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Effective use of digital technology and big data in mining

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Agenda

- 1) What do we mean by technology in mining?
- 2) The evolution of data analytics
- 3) A new vision for enterprise optimisation
- 4) Breaking down the silos, the case for change

What do we mean by technology in mining?

Disruptive technologies

- Automation
- Internet of Things

Big data

Digital technologies & software

- Sensors
- Optimisation
- Simulation



Technology should be part of a strategic vision

Technology must enhance

- Understanding of the value chain
- Mining productivity
- Mine planning
- Processing and logistics
- Mine safety

New reporting methodologies

New analysis methodologies

New optimisation methodologies

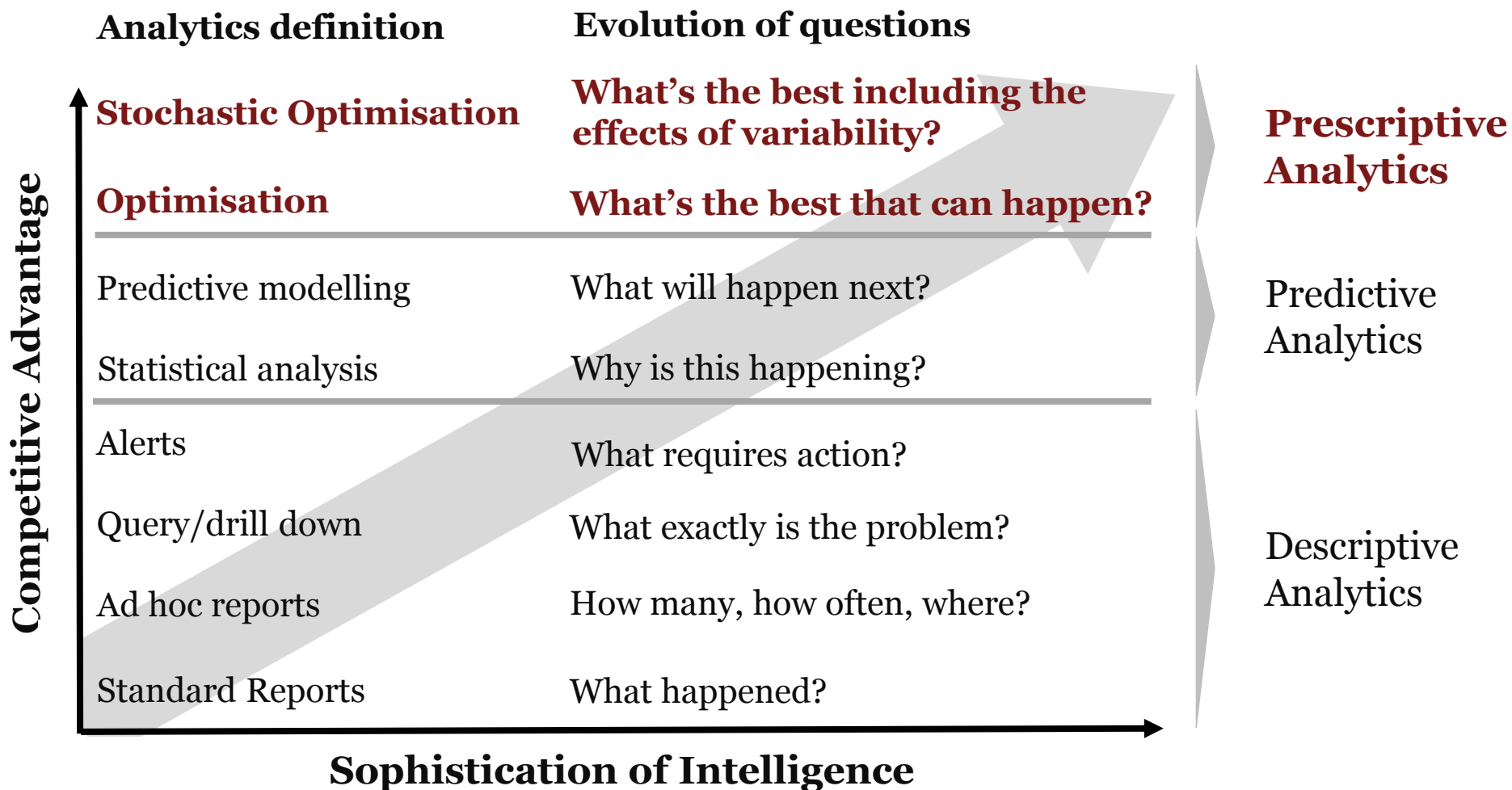
Big data, the power and the curse

- Data acquisition vs. data usage
- Big data is overwhelming some miners leading to data fatigue
- Turning data to information is key to successfully raising mining productivity

Mining companies that gather, analyse and use their data on a daily basis account for 92% of top-quartile equipment performance.

