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Business-driven assignment for teaching HCI

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ABSTRACT
The purpose of this paper is to offer a reflection on some of the challenges of teaching interaction design. A proposed solution to address these challenges is through a business-driven problem which has been translated into a research question to be tackled by students in their learning context. The case study outlines and evaluates the six stages of this process. Apart from providing the company with research solutions that can be used to improve its profitability, other benefits consist of better teaching/learning process which emphasises *learning by doing* and involves applying research knowledge and skills in an industrial project. The paper also highlights the lessons learned and the understanding gained into how this approach can be successfully replicated.

Categories and Subject Descriptors
H.5.2 [**Information Interfaces and Presentation**]: User Interfaces – *evaluation/methodology, theory and methods*

General Terms
Design, Experimentation, Human Factors, Theory.

Keywords
Interaction design, case study, business-driven project, collaborative design project.

1. INTRODUCTION

1.1 Challenges of Teaching Interaction Design
This section offers a reflection on the challenges of teaching and learning interaction design in an academic context. These challenges are analysed in the light of the proposed method for knowledge transfer, in order to emphasise how the partnership with a company in developing student assignments can in fact improve the quality of teaching/learning process.

An important challenge of teaching interaction design relates to the interdisciplinary nature of its creative process which is not entirely understood. At the core of teaching and learning interaction design lies an experiential component which requires besides the traditional academic training, the opportunity to access practical experience [3][5][6][8][14][16]. Unfortunately, the craftsmanship dimension of design is not entirely understood. It is this limited understanding that leads to difficulties in teaching interaction design. In fact, the challenges of teaching design can be seen throughout the entire design process, starting from problem specification, continuing with the relevant feedback that the students need to receive, and not least relating to the assessment of design-related activities and outcomes [9].

Problem specification in the context of interaction design brings into attention aspects like ambiguity, structure and abstraction. There is a considerable tension between students' need to have the project requirements well structured and the educator intention to have them more abstract in order to let the students structure the problem [12]. This tension is generated by students' limited ability to handle less structured tasks. However, the skill to formulate problem settings precedes and is at least as important as the one of finding solutions. Unfortunately, the acquisition of problem formulation skills has received insufficient attention in higher education and students, even graduates, are often less prepared for this challenge. Setting the problem is needed not only during the initial stage of the design but the iterative nature of this process requires continuous reformulation and restructuring of the problem [16]. Ultimately, problem specification challenges the educator to decide what the right level of detail is, so that unclear objectives, wide scope or vague approach are avoided [7].

Our experience showed that a design problem thought by the academic is usually abstract, open-ended and less structured since it lacks the constraints of a real-life problem. One explanation for this relates to the imagined problem which is conceived to *resemble* the problems encounters in industrial settings and be in the same time open enough to force students to find creative solutions. But irrespectively of how well crafted such a design problem is, it cannot replace a well chosen *real* problem. When the latter is selected to match and slightly challenge students abilities [15], is rich in real life constraints, as well as narrow and specific, it can offer a better starting point in the exploration of the design space for creative problem solving. One way to address this is through a business-driven problem formulation aiming to address a real company issue that can be formalised in academic terms.

Theoretical perspectives that can inform teaching and learning interaction design include constructivism which offers a basis for experiential learning and reflective action [12].

The following section describes the proposed method for addressing these problems, i.e., addressing a business problem through student assignment.

2. CASE STUDY

The case study presents a partnership between the Computing Department and the company Escendency both located in InfoLab21 at Lancaster University. This collaboration was facilitated by the Knowledge Business Centre (KBC), an experienced enabler for academic-industrial collaboration, that has developed since 2004 a sophisticated model for knowledge transfer and innovation aiming to contribute to the regional economic growth. The two parts involved in the collaboration described through this case study, have met in 2005 at a seminar series organised by the KBC.

Escendency (http://www.escendency.com) is a recently formed company developing a web-based performance improvement system to enable public sector organisations to measure strategic performance, and make sustainable progress towards their common vision. For this, their client organisations are required to identify their vision. Such highest level objective will be iteratively broken down in lower levels objectives so that any given level makes up 100% of the objective immediately above it. This process continues until the objectives can be directly measured through performance indicators. Action plans are used to monitor the organisation progress from performance indicators to objectives. The system also links the people in the organisation to the performance measures and action plans they are responsible for.

