Bob Hodgson

Managing Director of Zernike Ltd. UK.

VISIBLE, VIRTUAL AND VIABLE: HARD, SOFT AND WETWARE IMPLICATIONS

Bob Hodgson is MD of Zernike UK which manages innovation centres and technology parks, seed and start-up funds, business development and technology commercialisation services and consultancy to public/private partnerships on these and related topics. Prior to the launch of Zernike UK, Bob was an executive director of SQW Ltd and is a Senior Fellow at the Institute for Innovation, Creativity and Capital at the University of Texas at Austin.

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THE NEW ECONOMY

Science parks and incubators have been increasingly visible tools in the mainstream pursuit of an entrepreneurial high tech, high productivity, high growth and high wage economy. They help to bridge the gap between new knowledge and commercial application and so accelerate the derivation of wealth from research investments. As such, they are ubiquitous in policy and infrastructure development initiatives in the widest variety of context and countries. So far, so good!

The new economy, on the other hand, is also with us and while virtual in important respects it is vital that we all embrace it or be left behind in the global competitive race. The fundamental paradigm has changed, or so we are told!

One scenario is that there will be no more than a dozen global city-regions that will increasingly dominate a globally networked economy with the remainder playing subsidiary and increasingly dependent roles in relation to these few leading hubs. The drivers behind this new economy are knowledge based with Information and Communications Technologies (ICT) enabling an inevitable globalisation with its power to integrate nodes of specialisation into an efficient whole. Global brands fuelled by mobile capital will be available everywhere and consumers will increasingly be able to order goods meeting their personal specifications via a monitor connected to the internet. One half at least of perfect competition will have been achieved – atomistic consumers with complete knowledge of supply choices in a virtual and low transaction cost market place.

Several implications for Science Parks and Incubators are worth drawing out within the following core question.

Is this viable, both in the broadest sense of being supported by a sufficient consensus of the still powerful sources of influence across the world and in the narrower sense of individual enterprises?

Protests by broadly based alliances is the first visible sign that all is not well

together with increasingly well articulated arguments from emerging markets and developing countries that are challenging the fundamentals of the institutional structures – World Trade Organisation, World Bank and International Monetary Fund, for example – underpinning the new global economy. A second challenge is the headaches that have come to the previously unstoppable telecoms giants from too rapid investment in G3 licences and technology in addition to the unstable interest of capital markets in technology based stocks. And, third, is the growing influence of environmental concerns which at one level stimulate new markets and technologies but at another block investment in, for example, power supply - one manifestation of which is the recent California black outs.

IMPLICATIONS

The first implication for Science Parks and Incubators is mobility and migration – mobile capital and with it economic activity has been a target for many science parks which have been based on strategies of attracting major investments – Sophia Antipolis and Research Triangle Park, are the biggest and best known examples – while mobile people have also been at the heart of other schemes, again with the impact of the Russian émigrés in Israel's technology incubators being a relatively recent example. Will capital become more or less mobile with its negative as well as positive implications? And will migration continue to show up a significant under investment in education and training especially in core science and technology?

Second, home grown technology entrepreneurship – has been an alternative, and sometimes complementary, strategy especially in those areas where there already existed significant scientific strengths – Cambridge in the UK is very much in this mould. Here the challenge has been to provide the right culture and ingredients to enable new business growth and to build sufficiently rapidly the commercial expertise needed for new businesses to participate from the beginning in the global market place. While this will undoubtedly continue, it poses the problem of managing, and even constraining, growth in the hot spots and generating enough activity in those without the underpinning scientific strengths.

Third, is appropriate property solutions – which have interesting divergences in that to accommodate rapid change there is a need for flexibility and in-built redundancy while to accommodate niche specialities there is a concurrent need for specialist property and facilities. Within both of these the common ground has been in the inexorable need for upgrading of communications capacities to harness the power of ICT and to keep businesses connected. Fortunately scale is associated here with significant economies but does lead to a further tendency to concentrate in nodes. There are also distribution issues that overlay the global cities tendency – for example, the redevelopment urge for inner city brown field rather than expanded green field and the connection of Oxford and Cambridge to give sufficient critical mass in an effort to overcome a tendency to implode into the London metropolitan area.

Fourth, is the pace with which opportunities open and close - which has been most evident in the boom and bust phenomena of the "dot com" enterprises that has clouded national analysis of technology investment over the last few years. It has not, however, completely masked the accelerating pace of change in both technology and in industrial structures which has led to sunrise and sunset distinctions among industry being foreshortened and constantly changing demands for new skills and competences in the labour market especially in the continually undersupplied ICT area.

