflows
- **Geographical constraints**
  - Legal limits / requirements – firewalls e.g. video calling software
  - Data boundaries – view only within country
  - Software use – sharing licenses versus limited off-site use
  - Cultural differences e.g. mindset – "Out of sight, out of mind"
- **Data Security**
  - **Keep mining data separate** in the Cloud from company data, separate logins, zero trust security
- **Proprietary formats**
  - Due to site specific software
  - Time loss/inaccuracies/costs for conversion, possibly use Open Mining Format (being developed)
- **Too much data**
  - What to use/keep/discard? How to retrieve?
  - **Keep the data that decisions are based on as a minimum**
- **Work/life boundary dissolving**
  - (Too) many ways of being contacted
  - Different levels for different people

Less than 5% of data generated by the mining industry is actually used for prediction and optimisation.

Jeanne Els, Regional Director for Australasia Hatch (Mining Magazine July 2017)

Tailings Storage Facility (TSF) surveillance involves the collection and analysis of data from field inspections and instrumentation.
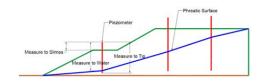
A monitoring system should be:
- Consistent
- Centralised / Organised
- Easily Accessible
- Intelligent
- Practical

Using ESRI's ArcMap, a map is created, shared and then downloaded onto a smart device where it can be edited using ESRI's freely downloadable Collector for ArcGIS application.

Benefits
- Ease of Collection
- Time saving
- Validation / Verification
- Location tracking
- Access to Historical Database
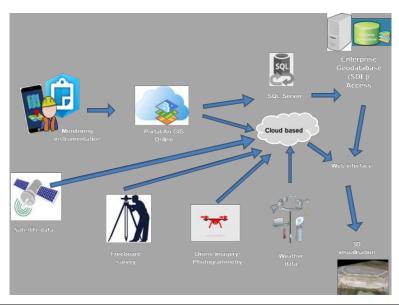- Works on any smart device
- Real-Time
- Fewer Errors

Way Forward
- Integration with all related data collected for the mine site
- Client specific web-based dashboard
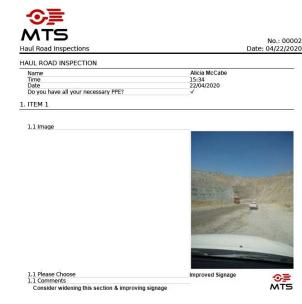- Implement for all SRK TSF monitoring sites

Haul Road Explorer (HRE) - Partnership between MTS and SRK

- Operating speed and location logged via mobile phones in trucks
- Data compared with design speed and visualized as heat maps
- No software - review in a browser on the company network/VPN
- See where things happen, not just when
- Quantify production opportunities and make an informed decision instead of just accepting poorly performing areas

Paperless Inspections (on mobile)

- Clean data capture into a digital location
- Easy retrieval of information
- Minimal physical interaction versus paper

We work on the boundary between analogue and digital

- **Apply geoscience strengths for data gathering and verification: (structural) geology, hydro(geo)logy, geotechnics, social/physical environment**
  - Determine data requirements for (future) studies
  - Data gathering and verification
  - Build a foundation for further project work

- **Apply technical disciplines for "remote site visits": mining, processing, tailings**
  - Different ways of data gathering, more photo/video focussed, in combination with digital models if available
  - Use various devices (e.g. phones/tablets, Gopro, Hololens, Sirovision, etc) but use single data agnostic platform

- **Digitisation of mines – Plenty of mines use non-digitised data, providing opportunity for the following:**
  - Education about benefits of digital models and planning
  - Digitisation of paper based resources
  - Targeted drill programmes
  - Conversion of schedules to mining software
  - Replication then optimisation
  - Reconciliation - much easier with digital data

- **Data management**
  - QCQA Procedures
  - Cloud platform – determine the right fit for the Client

"We are mining data, so if the data is not correct, the mining is not correct"

WFH

Like

OFFICE

Celebrate

MINE

Dig

ALL

Love

Which areas do you see where SRK's RMA could help you to build on existing strengths and provide additional services in data gathering and management?

>1,400 Professionals, 45 offices, 20 countries, 6 continents

srk consulting

Copyright and Disclaimer

Copyright (and any other applicable intellectual property rights) in this document and any accompanying data or models which are created by SRK Consulting (UK) Limited ("SRK") is reserved by SRK and is protected by international copyright and other laws. Copyright in any component parts of this document such as images is owned and reserved by the copyright owner so noted within this document.

The use of this document is strictly subject to terms licensed by SRK to the named recipient or recipients of this document or persons to whom SRK has agreed that it may be transferred to (the "Recipients"). Unless otherwise agreed by SRK, this does not grant rights to any third party. This document shall only be distributed to any third party in full as provided by SRK and may not be reproduced or circulated in the public domain (in whole or in part) or in any edited, abridged or otherwise amended form unless expressly agreed by SRK. Any other copyright owner's work may not be separated from this document, used or reproduced for any other purpose other than with this document in full as licensed by SRK. In the event that this document is disclosed or distributed to any third party, no such third party shall be entitled to place reliance upon any information, warranties or representations which may be contained within this document and the Recipients of this document shall indemnify SRK against all and any claims, losses and costs which may be incurred by SRK relating to such third parties.

SRK respects the general confidentiality of its potential clients' confidential information whether formally agreed with them or not and SRK therefore expects the contents of this document to be treated as confidential by the Recipients. The Recipients may not release the technical and pricing information contained in this document or any other documents submitted by SRK to the Recipients, or otherwise make it or them available to any third party without the express written consent of SRK.