Currently the system is being used by several City Councils and two universities but it has the potential to be used for any type of complex activities that require hierarchical organisation of tasks. In order to do this, the company has to refine the conceptual model of its system and the way in which it is represented.

There have been two major aspects which motivated the Escendency company to seek out academic collaboration. Firstly, the company has limited financial resources which exclude commissioning academic work for addressing some of the problems it faces. Secondly, it lacks the expertise to carry out research in the field of HCI.

As mentioned by the Escendency CEO, a common *problem* encountered when the system has been presented to potential clients is how to accurately convey a clear representation of the system. In order to support this intuitive understanding, the company has developed an animated representation which visualises metaphorically the conceptual model of the system. However, this work has been performed without any research into the fields of Human-Computer Interaction (HCI), interaction design, or metaphor visualisation. Therefore there is a need to refine the metaphor of the Escendency conceptual model so that it can be better understood by the current and potential clients. This requires the evaluation of the current metaphor together the exploration of alternative metaphors. In addition, the company intends to reach out new markets, so the metaphor should be able convey a domain-independent representation.

The academic involved in this collaboration is a newly appointed lecturer in HCI in Computing Department, University of Lancaster. As a lecturer, she has developed, taught and assessed several HCI courses ranging from first year undergraduate to Masters level courses. With a background both in psychology and computer science, this academic's research interests explore interdisciplinary areas such as adaptive systems, user modelling and interaction design.

The teaching course that was selected for this assignment was the Advanced Interactive System Design (AISD) module for the students enrolled in the Master by Research which is a HCI oriented programme. The AISD module focuses on the development of research skills in designing and evaluating interactive systems. It involves a teaching component in the form of a one week intense block mode, and a coursework component which is designed to support a constructivist approach to learning [1][9]. For the coursework, the students receive a design brief and are required to work both in group and individually to design the required system. By the end of the module, students produce low fidelity prototypes. The assessment procedure involves two individual reports in which students reflect on their individual and groupwork respectively.

Because of their practical component, such courses on interaction design have been previously used as a playground for experimenting with different teaching techniques [10][11].

Through exposing the students to a design brief based on a business problem, they become stakeholders in the academia-industry collaboration. This knowledge transfer method was particularly designed to better support the learning objectives while addressing some of the challenges of traditional project-based learning.

2.1 The Process

This section describes the multi-stage process enabling the collaboration and ultimately the knowledge transfer. Within this process, it should be mentioned the central role of the academic among the partnership stakeholders. The academic can be seen as linking the company – who provides the problem, and the students – who explore the solutions, while carefully directing the problem definition that meets the constraints of each of the stakeholders. The academic is responsible in the first phase for successively translating the problem from the original business language into a research questions and ultimately in a course assignment. In the second phase, the academic has to translate the solutions provided by the students in their coursework into meaningful research findings and in the accessible language to be understood by the company representatives. In addition, the academic has to coordinate students work as well as their communication with the company partner.

The following stages are presented from the perspective of the academic involved in the collaboration.

1) Understanding the business vision, aims and objectives and in particular the specific problems that hinder the current system development.

2) Narrowing down to a couple of such problems and selecting the one with greatest research potential.

3) Translating the identified problem from a business perspective into a scientific inquiry, e.g. as a research question.

4) Translating the research question in terms of learning objectives and teaching assignment.

5) Introducing the course assignment to students and monitoring their progress.

6) Assessing student work and preparing a report for the company.

Each of these stages is further detailed.

1) Understanding the business vision, aims and objectives and in particular the specific problems that hinder the current system development.

Intense communication took place between the academic and the company representatives. This consisted of presentations, demos, and questions sessions that enabled the academic to understand the company goal. The system website as well as the online documentation represented additional informational resources that helped clarifying outstanding issues. From the specific problems that hindered the system development both partners were interested in selecting those which fall under the remit of the academic's research expertise. Such HCI type of problems included the assessment of the system's overall usability and in particular interface usability, the behaviour and representation of various icons on the interface, the development of a library of interface icons, as well as visualisation of system metaphor, all with the purpose of supporting users to accept the system and the change that it promotes in the organisation.

