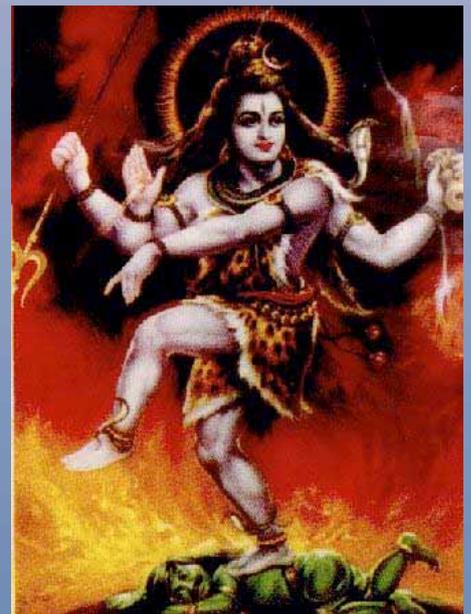


Nanotechnologies in 2009

Creative Destruction or Credit Crunch?



Tim Harper

Cientifica Ltd

Nanotechnologies In 2009



In October 2008, I was asked at the World Economic Forum along with other experts to address the main challenges facing nanotechnology. While environmental, health and safety concerns had been the preoccupation of many for 2008, this question posed by the WEF combined with the world economic crisis led me to consider the challenges of funding and commercializing of nanotechnology and other emerging technologies for 2009.

We can expect to hear much more of Joseph Schumpeter's ideas of Creative Destruction¹ this year as the world comes to terms with the credit crunch, or recession as these events used to be known. While the depths of a recession can be the best time to start a business, Microsoft is an oft cited example, this is scant consolation for the tens of thousands of companies that will not survive, and the millions who will lose their jobs as a result. An alternative scenario is Nietzsche's earlier Shiva inspired version of creative destruction, with the new morality standing in the ruins of the old, which may be the long terms fate of a number of financial institutions and economies.

Below are the five most significant issues which we see impacting the world of nanotechnologies in the coming year. Feel free to disagree at TNTlog (www.cientifica.eu/blog) or contact us for more specific information.

1. Technology Funding



The funding of early stage technologies, of which nanotechnology is one, has long been problematic and much has been made of the funding gap created as technology becomes sufficiently applied so as to cease being of purely academic interest, but adequately enough mature to attract equity funding.

While this has historically been an issue, many companies have overcome this funding limitation through a combination of boot strapping, local and national government grants angel investors and in some cases venture capital funding. However, the high risk factors combined with the high ROIs required by

¹ Capitalism, Socialism and Democracy by Joseph Schumpeter, 1942

the venture capital industry mean that venture backed nanotechnology start ups are thin on the ground.

In periods of cheap debt, there is almost enough early stage funding to go around, but the events of the past year have combined to create a perfect storm where

- a) As a result of heavy government funding over the last ten years an increasing number of commercially viable nanotechnologies are beginning to emerge from academia;
- b) Major challenges in health, agriculture, water and energy are emerging, many of which can only be addressed through technology;
- c) Venture capital is becoming an increasingly unattractive investment as returns dwindle with recent NVCA data showing that just 13% of VC companies exit while hundreds of VC firms have funds that return nothing;
- d) Opportunities are dwindling; Since 2002 over 19,300 U.S.-based companies have received VC funding but there have been only 351 VC-backed IPOs in the same period;
- e) Limited partners of many funds are under increasing financial pressure and may be unwilling or unable to fulfil capital calls.

