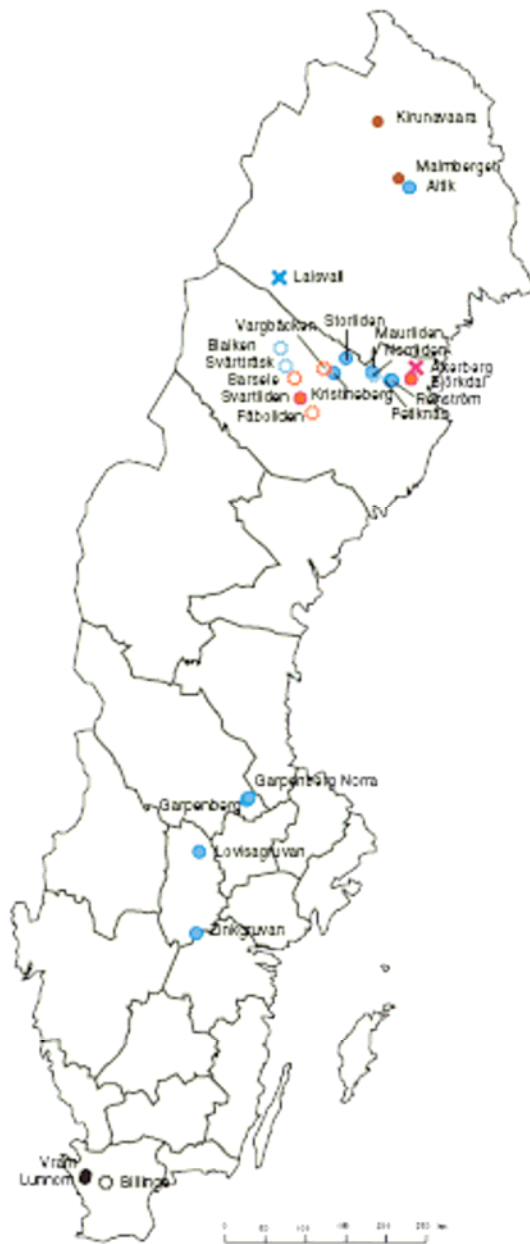


Rock Tech Centre – Status Report

**Bergforsk June 8th, 2006
Luleå**

Göran Bäckblom
MD Rock Tech Centre



MINES IN SWEDEN 2005

- Iron ore
- Sulphide ore
- Gold ore
- Industrial mineral
- In production
- ✕ Recently closed
- Applied for or granted



BERGSSTATEN

Major Swedish mining companies: Small but competitive through innovation and technological excellence

LKAB

BOLIDEN

lundin mining

Competitive suppliers



Basic ideas

- Technological leadership is necessary to stay competitive and for meeting current and future requirements.
- Leadership is maintained by close co-operation between operators, suppliers and academia toward a common objective.
- Rock Tech Centre is created to solve problems within mining and rock engineering, to move theory into practice and to shorten lead time from idea to product

