Caption

THE BIGGER PICTURE: Prof David Bell’s inaugural lecture at Nelson Mandela Metropolitan University focuses on a return to a broader understanding of Earth, where trans-disciplinary research is critical, and which incorporates natural sciences, social sciences, the arts and non-Western world views.

Headline

**NMMU talk: In search of a better understanding of our world**

Two hundred years ago, what we call “science” was known as “natural philosophy”, with an overarching focus to understand how the world worked, in its entirety.

Through time, “natural philosophy” split into different scientific specialisations – among them physics, chemistry, geology, biology and so on – and, with the rising emphasis on measuring and quantifying nature, the word “philosophy” slipped away completely.

The result was professional silos of research, dominated by a distinctly Western technocentric world view that enabled scientists to understand small parts of nature in minute detail. As useful and as valuable as this has been, a “bigger picture”, resonating with common experience, was often missing.

In his inaugural lecture on August 2, Nelson Mandela Metropolitan University’s Prof David Bell, who holds a Research Chair in Earth Systems Science, will focus on a return to a broader understanding of Earth, where transdisciplinary research is key – and where natural sciences, social sciences, the arts and non-Western world views can all offer important insights and derive mutual benefit.

Among the many reasons for the shift is that complex computer models are enabling scientists to recreate natural systems, for which the silo approach falls short. “It is bringing us back to a more holistic way of trying to understand our surroundings.

“Although based in science, my lecture is quite philosophical in nature. It deals with the approach we have used in describing and understanding the world over the last few hundred years, and the recent motivation – both scientific and social – to modify it. There has always been a thread of opposition to an overly mechanised view of how things work – where scientists offer exact predictions, attempting to put into precise mathematical theory what nature is doing. This works well for some situations but not for others,” said Bell, a geochemist who spent 12 years as a research scientist at Arizona State University, United States before taking up the Chair at NMMU in 2013.

His research entailed studying the processes on Earth and other planets by analysing rocks from deep below the earth’s surface for clues to natural world events, past and present, including climate change.

“What has become clear from recent research is a close relationship between the physical and the biological – it doesn’t make sense to separate them when we are trying to understand how the world works.

“For instance, to try to understand climate change, you need to take into account biology and human behaviour and inter-planetary systems. They are all inter-related and affect one another.

“As technology has increased, we have discovered new ways of quantifying some of the complicated interactions that are not quite as predictable as scientists are accustomed to assuming. Furthermore, quantum mechanics [which looks at how the smallest things in nature work, such as protons, neutrons and electrons] has taught us to accept the fundamental role of uncertainty in the material world.

“This increased capability to deal mathematically, computationally, and philosophically with complexity and uncertainty is allowing scientists to become more comfortable with holistic approaches, encouraging them to step back and look at patterns in the way ‘the whole thing’ is working, without focusing exclusively on individual components.”

Whereas certain common patterns in systems operating in completely different settings have long been noted – the branching of trees, rivers and the human lung, for example – what has emerged is an identification of similar patterns of behaviour in time. “For example, an analysis of the human heartbeat looks a lot like the behaviour of earth’s tectonic plates or of financial markets.

“This commonality we observe is most intriguing, suggesting underlying governing principles that cut across all systems and opening the door to applying knowledge gained in one area to an entirely different sphere. One of the important principles emerging is that of perpetual change, but change that takes place in fits and starts, not continuously.

“In departing from a world view that is mainly linear, divided, static and strictly deterministic, the systems-based view incorporates and promotes ideas prominent in many non-Western cultures.

“When so much is happening to fragment us locally, my hope is for ideas and people to come together … It is inter-disciplinary, trans-disciplinary and offers new ways to approach problems.”

It’s an approach Bell and other researchers are trying to encourage through NMMU’s Earth Stewardship Science Research Institute, in the hope that all the different faculties will sit around the same table, to work on common problems.

“It is science that has led me personally this view – the path I’ve walked as a researcher, the problems I’ve encountered plus the observations I’ve made have propelled me towards this necessity for a more holistic description of the world, which is what many poets and artists have been saying all along.”

The born-and-raised Capetonian obtained his BSc and Geology honours degrees at the University of Cape Town, and later his PhD in geochemistry at the California Institute of Technology (Caltech).

After his PhD, Bell spent four years as a post-doctoral researcher at the Carnegie Institute for Science in Washington DC, before returning to UCT as a post-doctoral fellow focusing mainly on diamond research, stimulating his interest in the global carbon cycle at the centre of current climate change.

After UCT, Bell spent a year at the Massachusetts Institute of Technology (MIT) before moving to Arizona State University, where his research broadened to meteorites, Mars and the early solar system.

While at UCT, Bell was one of the founding members of the Africa Earth Observatory Network (AEON), an institute drawing together natural and social scientists from different disciplines to study and tackle emerging problems of the environment and society. AEON is now headquartered at NMMU as the Earth Stewardship Science Research Institute.

* Prof Bell’s inaugural lecture takes place on August 2 at 5.30pm at NMMU’s North Campus Conference Centre. The public is welcome to attend. RSVP to Allison.Olivier@nmmu.ac.za