

PINCOCK

Perspectives

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CALENDAR

■ World Mining Investment Congress 2009

June 2 – 4, 2009
Park Plaza Victoria London
London, United Kingdom
Email: paul.gilbertson@terrapinn.com

■ Mines and Money Asia 2009

June 3 – 4, 2009
Four Seasons Hotel
Hong Kong, China
Email: pablo.martin@mining-journal.com

■ 24th Annual Elko Mining Expo

June 8 – 12, 2009
Elko Convention Center
Elko, Nevada
Email: cathie@elkocva.com

■ African Mining Congress 2009

July 14 – 17, 2009
Sandton Convention Centre
Johannesburg, Gauteng, South Africa
Email: taryn.vanzanten@terrapinn.co.za

■ Diggers & Dealers Mining Forum 2009

August 3– 5, 2009
Goldfields Arts Centre
Kalgoorlie, Australia
Email: admin@diggersnddealers.com.au

■ XXIX Cenvencion Minera Extemin 2009

September 14 – 18, 2009
Tecsup
Arequipa, Peru
Email: msovro@iimp.org.pe

■ Exposibram 2009

September 21– 24, 2009
Expominas
Belo Horizonte, Brazil
Email: ibram@ibram.org.br

Mining, Modeling, and Modesty (the 3 Ms)

"I think I would like to go into modeling. Of course, I don't know how to do it, and wouldn't be any good at it if I did, so I'm going to employ someone to walk the catwalks on my behalf." Sir Terry Pratchett (British novelist)

We, in the mining business, would like to go into modeling too. And we do! In a sense that is. Maybe not quite so glamorous as swinging down the catwalk in the latest fashion statement, but in the no-less-enchanting world of mining. We walk, as it were, the catwalks showing off the latest cute, stylish models we've generated for the latest world-class, high-fashion mining project.

Our models cover a wide range of disciplines, and some are more sexy than others. Most are complicated and only really understood by the cognoscenti of their profession - try as we might to attire them with lucidity. As with high fashion, we group all our models by the sequence of their need before they prance

down the catwalk. Here is the program for our latest show:

- ◆ Business wear (Topography, Grade, Geology, and Resource)
- ◆ Sports wear (Geotechnical and Hydrology)
- ◆ Swimsuits (Climate and Seismology)
- ◆ Casual wear (Ecology and Sociology and Archeology)
- ◆ Evening wear (Mining, Processing, and Administration)
- ◆ Bath wear (Schedule and Management)
- ◆ Bedtime wear (Cost, Marketing, and Economics)

The principal source of our creativity is an enormous database established for each project. This database is a three-dimensional representation of drill, channel, and trench samples

with assay values, rock types, oxidation state, geotechnical data, mineral hardness, metallurgical recovery, etc. In reality, several separate databases with information from different types of sampling are usually employed.

The raw databases must, however, be manipulated to prepare them for our models. Firstly the assay data must be composited into samples of equal size so that they may have equal importance in the subsequent geostatistical analysis. Then, through variograms, the assay data are analyzed to determine the probable orientation, extent, and persistence of the assays and the best way of assigning assay values to the selective mining unit (SMU) - blocks that match the probable mine bench elevations and heights. This done, we can go on with the show.

First down the project catwalk of our mining project assessment are our business-wear models. There are four of these models and they may be in one of two forms, or in both forms, as indicated below:

Model	Wireframe	Block
Topographic	X	
Grade	X	X
Geology	X	X
Resource		X

As shown, Topographic Model is always a wireframe; Resource

Model is always in block form (with a few exceptions, such as coal); and Grade Model and Geology Model can be in either or both wireframe and block form. **Topographic Model** is the first to appear and her wiry frame lends a certain austerity to her form-fitting dress. She is a three-dimensional representation of the land surface, simple, elegant, and lovely.

Next comes **Grade Model** with nothing but assay information through which she demonstrates, as best she can, the mineralized envelope and its contents. But the database usually has a lot of geological information which Grade Model cannot show. For that we bring out **Geology Model**, and what a stunning model she is, albeit heavily constrained by faults, lithology, and unconformities. She displays a more complex mineralized envelope with lots of tucks and interesting projections – something the rock connoisseur can surely appreciate!

Now for the final business-wear model, and we have left the best for last. On walks **Resource Model**. She shows off cubism that Picasso would envy. She's dressed in a glorious assemblage of blocks, the dimensions and elevations of which were derived in assembling the revised database. Each and every block has a slew of information, such as grade, rock

type, density, metallurgical recovery, net-smelter-return (NSR) value, etc. She glides smoothly down the runway, with that proud, fixed stare of a model who knows she incorporates all the critical information of her creators. She sweeps through the turn, and retaining her confident air, glides back into the wings.

Our sportswear models are next. **Geotechnical Model** comes marching out. She's in a rust-colored jump suit, a three-dimensional representation of rock quality and rock-strength orientation that will be used to determine the pit slope in the various sectors of the pit and the waste dump slopes. She spins into a cartwheel and wheels off the runway.

Then comes **Hydrology Model** in aquamarine shorts and t-shirt carrying a length of garden hose. She's evidently a gardener who knows where the water is in the ground, where it is flowing, how much is flowing, and the seasonal variations. With this model we can figure out if the pit needs dewatering and how to go about it, and where and how much water we can get for the project needs. As Hydrology Model is about to leave she playfully sprays the cheering audience with the hose and skips away.