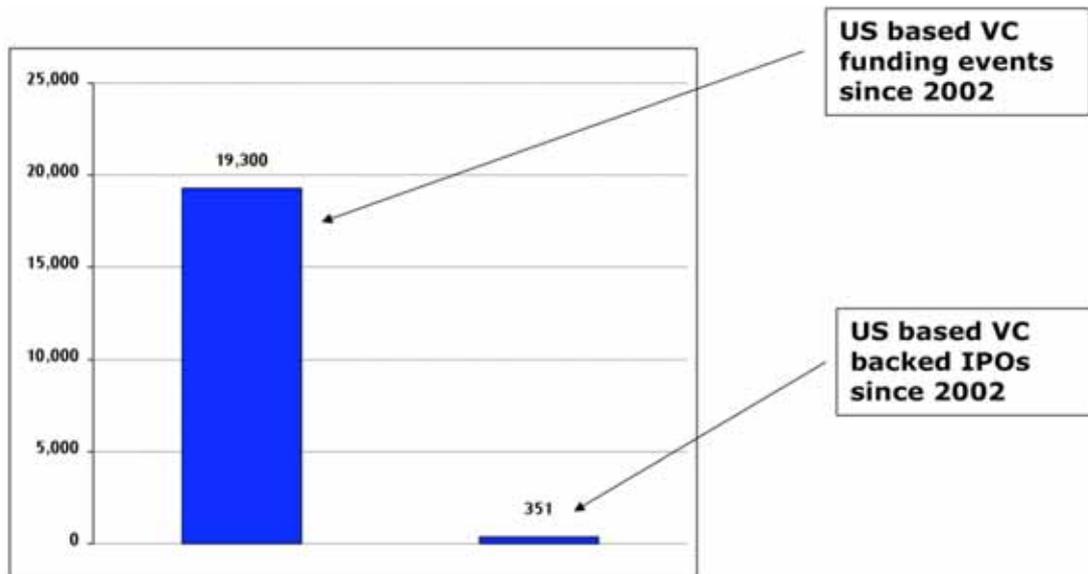


Figure 1 Source NVCA

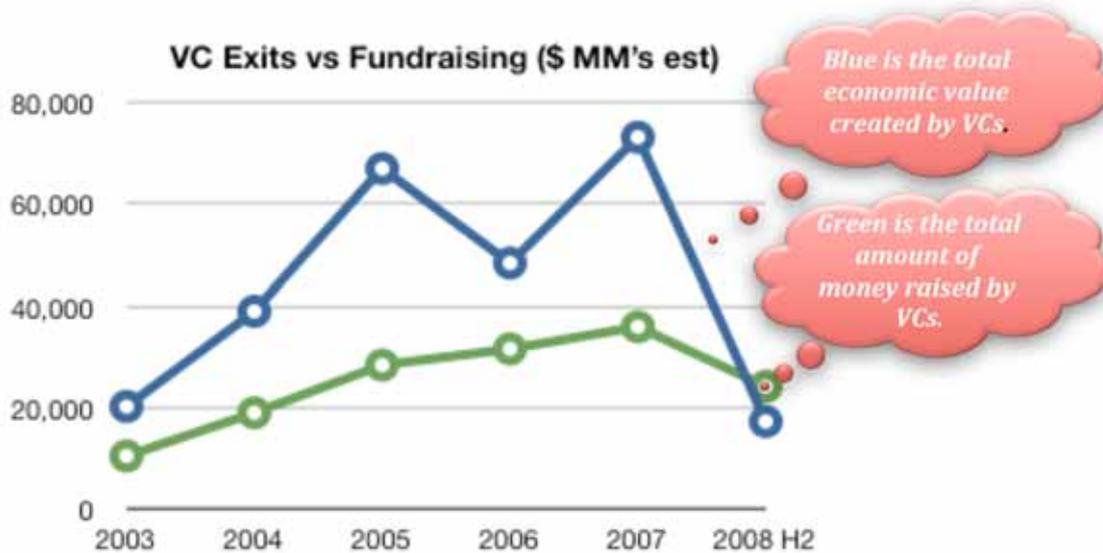


Figure 2 From Adeo Ressi – *The VC Model is Broken* SOURCE: NVCA / Thompson Reuters Exit Poll

As if that wasn't bad enough there is worse to come. Dow Jones VentureSource reported in January 2009 that U.S. venture-backed companies got only \$24.1 billion in liquidity through initial public offerings, mergers and acquisitions in 2008, down 58 percent from 2007. The seven companies that did IPOs raised only \$551 million, compared with \$6.8 billion raised in 76 IPOs in 2007, the lowest total recorded since 1992. None of these numbers make venture capital a particularly appealing proposition.

I also expect the oil backed sovereign wealth funds that grew fat on \$100 plus oil prices to react with shock and awe to declining commodity prices and pull their horns in. We predict a large number of write downs and renegotiations of existing deals before oil prices start to rise. Anyone on the receiving end should hold their nerve until mid 2009.

