



ADVANCING INNOVATION AND KNOWLEDGE TRANSFER

Identification of and
Improvement to Technology
Transfer Best Practice

Work Package 2 Final report

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PROTTEC PARTNERS

PROTTEC is an INTERREG IVA project that brings together partners from the Channel coasts of France and England in exploring the transfer of knowledge and innovation generated by publicly funded research.

In Europe, knowledge transfer from academia to industry, particularly SMEs, falls behind the levels and quality achieved in the United States and Japan. Whilst academia has strong links with enterprises in education and research, technology transfer remains weak. Europe is usually considered among the best world performers in terms of research capacity, but this potential is too rarely transformed into innovative products and ideas, and the potential contribution to economic growth is lost.

This is the situation PROTTEC seeks to address.



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Part One: Introduction

PROTTEC Work Package Two, Identification of and Improvement to Technology Transfer Best Practice was undertaken by the University of Exeter. It considers: the identification of the range and scope of knowledge transfer activities in Bretagne, France and the South West and South East regions of the UK using quantitative analysis of government and regional statistics – supplied by the University of Plymouth from Work Package One – and qualitative assessment based on interviews with key staff from partner institutions and stakeholders across the regions; a desk-based assessment of evident best practice for knowledge transfer from both France and the UK; and a comparative study of around thirty case studies from the UK and France.

Work Package Two mainly focuses on knowledge transfer activities from interviews with key staff from partner institutions and stakeholders from the South West, UK and Bretagne, France. This was done so that the University of Exeter could interview stakeholders from comparable organisations.

Also, both Bretagne and the South West have analogous qualities: they are coastal, with most demographic and economic activity taking place in and around the coastal areas and benefit from marked economic diversity, but are largely dependent on a rural economy.

The final report summarises the combined results of each of these research elements and highlights common threads for best practice, whilst also identifying barriers to success and recommendations for further research.

Part Two: Summary of results

Appendices one, two and three outline a summary of each of the three sets of research results. Appendix four contains substantiating documentation for WP2 and also includes commercially sensitive information.

Appendix One summarises the identification of the range and scope of knowledge transfer activities in Bretagne, France and the South West and South East regions of the UK using quantitative analysis of government and regional statistics and qualitative assessment based on interviews with key staff from partner institutions and stakeholders across the regions.

Employing the findings of the University of Plymouth's Work Package One (2009) report, a number of comparisons can be drawn between the quantitative analysis of government and regional statistics and qualitative assessment based on interviews with the stakeholders. Also, Work Package One identifies numerous suggestions for filling innovation and knowledge transfer gaps; regional stakeholders strengthen these findings through their observations.

Findings highlight that all stakeholders are aware of knowledge transfer activities and innovation strategies within their respective organisations. Each of their roles comes with some degree of knowledge transfer expectation and differing knowledge transfer channels.

Stakeholders are keen to undertake the expectations essentially set out by Regional Economic Strategies or Regional Innovation Strategies, in the UK, or through Regional Economic Development Strategies (Stratégie Régionale de Développement Economique – SRDE) in France. However, how strategic these are for engaging SMEs in knowledge transfer activities differ considerably.

Almost all stakeholders made suggestions to improve innovation uptake and the effectiveness of knowledge transfer activities. Bretagne highlights include: research positions need to be strengthened; more companies need to be attracted to the region to ensure its economic sustainability; universities need direct links with industry to be more efficient; funding limits technology transfer; and a more strategic approach is necessary.

South West stakeholder suggestions include: the need to identify and break down barriers where they exist; fund the best mechanisms for innovation; investigate the mechanisms behind successful clusters; create more of an incentive for knowledge transfer; encourage business work placements, secondments and job rotation; employ the region's retired source of business acumen more extensively; continue to offer support in a variety of forms to SMEs.

Others general observations from stakeholders include: an identification of the need to have more joined-up thinking from policy makers; develop an understanding that innovation only happens if there is a customer need, the technology and resources available to meet it, and the skills to make it happen; develop boundary spanners that can facilitate interactions between separate stakeholders; spend money effectively and develop more professional administrative mechanisms; provide seed funds for more proof-of-concept projects; build capacity in the academic community itself (by training academics); marketing, publicity and events for en mass interactions, which raise profiles and the ability to network; and take into account the effectiveness of physical proximity in places such as science parks.