We will see the swimsuits next. There is a gasp from the crowd

as **Climate Model** steps onto the runway. She's a woman for all seasons. She has all the information about temperature, precipitation, wind strength and direction, the averages, the maximums and minimums, the 50- and 100-year storms. As she departs from our gaze, a gust of wind lifts her lovely waist-length hair.

Next comes **Seismology Model**. She has obviously spent a lot of time at the gym. Her swimsuit reveals a muscular physique as she moves abruptly with sudden stops accompanied by a banging base drum. This model tells how much and how frequently the earth is likely to shake, information that's used to design the dumps, dams, and structures. The model is a bit intimidating, not one we want to tackle with if we can help it, and we're relieved when she moves on.

Now it's après-swim time. Time to get into some casual wear for late afternoon. First comes **Ecology Model**. She's in a leotard with a leopard-skin motif. She's miming a leopard too, as she slinks down the runway. She has all the information on the flora and fauna, the endangered species, the migration patterns, susceptibility to toxins and dust and noise. We're lulled into thinking she's a tame tiger when she suddenly roars and, as our attention is refocused on her, she jumps up and bounds away.

Now **Sociology Model** steps to the stage, a lady of grace and form, yet there's something of Scottish pragmatism in her attire and demeanor. Dressed in a tartan skirt and ruffled blouse, she has all the "stakeholder" information. She knows the location, education, acculturation, demarcation, protestation, and demographics of the people in the project vicinity. The information is used to determine what impact the project will have on the "stakeholders" and determine what is required to hopefully avoid any remonstrations.

Archeology Model now twirls onto the runway. She is dressed retro-style in a hooped skirt which displays all the historic structures, sacred sights, tombs, and artifacts related to the proposed mine site. This information will be used to generate plans to record, preserve, and relocate, if need be, any archeological findings in the area. With a whirling do-si-do she spins around and exits the stage.

We're now in early evening. Time for a night on the town. Out comes **Mining Model**. She's dressed in an off-the-shoulder backless chemise, simple, but stunning. Down the catwalk she strides, the dress floating on her tall, slim form. Mining Model is a creation of sophisticated software that uses information from the Resource Model to "float" the ultimate pit profile and the sequential shells of pushbacks

that will proceed from the initial cone to the ultimate pit. Along with the pit, the model also shows the sequence of waste dump formation. From this model, the ore reserves are established. Mining Model spins around and strides off; the audience is impressed.

Processing Model is next. She's a petite girl dressed in a batik-dyed sarong, practical and stylish. Processing Model uses an array of software to figure out the process flow-sheet and flow-rates, the product recovery and quality. From this model the machinery requirements and plant design can be determined. With a quiet confidence she paces down the runway, pauses, pirouettes, and now walking backwards, a tranquil smile on her angelic face, gently leaves us.

Administration Model now comes strutting down the runway. There's a certain authority in her demeanor which is also reflected in her attire. She's dressed in a tight, dark-silk pant suit. Administration Model shows how all the ancillary components of the project are to be handled: the accounting, purchasing, warehousing, utility systems, security, and personnel transportation and housing.

The evening is now almost over. Time to remove the make-up and get cleaned up before bedtime. Here come the bath wear models. Gliding on next is **Schedule**

Model, draped in a beach towel decorated in a series of horizontal bars. Schedule Model shows us, in Gant-chart form, the plans for getting the project going, the pre-stripping and infrastructure development, plant construction and commissioning.

Next for bath wear is **Management Model**. Though her form is largely hidden under a toga-like bathrobe, Management Model shows us the intended strategy for the project through development, operation, and post-production (closure and reclamation). Essentially she shows us how the project is to be structured and the human resources required during each phase.

The evening is now almost over. It's time for bed and our sleep-wear models make their appearance. First is **Cost Model**. She's in pajamas, a soft knit with cuddly bears printed back and front. Cost Model is usually reasonably simple. She shows the initial and sustaining capital costs and operating costs

and how they change in time. Operating costs are usually in three groups: mining, processing, and general and administration (G&A).

Next on is **Marketing Model**. She knows what she's worth. She comes waltzing out in a long, loose nightgown. This model has the data on product freight, smelting, and refining (FSR) costs and product prices, though she can be a little hard to pin down on product prices. As she is about to leave, she gracefully curtsies and disappears.

Now for the grand finale. On comes **Economic Model**. She has it all, and she knows it. She's dressed in an embroidered nightgown. With purposeful stride she saunters onto the catwalk head held high in a haughty gaze at the adoring peons. Economic Model is the culmination of everything. This is where all the production, costs, and marketing information come together, where the revenue numbers are generated, and the net present

value (NPV) and internal rate of return (IRR) figures are established. Economic Model includes royalties but may or may not include taxes. We, at PAH, do not incorporate financing; we leave that to the financial institutions. At last, the show is over, Economic Model sweeps off, the crowd rises to its feet in cheering madness, and the curtain closes on our glorious mining extravaganza.

The models were complex, elegant, and sophisticated, though perhaps not as modest as we would have wished. Still, there will be another show before long and we'll be back, cutting, stitching, and pressing to prepare another set of models for yet another magnificent mining project.

The author of this Perspective issue, Dick Addison, Principal Process Engineer and Humorist, is normally immersed in metallurgical minutiae; that is, when he's not assessing fine fabric and elegant models.

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