Annual Report 2019

Mining innovation for a sustainable future
“Sustainability and reduced climate impact are the industry’s highest priority. SIP STRIM has a strong focus on these issues and this will continue during the next program period.”

Pia Lindström, Chairman of the board
A year with gathered strength in focus

When we sum up 2019 and add it to the books, it is a very fruitful year that we can look back on. Six years of work with mining innovation in focus has resulted in many good results and innovations that I can proudly see have led the Swedish mining industry in the right direction.

At the program office, we see 2019 as the year of the roadmaps. During the spring, the new research and innovation agenda was released, which is the result of gathered strength from the industry, and then more roadmaps have come at a rapid pace. The roadmaps “Roadmap for a competitive and fossil-free mining and mineral industry”, “Mining and mineral industry in a sustainable future” and “Competence roadmap: The road ahead for the mining and steel nation Sweden” focus on issues that are important for the industry, sustainability, climate impact and competence enhancement, and all roadmaps are extremely important documents that pave the way to meet industry’s highest goals.

During the latter part of the year, we have worked extensively with internationalisation and influence work, which we believe will yield good results in 2020. SIP STRIM’s role is to drive innovation, stimulate the Swedish innovation system and leverage major investments, something that we have with us several successful examples of where we with small effort managed to create large significant projects and initiatives. Our total contribution of 4.3 MSEK has given us 188 MSEK back, in the form of EU funding for mining innovation projects to our actors.

Something else that has been very positive for the program and that enables investments of the size required, is the increased staffing of the program office during the year, and we look forward to continuing with the same strong mass in the coming years to meet the industry’s expectations and to drive Swedish mining innovation forward.

2019 was another year that SIP STRIM led the mining industry towards a more innovative and sustainable world. I hope you join us in 2020!

Jenny Greberg
Program Director

“The demand for sustainably produced metals is increasing, and it is important to have a working traceability system in place as soon as possible. The Swedish industry have great opportunities through this to contribute to a sustainable future in a significant way, while at the same time providing competitive advantages and driving other actors towards a more sustainable production. It is gratifying that the initial feasibility study on traceability is now being followed by a pilot project, and the constellation of actors in the project, with everything from the mining companies to Volvo and Scania guarantees good results.”

Jenny Greberg, Program director
SIP STRIM brings together the mining cluster around innovation

Society faces major challenges, primarily related to climate and environmental impacts, but also challenges related to competitiveness. Collaboration within the Swedish mining cluster is unique and SIP STRIM is an important instrument for supporting and driving that collaboration so that we can jointly achieve our high goals.

As Chairman of the Board, I see great importance and potential in the industry having a strategic innovation program that is fully integrated with industry and the industry organisation. This enables the joining of forces required for the Swedish players to continue to be world leaders and show the way towards the sustainable and efficient mining industry of the future.

In 2019, the first five strategic innovation programs underwent a thorough six-year evaluation. The evaluation concluded that the programs are good tools for collaboration and an effective way for all actors to gather. I am proud to announce that SIP STRIM’s evaluation results, which we received in December, gave us an acknowledgment of the program’s value and that the industry is committed to supporting the SIP.

I feel both proud and confident in the fact that we have created a strategic innovation program with wide breadth that can develop our industry and solve problems along the entire value chain. SIP STRIM raises issues ranging from exploration and characterisation to equality, diversity and social issues. The program was the first of the strategic innovation programs to put gender equality and diversity high on the agenda, and it is nice to see that it has produced results. In 2019, we approached an increasingly gender-balanced project portfolio with a total of 40% female project managers for our projects.

I look forward to the second half of SIP STRIM’s operating period, which I know will give the Swedish mining industry the opportunity to take ever greater strides in innovation!

Pia Lindström
Chairman of the Board
This is SIP STRIM

SIP STRIM is the strategic innovation program for the mining and metal producing industry and is one of seventeen national strategic innovation programs supported by Vinnova, the Swedish Energy Agency and Formas.

IN ANSWER TO SOCIETAL CHALLENGES
The program aims to create conditions for international competitiveness and sustainable solutions to global societal challenges, such as access to raw materials and sustainable raw material production. Within the program, companies, academia and other organizations work together to contribute to new innovations.

INNOVATION AT THE FOREFRONT
Sweden’s mining and metal producing industry is already at the forefront today and in order to constantly improve, the industry has gathered strength and developed a national strategic research and innovation roadmap for the Swedish mining, mineral and metal producing industry. SIP STRIM works along the entire value chain, which is addressed in the third edition of the roadmap. The value chain ranges from exploration, resource characterization, mining, mineral technology, metallurgy and recycling for both mining companies and suppliers. The areas of environmental performance, attractive workplaces, as well as gender equality and diversity are integrated and prioritized throughout the value chain, and the areas of social acceptance and the provision of skills are central.