Fifth, is the shift to service content which is still to a large extent local/regional at the personal end but essentially mobile in

other areas as is evident from the impact of cheaper telecoms and the emergence of massive call centres in low wage regions. This is in marked contrast to the internet sales model which is essentially passive – an offer and asynchronous response rather than an active but sometimes irritating cold call sales technique.

SOME EXAMPLES OF IMPACTS

In large part these trends are at most accelerations of changes that have been evident for some time and the hype of new paradigm is somewhat overstated. Two things that, however, do emerge are the centrality of skilled people as the key resource for competitiveness in the future and the need for high capacity affordable linkages based on ICT to connect to the global economy.

An interesting example of this new economy is a small new technology based business I met recently in Turkey – the entrepreneurs are a husband and wife team, both having recently completed their PhDs. The product is a blood flow monitor designed for use in critical post operative care units. The fundamental science upon which it is based – serial data processing – was developed by Russian academicians. The device is made in Turkey using venture funding provided from Singapore and is being marketed globally by a German partner who provides the image in a market where perceptions of a quality and reliability are still paramount.

Another is a software production unit in Yerevan, Armenia which completes tasks specified by its parent company in Silicon Valley without any contact with its final customers. The business trust network is through the US based Armenian diaspora and at present the jobs in Yerevan are providing a good local wage albeit in global terms at a fraction of the cost of equivalent skilled workers in the destination market. There are already about 20 such companies and the local desire is, of course, to build on this entry point and to develop a high value niche strategy and move up the value chain.

The first example is based in a Technology Development Centre on a university-based Technopole and receives significant rent subsidies and a package of publicly funded business advice and training. Good for the first entrepreneurs but not really dynamic in that they have little incentive to move on and release the space for the next generation. The second in a recently refurbished and privatised former academic research unit with minimal infrastructure and no explicit government assistance. Is this enough and where can help be focussed to ensure that the private investment is dynamic and developmental rather than merely exploitative?

There is also a potentially interesting implication in the need to provide an integrated model that is based on a rapid life cycle of new business development. These are impacting at two levels. The first round projects as much as round business entities with collaborations and seamless working between corporate and academic institutions in a particular area of application. The new models – sometimes called Applications Oriented Science, rather than the old terms of pure and applied science – are flexible alliances based on excellence that demand new linkages to be built, demolished and rebuilt around the needs of the next projects. The birth, death and regeneration cycles observed in Silicon Valley are an epitome of this implication.

The second is also manifest in this example and concerns the mix of ingredients that are needed to foster this entrepreneurial churning with its high birth and growth rates of new businesses and frequent deaths too.

Traditional banking and solid business advisory functions are struggling to cope, even in the good areas where they are aware

of the issues, and failing to respond in the majority of others. New types of models of integrated new business incubators with combinations of property/risk capital/training/ mentoring/commercialisation assistance in one package are emerging in response and challenging the previous generation of incubators to respond.

Evidence has not yet, of course, been accumulated to show whether this new integrated model is sustainable but interesting experiences are being built.

Zernike Group, the business I have launched in the UK, is a related response to the need for a global reach. From a strong base in Holland we now have independent but linked businesses in Australia, Germany, Italy and the UK and interest in extending the networks wider afield. In each market we are building an integrated approach with property management – mainly entrepreneurial centred new business development units – linked to seed and start-up funds and to commercialisation expertise. The latter has a particular strength in the development of sales opportunities which provide both early cash flow and market credibility and feedback to the new business.

The linkage between the national markets for small technology based firms is a crucial one where a Zernike trust network can help internationalise new businesses more rapidly than available alternate programmes. The culture is entrepreneurial rather than bureaucratic and oriented towards viable businesses capable of making a profit. Another approach that has met with mixed success is the international venturing/product bank method which is a variant of the franchise model. Interesting small business ideas from one location – the source so far has mainly been the USA – where the initiating entrepreneur does not wish to internationalise are being brought to the attention of entrepreneurs in remote markets and the ingredients to make a new business put together as a local innovation.

CHALLENGES TO ESTABLISHED MODELS

Taking another perspective, among the best known models of knowledge flows are those developed by Klein and Rosenberg relating to large firm interaction with the research base in the USA and Callon and colleagues at Ecole de Mine in Paris looking at flows of new ideas through a nodal chain that includes technology and development as well as research and commerce as distinct poles of activity. Do these still apply?

