

NOTICE

M-START CYCLE 7

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CHAPTER I - THE PROGRAM

Article 1 - The M-START program is an initiative of the **MINING HUB** and aims to build a direct channel between mining companies and applied innovation initiatives (startups, academic projects, and technology-based companies). The program seeks to connect these enterprises to the associated mining companies for, mainly, the development of solutions for challenges in the following themes: (1) Social Development, (2) Operational Efficiency, (3) Alternative Energy Sources, (4) Water Management, (5) Tailings and Waste Management, and (6) Safety and Occupational Health.

Sole Paragraph - The purpose of this Public Notice is to define the rules and conditions for participation in the **M-START CYCLE 7** program.

Article 2 - In order to seek innovative solutions for the mining industry, the main objective of **M-START** is to prospect and select ("STARTUPS"), as defined in Article 3 of this chapter, and support the development of Proofs of Concept ("POC") of such startups with the Mining Companies associated with the Mining Hub.

Article 3 - Participation in the M-START program is targeted at:

(i) STARTUPS and technology-based companies that fit the definition of Startup according to Complementary Law 146/2019, which in its Article 4 defines:

Startups are defined as business or corporate organizations, newly created or in recent operation, whose performance is characterized by innovation applied to the business model or the products or services offered.

§ 1st For the purposes of applying this Complementary Law, the individual entrepreneur, the individual limited liability company, the business companies, the cooperatives and the simple (civil) companies are eligible for framing in the special treatment mode intended for the promotion of startups:

I - With gross revenue of up to R\$ 16,000,000.00 (sixteen million reais)¹ in the previous calendar year or of R\$ 1,333,334.00 (one million, three hundred and thirty-three thousand, three hundred and thirty-four reais) multiplied by the

¹ For currency conversion purposes, the value of 1 USD = 5.1961 Real/BRL, as established on 12/31/2020 by the Central Bank of Brazil, shall be used as reference.

number of months of activity in the previous calendar year, when less than 12 (twelve) months, regardless of the corporate form adopted;

II - With up to 10 (ten) years of registration in the National Register of Legal Entities (CNPJ) of the Special Secretariat of the Federal Revenue of Brazil of the Ministry of Economy.

(ii) SPIN OFFS, as companies derived from another organization, whose purpose is dedicated to innovation and that meet items I and II set out above.

(a) For purposes of this Public Notice, hereinafter, these companies will also be referred to as STARTUP.

(ii) MINING COMPANIES associated with the Mining Hub.

Article 4 - The right to become a “SPONSOR MINING COMPANY” to the MINING COMPANIES associated with the Mining Hub is exclusive. A SPONSOR MINING COMPANY is the one that directly supports the development of one or more Proofs of Concept.

CHAPTER II - PROGRAM STAGES

Article 5 - The main stages of the **M-START CYCLE 7** are shown and detailed below:

- Applications: The candidate STARTUP must submit its proposal using the online form available through the website www.mininghub.com.br.
- Selection: The evaluation and selection of the proposals will be made by a panel composed of the program management team and technicians from the MINING COMPANIES, according to the rules established in this Public Notice. More information about the Selection stage can be found in Chapter V of this Public Notice.
- Proof of Concept (POC): Period in which the STARTUP will sign the contract with the SPONSOR MINING COMPANY and will also execute the POC, according to the work proposal presented and validated in the Immersion stage, held during the Selection stage.

At the end of the Proof of Concept stage, the STARTUP that has its POC validated will participate in the Demoday, closing event of the program cycle, in which the STARTUPS present the results of the POCs.

First Paragraph - The execution activities of the POCs will only start after the conclusion of the contract signature process by all parties involved - STARTUP, MINING COMPANY and IBRAM.

Second Paragraph - The validation of the POC for a given challenge, throughout the program, will occur between one STARTUP and one SPONSOR MINING COMPANY, and at the end of the execution cycle the case generated will be shared with all other MINING COMPANIES associated with the Mining Hub.

Third Paragraph - The schedule of activities for the main stages of the **M-START** program is available for consultation on the website www.mininghub.com.br/en/programas/m-start, as well as in ANNEX I of this Public Notice.

CHAPTER III - CHALLENGES AND SPONSOR MINING COMPANIES

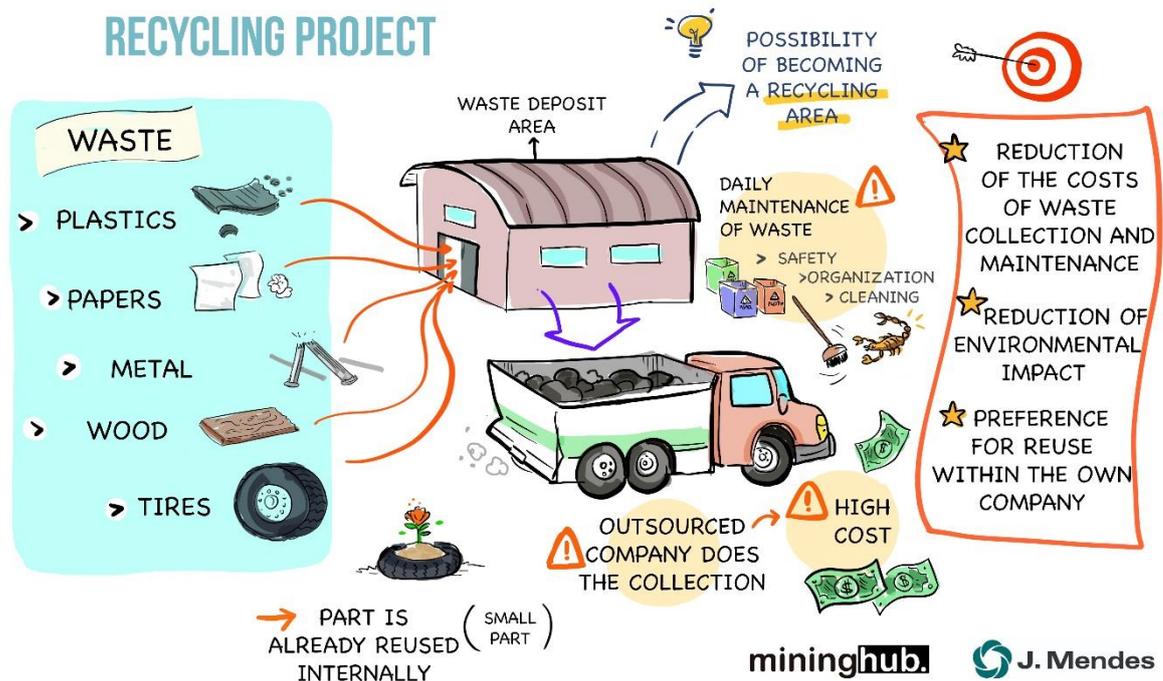
Article 6 - From article 7 to 12 of this Public Notice, we describe the challenges proposed by the Mining Companies, divided by themes. In addition, for each challenge, there is a picture that aims to promote a better understanding of the key information of each problem. The pictures can be seen in Annex II.

Article 7 - Regarding the theme "SOCIAL DEVELOPMENT" the challenges launched, and the respective SPONSOR MINING COMPANIES are shown in Table 1.

Table 1 – Social Development

CHALLENGE	MINING COMPANY
1.1 - Recycling Project	J.Mendes
1.2 - Reduced response time for particulate control	Nexa e RHI Magnesita

1.1 Recycling Project



Sponsor Mining Company: J.Mendes

Challenge description:

Currently, the waste generated in the production process, such as metal, tires, wood, plastic, among others, are stored in a large waste yard until collected by third-party companies, thus generating a cost for the removal of these materials, as well as site maintenance.

Expected results:

Elimination of the cost of collecting these materials and reusing part of this waste within our operations.

What we do not want or have already tested:

Use of this waste for signaling points, marking areas and use in living areas.

E.g., metal tube transformed into physical barrier for safe access, tires converted into seats and so on.

Possible difficulties in implementing the POC:

Area or place of implementation for the installation of a waste transformation workshop.

1.2 - Reduced response time for particulate control



Sponsor Mining Companies: Nexa e RHI Magnesita

Challenge description:

We need to reduce the response time to be more effective in particulate emission handling. Today we work with equipment in which the final result takes approximately 12 to 24 hours to be consolidated.

Expected results:

Reduced time for consolidating the results of air quality monitoring for particulate matter and consequently more effective actions and less time in controlling particulate emissions.

What we do not want or have already tested:

Similar solutions have not yet been tested. The data obtained today, through the existing equipment, meet the legal requirements, but the response time is very high, the results take approximately 12 to 24 hours to be consolidated.

Possible difficulties in implementing the POC:

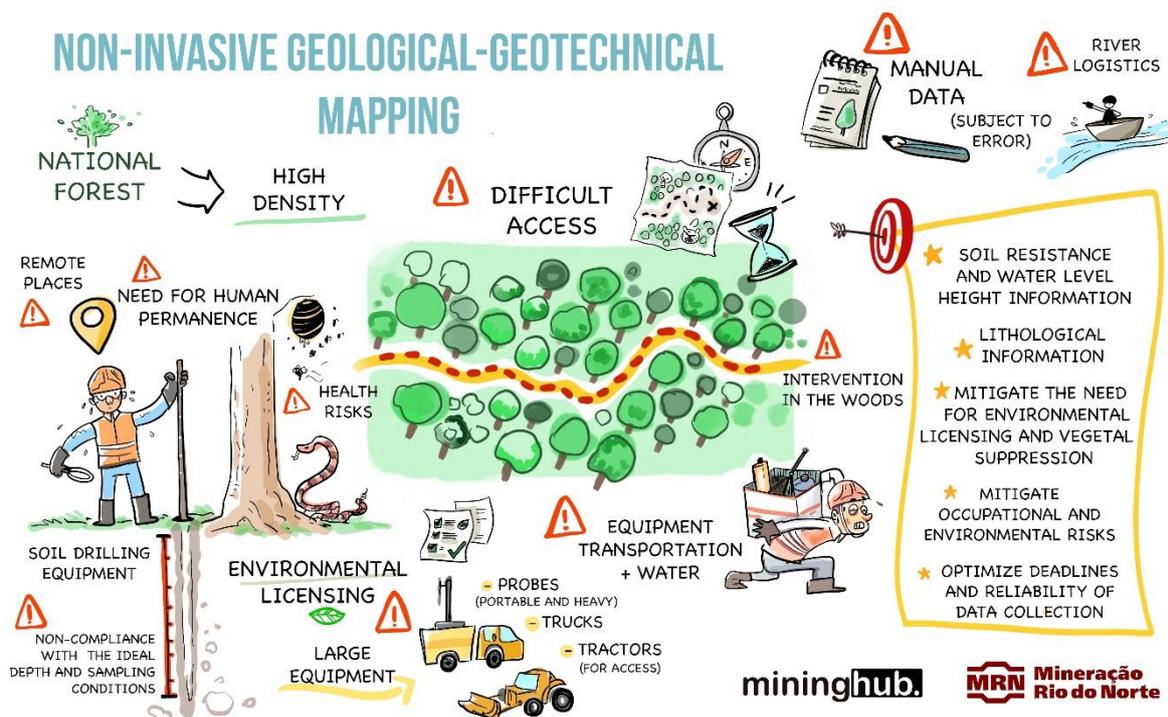
The solution must be economically viable, and above all meet the monitoring logistics, as access to energy and communication is limited.

Article 8 - Regarding the theme "OPERATIONAL EFFICIENCY", the challenges launched and the respective SPONSOR MINING COMPANIES are shown in Table 2.

. Table 2 – Operational Efficiency.

CHALLENGE	MINING COMPANY
2.1 - Non-invasive geological-geotechnical mapping	MRN
2.2 - Cut mitigation on loader's tire	Anglo American
2.3 - Softsensor for online silica prediction	J.Mendes e Samarco

2.1 - Non-invasive geological-geotechnical mapping



Sponsor Mining Company: MRN

Challenge description:

The question to be solved in this challenge is: how can we map (surface, subsoil, vegetation, soil type) by non-invasive methods in remote flona's areas and in order to gain agility in the processes and subsequent stages?

Such question derives from the difficulty of entering the Amazon Forest to carry out the stages of the surveys. Besides the inherent difficulty, since the vegetation is virgin and dense, which exposes the technicians to the heat and inconvenience of the contact with the native fauna and flora, generating too much time for locomotion and mobilization to the site with equipment that is often heavy to be transported by people over long distances. More than that, entering the forest to perform activities usually demands authorization from environmental regulatory agencies that sometimes delay or limit the scope of action.