ACTIVITIES THAT MAKE A DIFFERENCE
All efforts made by the program aim to realize the roadmap’s visions. The program’s efforts range from strengthening Swedish innovation capacity in the area, to supporting and initiating projects and other activities that enable research, development and innovation, to promote the social benefit of the industry and to work for social acceptance and to promote secure competence provision.

Vision: A world leading mining and mineral producing industry contributing to a sustainable society
**SIP STRIM in numbers**

**LEVERAGE**

4,3 MSEK 188 MSEK

Since start:
4,3 MSEK gives 188 MSEK

**GENDER EQUALITY**

Project leaders all projects

2019:
54 % female / 46 % male

Since start:
41 % female / 59 % male

**PROJECTS**

<table>
<thead>
<tr>
<th>LAUNCHED PROJECTS 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-scale projects</td>
</tr>
<tr>
<td>Pilot projects</td>
</tr>
<tr>
<td>Pre-studies</td>
</tr>
<tr>
<td>Strategic projects</td>
</tr>
<tr>
<td>Leverage projects</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>3</td>
</tr>
</tbody>
</table>

2019:
53 on-going projects

Since start:
134 total projects

**PARTNERS**

25 New 2019

13 International

152 Total, since start

**PROGRAM BUDGET**

69 242 195 SEK / 38 862 000 SEK

2019:
Total / public financing

394 200 449 SEK / 208 220 490 SEK

Total, since start:
Total / public funding
Organization

SIP STRIM is chaired by a Board of directors whose members are appointed by the various organizations that collaborate within the program. The day-to-day activities are managed by the program office hosted by Luleå University of Technology. In addition, there is an advisory body, the Executive committee, which together with the program office is responsible for the thematic development of SIP STRIM’s focus areas.

Anyone who wishes to contribute to realizing the goals and visions described in the Strategic research and innovation roadmap for the Swedish mining, mineral and metal producing industry is welcome to take part in the activities of SIP STRIM.

BOARD OF DIRECTORS
Pia Lindström, Boliden (acting chairman)
Monika Kristel Hernblom, Boliden (deputy chair)
Susanne Rostmark, LKAB
Göran Tuomas, LKAB (deputy)
Åsa Gabrielsson, Episrc
Anders Gustafsson, Zinkgruvan Mining
Katarina Malaga, RISE
Johan Eriksson, Swerim (deputy)
Karin Högdahl, Uppsala University
Thomas Kalscheuer, Uppsala University (deputy)
Pär Weihe, Luleå University of Technology
Charlotta Johansson, Luleå University of Technology (deputy)
Susanne Gylesjö, Vinnova (adjunct)
Maria Sunér Fleming, Sverim (adjunct)

EXECUTIVE COMMITTEE
Niklas Juhojuntti, LKAB
Nikolaos Arvanitidis, SGU
Peter Holmes, Uppsala University
Åke Krukka, Episrc
Lars Malmgren, LKAB
Erling Nordlund, Luleå University of Technology
Hamid Manoucheheri, Sandvik
Kari Niiranen, LKAB
Anders Sand, Boliden
Johan Eriksson, Swerim
Monika Hernblom, Boliden
Karin Willquist, RISE
Lars-Åke Lindahl, Sverim
Lotta Lauritz, LKAB
Patrik Söderholm, Luleå University of Technology
Lena Abrahamsson, Luleå University of Technology
Kurt-Ove Åhs, Boliden
Pär-Erik Martinsson, SIP PiiA
Rikard Mäki, Boliden
Robert Mäkelä, ABB

PROGRAM OFFICE
Niclas Dahlström, Project Manager
Lawrence Hooey, Technology and Innovation Manager
Jenny Groberg, Program Director
Terese Mello, Communications Manager
Matz Sandström, Project Manager
“The evaluation shows that the programs have contributed to increased knowledge, new collaborations and to companies investing in research and innovation in Sweden. This type of player-driven national investment is becoming increasingly important to keep pace with the rapid societal changes that are taking place in Sweden and globally.”
Darja Isaksson, Director General of Vinnova

Six-year evaluation of SIP STRIM

The first five strategic innovation programs underwent a major six-year evaluation during the year. The programs evaluated are Lättvikt, Metalliska material, Processindustriell IT och automation (PiiA), Produktion2030 and SIP STRIM.

The evaluation has shown that the investment in strategic innovation programs has led to broad collaboration, the spread of technology across traditional industry boundaries and strengthened international competitiveness of the participants.