The method of knowledge transfer through student assignment had been previously piloted at Lancaster within a HCI undergraduate course in Michaelmas term 2005-2006. For this, more than 100 students completed an assignment involving five tasks and subsequently assessed the system usability through employing a classic usability method, e.g. heuristic evaluation. The main usability problems identified by the students were hierarchically clustered by the academic and made available in a report handed to the company representatives. This report is currently a core document being used by the Escendency developers to take the system to the next level of usability. Apart from the direct input into refining the system, this initial collaboration has an additional twofold benefit. It helped the partners to establish a trustful relationship, and suggested that the proposed method for knowledge transfer is feasible. However, at this level, no research component has been involved in the knowledge transfer. In order to incorporate it, a new type of assignment needed to be designed: one that involves mature students enrolled in a research programme.

2) Narrowing down to a couple of such problems and selecting the one with greatest research potential.

Among the previously identified business problems, the visualisation of system metaphor was selected to be addressed. This choice enabled the highest research component to be brought into the collaboration while being sufficiently open-ended. At the same time, the expected outcome of its solution would not only support the better understanding of the Escendency conceptual model by its current clients, but also the development of a better marketing tool to promote this conceptual model to new potential clients in different application domains.

This process required several communication sessions where both the academic and the company representative became aware of each other perspectives and constraints. For this, a joint interpretative forum needed to be established. Two months of weekly meetings between the academic and a company representative took place in order to negotiate the objective of the alliance and share its understanding.

3) Translating the identified problem from a business perspective into a scientific inquiry, e.g. as a research question.

A proper preparation enabled by the previous stage contributes to the easiness of this translation of business problem in the language of scientific inquiry. This stage is considerably easier if the academic's research interest circumscribe the business problem. Additional literature review can support the academic to cover those domains that are outside her areas of expertise, since the business-driven problems can seldom be confined to one discipline or methodological approach,

Although challenging, this stage could force the academic to seek creatively research questions that transcend disciplinary boundaries [4]. This in turn can lead to an inquiry that involves meaningful, well motivated and original research, increasing thus the academic's benefit of collaboration.

4) Translating the research question in terms of learning objectives and teaching assignment.

Once the research question is identified and agreed upon between the academic and company representative, it should be formulated in such a way so that it matches the requirements encapsulated in the course assignment. At this stage, it became obvious that the company problems have to be partitioned in design briefs consistent with the short-term business objective rather than long term ones. In preparing the brief, care had to be taken to match the assignment difficulty with the students' previous knowledge and skills, and the amount of work involved in the assignment with the amount of time that students have allocated for it. This also involves providing students with a road map of the essential steps that need to be performed for carrying out the research activity. Various research methods need to be selected and outlined. At this stage, specific questions regarding the study procedure and participants need to be clarified and mutually agreed by the stakeholders.

For example, at this stage, the academic considered that real users of the Escendency system need to be directly involved in the process of gathering requirements. The company representative understood this need and diligently looked for opportunities to address it. This would involve ensuring students' access in company clients of Escendency, with the purpose to observe working practices and interview employees about their conceptual model of the Escendency system.

Attempts to find Escendency clients interested in hosting a field study, involved Lancaster City Council, and 30 leaders of SME's who participated in a CFLD program run by the Management School. This would have allowed students' access to real users, their understanding of and experience with the system. A compromising solution was to perform the field research with users who are doing performance management

without Escendency's system. Given the easy access to university students, the design brief required MRes students to work with students rather then real users of Escendency.

Despite the efforts put into this, we failed to ensure such access, which had two consequences. Firstly we need to redraft the design brief so that more accessible participants are included into the study, e.g. university students. Secondly, this led to unexpected delay in delivering the brief and student's starting day for this assignment, which in turn forced us to postpone the date of the assignment due. Further problems triggered by this issue are highlighted in section 4.

5) Introducing the course assignment to students and monitoring their progress.

For this stage, the academic organised a meeting with all the stakeholders, where the students were given a presentation of the design brief whose aim was to investigate how the conceptual model of the Escendency system can be visualised and offered in the form of metaphors to a new user group, in a different application domain (see attached). This presentation was followed by one of Escendency CEO who introduced the conceptual model of the system and highlighted the relevance of the visualisation metaphor. The students received additional reading material and were encouraged to ask questions.

This stage involved also monitoring students' progress on the given assignment. An important communication problem became clear at this stage. Since the academic facilitated the initial communication between the other two stakeholders, the students took little initiative in communicating directly with the company representative to ensure subsequent meetings. For this, the assignment due needed to be further postponed for three weeks.