The essence of the large company model clearly does apply in relation to the linkages within enterprises although these are becoming more complex often involving more than one independent business and potentially becoming overwhelmed with data as feedback. Where things are really changing are the relations between business, knowledge base and research activities. Nested laboratories in centres of academic excellence are becoming more evident rather than a reluctant interchange in extreme cases. Networked RTD facilities – linked to corporate university models as partnerships between companies and academic centres – are also growing in significance albeit focussed on the challenge of new skills and competences rather than research activity and outcomes.

The area where the Callon model appears to be being stretched relates to the pace to market and the degree to which ideas are migrating directly from lab to application. The bio sector is one where the distinctive steps appear to be merging as is the software and chip design area but the latter may just be the effect of mature knowledge spreading into new areas of application.

NACFAM (National Federation of Advanced Manufacturing) the representative body of high tech manufacturing in the USA that commissioned the original Porter competitiveness of nations work have also recently been turning to the implications of the new economy paradigm. The threat this time is the dot com revolution

rather than the competitive threat from Japan and Taiwan although the implications for US manufacturing are no less fundamental. On reflection NACFAM have concluded that it is easier to convert a traditional manufacturing business into a dot com enterprise by bolting on a new sales and marketing front than it would be to create a production back end from a dot com front.

This is not to imply complacency as the changes needed are still large, although the apparent urgency of the threat was judged to be less than first envisaged before the dot com bubble burst. However, the ICT revolution is and will continue to impact dramatically on the sales and distribution end of the economy. Modes of selling and channels of distribution are changing and will impact on new technology based firms on science parks as much as on the more traditional economy. It will also throw up new opportunities – not least of which will be the need to make sense of the massive amount of customer data that such transactions media can automatically generate.

Another interesting variant on the model is the Virtual Science Park at University of Leeds in UK. Here the problem initially was a lack of space adjacent to the University on which to base a traditional science park, plus a recognition that real estate development was both expensive and not necessarily able to change behaviours among the academic community to become more interactive with business. After a long gestation period what emerged was a powerful knowledge management tool – that has been commercialised through a University owned company – which facilitates joint working at remote locations. Now academics and indeed others can work on problems with teams remote from the University and without the need for a special building as the intermediate space. Does this mean the Science Park is redundant, or merely that it needs to be reinvented to offer a different functionality?

What is not evident, however, is the extent to which this functionality of remote joint working is leading to a lesser pressure for concentration of activity. Indeed the evidence appears to be the opposite – Silicon Valley, in spite of its poor environment and extremely expensive real estate, is still the vibrant hub of the global IT industry to which the brightest talent are attracted. New centres have emerged – Austin, Texas and Seattle in the US, for example and Bangalore in India – some the result of distinct strategies to accelerate development some an accident of entrepreneurial birth.

CONCLUSION

Coming back to the question - What are the implications for the future for the Science Park and Incubator movement? – several important themes emerge. We can summarise.

First, hardware, which in terms of property is moving towards recyclable buildings with a shorter life expectancy. In terms of telecoms the movement is towards higher and higher capacity to accommodate a different scale of demand from the new commercial model.

Second, software, is moving to a different level of sophistication in the support needed for enterprise birth and growth as a key engine for the fast moving global economy. Having a model of new firm formation that provides access to risk capital and business skills especially among young entrepreneurs is crucial.

Third, wetware or people, where the need is for skills and attitudes that can accommodate change and that are capable of five career switches in one working life and that give rise to a clear incentive to continue to constantly learn. New approaches – the International University for Entrepreneurship and the UK University for Industry – need to be pursued to overcome complacency in dynamic areas with full employment and improve the

competitiveness and linkages in other areas struggling to compete.

To conclude, there is an interesting dichotomy in areas with a culture of technology based entrepreneurship that the current turn down in the global economy will probably exaggerate. Lots of examples of successful technology entrepreneurship – for example in Cambridge UK – create the culture of having a go at setting up a new business not least of which because if it fails there is always a skill shortage which means that the failed entrepreneur will find a job easily. Concurrently, full employment is leading to a complacency about acquiring competitive skills that will sustain the economy in the future which will have a double impact in view of the demographic tendencies of an ageing population. But then, perhaps, these are problems that many other areas that struggle to get new technology based firms off the ground would love to have which is a sign of the divergent times suggested by the scenario mentioned at the beginning of this paper.