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## University-Industry Collaboration: where to next?

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# University-Industry Collaboration: where to next?

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## Abstract

The focus on the third mission of Universities is now some decades old. Boyer's assertion that 'theory simply cannot be divorced from practice' and that any consideration of the role of faculty 'must give new dignity and new status to the scholarship of application' (Boyer, 1992) has been embodied in the almost ubiquitous linking of scholarship to real world issues and applications. There is a general acceptance that the knowledge and skills required in existing and emerging labour markets are often not well served by universities while at the same time there is a realisation that these skill requirements are rapidly changing (Muller, 2015). Collaboration between universities and industries is seen as essential to innovation systems, with a number of researchers pointing to the impact of such collaboration on both the company's ability to innovate and the generation of economic value within the country and the region. In Ireland a plethora of documents and a range of agencies purport to support and incentivise various forms of engagement interactions (Department of Education and Skills, 2017, 2016, 2015). Despite the significant apparent importance placed on university enterprise interactions, concrete measures of impact are severely lacking. Focus at a government agency level tends to be on the (relatively few) impact measures associated with technology transfer activity (Knowledge Transfer Ireland) while the myriad of more common interactions such work-placement opportunities for students, industry-based project activity, site visits, cultural and community interactions, subject matter expert seminars and customised and practice-based learning for those in the workplace tend not to attract as much attention. This full range of possible interactions has been the focus of the work of the CIT Extended Campus – a codification of interactions and an engagement mapping exercise provide a valuable perspective on the potential of collaboration across the academic-industry divide.

It is recognised that the motivation and ability to collaborate changes with company size, sector and culture. Geography impacts on collaboration with many companies in collaboration with neighbouring universities, however the quality of the university is also a factor (Laursen, Reichstein, & Salter, 2011) (Fitjar & Gjelsvik, 2018). The factors that influence the scale and scope of engagement within a university differ from those which impact from the business perspective and while 'the cultural divide between universities and industry runs deep', effective measures can make a lasting difference (Science | Business Innovation Board, 2012).

According to the Central Statistics Office over 99% of enterprises in Ireland are SMEs. While Cork Institute of Technology has worked to support interactions with all sectors and sizes of industry partners over many years it is still not clear that local industry has a knowledge of the possibilities and benefits of engaging. Using the initial results of the State of University-Business Cooperation study (Science to Business Marketing Research Centre, 2017) as a framework and question guide, a brief review of the motivators and barriers as experienced by small and medium enterprises is conducted and the findings provide some direction for future efforts.

## Keywords

University-industry collaboration, engagement mapping, small and medium enterprises.

# 1 Introduction

Cork Institute of Technology's Extended Campus is a facility designed to support the two-way interactions of individuals and organisations with the HEI (Higher Education Institution) for knowledge exchange, lifelong learning and responsive engagement. There is a wealth of world-class research, learning and facilities available within Higher Education Institutions but it is not always clear to companies, enterprises, individuals or communities how to access or interface with this knowledge. There are also very valuable contributions to learning and knowledge generation at an undergraduate and at a post-graduate level that can be made by individuals and organisations working in collaboration with higher education.

However, an exploration of existing relationships between Irish higher education institutions and external entities reveals that the HEI tends to operate not as a single homogenous entity but as a series of separate and distinct units. The experience from the perspective of an external partner then, is not one of a single, seamless relationship but of many disparate and different relationships with different parts of the institution. In 2012 a national survey of employers' views of Irish Higher Education outcomes identified the need for greater engagement and openness, with a particular emphasis on the need for a joined-up proactive approach by HEIs (McGann and Anderson 2012). Academic and research units can operate as separate and sometimes competing entities from the perspective of the external partner. One exploration of engagement interactions found that a HEI might be involved with an organisation for undergraduate internships or workplacements, customised learning and continuing professional developments, funded research projects, guest lectureships, graduate recruitment, sponsorship and endowments simultaneously through a number of different academic departments and research units. Initial investigation found that there was no single view of this relationship available within HEI and equally a fragmented view within the external partner.

## 2 Collaboration from a University Perspective

Through the development of a Customer Relationship Management system engagement interactions with companies large and small were tracked and recorded over a number of years (Sheridan *et al.* 2013). This facilitated the development of a codification which allowed the various forms of interaction to be grouped and resulted in the identification of three separate pillars of engagement as illustrated in Figure 1 below.

