

Industrial Research Collaborations before a Product Is Developed

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Introduction

One of the fundamental activities of a contemporary university is to engage in collaboration with external bodies where both parties can use the generation of new knowledge to further their own core activities. In this chapter we review how universities collaborate with industry and what makes a successful partnership. With technological advances happening on a daily basis, it has never been more important for universities to develop long-term relationships with industry. The current level of knowledge being generated globally in areas such as genetics, proteomics, environmental science, and others means that industry can use that knowledge to create new products and services that benefit mankind, while, at the same time, achieve the economic growth and profits demanded by their stakeholders. Globally this has become known as the knowledge-based economy.

The major problem in establishing partnerships between industry and academia is that realms of academia and industry operate in totally different environments; their basic aims and interests are different (Table 62-1). It is important, therefore, that the value of the proposed collaboration (partnership) and the potential areas for conflict should be explicitly understood and addressed at the outset in order to foster valuable relationships.

Most national governments recognize the knowledge-based economy as the main driver for economic growth at the regional and national level; to this end governments have been proactive in facilitating links between industry and academia. Research-led univer-

TABLE 62-1

Comparison between Academia and Industry

	University	Industry
Purpose	Knowledge	Profit
Accountability	Public	Shareholders
Operational Area	Freedom	Competition
Time Lines	No specific time or limits	Short time scope
Scientific Results	Publish	Concealment

sities have established offices responsible for generating these forms of partnerships that are responsible to ensure that the universities' knowledge, ideas, and products are transferred to the external markets. These offices are now regarded as mainstream in the university's operations and, further, in research-led universities, these offices are responsible for a significant share of the university's total income stream. Major industrial sponsors, in turn, have offices and staff responsible for interactions with academia. The offices within each organization are acutely aware of the need for collaboration (see Table 62-2). At the national level, industries have formed groupings such as the Inter-Company Academic Relations Group (ICARG) in the United Kingdom and Business Higher Education Forum (BHEF) in the United States. More recently in the United Kingdom, as a result of the government's review of funding for research, there has been the formation of a Funders' Forum. Those industries that have had significant collaborations now include them in their business and development plans.

TABLE 62-2 Main Drivers for Collaboration

University	Industry
Potential income source	Gearing of funds
Access to specialized equipment	Access to latest technologies
Supply of raw materials	Recruitment of graduates
Publications	Prestige
Government funding	Regional presence
Increased research ratings	Product development
Personal income	Public relations
Establishment of research centers	Potential for multi-disciplinary teams
Student placements	Access to expertise
Increased skills base	Increased skills/knowledge base
Improved teaching base	Outsourcing

There are many obvious benefits to both academia and industry, but there are also other intangible benefits that can be reached when collaboration is managed professionally, for example, increased experience and expertise of staff within each organization.

There are different stages in the course of establishing a partnership. Further discussed in this chapter are the various elements that make up a successful partnership and the key elements from a research administration perspective.

Stage 1. Identifying the Need

Most universities would like to engage with industrial partners for carrying out funded research projects. Before trying to attract industrial funding, however, it is important that to be completely aware of the skills index of the academic staff to ensure that the university has the "critical mass" of expertise that can support the relationship. It is also recommended that the current industrial funding base be assessed and resources benchmarked against those of the competition. It is no use trying to attract a particular company if they are already engaged at significant level of activity with another university. To start in a partnership, the university must agree on and understand the main drivers for the collaboration, including the potential benefits and the risks (Table 62-2). Once this criteria has been agreed upon within the university and there is awareness about the specific areas in which collaboration can be achieved, then an appropriate industrial partner can be found.

Stage 2. Finding the Partner

One would be surprised at the level of contacts that the university has with industry. First, there is a requirement to gather as much information as possible on the current relationships that exist within the university. Senior personnel must be made aware of relationships with industry that already exist. Industry performs a significant amount of due diligence in the selection of the academic partners they want to have a relationship with, it is important that universities similarly take this approach before selecting potential industrial partners. Once this information has been collated, combined with the selection of the particular scientific areas in which the university wants to foster relationships, the institution is then in a position to select the industrial sector in which to operate and be able to target within that sector and to market the university. Generally, the university and industry contacts and points of interaction are spread across a wide operating area and include:

