

REGISTER ONLINE :

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REGISTRATION DEADLINE October 26, 2018

**Send registrations to:**

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**AusIMM, CIM, SME, and SAIMM Members:**  
**\$2,750.00 AUD (\$2,500 Excluding Taxes)**

**Non-members:**  
**\$3,069.00 AUD (\$2,790 Excluding Taxes)**

Name: \_\_\_\_\_

AusIMM, CIM, SME or SAIMM Member #: \_\_\_\_\_

Job Title: \_\_\_\_\_

Employer: \_\_\_\_\_

Postal Address: \_\_\_\_\_

City: \_\_\_\_\_

Prov/State: Postal/Zip Code: \_\_\_\_\_

Country: \_\_\_\_\_

Phone: \_\_\_\_\_

Fax: \_\_\_\_\_

Email: \_\_\_\_\_

I will bring a laptop:  Yes  No

**Payment:**

Diners  Amex  Visa  MasterCard

Bankcard  Cheque

Card Number: \_\_\_\_\_

Expiry Date: / \_\_\_\_\_ Amount \$: \_\_\_\_\_

CCV Code (3 digit code on back of card): \_\_\_\_\_

Name on Card: \_\_\_\_\_

Signature: \_\_\_\_\_

Registration includes course notes, lunch, and morning and afternoon tea.

Participation in this course may be a valid activity towards continuing professional development with up to **26 contact hours**. Participants receive a Certificate of Completion.

Notification of Cancellation received in writing up to **October 26, 2018** (minimum of 10 working days before the course) will incur a 20% cancellation fee. No refund will be made after this time. An alternative participant may be nominated.

**INSTRUCTORS**

**Roussos Dimitrakopoulos** is a Professor and Canada Research Chair (Tier I) in Sustainable Mineral Resource Development and Optimisation under Uncertainty, and Director, COSMO - Stochastic Mine Planning Laboratory. He holds a PhD from École Polytechnique de Montréal and an MSc from the University of Alberta. He works on risk-based simulation and stochastic optimisation in mine planning and production scheduling, the simultaneous optimisation of mining complexes and mineral value chains under uncertainty. He has taught short courses and worked in Australia, North America, South America, Europe, the Middle East, South Africa and Japan. He received the Synergy Award of Innovation in 2012 by the Governor General of Canada for research contributions to mining science and engineering and his long-standing partnership with AngloGold Ashanti, Barrick Gold, BHP, De Beers, IAMGOLD, Kinross Gold, Newmont Mining and Vale. In 2013, he received AIME's Mineral Economics Award, and was a CIM distinguished lecturer in 2015-2016.

**Dr Brett King** is a respected global figure in the field of optimisation application and research. Dr King has more than 30 years of international experience covering operational and strategic roles in both small and multi-national companies. Prior to establishing COMET Strategy in 2000 while working in the Rio Tinto Technical Services group, his role included advising on practical strategy implementation decisions for their most valuable projects including Bingham Canyon, Escondida, Grassberg and Boron operations. He then created COMET Strategy Pty Ltd to help the mining industry implement optimisation principles based on the pioneering optimisation algorithms from Ken Lane, creating the COMET Optimal Scheduler software in 2001. This software is now widely used by the large mining houses for strategic planning of their most valuable assets. Significant clients include Anglo American, Antofagasta Minerals, BHP Billiton, Codelco, Glencore, IAMGOLD, Rio Tinto, Southern Peru Copper, and Teck Resources. These projects include bauxite, boron, coal, copper, diamonds, gold and uranium commodities from Australia, Argentina, Brazil, Canada, Chile, Peru, PNG, Mongolia, Namibia and the USA. A widely published author and popular conference speaker, he holds a PhD from the Royal School of Mines at London University on optimal mine scheduling policies, as well as a Bachelor and Masters degrees in Mining Engineering from Queensland University.

**Venue Details**

Pan Pacific Perth | 207 Adelaide Terrace | Perth, WA 6000 Australia | [www.panpacific.com/en/hotels-resorts/australia/perth.html](http://www.panpacific.com/en/hotels-resorts/australia/perth.html)

**Logistics**

Lectures are given from 9 AM (refreshments at 8:30 AM) to 5 PM with two 15 minute coffee breaks and a 1 hour lunch break.



[cosmo.mcgill.ca](http://cosmo.mcgill.ca)

**COSMO - Stochastic Mine Planning Laboratory**, a global centre for leading-edge research and graduate education in "orebody modelling and strategic mine planning with uncertainty", is supported by AngloGold Ashanti, Barrick Gold, BHP, De Beers, IAMGOLD, Kinross Gold, Newmont Mining, Vale, and Canada Research Chairs Program, NSERC, CFI.

[www.cometstrategy.com](http://www.cometstrategy.com)



**COMET Strategy Pty Ltd** is a specialised mining consultancy focusing on the provision of the tools and knowledge that are essential to maximise the value of resources through optimum operating policies. Founded in 2000, COMET Strategy Pty Ltd optimises schedules for a range of energy, metallic and non-metallic resource projects with leading mining companies including Rio Tinto, Glencore, Anglo America, Teck Resources, Antofagasta Minerals and Southern Copper Corporation.

