New Frontiers of Science and Technology Parks – hospital based projects

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1. Executive Summary

This paper proposes that major hospitals create opportunities for science and technology parks (STPs) but also a variety of new challenges to be addressed as specialist parks are created. Projects presented, such as the Former Royal Eye Hospital in Manchester UK and Johns Hopkins in Baltimore US, demonstrate opportunities for specialist parks to take a role in the delivery of technological innovation within the healthcare industry, and to enhance the success of clinicians, researchers, and business. In order to boost the performance of specialist healthcare-related STPs a range of skills needs to evolve. For example, by ensuring that specialist parks engage appropriately with clinicians and researchers and work hard to evolve and market their product, those managing and developing them can respond to the issues created by an increasingly complex mix of healthcare activity, research, and business interface being present at science and technology parks.

2. Introduction

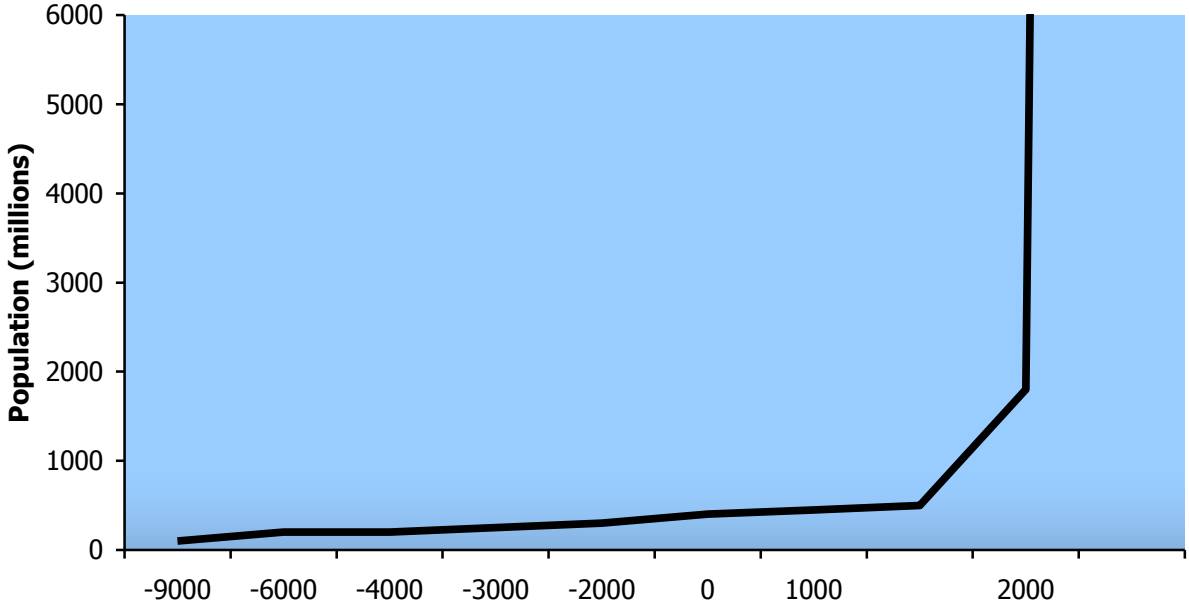
2.1 Creative Places is a specialist consultancy providing a range of services to clients involved in the promotion of projects with the purpose of accommodating research and R&D activity. These typically involve universities, hospitals and science park companies. Activity ranges from the formation of appropriate agreements between promotional stakeholders and governance structures to the sourcing of capital and occupiers. With backgrounds in property expertise in the science and technology park sector, the Creative Places team has a strong understanding of all factors that must be considered by science park investors and managers, such as environment creation, commercial and academic interface, and community development.

2.2 Hospital based projects typically involve and connect healthcare focused businesses, clinicians and researchers. Such projects require all of those groups to work together to improve patient outcomes cost effectively. There is not just one customer in healthcare provision, from a business's perspective. Those firms operating in the healthcare sector are faced with three customer groups to satisfy: their own investors, the government in the country of operation and the intermediaries that it funds, and the end users - the patients. Healthcare is one of the most extraordinary markets because the end user often has little influence over the products he or she ultimately ends up using. The buyers of drugs and devices operate in a changing landscape, where politics plays a significant role in both how and why decisions are made. Businesses find it particularly difficult to evolve innovative products and sell them into the sector.