- Current research collaborations
- Suppliers
- Careers office
- Continuing professional development
- Industrial representatives on governing bodies
- Sponsored chairs
- Endowments
- Industrial board
- Alumni
- Personal relationships
- Industrial student placements
- Visiting staff
- Technology transfer offices
- Donations
- International office

After having selected the target, it is then important to find the appropriate person within the target area to whom the initial approach can be made. This person should be as senior as possible and any initial contact should be made at vice principal or vice chancellor level. It is critical that before making this initial approach that the university has completed a significant amount of detailed analysis on the sectors needs and in particular the problems that the selected target currently faces and how the university can address their requirements. This information is now freely available, as most companies place their mission statements, research plans, and key issues on their corporate Web sites. Other

good sources for gathering this type of information include conference proceedings, trade associations, local development agencies, professional interest groups, and industry marketing reports (e.g., Keynote, Reuters and Snapshot, although these reports are costly).

Stage 3. The Research Proposal

When the partner has been found and has agreed to the benefits and outcomes of the planned collaboration, the next stage is to develop a potential research plan. The research plan forms the basis for any eventual formal binding agreement. In a potential research plan, the following areas should be explicitly addressed:

- Participants
- Scope of the project
- Overview
- Background
- Aims and objectives
- Description of the research
- Duration
- Budget requirements
- Management/reporting requirements
- Dissemination and exploitation
- Success criteria

Extensive discussions between the academic staff at the university and the technical staff from industry are required before the research plan can be drafted. A good reason for having a comprehensive project plan is that this document can be used as a reference by the academic staff at the university when carrying out the work (instead of using the actual contract put in place for carrying out the project). A research administrator can facilitate these preliminary discussions by providing direct input into the nontechnical areas of the project such as budget requirements, management, dissemination, exploitation, and the drafting and issuing of any required agreements. The level of involvement and the requirements for each element depend on the scope of the planned relationship. At this early stage, ensuring that documents are dated and marked as confidential, where appropriate, demonstrate to the potential partner the university's intention to act in a professional manner. It is, however, important that these inputs are also performed in a timely manner with both the research administrator and the academic realizing that industrial sponsors tend to work with different timelines than do gov-

ernment sponsors and that delays can destroy a potential relationship before it has even begun.

Stage 4. Costing and Pricing a Partnership

A university must be aware of all the costs involved in carrying out sponsored research and must have a clear and precise costing and pricing policy that enables administrators to estimate accurately both the direct and indirect costs of any sponsored research partnership. The cost of the partnership and each party's respective contributions will help influence the terms and conditions of the contractual instrument put into place to help manage the partnership (Figure 62-1). Actual recovery rates can vary significantly between sponsor types and on industrial projects; there is always a requirement to be aware of the income-achieved set against the academic rewards.

The full cost of participation by both parties should be as accurate as possible; and both parties should be able to view each other's estimates. In the long run, inaccurate cost estimates can lead to problems in the relationship if projects are under-resourced and greater commitments are required over and above anticipated levels of participation. The funds needed for protection and exploitation of arising intellectual property and dissemination of the results are important and must be addressed during preparation of costings. It is always important to remember that in its commitment to university research, the industrial partner will have to budget beyond its current fiscal year: in essence, this means that approval may have to be sought at a senior level for signing off the required financing.

Stage 5. Forms of Engagement

It is still the case that most university-industry collaborations are performed on a single project or a one-time consultancy basis. As further discussed, these research partnerships can take many forms.

Specific Goal-Orientated Research Partnerships Addressing a Particular Problem

This is a standard model for most university-industry relations and one of the more frequently used models. In these cases, the funds supplied by industry are for a one-time research project to address a problem specific to the industry or to produce incremental developments to an existing product

