# How to cross the intellectual-practical divide—a case study in blue-skies entrepreneurship

Posted on Wednesday 21st August 2013

Richard Palmer, Professor of Experimental Physics and Head of the Nanoscale Physics Research Laboratory, came to Birmingham in 1994 to set up the UK's first centre for nanoscience. He is a leading figure in the fields of atomic manipulation, atomic clusters, nanofabrication, and novel instrument development. His research has led to a number of inventions, which over the past two decades he has developed into innovative businesses.

The four spinout companies arising from his research are **Inanovate (http://www.inanovate.com/)** (biochips), Interface Spectra Limited (SPELS), **Birmingham Instruments (http://www.birminghamsciencecity.co.uk/news/manufacturingisreborn050310/)** (cluster beams) and **Irresistible Materials (http://www.irresistiblematerials.com/)** (molecular resists). He also played a central role in the formation of Materials Solutions (nanomaterials). The formation of these companies fulfils a longstanding desire to translate new discoveries into technology and to contribute to the regeneration of the Midlands.

Much of this has been done with the support of **Alta Innovations Ltd (http://www.birmingham.ac.uk/generic/alta-innovations/index.aspx)**, the University's technology transfer company, which is dedicated to helping academics protect and commercialise their inventions, as well as providing licensing, consultancy and spinout development advice.

You can read about how Richard forged his path in the early days, and benefitted from Alta Innovations and the increasing University support later on. It may also shed some light on how forming a spinout company can ensure your ideas reach the people who will benefit most from them.

***Describe your research activities...***
The main theme is the control of materials on the nanometre scale, which is the scale of atoms. When you control the materials at the scale, you can get novel behavior compared with the corresponding bulk material, for example, silicon becomes a lighter emitter and ceramic materials can become super-plastic.

When setting up the Nanoscale Physics Research lab, the environment was similar to now; I felt we needed to protect our core research. Our shell of applied research would be like a semi-permeable membrane, through which ideas could flow out of and make an impact, and industrial funding could flow in to reinforce funding for the core sciences. That model has worked quite well. We're still 80% core science, but 20% carefully selected applied science, and it's been like that from the beginning. Essentially what happened over the past 20 years is we started some long-term studies, which are now coming through in terms of commercial impact, with the four spinout companies, for example, emerging since 2005.

***In what ways are you engaging with industry and how does this shape your research?***
Well some of our research doesn't link to industry, it's important to say that, some doesn't have an industrial application. But as an example, regarding the fullerenes and the Irresistible Materials company, this story started out as a basic study about how these molecules, which were quite newly discovered when we started to work on them, how they interact with surfaces and the bonding, atomic arrangements, and electronic structure. And we found during experiments that when irradiated with low energy electrons, the fullerenes were turning into graphite. We realized immediately that this would be translated into a new material for lithography.

So that story goes as far back as the 90s, and the spinout company to exploit it was only formed a few years ago, in between we were on a journey of discovery to see if the materials would match industry requirements. We had the original concept, and it was a very long process to take that idea and turn it into a practical application that can satisfy the demands of industry. The difference between our group and quite a lot of other groups, is that we took that challenge on alongside doing the basic research, so we set out long-term, parallel applied projects looking for direct sponsorship, collaborations, government-funded projects, exploring the multiplicity of relationships.

***How do you think your research could impact on society? And what applications are there for your research?***
Well, for example, once you've set up your company, to whom you license your invention, obviously you lose a bit of control, but a very satisfactory end to the journey would be to see the technology taken up for beneficial purposes.

So in the case of Inanovate, a spinout company in the area of protein biochips, the core idea I had was to immobilise individual protein molecules on specific clusters and orientate them. That led to biochips, and the spinout company was set up in 2005. Now they've developed analytical capabilities too, for interrogating the chip and a new reader and, hopefully, it eventually comes to the point where you have a test for cancer, and that would be rather gratifying.

So I think we need to understand that there is a lengthy process – in our case so far it's been 10 or 20 years from the original discovery and subsequent patent – before it has an impact on society.

***What support has the University provided in relation to KT activity?***
We've always had a very good relationship with Alta Innovations and its predecessor. Right from the beginning they decided to take a more long-term view of these inventions than they normally would, rather than expected an external investor to pop up immediately. The University took the view with nanotechnology that it was an up and coming thing. We also got support from the Mercia Fund, which is a sort of soft VC fund, to help support the nanotechnology inventions. I think the University taking a long term view has been vital, that has helped give our work the industrial impact it is now having. In more recent years there have been various funds from the University to support these initiatives, and I have to say the personal interest and encouragement from the Head of College has been very much appreciated.

***What do you find most rewarding from KT activity?***
I'm driven by the science. I engaged with knowledge transfer because I thought it was important, because it stimulates invention, and – this is the main thing – because I thought it was valuable for the University and the city. One of my main concerns was that Birmingham was at the heart of the industrial revolution, but at the time it was going through very hard times. I came from Cambridge, which was booming industrially through the Cambridge phenomenon, but Birmingham had been in decline. I hoped that we could do something to help the local economy.

***Any advice for other academics?***
For me a key issue was to wait, after the invention, till I could exploit the invention without committing a large proportion of my time to it. In the early days venture capital wanted the majority of my time, and I thought if I did that, I wouldn't be making any more inventions, and I didn't want to go down that route. But of course some colleagues may prefer to throw themselves into the exploration of their idea, and that's great too.

In general I think you need to consider carefully what level of commitment you want to put in to the project. And if you want to commercialise these things, you may need to bring in a manager, an entrepreneur, to drive a new vehicle. You need to talk at a pretty early stage to Alta Innovations, who can present you with different options as well as the support for licensing, the spinout company information, and the network of entrepreneurs that can be called upon. So I think the network of support is much better than it was, which is to be welcomed.



© University of Birmingham 2015