For SIP STRIM, the evaluation shows that the program greatly contributes to strengthened competitiveness and thereby growth. The key actors in the Swedish mining and metal mining sector have succeeded in mobilizing with strong collaboration. Furthermore, it was shown that SIP STRIM has been successful with external monitoring and internationalization. In several cases, leverage has been created for carrying innovations further to larger EU projects. The evaluation shows that we have worked effectively to stimulate innovation and promote participation among SMEs with our annual innovation idea competition being a good example. Our focus on, and success with gender equality issues was raised, and we will continue this work. It has also been noted that the scientific publications from the projects are published in highly ranked journals.

In summary, the evaluation shows that SIP STRIM is a well-functioning program that delivers good results. The evaluation also shows that SIP STRIM has an important role to play in gathering the power needed to achieve the industry’s ambitious goals regarding sustainability and competitiveness.

The national strategic research and innovation roadmap sets our sights

Swedish mining companies, technology providers, universities and research institutes have jointly developed a common strategic research and innovation roadmap for the Swedish mining, mineral and metal producing industry that is revised every third year. The third update of the roadmap was released at this years Bergforsk- och STRIMdagarna, May 15 at Kulturens hus in Luleå.

The aim of this national research and innovation roadmap is to jointly define the challenges, objectives and activities that are relevant and describe how research and innovation will further strengthen the competitiveness and sustainability of the mining and metal-producing industry including equipment supplier and services sector. Bringing together all stakeholders to create a common vision and identifying the key industry-wide challenges further enhances our collaborative approach which is recognised internationally as a fundamental strength of our innovation system.
Events and activities during 2019

1 MARCH
Launch of projects approved in 2018 call

15 MAY
Launch of 2019 open call for projects

13 FEBRUARY
Pitch event SIP STRIM and Eit RawMaterials Innovation idea competition

15–16 MAY
Bergforsk- och STRIMdagarna
Photo: Anders Ahn

1–4 JULY
Almedalen

27–28 MARCH
GMG Forum: Future Mining Forum

4–5 JUNE
MINEXS workshop

10 AUGUST–OCTOBER
Call information sessions held around Sweden

1 OCTOBER
SIP STRIM Program day

7–11 OCTOBER
Swedish Brazilian Innovation week

7 NOVEMBER
AI workshop - Hype or Hope?

1 OCTOBER
SIP STRIM Swedish Mining Innovation Award at Svemin’s Autumn meeting

7 NOVEMBER
Close of 2019 open call for projects
Open call projects launched in 2019

The open call for the year attracted a broad range of technological innovation projects representing all segments of the value chain for mining and metals from exploration to recycling.

Eight pre-studies, four full-scale and one pilot project were launched. Digitalization and automation for safer and more efficient mining and metal production processes are well represented. Sustainability and environmental challenges include metal supply from recycling, innovation critical metal (Li), replacement of toxic chemicals with sustainable forest product-based flotation agents and flexible use of raw and secondary materials, and improved environmental controls. Eleven new actors were engaged in the projects. There was also the highest ratio of women to men project leaders in all open calls so far at 62%/38% which helped to raise the overall program to the desired gender balance.

Project descriptions are available on SIP STRIM and Vinnova’s website.

PRE-STUDIES

Digital driver support for interaction between vehicles in mining environments
RISE Research Institutes of Sweden AB, RISE ICT/Interactive PiXeå
Granted funding: SEK 500 000
Total budget: SEK 827 000
Partners: Epiroc Rock Drills AB, Mobilaris AB, Scania CV AB

Developing a numerical tool to optimise mining sequences and minimize seismic hazard using mine stiffness concept
Luleå University of Technology
Granted funding: SEK 487 500
Total budget: SEK 650 000
Partners: LKAB

Platinum-group elements in Swedish Ni-Fe-Cu sulfides
Luleå University of Technology
Granted funding: SEK 469 000
Total budget: SEK 625 000
Partners: University of Barcelona

Energy Efficiency in Rocks Comminution using High Power Microwaves
Uppsala University
Granted funding: SEK 500 000
Total budget: SEK 670 000

Distance, Awareness and Orientation: Exploring Augmented Reality Applications for the Deep Mining Industry
Boris Design Studio AB
Granted funding: SEK 469 000
Total budget: SEK 625 000
Partners: Mine Tec, RISE Research Institutes of Sweden AB

Efficient metalpowder process with innovative sensor technique
RISE Research Institutes of Sweden AB, RISE Acero
Granted funding: SEK 400 000
Total budget: SEK 540 000
Partners: Höganäs AB

GRAV – mining value change
RISE Research Institutes of Sweden AB
Granted funding: SEK 431 000
Total budget: SEK 702 000
Partners: Karlstad Innovation Park, Sticky Beat AB, Up is down AB, Voestalpine precision strip AB