2. Purchases of Worthless Intellectual Property



I have seen a huge number of technology businesses closing or going into administration in the last quarter, and this will worsen as credit conditions tighten. Sir Christopher Evans recently bemoaned the lack of funding for biotech firms that have seen funding almost completely dry up and that has been my experience talking to dozens of nanotechnology related companies. There are lots of technologies that just didn't quite get to market fast enough.

Given that the current liquidity crisis may last for up to two years, and most firms don't have two years cash in the bank, I expect to see a growing number of fire sales and intellectual property disposals among most emerging technologies. Secondary investors may have a very good year buying distressed VC portfolios.

However, while selling off the IP may be attractive to administrators, much of this may be worthless unless the knowhow, which is mainly a human resource, goes along with it. As a result, companies need to be very wary when purchasing assets as many of these deals may indeed be too good to be true unless the technical team can be kept together.

3. Academic Funding and Spinouts



I expect pressure to mount for a shift from blue sky to goal-oriented research as the year progresses. While most funding programs are run on three- to five-year cycles, nanotechnology research funding will come under increasing scrutiny from funding agencies that in turn will be under pressure to develop better value for money. The government bailouts of an increasing number of sectors will result in increased competition for funding, and it is unfortunately the nature of politics that short-term measures such as job creation will take priority over generating long-term growth through technology.

Over the past three hundred years technological advances have improved almost every area of human existence, from improving public health to a growing awareness about the environment. Most economists agree that economies are strongly driven by new technologies and the consequent ongoing improvements in efficiency. However, unless innovation can get out of the lab then the global economy will suffer, and many of the supposed benefits of nanotech, regenerative medicine and other emerging technologies just won't happen.

The effects of this are potentially horrendous. If we do a rough calculation assuming that 90% of academic work produces no commercially viable products, the \$45Bn sunk into nanotechnologies so far by global governments indicates that there is some \$4.5Bn worth of technology available to be exploited over the coming few years. Given a conservative return on investment of 5x over five years, this indicates some \$22.5Bn of potential revenue for the taking, with no mechanism to do so.

4. CleanTech

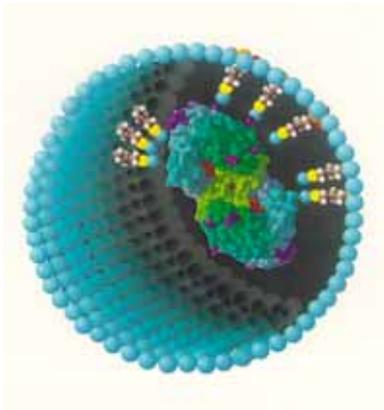


I expect a yoyo year for clean tech as this sector tends to track oil prices and is perhaps the most sensitive sector to geo-political concerns. Increasingly nervous investors will take a hokey cokey approach (you put your left leg in, your left leg out....) and new ventures may encounter significantly more dithering by investors. The solar sector seems ridiculously overheated and out of reach of most people with less

than a billion dollars to play with. In any case, the best deals to be had are for those who look outside the herd mentality.

Government funding for all things green and clean will be placed under increasing pressure, as keeping economies afloat becomes a higher priority than controlling emissions and meeting international targets. Some adjustment in subsidies for wind and solar energy will occur, making getting solar to grid parity without subsidies a substantially more difficult challenge, resulting in a few of the existing solar companies folding. I also expect to see at least one of the high profile nanotech solar companies close their doors in 2009 through the combination of lack of funding and increased competition.

5. Nanotechnology Applications



And now the good news...

The historical problem with nanotechnology has been its potential to revolutionise a wide variety of areas from semiconductors to medicine has never been properly articulated. The reason for this is, of course, that there is a huge gap between publishing scientific results and applying them – seven to fifteen years is the usual window if you are lucky! After ten years of nanotechnology funding I am seeing a much better focus with fewer technologies around claiming to have the potential to revolutionise broad applications areas

such as communications or medicines, and an increasing number that are being applied in specific areas. Moreover, many of the companies I have looked at recently have a clear market focus and address real and critical needs in a cost effective manner. This is in marked contrast to the more traditional nanotech approach of attempting to push a new materials based technology such as carbon nanotubes onto a technology agnostic and generally uninterested market.

As companies drew down mountains of cheap debt of the past decade to finance growth, 2009 will see falling share prices exacerbating to struggle to refinance existing bonds and loans. I expect to see a couple more high profile nanotechnology failures this year, probably among the large number of illiquid public companies focussing on materials.