

Technology Transfer a Partnership between Research and Industry

In this technological world, the economic well-being and health of a nation's citizens, increasingly depends on access to new technologies, that deliver greater and greater efficiencies. New technology arises out of researcher's quest for new knowledge, and is delivered by companies in the form of new or better industrial products to consumers. The distance between new knowledge and new product is called the Technology Transfer (TT) 'gap', which needs a 'bridge' if economic development is to happen.

Therein lies the problem :

- Researchers are specifically trained and experienced in the very demanding disciplines required to search for new knowledge,
- Industrial managers are specifically experienced in the equally demanding disciplines required to deliver industrial products to customers.
- Very few people have a work experience which spans these two disciplines.

Therefore, the bridge between research and industrial application requires effective **collaboration** between academia and industry. While the search for knowledge (research) and delivery of products to customers (industry) are both very well understood within their own fields, the two activities are almost mutually exclusive, requires fundamentally different skills and are motivated by entirely different forces.

Large companies address this of course by managing their own research facilities and academics can find themselves interacting with a wide range of research expertise in the industry sector. The technology transfer gap is therefore more acute in industries dominated by SMEs, including agriculture.

The different motivations driving each activity have to be recognised, made explicit and accepted before true, effective and sustainable collaboration can take place. A successful technology transfer project has to provide sufficient incentive and be free of dis-incentives, to motivate each partner to complete their respective tasks in the technology transfer process.

Funding agencies in particular have lately recognised the need to bridge the technology transfer gap when commissioning research. Increasingly reflected in the calls for proposals, the technology transfer elements aim to provide incentives to motivate the academic and industrial partners into collaboration. These pages hope to go some way to explaining the rationale behind the technology transfer elements in such proposals :

The core question is : what actually motivates researchers, and alternatively, industrial managers, to which the incentives have to address ?

Incentives common to both partners :

There is of course, only one incentive that will motivate a collaboration : each has to provide something that the other is missing. Most often that 'something' is access to funding but there are other motivations that can at times assume greater importance :

- § **Funding** – all of us are only allowed to carry out activities that are explicitly funded : either externally (public research or education funds) or from profits generated from previous activities (industry)
- § **Joint interest** – unless the academic partner has some interest in the impact of their research after it is published, and the industry partner has some interest in the science underlying their activity, it is unlikely TT will happen.
- § **Self interest** – otherwise called 'job satisfaction' – individuals tend to exercise some choice about what interests us, enjoy a perspective wider than our day-to-day problems and appreciate recognition outside our usual circle of activity. Researchers are expected to have job satisfaction already, industry staff usually have to work hard to get it, but both will go to some lengths to achieve it.

Academics are motivated by :

- § anything which enhances an individual's career or a department's reputation, through published papers, leading to access to further funds, etc. (- this is a necessity, not a luxury, something not always appreciated by industry managers)
- § the strategic plan of the public funders, explicitly stated in the 'calls for projects' – researchers will develop an interest in new areas (eg TT) they know will be funded.
- § direct public funding for technology transfer, even if restrictions are placed on the exposure allowed to accrue (published papers, presentations etc)
- § funding conditional on industry co-funding – there is implicit access to additional industry resources.
- § direct industry funding, even if it comes with strings attached (eg Industry supported Chairs in Universities, confidential projects etc)
- § explicit access to breeding populations, biological material, phenotype and genotype data on an industrial scale, extreme phenotypes, sample collection, etc., that would otherwise be impossible to generate within academic resources.
- § enhancement to funding applications, research plans and access to relevant industry knowledge through input from the industry partner.
- § some sense of satisfaction that their results might 'make a difference' somewhere downstream, further justifying the public research spend.

Industry managers are motivated by :

- § anything that addresses the strategic development plans of the company, that results in increased competitiveness of the company, allows delivery of a new product that will draw a revenue, or otherwise reduce costs and

increase profits. (- this is a necessity, not a luxury, something not always appreciated by academics)

- § access to research infrastructure, (basic knowledge, staff, tools and skills) avoiding the need to set up your own research departments within the industry – ‘outsourcing’ of research.
- § access to public research funding that would otherwise require in-house investment.
- § ability to access a wider range of research and development that cannot be otherwise accommodated within the company’s priorities.
- § anything which provides a deeper insight into the breeding populations forming the basis of the company’s business.
- § anything which motivates academic research to be directed at addressing specific questions and conditions applicable in the industry.

It is clear that the technology ‘gap’ can be bridged by building confidence and trust between both communities. This means recognising and accepting the differences outlined above. Distinctions between the layers of fundamental, strategic and applied research, technology transfer and industrial development are functional realities that are starting to be recognised and it is essential to use them to best advantage.

The funding agencies are starting to make this clear through the calls for research projects with industrial participation now often required (part or fully funded within the project) wherever downstream application is one of the outcomes. National and Community funding agencies have an increasing duty to demonstrate benefit to its citizens and this trend can only increase. Livestock breeding, genomics and health, must surely be the one sector with the most to offer and most to gain from this greater integration between research and industry.

In summary, the benefits of collaboration are :

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| To academia : | <ul style="list-style-type: none">* Access to industry-scale populations and data* Increased relevance of research outputs* Access to public and private technology transfer funds |
| To industry | <ul style="list-style-type: none">* Access to large-scale research infrastructures* Opportunity to influence the direction of research* Access to public funding to aid industry development |

These are not so different after all