PwC – Mining for Efficiency (2014)

The evolution of analytics capability



Source: Competing on Analytics: The New Science of Winning (Davenport / Harris)

Factors for mining productivity execution and success



Mine

Define, plan, articulate and execute a clear mine strategy including expectations for specific equipment productivity



People

Identify and recruit people with the right abilities for each job and provide proficiency based training to all levels within the mine

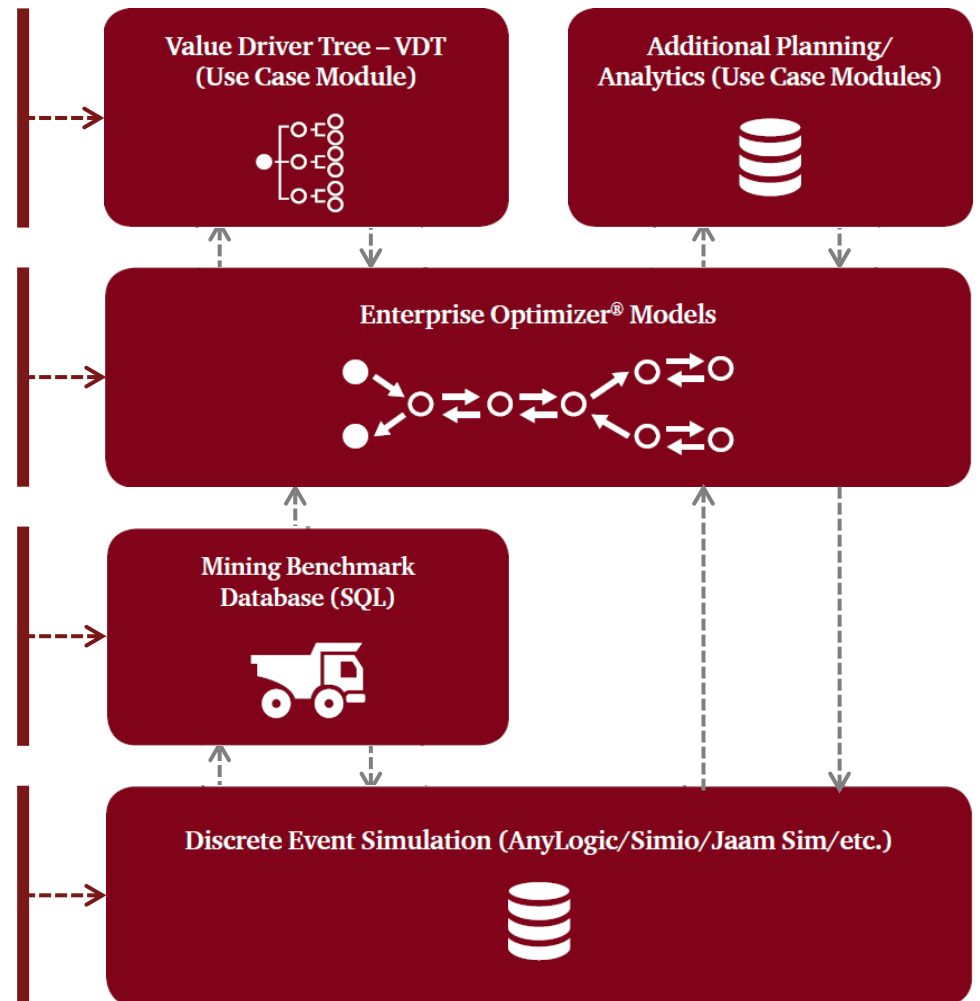


Data

Develop an equipment-level performance data management process and use it to steer daily decision-making

A new suite of data analysis tools

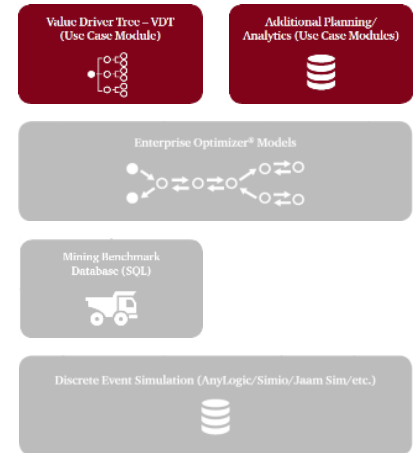
- How are the physical and financial drivers linked?
- What is mathematically optimal?
- What is possible in real world mining operations?
- Is this physically achievable?