2.3 All over the world, the number of people interfacing with organised healthcare is increasing, leading to a growing market that is creating massive demand for healthcare systems, services, and products. In China, for example, with a population 1,000 million greater than that of the US (300 million), more people than ever are gaining access to healthcare for the first time. The health service system in China has developed rapidly and health conditions of urban and rural Chinese people have improved continuously over the thirty years of reform. Average life expectancy is now seventy-three years, ten years higher than the average age in developing countries. The maternal and infant mortality rates are among the lowest of developing countries, and there are now over 280,000 healthcare facilities and 6 million medical personnel. The ongoing improvements to the medical insurance system mean that over 90% of the population now enjoy basic health insurance. All of this puts pressure on the systems of healthcare provision and insurance, with rapidly increasing costs and expectation. Adoption of innovation will be essential in the future.

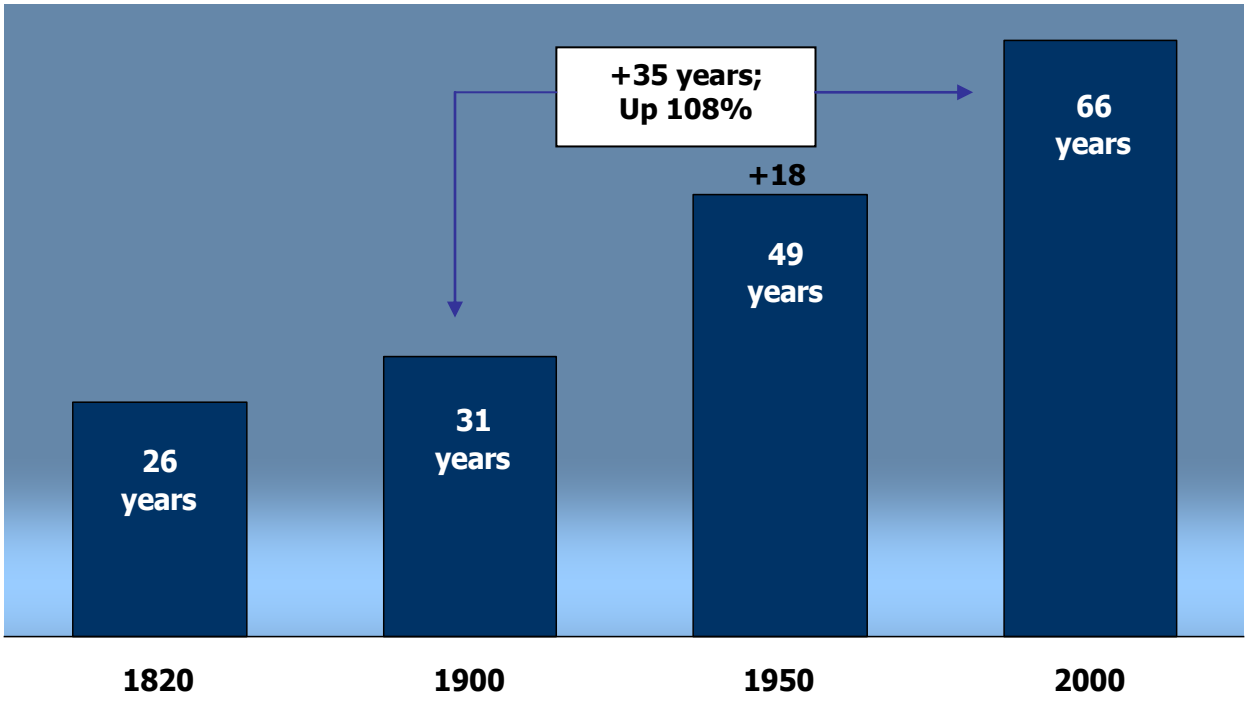
The graphs below show the increases in world population and growth in life expectancy.