There is no quick-fix, but findings from this set of research suggest that consistent, correctly-targeted, ring-fenced funding allocated to these activities would improve the effectiveness of these activities and therefore generate more innovating regions.

Also, HEIs, public research organisations and the government bodies that support them need to improve communication with each other and the best way to do this is through face-to-face contact.

Industry also needs to understand that HEIs, rather than being relatively cheap, non-commercial, antiquated organisations, are a valuable resource of innovation that can directly impact a company's success.

Regional comparisons from Work Package One (2009) with input from regional stakeholders from Work Package two, include:

- Where Work Package One (2009) finds that all four regions support activities around the development of clusters, supply chains and company networks to

support objectives addressing internationalisation and foreign investment. Stakeholders unanimously suggest at different points that clusters, in various forms, such as technopôles and science parks, support knowledge transfer activities.

Stakeholders also support suggestions that these activities could be enhanced through cross-border collaboration to enable regional companies' access to a network of international companies.

- Work Package One (2009) finds that the South East and South West of England and the Bretagne region of France all adopt activities to support companies in transferring their technology and knowledge at an international level to improve their international competitiveness. And highlights a potential gap in the application of innovation and knowledge transfer activities to improve international competitiveness within the Nord-Pas-de-Calais region.

Although mention of transferring technology at an international level was limited, the majority of stakeholders from Bretagne and South West, saw the promotion of knowledge transfer activities on broader international platform as important and stakeholders such as, the France and UK Knowledge Transfer Office representatives, saw international collaboration as key to their knowledge transfer activities.

- Work Package One (2009) finds that the South West of England aims to support an 'aftercare' service to organisations investing in the region to help secure their long term future in the region. This is an activity that could be applied in other regions to develop more sustainable internationalisation and foreign investment.

The UK local authority stakeholder representative, supports this finding. However, in general, all stakeholders believe that some input is invested at the end of knowledge transfer activities to improve the chances of competitiveness and success.

- Work Package One (2009) finds that the South West of England and Nord-Pas-de-Calais region of France both support activities to promote their regions internationally in some way. These activities could be enhanced within each region to provide a more rounded promotional approach to internationalisation, and also be applied in other regions.

Again, mention of transferring technology at an international level was limited, but the majority of stakeholders from Bretagne and South West, saw the promotion of knowledge transfer activities on broader international platform as important.

- Work Package One (2009) finds that both English regions support a number of activities to promote an innovation culture amongst young people, while the South East of England and Bretagne region both support a number of activities to promote an innovation culture and entrepreneurial mindset through competitions. The similarities in the types of activities supported offer the

opportunity for sharing experiences, best practice and expertise across the regions to maximise their impact in developing a culture of innovation.

From a stakeholder perspective, the UK local authority stakeholder representative, supports this finding and notes that its organisation undertakes a lot of work with 14 to 19 year-olds. This has enabled particular projects that look to engage young people with industry, such as the maritime sector. It also suggests that as successful business people tend to retire in the South West, they could give the region significant advantage in the form of a valuable resource of experienced business personalities and a youthful population ready to learn.

- The South East, South West and Bretagne regions all support activities to deliver business support which presents an opportunity for the regions to share best practice in terms of the business support mechanisms they adopt.

All the stakeholders, in one form or another, highlight knowledge transfer activities that deliver business support, from funding equipment or schemes to offering training and networking opportunities. Stakeholders report that a range of mechanisms are helpful, but a more targeted approach could be more effective.

- Work Package One (2009) finds that the South West of England's RES supports a comparatively large number of activities focusing on technology and knowledge transfer actions in order to address the promotion of an innovation culture and entrepreneurial mindset compared to the other partner regions. This offers the opportunity for other regions to consider the impact such activities might have on addressing objectives to promote a culture of innovation and entrepreneurialism.

Stakeholders from the South West region do comment about the need to enhance the innovation drive, mostly because it has a rural lifestyle-led economy, and the RES is designed to meet this need.

- A number of the regions support the development of networks to assist in the promotion of a culture of innovation. There is an opportunity for knowledge sharing across the regions regarding the structure, working practices and communication of their networks, and partnerships between the regions to maximise their impact on business innovation.