Expected results:

Optimization of parameters:

- Reduce travel time and access to the drilling point (today >3h);
- Reduce the risk of error in data capture (manual data log and transfer);
- Meet the normative and technical parameters for geotechnical (soil strength, water level, etc.) and geological (lithography, soil stratification, sampling, etc.) tests;
- Reduce the occupational risk of remote work (contact with native flora, equipment load, heat, lack of communication, getting lost in the jungle, etc.)
- Reduce or eliminate the human dwell time in the remote hazardous area;
- Reduce or eliminate the demand for licensing and vegetation suppression to perform the tests;
- Reduce the effort for vegetation characterization and forest inventory (desirable).

What we do not want or have already tested:

There have been no field trials but rather prospections, although MRN customarily uses drone overflights to survey fields, mainly in its tailings system, but nothing in the forest. The traditional survey is used.

Possible difficulties in implementing the POC:

There is knowledge that solutions related to geophysics (similar to what is done in deep water oil exploration), automated forest inventory, drone overflight would be references. As well as the possibility of optimization reducing the portability of field equipment would help in parts. The fact is that there is a range of possibilities, but not

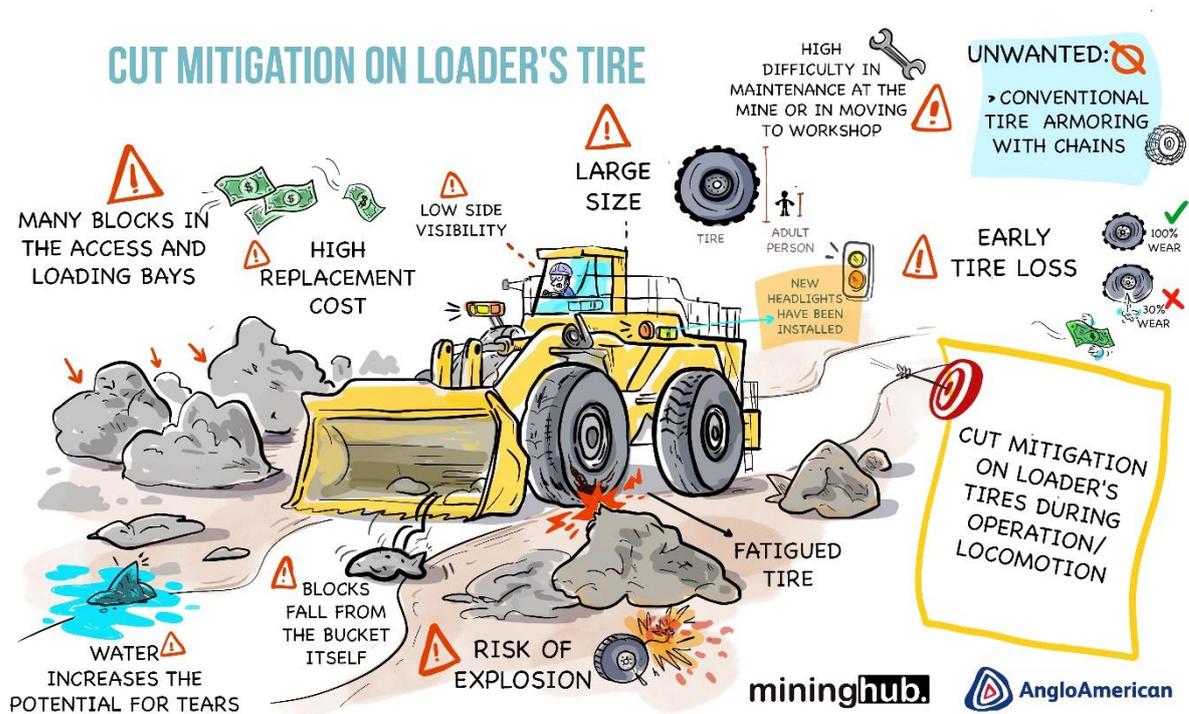
directed at the problem at hand, that could synergistically, together or combined into a single solution, meet the challenge.

In what is known as Aerial Geophysics, the equipment for surveying, using electromagnetic radiation, magnetic and gravitational fields, is conducted by small airplanes, ultralights and helicopters, as well as by means of artificial satellites and high-altitude aircraft. Such solutions, which do not meet some exceptions such as electrical, seismic and thermal methods, have not been thoroughly tested in the conditions at MRN. It has not been mapped exactly which methods, equipment and aircraft could meet and if they truly solve the issue.

For forest inventories, other methods, if not geophysical, are expected to be sought. Besides this, the overflying does not solve the demand of some tests and norms of collection of subsoil physical samples and other requirements.

Finally, the location of MRN's mines, located in the interior of the state of PA, in the middle of the sustainable use unit National Forest Saracá-taquera in the Amazon jungle. The carrying out of on-site tests depends on advance logistical preparation and may require communication to regulatory agencies.

2.2- Cut mitigation on loader's tire



Sponsor Mining Company: Anglo American

Challenge description:

Mitigating the cutting of tires of the Komatsu WA1200 Loaders came about due to the high incidence of cuts, mainly in the front tires of Anglo American Minas Rio's machines. Based on the operational history, the cuts are mostly caused by blocks during the operation in the loading bay and during the displacement in the mine accesses.

Operators' visibility in relation to the blocks is compromised due to existing blind spots or low light at night, and several blocks are small compared to the size of the WA1200 and directly contribute to cuts in the tires either by slippage, impact etc. Generally, tires with cuts are removed for repair and, as a safety standard, make it impossible to return to the forward position after repair.

Tires with cuts have a high potential for an explosion hazard. In addition, when cuts occur, we have component replacement costs, which consequently increase the consumption of new tires, directly impacting inventory replacement cost.

Expected results:

Obtain a longer operating lifespan of the loaders' tires, especially in the front position, and consequently reduce the equipment downtime for tire maintenance.

What we do not want or have already tested:

There are operational procedures and operator/technicians' inspections regarding access conditions and loading bay floors, however, due to the size of the mine, we have difficulty monitoring them in real time.

Conventional armoring of front tires using chains is a known and untested solution on our site.

It is believed that with this market solution we would be able to reduce tire cut events, but we would have as disadvantage the high cost of implementing the solution and the lower DF of the loading fleet for armor maintenance. Another important point would be the need for specialization of the internal workforce for maintenance.

The points raised are obstacles in applying an effective solution to the problem in question.

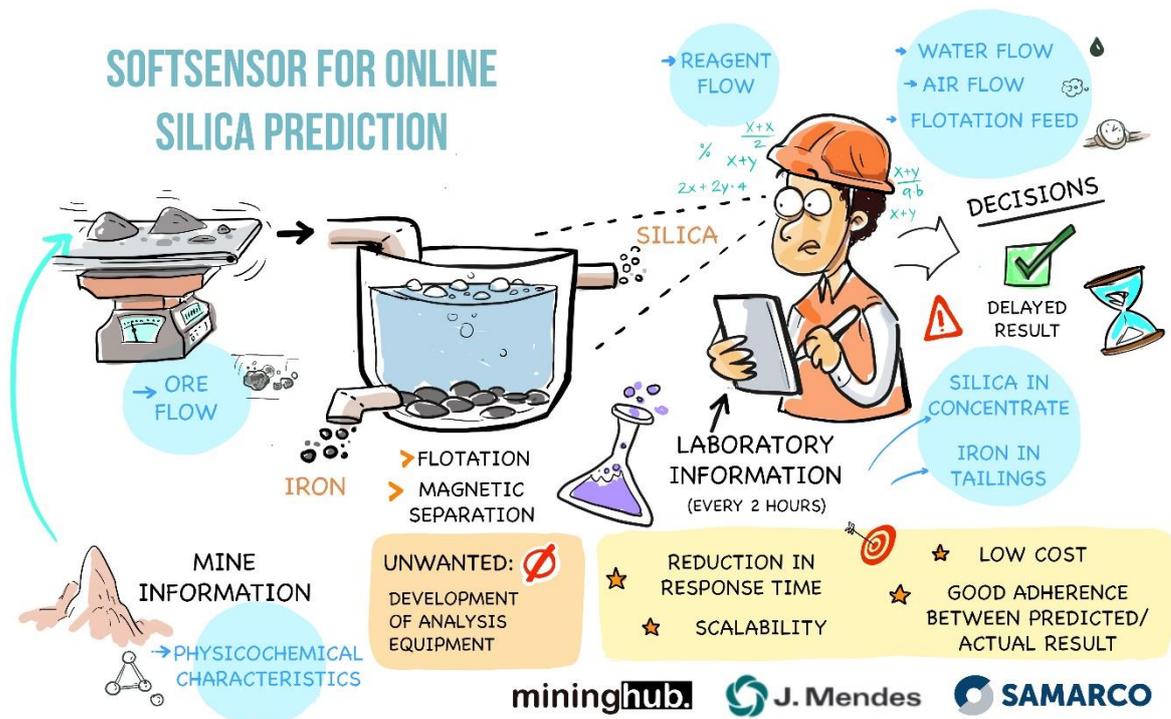
Possible difficulties in implementing the POC:

The size of the Mine, interaction with the structural system of the equipment to maintain the integrity of the equipment and guarantees with Komatsu are listed. Finally, training the workforce to keep the solution working correctly is a technical difficulty since we would have to train the Mine Maintenance team to work on the system where we have a possible shortage of the workforce.

Currently, we have approximately 30 km of operational accesses that need to be monitored and maintained without blocks in the equipment's roadway.

For new technologies, we have in the Mine area a robust network that allows access to remote equipment data. However, in certain regions, the system may fail due to blind spots that can become an obstacle in the implementation of a new initiative.

2.3- Softsensor for online silica prediction



Sponsor Mining Companies: J.Mendes e Samarco

Challenge description:

To achieve target values of silica in the concentrate in an iron ore flotation process, an expert system or plant operator makes decisions based on input from laboratories that take considerable time to return the values, or on data from equipment that performs this measurement but is not directly integrated into the process, have relatively high cost, or are "black box" solutions. The challenge would be to develop a reliable and

low-cost system capable of estimating the SiO₂ value in the flotation process with short time intervals, based on existing historical information and on real-time data obtained from the different phases of the process.

Expected results:

- Average error below 2% compared to data obtained from the laboratory;
- Response of the silica value with a maximum period of every 20 minutes;
- Greater speed (agility) of decision-making and performance of the process team (technicians and engineers);
- Less variability of results, depending on the performance in the process.

What we do not want or have already tested:

We use the “online” silica analyzer that performs SiO₂ analysis through image analysis of a prepared sample of the ore, but it works. The unfeasibility of this system is due to the high costs for acquisition and maintenance, the solutions being closed requiring a specific contract with the company holding the technology and the obsolescence of the assets used in the solution, which could compromise the availability of the equipment.