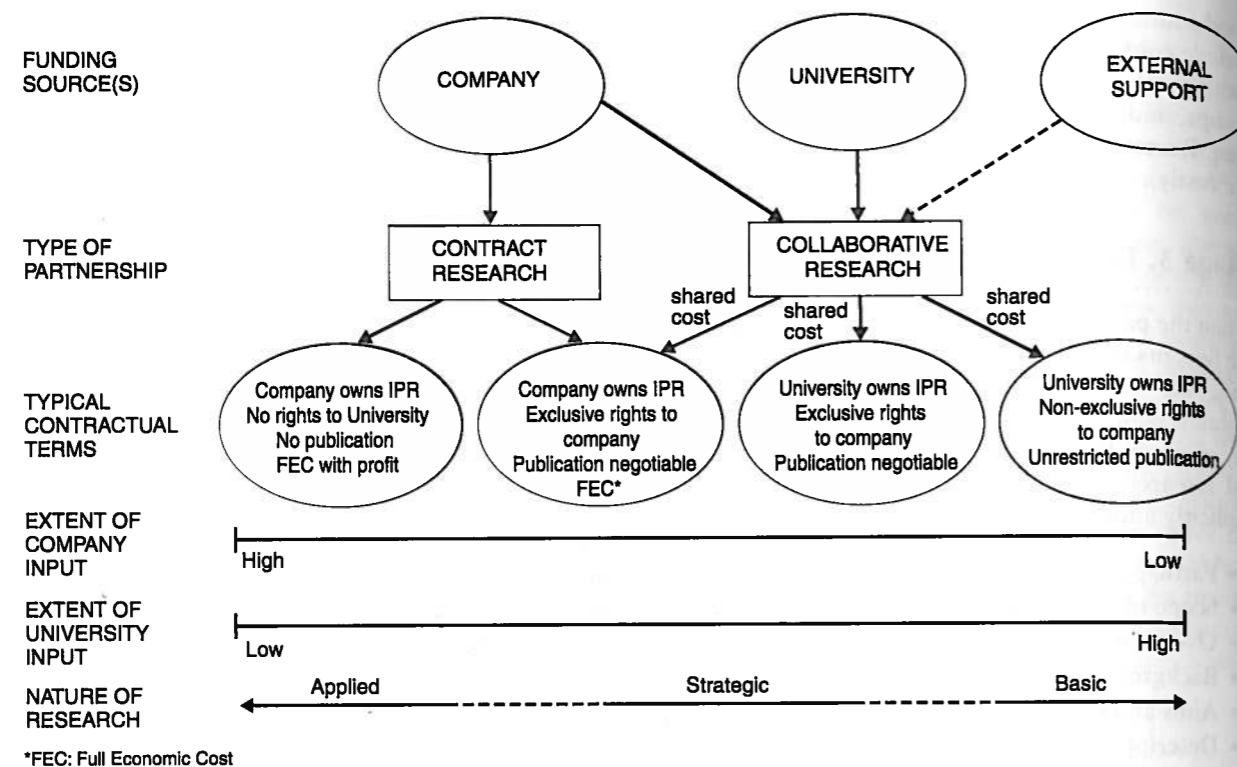


FIGURE 62-1 Research Partnerships: Possibilities for Ownership and Use of Results

that is already on or near the marketplace. The research plan therefore is usually set by the industrial partner based on its own background knowledge and intellectual property (IP) and the results are commercially confidential and hence the ownership of arising IP would normally rest with the industrial partner. In these cases, the university can expect, depending on the level of industrial funding, to have a negotiated right to publish and a share in any future commercial exploitation of the results (Figure 62-1).

Collaborative Research Partnerships

In a collaborative project the research plan is generally set by both parties and is based on background IP of both parties, the results of the research will be of benefit to both. Each party contributes to the funding of the project, either in cash or in kind, and both can expect to share in the results with joint ownership of inventions.

Project Partners on Government-Funded Research Programs

Increasingly in the knowledge-based economy, governments are providing third-party funding to foster the development of partnerships between industry and academia. There are many schemes that

encourage partnerships between small-to-medium-size enterprises (SMEs) and universities. With these programs, the research plan and the formal agreement are based on the particular scheme chosen, and proposals are normally peer reviewed. In these cases, it is good practice to designate a head of agreement at the proposal stage so that funding agencies and their reviewers are aware that consideration has been given to the outputs of the collaboration.

Consultancy/Subcontracts

Consultancy agreements are for smaller one-time goal-orientated services; for example, the use of a specific piece of equipment or for academic specialist knowledge. In these cases, there is no research plan, as there is no expectation for the generation of new knowledge. Instead, industry normally expects to own all the results and there are no publication rights. These projects normally have short time spans. A consultancy agreement is a good tool for marketing the university's skills to business and these should be encouraged as a first stepping-stone to develop longer term relations with industry.