The majority of stakeholders mentioned some form of networking and iterated how important this activity was to the effectiveness of knowledge transfer. One Science Park representative stakeholder from the South West also stressed how important communication was to innovation, saying that for many activities modern methods of communication have pretty much negated the need for travel, however, nothing replaces the impact that face-to-face contact creates.

- The South East, South West and Bretagne regions all support activities to market the regional innovation profile which offer opportunities for sharing

best practice and expertise across the regions to enhance each region's promotional activity with a view to promote a culture of innovation.

There was limited mention of the regional innovation profile and best practice considerations from the stakeholders.

- Work Package One (2009) finds that the South East and South West of England both recognise the importance of engaging with HEIs to ensure they are providing the right skills to the labour market, each adopting activities to support this process. Activities to engage with HEIs in this way could be applied within the French regions to assist in the appropriate development of their workforce skills to compete in the global economy.

Stakeholders from France support this finding and stress that a more strategic approach to engagement would be beneficial.

- Work Package One (2009) finds that the South East of England and Bretagne region of France both adopt activities to develop a directory of their competencies. This highlights an opportunity for both tools to be further developed through cross border collaboration to enable them to be utilised regionally, nationally and internationally.

Again, many stakeholders from Bretagne stress that a more strategic approach to this type of tool would improve cross-border collaboration.

- Work Package One (2009) finds that the South East of England supports a number of activities to provide enhanced innovation support services and infrastructure in order to promote innovation in SMEs. However, neither region's in France adopt activities within this criterion, highlighting a potential gap in their innovation activities.

The majority of stakeholders, in both the UK and France, were not aware of specific strategies to engage SMEs in knowledge transfer activities. Contact with SMEs was arranged, for the majority, on an ad-hoc basis. The two respondents that highlight specific strategies were from corresponding UK and France competitiveness clusters.

- The South West of England directly supports a number of activities to provide enhanced innovation support services and infrastructure which focus around the Business Link service. Bretagne's Regional Council supports activities to place advisors within the Innovation Network and to develop tools and skills within the innovation structures that support companies through the innovation process. These activities could be enhanced through the sharing of best practice with established schemes operating within the South West of England.

Again, some stakeholders from Bretagne stress that a more strategic approach to the use of these types of tools would enhance their use.

Appendix Two summarises the desk-based assessment of evident best practice for knowledge transfer from both France and the UK.

It finds that recent years have seen significant developments in the effectiveness of knowledge transfer in both France and the UK; and that this transfer is dependent on a complex series of interactions between industry and university.

The desk-based assessment notes that numerous factors influence the effectiveness of knowledge transfer activities. For best practice, an awareness of the most influential of these should be central to any knowledge transfer activity programme. They include:

- people play the most critical role in the success of technology transfer and the best forms of knowledge transfer involve human interaction (Argote and Ingram 2000; Lambert Review 2003).
- the ease of knowledge transfer is dependent on the type of knowledge in question: it is more difficult to transfer tacit knowledge than codified knowledge, which suggests that tacit knowledge requires more motivation, effort, and ability to transfer than codified knowledge (Reagans and McEvily 2003).
- tacit knowledge transfer is more dependent on the right person, with the right connections in the right place, ultimately limiting the number of people who can contribute to the process (Reagans and McEvily 2003).
- individuals who understand the ‘market’ are a major determinant of success with university/industry interactions (Stevens and Bagby 2001).
- organisational and managerial behaviours and skills are critical factors in facilitating the university-industry technology transfer process (Siegel, et al, 2003)
- the skills and actions of individual project leaders are key to the successful exploitation of public research (Martin 2008).
- knowledge transfer activities targeted at large companies and institutions, have an impact on SMEs through the supply chains of these corporations (PACEC report 2008).
- trust is a central element in alliances and joint ventures; and allows access to resources and a willingness to work things out through mutual problem-solving (Dhanaraj, et al, 2004; Uzzi, 1997).