Strategic Research & Development Groups

Operates on fully commercial conditions – no public funding



Mining & rock technology
RTC
ROCK TECH CENTRE

Management of Technology and Innovations



Recycling
MiMeR
i samverkan med
VINNOVA

Blasting research
Swebrec
Swedish Blasting Research Centre

Particle research
ARC
AGRICOLA RESEARCH CENTRE

Gauge & sensor technology



Centre for railroad technology

Exploration
CTMG 2*

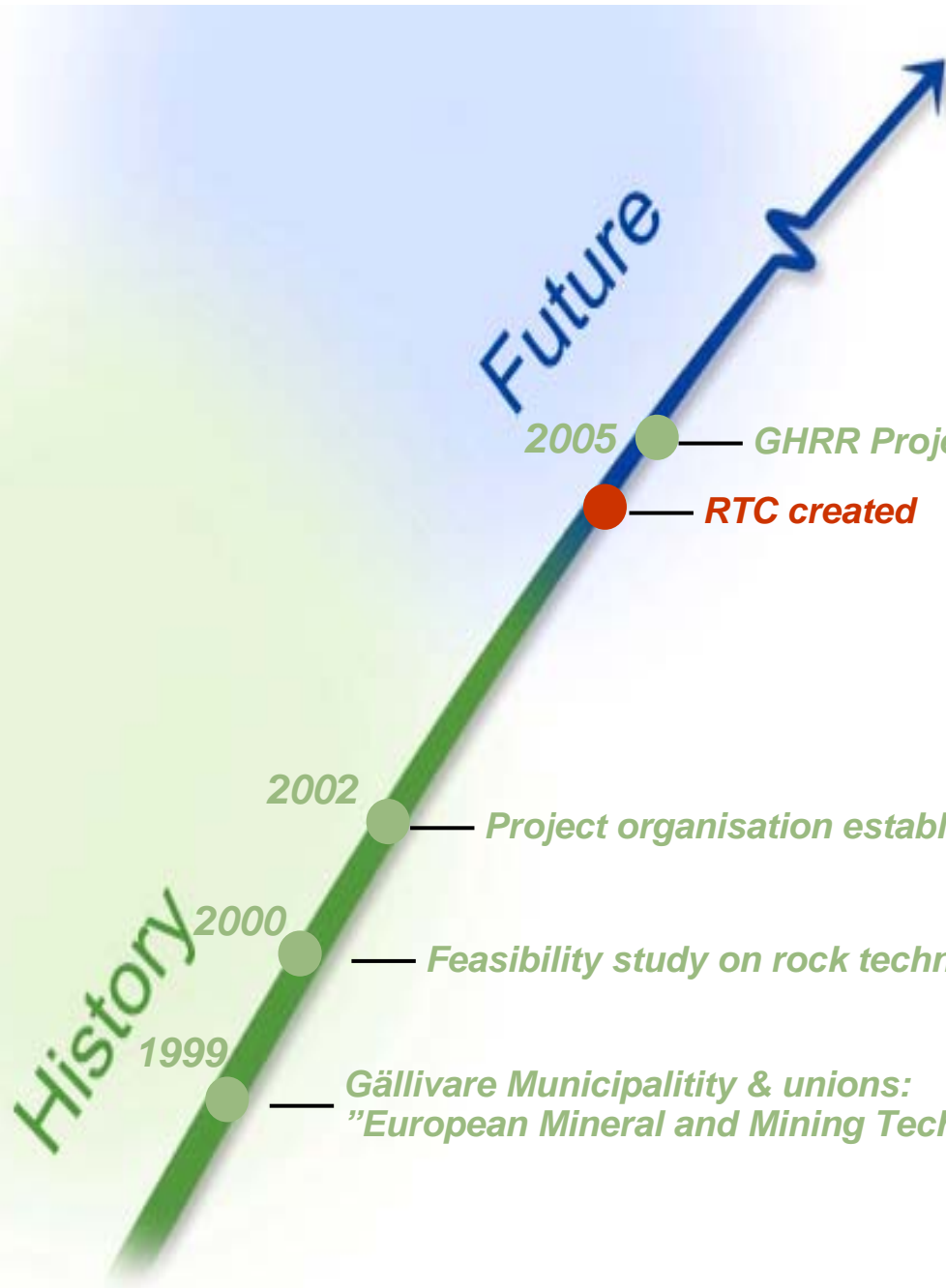
Environmental
MiMi*

Luleå University of Technology

Swedish Mining Research Foundation (MITU)

Georange

Bergforsk



Future

History

2005 — GHRR Project ends
 2005 — RTC created

2002 — Project organisation established

2000 — Feasibility study on rock technology center - Bo Hedberg

1999 — Gällivare Municipality & unions:
 "European Mineral and Mining Technology Center"

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från teori till praktik • moving theory into practice

Stiftelsen MITU

BOLIDEN LKAB lundin mining





Stiftelsen MITU



- From GHRR:
 - Project proposals
 - State-of-the-art reports on e.g.:
 - Fuel cells for underground use;
 - Water hydraulics;
 - Micro-Electro-Mechanical Systems (MEMS) for locating equipment underground and to pinpointing the location of the drill bit during production drilling;
 - Laser scanning for rock mechanical monitoring

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”Business Plan”

Board of Directors

**Thomas Hedberg, Chairman,
New Boliden, representing MITU.**

Thomas Hedberg has been employed at Boliden since 1975, where he had several posts as mining manager. He has been responsible for Mining Technology at New Boliden since 2001.

Tel : +46-(0)910-77 41 30

E-post:

firstname.surname@boliden.com

**Torbjörn Naarttijärvi,
LKAB, representing MITU.**

Torbjörn has been in charge of mining technology at LKAB since 1999

Tel: +46-(0)980-712 64

E-post:firstname.surname@lkab.com

**Monica Quinteiro,
LKAB, representing MITU.**

Monica has, since 2004, been mining manager of LKABs mines in Malmberget and Kiruna.

Tel : +46-(0)980-710 00

E-post:firstname.surname@lkab.com

**Erling Nordlund,
representing MITU.**

He has been a Professor of Rock mechanics at Luleå University of Technology since 2000.