Fig. 1 Growth of World Population



(Source: Milken Institute, Robert Fogel/University of Chicago)

Fig. 2 Worldwide Life Expectancy Growth

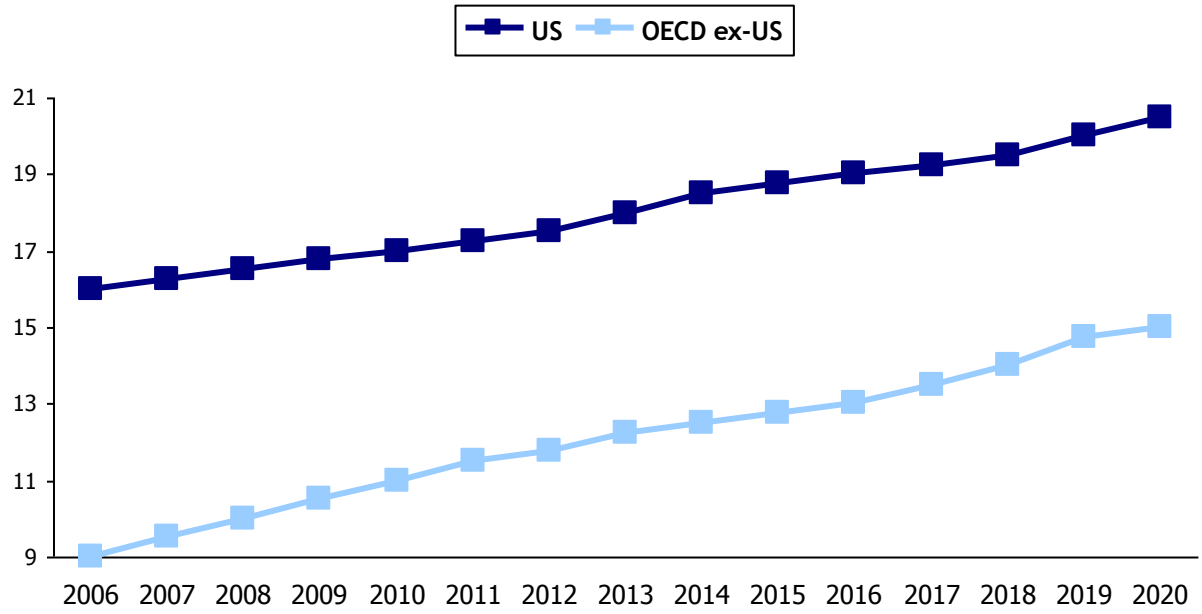


(Source: Milken Institute, Robert Fogel/University of Chicago)

2.4 Such growth has placed huge financial demands on healthcare systems, leading in the US and the UK to difficulties finding the resources to meet the associated costs. The graph

below illustrates how healthcare costs have risen, as a percentage of GDP, in the US and in other OECD countries.

Fig. 3 Rising Healthcare Costs – US and OECD
Health costs as a % of GDP



(Source: PricewaterhouseCoopers Health Research Institute)

2.5 This paper explores the way in which hospital based projects are contributing to the theme of new frontiers of science and technology parks (STPs). Specifically, the authors suggest that hospital based projects create new opportunities for specialist parks to take a role in enhancing the development and use of new technologies and innovation in the healthcare industry. There exists an opportunity to improve communication and relationships between clinicians, researchers, and business. The paper explores this theme by addressing the drivers of healthcare innovation, the roles and opportunities for specialist STPs, the lessons to be learned from leading projects, and the skills to be evolved to enhance the performance of STPs in this area. It is not a coincidence that the choice of subject falls at a time when the healthcare industry is experiencing and facing extraordinary challenges. In this paper the authors utilise their knowledge of the required collaborative relationships and built environments to consider how parks may respond to the demand for technological innovation. Importantly, the authors recognise the socio-economic backdrop to the changes in STPs and the healthcare industry, as explored more fully below.

3. Drivers of healthcare innovation

3.1 Economy and Industry trends

The developing systems and widening reach of healthcare throughout the world create a greater burden on healthcare systems. Massive healthcare reforms are being driven by wealthier populations and the provision of state insurance in countries like China, Brazil and Russia.[1] This creates opportunities to increase business in emerging markets. Over the next decade it is thought that around a third of global drug sales will be taken by emerging economies.[2] Acquiring new products by undertaking M&A activity, particularly acquiring biotechnology companies that have been working on new drugs for many years, is easier for many large cash-rich pharmaceutical companies than developing new drugs in-house. Thus the open innovation agenda is important. Drugs and treatments drive the healthcare

[1] Uncertainty presents opportunity in pharma, Investors Chronicle, 2 February 2011
[2] *ibid*

industry and the fast-growing biotech sector is crucial to help the pharmaceutical sector deliver what is required of it. In addition, in the western world the whole healthcare industry has been focussed on cure rather than prevention until now. A move towards prevention is a big step, especially whilst the need to work on cure remains.

