In a nano-cul-de-sac?

Imagine the scenario, having just sold your international textile group to your nearest competitor, a leisurely cruise on the Queen Mary 2 is probably in order. But, three days out from New York, and your normally active brain is going hyper with too little to occupy its capacity.

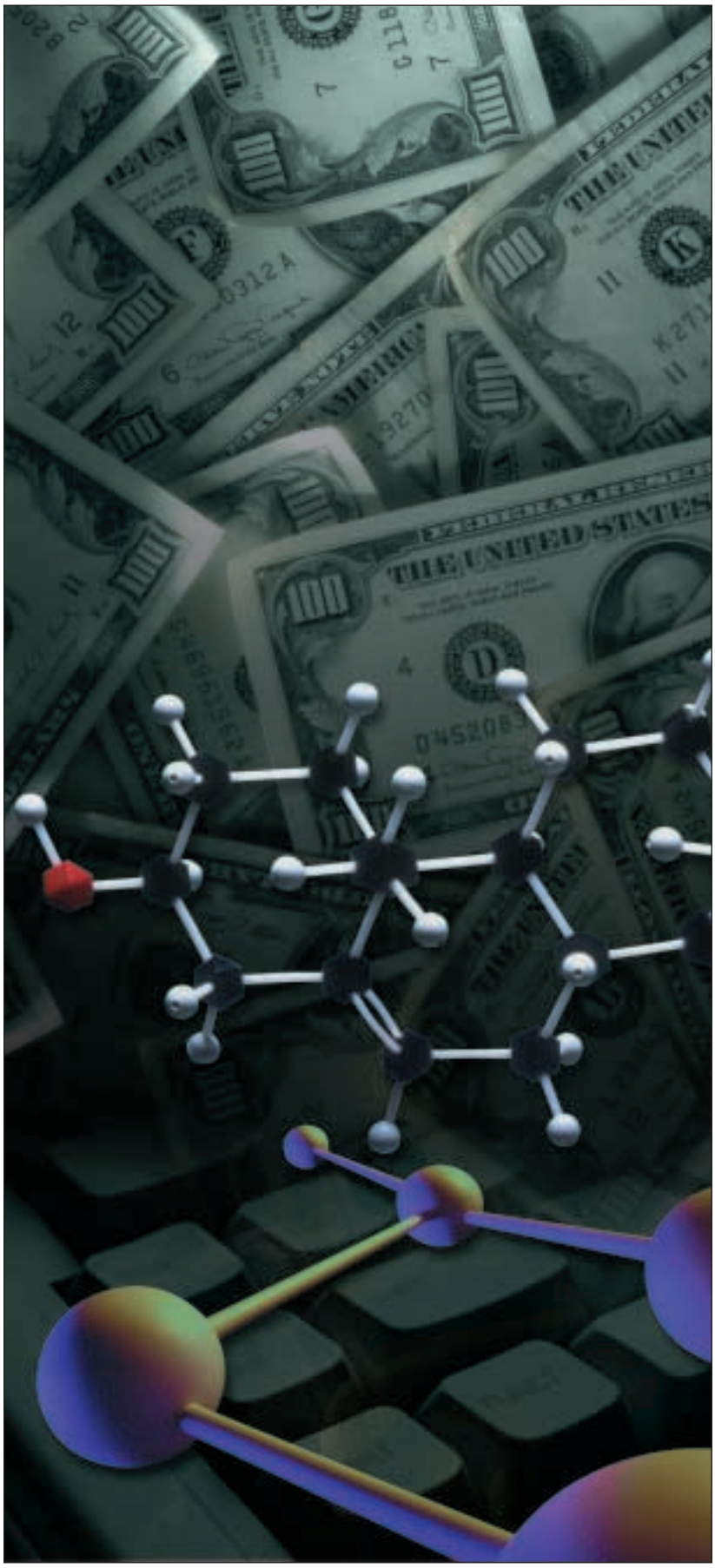
Fortunately you then meet a like-minded guy in a bar on the promenade deck and you both indulge in a little 'setting the world to rights' inactivity, fuelled by the finest of Scottish malt.

A couple of days later it's suggested that there's a hint of a textile-related project in which your new friend has an interest - and with your background, so could you. Basically it's a process that promises much to mankind as a whole, riches to its investors and an exciting boost for science. It's called nanotechnology and it's concerned with very small particles and the ability to manipulate them.

Of course, you can't see the particles without an electron microscope. The manipulative process is invisible to all intents and purposes, and the physical benefits are a little uncertain just at present. But there is a PowerPoint presentation, if you're really interested?

The investment? Was that mentioned? Well that's probably going to be in the order of a few billion dollars in total, but the potential rewards are incalculable...

To quote modern teenagers: 'Yeah - right. Whatever.'



