

FIG
2018
ISTANBUL

XXVI FIG CONGRESS

8-11 May 2018, İstanbul

Presented at the FIG Congress 2018
May 6-11, 2018 in İstanbul, Turkey



Mine Surveying in Finland

Education and Professional Practices

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EMBRACING OUR SMART WORLD WHERE THE CONTINENTS CONNECT:
ENHANCING THE GEOSPATIAL MATURITY OF SOCIETIES

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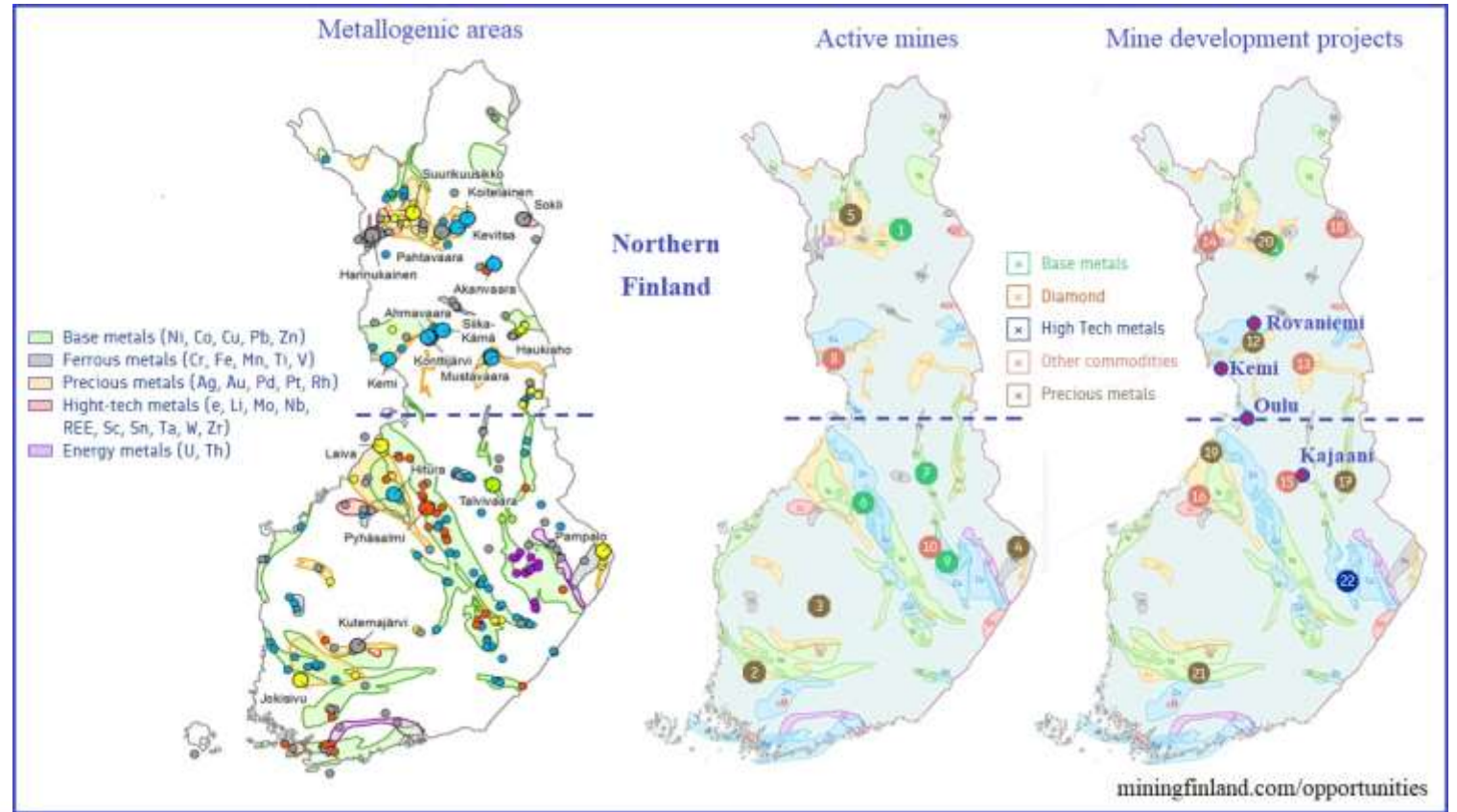
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The Finnish minerals sector

