



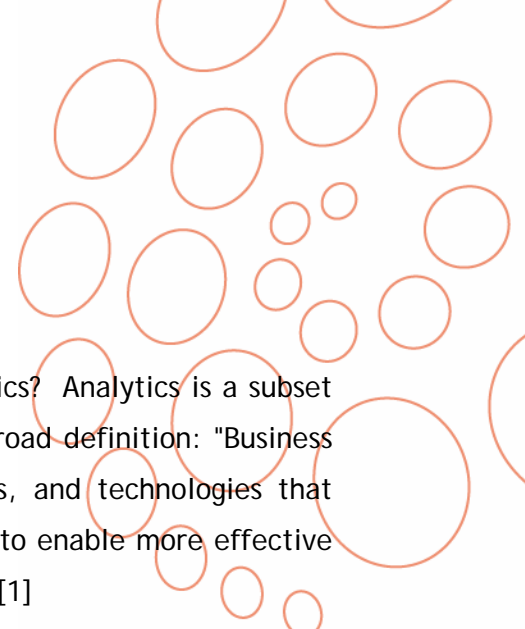
**Analytics and Mining 3**  
**13 February 2011**

I (maybe unwisely) restated a derogatory comment made to me by a senior and highly respected technical employee of a large mining company about their own company. This week I was looking at the truck and loader performance at one mine (not the same company) and while it is alarming it demonstrates what is happening at many mines.

Figure 1 demonstrates what happened in 2010 on their total truck and loader production rate and the average loader payloads on a month by month basis. This should be alarming. When we made some enquiries as to what happened in the middle part of the year we found that they embarked on a program of cutting spillage to try to save money on equipment employed to do "clean-up". There is no argument here that spillage has a major impact on equipment, particularly trucks, and must be cleaned up. I am sure someone will get a pat on the back for saving (we are told) in excess of \$1M on spillage clean-up in the second half of 2010. That is real. It is in their profit and loss statement.

However, the opportunity cost of making that change should be determined. Compared to the first half of 2010 the mine has lost over 6.3M tonnes of material moved with their truck and loaders. The easiest way to understand this cost is that to retain the status quo of sending the same tonnage of the commodity off the mine the 6.3M tonnes of material has to be moved by other equipment. In reality, this is normally absorbed into less commodity available to be mined or variations in inventories or stockpiles, and as there are multiple inputs into this single number of mine output. That is, there are multiple sins covered. So the \$1M in savings has been achieved at a cost to the mines profit (maybe now, maybe down the track) of \$9.3M.

I will again emphasise that this cost probably won't show up in the profit and loss but it should be in the balance sheet. But 9 times out of 10 it will be lost in everything going on with the mine.



OK so where do we take the whole business about Mining Analytics? Analytics is a subset of Business Intelligence systems. Forrester uses the following broad definition: "Business Intelligence is a set of methodologies, processes, architectures, and technologies that transform raw data into meaningful and useful information used to enable more effective strategic, tactical, and operational insights and decision-making." [1]

Upon doing a little research I find PWC, Deloitte, IBM, Microsoft, Oracle and a whole range of smaller companies working in this space. I have been speaking to a major corporation this week about their extension of Business Intelligence into the mining industry and I must admit to more than a little excitement. At last someone is looking at not just how to use and present the data but how to do it intelligently.

So what is needed in a Business Intelligence System applied to the mining industry? Well, much the same as most other industries.

1. Standard reports

- What happened?
- When did it happen?
- Always compare with a target / best practice

2. One-off reports and data drill down

- How many?
- How often?
- Where?
- Always reference a target / best practice

3. Real time data & alerts

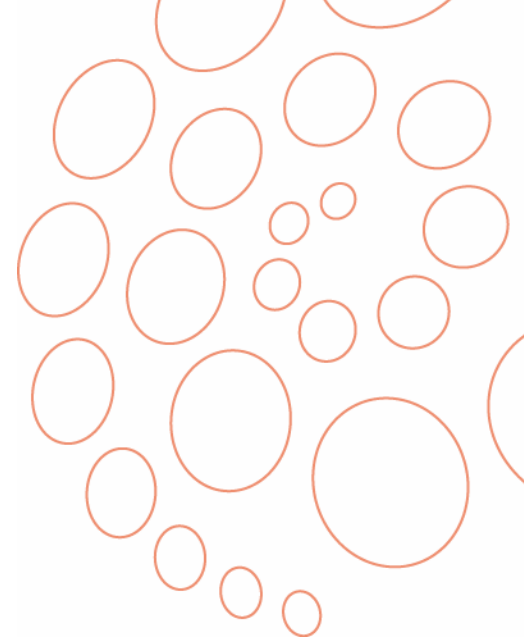
- When should I react?
- What am I reacting to?