6) Assessing student work and preparing a report for the company.

Despite the project challenges and the additional communication problems encountered during its life cycle, the quality of students work was high. Besides gaining a thorough understanding of the conceptual model of Escendency system, the students developed and evaluated nine metaphors encapsulating this model. Their work also highlighted some of the weaknesses of Escendency current river metaphor. These relate to its rigid structure which restricts performance definition to only one objective, as this would involve the unrealistic scenario of selecting some rivers and reconnecting them at will. The metaphors were evaluated on a seven points Likert scale consisting in the following indicators: metaphor clarity, familiarity, learnability, relevance, consistency, extensiveness, customisability. The nine metaphors are briefly summarised below.

M1 The national power grid. Measure of performance: providing enough power to all areas.

M2 Running a restaurant. Measure of performance: profit.

M3 Climbing a mountain. Measure of performance: how far up one reaches the mountain.

M4 Train network. Measure of performance: trains travelling between stations.

M5 Building site. Measure of performance: task needed to construct a wall.

M6 Flying a plane. Measure of performance: maintaining altitude and arriving on time at the destination airport.

M7 Ant colony. Measure of performance: ants represent objectives that are completed once the ants reach the colony.

M8 Road traffic. Measure of performance: cars travel towards a destination point.

M9 Health monitoring system. Measure of performance: the health of different organs enable an organism to carry out a demanding physical activity.

A closer analysis of these metaphors suggests two clusters:

- organisational metaphors (M1, M4, M7, M9) which succeed in capturing the interrelationships between individual components for reaching common goals.
- individual metaphors (M2, M3, M5, M6, M8) which emphasise individual efforts required to achieve individual goals as opposed to organisational goals.

Two organisational metaphors, e.g. the national power grid and the train network metaphors, received the highest scores on clarity, familiarity, consistency, and extensiveness. The students' work was summarised in a report prepared by the academic and forwarded to the company. The report was written in an accessible language [13] and subsequent meetings took place to ensure that it is understood by the company representatives and how the work outcomes can be of benefit for Escendency.

3. EVALUATION

The evaluation of the proposed knowledge transfer method involved a dialogue between the academic on the one hand and the students and company representatives on the other hand. The students were invited to fill in a course evaluation form and were informally interviewed in order to identify the perceived strengths and limitations of this method. The main problems highlighted by students relate to the project goal and constraints. As mentioned in section 3.3, the course assignment needed to be revised because the company representatives have encountered difficulties in involving their clients in this project. A major local client which showed an initial interest in hosting the field study had to withdraw at a later stage because other business commitments needed to be attended in the same time frame, e.g. preparing an end of year audit. This meant that the students had to interview users of a surrogate system. The most accessible study participants are usually recruited from the student population. However a field study involving student participants as opposed to Escendency users led to a shift of emphasis from organisational goals and objectives to individual goals and objectives. Although mentioned during the introduction of the design brief, this compromise has not been sufficiently emphasised. Once rediscovered by the students, it led to their initial disengagement with the project. Students' lack of communication prevented the academic to address the issue in time. A more clear emphasis on the limitations of the design brief together with a clearer description of why the project does not involve real Escendency users would have allowed the students to better shape their expectations regarding this assignment.

Another stumbling block encountered by the students relate to the given conceptual model of the Escendency system which needed to be critiqued but could not be changed or improved. Once the students have identified flaws within the Escendency conceptual model, these flaws were perceived as constraints to be refuted rather than challenges to creatively explore the design space in order to address them. This problem highlighted the need for emphasising within the learning outcomes of the assignment not only knowledge and skills but also values [1]. Thus, prior presentation of the challenges involved in an industrial project and of the frame of mind and attitudes required for approaching it could further improve the learning experience.

The company representatives were invited to evaluate this collaboration in terms of its strengths and limitations. For this, we employed questionnaires and informal interviews. The main themes emerging from their answers are summarised below. The joint interpretative forums offered the opportunity for exchanging several ideas. Although only one of these ideas has been pursued through the course assignment, the other ideas represented avenues for future business development, e.g. building a repository of collective expertise encapsulating tacit knowledge of using the system that can be used by and evolve with input from Escendency clients. As highlighted in the company representative answers: "*this collaboration suggested a way in which we might interact with our customers. We don't necessarily have to think everything through ourselves, we just need to provide the leading ideas and a framework for developing them, then create a repository for collecting and organising those ideas for future use by ourselves or others*".