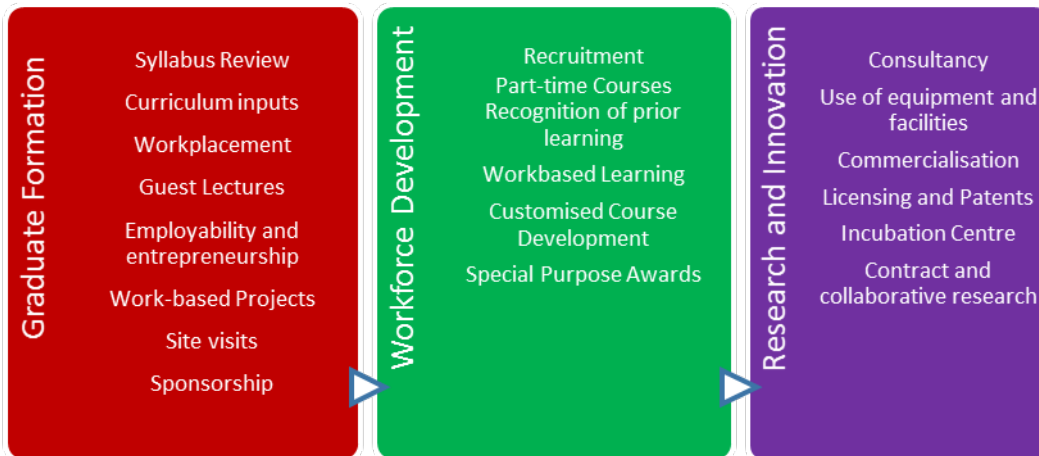


Figure 1: Three Pillars of Engagement

Using these pillars as a framework an attempt was made to map the full extent of engagement activities and collaborative relationship between Cork Institute of Technology and a local multi-national corporation over three months in 2017. This exercise revealed that seven academic departments, three research units, a continuing professional development unit and three central offices had active interaction with the company. These were further categorised into eleven different interaction types in Figure 2 below. While it is acknowledged that this is unlikely to be a complete picture or exhaustive mapping, this identification and classification of interaction has illustrated the complexity, breadth and depth of the interactions as well as the lack of visibility of those interactions internally within the institution.

University Unit	Types and number of Interactions											Totals
	STEM Promotion / Advocacy	Work Placement	Guest Lecturer / Site Visit	QA and Curriculum Development	Company-Based Projects	Sponsorship / Donation / Mentorship	Continuing Professional Development	Customised Course Development	Recruitment	Research and Innovation	Consultancy	
Academic Department 1		14	1	1	13	1			1	2		33
Academic Department 2			4	1			3		1	2		11
Careers Office	1								21			22
Research unit 1										1	6	7
Research unit 2										2		2
Research unit 3										2		2
Academic Department 3							3					3
Academic Department 4		1	1	1			2					5
Academic Department 5		2	2	2	1	2	4		2			15
Academic Department 6		6	4	7	10	10	1		1	7		46
CPD Unit							16					16
Academic Department 7		16										16
Alumni Office						3						3
Access Office	3											3
<b>Totals</b>	4	39	12	12	24	16	29		26	16	6	

Figure 2: Range and number of interactions between CIT and a large enterprise

Assisted by the visualisation and working with the company management, a strategic partnership is developing which will harvest the value of these mapped existing interactions and seek to expand and explore further mutually beneficial collaboration.

This mapping process will benefit from further refinement and comparative analysis across sectors, however in terms of the relationship with this particular company there are some high level reflections that are worth mentioning here.

- (1) The organisation in question is primarily a manufacturing one, involved in both discrete and bulk manufacturing. While the organisation's businesses include business and finance units, nevertheless, the vast majority of the interactions with CIT were with STEM departments in the Faculty of Engineering and Science
- (2) The spread of the interactions across the three pillars shows that most of the interactions came under the Graduate Formation and Workforce Development pillars, with far fewer under the Research and Innovation pillar. This may be reflective of the fact that much of the activity of large multi-national corporations in Ireland is at the manufacturing and new product introduction stages. As their presence in Ireland matures these organisations are bringing a more R & D focus to bear. Less activity under the third pillar may be a sign therefore of that developing maturity and an indication of future opportunity to interact.
- (3) Neither organisation was able to say with any degree of confidence what the number of graduates recruited from CIT into the organisation was for the three years in question.

However, unearthing the full picture of the extent of the collaboration is not trivial and without a clear institutional view of the depth and breadth of engagement interactions, it is difficult to achieve any organisation learning or to develop potential strategies that might benefit from a more integrated response. This lack of visibility or awareness across the institution was mentioned by Edmunds in his exploration of the barriers to engagement with SMEs in Canada (Edmunds, 2017).