There are also numerous barriers to success. The assessment finds that to overcome these barriers and improve university/industry knowledge transfer, it is necessary to:

- design flexible university policies on technology transfer (Horng and Hsueh 2005)
- employ managers/research administrators with a strategic vision, who can serve as effective boundary spanners (tie to boundary spanning literature) (Siegel, et al, 2003)
- employ licensing officers and technology transfer office managers with more business experience and devote additional resources to the technology transfer office and patenting (Siegel, et al, 2003)

- enhance the reward for engaging in university/industry technology transfer (Horng and Hsueh 2005)
- universities should improve their understanding of the needs of their true ‘customers’ i.e., firms that can potentially commercialise their technologies (Siegel, et al, 2003)
- streamline university-industry technology transfer policies and procedures (Siegel, et al, 2003)
- improve staffing practices in the technology transfer office (Horng and Hsueh 2005)
- make time available for academics to undertake knowledge transfer activities (PACEC report 2008)
- devote additional resources to university/industry technology transfer (Horng and Hsueh 2005)
- switch to incentive compensation in the technology transfer office (Siegel, et al, 2003)
- recognise the value of personal relationships and social networks, involving scientists, graduate students, and alumni (Siegel, et al, 2003)
- when establishing collaborative research partnerships determine at the outset the ownership and exploitation rights for any intellectual property (IP) that may be generated (Lambert Review 2003)
- improve job-specific experience (Riege and Zulpo 2007) and employ technology managers with university experience (Siegel, et al, 2003)
- industry should be proactive in their efforts to bridge the cultural gap with academia (Siegel, et al, 2003)
- more knowledge transfer with small and medium-sized enterprises (Sainsbury Review 2007)
- explore alternative means for tapping into university-industry technology transfer social networks (Siegel, et al, 2003)
- increase the number of Knowledge Transfer Partnerships in the UK (Sainsbury Review 2007)

The assessment also highlights that it is often difficult to quantify the complex series of interactions between universities and industry, and indicators of university performance, in terms of technology transfer to industry, often concentrate on only a few types of knowledge transfer. Therefore, a unified system for quantifying knowledge transfer across a range of channels would be helpful.

Appendix Three summaries the comparison of knowledge transfer cases, conducted in the UK and France, to see if certain elements of the project, the team, its leader or the company receiving the knowledge (or technology), stand out as factors that are significant to success or act as barriers.

The fifteen French PROTTEC case studies, carried out by Bretagne Valorisation, cover a range of projects and are led by a variety of project managers. They mainly concentrate on technology transfer and remain in the patents & licensing, collaborative research, contract research & consultancy, and joint venture transfer channels.

A similar set of interviews were then undertaken by the University of Exeter as part of its Work Package Two programme. They comprise 15 case studies carried out by the University of Exeter and three additional studies carried out by the University of Plymouth. They comprise:

- 3 x patents & licensing
- 2 x joint ventures
- 1 x contract research
- 1 x consultancy
- 3 x spinouts
- 1 x joint conference
- 1 x professional journal publication
- 1 x network
- 1 x secondment
- 1 x collaborative research
- 3 x joint supervisions – including two Knowledge Transfer Partnerships (KTPs) and one Knowledge Transfer Fellowship (KTF)

UK case studies conclusions

The UK's case studies show that success depends on a number of factors. The UK studies demonstrate that an experienced project leader is able to drive a project the most effectively, but perhaps most importantly, findings suggest that it is individuals that are the biggest success factors. A case study comment that supports this includes: 'One experienced person guiding throughout the early phases was key to success'.

They demonstrate that success is dependent on identifying the right projects and finding the right people to carry them forward. A sense of enthusiasm seems to also be an essential element, along with a willingness to part with information before trust has been established. 'This is why it is essential to establish face-to-face contacts in advance of initial information requests,' highlights one case study respondent.

Main highlights from the UK case studies include:

- Face-to-face contact is viewed as the biggest single factor to a project's success, whether it is part of an initial consultation at the beginning or during a project, or whether it is as part of the project itself, in the case of a network or conference.
- Face-to-face contact enhances the quality of a relationship between parties, and in some cases, more contact would have ranked the project's success higher. Supporting comments include: 'The need for face-to-face contact and verbal exchange of ideas is essential in every project; it is the foundation to making a project happen'.
- Success is dependent on a real willingness from all parties.
- Most teams leaders, from both HEIs and Industry, collaborate with other laboratories and offices positioned in other research areas, and view this as important to success.

