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TECHNOLOGY TRANSFER SUPPORT: AN ASSESSMENT OF THE MODELS USED IN UK UNIVERSITIES

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EXECUTIVE SUMMARY

Today, funders, governments and the public expect universities to demonstrate the impact that their research delivers for society and the economy through knowledge exchange (KE) activities. This spectrum of activities may involve many different functions of a university, and the organisational structures used to manage these interactions can vary considerably. In this white paper, we have used secondary research and interviews with several universities to investigate the specific organisational structures used by universities to manage the technology transfer (TT) functions of KE. We have used the terminology "Technology Transfer Office (TTO)" to refer to an internal university function, and "Technology Transfer Business" (TTB) to refer to a separate company which carries out the function on behalf of the university. In practice, these groups have a number of different titles, and may also have a wider responsibility for other KE activities.

Diverse approaches are taken within the university sector in the UK and abroad to support technology transfer activities. These approaches have varying advantages and drawbacks, and have typically been developed to suit different situations. Although we can divide them into groups, we found that the detail of the implementation of each model varies from place to place to suit the specific local conditions.

Many UK universities use internal departments, staffed by university employees, to provide their technology transfer activities. There has been a general trend towards closer working relationships with other university KE activities, and one of the main benefits of an internal department is the potential to offer a more joined-up approach to ensure that the technology transfer functions are supporting the university's wider Impact agenda. Internal TTOs may also be more closely integrated with the academics, and incorporated into university planning. However, the need to work within university constraints can lead to slower, more bureaucratic processes, and there are also constraints on the types of relationship that are permitted under the charitable status of the organisation.

In order to support a separate commercial TTB, it is necessary to have a consistently high level of research outputs to produce a reliable income stream. In all the universities which are top-rated for research, a separate technology transfer business is used, which allows them more freedom to act flexibly and quickly, and to present a commercial face to external businesses. It also allows them to attract good quality TT professionals by offering an appropriate working culture, terms and conditions. This model requires careful management to ensure that the business activities are aligned with the university aspirations, and to maintain a close relationship with the academics.

Between these extremes, universities today are using other blended models to bolster their capabilities with judicious use of collaboration and outsourcing of specialised functions such as spin-out funding and support, patent assessment and valuation, market research and validation, technology marketing, TT database management, or crowd-funding platforms. In all these arrangements, it is important to have local TT support to ensure an effective link back into the local academic research base.

There is no single right or wrong way to support technology transfer, and good KE professionals will find a way to maximise the social and economic impact of their university research no matter what their surroundings. They will also look to learn from best practice in other organisations. Flexibility is needed to allow the leadership team at individual universities to pick and choose the approaches that suit their university, to update them as the external environment evolves, and to set their own priorities in terms of outcomes and impact that fit with their particular research structure.

INTRODUCTION

Teaching, research and knowledge exchange are the three key missions of universities worldwide. Today, funders, governments and the public expect universities to demonstrate the impact that their research delivers for society and the economy. Knowledge exchange activities encompass joint research and development projects, consultancy and training, knowledge transfer partnerships, licensing, setting up new companies and social enterprises, public and community engagement, and the enterprise agenda for staff and students.

This spectrum of activities may involve many different functions of a university, and the organisational structures used to manage these interactions can vary considerably. In this white paper, we have investigated the specific organisational structures used by universities to manage the technology transfer (TT) functions, and how these relate to other knowledge exchange and impact activities in the university. Technology transfer was defined in the recent McMillan report[1] on good practice in technology transfer as:

> *"the commercialisation of university-owned research outputs through the licensing of IPRs (patents, copyrights, know-how, databases and design rights) to existing companies and setting up new spin-out companies."*

We have used the terminology "Technology Transfer Office (TTO)" to refer to an internal university function, and "Technology Transfer Business" (TTB) to refer to a separate company which carries out the function on behalf of the university. In practice, these groups have a number of different titles, and may also have a wider responsibility for other KE activities. Through secondary research, and interviews with several universities, we have identified the main structures that are used in the UK, and summarised the strengths and weaknesses of each, and the type of university that may benefit from each approach.