The push to collaborate has resulted in some structural and strategic change within universities. In Cork Institute of Technology (CIT) the establishment of a unit specifically charged with stimulating and supporting enterprise connections and engagement was a first step towards developing clear business intelligence and strategic decision-making. In seeking a transversal mechanism to support develop a joined-up picture of engagement and to support a coordinated institutional response a customer relationship management (CRM) solution was developed to support and stimulate the full range of engagement interactions. CRM in the public sector tends to be less well-developed than in the private sector. Insofar as CRM systems are used in higher education they tend to be used as a mechanism to engage with potential, current or past students in what is often termed Student Lifecycle Relationship Management. CIT's use of the CRM system for engagement with the business and enterprise community was novel within the Irish higher education sector and was supported initially by the Higher Education Authority (HEA).

CIT's CRM project allows users to gain an insight into engagement with community and enterprise and to share this knowledge across departments and business units. The intention is that, at any one time, the very broad range of interactions with an external partner can be viewed and explored in depth as required. However the difficulty with collecting and sharing data is that it is a challenge to ensure that the information remains complete and current.

### 3 Nature of Industry in Ireland

A very significant portion of active enterprises in Ireland are very small or micro enterprises and there is also considerable churn. Table 1 below is developed from data provided by the Central Statistics Office ([www.cso.ie](http://www.cso.ie)) for illustration.

Number employed	2014	2015
Fewer than 10 people	219,888	229,472
10-19	9,838	10,316
20-49	5,375	5,686
50-249	2,634	2,829
Over 250	514	540
Totals	238,249	248,843

*Table 1: Active Enterprises by Employment Size*

In 2016 there were 20,997 company start-ups and 12,865 closures (Vision-net, 2017). Developing and charting links with Irish companies is a complex and demanding task for a university and an analysis of the value of recording and maintaining information on interactions versus the resources required should be considered before developing a single Institute-wide shared database. Such a comprehensive system has the advantage of providing the institute's management with an informed overview of the complex relationship between the institute and external organisations. As well as providing an opportunity to understand analyse and nurture existing relationships it provides an informed strategic framework for the targeted development of new relationships. However it does bring to light challenges in the perspectives and cultural change needed to encourage such an open sharing of information and the cost/benefit question of the investment of resources.

Nationally, a plethora of documents and a range of agencies purport to support and encourage various forms of engagement interactions (Department of Education and Skills, 2017, 2016, 2013, 2011). Despite the significant apparent importance placed on university enterprise interactions, concrete measures of impact are severely lacking. Focus at a government agency level tends to be on the (relatively few) impact measures associated with technology transfer activity (Knowledge Transfer Ireland, 2016), while the myriad of more common interactions such as work-placement opportunities for students, industry-based

project activity, site visits, cultural and community interactions, subject matter expert seminars and customised and practice-based learning for those in the workplace tend not to attract as much attention. However these everyday, cooperative engagement activities are the most common experience of interaction with higher education as experienced by the enterprise base.

## **4 Collaboration from the Enterprise Perspective**

In a complex policy environment in which reports and strategy documents repeatedly espouse the view that relationships and partnerships between higher education and enterprise are vital to regional economic and social development, graduate employability and relevance of the curriculum; there are neither clear funding supports nor inclusive measures for the broad range of partnership activity, and the understanding of the potential of engagement interactions within the industry base are mixed at best. In many jurisdictions, university-business collaborations are seen as potential sources of funding which might have the capacity to replace declining government funding (Berman, 2008). Radas points to a number of factors which can provide the basis for good collaboration from the company perspective; a long-term development vision, availability of new technologies, awareness of the importance of innovation and availability of sufficient funds for research are factors in influencing companies to collaborate (Radas, 2005). Radas also notes that companies who collaborate with universities to solve specific concrete problems tend to have a better experience and to rank the collaboration as more important or significant. Again, many authors tend to view university collaboration as R&D collaboration only, while from the business perspective the most significant interaction that they often have with university is through the recruitment of graduates and strong collaboration focused on graduate formation can be vital for the students, university and business (Guimon, 2013).