Sponsored Research Studentships

A sponsored studentship is a most effective tool for fostering relationships with industry, providing stu-

dents with an opportunity to spend some time in industry, and even the potential of employment at the end of the project. In these agreements, the research plan is first drawn up between both parties, usually based on a specific industrial theme. A sponsored studentship is an affordable alternative to a sponsored research project for industry. The contractual terms for this form of partnership are particularly important, as there must be a right to publish allowed so that students can be awarded their higher qualifications through the production of a thesis. This can be a stumbling block for projects that are commercially sensitive and industrial partners have to consider this when accessing the appropriate form of engagement with the university. Studentships can take many forms, depending on whether the student is studying at undergraduate or postgraduate level; the length of the project; and placement time of the student with the industrial partner. For postgraduate students, the industrial partner must commit to funding the project for the length of time it will take the students to complete their studies (up to three years).

Networks

There are some industrial sectors that fund research at universities through a consortia arrangement. This allows the consortia to fund projects that address generic problems across a particular area. An arrangement that addresses generic issues lessens the problems that can arise with IP; however, IP background and IP generated during the partnership can be problematic within consortia. The main area of concern in relation to IP is the retention of ownership of background IP, this can be resolved in the consortium agreement with a clause that stipulates background IP remains the property of the party that brings it to the project, is only available during the course of the project, and can only be used under license by other members for the exploitation of IP generated during the project (foreground IP). The memberships to these consortia are normally based on an annual fees, as well as on research projects. It is also typical for consortia to run workshops and symposia for their staff.

Long-Term Partnerships in Training and Research

If a university is to be truly successful in achieving a long-term relationship, it is preferable to have a corporate relationship with the industrial partner (Figure 62-2).

The benefit of a corporate relationship is in its longevity, as it means that there can be a mutual

and beneficial input into the association over an extended and predicted period. Other benefits include the opportunity to develop joint interdisciplinary and multidisciplinary teams to address industry's applied problems, while still looking to address the university's fundamental motivation in producing new knowledge through basic research programs. In a one-to-one relationship built around only a small number of individuals, if a member of the party leaves his or her employment, then the relationship is often ended, and, thus, the organization's time and resources spent on supporting the relationship have been wasted. A long-term corporate relationship, instead, allows the university to plan a research strategy rather than an *ad hoc* one, as there is a guaranteed funding stream with which to plan. From industry's perspective, such an arrangement allows for product development planning and, of course, the potential to hire experienced university graduates. In Figure 62-2, it is suggested that there is a single point of contact from both sides to ensure that initial enquiries are dealt with effectively and that any conflicts that might arise in the event of establishing a corporate relationship can also be dealt with expeditiously.

Each of the models described requires a legal agreement so that potential areas for dispute can be resolved at the earliest stage. In each case, specifics (e.g., ownership, confidentiality, and publication rights) must be addressed. Before any formal agreement is reached, there has to be extensive discussion on the focus and research area of the project. To enable free discussion, it is always advisable that both parties sign a confidentiality agreement. This enables both parties to discuss the objectives of the project and to supply background knowledge and any new ideas they may have. The agreement also ensures that the information exchanged will not be used beyond the fledgling partnership and that, in commercial terms, no information will be made available to third parties without the prior and mutual permission of both interests (Appendix 62-A). When seeking third party support, for example from government schemes, it is also a good idea to have a heads of agreement (HOA) signed between the partners. An HOA reaffirms the partner's intention to work together in the event that the proposal is selected for funding and outlines the planned ownership and dissemination of the results of the work. This shows to potential reviewers of the work that the project and the relationship have been thought out and mutually developed by the participants. (An example of an HOA is given at the end of this chapter.)