Vision for 2050: Finland is the global leader in the sustainable utilization of mineral resources



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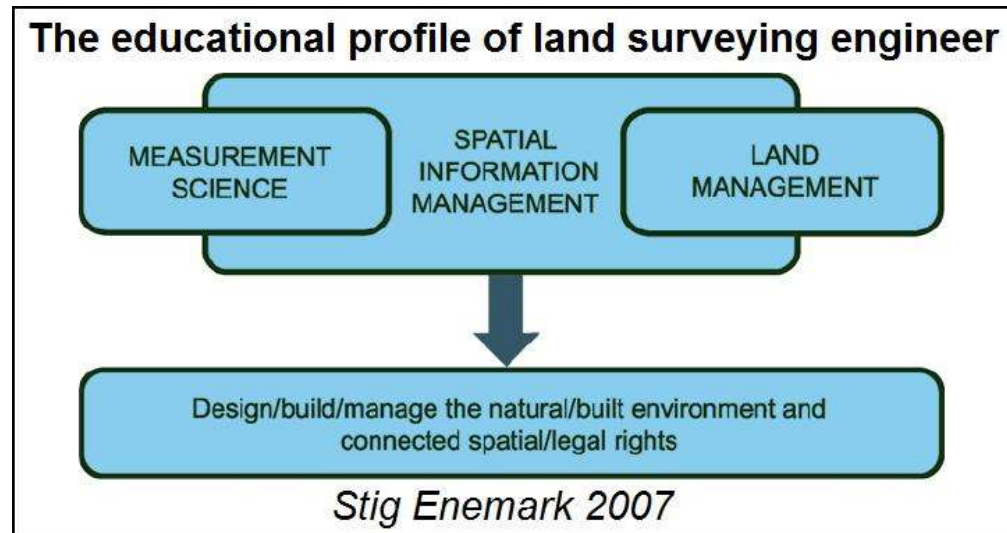


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Land surveyors in minerals sector

Multidisciplinary approach is the strength of land surveying profession, also in minerals sector



Land use planning, sustainability, legal issues, initial explorations, mine construction, mining works, and rehabilitation

Land surveyor as mine surveyor



Photos from
Agnico Eagle
Kittilä Mine



Mine surveying is a special field of land surveying

Special responsibility for accurate plan of the mine as a whole

Safety!

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Mine surveyor's competencies

- Demanding working environment
- In Finland, surveyors usually work alone
- Competencies:
 - Self-reliance
 - Problem-solving skills
 - Punctuality
 - Management of the mining process as a whole
 - Good knowledge of measuring techniques
 - Learning skills
 - Language skills

**The necessary knowledge,
skills and attitude to work
as professional land
surveyor**

GENERIC COMPETENCIES

**LAND SURVEIVING
COMPETENCES**

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Mining specific technical studies

- In Finland, there are no mining specific studies especially for land surveyors
- Most of mine surveyors come from Lapland UAS through practical training and thesis studies
- Mining specific technical studies in general are available in Northern Finland:
 - University of Oulu
 - Lapland and Kajaani Universities of Applied Sciences together
 - Three vocational schools