Explaining the explainable

Irony to one side, the ability of nano-science to attract mega-bucks could be seen as a triumph of hope over logic. Nanotechnology has been defined as "the thorough three-dimensional structural control of materials, processes and devices at the atomic scale". Or in other words the ability to do things on the scale of atoms and molecules. You cannot see it and you cannot feel it.

Traditionally it is concerned with manipulating objects in the nano-scale, i.e. being between 0.1 and 100 nanometres. A nanometre is one thousandth of a micron (micrometre), which is, in turn, one thousandth of a millimetre.

But it is the harnessing of nanotechnology that has the apparent potential to be truly revolutionary. The possible applications of nano-engineered products are said to be almost without limit. It has been claimed, for example, that, using nanotechnology, a material could be developed that has ten times the strength and durability of steel for the same mass.

A form of nanotechnology is already being used to produce improved products in the fibre and textile related industries. Nano-coatings

applied to fabrics, or in truth - adjustments being made to the surfaces of fabrics - have already led to the development and marketing of clothing that is 100% water and stain repellent.

Predictive/fulfilment gaps

The US National Science Foundation has predicted that the US market for nanotechnology products and services could reach $1 trillion by 2015. But sensational claims and hyperbole have created a smoke screen which makes it difficult to assess nanotechnology's true potential.

The truth is that nanotechnology is barely there in marketing terms. Existing markets are sceptical and new ones are still to be created and satisfied with product. It promises everything, yet so far appears to have produced very little.

The major investors are governments, because business is playing it safe by staying with comprehensible products. Because of this there is a danger that not only will nano-businesses miss new revenue opportunities, but the inevitable glitches in any new products will establish them as a poor second to their rivals using traditional production methods.

Legitimately one can foresee that nanotechnology could become the deserving victim of just another hype-and-deflate media cycle. Media coverage is already exhibiting scepticism in the way it covers the subject because of frustration at the gap between promises and current reality – and the difficulty in comprehending the visibly invisible in consumer terms. So why not give them magic?

Paradigm shift

It is easy to see moving to another market sector as the saviour, but this particular set of affairs seems to have a potential in almost every aspect of daily life, from health through clothing and feeding to providing shelter. Where do you start?

Moving the nano-focus onto another area to compete with goods and services produced with current macro-technology raises questions of acceptability and achievable parameters. 'What presently unachievable goal should we target (in questions of health this is perhaps more easily answered than in others)?' 'Are there questions of social ethics that do not arise with existing methods?' 'Will the results make me happier?'

Most importantly perhaps, this is the time to move away from financing via the public purse and to move in on the entrepreneurs and marketers who are currently undertaking leisure cruises.

Venture and focus

A recent market paper suggested that 'the current focus for using nanotechnology in existing markets is partly the result of a venture capital community still smarting from the (dot.com) '90's. But the business of the application of venture capital is not just about risk calculation, but of recognising opportunity. And opportunity definitely exists in taking nanotechnology out into the full blast of the winds of consumerism. Some of the technicians and scientists might not approve of the results, but it is fair to suggest that high-minded attitudes and fixed ideals will not enable them to continue their work beyond the next half-decade or so.

By applying nanotechnology to existing markets we can establish the commercial viability of the methodology and then expand it into new market sectors. As an example of the premise in action consider the aircraft industry. In the years immediately following the Wright brothers, initiatives the development emphasis was on the provision of machines for singular use as flying test beds.

The Great War saw the application of government monies as the more lethal potential was understood, but the 1920s and 30s would have been a period of stagnation had not venture capitalists seen the long-term opportunities in commercial air travel. That is not to say that the current output from the likes of Boeing and Airbus Industrie was envisaged in the first half of the 20th century, but without the financial risk takers of the time the drive to develop aircraft capable of moving hundreds of passengers around the world would never have happened. Instead we should probably have craft that were beautifully engineered for very specific purposes – and useless for all else.

That we need a market to kick-start the project is true, but we must have an eye to the future of nano-products to ensure that they meet a real need and can generate sufficient revenues to satisfy the entrepreneurs as well as the scientists.

Who dares and cares… wins

To conclude, in the short term success will come to those nanotech companies that also hire the right people to be commercial. They in turn will search out the current technologies that can be quickly improved with an application of nano-development - and these could be anything from surface coatings to computer memory chips to automotive dashboard displays.

The resulting generation of first-rung revenues will, in its turn, attract the interest of the money men - but then only if the owners of the laboratories and workshops are ready to demonstrate their willingness to continue to operate in new markets. To do otherwise will expose them to the risk of becoming bound-in to high-tech/low-return areas that will not generate sufficient returns to enable competition with established products.

Although nanotechnology may seem like magic to many, it will take more than a touch of the 'Harry Potters' to create new markets from the majority of the current work. The drive to do this will come from men and women who can see new opportunities for nanotech applications and grasp them with both hands.