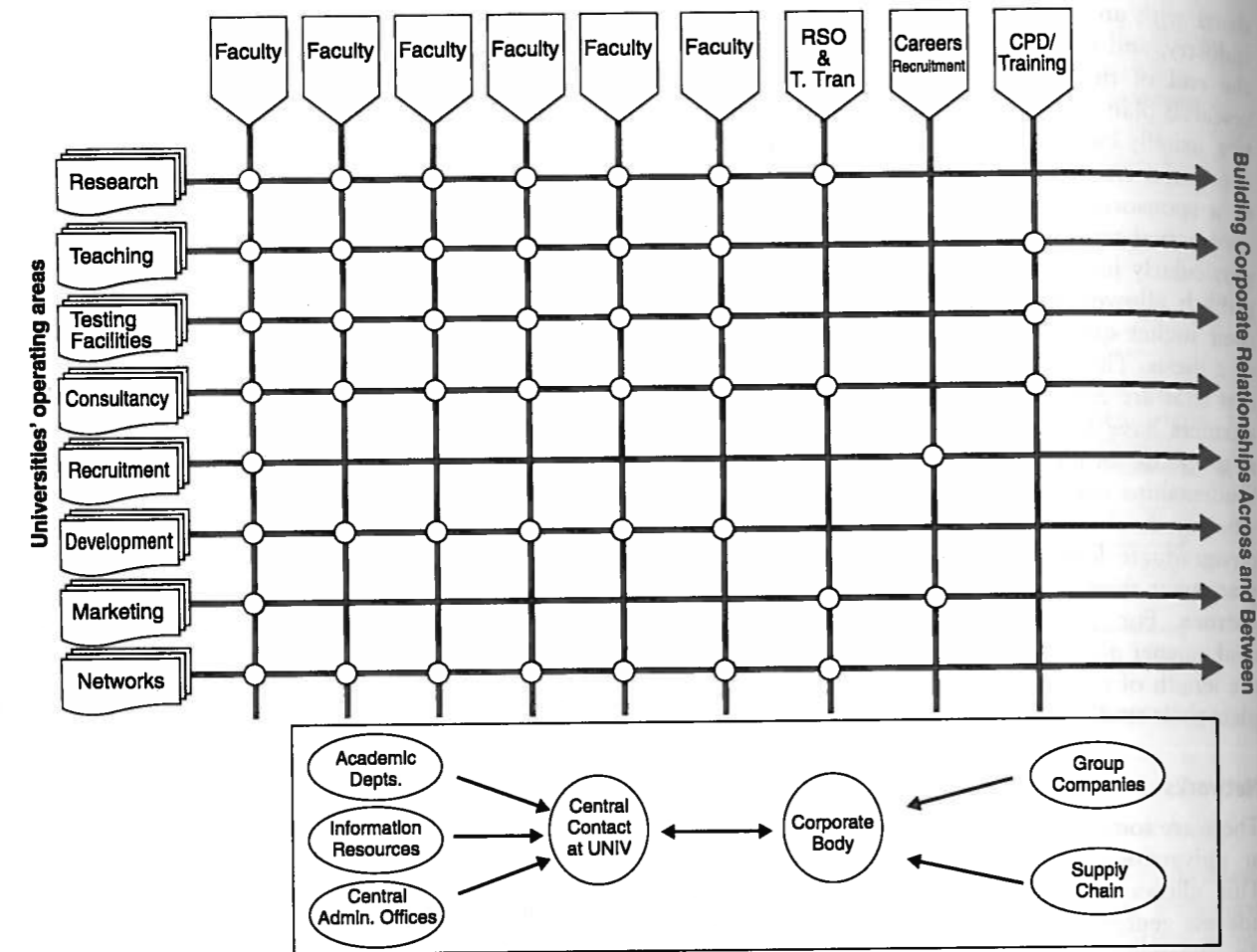


FIGURE 62-2 Corporate Relationship

Stage 6. Negotiating an Agreement

The negotiation of an agreement to cover the planned partnership is one of the key areas. The agreement governs how the project and the relationship are run and each agreement varies because each partnership is unique. The areas within a well-structured research plan are duplicated in any formal agreement (Table 62-3). When negotiating, it is important for both parties that the negotiation process is not prolonged. From the academic side, delays can result in missed opportunity to appoint suitable research staff or students to work on the project. From the industrial side, delays can mean a loss of potential market advantage. There is no advantage in getting drawn into lengthy negotiations with a resultant detailed and expensive legal agreement when the project is a one-time arrangement or of limited value. Conversely, there are advantages for negotiating a master or corporate

agreement where there is a significant level of activity between the parties.

Most companies that invest in research at universities have their own standard (model) agreements; research-led universities have theirs, too. These standard agreements are a good starting point for the negotiation, but rarely do they become the final signed document (Appendix 62-B, 62-C, and 62-D.)

The main stumbling block in any contract negotiation is the ownership of IP generated through the research work. Each industrial partner and each university will have its own policy in relation to IP rights and, indeed, the rules and regulations vary worldwide. There are no standards, and each case has to take account of a number of factors in the decision-making process that can include the contributions from each party, the particular industrial sector, the cost of protecting the IP, and academic pressure to publish. Figure 62-1 explores

Research Plan	Research Agreement
Participants	Parties
Scope of the project	Work program (normally an annex)
Overview	Recitals
Background	Recitals/IPR ownership
Aims and objectives	Consideration
Description of the research	Title
Duration	Start and date
Budget requirements	Price and payment
Management	Reports, confidentiality, warranties, liability, termination
Dissemination and exploitation	Publication, IPR ownership
Success criteria	Exploitation rights, papers, thesis, journals, products, patents, trained staff

some of the potential routes for ownership and exploitation.