MODELS OF TECHNOLOGY TRANSFER SUPPORT

We have described broad groupings of different models. However, within each category there are significant differences in the detail of how each university divides up the activities and manages the relationships between them.

INTERNAL TTO

Many UK universities use internal departments, staffed by university employees to provide their technology transfer activities. Some are closely integrated with collaborative research support functions, KTPs and the wider Impact agenda, whilst in others it is kept more separate. There has been a general trend towards closer working relationships over a number of years in many universities, leading to the formation of larger directorates tasked with many aspects of innovation,

[1] University Knowledge Exchange (KE) Framework: good practice in technology transfer. Report to the UK higher education sector and HEFCE by the McMillan group. September 2016. http://www.hefce.ac.uk/pubs/rereports/Year/2016/ketech/Title,109539,en.html

impact and business interactions. In general terms there is a correlation between the size of a university's research activities and the size of its TTO. Larger universities are more likely to separate the functions more formally, whilst in a small university the TTO may also be responsible for Impact, business development, collaborative research and consultancy.

These offices are often funded through a mix of Higher Education Innovation Fund (HEIF) funding from the Higher Education Funding Council for England (HEFCE), university central funds and/or specific grant and project funding. The returns produced from their activities usually feed into central funds, but some may be ring-fenced for the department (particularly reimbursement of prior patent costs) or for re-investment to support new spin-outs.

STRENGTHS	WEAKNESSES
○ Easier to focus on Impact not income, and coordinate with related KE activity ○ Closer integration with academics ○ Integrated into University planning ○ Simpler to re-structure? ○ Can be agile and responsive IF given delegated authority and dedicated legal/financial resource	○ Slow, bureaucratic, need to work within University constraints ○ Often distracted by non-core activity and politics ○ Risk averse and bound by charitable status ○ Hard to attract the right staff (pay, working environment, ethos) ○ Tax inefficient ○ Insufficient breadth of staff experience? ○ Companies prefer to work with companies

The main advantages consistently cited for the use of an internal TTO are the potential to be more closely integrated with the academics, and to take on responsibilities reflecting a wider Impact agenda, rather than just direct commercial TT activity.

INTERNAL TTO WITH EXTERNAL SPIN-OUT SUPPORT

A number of UK universities, many of which are in the Russell Group of research intensive universities, supplement their internal offices using an external company which provides support and investment for potential spin-outs arising from the university. The leading UK company in this category is IP Group, which is listed on the main market of the London Stock Exchange, and has direct relationships with 14 UK universities as well as a number in the US. The detailed financial arrangements of these relationships vary.

STRENGTHS	WEAKNESSES
○ As for Internal TTO model, plus: ○ More flexibility for spin-out activities ○ Additional expertise available for spin-out formation, both support staff and funding ○ Added certainty about the type of deal that will be supported	○ As for Internal TTO model, plus: ○ External provider can pick and choose opportunities, leaving a gap of unsupported projects ○ No support for licensing ○ Long-term financial stability and investment resources? ○ Lack of flexibility if a 'one-size-fits-all' approach imposed

WHOLLY-OWNED SUBSIDIARY TTB

In this model, the university has set up a separate subsidiary business which undertakes TT and related activities on their behalf. The university is the sole shareholder, but because of the limited company structure, the company is able to behave in a responsive, commercial manner, and can take on risks that are contained within the limited liability company structure. This model is found amongst all but one of the top six research intensive universities along with several others in the UK (many of them in the Russell Group). The exception amongst the top six is Imperial College London, which has a part-owned TTB approach described in the next section.

These wholly-owned subsidiary businesses are funded by a share of the revenues that they make from licensing and spin-outs. They may also be paid a fee by the university in return for providing specific services, and may receive some of the university's HEIF award. It is usual for the tasks, responsibilities and authorities which have been delegated by the university to its subsidiary business to be defined in a service agreement.