The greatest challenge was related to the fact that the company did not succeed in attracting real clients to become stakeholders in this collaboration and host the field study. As pointed out: "*the great challenge, of course, was that what was really needed was not really ours to deliver, namely our customers' time*".

One suggestion for improving the quality of this partnership consists of involving the students earlier in the collaboration: "*Maybe the process would have been more efficient if some of what was done later was done earlier - namely, involving the students directly in discussions. Early discussions were actually two steps away from the students, and I think the system worked pretty well. Maybe, however, as part of the taught part of the course, a general brainstorming of potential projects could help to clarify the state of industry as well as desired outcomes of the course for industry*". This suggestion addresses some of the problems identified by the students and could alleviate their initial disengagement with the project. Enabling students' access to the preparatory stage of the project, alongside with the academic and the company representatives could allow students to develop the proper sets of attitudes and values required by an industrial project as well as shaping their expectancies for its outcomes.

The second suggestion solicited earlier feedback from the student work so that it can be exploited before the deadline of this project and overcome the limitation of the lengthy project duration: "*the informal feedback to the company could be done at various times during the course of project implementation so that the company is not waiting on a final report before it can begin to realize benefit from the collaboration, and the students are able to benefit from any comments the company makes about whether they are still on course for delivering that benefit*".

The company representatives' feedback on the report prepared by the academic to summarise the project outcomes was positive: "*excellent report*" that happened to be delivered at a favourable time: "W*e now have a visualization capability which means that we can actually implement pretty pictures in the system. We are also currently building an e-learning tool which will also be used in marketing, so we have the capability of actually implementing these metaphors and using them productively, which makes this report even more valuable*".

4. DISCUSSION

This paper presents the process of translating a business-driven problem into a research/teaching assignment. The initially business-driven problem has been translated into a research question addressable by students in their learning context. Several conditions have to be ensured before this avenue can be fully exploited. Firstly, it requires a good articulation between the academic's research and teaching expertise. In order to bring meaningful problems into the teaching/learning process, the academic should teach those disciplines that are closely related to her/his research interests.

Not at least, there should be a particular rapport between the academic and business people based on mutual trust, commitment, match between academic's interests and expertise, and company's goals, objectives or problems, as well as academic's interest to network and reach out practitioner community. The successful links have in common flexibility, rapid response, timely delivery and management skills.

The critical factors contributing to the success of this approach are communication and matching the requirements of the stakeholders involved. The leading role in this approach belongs to the academic staff who needs to communicate both with the business and the students. This proved to be time consuming and sometimes inefficient. Ensuring direct communication between business and a student representative would reduce the time required for arranging meetings and the overload of the academic staff. In this collaboration, matching the requirements of business and academia is by far a non-trivial task. The specific problem to be addressed should further promote business development. Such problem is even more relevant when solving it through research is out of company's reach because of the lack of resources or skills required to address it. It should preferably fall under the academic staff's research interests (although a perfect match is not necessary). In addition it needs to support the course learning outcomes, to be doable in the assignment time frame, and not at least assessable.

Several lessons have been learned that can improve future such collaborations for knowledge transfer. Addressing the gap between different perspectives requires that the different stakeholders creatively solve the issues of research content, research process and dissemination. From students' perspective, this study showed that insufficient communication and lack of proactive attitude can seriously hinder their learning process. Therefore, there is a strong need for a better student preparation for this collaboration. They need to be informed not only about the project content but also about how it differs from a traditional academic project. In

this way, their involvement in the project could be more responsible, proactive and with the right level of expectations.

If the communication between the academic and the company representatives was successful, the communication between these two stakeholders and the students can be improved. For this, the students need to be earlier involved in the collaboration and made aware of the efforts made to reach a satisfactory solution able to accommodate the constraints of the industrial partner. This will ensure that the communication process will flow easier between each pair of stakeholders and rely less on the academic as informational hub.

The length of project preparation should not be underestimated. This is particularly relevant when secondary stakeholders, i.e. Escendency clients, are approached and invited to become project partners for hosting the field study. The next section highlights the main benefits entailed and costs required by this process.