Just for Fun

The most important partnership that most research administrators enter into is a marriage partnership, and the elements of that relationship bear an unnerving similarity to a university-industry partnership (Table 62-4).

Suggested Resources

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2. Laidler, D. A. *Research Partnerships between Industry and Universities Partnerships for Research and Innovation*. Runcorn, UK: CBI Publications, 1988.
3. Duncan, D. "Partnerships between Industry and Academia in Information Technology," *Journal of Business Education* 1, Proceedings 2002. <http://www.abe.villanova.edu/proc2000/n086.pdf> (accessed October 20, 2005).
4. Lambert, R. "Lambert Review of Business-University Collaboration (UK Government)," 2003, <http://www.hm-treasury.gov.uk/media/>

Marriage	Research Administration
Flirting	Marketing
Finding the right one	Partner searches, due diligence
Opposites attract	University/industry
Engagement	Heads of agreement, MOU
Prenuptial agreement	Feasibility study, background IP
Marriage license	Corporate agreement, master agreement
Honeymoon	!*!+!*!
Anniversary	Annual reports
Children	Outputs
Any marriage has its problems...	
In-laws	Lawyers
Rows	Disputes
Affairs	Loose sponsors or academic staff
Trial separation	Fixed contract
Divorce	End of contract
But all problems can be resolved..	
Marriage guidance counselor	Research administrator

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15. Higher Education Funding Council of England, *HE Business Interaction Survey*. January 2004, http://www.hefce.ac.uk/pubs/hefce/2004/04_07/ (accessed October 20, 2005).
16. Leigh, B. *Research Partnerships*. Vancouver, Canada Society of Research Administrators International annual meeting, 2001.

All model agreements are used by the author's research administration and therefore certain terms and conditions that may not be applicable to universities outside of the United Kingdom.

62-A

Confidentiality Agreement

Part A

DATED 2005*

- (1) THE UNIVERSITY OF
 (2) LIMITED/PLC
 CONFIDENTIALITY AGREEMENT

DATE: 200*

PARTIES:

- (1) THE U* address ("U*") acting on behalf of itself and its employees, students and persons otherwise engaged at U* in a research or teaching capacity involved with the Development (defined below) ("U* Staff");
- (2) _____ LIMITED/PLC (registered in _____ number _____) whose registered office is at _____ acting on behalf of itself and each and everyone of its subsidiaries, holding companies, and any subsidiary of such holding companies (together referred to as "the Company")
 (Hereinafter referred to collectively as "the Parties")

BACKGROUND:

- (A) U* acting on behalf of itself and its employees owns intellectual property and other rights in and to _____ ("the Development").
- (B) U* and/or U* Staff has/have disclosed and/or will be disclosing to the Company information designated by U* and/or the U* Staff to be confidential, whether expressly or not relating to the Development which may include, without limit, drawings, samples, know-how and/or data in any form ("the Confidential Information").

- (C) The Company may also disclose secret and confidential information relating to its business (to be included within "the Confidential Information").

OPERATIVE PROVISIONS:

In consideration of U* and/or any of the U* Staff agreeing to disclose the Confidential Information to the Company, and vice versa, the Parties agree that:

1. they will:

- 1.1 only use the Confidential Information for the express purpose of evaluation of the Development [in order to decide whether or not they wish to be involved with its commercial exploitation] ("the Purpose") and for no other purpose, whether commercial or otherwise whatsoever;
- 1.2 keep the Confidential Information confidential and exercise at least the same degree of care with it as they exercise with their own confidential information which they do not wish to be disclosed;
- 1.3 not disclose or divulge the Confidential Information or any part of it or extracts from it to any third party without the prior written consent of U* or the Company, as appropriate, except as required by law;
- 1.4 divulge Confidential Information only to those of its employees, agents or representatives ("the Parties' Staff") who need to have access to it for the performance of their duties, and then only to the extent actually needed for the Purpose;
- 1.5 ensure that each member of the Parties' Staff is fully aware of and complies with