Title: **"Project risks" in mining operations.** Evaluation and commensuration of technical and societal risks, with application to open pit mines during the development and exploitation phases, especially under tropical climate.

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The considerable development of the mining industry over the last years is characterized by an explosion of demand and therefore production of most metals. To face them, most of the mining companies have started to look for high-tonnage, low-grade ores. Consequently, they are faced with higher **technical challenges**: the need to avoid, to reduce or to compensate environmental impacts (impact on soil and water quality, noise pollution and dust, rehabilitation, etc.), the management of geotechnical risks (instability of pit walls and stock piles, etc.) and the management of large volumes of sterile, in a context where the safety requirement Increases.

Nowadays, to these technical risks are added more and more **societal challenges** associated with the human upheavals, that mineral exploitation projects induce in the implemented territories: population movements, local economic benefits which are usually trivial, etc. These societal challenges may lead to the rejection of the projects by the riparian populations.

These technical and societal challenges could have considerable impacts on mining companies and their financiers, on public authorities and also on local populations. This makes it inevitable to understand and manage both types of risks together, using common and coherent assessment scales. The very different nature of these two kinds of risks is the reason why they are so far assessed with different scales and following incompatible approaches. The current thesis project aims to develop a common approach in order to assess, analyse and manage the two mentioned risks by adopting a new risk management approach (see below).

After creation of a database of the most probable risks in the mining exploitation projects, it will be necessary to define a common grid of risk analysis allowing to treat the both types of risks and to classify them. The proposed method should be able to combine consistently the quantitative and qualitative approaches, allowing the user to choose the most appropriate one for risk assessment, based on the available

information and required accuracy. We will rely on the methods of “project risk analysis”, already widely implemented in the field of civil engineering. This approach will allow to identify and analyse risks in a more formal, efficient and systematic way, that has not been the case so far, in order to better understand and manage them. It will thus serve as a tool for risk-based decision-making.

Since the subject is so wide, in this thesis we will focus voluntarily on two well-documented cases of open-pit mines under tropical climate, in New Caledonia and Guyana. The application in to other exploitation projects will then be discussed.

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