FULL-SCALE PROJECTS

Automated Drill Planning for Multiple-Boom Rigs in Underground Mining
Örebro University
Granted funding: SEK 4 608 000
Total budget: SEK 8 078 926
Partners: Alfred Nobel Science Park, Epiroc Rock Drills AB, Zinkgruvan mining AB

Organosolv lignin hydrophobic nanoparticles as low-carbon-footprint biodegradable flotation collectors
Luleå University of Technology
Granted funding: SEK 2 399 000
Total budget: SEK 4 799 416
Partners: Akzo Nobel Surface Chemistry AB, Boliden Mineral AB, Sveaskog förvaltnings AB

SO4-BIORED Demonstration of biological sulfate reduction in cold climates
RISE Research Institutes of Sweden AB
Granted funding: SEK 1 632 000
Total budget: SEK 3 265 175
Partners: Boliden Mineral AB, Fortum waste solutions AB

Optimized roasting of complex copper sulphide concentrates for flexible raw material utilization
Luleå University of Technology
Granted funding: SEK 4 072 000
Total budget: SEK 8 148 945
Partners: Boliden Mineral AB (Smelters and Mines), Semtech Metallurgy AB

PILOT PROJECT

Improved resource efficiency through dynamic loading control II
Luleå University of Technology
Granted funding: SEK 3 356 000
Total budget: SEK 7 263 711
Partners: Agco system och kompetens i Skandinavien AB, LKAB
Completed open call projects 2019

**PRE-STUDIES**
- **Stochastic Mine Design**
  - Gosselin Mining
  - Granted funding: SEK 350 000
  - Total budget: SEK 1 000 000
  - Partners: Sofreco, McEwen Mining Inc.
  - Innovative DTH drill monitoring - a pre study
    - Luleå University of Technology
    - Granted funding: SEK 496 000
    - Total budget: SEK 496 000
    - Partners: Epiroc Rock Drills, LKAB

**FULL-SCALE PROJECTS**
- **PREP – Primary resource efficiency by enhanced prediction**
  - Luleå University of Technology
  - Granted funding: SEK 4 550 000
  - Total budget: SEK 15 767 019
  - Partners: Lundin Mining, LKAB, Boliden, Chalmers University of Technology, Outotec
  - Innovative quality assured fayalite slag products (IQSLAG)
    - Luleå University of Technology
    - Granted funding: SEK 4 351 000
    - Total budget: SEK 8 113 798
    - Partners: Nordkal, Boliden Mineral AB, Pebd, Xore AB

- **SafePos II – Safety positioning for the mining industry II**
  - RISE Research Institutes of Sweden AB
  - Granted funding: SEK 500 000
  - Total budget: SEK 666 666
  - Energy efficiency in rocks comminution using high power microwaves
    - Uppsala University
    - Granted funding: SEK 500 000
    - Total budget: SEK 670 000

  - Efficient metalpowder process with innovative sensor technique
    - RISE Research Institutes of Sweden AB
    - Granted funding: SEK 400 000
    - Total budget: SEK 540 099
    - Partners: Höganas

  - Platinum-group elements in Swedish Ni-Fe-Cu sulfides
    - Luleå University of Technology
    - Granted funding: SEK 469 000
    - Total budget: SEK 625 000
    - Partners: University of Barcelona

**END 2019**
- **Exploring alternative sustainable futures for the Swedish mining industry**
  - The purpose of the project is to highlight the role of the mining and minerals industry and the interaction with society in sustainable social transformation and, together with various relevant stakeholders in society, discuss and drill into the importance of the mining and mineral industry in a sustainable society and the challenges and opportunities it faces. The goal is a picture of the future mining and mineral industry role in sustainable social development and a strategic activity program to navigate from behind for a clear contribution to sustainable social development in the continued operations.
  - Coordinator: Swemin AB
  - Granted funding: SEK 2 265 000
  - Total budget: SEK 2 685 000

- **Hard Rock Tour 2019**
  - The purpose of the Hard Rock Tour activity is to inspire and inform them about their choices for further studies in topics related to the mining industry. The plan is to create a tour where the program with connection to the mining industry is packaged in a concept that is continuously updated geological models will give better understanding of the rock and ore body.
  - Coordinator: Nordic Rock Tech Centre
  - Granted funding: SEK 691 000
  - Total budget: SEK 1 997 000

**Roadmap for a fossil-free mining and mineral industry**
- The roadmap describes how fossil freedom can be achieved in the mining and mineral industries. It works inter alia as a tool for strategic planning before and during the transition and shows how technology, investments, policies, and systems need to be developed in interaction. The roadmap has identified priority areas for innovation, as well as already on-going projects. It has been used and can be used to improve dialogue within and outside the industry.
  - Coordinator: RISE Research Institutes of Sweden AB
  - Granted funding: SEK 1 066 357
  - Total budget: SEK 1 222 357