Research has shown that drugs often go to market that are effective for less than half of the patients they are designed to serve. US-based Burrill & Company in 2010 presented data on the role of companion diagnostics, stating that identifying a sub-group of patients likely to respond can dramatically increase cost-effectiveness of a drug.[3] Burrill reported that 90% of drugs work in 30 – 50% of individuals. To put this in financial terms, in 2009 global drug sales of $820 billion were generated and it is estimated that $350 billion of this was ineffective. There is now an expectation that research and technology in personalised (or, stratified) medicine will lead to drugs that are targeted to specific groups of patients, with significantly improved outcomes.

The European Commission, in relation to Europe's innovation performance, is using its Innovation Union strategy to promote public-private research programmes dealing with the pressing issue of healthy ageing, amongst others. By 2014, the Commission wants to see the completion of a unified European Research Area in which public and private sectors operate freely and on a global scale, to encourage public procurement as a driver of innovation.[4]

3.2 People and patients

We have a growing, ageing, and wealthy population that, for the most part, expects to get what it needs and wants. It is made up of people with ever-failing bodies, as we see countries made up of greater proportions of older people.

Many of the medical innovations currently entering the market support the centrality of the consumer. The healthcare system in the UK is heading towards one more focused on the individual's ability to 'self-help' from home, with more power and responsibility given to primary healthcare professionals for the provision of services. It is believed that this can benefit the individual consumer and save money. The advanced technologies now being developed mean that it is becoming far easier for diagnoses to be obtained and monitored remotely. Healthcare providers will see massive savings if this can work successfully.

3.3 Government and legislation

The selection of healthcare providers is likely to become more competition-based and cost-driven. Commercial elements of the healthcare system are therefore growing in importance, creating requirements for clinicians and researchers of healthcare to interface more with business and industry. The recent NHS White Paper, published in the UK in July 2010, is expected to bring huge change to the organisation of healthcare. It is planned that, by 2013, strategic health authorities and primary care trusts will be abolished, an independent commissioning board set up, and a new economic regulator created. Provision of care and products will be in the hands of foundation trusts and private sector providers. General Practitioner (GP) consortia will drive commissioning of services. Private sector providers are already taking a larger slice of the market.

Strong collaborative arrangements and local partnerships will be required in order to deliver more personalised care to patients. The UK reforms are intended to create competition, believing that the operation of markets is better than the setting of targets to drive improvement. Monitor will take on the role of economic regulator, to promote competition,

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[3] Burrill & Company, 2010

[4] Anna Jenkinson, "Low private sector investment main source of the EU's innovation gap, says Scoreboard," 3 February 2011, Science | Business.net

price regulation and service continuity. The aim of the reform is to make efficiency savings, inevitably causing hospitals and providers to innovate.

Whilst all this is happening, universities are coming under pressure to demonstrate the impact and societal value of their work. If they fail to demonstrate the value of research to society there is the potential for a cut in the funding they receive from government. Accordingly, not only is market demand for enhanced technological innovation acting as a carrot, but also the government is wielding a big stick to further ensure it is pursued.

4. Roles and Opportunities for specialist STPs

In the following sub-sections we define problem areas and how specialist science and technology parks might help deal with them, creating opportunity.

4.1 Healthcare Providers

In Europe and the United States healthcare providers tend to be public rather than private. Within the private sector few businesses are large. The consequence of this is that when developing and improving ways of providing healthcare involvement of the public sector is often essential. Private sector firms are simply not big enough to take on the level of costs or risks, or both, alone, or indeed have the necessary access to patient numbers.

Unfortunately public sector providers often find it difficult to deliver innovation, or effect its adoption. When it comes to adoption, they can find it hard to provide the necessary justification. Procurement teams tend to be very cautious but probably more importantly tend to have sufficiently sophisticated financial models to adequately appraise longer-term costs and benefits in the emerging markets of diagnostics and devices. Accordingly industry believes that the value of these benefits is often understated.

4.2 Universities and the Research Base

Universities are essential for providing people to undertake a great deal of the research in the sector, and indeed teaching, of healthcare. More than in other areas, research is, by its very nature, applied as opposed to academic. This is a good thing for the sector and the industry as a whole. However there is often a difficulty associated with academics engaging with businesses, particularly in relation to deliverables, associated time frames and IP management.