Possible difficulties in implementing the POC:

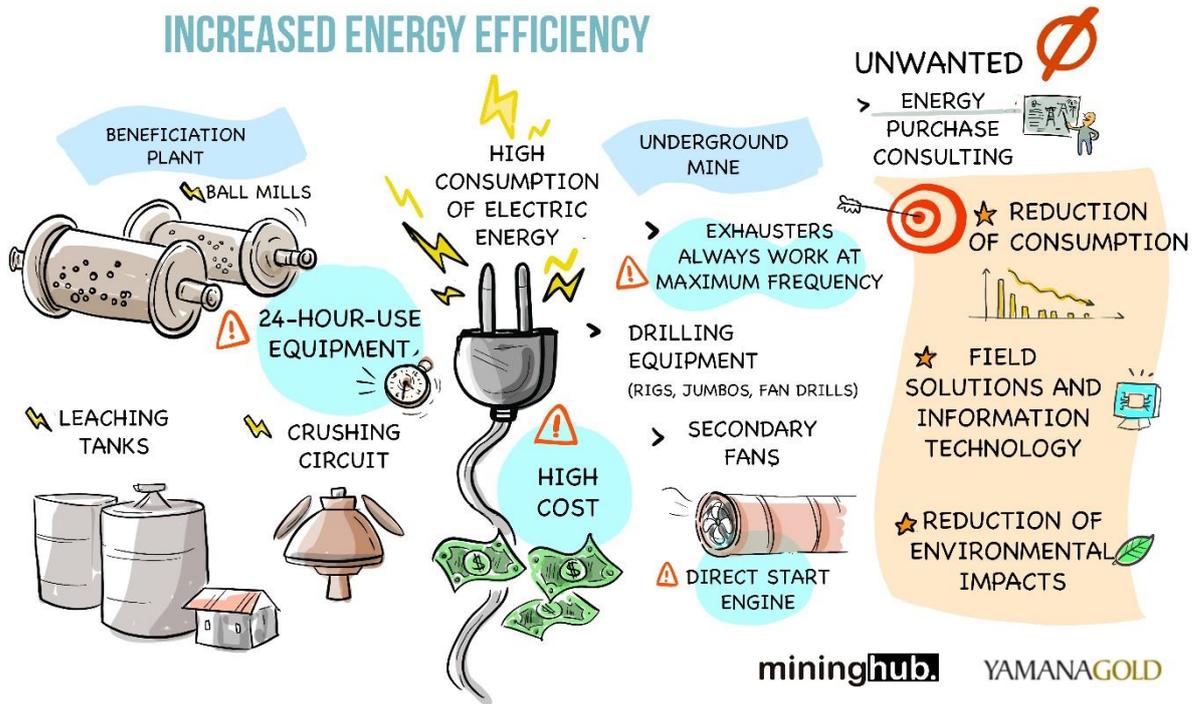
- Lack of historical database that reflects the current scenario;
- Variability of the qualitative parameters of the process;
- Difficulty in integration through OPC with the plant's control system;
- Inexistence of input analysis for solution design.

Article 9 - Regarding the theme “ALTERNATIVE ENERGY SOURCES”, the challenges launched and the respective SPONSOR MINING COMPANIES are shown in Table 3.

Table 3 – Alternative Energy Sources.

CHALLENGE	MINING COMPANY
3.1 - Increased energy efficiency	Yamana Gold
3.2 - Fossil fuel-free mine equipment	AngloGold Ashanti

3.1 - Increased energy efficiency



Sponsor Mining Company: Yamana Gold

Challenge description:

Ensuring plant energy service; Feasibility analysis of flexibilization of the energy matrix: wind and photovoltaic energy; Energy measurement campaign; Economic viability; Network structure; Allocated infrastructure; Charge reduction; Energy efficiency assessment of equipment on site; Possibility of a hybrid system to supply energy to the mine;

Expected results:

- Reduction of contracted demand;
- 12% reduction in demand registered through self-generation (MW).

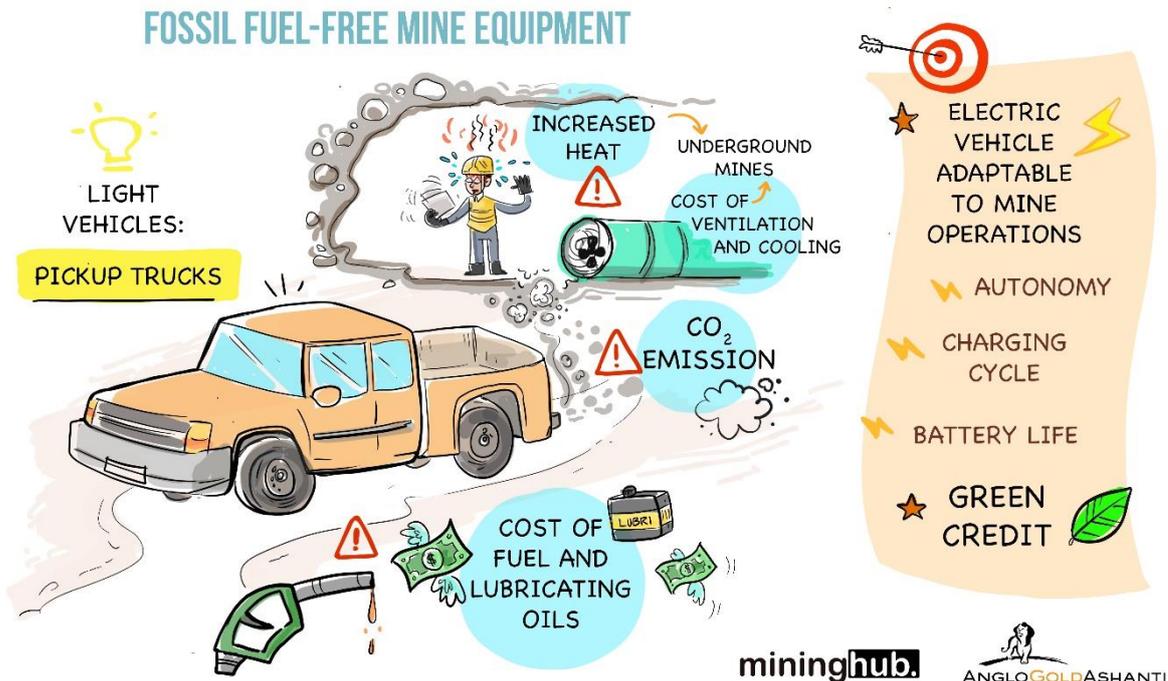
What we do not want or have already tested:

In this case, we have not tested any solution yet. But we have some studies on the potential for implementing a wind or solar solution, due to the region's climate.

Possible difficulties in implementing the POC:

Assembly and installation of the unit's infrastructure, in addition to the interconnection to the electrical network that feeds the site.

3.2- Fossil fuel-free mine equipment



Sponsor Mining Company: AngloGold Ashanti

Challenge description:

Develop a battery propulsion system with autonomy and charging cycle compatible with the operating regime of light mine vehicles (pickup trucks). Evaluate the adaptation of the engine and power train system to commercial fleets available in the Brazilian market, for example: Hilux, L200, S10, Ranger etc.

Expected results:

Reduce the emission rate of heat, CO₂ and other harmful gases in underground mines, and consequently to the environment. Increased energy efficiency and productivity of equipment. For underground mines, reduce ventilation and cooling costs.

What we do not want or have already tested:

Engines powered by hydrogen cells have already been tested, but this proposal did not have the maturity to scale the operation of a mine.

Possible difficulties in implementing the POC:

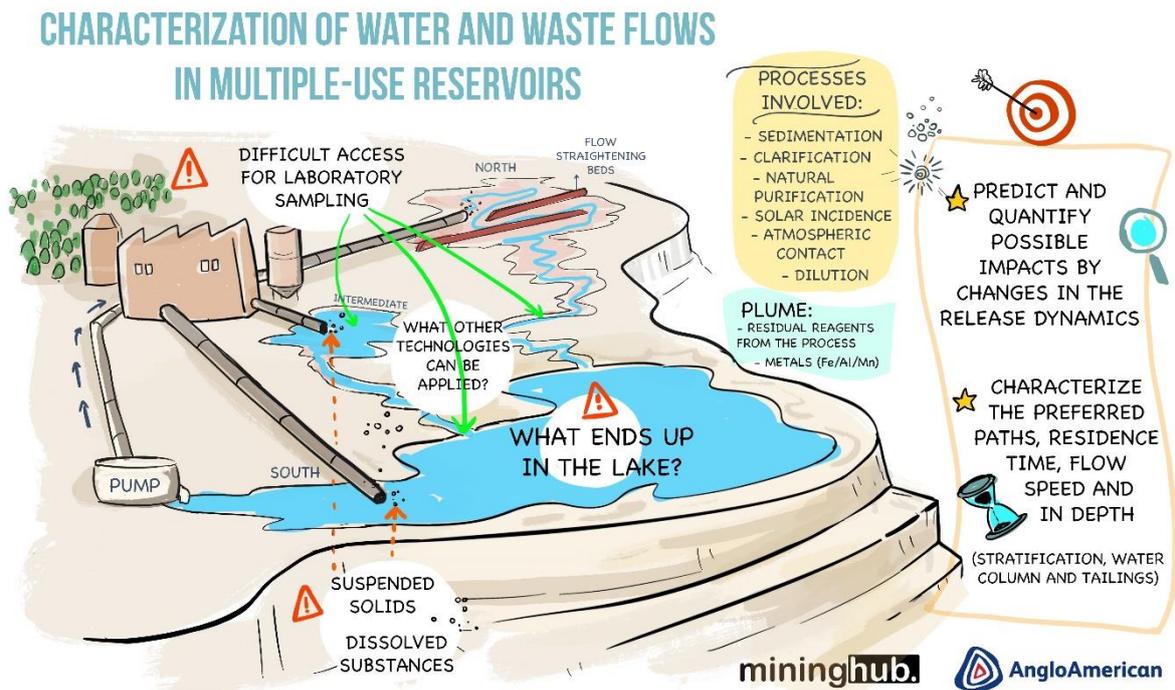
Align the autonomy and charging cycle of vehicles with the availability and use required of this equipment within a mine's cycle.

Article 10 - In relation to the “WATER MANAGEMENT” theme, the challenges launched and the respective SPONSOR MINING COMPANIES are shown in Table 4.

Table 4 – Water Management.

CHALLENGE	MINING COMPANY
4.1 - Characterization of water and waste flows in multiple-use reservoirs	Anglo American
4.2 - Control of physical-chemical process in tailings dam	Anglo American

4.1 - Characterization of water and waste flows in multiple-use reservoirs



Sponsor Mining Company: Anglo American

Challenge description:

Anglo American's Minas-Rio tailings dam has a dynamic for disposing of this material in the reservoir, which currently has three discharge lanes, but which are not used simultaneously. These paths depart from different regions of the dam (North,

Intermediate and South) and, therefore, have physicochemical flow conditions (time and speed) with different processes acting on the route that directly interfere with the characteristics of the tailings that reach the lake (sedimentation/clarification, natural purification, solar incidence, atmospheric oxygen transfer and dilution). The present challenge is to characterize the deposited sediments and the water in the lake (diagnosis, quantification of suspended and dissolved physicochemical elements) as a function of the preferential paths of the tailings that possibly form an attenuation plume of the presence of residual process reagents and metal concentration in the water and in the sedimented tailings. The objective is to define metrics for the characterization of these flows that can be replicated to future tailings release points and improve the representation of changes in water quality with the operation of one or another used discharge point.

Expected results:

With the preparation of the POC, it is expected that the characterization of the preferred paths, definition of metrics between the paths, the active processes correlating with the parameters observed in the deposited sediments (stratification of layers) and in the water stored in the reservoir (along of the water column), in order to predict and quantify possible changes in the conditions of the dam due to changes in the dynamics of use of the tailings discharge points.

What we do not want or have already tested:

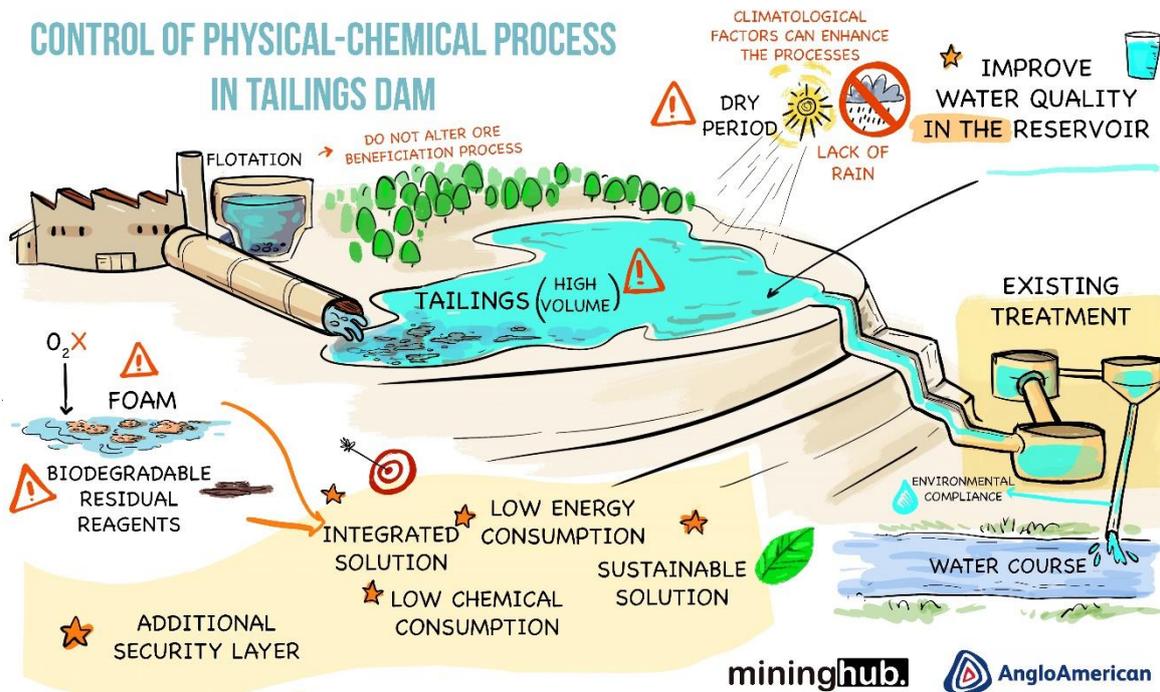
No solution has yet been applied to the challenge in question, however, bathymetric surveys are periodically carried out to characterize the tailings sediment process at the bottom of the reservoir and water samples are collected in strategic locations with safe access to employees, which contribute to an understanding of the physical-chemical behavior of the material and water stored in the tailings dam.