4.1 The benefits of the process

This knowledge transfer method has emerged from the company needs coupled with the academic's research interest. In other words, the lack of company's resources to address the identified problem and the academic willingness to get involved and found solutions to help the company were two significant factors.

The solutions provided by the research carried out through student assignment can be used to improve the company's profitability (economic theory) and increase its competence base in addressing similar future problems (learning theory). The latter involves experience for working with an academic on student assignments which helps shape future expectancies on similar collaborations. Given the nature of this assignment, the time taken from providing the brief to the students and having them return their complete coursework was almost four months. Considering also the time taken to prepare the brief, it becomes clear that the time interval between the company input into collaboration and the moment when the expected outcome is received is considerably long. This time delay brings into attention that the problem addressed through the assignment should still be relevant after couple of months or otherwise the entire exercise is less beneficial for the company. Other potential benefits for the company include satisfaction for having contributed to learning in higher education, as well as the opportunity to identify potential employees among students.

The benefits for the academic are analysed along three main dimensions defining academic work: research, teaching and networking. *Research*-wise, this collaboration enabled the academic to lead students' research in an area of interest as well as exercising control over the content being learned. HCI research topics such as visualisation and metaphors can be further exploited in academic papers. This knowledge transfer method also supports the *teaching* process through real world experience and transferable skills that it enables. Not at least developing links with industry can foster future collaborations. Thus, this partnership for knowledge transfer can be seen as part of the academic's *networking* (social network theory) and outreach activity. One way to increase the academic benefit from such collaboration is to define university incentives which recognise the outreach activity as being an essential part of the promotion process.

The benefits of this form of knowledge transfer, i.e. solving a business problem through student assignment, reside in *learning by doing* which offers students an opportunity to apply their research knowledge and skills, to develop transferable skills, together with the ability to bridge the gap between theory and practice. Within this proposed method, the academic project is replaced by an industry project. The rationale and objectives are based on the company needs, but the work itself is research-led performed in an academic context. In this way, the proposed method brings authentic problems in the context of the academic teaching, ensuring students satisfaction of doing a real job rather than a pure academic exercise.

4.2 The cost of the process

Although the proposed method for knowledge transfer is low cost, it still requires time investment from each stakeholder. The costs of this process of knowledge transfer are further outlined, separately for each stakeholder.

The company representatives need to make time for introducing the system to the academic and students, for negotiating with the academic the problem to be addressed as well as the project requirements and objectives.

The academic's time is required at each stage of this process primarily for establishing and maintaining links with the company. Initially the time is required to understand the system, its problems and to identify the research topic. After that, the academic should be able to support and monitor student' progress and not at least, should be able to make the research findings available to the company and liaise with its representatives on identifying proper ways for exploring these findings.

The students cost is not obvious since their course requirements involved anyway a project-work assignment. The difference, which can lead to additional efforts, relates to the challenges associated with this assignment. However, because the students are challenged with real problems they may be more motivated and easier to connect with the project topic.

5. CONCLUSION

This paper offers a reflection on a low-cost method of knowledge transfer in the form of a student assignment, through which the traditional academic project is replaced by an industry project taking place in an academic context. It consists of a six-stage process, where the central role is played by the academic.

The prerequisites of this collaboration consist of a good articulation between the research and teaching components of the academic's work, as well as a good rapport between the academic and the company representatives. This will ensure efficient communication and willingness to match each other's requirements. Although the problem to be addressed is selected among the problems encountered by company, it should also support the course learning outcomes, be doable in the assignment time frame and be assessable. Not at least, the problem should fall under the academic's research interests.

This form of partnership is beneficial for each stakeholder involved. It provides the company with research solutions that can be used to improve the profitability and increase the company competence base in addressing similar future

problems. Given the time frame of such a project, care should be taken that when the solutions are provided the problem that they addressed is still relevant for the company. The academic benefits from leading students' research and enabling a better teaching/learning process. In this way, students can benefit from "learning by doing" which involves applying research knowledge and skills in an industrial project.

This type of knowledge transfer is low cost since it does not require additional funding. However, it does require time, particularly from the academic and industrial partners. The former is heavily involved at each stage of the process. In order to be cost effective, this methodology can be employed for small cohorts of students, i.e. not larger than 20, and enrolled in graduate studies, i.e. Master by Research programmes. Although this type of outreach activity performed by the academic is considered important, it is currently received with surprisingly few university incentives.

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