4. Statistical Analysis & Data

Mining

**Head Office**  
Brisbane Technology Park  
Unit 2 / 53 Brandl St  
Eight Mile Plains Q 4113  
Australia  
Ph: +61 7 3147 8300  
Fax: +61 7 3147 8305  
Email: [gbi@gbimining.com](mailto:gbi@gbimining.com)  
[www.gbimining.com](http://www.gbimining.com)

**South African Office**  
8 Corridor Crescent  
Building B Ground Floor  
Route N4 Business Park  
Ben Fleur X11 Witbank 1035  
South Africa  
Ph: +27 13 6564114  
Fax: +27 13 6564114  
[www.gbimining.com](http://www.gbimining.com)



- Why is this happening?
- What opportunities am I missing?

#### 5. Forecasting & Predictive Modelling

- What if these trends continue?
  - Monte Carlo simulation (eg. TALPAC)
  - Markov processes
  - Queuing theories
  - Process simulations
- How will it affect my business?
  - Risk & risk return

#### 6. Optimisation

- How do we do things better?
- What is the best decision for a complex problem?
  - Lerchs-Grossmann based methods for final pit design, (eg. Whittle)
  - Operations research
    - equipment and staff scheduling for max throughput/utilisation
    - optimal staff scheduling and rostering
    - mine spares supply chain optimisation
    - production rates to be expected in certain areas of the mine
    - Blending and mill throughput

One would hope that with a system such as this the losses incurred in the previous example just would not be allowed to happen. Over the next few weeks I will break each of these six points down and discuss in turn.



Evelson, Boris (2010). "Want to know what Forrester's lead data analysts are thinking about BI and the data domain?" Accessed 14 February,

[http://blogs.forrester.com/boris\\_evelson/10-04-29-want\\_know\\_what\\_forresters\\_lead\\_data\\_analysts\\_are\\_thinking\\_about\\_bi\\_and\\_data\\_domain](http://blogs.forrester.com/boris_evelson/10-04-29-want_know_what_forresters_lead_data_analysts_are_thinking_about_bi_and_data_domain),

April 29.

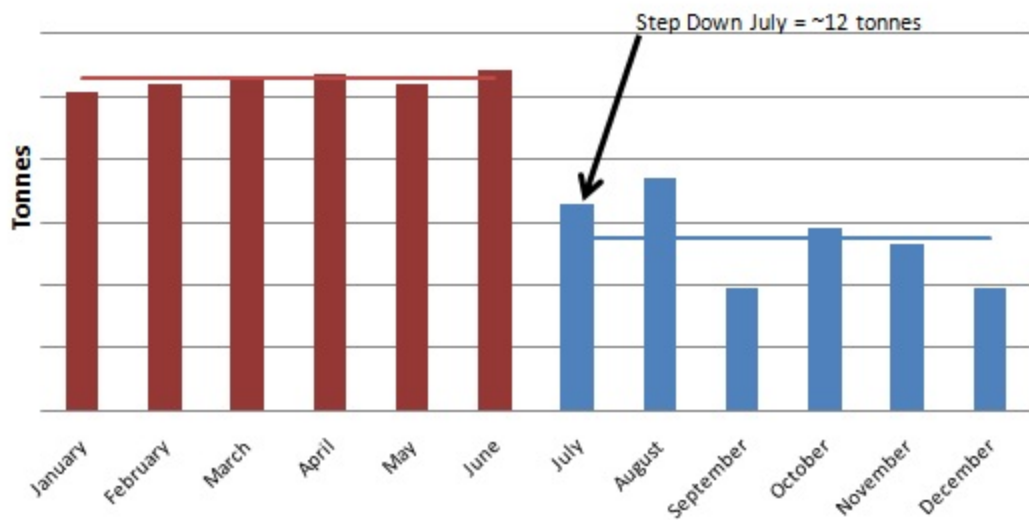
**Head Office**

Brisbane Technology Park  
Unit 2 / 53 Brandl St  
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Australia  
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Fax: +61 7 3147 8305  
Email: [gbi@gbimining.com](mailto:gbi@gbimining.com)  
[www.gbimining.com](http://www.gbimining.com)

**South African Office**

8 Corridor Crescent  
Building B Ground Floor  
Route N4 Business Park  
Ben Fleur X11 Witbank 1035  
South Africa  
Ph: +27 13 6564114  
Fax: +27 13 6564114  
[www.gbimining.com](http://www.gbimining.com)

## Average Load 2010



## Total Production Rate 2010