Possible difficulties in implementing the POC:

The implementation of the solution may face challenges associated with the difficulty of access to carry out sampling of material and water, however alternative technologies for obtaining the data can be assessed. It must be considered that there are several processes acting simultaneously in the dam that must be analyzed together with the possible discharge points and there may be difficulty in the individualization of the effects in the definition of characterization metrics for the

discharge points and the plume of the presence of related elements to the beneficiation process.

4.2 - Control of physical-chemical process in tailings dam



Sponsor Mining Company: Anglo American

Challenge description:

Anglo American's Minas-Rio tailings dam is a structure that, in addition to storing tailings from the beneficiation process, is also used as a water reservoir that currently has a lake area of approximately 3 km² and a stored volume of 20M m³. The challenge presented here is aimed at finding a solution that can contribute to improving the quality of water stored in the reservoir, analyzing in an integrated way the main parameters that influence this aspect related to biodegradation and self-cleaning of residual reagents from the process. The solution should apply to the reservoir formed by the tailings dam and should not change the processes of the ore processing plant. This solution will be important to provide an additional layer of security for the quality of the water released into the downstream watercourse, considering that a physical-chemical treatment system is already in operation to ensure legal compliance before its discharge into the natural drainage.

Expected results:

With the preparation of the POC, it is expected that an integrated and sustainable solution will be presented that is not focused on a single factor/parameter associated with the condition of the reservoir's water quality, that is, a joint analysis of the benefits that would be achieved must be presented and possible changes in other quality control parameters. Furthermore, it is expected that the implementation of the solution will be associated with a low cost of energy and the use of chemical products due to the high volume of waste and water stored.

What we do not want or have already tested:

Pilot scale tests were carried out with the installation of a Turbidity Curtain in one arm of the reservoir to control suspended solids with a very positive effect in comparing the results upstream and downstream of the structure, but this alternative does not include improvements related to other parameters such as the degradation of the process' residual reagents, but it may become an integrated solution to others suggested by the startup. In addition to this, bench tests were carried out on a smaller scale by chemical oxidation and mechanical aeration, which can be reanalyzed by incorporating elements to assess potential increase in toxicity and effects in the medium and long term of the transfer of oxygen to water in a natural or artificial way.

Possible difficulties in implementing the POC:

The implementation of the solution may face challenges associated with the dimensions of the reservoir (20 Mm³) and its irregular shape for the installation of structures on the lake shore, as well as the considerable volume of tailings disposed in the structure, which can reach 120 thousand m³ daily, in addition to possible undesirable effects of the proposed solution that must be surveyed and circumvented as part of an integrated solution, such as, for example, increased turbidity with mechanical aeration.

Article 11 - In relation to the theme "TAILINGS AND WASTE MANAGEMENT", the challenges launched and the respective SPONSOR MINING COMPANIES are shown in Table 5.

Table 5 - Tailings and Waste Management.

CHALLENGE	MINING COMPANY
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5.1 - HDPE blanket inspection and integrity assessment	Yamana Gold
5.2 - Transformation of gold mining tailings into co-products	Aura Minerals e Yamana Gold

5.1 - HDPE blanket inspection and integrity assessment

HDPE BLANKET INSPECTION AND INTEGRITY ASSESSMENT



Sponsor Mining Company: Yamana Gold

Challenge description:

Development of technology to assess the integrity of the HDPE blanket.

Technology for detection of failures in the HDPE blanket below the tailings layer.

Expected results:

The expected result is an anticipation of failures in the HDPE blanket that protects the tailings dam basin. The idea is to create a tool to quickly identify failures in the integrity of the blanket.

What we do not want or have already tested:

In this case, we have not tested any solution yet.

Possible difficulties in implementing the POC:

- Water turbidity;
- Low light;

- Access to the location;
- Particulate material at the bottom of the basin.

5.2 - Transformation of gold mining tailings into co-products



Sponsor Mining Companies: Aura Minerals e Yamana Gold

Challenge description:

The purpose of the project is the transformation of tailings from the processing plant into a co-product, or raw material that can be used in other production or processes of buildings and construction. The project would have as important deliverables the definition of the generated product, routes and stages of production and economic assessment of the solution. Ideally, the production process should be developed to be managed by a partner or local companies, with the need for operational support from the mining company only in a pre-treatment phase.

Expected results:

Reach a 10% reduction in the generation of tailings deposited in the dam annually + developed product and processes.

What we do not want or have already tested:

We have not tested any yet.

Possible difficulties in implementing the POC:

- Presence of chemical reagents in the material;
- Implementation and infrastructure of the pre-treatment system;
- Clearance of environmental agencies.

Article 12 - Regarding the theme “OCCUPATIONAL SAFETY AND HEALTH”, the challenges launched and the respective SPONSOR MINING COMPANIES are shown in Table 6.

Table 6 – Occupational Safety and Health.

CHALLENGE	MINING COMPANY
6.1 - High performance in risk perception and control	Samarco
6.2 - Remote/autonomous breaker removal and insertion	Nexa e Vale
6.3 - Reducing employee exposure to risk and effort during drum coating removal	Vale

6.1 - High performance in risk perception and control



Sponsor Mining Company: Samarco

Challenge description:

Propose a solution that allows the employee to observe their work front and correlate the information obtained from the image with the company's existing risk management systems, such as: hazard and risk mapping, Riskex, Bow Tie, risk analysis carried out previously on the same activity, among others.

From this correlation, a visual indication (for example, heat map) for the activity must be generated that allows identifying where all the risks are and which are the most critical, resulting in a Preliminary Virtual Task Risk Analysis. For each identified risk, the employee must indicate the control and, only after the risks are controlled, will he be authorized to start the task. This feature should also allow any leadership to access the solution and be able to check the employee's virtual APR, thus certifying that all identified risks have been controlled.

The solution should offer a great user experience (UX), considering the characteristics of the people involved in carrying out the activities to be mapped.

Expected results:

Risk analysis better prepared considering that it will seek the assessment already carried out by a group of experts, thus reducing intuition or not identifying risks that could lead to accidents.

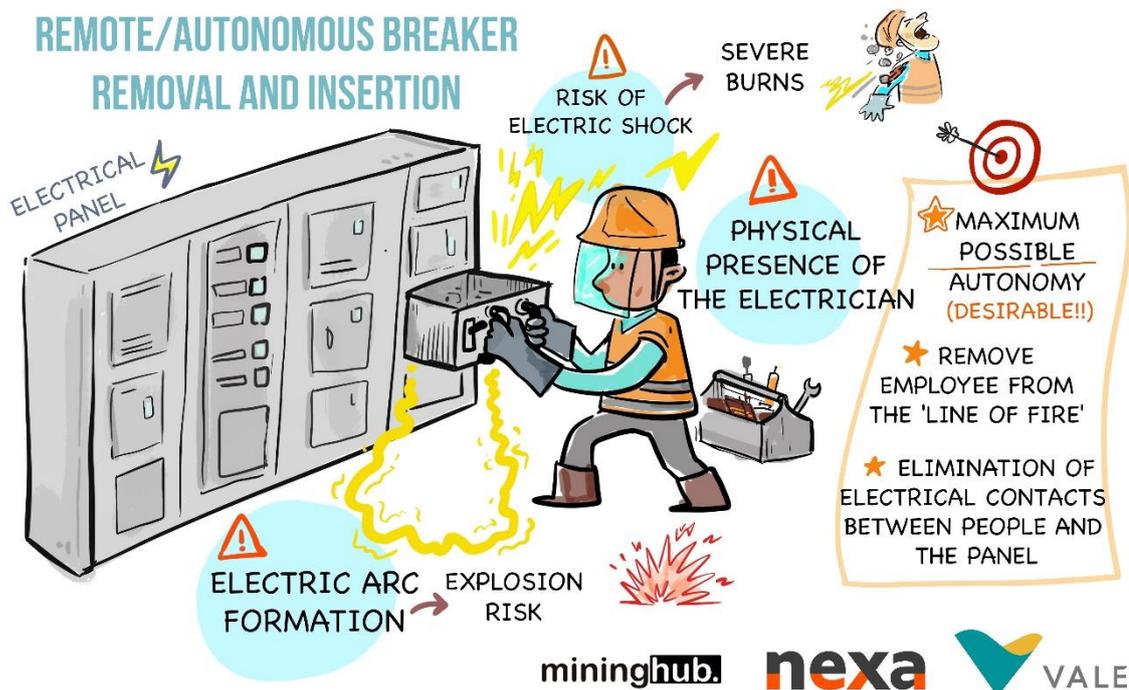
What we do not want or have already tested:

Not tested. We currently have a Preliminary Risk Analysis APR model, but it is performed manually, making it vulnerable to misperceptions.

Possible difficulties in implementing the POC:

Interact with our systems that currently have risk mappings so that a virtual APR can be generated.

6.2- Remote/autonomous breaker removal and insertion



Sponsor Mining Companies: Nexa e Vale

Challenge description:

Nexa: The challenge is to carry out, extract and insert the electrical panels drawer, removing the responsible employee from the risk zone. The challenge will be at the SE-T main substation that distributes the 13.8KV to the unit. It has 22 high voltage circuit breakers, on which work will be carried out. We have more than one circuit breaker model in this substation, which consists of another challenge for the project.

Vale: The challenge consists of autonomously carrying out the location of the drawer, positioning the device, extracting and inserting the electric panels drawer, removing the responsible employee from the risk zone.

Expected results:

Among the expected results are performing the procedure without the use of activation through an electrical conductor and increased safety by ensuring proper distance to the operator. Safety is the main result for the project, in addition to the operability of the circuit breaker via the control room as well.

What we do not want or have already tested:

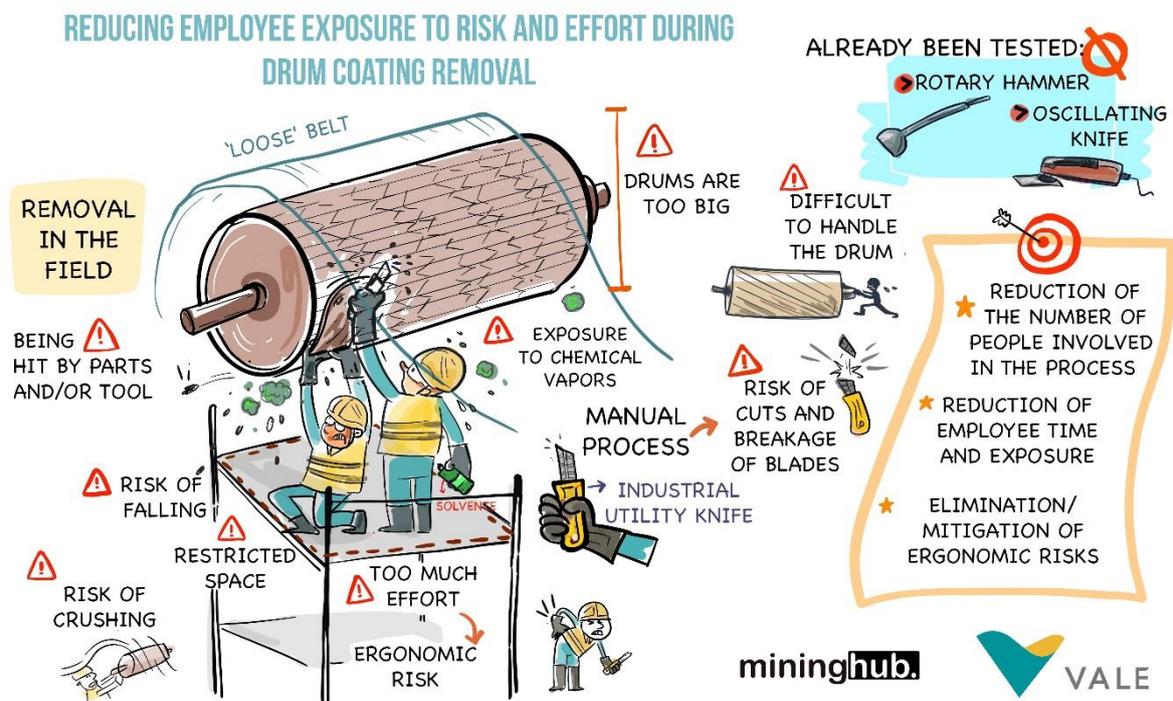
Nexa: No solution or other design model has been tested. Currently, the activity is carried out using NOMEX risk 4 clothing following existing safety standards.