Within the enterprise base there is a significant difference in the capacity to seek out and engage with students, staff and researchers in higher education between large multinational corporations and micro, small and medium-sized enterprises. There is a significant difference in experience and expectation (HEA, 2015; IBEC, 2015). There is also a mixed level of understanding of the potential benefits of engagement and the possible interactions that might be undertaken. While Cork Institute of Technology has worked to support interactions with all sectors and sizes of industry partners over many years it is still not clear that local industry has an awareness of the possibilities and benefits of engaging. Observation of leads generated over the past decade has illustrated that the majority of queries in relation to the broad range of engagement opportunities come from SMEs but that the transfer rate from query to action for the larger organisations is higher.

## 5 The State of University-Business Cooperation in Ireland

The State of University-Business Cooperation study (Science to Business Marketing Research Centre, 2017) provided initial results for Ireland in late 2017. Uniquely this study collated responses from individual academics, university management as well as businesses. Valuable insight can be gained from comparing these three viewpoints. For instance when asked about the process of initiating university-business collaboration over half of Irish academics (65%) consider that they or their colleagues usually or always initiate the interactions, while businesses saw themselves as the main initiators with 58% of business respondents stating that they or their colleagues usually or always began the process of interaction. The study uncovered the barriers to university-business collaboration from the different perspectives summarised in Table 2 below.

	Academics	University Managers	Business Respondents
1	Insufficient work time allocated by the university for academics' UBC activities	Limited resources of SMEs	Bureaucracy related to UBC in universities
2	Limited resources of SMEs	Insufficient work time allocated by the university for academics' UBC activities	Differing motivations between universities and our business
3	Lack of university funding for UBC	Lack of university funding for UBC	Lack of people with business knowledge within universities
4	Bureaucracy related to UBC	Lack of business funding for UBC	Universities lack awareness of opportunities arising from collaborating with our business
5	Lack of business funding for UBC	Business lack awareness of university research activities / offerings	Differing time horizons between universities and business

*Table 2: Barriers Hindering University-Business Cooperation*

What emerges from the study is a landscape of opportunity as the majority of the research respondents saw significant potential and were committed to developing and supporting more collaboration. Table 3 summarises the elements that are seen as key facilitators driving the collaboration.



	<b>Academics</b>	<b>University Managers</b>	<b>Business Respondents</b>
<b>1</b>	Existence of a shared goal	Existence of mutual commitment	Existence of funding to undertake the cooperation
<b>2</b>	Existence of mutual commitment	Existence of mutual trust	Existence of mutual trust
<b>3</b>	Existence of mutual trust	Existence of funding to undertake the cooperation	Existence of mutual commitment
<b>4</b>	Existence of funding to undertake the cooperation	Existence of a shared goal	Prior relation with the university partner
<b>5</b>	Interest of business in accessing scientific knowledge	Prior relation with the business partner	Existence of a shared goal

*Table 3: Drivers Stimulating University-Business Collaboration – Facilitators*

The facilitators are remarkably similar from the different stakeholders’ perspectives while the motivators for collaboration summarised in Table 4 show some differences.

	<b>Academics</b>	<b>University Managers</b>	<b>Business Respondents</b>
<b>1</b>	Gain new insights for research	Improves graduate employability	Obtain funding / financial resources
<b>2</b>	Uses my research in practice	Addresses societal challenges and issues	Get access to new technologies and knowledge
<b>3</b>	Contributes to the mission of the university	Contributes to the mission of the university	Improve our innovation capacity
<b>4</b>	Improves graduate employability	Provides funding / financial resources	Positively impact society
<b>5</b>	Obtain funding / financial resources	Uses my research in practice	Improve the reputation of our business

*Table 4: Drivers Stimulating University-Business Collaboration - Motivators*

The UBC study is of significant interest as it considers the broad range of engagement interactions and it is possible to align the interactions highlighted in the UBC study with the mapping and broad codification exercises conducted by CIT with specific industries. In exploring the extent of the collaboration activities the UBC study presented the interactions from the industry perspective.

