

The Impact of Collaborative Research to the Mining Value Chain

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Newcrest invests in strategic research that extends from basic documentation of deposit geology to the application of new automated and microbeam technologies that allow for faster and smarter characterization of gold ores. Ideas and insights derived from fundamental geological studies and the application of smart technologies have resulted in step-change innovation in value models and smarter ore processing at Newcrest's most significant assets, including the world-class Golpu Cu-Au and Lihir Au deposits, Papua New Guinea.

Technological advances in the past decade, including increased processing capacity combined with precision robotics and high-resolution infrared spectrometers, have resulted in a new generation multisensor automated platform that provides a step change in our characterization of ore systems. With a spatial resolution down to 0.5 mm, application of this automated scanning technology has made it possible to complete a deposit-scale petrographic study of Golpu using VNIR + SWIR that complements more traditional cm-scale sampling completed using optical or electron microscope-based observations. Over 15 km of scanning (resulting in 2 billion SWIR data points) has helped inform a new detailed spatial model for Golpu that reflects recovery complexity which includes liberation, entrainment, and concentrate grade.

At Lihir, a study of microscale pyrite chemistry has been completed. Over 1.5 million laser ablation micro assays confirm that higher Au grades are associated with ornate pyrite morphology. This knowledge, gathered in the context of new deposit-scale petrography (via automated core logging) and a well-established paragenetic framework (from multiple research projects in collaboration with university-based researchers), has challenged accepted thinking on the treatment of Lihir ore types. A change in POX management has increased capacity, with the net impact being increased production of Au at a lower unit cost.

Successful uptake of research outcomes, be it a new concept or the application of technology, requires many champions who collectively adopt and develop ideas to produce positive change. The transfer of knowledge is best achieved through practical demonstration; every research effort has documents and databases, but it is the people and their interactions that drive change. Innovation comes from a collaborative environment that brings together diverse individuals, including industry experts and research partners, be they university-based academics, consultants, or service companies. It is critical that everyone involved knows the strategic goals and outcomes of any objective.

Innovation comes from a culture that continually seeks change throughout the mining value chain. Innovation lies not only in the smart application of widgets or research outcomes, but in creating an environment that can challenge an industry that is increasingly conservative, risk averse, and commonly focuses on predictability and stability. To manage change within the value chain requires mobilizing a critical mass of commitment and preparedness to innovate. To meet the cyclic nature of our business, the industry needs to look beyond short-term incentives and market cycles to build and maintain strategic research portfolios with flexible components.