Vale: A model that performs the maneuver of removing and inserting circuit breakers in the CCM was tested, but that does not eliminate the need for the operator to travel inside the CCM to position the device, nor to operate it, even remotely.

Possible difficulties in implementing the POC:

One difficulty is the execution of a command without the use of electrical conductors that increase the risk of the activity. Another difficulty is the application of the project in the various models of current circuit breakers in the plant.

6.3 - Reducing employee exposure to risk and effort during drum coating removal



Sponsor Mining Company: Vale

Challenge description:

Drums are generally coated cylindrical components that act as traction, return, and direction-changing elements for conveyor belts. Its coating is intended to protect its carcass and ensure adherence to the belt, with the need for periodic replacement due to natural wear during the process. Currently, the removal of the coating is carried out with the participation of several employees, working in the handling of the drum

(locking or moving it), in the removal/cutting of the coating using industrial utility knives and in the act of pulling the coating part already detached with the aid of claw and traction tool.

This activity can occur in a variety of scenarios, as the drums can be located in tunnels, at ground level, or on conveyors in elevated positions. For all these cases, the space for carrying out the activity is quite limited. Thus, there are several associated risks: risk of cutting due to breakage and projection of the utility knives' blades, risk of limbs hitting the structure due to limited space, ergonomic risks (inadequate posture, repetitiveness, high physical effort and static muscle overload), exposure to chemical vapors due to the use of solvents to facilitate the removal of the coating, risk of falling from different levels, risk of projecting parts and tools (there is the possibility of the coating breaking during traction), risk of pressing limbs due to the possibility of unwanted movement of the drum during the activity. Therefore, the objective of the challenge is to find ways to eliminate/mitigate all associated risks and increase productivity in this process in order to reduce the exposure time of employees.

Expected results:

It is expected to eliminate/mitigate the risks associated with the drum coating removal activity and reduce the activity's execution time.

What we do not want or have already tested:

Aiming at reducing the exposure time and eliminating the risks associated with the use of the industrial utility knife, the oscillating knife and hammers were tested, which brought an increase in productivity and reduced cutting risks, however it makes the employee subjected to the risks associated with the vibration of these tools. The self-retracting utility knife was also tested, which reduced the risk of cutting during the activity, keeping the exposure time similar to what is already practiced.

All tested solutions do not eliminate/mitigate all risks presented above.

Possible difficulties in implementing the POC:

- A possible difficulty in implementation is the fact that the coating removal is carried out in several scenarios, as the drums can be located in tunnels, at ground level or suspended in the structures of the conveyor belts. For all these situations, the space for carrying out the activity is quite limited;

- The solution must meet the various types of drums: varied diameters, varied coatings (100% smooth or crimped rubber; or rubber with ceramic inserts);
- The presence of material (ore) embedded in the coating during its removal makes the activity harder to perform.

Article 13 - The resources available by the SPONSOR MINING COMPANIES for the validation of the STARTUPS POCs will be agreed by means of a contract to be signed between the parties at the beginning of the Proof of Concept stage.

First paragraph - Expenses related to participation in the M-START program, including transportation, accommodation and food, may be reimbursed within the total amount made available and previously agreed by the respective SPONSOR MINING COMPANY for the execution of the POC.

Second paragraph - The disbursement plan for the resources for the POC and reimbursement of expenses will be developed by STARTUPS and validated with the SPONSOR MINING COMPANIES during the Immersion phase, in the Selection stage.

Third paragraph - If any SPONSOR MINING COMPANY does not have the resources available to carry out the POC and, even so, STARTUP chooses to work with this company, it will not be possible to claim any kind of reimbursement or payment by STARTUP in the future to SPONSOR MINING COMPANY in question.

Article 14 - The place of development of the POC will be defined by SPONSOR MINING COMPANY, and may undergo changes at its discretion.

Article 15: Each MINING COMPANY may be allocated to more than one challenge and, for this reason, may work with more than one STARTUP, executing more than one POC, as long as in different challenges.

Article 16: A challenge may have more than one SPONSOR MINING COMPANY. In these cases, after the Selection process, each SPONSOR MINING COMPANY will execute a POC with its respective selected STARTUP.

Article 17: STARTUPS are authorized to perform only one POC per cycle, even if they are selected for more than one of the challenges launched. If this is the case, the STARTUP must choose which challenge/ mining company it will follow in the cycle in question.

CHAPTER IV - APPLICATION

Article 18 - The application process for a STARTUP is free and must be done by filling and sending the electronic form available, exclusively, through the **MINING HUB** website www.mininghub.com.br, during the period from **09/20/2021 to 10/24/2021**, at 11:59 pm (eleven, fifty-nine minutes), Brasília time.

Article 19 - Responses to the registration form can be written in Portuguese or English.

Article 20 -The applicant, when filling in the submission form, must always indicate, in a specific field, the respective theme and challenge in which wishes to execute the POC.

Article 21: After the end of the registration deadline, the STARTUP will not be able to make changes to the submitted answers.

First paragraph – The STARTUP will be able to apply for more than one challenge in the cycle, as long as different registrations are made.

Second paragraph - If the STARTUP chooses to work in partnership with another company, this must be indicated on the registration form and must participate in all stages of the selection process, and, at the discretion of the Mining Hub, the partnership may be admitted or not.

Third paragraph - The applicant who has a solution within one of the 6 (six) themes of the program, but who does not fit the challenges launched in this cycle, or who have proposals that do not adhere to one of the 6 (six) themes, but which have innovative applicability for the mining sector, can register at [M-CONNECT](#) for future opportunities.

Article 22 - The STARTUP representative indicated on the registration form as “project leader” must have sufficient autonomy to represent THE STARTUP in decision making throughout the selection process and will be responsible for all communication with the program.

Article 23 - Requests for clarification and doubts must be sent up to 05 (five) business days prior to the closing date for receipt of applications, in Portuguese or English, to the e-mail mstart7@mininghub.com.br

CHAPTER V - SELECTION

Article 24 - STARTUPS that propose to develop solutions to the challenges presented by the MINING COMPANIES during the Proof of Concept stage will be selected.

Single paragraph - The selection of the STARTUPS participating in the program will be carried out by a panel, composed of the program management team and MINING COMPANY technicians, according to the criteria described in Chapter VI. It is also up to the panel the right not to select a STARTUP for one or more challenges, if they believe that there are no suitable proposals.

Article 25 - The STARTUPS application analysis process consists of the following phases:

(i) Framework of the STARTUPS, considering the “Elimination Criteria, as described in article 27 - Chapter VI, below;

(ii) Technical screening of the STARTUPS 'proposals with the SPONSOR MINING COMPANIES for each challenge. In this stage, the first technical evaluation of the proposals will be made, based on the registration form filled out by the STARTUPS and in accordance with the “Classification Criteria”, as described in article 28 - Chapter VI, below;

(iii) Face-to-face and/ or online interviews, in PITCH format up to 5 minutes in duration, in which the STARTUP must present its proposal to SPONSOR MINING COMPANY for the challenge. Up to three (3) the STARTUPS may be selected for the Immersion phase, according to the “Classification Criteria”, as described in article 28 - Chapter VI, below;

(a) The non-attendance, without any justification, of any member of the candidate STARTUP on the date, time and place designated, even if it is the case of remote presentation, disclosed under the terms of this Notice, will be considered as withdrawal of its participation in this selection process. Justified cases will be analyzed and handled individually.

(iv) Immersion in person and/ or online, in which the objective is to provide the STARTUPS with access to SPONSOR MINING COMPANIES and the Mining Hub team to understand the details of the challenges and refine the POC proposal, together. In the period of 1 (one) week, the SPONSOR MINING COMPANIES will accompany the pre-selected the STARTUPS in the interview phase, providing data and clarifying doubts so that each one of them can refine the scope of the proposed

solution for the challenge (s) which one (s) applied. At the end, up to 01 (one) STARTUP may be selected by SPONSOR MINING COMPANY to proceed to the Proof of Concept stage. The “Classification Criteria” are described in article 26 - Chapter VI, below.

- (a) During the Immersion phase, the participating STARTUPS will be asked to prepare additional documentation related to the implementation of the proposed POC (physical and financial project schedules, presentation and other documentation). The selection of the STARTUP for the Proof of Concept stage will be made based on the documentation presented.
- (b) During the Immersion phase the participating STARTUPS must attend all the schedules requested, with the participation of at least one member.

Article 26 - The result of the selection of the STARTUPS will be announced through the communication channels of the Mining Hub, such as the website www.mininghub.com.br, Instagram **hubdamineraçã**o and by e-mail until **February 2, 2022**. The date may be changed by decision and necessity of the **MINING HUB**.

Single paragraph - The STARTUPS not selected in the Technical Screening, Interviews and Immersion phases will receive feedback, exclusively in writing, through the e-mail mstart7@mininghub.com.br, in up to 10 working days after the end of the Selection phase.

CHAPTER VI - SELECTION CRITERIA

Article 27 - STARTUPS will be evaluated according to the following Elimination Criteria:

- (i) Company Profile - The applicant company must fit as a STARTUP or SPIN-OFF, according to the definitions and criteria established in Article 3 - Chapter I.
- (ii) Themes and Proposed Challenges - The solution that does not meet the challenges proposed by the SPONSOR MINING COMPANIES will be eliminated, as mentioned in Chapter III;
- (iii) Innovation - The solution presented by the STARTUP must have an innovative character for the MINING COMPANIES, that is, it must be tested in Proof of Concept.

STARTUPS that present solutions routinely marketed or already tested previously in some mining company in Brazil or abroad, will be automatically excluded from the program.

Article 28 - STARTUPS will be evaluated by the MINING COMPANIES, during the stages of Technical Screening, Interviews and Immersion, according to the “Classification Criteria” presented in Table 6 below.

Table 6 - Classification criteria.

Criterion	Objective
Team	Assess the team's ability to develop the solution and leverage the business.
Technological potential	Evaluate the effectiveness of the technologies used in the solution and their degrees of maturity.
Proposed solution	Assess whether the solution meets the MINING COMPANY demand (s).
Scalability	Assess whether the solution allows scalability for companies associated with the Mining Hub
Potential impact	Assess the potential impact of the solution on MINING COMPANIES (financial, social, environmental, etc.)

Sole paragraph - The solutions will be evaluated with grades from 0,5 to 5 in each of the criteria described in Table 6. The final score of the STARTUP will be given by the average of the grades in each criterion.

CHAPTER VII - DURATION OF THE M-START PROGRAM

Article 29 - The schedule with the main milestones of the **M-START** program is available on the MINING HUB website (www.mininghub.com.br) as well as in Annex I.

Article 30 - Dates may change due to the **MINING HUB**'s decision and need.