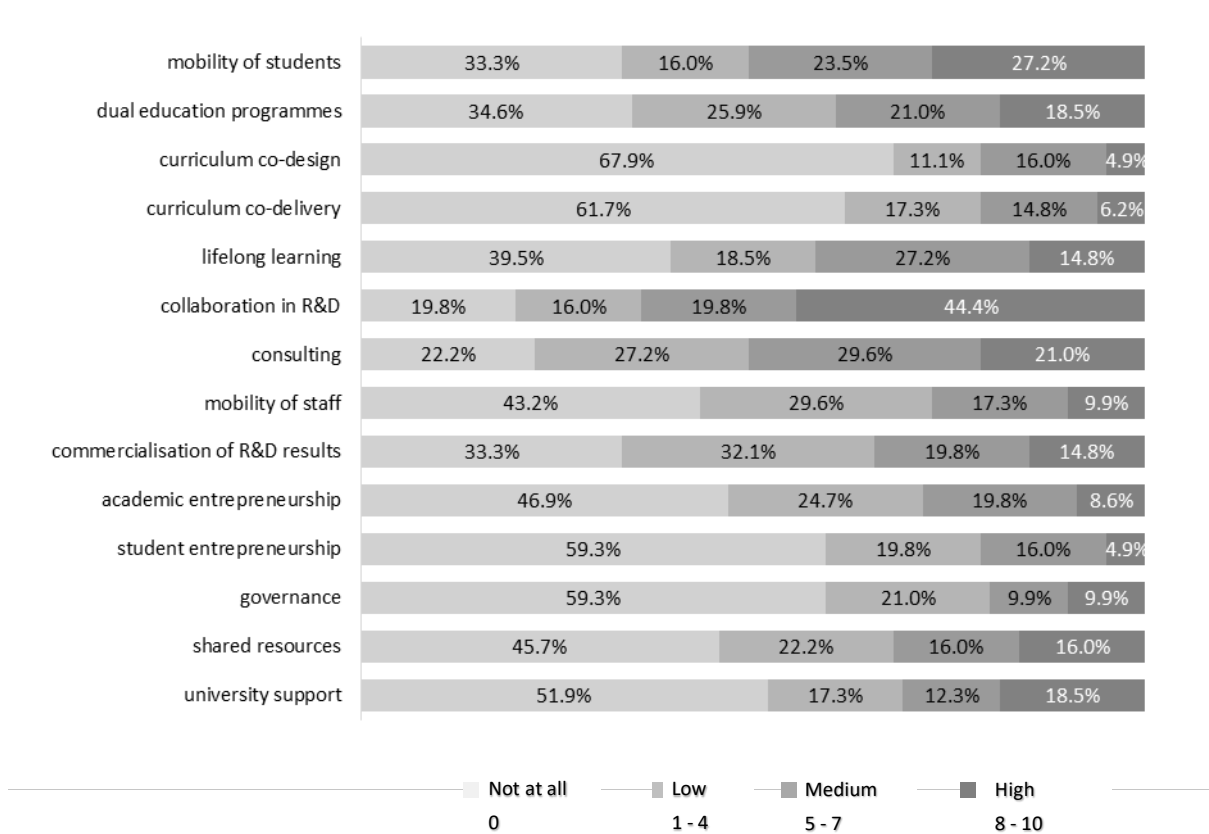


Figure 3: University-Business Collaboration Activities in which the business respondents are most involved

While the study reveals that collaboration in research and development is most prevalent it also serves to illustrate the interactions that support graduate formation such as curriculum co-design and co-delivery, student entrepreneurship and mobility. An attempt to align these collaboration activities with the three pillars of engagement illustrated in Figure 1 is shown below in Figure 4. In this case the broader interactions such as university support and governance are considered to be supportive of all three pillars.



Figure 4: Alignment of activities identified in UBC study with the Three Pillars of Engagement

As the number of SMEs in Ireland is a significant proportion of the industry base and as interacting with micro and small enterprise is often more challenging for higher education institutions an event for SMEs to illustrate and explore collaboration with CIT was held. The event attracted thirty small companies and provided an opportunity for them to hear from companies that had successfully engaged as well as to interact with CIT staff, students and researchers directly. The event also provided an opportunity to collect feedback from the attendees on the reasons that they might seek to engage and the perceived barriers. An initial review of the feedback is summarised in Figures 5 and 6 below.