4.3 Business Sector

The business sector's problem is two-fold. Firstly, there are often limited opportunities for it to sit easily alongside researchers and clinicians. There is a particular difficulty with hospital environments because clinicians experience pressure from their employers regarding the delivery of services and thus the time available to spend in helping companies evolve new products may be limited. Secondly, when a business has developed an innovative product, selling it to procurement teams generally proves to be extremely difficult, for the reasons covered above.

4.4 Pace of change

It can be a real challenge for hospitals and universities to cope with the pace of political change and to keep up with the evolving demands of government and the business sector. Governmental initiatives are often pushed ahead with lightning pace, shifting the platforms upon which people in the healthcare sector are working.

4.5 Tackling the issues

A good STP has the ability to work with the hospital and the research base to drive what happens at the hospital and on the wider hospital campus. There is a role for STP practitioners to assess the likely attractors to business; to identify strengths, weaknesses,

and unique selling points; to help evolve an environment that is attractive to business and to work out how to market the STP so as to secure further research initiatives and inward investment. There is often the opportunity to attract and secure more investment by charities and the surrounding communities. STP managers are often experienced at managing local politics and generating enthusiasm for collaborative projects.

We believe that managers of STPs are required to know how to bring in and put people together. Hospital based projects and parks provide a need for the bigger picture to be seen. STP managers are very well placed to do this. Where there is other research and commercial R&D activity in the area, outside of the hospital, then there is the prospect of marketing to businesses outside the region the opportunity of locating in a sub-region where there is much for them to gain. Those at the hospital or within academia will not necessarily find it that easy to see how other business activity can benefit a business, but STP managers are accomplished at doing this on a daily basis.

Developments in the healthcare sector, as outlined above, highlight the opportunity for specialist STPs to emerge and succeed. The commercialisation agenda creates an opportunity for specialist STPs and practitioners to deliver property and services that help hospitals and the research base deliver to their evolving agendas, ultimately helping to provide better access for business to patients, databases, tissue banks, research activity and facilities, as well as product sales.

There is a role for STPs to help accelerate hospitals and universities towards working to business agendas, timeframes and result-oriented delivery, and by providing the opportunity for co-location and more productive work.

5. Case Studies

The following projects demonstrate how opportunities are being exploited in practice and what the emerging lessons might be. The authors' research and experience of such projects highlights that there are a number of barriers to success.

5.1 The concept of co-location with business is relatively easy to define and market but the extent to which collaboration takes place day to day, in practice, is vital

The Audubon Biomedical Science and Technology Park was one of the early successes in the sector, based in New York and sitting at the interface of Columbia University and Columbia University Medical Centre. It comprises three buildings although two are for academic use; only one is for commercial R&D purposes. The academic buildings include laboratories, animal houses, classrooms and treatment centres. The third is a multi-tenanted commercial laboratory building, focussed on delivering space for new start-up biotechnology and biomedical related companies. It operates as an incubation facility of 10,000 sq m called the Mary Woodard Lasker Biomedical Research Building, with stringent entrance criteria including the need to have established people, finance and intellectual property.

Close to the Park the Columbia University Medical Centre complex is comprised of more than 400,000 sq m of space and is home to approximately 14,000 employees, including over 4,000 faculty and research scientists. In 1922, the medical school became part of the world's first academic medical centre when it formed an alliance with the Presbyterian Hospital. Columbia-Presbyterian is now part of a rapidly growing regional health network. The New York and Presbyterian Hospital Network includes 29 hospitals in the New York metropolitan area as well as a number of specialist institutes. The hospital has no business facilities within its campus. One would therefore expect the Park to work well. It aspires to ultimately deliver a total 60,000 sq m of research laboratory space and additional commercial research space.

A visit to Audubon Biomedical Science and Technology Park in September 2010 found that occupancy at the Park had fallen, even though businesses had located there in the past and it had enjoyed high occupancy levels until 2008. The Park did have its strengths: good, flexible laboratory space, proximity to the hospital and perceived support from the

university. However, the Park is of a limited scale and in practice appeared to work in isolation, with limited integration with the hospital. It is located across a busy main road and located behind some other non-related uses. By contrast the East River Science Park, situated five miles away next to the downtown hospital in Manhattan, has been a real success since 2008. Alexandria Real Estate has worked hard to ensure smooth transitions with the hospital, which it adjoins.

