Framework for Risk-based Pillar Design In Underground Mines

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SWEDISH MINING INNOVATION

Med stöd från
VINNOVA Sveriges innovationsmyndighet
Energimyndigheten
FORMAS
Strategiska innovations-program

Goals of the project

Define a framework for risk-based pillar design

- Framework structure
- Verification and validation
- Application and development potential

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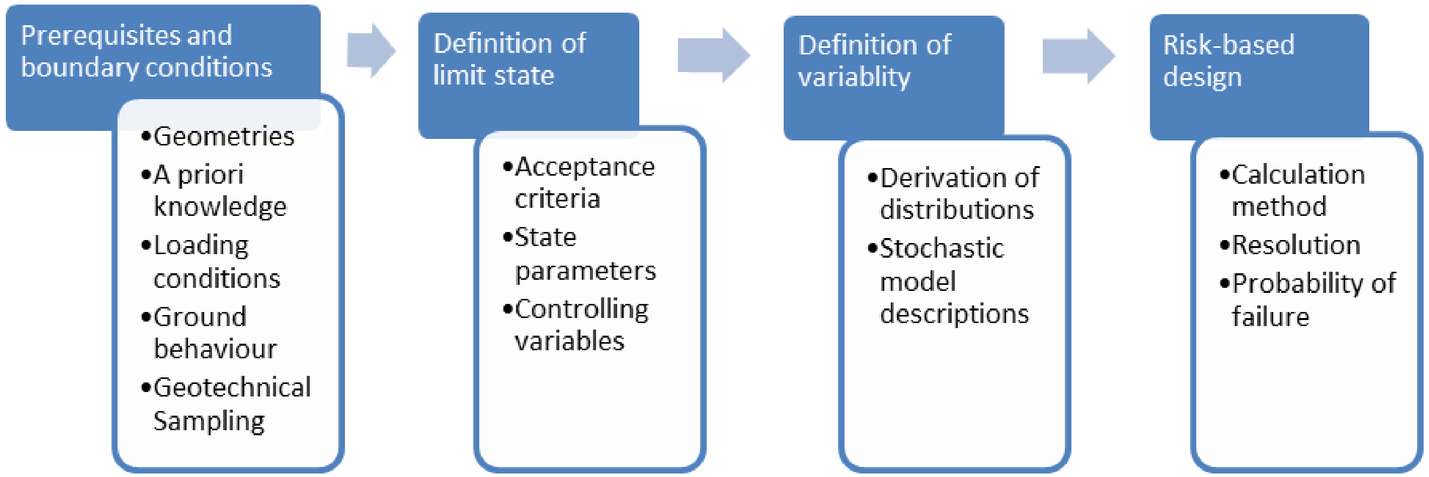
The Framework

The framework explains the steps needed to be performed in order to advance the analysis

- Deliverables from each block becomes input to the next
- Final product is a pillar design PoF



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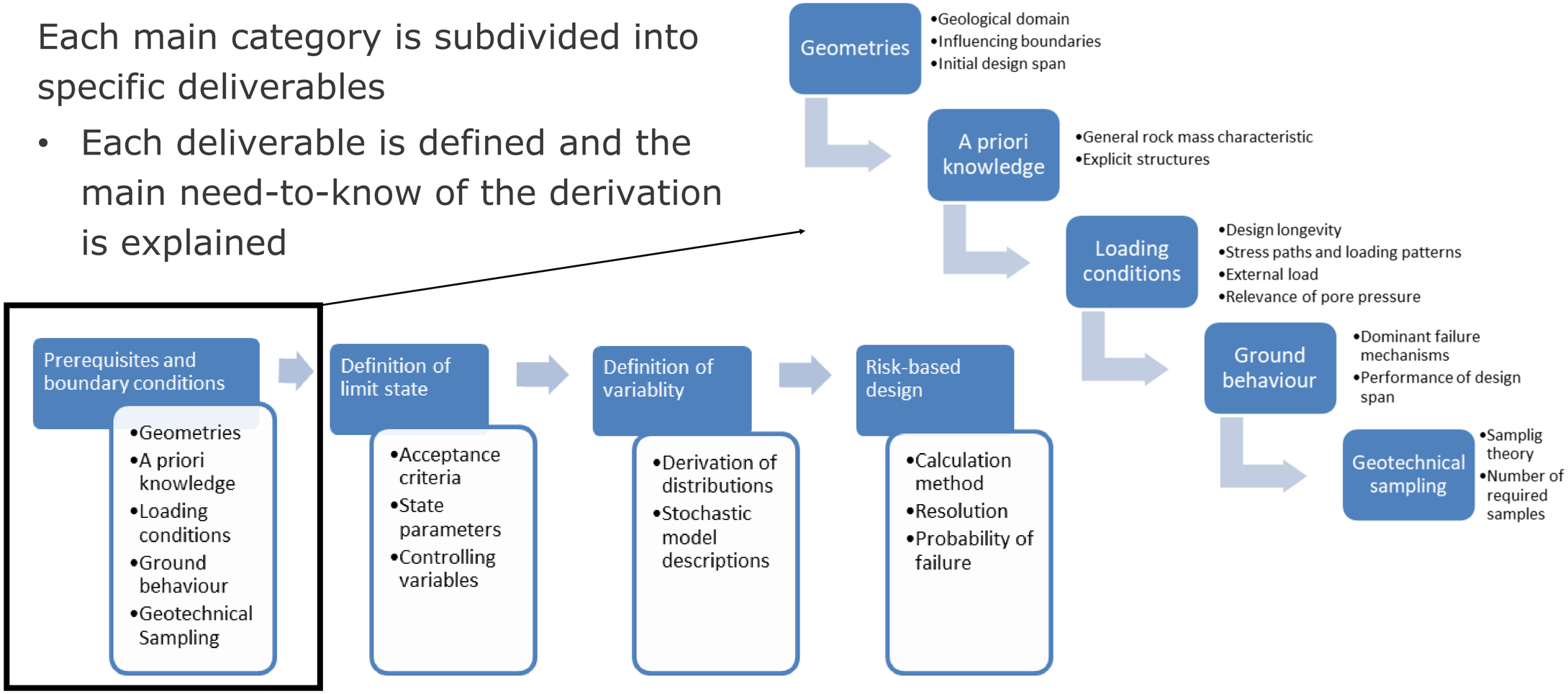
The Framework