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E-post: firstname.surname@ltu.se

**Christer Svemar,
SKB, representing MITU.**

He is employed at Swedish Nuclear Fuel and Management Co. (SKB) as head of repository design. He was previously Director of the Äspö Hard Rock Laboratory at SKB. Christer Svemar is also Chairman of the research organisation SveBefo.

Tel: +46-(0)8-459 85 93

E-post: firstname.surname@skb.se

**Andreas Malmberg,
representing Atlas Copco.**

Andreas Malmberg has been Managing Director of Atlas Copco CMT Sweden AB since 2004. Prior to that he was MD for Wassara AB, which develops drill technology using water hydraulics.

Tel: +46-(0)8-743 80 20

E-post:

firstname.surname @se.atlascopco.com

**Thomas Stenvall,
representing NCC Construction Sweden AB.**

Thomas has been employed by NCC since 1970. He is now in charge of their heavy industry department.

Tel: +46-(0)920-734 23

E-post: firstname.surname@ncc.se

**Bengt Ljung,
representing Reflex Holding AB.**

Since 2003, Bengt Ljung has been MD of Reflex Instrument AB. He has long experience from leading posts within large corporations in Sweden and the USA.

Tel: +46-(0)8-511 806 10

E-post: firstname.surname@reflex.se



Thomas Hedberg

Torbjörn Naarttijärvi

Monica Quinteiro

Erling Nordlund

Christer Svemar

Andreas Malmberg

Thomas Stenvall

Bengt Ljung

Vision

- RTC will within 3-5 years become an internationally respected company that **identifies and solves rock technology problems and skilfully transfers the solutions to practical applications in hard rocks** for areas like:
 - Drilling technology
 - Fragmentation
 - Tunnelling

Core values

- **Value creation** where solutions are developed that are effective in their practical application with short lead times from idea to finished product.
- **Professionalism** where good project management, good tools and good methods are used to plan and execute projects with the right quality at the right cost by the right time.
- **Good relations** where good contacts with companies, universities and field practitioners are exploited to ensure close collaboration and lasting relationships with stakeholders for coordination and prioritization

Present active project portfolio

- Boulder detection and boulder handling (Secondary breakage) within 2.5 minutes for remote LHD-operation. (Pre-study and field tests; LKAB, Atlas Copco, Process-IT, LTU/UU)
- Localisation of drill bit by seismic signals generated by the drill bit (Feasibility study and pre-planning of a field test; LKAB, SKB, Vibrometric Oy)
- Faster and better development; (LKAB, Boliden, Falconbridge, Rio Tinto NCC, SKB, Posiva, Atlas Copco, Sandvik Tamrock)

Planning ...

- Programme on Ground Support Systems (connected to Programme on Faster and Better Development)
- Programme on Production Drilling (e.g. develop systems for directional drilling of production blast holes using coiltubes.)

Faster and Better Development

Faster and Better Development Participants



Falconbridge



RIO
TINTO



Development work by Client

- LKAB: 30km/a
- Boliden: 15km/a
- Falconbridge: 25 km/a
- Rio Tinto: 30km/a (up to 50km/a around 2012)
- SKB: 1-2 km/a from 2011
- Posiva: 1-2 km/a from 2005
- SUM; Around 100 km/a

FBD Programme Objectives

- **Considerable increase of advance rate**
- **Total costs for tunnelling/drifts decrease at least 20 %**
- **The increased advance rate and cost decrease will be achieved without increasing the environmental footprint or increasing occupational risks.**

The Main Project

Scope of Works

- **Map quality and study improvements in advance rate/decrease of cost by better quality in breakage, scaling, mucking ground support**
- LKAB Development work at Malmberget Mine (mining crew, multi-face mining)
 - Improved breakage and mucking
 - Improved (optimization) breakage
 - Secure the ground
- NCC Development work at Malmberget Mine (contractor crew, access ramp, single face)
 - Improved breakage and mucking
 - Improved (optimization) breakage
 - Secure the ground
- Norwegian tunnelling
 - Contractor tunnel
 - Benchmarking (e.g. 5.6 km conveyor tunnel 120 meters per week – **17m/day**) .
 - Simulations using NTNU database

Concluding remarks

- Technological leadership is necessary to stay competitive and for meeting current and future requirements.
- Leadership is maintained by close co-operation between operators, suppliers and academia toward a common objective.
- Rock Tech Centre is created to solve problems within mining and rock engineering, to move theory into practice and to shorten lead time from idea to product

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Thank you!