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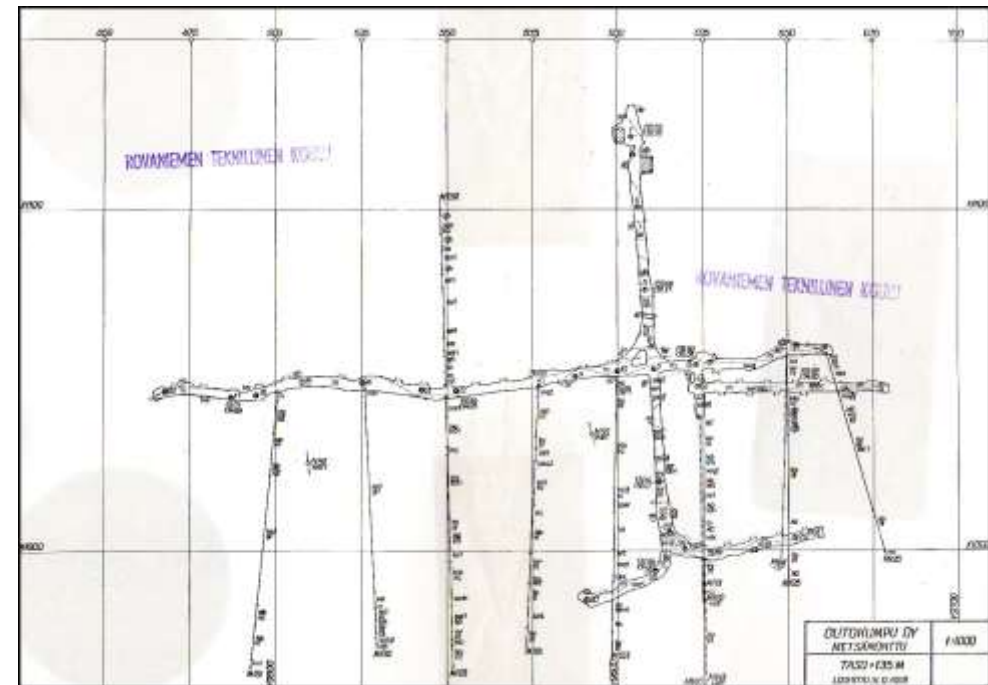
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Problematic control surveys

Especially underground mines are
complex 3D sites

- No standards for control surveys in mines
- Reference frames are old without documentation
- Importance of control surveys is not clear
- Mine surveyors don't know control survey methods



Mine map from 1958

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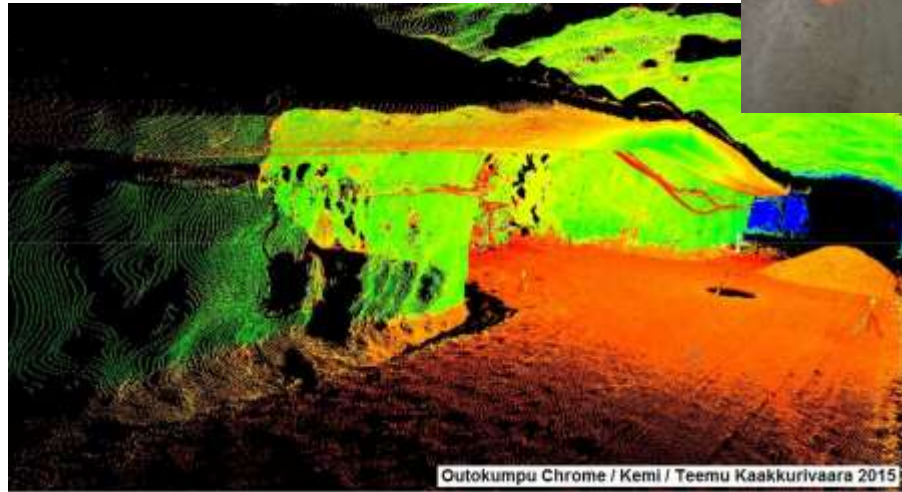
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Surveying techniques

Photos from mines in Northern and Eastern Finland



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Conclusions

- Mine surveyors work in demanding working conditions
- They are capable to use sophisticated techniques to produce efficiently various representations of the real mining world to assist mining operations
- Mine surveyors are especially responsible for maintaining an accurate plan of the mine
- **Well educated and practiced mine surveyors could be a kind of managers of the resources of the mines**

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