Each main category is subdivided into specific deliverables

- Each deliverable is defined and the main need-to-know of the derivation is explained



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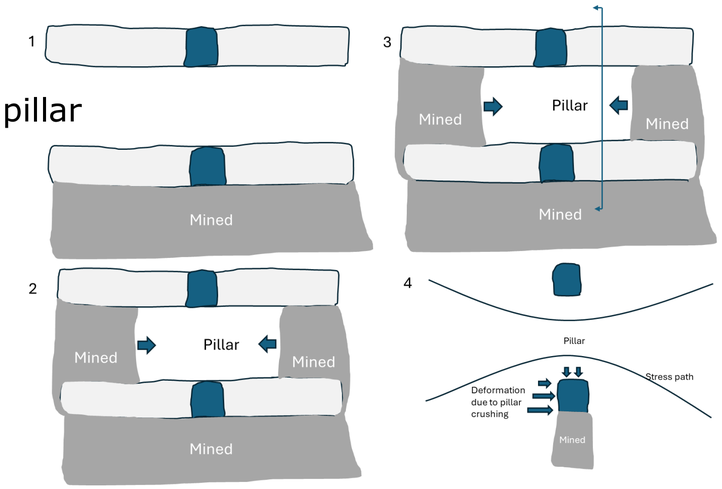
Verification and validation

Proof-of-concept verification

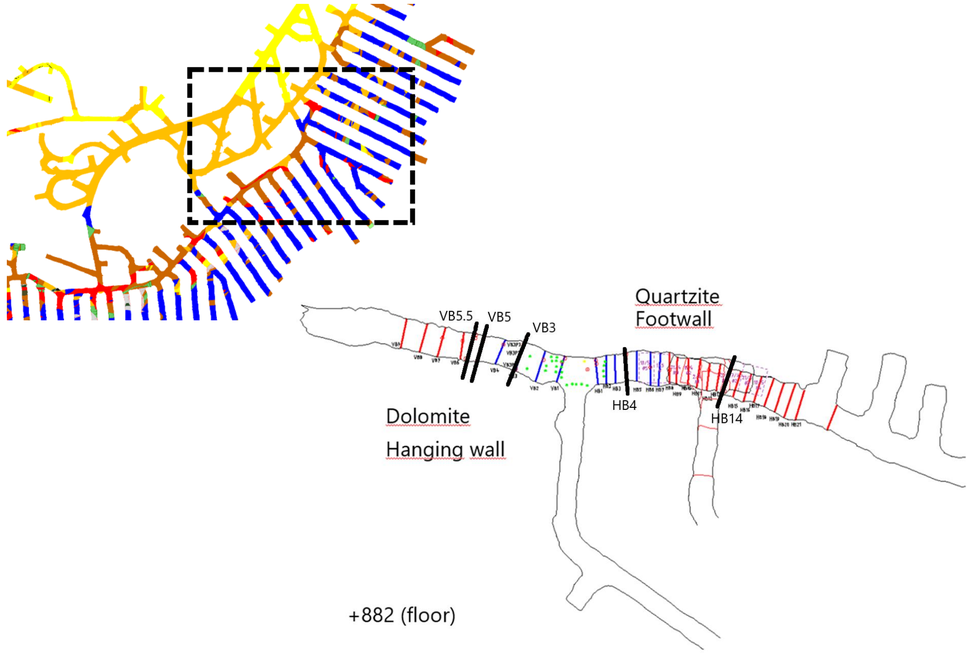
- Idealized cases with know boundary and input and thus predictable output

- Rill/Avoca pillar
- Sill pillar
- SLC cross-cut pillar



Mine case application validation

- LKAB Malmberget
- Boliden Garpenberg



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Application and development potential

- Means of quantitively comparing designs and layouts
- Potential for optimization from a risk-cost perspective

- Robust for directly observable limit state (e.g. deformation limits)
- Less robust for indirect limit state (stress-strength ratio, ”damage”)

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Main take-aways

- Output is never better than input
- Geotechnical sampling and definition of variability are key action blocks
- Definition of limit state is the most important ‘engineering work’

- Probabilistic analysis is the largest hurdle for application
- Perceived as time consuming and complicated
- Low industry adoption

- The need to define risk-acceptance thresholds remain
- What PoF is OK?

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