“The bridge must not fall down” – Ben Turok
[Text of the speech delivered at the UCT Faculty of Engineering and the Built Environment graduation on 15 December 2014]

It is a great honour for me to speak at my old alma mater, particularly to engineering graduates. I should tell you that I have not been in this hall for 70 years, so if I have a lump in my throat you will understand. On the other hand, it is really quite an experience to be up here rather than down there.

Let me recall my first day as an engineering student. At my first lecture in the faculty the professor told us “whatever you do as an engineer, the bridge must not fall down”. We all thought that was a rather bizarre thing to say. There was a kind of giggle in the lecture room. Then we realised that what he meant is that an engineer cannot afford to make mistakes. His work has to be rigorous and sound. I have never forgotten that advice and have often passed it on to my associates and indeed to my staff.

But what the professor did not explain was why the bridge must not fall down. He might have explained that the destruction can be immense, as well as the cost. Also the humiliation for the engineer, who will probably never get another opportunity to build a bridge.

In my case, if I build a bridge now it would certainly fall down, so fortunately I now work in an entirely different field. But that advice must apply to you.

What the professor also failed to explain is that a bridge is more than a technical structure. It is often a link between two places which have no common access. It often connects to areas across a river in rural areas, thus enabling children to go a nearby school, goods delivered to stores, and adjacent communities to socialise. There are bridges in the Transkei which have totally changed communities.

Many engineers fail to take the social implications of their work into account. They seem to think that their role is purely technical, forgetting that the consequences may be detrimental for society. I am not at all sure whether engineering courses should include some social sciences. That was certainly not the case in my studies. Most of my fellow students were rather contemptuous of the social sciences and especially the humanities.

Let me give a practical example of the importance of linking engineering with economics. For several years I have been deeply engaged in studies in the interface between mining and manufacturing. That is, the mineral value chain. Some of you will be working in mining, construction or manufacturing, so the issues should be of interest to you.

The mining industry in South Africa claims that their role is restricted to extracting mineral ores out of the ground and exporting this abroad. Because we are very well endowed with minerals, indeed the best in the world, this gives them a comparative advantage. A comparative advantage arises where a country has some natural resource which is not to be found elsewhere.

This attitude in mining reflects the classical situation in former colonial countries whereby some European power penetrated a country in Africa, Asia or Latin America, and then enabled a corporation to invest heavily in that colony to extract gold, silver, copper or some other mineral. That mineral was then transported to Europe where it was turned into finished goods.

Unfortunately when the minerals were depleted they left a large hole in the ground and not much else. This is what is to be found in many countries in Africa and we have it here in Kimberly and elsewhere.

The response from Africa has been to adopt the African Mining Vision which is now the flagship policy of the African Union, the African Development Bank and the Economic Commission for Africa. I am extremely fortunate to be involved in policy research with the ECA and we aim at advancing industrialisation across the continent based on its vast mineral wealth.

Our own manufacturers in South Africa also want a different model to that of a traditional export-oriented mining economy. They want two things: to supply engineering and other equipment to the mines; and they want minerals for beneficiation into final goods. In other words, to add value here, not abroad.

From the perspective of national interests this is a sound argument. It will increase our technological capabilities, develop new enterprises, broaden our tax base, enhance our R&D, and create employment.

These are great advantages compared with exporting raw ores to be turned into goods abroad, which amounts to exporting jobs overseas. We must find ways to increase our technical capabilities and create employment.

There are economists who don't agree. They say that proximity to natural resources does not mean that you should turn them into final goods. The arguments are too complex to go into that here.

But one would have thought that engineers, who may think more clearly than economists, would say at a very simple level, if you have grapes, make wine, if you have good fruit, export jam, if you have manganese, make steel, if you have polymers, make plastic goods. I have never understood why those who want gold rings have to buy imported rings when the gold in them is South African.

The point is that a country must turn its natural assets in national assets. Especially where there are technological gains to be made, and of course employment, which is our national priority number one. Unfortunately decisions about our industrial development are taken not by engineers or technologically trained people, but driven by financial concerns, whether it be in government or business.

And so I would urge that engineers ought to have views on such matters. You cannot confine yourself to the technical issues alone. There are many developmental and indeed socioeconomic consequences to what you do. There is no room for complacency.

Good engineers build societies, not just machines.

I trust that UCT has produced well-rounded graduates.