STRENGTHS	WEAKNESSES
○ Fast and agile, flexibility in relationships ○ Industry prefers to work with business ○ Focus on key tasks, less on politics ○ Experience through external board members ○ Ring-fence risks, wider range of possible trading relationships ○ Salary, bonus, working environment, business culture to attract skilled experienced employees ○ Tax efficient ○ Academics may prefer commercial company for commercial activities	○ Clear governance/University board membership needed for alignment ○ Internal university management needed ○ Effort required to ensure TTB is seen by academics as part of the university ○ Coordination with other KE activity may lead to some duplication of effort ○ Strong research foundations required to generate consistent licensing returns

The two major advantages consistently cited for the use of a separate TTB are the ability to act quickly and flexibly (aligned to the expectations of industry), and the ability to attract the right staff. Good quality TT professionals can be attracted partly by the terms and conditions, but mainly by the working culture.

PART-OWNED SUBSIDIARY TTB

The only UK university that we are aware uses a part-owned subsidiary TTB model is Imperial College, with the Touchstone Innovations Group. Touchstone Innovations is partly owned by Imperial College and is listed on the Alternative Investment Market of the London Stock Exchange. This listing has been used to raise investment finance, which can be invested into selected technology companies from Imperial College and from other universities. Within the Touchstone Innovations Group, Imperial Innovations Ltd is a subsidiary company which provides TT services to the College. The Imperial College shareholding in Touchstone Innovations Group has gradually decreased over the years, to approximately 15% at present. Imperial Innovations has a Technology Pipeline Agreement with Imperial College London until 2020, under which it acts as their technology transfer function. The performance of the TTB is monitored by the College through a service level agreement.

Imperial Innovations is supported by the wider Touchstone Group companies. It receives a share of the income that it generates from licensing and spin-outs, and does not receive additional funding from the College.

STRENGTHS	WEAKNESSES
○ Generally as for wholly-owned subsidiary, plus: ○ More flexibility (for spin-outs) ○ Additional expertise and funding, including post-IPO ○ May take on all the costs of TT provision ○ Scale allows a more strategic view ○ Structure requires emphasis on academic customer service	○ Generally as for wholly-owned subsidiary, plus: ○ Conflicts between university and other shareholder interests ○ Potential misalignment with the university needs ○ Additional barrier to academic engagement ○ Some local resource is still required ○ External provider may be able to pick and choose opportunities, leaving a gap of unsupported projects

The main advantage of this part-owned model over a wholly-owned TTB is the bigger scale, giving access to larger funds and investment management expertise.

CONTRACTED OUT

In some cases, the organisation which provides TT services may be the TTB of another university or an independent company. This model can allow a smaller university to gain access to the full resources of a more experienced team, but can lead to some logistical difficulties with maintaining relationships with the academic researchers. This model was more common in the recent past than today, and most of these universities are now bringing some or all of their TT activities back in house again.

As university technology transfer activity has developed over the years, a number of commercial businesses have been created which provide support to the TTO/B in certain areas. Using these can be described as ‘part contracted out’ and is an increasingly common approach for both larger and smaller TTO/Bs. Some areas where services are available include: patent assessment and valuation, market research and validation, technology marketing, TT database management, crowd-funding platforms. The “Internal TTO with external spin-out support” model described above can be seen as a specific example of this part contracted out approach.

STRENGTHS	WEAKNESSES
○ Much larger pool of TT expertise ○ Reduced need for internal support ○ Advantages of wholly owned subsidiary may also apply, depending on delegated authority ○ (Part contracted out) Ability to pick and choose the best providers for specific expertise	○ Additional barrier to academic engagement ○ Some local resource is still required ○ External provider may be able to pick and choose opportunities, leaving a gap of unsupported projects

The flexibility of this ‘part contracted out’ model means that almost all UK universities use it to a greater or lesser extent to allow them to access particular expertise as needed.