Audubon demonstrates that historically a Park can sell a location to businesses by defining the opportunity and having space available for companies to move into. For a park to be a success over time, and indeed today, in a more competitive market, it is clear that close engagement of clinicians and researchers is essential.

5.2 **Property and collaboration opportunity needs to be good but this also needs to be supported by a vibrant business community**

The limited success of the Science and Technology Park at Johns Hopkins located next to the Johns Hopkins Medical campus in Baltimore, Maryland (US) highlights the importance of attending to all necessary factors when delivering success, not just delivery of the property to house STP activities and a strong hospital/research base. The Park is intended to offer a total of 110,000 sq m of laboratory and office space to meet the requirements of emerging and established research organisations. Private sector developer Forest City claims that it offers seamless access to Johns Hopkins scientists and facilities, new housing, shops, restaurants and parking, all within a vibrant and safe community setting. However, the Park, even though the location of Baltimore is known to be a world leader in clinical delivery, has struggled to find commercial tenants and space has not been easily let over the last few years, following completion of the first building of 26,000 sq m.

On a visit to Johns Hopkins in September 2010, we found that the research space and associated amenity units were not attracting significant interest, such that the developer was considering offering concessionary rents. By contrast, the Johns Hopkins Hospital had undertaken recent developments on the campus including an educational building, institute, and medical centre, all exceeding 10,000 sq m. Construction of another building, for the Maryland Department of Health, was about to start. It is our view that to make an STP a success, any private sector developer should work through and with the hospital and research base to identify the unique reasons why a business would want to locate there, it should work through them on marketing initiatives and its physical proximity needs to be immediate. It may be that Baltimore lacked a sufficient range of innovative SMEs in the sector, something which we know the open innovation agenda is now bringing to the fore for multi-nationals when considering locations for new R&D teams.

5.3 **Business demands of hospitals and the research base are becoming ever more challenging and an unashamedly customer focussed approach is required**

An ongoing project in Manchester, UK, can be used to demonstrate how parks and campuses can be developed to meet the evolving needs of the relevant sectors, markets and potential occupiers. The former Royal Eye Hospital is located in the heart of Manchester's University and Hospital district and has been identified as a hub for biomedical research. The former Royal Eye Hospital is currently subject to a development proposal to provide clinical trials space for contract research organisations that can market services to pharmaceutical companies and also a MedTech centre targeted towards SMEs working on clinical devices and diagnostics. In total there is the potential to provide 10,000 sq m of laboratory, office, exhibition space, training and café accommodation.

The authors are involved in this project and believe it to be a good example of how those managing and planning STPs should evolve strongly business and customer focussed strategies. The University of Manchester and the Hospitals NHS Foundation Trust worked hard to engage with companies before designing the scheme and have worked hard to bring forward a whole pipeline of services in order to deliver what future business customers tell them they need. There is an expectation that over half the floor space will be pre-let before work starts on site.

5.4 **Clinical and research priorities do not necessarily easily align with business**

It is of paramount importance to identify and accept that clinical and research priorities are not necessarily aligned with business priorities when promoting and managing these projects. The Cambridge Biomedical Campus development at Addenbrooke's Hospital in Cambridge, UK, demonstrates how hospitals and universities can find it easier to bring in further research and clinical activity and that it is hard to source businesses to co-locate. The Cambridge Biomedical Campus incorporates the world renowned Addenbrooke's Hospital, Cambridge University's School of Clinical Medicine, and a Cancer Research UK facility, along with various research institutes. Development land is earmarked for buildings for commercial research and R&D occupiers working in the healthcare and life sciences sectors. The Campus development will also include expansion space for the hospital and further research institutes. In total it will provide over 200,000 sq m of new accommodation.

The authors are directly involved with this project. The Project Director, coming from a life sciences background rather than a science and technology park management background, has spent a great deal of time in recent months analysing the opportunity, understanding the product and exploring where the strengths and weaknesses lie, in order to identify some truly unique selling points to industry. The unique selling points are being clarified at present in order to articulate an extremely focussed marketing initiative, supported by good data and contacts.