- An understanding of tacit knowledge transfer is important and that tacit knowledge transfer happens during the face-to-face contact. Supporting comments include: ‘Tacit knowledge was vital and the research required both; if you have tacit knowledge there is more scope to innovate in the long-term’; and ‘Some explicit knowledge is needed, but the essence of the project, and its greatest benefit, is the transfer of tacit knowledge’.
- Explicit knowledge is often required by the funding organisation as it is the most effective way to measure the success of a project; tacit knowledge transfer is much harder to quantify.
- The amount of tacit knowledge transfer depends on the project; projects leaders in engineering-based projects seem to expect, or not wish to have as much tacit knowledge transfer as those in, for example, networks, spin-offs or joint ventures.
- Successful projects seem to have leaders with good links to the university knowledge transfer office.
- Trust and motivation are needed for knowledge transfer, but particularly commercial motivation.

The case studies also identify barriers to knowledge transfer; these include:

- Misunderstanding and disagreement with the university regarding ownership of personal IP generated whilst working for the university
- The university system causes reaction to be much slower than that experienced with the industrial partners
- Unforeseen difficulties in the development path of the technology
- Obtaining funding & venture capital
- Length of time it takes to gain trust
- Time availability; academic in particular
- Lack of commercial experience (university & academic)
- Engaging academics to grow a third revenue stream.

Participants in the case studies also highlight numerous suggestions that would either have improved their particular project, or would improve future ones. Main suggestions include:

- The university should provide clearer information and better advice on IP issues; support was only strengthened as the project’s success became evident.
- Fostering interest from academics to set up companies, a ‘quick guide’ to motivate the first steps for setting up spin-outs would be a useful tool to initiate action.
- Make more time available for face-to-face contact; particularly when working on projects where the partners are not situated locally.

- Set aside more project time for client management and ‘care calls’; more time with the client established a relationship, builds up trust and improves understanding between partners.
- Long-term financial commitment and an increase in funding would improve the knowledge transfer process and help to crystallise the development of a product.
- Applying for a government grant could be simplified to encourage SMEs to participate.
- A more centrally-led university approach to industry engagement.
- Commercialise the interface between industry and the university, along with a centralised information system for providing the university with a ‘commercial face’.
- Encourage structured secondments – between university and industry and between different universities and research organisations – based on ‘true experience’, ensuring that the person on the exchange was genuinely interested in it.
- Educate industry about the advantages of working within the university.
- More consistent, specific, targeted help for newly set-up spin-offs to increase their competitiveness.

French case studies conclusions

Through a comparison of each case study and the profiles of the project, the team, its leader and the company receiving the technology, Bretagne Valorisation conclude the following:

• The competency profile for project

This profile appears as a central element in the effective capacity to transfer a patent. The ‘reticular academic’ (Profile 1) present a profile of a ‘facilitator’ because these people combine academic recognition with the ability to establish relationships of trust with the support structure, but also the ability to develop networks for obtaining research contracts. This result converges with those who emphasise the key role of academics involved in several networks (the ‘gatekeepers’, see, in particular Murray, 2002). Other types of project (the ‘independent academic’, the ‘technologists’ and ‘Ivory Tower’), probably because of their skills profile, will initiate differentiated strategies from technology transfer offices (TTOs) to transfer their research.

• The project team profiles

If the skills portfolio of project teams is rather mixed (for example, the distinction between ‘collaborative/applicative’ and ‘independent’), it seems there is convergence between, on the one hand, the profile team that combines expertise in the applicative and collaborative dimensions, and, secondly, the profile of project leaders described

as ‘reticular academic’. However, this team profile ‘application and collaborative’ can also be mobilised by ‘independent academic’, and by ‘ivory tower’ academic.

• **The types of project transferred**

The projects are characterised by ‘patterns of knowledge’ more complex than we usually imagine. Thus, the project of ‘archetype 1’ is characterised by the existence of a conceptual model and the importance of the share of tacit knowledge, but also by the difficulty of counterfeiting, while remaining understandable by non-specialists. However, in the fifteen cases studied, the majority of different types of ‘knowledge configuration’ do not play a role in more or less ease of transfer of a patent. One exception, however: the project profile ‘archetype 2’ – an incremental invention with a relative ease of counterfeiting. One of the five projects in this category was transferred.

Apart from this type of project, the French study concludes that the ‘reticular academic’ profile associated with a profile of team ‘collaborative/applicative’ (Profile 1 team) appears as central to the effective capacity to transfer, whatever the type of project.