PROFESSIONAL DEVELOPMENT SERIES **2018**

STRATEGIC RISK QUANTIFICATION & MANAGEMENT FOR ORE RESERVES & MINE PLANNING



STRATEGIC MINE PLANNING AND ANALYSIS WITH NEW DIGITAL TECHNOLOGIES, RISK MANAGEMENT AND MINERAL VALUE CHAINS

**Roussos Dimitrakopoulos**  
McGill University, Canada

**Brett King**  
COMET Strategy, Australia

**November 12-14, 2018**  
Perth, Western Australia





## OBJECTIVES AND CONTENT

**At the time of a continuing rebound of metal markets**, learn how the application of new digital technologies that can add substantial value to strategic mine planning and asset valuation. The new technologies and related tools integrate technical risk management while capitalising on the synergies amongst the elements of mineral value chains through their simultaneous optimisation – from mines to products to markets.

*Learn how you can improve performance by:*

- Learning the state-of-the-art strategic mine analysis concepts and new approaches that unlock and add value to mining assets
- Finding out how to reduce technical risks and produce optimal pit designs with strategic mine planning processes and the next generation optimisation methods
- Discovering methods and tools for the simultaneous risk-managing (stochastic) optimisation of mining complexes and mineral value chains from mines to products to markets
- Discovering how the new developments will help you capture the “upside potential” in mine plans and minimise “downside risks”, as well as increase cash flows
- Exploring and learning from real-world examples, practices and comparisons in diverse applications, from gold and copper mines to iron ore and nickel laterites
- Understanding how to deal with blending and non-linear geo-metallurgical interactions in the processing streams, as materials are transformed from bulk material to refined products
- Participating in hands-on computer sessions that show how to increase project value by employing new risk-managing simultaneous optimisation models

**Please note:** Participants require a laptop capable of connecting to the internet through WIFI.



2018 Springer publication entitled: **“Advances in Applied Strategic Mine Planning”** (Editor Roussos Dimitrakopoulos) is included with the course materials.

## COURSE OUTLINE

### INTRODUCTION - FOUNDATIONAL CONCEPTS, TECHNIQUES AND LIMITS (DR BRETT KING)

- Strategic mine planning and optimal strategies.
- Overarching direction for strategic decisions - the bigger picture.
- Integrated optimisation: multiple mining areas, multiple processing and expansions, surface to underground interfaces.
- Advanced life-of-mine production schedule optimisation.
- Cut-off grade optimisation: theory and practical integration with processing throughput/recovery and pre-concentration optimisation.
- Cost management: reduction or justification?
- Eliminate or model constraints? Incorporating environmental, geotechnical, access, vertical advance rates and marketing issues into an optimisation
- Limits of conventional approaches: need for risk management and integrated models

### RISK QUANTIFICATION AND INTRODUCING A NEW MINE PLANNING PARADIGM

- Breaking down silos: models of mineral deposits and mine planning optimisation
- Understanding how to quantify and utilise grade/tonnage/metal uncertainty and variability
- Intuitive introduction to Monte Carlo simulations and risk assessment
- Stochastic optimisation methods and mine planning: concepts and uncovering additional value

### RISK MANAGEMENT IN MINE PLANNING: LESS RISK AND HIGHER NPV

- Pit design and production scheduling with simulated orebodies
- Stochastic pit limits are larger and pushback design with grade uncertainty
- Risk based optimal design for sublevel open stoping, and lessons learned
- Product quality management and production scheduling with simulated deposits
- Stochastic production scheduling application and comparison to conventional scheduling

### THE NEXT LEVEL: MINING COMPLEXES AND MINERAL VALUE CHAINS

- Mining complexes - mineral value chains and new smarter digital technologies
- Simultaneous optimisation of mining complexes from pit to port with geological (supply) uncertainty, stockpile and blending optimisation, processing and CAPEX options.
- Industry examples and comparisons: diverse applications from gold and copper mines to iron ore and nickel laterite
- Blending and non-linear geo-metallurgical interactions in processing streams as materials are transformed from bulk material to refined products
- Dealing with exceptionally large mining complex optimisation models
- Optimisation of mining complexes with joint supply (raw materials) and demand (markets)
- Linking long- and short-term planning in mining complexes

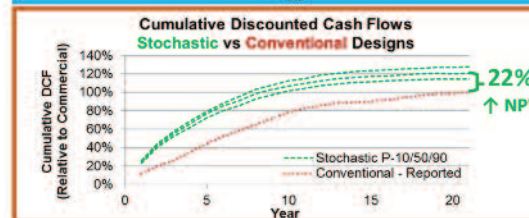
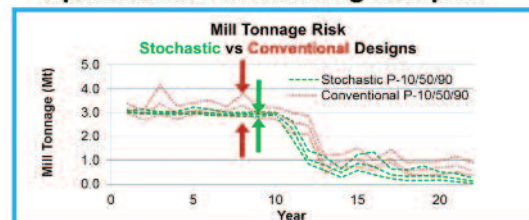
## COMPUTER WORKSHOPS

- Rapid online schedule optimisation for understanding value drivers.
- Mine specific value estimation for detailed optimisation analysis.
- Uncertainty modelling and risk quantification in existing designs - choosing a robust design
- Step-by-step simultaneous stochastic optimisation of a copper-gold mining complex
- Assessment of the strategic plan for the copper-gold mining complex

## WHO SHOULD ATTEND

This course is designed for mining engineers, mine planners, mine geologists, project managers, resource analysts, involved in feasibility studies, development and operations, interested in new technologies for risk management and optimal decision support.

### Simultaneous Stochastic Optimization of a Mining Complex



Less risk and higher value