We believe that it is also important to indentify the champions that can best help influence success from within. STP managers and practitioners should consider, in this context, that it is often hard to achieve partnerships if the STP team is in the front line of marketing initiatives. Marketing can be far more productive if led by those within the research base and by the clinicians, albeit potentially orchestrated, in part, by the STP team. It should also be noted that commercial research units or firms working in partnership with the stakeholders at a hospital often find that success takes time and constant endeavour is required to make relationships work. It can take a much longer period of time than expected for the parties to move into territory where private sector and academic researchers are truly working to satisfy all agendas. The GlaxoSmithKline R&D presence at Addenbrooke's hospital has been in existence since around 1990 and working practices continue to evolve. As relationships and interfaces are improved, for the clinical, academic and business groups on the campus, we believe that success will breed success. Once business benefits can easily be seen, many businesses will be attracted to the location.

6. Skills to be evolved

A number of issues have been explored at first-hand whilst researching and advising STP and hospital stakeholders on the achievement of their performance goals, through the creation of suitable environments and buildings. What we have learnt from the projects set out in section 5 is that practitioners should evolve some very specific skills in order to enhance the performance of STPs at hospitals. In our view, STPs must be responsive to the new frontiers faced by hospitals and businesses in the healthcare innovations sector.

6.1 Appropriate Engagement of Clinicians and Researchers

It is important to engage appropriately with clinicians and researchers and to respectfully attend to their agendas. Succeeding at this is very important and can be very difficult. Successful STPs should be able to develop appropriate methods of liaison. This skill involves recognising that clinicians are often very pressed to deliver to other agendas, such as waiting lists and above average operational targets. On the other hand, researchers are often passionate about their area of work and too rarely commit time to interfacing with businesses wishing to assert their authority and push teams to explore an area of commercial interest. Considerable skill and great care is required to motivate clinicians and academics to assist the engagement and commercialisation agenda and to find ways to achieve success. The team managing the park will need to learn to connect with the right

people, let go of control at times and work to succeed *through* academics and clinicians, not just with them.

6.2 Evolving and Marketing the Product

For STPs, being clear about what their product is and how it can be evolved to add value to its targeted audience is a very important issue to be addressed; it should sit alongside marketing of the product. The skills associated with marketing therefore have to include exploring and understanding what the product (opportunity) is and that it delivers the value that is claimed. Marketing must include articulating the advantages in both a comprehensive and concise fashion. People at hospitals and universities are often reticent about marketing the opportunities that their work creates. In addition, they may wish to keep the potential availability of specialist equipment out of the public domain, especially from collaborators that might seek to use it. Therefore, STP promoters need to take care and skill when exploring and then creating appropriate key messages for their parks so that they will be acceptable to all stakeholders.

6.3 Encouraging Involvement and Ownership

Encouraging those involved in healthcare provision to own a project, build a vision and help it to succeed, where they do not necessarily have a direct financial interest in the initiative, is a difficult task to be undertaken by practitioners. Skill is required here because encouraging involvement and ownership leads to managers getting individuals to, essentially, both collaborate and market the opportunities for them. The crucial issue with hospital based projects, more so than in any other discipline, is that the perceived attitude of the researchers and clinicians involved has a material effect on the levels of business interest and engagement. From experience, the results can be truly outstanding if researchers and clinicians go out of their way to find out what businesses want and to help where they can.

6.4 Engaging with Wider Networks

Engaging with the wider research base, facilities, and stakeholders connected to a project is very important. Skills need to be developed to ensure that connections are created in a sustainable, mutually beneficial way. To illustrate: being aware of and connected to the work undertaken at the rest of Cambridge University, at the Babraham Institute, at the Wellcome Trust Genome Campus, and in London (only three quarters of an hour away by train) is of paramount importance to the promotion of the Cambridge Biomedical Campus project.

7. Conclusion

There will be many opportunities for specialist science and technology parks to be developed at the best hospitals around the world, particularly where there is a nearby research base of excellence and where businesses working in the life sciences sector already locate. The skills required to make these projects a success will need to evolve, building on the existing skill sets of the STP directors and managers, but honing them further in what is a particularly challenging environment.

Those looking to progress hospital based projects need to ensure that the unique selling point(s) of their project is understood, that the hospital and the research base is sufficiently engaged so as to take an active, direct role in product development and promotion, and that wider, specialist networks are adequately engaged with. To achieve success, skills need to evolve.