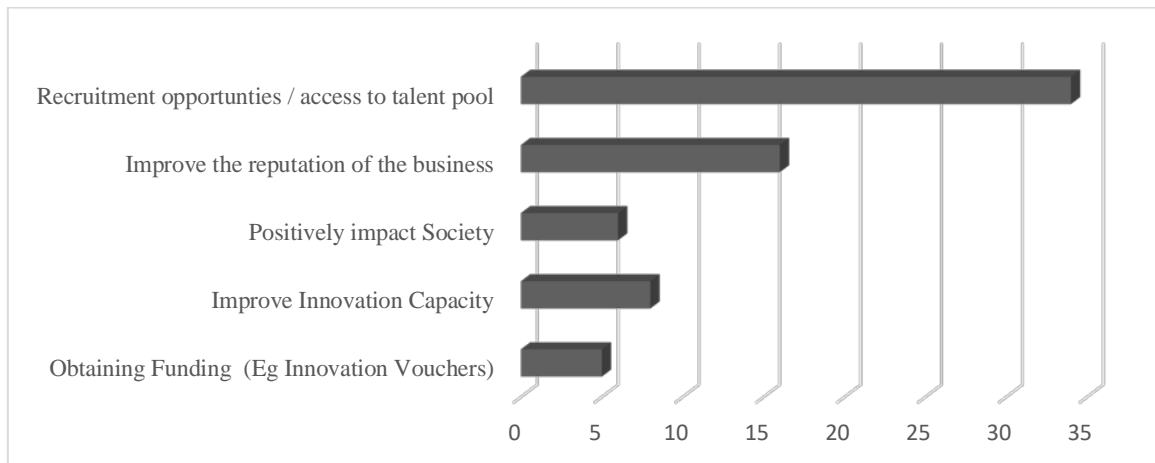


Figure 5: Why SMEs Engage with CIT

While many attendees indicated the motivators which would encourage their company to engage with CIT far fewer indicated barriers to that engagement. In fact barriers such as the lack of people with business knowledge in the university, which had featured on the UBC study did not feature at all in this feedback from SMEs.

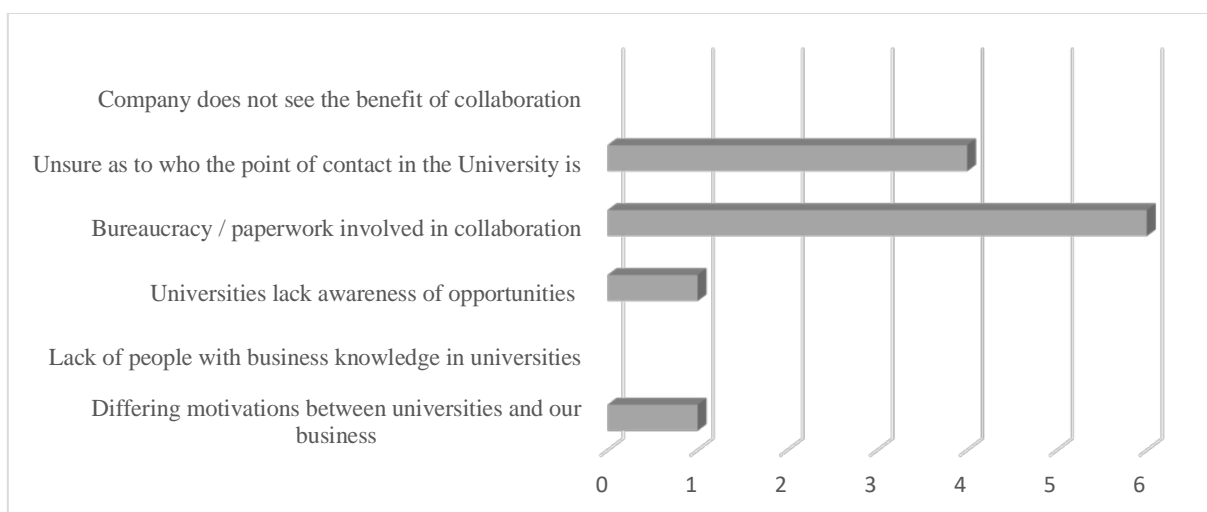


Figure 6: Barriers to SME Engagement with CIT

It is of course unsurprising that representatives of SMEs attending an event to support engagement with CIT would be well disposed to engagement and would see the potential benefits thereof.

## **6 University-Industry Collaboration – Next Steps**

In Ireland the most recent Action Plan for Education (Government of Ireland, 2018) includes greater involvement of industry as a key enabler of the development of relevant education provision and a strong talent pool. The National Skills Strategy refers to the need to ‘forge practical alliances between industry and academia in the region’ (Department of Education and Skills, 2015, p. 84) as well as the need to enhance and support lifelong learning. Several agencies work to support interactions through funding mechanisms such as Innovation Vouchers (Enterprise Ireland) model cooperation agreements (Knowledge Transfer Ireland). However the experience of Cork Institute of Technology and the initial Irish findings from the Study on University-Business Collaboration would illustrate that there are still significant barriers and that those barriers may be more keenly felt by SMEs than by large industries. Given the proportion of active industries that are either micro or small this presents a real challenge in Ireland. To support engagement with small enterprises one potential way forward is to provide small industries with relevant exemplars and to overcome the bureaucracy barrier through providing low-barrier entry points to create contacts and begin the process of collaboration.

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