**Completed open call projects 2019**

**Strategic initiatives and projects 2019**

**ENDED 2019**
- **Exploring alternative sustainable futures for the Swedish mining industry**
  - The purpose of the project is to highlight the role of the mining and minerals industry and the interaction with society in sustainable social transformation and, together with various relevant stakeholders in society, discuss and drill into the importance of the mining and mineral industry in a sustainable society and the challenges and opportunities it faces. The goal is a picture of the future mining and mineral industry role in sustainable social development and a strategic activity program to navigate from behind for a clear contribution to sustainable social development in the continued operations.
  - Coordinator: Swemin AB
  - Granted funding: SEK 2 265 000
  - Total budget: SEK 2 685 000

**Roadmap for a fossil-free mining and mineral industry**
- The roadmap describes how fossil freedom can be achieved in the mining and mineral industries. It works inter alia as a tool for strategic planning before and during the transition and shows how technology, investments, policies, and systems need to be developed in interaction. The roadmap has identified priority areas for innovation, as well as already on-going projects. It has been used and can be used to improve dialogue within and outside the industry.
  - Coordinator: Nordic Rock Tech Centre
  - Granted funding: SEK 691 000
  - Total budget: SEK 1 997 000

- **Exploring alternative sustainable futures for the Swedish mining industry**
  - The purpose of the project is to highlight the role of the mining and minerals industry and the interaction with society in sustainable social transformation and, together with various relevant stakeholders in society, discuss and drill into the importance of the mining and mineral industry in a sustainable society and the challenges and opportunities it faces. The goal is a picture of the future mining and mineral industry role in sustainable social development and a strategic activity program to navigate from behind for a clear contribution to sustainable social development in the continued operations.
  - Coordinator: Swemin AB
  - Granted funding: SEK 2 265 000
  - Total budget: SEK 2 685 000

**END 2019**
- **Exploring alternative sustainable futures for the Swedish mining industry**
  - The purpose of the project is to highlight the role of the mining and minerals industry and the interaction with society in sustainable social transformation and, together with various relevant stakeholders in society, discuss and drill into the importance of the mining and mineral industry in a sustainable society and the challenges and opportunities it faces. The goal is a picture of the future mining and mineral industry role in sustainable social development and a strategic activity program to navigate from behind for a clear contribution to sustainable social development in the continued operations.
  - Coordinator: Swemin AB
  - Granted funding: SEK 2 265 000
  - Total budget: SEK 2 685 000

**Roadmap for a fossil-free mining and mineral industry**
- The roadmap describes how fossil freedom can be achieved in the mining and mineral industries. It works inter alia as a tool for strategic planning before and during the transition and shows how technology, investments, policies, and systems need to be developed in interaction. The roadmap has identified priority areas for innovation, as well as already on-going projects. It has been used and can be used to improve dialogue within and outside the industry.
  - Coordinator: Nordic Rock Tech Centre
  - Granted funding: SEK 691 000
  - Total budget: SEK 1 997 000

**Roadmap for a fossil-free mining and mineral industry**
- The roadmap describes how fossil freedom can be achieved in the mining and mineral industries. It works inter alia as a tool for strategic planning before and during the transition and shows how technology, investments, policies, and systems need to be developed in interaction. The roadmap has identified priority areas for innovation, as well as already on-going projects. It has been used and can be used to improve dialogue within and outside the industry.
  - Coordinator: Nordic Rock Tech Centre
  - Granted funding: SEK 691 000
  - Total budget: SEK 1 997 000