CHAPTER VIII - OBLIGATIONS AND RESPONSIBILITIES

Article 31 - The obligations of the STARTUPS are:

- (i). Comply with all the provisions present in this Public Notice;
- (ii) Deliver the documents requested to register new “suppliers”, demanded by SPONSOR MINING COMPANY for the challenge and within the established deadlines;
- (iii) Present, when requested, the Legal Register and Bank Account – the STARTUP or the SPIN OFF must have the National Register of Legal Entities (CNPJ), in case of Brazilian nationality or legal regulations related to their respective nationality, such as Tax Identification Number (NIF), case of Portugal, as well as current account in the name of the company for the signature of the contracts;
- (iv). Participate in the actions provided for in each phase of **M-START**, as well as provide all the necessary information and documents required by the SPONSOR MINING COMPANY and or by the Mining Hub team;
- (v). Attend, compulsorily, the events and activities of the M-START CYCLE 7, presented in this notice and/or communicated via mstart7@mininghub.com.br, with at least 01 (one) representative of the STARTUP;
- (vi) the STARTUP, when enrolling in this program, declares that it does not use and does not have, in its entire production chain, directly or indirectly, slave labor, in degrading conditions, workers subjected or forced to illegal conditions under the employer's domain, work by minors under 16 (sixteen), except as an apprentice from the age of 14 (fourteen), as established in article 7, item XXXIII of the Federal Constitution, as well as not allowing any type of discrimination and respecting freedom of association, under penalty of being immediately eliminated by the MINING HUB, without the need to send prior notification, being the STARTUP, in case of violation of this clause, subject to compensation of losses and damages caused and the penalties provided for by law;
- (vii) The STARTUP, when enrolling in this program, declares, to fully observe Law n^o. 12,846/ 2013 (“Brazilian Anti-Corruption Law”) and declares that it is aware of all the terms and definitions provided in the Brazilian Anti-Corruption Law, which defines as

a harmful act to promise, offer or give, directly or indirectly, an undue advantage to a public agent or the third person related to it, among others. In case of breach of said Law, it will be responsible for any losses, damages or liabilities caused, in addition to the penalties provided for by law.

CHAPTER IX - TERMINATION OF THE RELATIONSHIP BETWEEN THE STARTUPS AND THE MINING COMPANIES OF THE M-START CYCLE 7

Article 32 - The relationship between the M-START program and the STARTUPS will be considered terminated upon prior notification, in the following cases:

- (i) Elimination in the selection phases;
- (ii) End of program duration term;
- (iii) If there is a violation of any clause of this Public Notice;
- (iv) If the MINING HUB significantly changes the main features of M-START and the STARTUP does not agree with these changes;
- (v) If the insolvency, bankruptcy or judicial recovery of STARTUP and its members is verified;
- (vi) If there is a temporary transfer of activity from STARTUP;
- (vii) At the initiative of STARTUP, duly justified;
- (viii) At the initiative of the MINING HUB, duly justified;
- (ix) At the initiative of the SPONSOR MINING COMPANY, duly justified;

First paragraph: The STARTUP that does not have available time or does not respect attendance during the program, which will be carried out in person, at the headquarters of the Mining Hub and/ or associated Mining Companies, or online, will be eliminated. The eliminated will be the sole and exclusive responsible for any costs spent in this period.

Second paragraph - After the disclosure of the selection result, each STARTUP will have up to 7 calendar days to communicate without prejudice, via e-mail mstart7@mininghub.com.br, the withdrawal regarding participation in M-Start Cycle 7. After this period, the STARTUP that, for any reason, gives up participating in the program will be unable to apply for another MINING HUB initiative for 6 (six) months, counting from the date of withdrawal.

Third paragraph: If the SPONSOR MINING COMPANY chooses to leave the program, it must present its justification in writing to the Mining Hub Board of Directors.

Fourth paragraph: Any financial expenses incurred to the STARTUP or the Mining Hub, within the period referring to that cycle in which the SPONSOR MINING COMPANY gave up, shall be reimbursed in full by the quitting mining company to the first two cited in this paragraph.

CHAPTER X - POSSIBLE BENEFITS FOR THE SELECTED STARTUPS

Article 33 - The following benefits can be made available to the STARTUPS selected for the Proof of Concept stage:

- Possibility of investment to develop the projects together with SPONSOR MINING COMPANIES for validation of the POCs;
- Possibility of access to the infrastructure and teams of the associated Mining Companies, under favorable and safe conditions for the parties involved;
- Working together with professionals in the mining sector;
- Working together with the program management team;
- Methodology for carrying out Proofs of Concept: technical visits and development monitoring routines.
- Presentation of the partial results of the Proofs of Concept for Mining Companies associated with the Mining Hub.
- At the end of the program, and at their sole discretion, the MINING COMPANIES, if they consider it feasible for their business, will be able to invest in the operational scale of the solutions, as well as establish partnerships to seek funding, purchase or distribute the STARTUPS' products and services.
- The STARTUP participating in the M-START is eligible to participate in the M-GROWTH program.

CHAPTER XI - GENERAL PROVISIONS

Article 34 - It is hereby clearly and established that all rights related to the intellectual property arising from the work performed as a result of this Notice shall be owned by the STARTUP, which shall be entitled to the free disposal of such rights.

Article 35 - It is clear and established from now on that the participation and / or selection in the **M-START CYCLE 7** does not constitute any kind of bond, operating agreement, joint venture or association between the participant STARTUP (selected or not), the **Mining Hub** and others involved in the program. The participating STARTUP (selected or not) and others involved in the program are independent entities among themselves, that no provision of this Public Notice or the program shall be construed to create any corporate, labor or tax relationship between the parties and that there is not or will not be any solidarity or subsidiarity of any nature between the parties.

Article 36 - It is hereby made clear and established that the participation in the program and the eventual signing of a contract with the SPONSOR MINING COMPANIES does not generate any kind of employment relationship. The STARTUP undertakes to exclude the Mining Hub and others involved from any liability in labor / social security lawsuits eventually brought by any of its employees, as well as to bear all costs incurred in such lawsuits, including, but not limited to, attorney's fees.

Article 37 - It is hereby clearly established that the management team may alter this Public Notice at any time if necessary for the good and regular course of the Program established herein.

Article 38 - It is clear and established now that all STARTUPS registered in M-Start Cycle 7 authorize the Mining Hub to eventually make contact about future opportunities in other areas of operation of the Mining Hub itself. The STARTUPS may also register a new solution in the [M-CONNECT](#) program.

Article 39 - It is hereby made clear that if there are any questions about this Public Notice, the MINING HUB is available to answer them by e-mail at mstart7@mininghub.com.br.

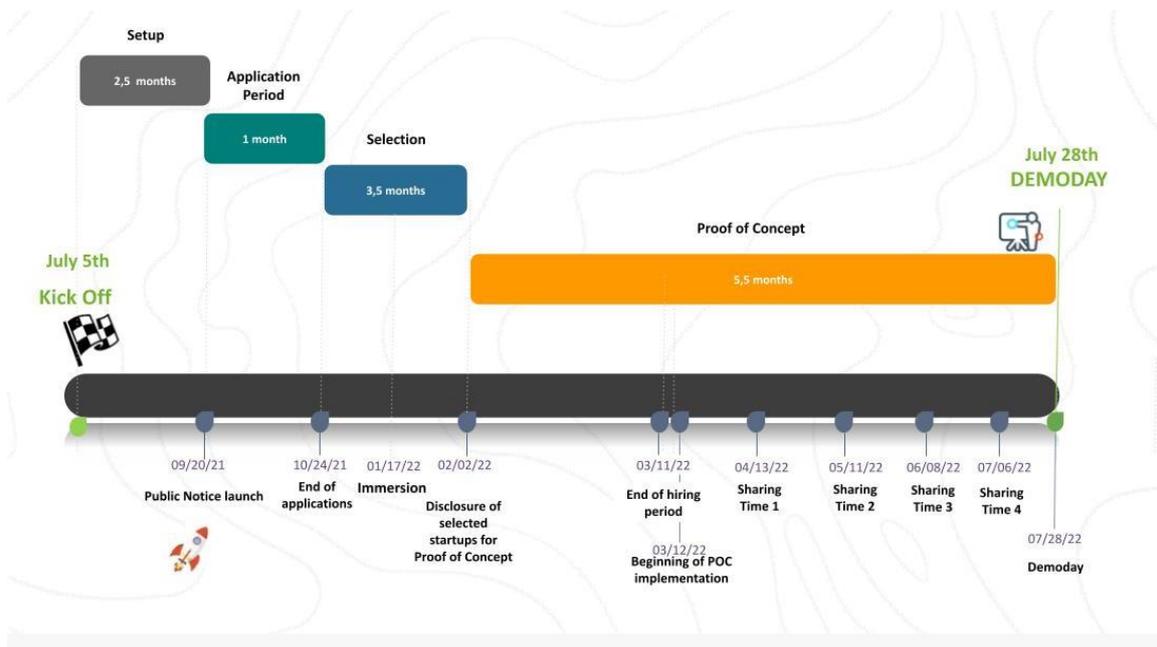
Article 40 - The participants give Mining Hub the right to use their image, text and/or voice in any type of material, free of charge and without exclusivity. In return, the Mining Hub undertakes to use the image of the participants without making any changes to the physiognomy and, further, not to use the image in a derogatory manner, or that may represent, in any form, some kind of violation of moral damage.

Article 41 – The Mining Hub clarifies that, in the programs conducted by its initiative, the rules provided in the Law for the Defense of Competition (Law No. 12.529/11) are

applied, in particular with regard to art. 36 and following, which determines as violations of the economic order, among others, all and any act related to (i) discussion, negotiation, agreement, collusion, manipulation or adjustment on prices, production and division of market segments; (ii) promotion, obtaining and/or influence to adopt uniform commercial conduct (iii) limiting the access of new companies to the market; (iv) preventing the access of competitors to the sources of inputs, raw materials, distribution channels or technology; (v) discriminating purchasers or suppliers of goods or services by means of the differentiated fixing of prices or operational conditions; and (vi) abusive exploitation of industrial property rights, intellectual property, technology or trademark. In this regard, Mining Hub constantly applies measures to mitigate any competition risks arising from the interactions related to the programs, including, among them, but not limited to, the establishment of Antitrust Protocol with the Mining Companies and the Startups eventually selected for its programs.

Article 42 - The e-mail mstart7@mininghub.com.br is established as the program's official communication channel.