First we link the financial and operational drivers

Value driver tree & planning analytics

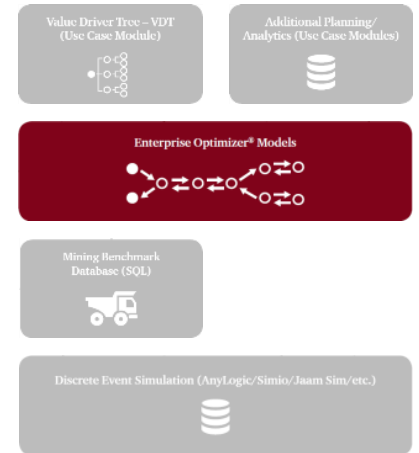
- Linking the financial to the physical drivers of the business
- Activity-based costing in an intuitive format
- Can be fully integrated with existing business ERP and analytics platforms



Then we calculate the mathematical optimum

Enterprise Optimizer®

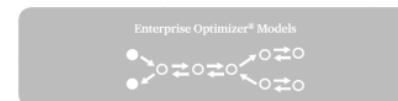
- Outputs utilise activity-based costing in an intuitive format
- Allows management to fully understand operations performance and direct impact it has on financial results
- Constrained optimisation made simple
 - Holistic
 - Visual
 - Dynamic
 - Collaborative



We ensure that assumptions are achievable

Mining benchmarking database

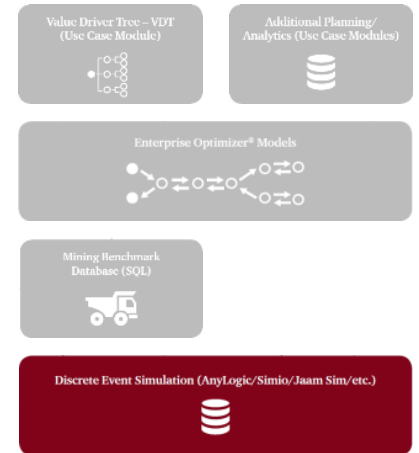
- Mobile plant equipment operating database:
 - 47M+ hours of operations
 - 308 makes and models
 - 136 mines
 - 5 continents
- Are assumptions achievable in real-world mining operations?
- How much room is there to improve?



Financial and operations outputs are validated

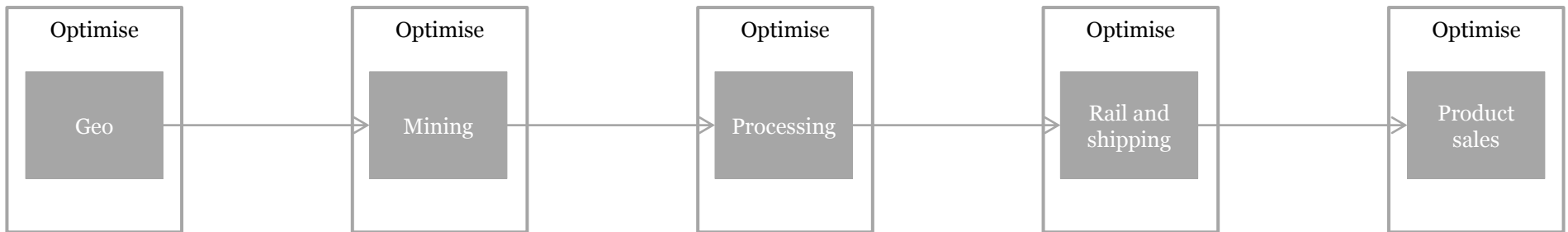
Discrete event simulation

- Estimates process throughput and capacity as well as variation in predictions
- Validation that EO outputs can be physically achieved
- Fully accounts for physical interactions between equipment and product

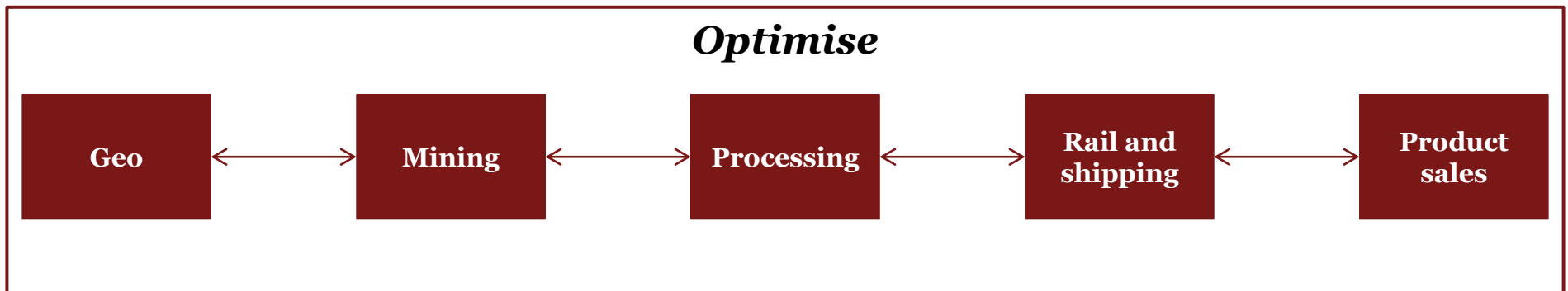


It is essential to break down silos for us to improve

Currently- local optimisation



Ideally- enterprise optimisation



Seizing the opportunity

Optimised execution

- Shared context
- Global vs. local optimisation
 - 1-5% profit increase
- Powerful change management
- Embedded collaboration

Optimised analysis

- What-ifs measured in minutes not days
- Unlimited scenario analysis
- Quantify trade-offs financially and operationally
- Deeply understand value chain constraints

Thank you...



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