**Roadmap for competency supply for the Swedish mining and steel industry**
- The aim of the project was to clarify the needs and challenges of the mining and steel industry regarding the ability to secure future skills and competences. This was partly done to enable the trade and employers’ organisations and the companies to prioritise their future investments. The aim of the project was to create a roadmap for the provision of future competences and skills that is well worked through and established. The created roadmap is well established by the industries, clear and fulfils the aim and purpose of the project fully.
ON-GOING
Integrated Smart Test environment for the mining industry – SMIG
Co-operation with SIP PiA
The degree of automation and digitisation are constantly growing in the mining industry. Mining companies, for example, invest a lot into removing people from the production front, aiming at improving both safety and efficiency. The development requires new solutions and products, solutions and products that need to be tested in reliable and efficient test beds. A first step of the project is to map the current situation to identify possibilities for test activities and product development. A first version of an integrated, smart test bed will be produced. The new test bed must be able to handle several delicate problems. For example, the test bed should be able to take into account if there is competition between participating actors because all actors may not want to share all their results. Other important aspects are related to business models to develop how the SMIG test bed will be financed and organised, and how can it support evaluation of new business models.
Coordinator: Svemin AB
Granted funding: SEK 1 481 016
Total budget: SEK 1 481 016
SIP STRIM Performance Assessment and Sustainability Baseline
The aim of the Project is to i) establish a baseline of sustainable related data for the Swedish mining and metal extraction industry and develop a database which will host sustainability related data ii) analysis over time of the efficiency of SIP STRIM program related to the program’s targets.
Coordinator: Swedish Geological AB
Granted funding: SEK 1 043 000
Total budget: SEK 1 043 000
Traceability – for sustainable metals and minerals
The project developed a concept for a traceability system for copper. The system enables stakeholders early in the value chain to use sustainability as a competitive advantage and enable customers in the whole value chain to demand and buy sustainable certified copper. Mapping the copper flow was a challenge as players in the value chain are reluctant to share the information, but the project was able to create a sufficiently good understanding of the flow to achieve the project goals. The steering committee is now committed to testing the developed system in a pilot study.
Coordinator: RISE Research Institutes of Sweden AB
Granted attracting: SEK 1 944 811
Total budget: SEK 2 244 811
Traceability – a pilot for sustainable metals and minerals
The purpose is to arrange a national summer program where students work on thematic innovation cases within the mines and minerals value chain. Four students divided into two teams complete two innovation cases in 2020. The innovation case has either been brought closer to the market or they have been dismissed, so-called fail-fast. The program and the innovation cases have been exposed to actors in the industry and in the innovation system.
Coordinator: LTU Business
Granted funding: SEK 360 000
Total budget: SEK 440 000
SIPS VR-mine in Teknikens Hus
The purpose of this project is to awaken curiosity and show how a state-of-the-art mine works. Goal - Together with SIMS mining create an exhibition where the visitor gets a good understanding in how a modern mine works. -To stimulate curiosity and interest in the mining industry.-To contribute to a more nuanced picture of the importance of mining for further development in society. -Creating an exhibition that appeals to and attracts both boys and girls.
Coordinator: Stiftelsen Teknikenshus
Granted funding: SEK 150 000
Total budget: SEK 150 000
The Swedish mining industry’s current and future relationship with biodiversity
The aim of this project is to produce a description of the current situation and assessment of the future outlook of the Swedish mining industry’s relationship with biodiversity at a comprehensive, strategic level. The goal is to produce a comprehensive position document for the Swedish mining industry on biodiversity issues. The document will cover various aspects of biodiversity issues and include proposals for a strategic roadmap for how the industry should be able to reduce or completely avoid net losses of biodiversity in the future.
Coordinator: Ecogain AB
Granted funding: SEK 690 000
Total budget: SEK 1 010 000
ON-GOING
Virtual Reality Lab LTU
The purpose of the SBN Virtual Reality Lab is to create attractive research and learning environments where academia and industry can meet in order to use virtual environments for visualisation, simulation and analysis of products and processes in areas of excellence in research and innovation. Attractive built environment and Future mining. Our goal is to enable researchers and students to undertake studies in realistic, virtual environments, and in connection to existing research and learning environments at the university.
Coordinator: Luule University of Technology
Granted funding: SEK 1 000 000
Total budget: SEK 6 732 000
Web training; environment and work environment regards at exploration drilling
The purpose is to provide a web-based training for drillers in both exploration drilling and other kinds of drilling. The goal is to increase knowledge and considerations of environmental and work environment aspects, thereby improving safety and environmental performance when drilling. It is possible, if required, to introduce certification linked to completed and approved education.
Coordinator: Svemin AB
Granted funding: SEK 425 000
Total budget: SEK 915 000
The Swedish mining industry’s current and future relationship with biodiversity
The aim of this project is to produce a description of the current situation and assessment of the future outlook of the Swedish mining industry’s relationship with biodiversity at a comprehensive, strategic level. The goal is to produce a comprehensive position document for the Swedish mining industry on biodiversity issues. The document will cover various aspects of biodiversity issues and include proposals for a strategic roadmap for how the industry should be able to reduce or completely avoid net losses of biodiversity in the future.
Coordinator: Ecogain AB
Granted funding: SEK 690 000
Total budget: SEK 1 010 000
Traceability – a pilot for sustainable metals and minerals
This strategic project follows the successful Traceability – for sustainable metals and minerals project which was completed in May 2019. It will develop a pilot system to certify the origin of metals and minerals, the carbon footprint and the percentage of recycled materials - and make it traceable throughout the value chain. The system should be reliable, functional and distributed so that it can be used by various actors in the value chain. Such a system can drive the development towards a more sustainable metal production globally, by giving responsible producers a competitive advantage and improving the conditions and incentives for recycling metals and minerals. TraceMet will be developed and evaluated for both steel and copper flows, two independent value chains. It will highlight opportunities and challenges for developing, implementing and using this type of traceable certification systems. By spreading the results even outside the Swedish mining industry, interest and demand for this type of system solutions is expected to increase. This can lead to a positive spiral that, in the long run, will benefit responsible producers and thus contribute to more sustainable development.
Coordinator: SVemin AB
Granted funding: SEK 360 000
Total budget: SEK 2 060 000
SIP STRIM Innovation Idea Competition

SIP STRIM’s innovation idea competition is an annual upcoming event and was organised for the fifth time in 2019. The competition, which aims to strengthen Swedish competitiveness in the mining and metal-producing industry, is an excellent opportunity for small business owners, entrepreneurs and suppliers to have the opportunity to realize an idea, but also a great opportunity to make contacts with representatives from the industry.