SHARED TTO/B

There are some examples, particularly in Europe, where a single entity is responsible for the TT activities of a number of universities, and is typically jointly owned by each of those universities. Some are regionally based, whilst others specialise in specific subjects and industry sectors.

We are not aware of any instances of fully shared TTO/B in the UK; however there are some examples of university alliances where groups of universities share certain TT-related activities. A leading example is the SETsquared Partnership, an enterprise collaboration between the universities of Bath, Bristol, Exeter, Southampton and Surrey which focuses on supporting new business start-up and student enterprise at its member universities. There are also some subject/sector focused examples, such as Cancer Research Technologies (CRT) or the regionally based NHS Innovation units.

STRENGTHS	WEAKNESSES
○ Larger pool of TT expertise, can specialise ○ Reduced need for internal support ○ Ownership makes it easier to align goals	○ Additional barrier to academic engagement ○ Some local resource is still required ○ Conflicts between aims of members needs careful management (especially if these change)

Shared approaches allow a group of like-minded universities to provide a wider service than the individual members would be able to deliver alone. This is easier to coordinate if the sharing is local/regional, but still does not do away with the need for local interfaces with the research base.

COMPARISON OF KEY UK UNIVERSITY STRUCTURES

The Russell Group[2] represents 24 leading UK universities which are committed to maintaining the very best research. As the most research-heavy group of universities, these are the most likely to generate suitable ideas for technology transfer. Several of the models described above are being used by the Russell Group universities, as summarised in the table below:

MODEL	UNIVERSITIES
Wholly-owned subsidiary TTB	University College London, Cambridge, Oxford, Manchester, Birmingham, Edinburgh (two TTBs), Queen Mary, Warwick
Part-owned subsidiary TTB	Imperial College London
Internal TTO with external spin-out support (IP Group and/or SETsquared)	Nottingham, Leeds, Kings (two separate functions), Bristol, Cardiff, Exeter, Glasgow, Sheffield, Southampton, York
Internal TTO	Durham, Liverpool (used to be contracted out), Newcastle
Internal TTO with wholly-owned subsidiary TTB for spin-outs	Queen's University Belfast
No specific Tech Transfer support	London School of Economics (wholly-owned subsidiary for consultancy, CPD, etc)

[2] http://russellgroup.ac.uk/

CONCLUSIONS

Diverse approaches are taken within the university sector in the UK and abroad to support technology transfer activities. These have varying advantages and drawbacks, which suit them to different situations. Although we can divide them into groups, we found that the detail of the implementation of each model varies from place to place to suit the specific local conditions.

In order to support a separate commercial business, it is necessary to have a consistently high level of research outputs to produce a reliable income stream. In all the universities which are top-rated for research, a separate technology transfer business is used, which allows them more freedom and flexibility and to attract the right calibre of staff.

In some other universities, however, this purely commercial focus is much less appropriate, and a more joined-up approach is needed to ensure that the technology transfer functions are supporting the university's wider Impact agenda. This may be best achieved through an internal function.

No matter what underlying structure is used, universities today are bolstering their capabilities with judicious use of collaboration and outsourcing of specialised functions such as spin-out funding and support, patent assessment and valuation, market research and validation, technology marketing, TT database management, or crowd-funding platforms. In all these arrangements, it is important to have local TT support to ensure an effective link back into the academic research base.

There is no single right or wrong way to support technology transfer, and good technology transfer professionals will find a way to maximise the social and economic impact of their university research no matter what their surroundings. They will also look to learn from best practice in other organisations. Flexibility is needed to allow the leadership team at individual universities to pick and choose the approaches that suit them, and to set their own priorities in terms of outcomes and impact that fit with their particular research structure and local environment. These models are in flux and the environment is not static, so universities will also need to review their model periodically to ensure that it is still fit for purpose or to adapt the model.