# Why we need to look at decline, not just growth

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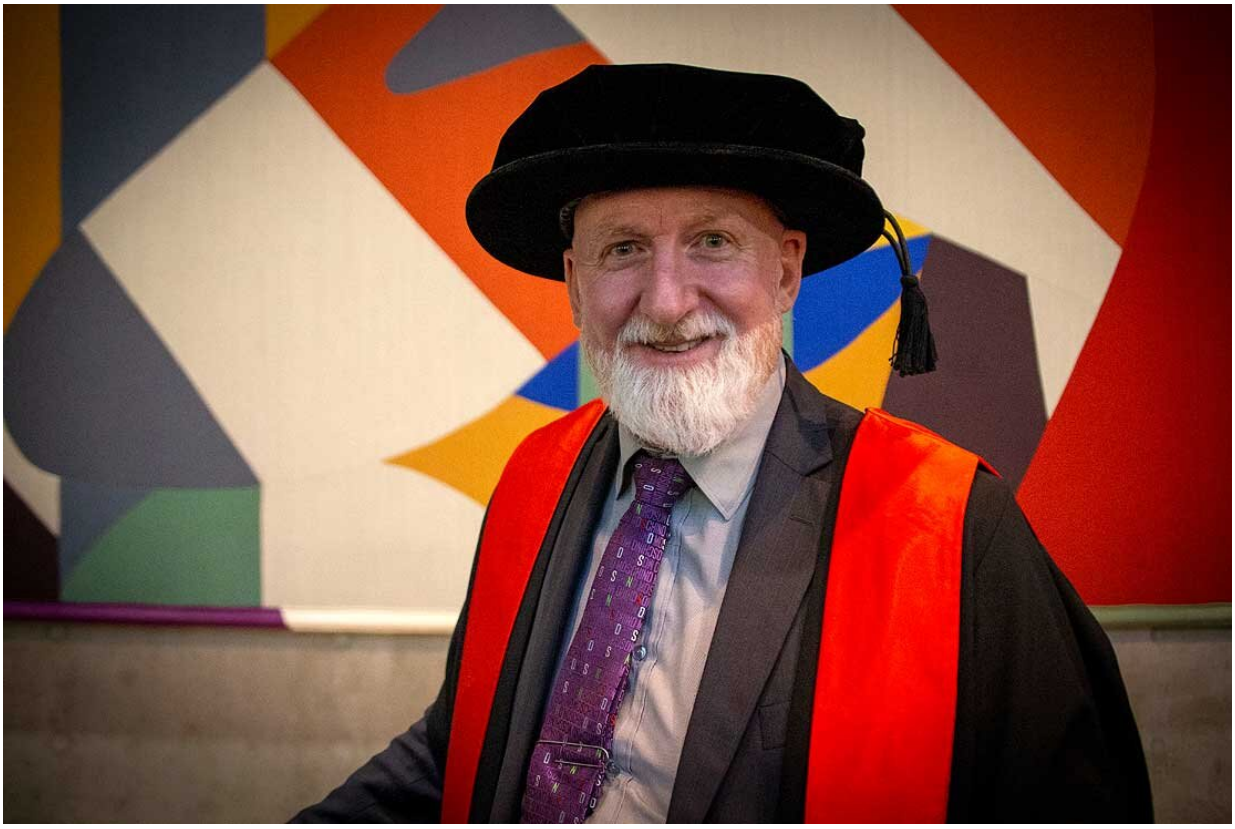

Dr Murray Macrae after graduating last month. Credit: Massey University

When Dr. Murray MacRae embarked on his Ph.D. thesis on forecasting the decline of technology, a lot of academics wondered why. But the Massey University marketing lecturer believes humans are reaching a

critical point on this planet and understanding patterns of decline will be crucial to our future.

"Like all humans, academics tend to focus on growth and new innovations, to the detriment of our understanding of the status quo and the past, we call this pro-innovation bias," Dr. MacRae says.

"As a result people thought my decision to research technology decline an arid area, compared to the rich existing literature on growth, but my argument is we need to start focusing more on patterns of decline."

That's because the paradigm of technology decline has changed, Dr. MacRae says. Previously, old technology was pushed into decline by the arrival of a new technology, but that no longer universally applies.

"We are moving headlong into an era of resource scarcity, and substantial degradation of our planet. Climate change, pollution, the loss of natural environments, all of these are driven by existing technologies and systems that are going to become unsustainable by definition."

"Our new future will see humankind abandoning technologies because we don't have the resources to support them anymore. This changes the forecasting paradigm because, in the past, researchers have assumed decline is just the mirror image of what happens when a new technology arrives."

## Separating decline from growth

In his thesis, Dr. MacRae decided to "decouple decline from growth" by looking at decline data in isolation—but that proved to be easier said than done.

"That human pro-innovation bias means there is very little research on

the decline of technologies—I found thousands of data sets recording the growth of technologies, but only a few hundred recording the decline of those technologies," he says.

This was further complicated by the "shortness" of the data series available because technology growth and decline now happens at a pace that means the data is rapidly out of data.

## Sometimes, simple is best

Surprisingly, after trying many different methods of predicting a technology decline, Dr. MacRae found the simplest mathematical models were accurate and that the sophisticated models commonly recommended would not suit the data available in the real world.

Controversially, he found that forecasts by a panel of experts also performed well, while the science says humans are poor at predicting this sort of change.

He also found that while the forecasts from simple models were relatively accurate, they provided little fore-warning of decline. In fact, the last half of the decline pattern can look very much like a straight line because the fall is so fast.

Dr. MacRae acknowledges the available data in this area is far from perfect, but says researchers have to take those first steps in investigating the retrenchment of unsustainable technology.

"I hope the study of technology decline starts getting a lot more attention," he says. "It's imperative we start thinking about it because many of our technologies are unsustainable, whether it's the airline industry, food production systems or antibiotic resistence.

"Classical economic theory assumes we are not resource limited in any way, but that is clearly not true."

Provided by Massey University