This year’s competition, which was organized together with EIT Raw Materials attracted a record number of applications and from these, the expert jury selected the twelve sharpest innovations that were pitched to the jury and audience on February 13 at Luleå Science Park.

After careful deliberation, it was clear that SIP STRIM’s winner became Atium AB for their idea of efficient and sustainable purification of mercury from water, and EIT’s winners was ReVibe Energy for their idea with wireless recording and analysis of vibration and shock monitoring equipment for mining equipment and industrial environment. The two winning innovators received SEK 600 000 each to realize their idea.

The jury’s motivation reads: “Mercury is one of the ten most dangerous substances for human health, according to WHO. At the same time, it is an extensive global problem. Many industries, including the mining industry, handle mercury in process and waste water. Atium AB develops a more efficient and sustainable technology to selectively clean water from mercury with a reusable filter. The method can clean low concentrations in an energy-efficient manner. The idea has a great development potential because purification of mercury is a global need, and there are also opportunities to develop the method for purifying water from other heavy metals.”

SIP STRIM’s winner – Atium AB, “Innovation for more efficient and sustainable purification of water from mercury”
During the year, a new award, SIP STRIM Swedish Mining Innovation Award was instituted. The award was established to highlight and reward an innovation, project or other that has been of great importance to mining and innovation in Sweden.

The jury’s motivation reads: “The winner of the SIP STRIM Swedish Mining Innovation Award 2019 has, through great inventiveness, found a solution that is a prerequisite for the paradigm shift that the mining industry is facing. The innovation has global potential, and is a fine example of Swedish mining innovation at the forefront. With great innovation they have combined existing technologies and created new flexible solutions that are easily integrated into existing systems. The solution, which is a step towards Industry 4.0 in the mining industry, contributes to increased personal safety, fuel savings and increased productivity.”

Mobilaris

The entire nomination process confirmed that Sweden is rich in fine solutions. From the many nominations submitted to the jury consisting of experts from financier, industry and the industry organisation three finalists were chosen: Boliden for their electric trolley solution in Aitik, Fortum Waste Solution for their innovation around purification of process water and Mobilaris Mining & Civil Engineering for their innovative solution Mobilaris Onboard™. At the awards ceremony at Svemin’s Höstmöte at Nalen on November 27, it was announced that final winner of the first SIP STRIM Swedish Mining Innovation Award was Mobilaris.

The jury also awarded Jan-Eric Sundkvist, Senior Metallurgist at Boliden Mines Technology in Boliden an Honorary Prize. Jan-Eric was nominated by colleagues for the efforts he has made within and for Boliden during a long period of time, and the jury decided that an honorary award was fitting to acknowledge Jan-Eric’s efforts.

Jan-Eric Sundkvist
SIP STRIM PhD network
MINERS – a cluster of future leaders and specialists across Sweden

The purpose of the PhD network is to bringing together doctoral students from different disciplines and universities in Sweden and facilitate dialogue with industry and other stakeholders to give a broad overview of industry in Sweden, allow them to exchange ideas and inform others on education and research opportunities.

This improves contacts between universities and establishes a cross-disciplinary network – a cluster of future leaders and specialists across Sweden.

1ST SIP STRIM PHD NETWORK MINERS WORKSHOP

The network’s first workshop was held in the beginning of June in Gällivare and collected together 24 doctoral students from the Luleå University of Technology, Chalmers, Stockholm University and Outotec. Many of the participants had never visited a mine before, so it was very much appreciated that they were able to visit the Aitik and Malmberget mines and meet company representatives. The participants also presented to each other the projects they are working on, and it was found both interesting and beneficial to listen to related subjects.

AI in Mining

During the year, we conducted a study (Alming) with the aim of identifying areas where AI has the potential to create new values and increase the competitiveness of the Swedish mining industry.