• **Companies interested in patents**

Finally, the last dimension, and for the fifteen cases studied, that seems important is the competitive position of companies in their markets. Those who obtain a patent (six cases out of fifteen studied) are well positioned in their markets. They have, again, a R&D team, which appears as an important component in the absorption and use of patents bought (or made under license). The first results of this qualitative study allows for the specification of the factors that can facilitate (or, conversely, make it more difficult) the transfer of patents.

Essentially, Bretagne Valorisation concludes that the competency profile of the project leader appears to be a central element in the effective capacity to transfer a patent along with the profile of the project team. Also, the competitive market position of the interested company, and whether or not it has an R&D department, are significant factors in the successful transfer of knowledge.

Among the limitations of this work, the French findings suggest two elements: the first concerns the relatively small number of cases studies and the second is the collection of data. Bretagne Valorisation notes that: ‘In a perspective of ‘modelling’ (descriptive approach), fifteen cases of technology transfer remains a small number. However, patent licensing is subject to confidentiality clauses and it seems difficult to conduct a quantitative study based solely on questionnaires, that is to say without a precise knowledge not only of actors but also content and context of innovation. The number of cases studied, however, helped to refine the model.

‘The second limitation of this work involves the collection of data: it relies on primarily knowledge of the engineer responsible for the licensing of patents studied. However, the knowledge from the engineer is difficult to replace because of the confidential aspect and frequent informal discussions on their projects with researchers, or even when plenary meetings of the committee of expertise, have to cross the assessments made and check relevance.’

Overall case study conclusions

A number of factors highlight success in both the French and UK case study projects, including the impact that the project leader has on a project.

Findings suggest that successful knowledge transfer is derived from an experienced and motivated project leader, working with enough funding and support from his/her organisation, and transferring knowledge to a company that is open to the experience and has enough business acumen to know what to do with the knowledge once it has been received. Like the French case studies suggest, the receiving company often has an R&D department.

A comparison of all case study findings also suggests that the type of technology (be it proven or emergent) or the type of innovation (be it incremental or radical) being transferred has limited impact on the actual success of the knowledge transfer process.

The case studies strongly demonstrate that there has to be face-to-face contact to make the projects a success. This face-to-face contact is critical in establishing trust and developing a deeper understanding of each partner's needs and expectations. Meeting these expectations seems to ensure the continuing successful and deepening relationship between project partners.

The case studies also show that tacit knowledge transfer is extremely important and happens during the face-to-face contact; however, this transfer is harder to achieve because it takes more effort.

It was not possible to exactly compare the case studies between France and the UK, because there are too many unknown variables in trying to establish the equivalent profiles that the French case studies use for the different types of leaders, project teams, project technologies and receiving companies. Also, UK case studies consider a broader range of knowledge transfer channels and as a result employ the responses of differing parties within a project.

Part Three: Discussion

A comparison of each set of results reveals that there are numerous similarities between the research areas. These commonalities suggest that, almost without exclusion, cross-regional experiences of knowledge transfer are dependent on the same elements for success and that they also meet similar barriers.

In terms of best practice, all three sets of research highlight the following as key to success:

- Individuals are the biggest success factors in knowledge transfer activities, regardless of the knowledge being transferred.
- Face-to-face contact is key to a project's success; it enhances the quality of a relationship between parties, and is an essential part of the process of one partner parting with information before trust has been established.

- An understanding of tacit knowledge transfer is important; tacit knowledge transfer happens during face-to-face contact, and the amount of tacit knowledge transfer depends on the project.
- Experience, and organisational and managerial skills are critical factors in knowledge transfer activities between universities and industry; an experienced project leader is able to drive a project the most effectively.
- The match: identifying the right project for the right people to carry them forward.
- Trust and motivation are needed for knowledge transfer, but particularly commercial motivation.
- Success is dependent on a real willingness from all parties.

Key barriers to success, which were consistently highlighted by the three sets of research include:

- Obtaining funding & venture capital
- Lack of continuity and strategic approach to funding knowledge transfer activities and engagement with SMEs
- Time availability; academic in particular
- Lack of commercial approach & experience (university & academic)
- Engaging academics to grow a third revenue stream.