ANNEX I - SCHEDULE



ANNEX II – CHALLENGES

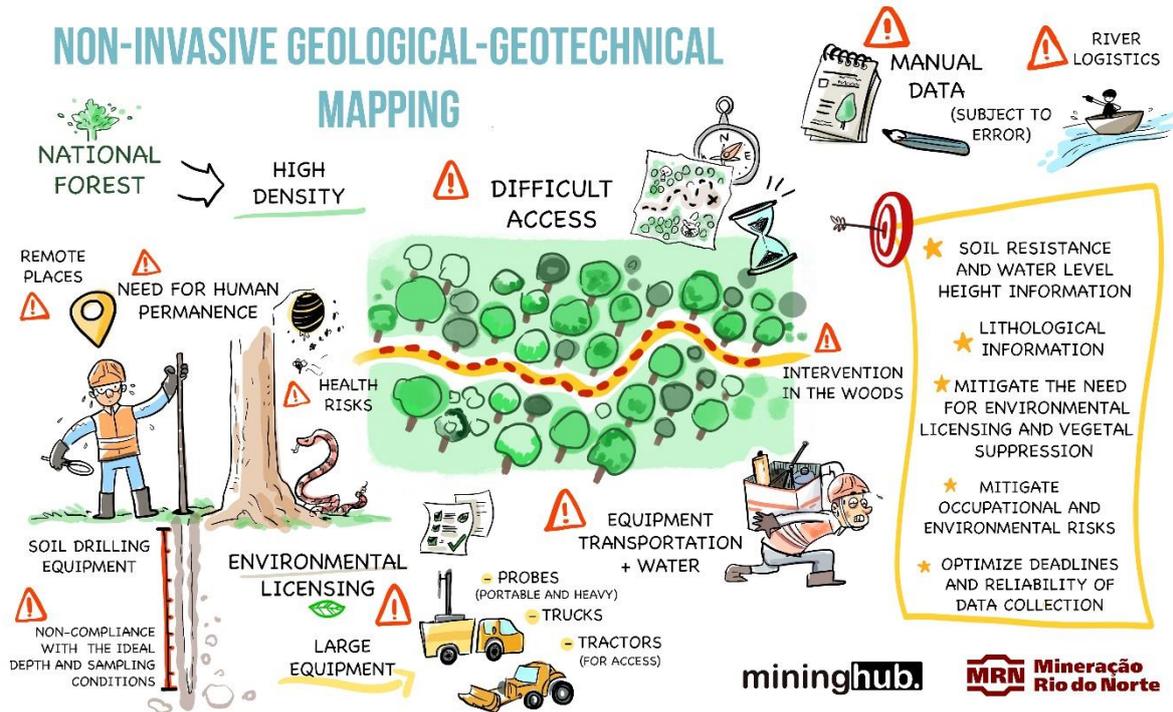
1.1 Recycling project



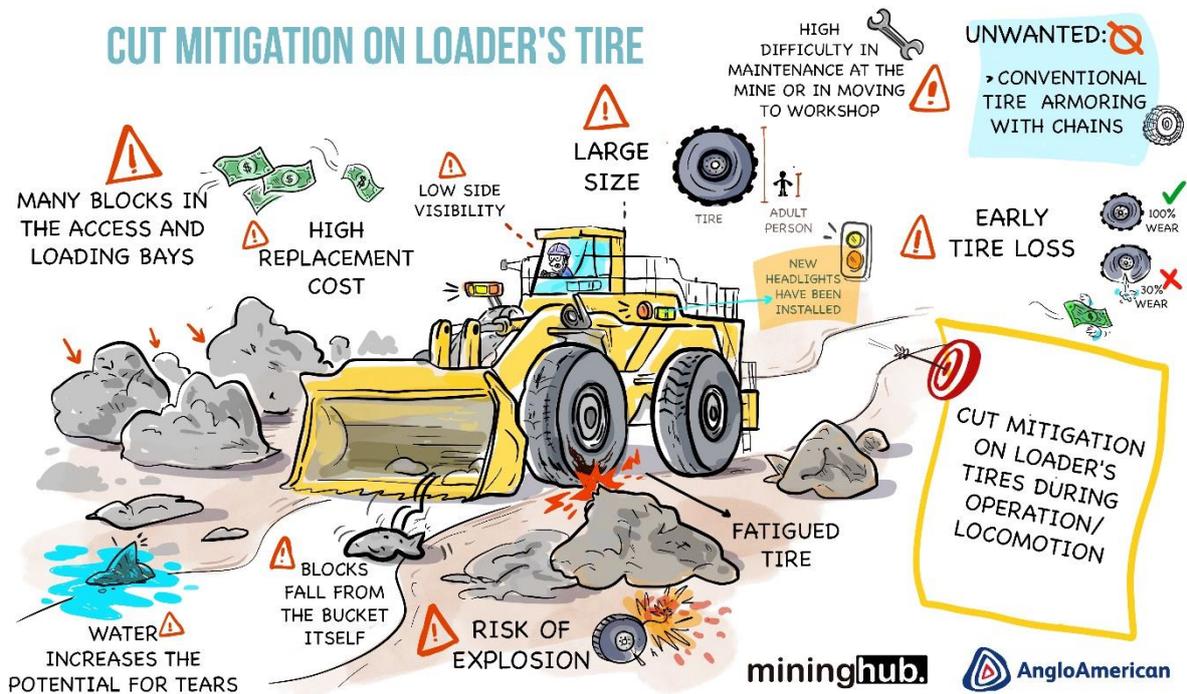
1.2 Reduced response time for particulate control



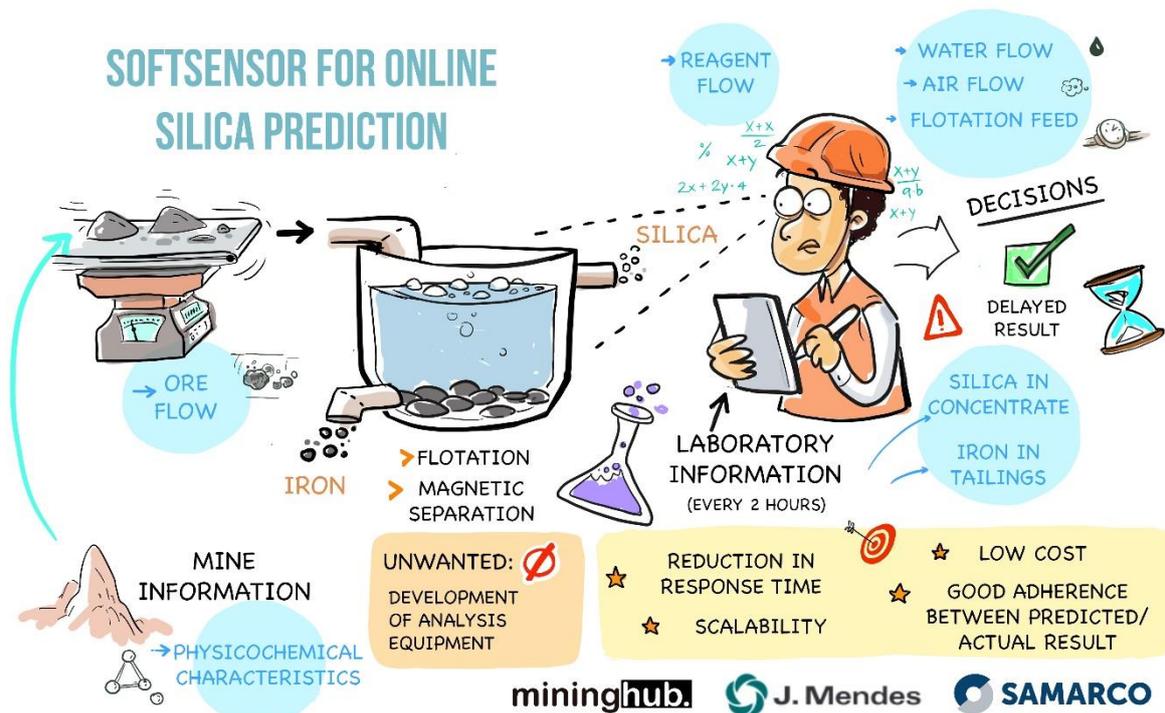
2.1 Non-invasive geological-geotechnical mapping



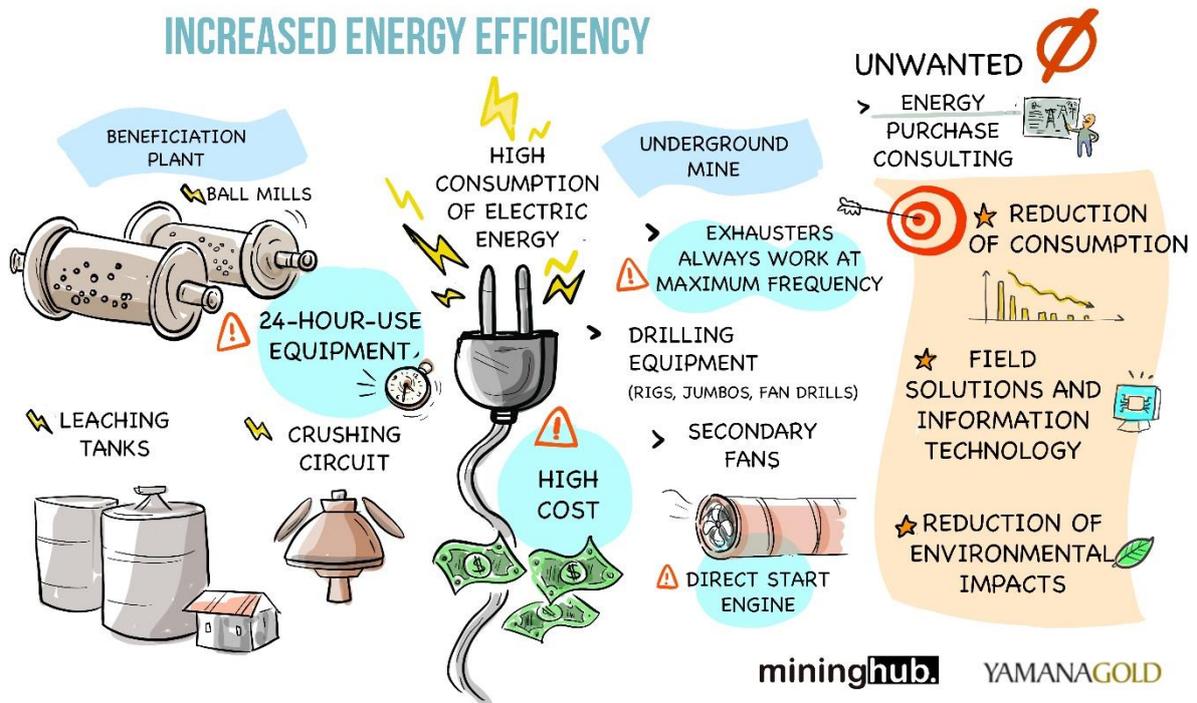
2.2 Cut mitigation on loader's tire



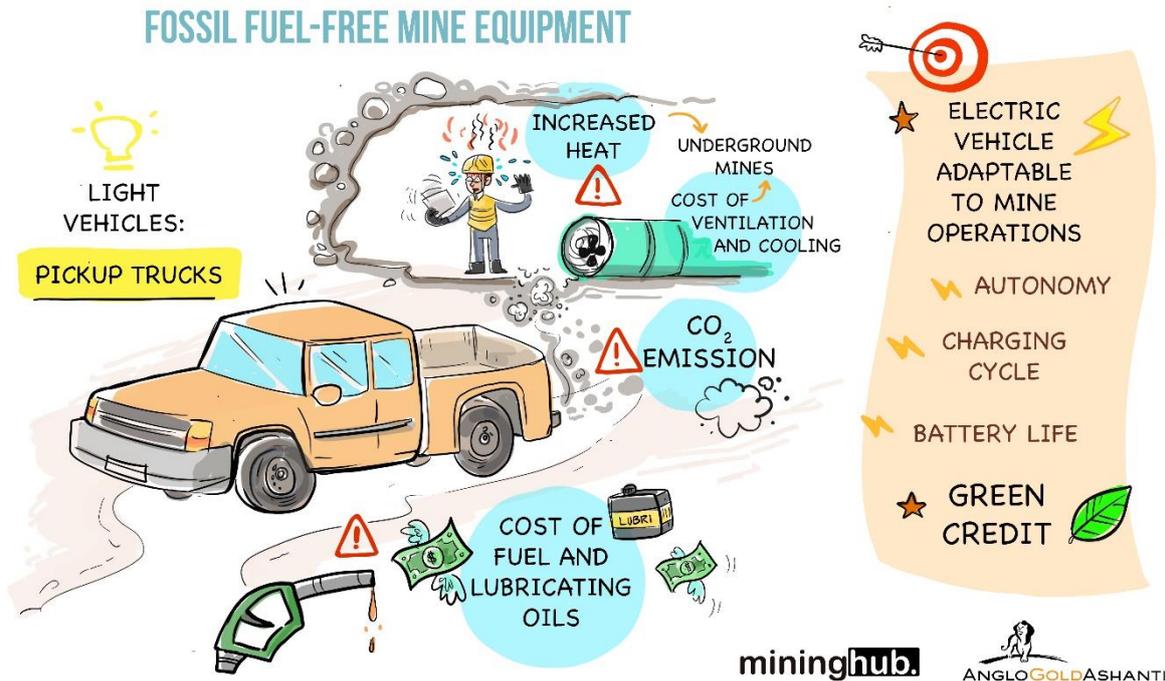
2.3 Softsensor for online silica prediction