The work has been done in close collaboration with representatives of the industry and its suppliers, but also with research players with specialist expertise in the field. Several actors were interviewed and as part of the study, a workshop was conducted in which the interview results were presented and the participants contributed additional thoughts and ideas. The workshop, which attracted more than 50 participants and also offered inspirational speakers and information about our large companies’ AI initiatives, was much appreciated and we hope for a follow-up in 2020.
Partners

A. AB Sandvik Materials Technology
   ABB Switzerland LTD
   ABB AB
   Actee
   Aiqo system och kompetens AB
   Aktiebolaget Elektrooppaer
   Alecom AB
   Alfred Nobel Science Park AB
   Algoryx simulations
   Askersunds kommun
   Atlas AB
   Atlas Copco Cradelius AB
   Atlas Copco Rock Drills AB

B. Baettt Guldsmesdytta AB
   Bergteamet AB
   Bioprocess Control Sweden AB
   Bjorka Mineral AB
   BreatIT
   Bolinden AB
   Boliden AB
   Boliden Commercial AB
   Boliden Mineral AB
   Boris Design Studio AB
   Borgerald Industries Ltd
   Barfotetagen i Sverige ekonomisk forrening
   Broii Aktiebolag

C. Cameco
   Cedervall Arkitekter AB
   Cementa AB
   Chalmers University of Technology
   Creamus AB

D. Data Ductus
   Des Nedhe Development
   Dragon Mining (Sweden) AB
   Drillcon Scandinavia AB
   Drager Safety Sverige AB
   Ductus Preeye AB

E. Ecorgain AB
   Enetjarn Natur AB
   English River First Nation
   Epirec AB
   Epirec Rock Drills AB
   Ericsson AB

F. Forcit Sweden AB
   Forum Waste Solutions AB
   Fracinus Rock Stress Measurements AB

G. Galvano Tia AS
   Georange
   Global Castings Guldsmeshyttan AB
   Gosselin Mining AB

H. Hedemora Nairingsliv AB
   Hoganas AB
   Hogskolan Dalarna

I. IBM
   IGV Europe AB
   Imega Promotion AB
   Inkoniva AB
   Innan AB
   Innovative Machine Vision Pty Ltd
   Interspino AB
   IVL Svenska Milj uninstitutet AB

J. Jernkontoret
   Johnson Metall AB

K. Karlstad Innovation Park ekonomisk forrening
   Kaunis Iron AB
   Kbolide & Partners AB
   KTH Royal Institute of Technology
   Kuuskoski Sverige AB

L. Linkoping University
   LKAB Kimit AB

M. Maskinteknik i Oskarshamn AB
   MBV Systems AB
   McEwen Mining AB
   Minalyte AB
   Mine Tec Handelsbolag
   Mobilis AB/Mobilis MCE AB
   Mahiralen University

N. Nordic Rock Tech Centre AB
   Norrkal AB
   Northern Mining Products AB
   Nordberg Resources AB
   Nouyrion Surface Chemistry AB

O. Optimisation AB
   Oreibre AB
   Orxy Simulations
   Oskarshamns kommun
   Outotec (Sweden) AB

P. Pajala kommun
   PEAB Anlagning AB
   RISE Processum AB

Q. Ramboll Sverige AB
   Region Dalarna
   RISE Areco AB
   RISE Energy Technology Center AB
   RISE Kimal AB
   RISE Research Institutes of Sweden AB
   RISE Slices AB
   Rubico Consulting AB
   Ruukki Sverige AB

S. Sandvik SRP AB
   Scania AB
   Scania CV AB
   Semtech Metallurgy AB

T. SICS Swedish ICT Vasteras AB
   SKB Näringslivsrutvittning AB
   Skelleftevik kommun
   Sofresco
   SP Energy Technology Centre AB
   SP Process Development AB
   SSAB AB
   SSAB Mex AB
   Stena Recycling AB
   Stens Recycling International AB
   Sticky Beat AB
   Stiftelsen Bergforsk
   Stiftelsen Fraunhofer-Chalmers Centrum för industriematematik
   Stiftelsen Teknikers Hus
   Stockholm Environment Institute AB
   Sustainable AB
   Svezskog Forvaltnings AB
   Swedish Geological AB
   Swemin
   Svensk Kännsrekenhantering AB
   Sveriges geologiska undersökning
   Sveriges Lantbruksuniversitet
   Swerim AB

U. Tailings Consultants Scandinavia AB
   Tacchi Energetik AB
   ThingWave AB

V. Umea University
   UMIT Research Lab
   University of Barcelona
   University of Northern British Columbia
   University of Saskatchewan
   Up is Down AB
   Uppsala University

W. Volvo S.A.
   WideFind AB
   VoestAlpine precision strip AB
   Volvo group purchasing AB

X. Xore AB

Z. Zinkgruvan Mining AB

O. Örebro University
Contact

sipstrim.se
linkedin.com/company/sip-strim
twitter.com/sipstrim
mynewsdesk.com/se/sip-strim