Common findings for suggestions for improvements to knowledge transfer between universities and industry include:

- Universities needing direct links with industry to be more efficient
- Correctly-targeted, ring-fenced funding; and seed-funding for more proof-of-concept projects
- A more strategic approach
- Encourage networking, mentoring, business work placements, secondments and job rotation.
- Develop mechanisms that can facilitate interactions between separate stakeholders

- Train academics for interactions with industry to develop an innovation culture within HEIs
- Improve marketing and publicity
- Create more of an incentive for knowledge transfer
- Establishing ownership and exploitation rights for any intellectual property (IP) from the outset of any project
- Take into account the effectiveness of physical proximity in places such as science parks.

Some suggestions were unique to particular sets of research, in particular the UK case studies. Examples of which include:

- Fostering interest from academics to set up companies, a ‘quick guide’ to motivate the first steps for setting up spin-outs would be a useful tool to initiate action.
- A more centrally-led university approach to industry engagement.
- Commercialise the interface between industry and the university, along with a centralised information system for providing the university with a ‘commercial face’.
- More extensively employ retired business personalities as a valuable source of business acumen.

In addition to these, the findings show that it is helpful for any form of knowledge transfer activity to have input past the final stage of a project. In the case of an SME, this either increases its competitiveness, if the input is in the form of a grant or access to subsidised resources, or, if in the form of ‘care calls’, for example, it can create better relationships and enables contacts to become more ‘embedded’, which improves the chance of parties working together again.

The results also demonstrate that it is often difficult to quantify the complex series of interactions between universities and industry, and indicators of university performance, in terms of technology transfer to industry, often concentrate on only a few types of knowledge transfer. Therefore, a unified system for quantifying knowledge transfer across a range of channels would be helpful.

Part Four: Conclusions

PROTTEC Work Package Two highlights many factors that are central to successful knowledge transfer activities, and best practice dictates that these mechanisms should be key aspects when considering knowledge transfer strategies.

Although it is not surprising to see these similarities in findings, not only between the sets of research, but between the regions, it is encouraging. Encouraging because, if similar issues dictate success and prove to be barriers, then any focus on these carried out by any of the regions should prove to enhance innovation uptake for both the UK and France.

When speaking at the seminar for the dissemination of the results from PROTTEC Work Package One, Lionel Pujol from Bretagne Valorisation, in France, says that: ‘We are all confronted with similar problems and ambitions: original ideas are hard to find, the originality is in how we do it.’

In this spirit, PROTTEC Work Package Two outlines the following recommendations for best practice in knowledge transfer:

- Carefully select an individual: ensure that they have the right experience, the right managerial and organisational skills, and that they are enthusiastic and engaging.
- Spend time identifying and matching the right person for the right project.
- Encourage face-to-face contact; it enhances the quality of a relationship between parties and is an essential part of the process.
- Understand the importance of tacit knowledge and the fact that it is transferred during face-to-face contact.
- Make time available, within a project, for developing trust.
- Encourage commercial motivation through strategic engagement with SMEs.
- Lobby for correctly-targeted, ring-fenced funding.
- Encourage more efficient direct links with industry.
- Encourage networking, mentoring, business work placements, secondments and job rotation.
- Develop mechanisms that can facilitate interactions between separate stakeholders.
- Create incentives and engage and train academics for interactions with industry to develop an innovation culture within HEIs; protect their time whilst they do this.
- Improve marketing and publicity.
- Establish ownership and exploitation rights for any intellectual property (IP) from the outset of any project.

- Take into account the effectiveness of physical proximity in places such as science parks.

Some additional suggestions that the results raised:

- Develop a 'quick guide' tool for academics to motivate the first steps for setting up spin-outs.
- Develop a more centrally-led university approach to industry engagement.
- Commercialise the interface between industry and the university, along with a centralised information system for providing the university with a 'commercial face'.
- More extensively employ retired business personalities as a valuable source of business acumen.
- Develop strategies to input effort at the end of all knowledge transfer activities
- Develop a unified system for quantifying knowledge transfer across a range of channels.

Part Five: Further research

The research areas also highlight areas for further investigation. These include:

- Investigate the mechanisms behind successful clusters
- Broaden the case study research to look at different forms of knowledge transfer activities, particularly across the French regions.

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