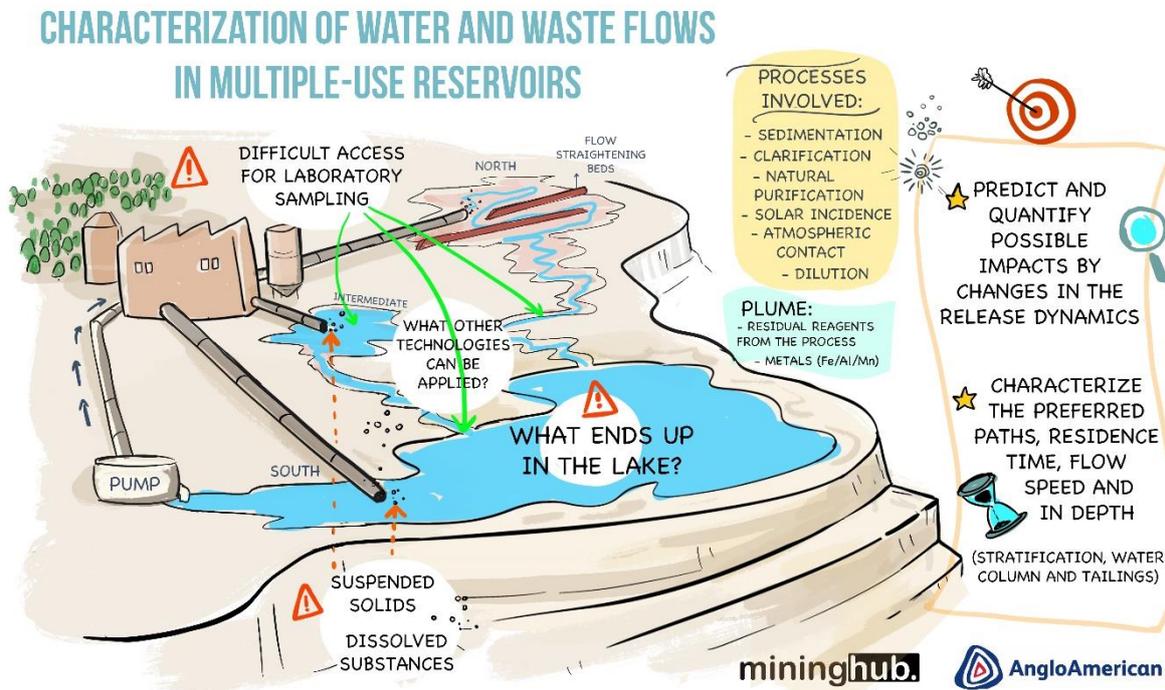
3.1 Increased energy efficiency



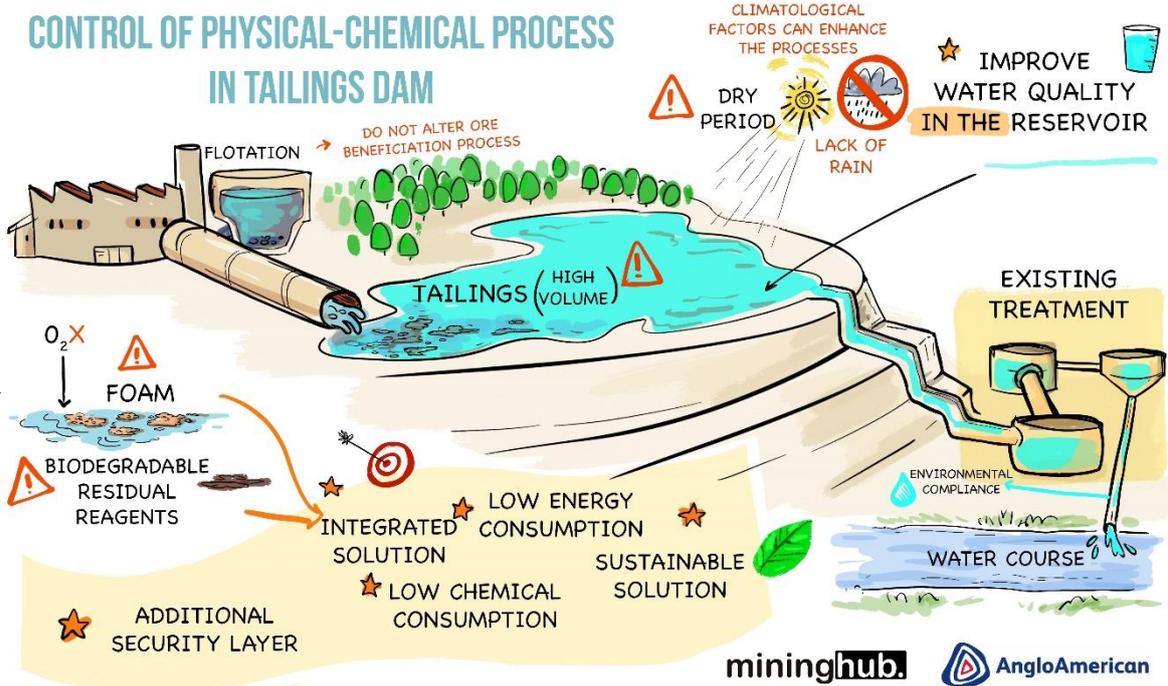
3.2 Fossil fuel-free mine equipment



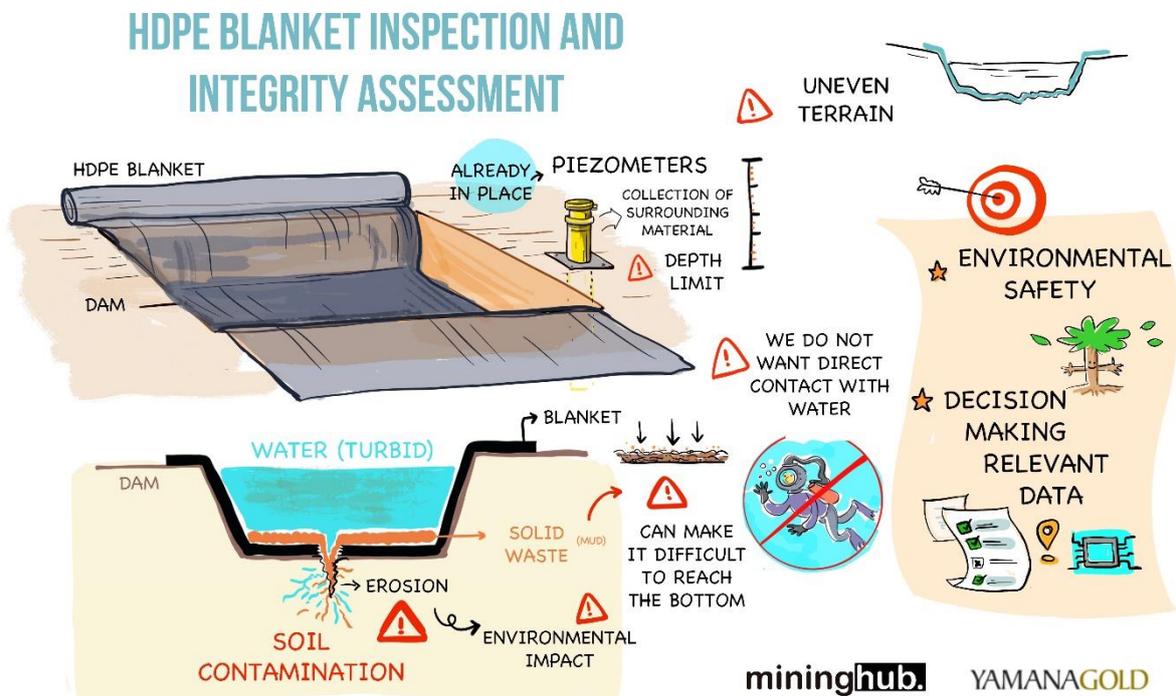
4.1 Characterization of water and waste flows in multiple-use reservoirs



4.2 Control of physical process in tailings dam



5.1 HDPE blanket inspection and integrity assessment



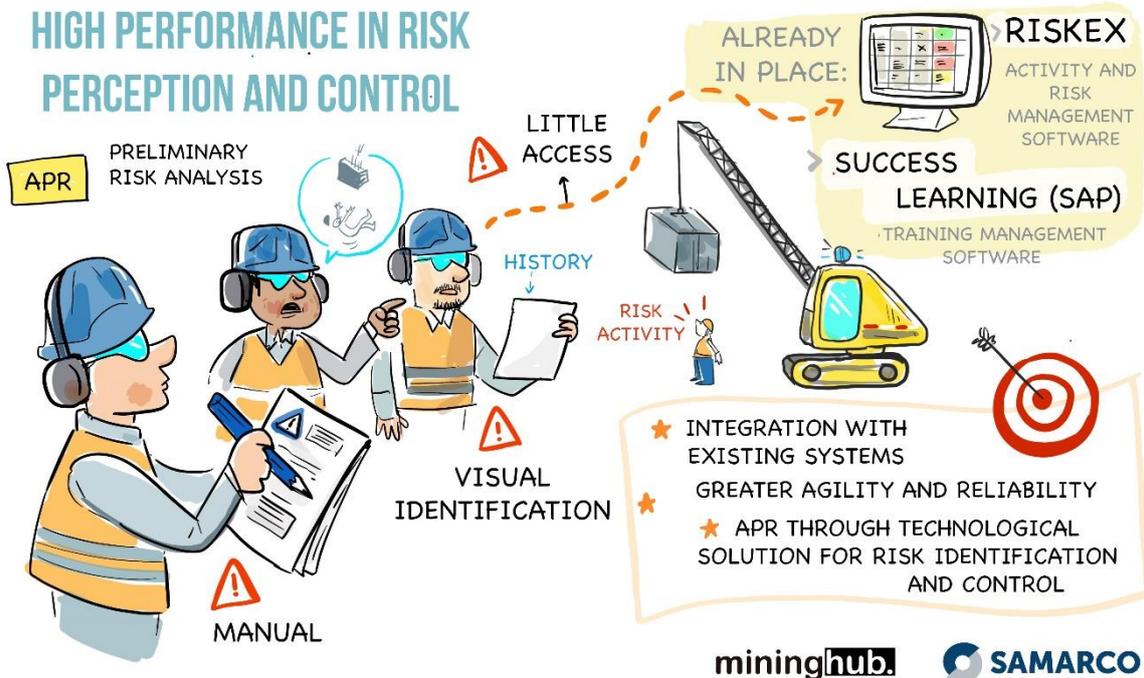
5.2 Transformation of gold mining tailings into co-products

TRANSFORMATION OF GOLD MINING TAILINGS INTO CO-PRODUCTS

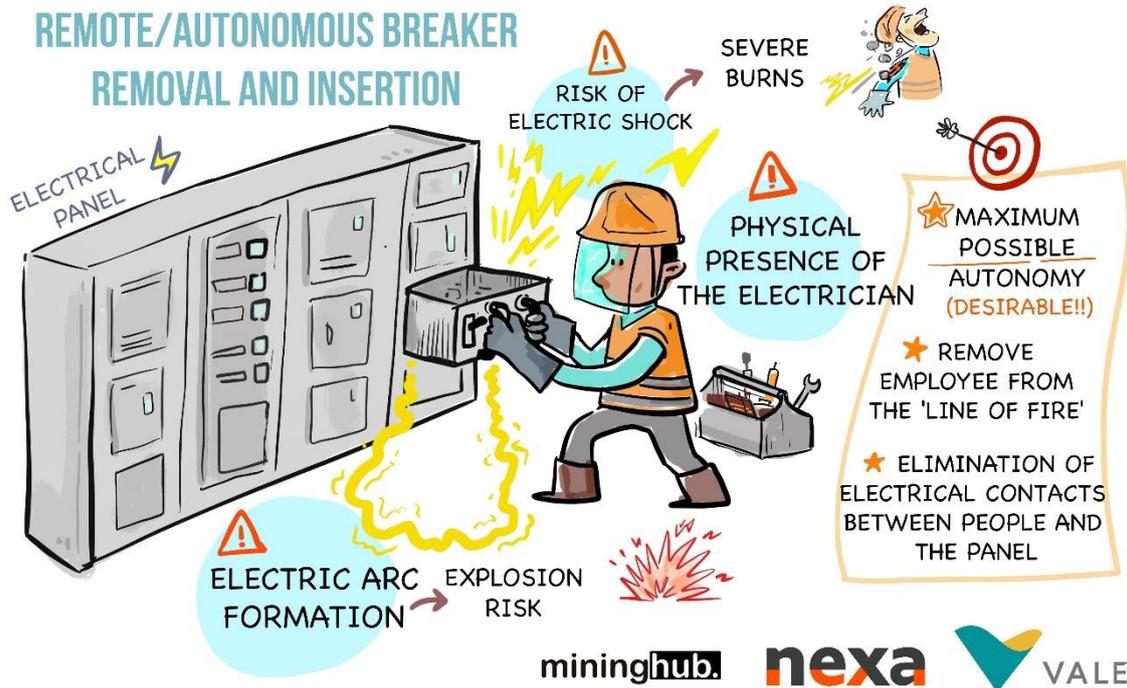


6.1 High performance in risk perception and control

HIGH PERFORMANCE IN RISK PERCEPTION AND CONTROL



6.2 Remote/autonomous breaker removal and insertion



6.3 Reduction employee exposure to risk and effort during drum coating removal

