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Clare Farrukh (CTM, University of Cambridge) *
Nicky Athanassopoulou (ECS, University of Cambridge)
Imoh Ilevbare (CTM, University of Cambridge)

* Please contact the corresponding author for feedback:
cjp22@cam.ac.uk

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How inbound open innovation helps SMEs learn and improve: knowledge transfer from university to industry through direct coaching

Clare Farrukh, Nicky Athanassopoulou and Imoh Ilevbare
University of Cambridge, Department of Engineering, Institute for Manufacturing, 17 Charles Babbage Road, Cambridge, CB3 0FS, UK, cjp22@cam.ac.uk, naa14@cam.ac.uk, imi22@cam.ac.uk.

Abstract: This paper explores how coaching using University generated knowledge can be seen as a form of inbound organizational innovation (OI) that enables SMEs to improve their innovation activities. Evidence from one of seven OI pilots within the EU Science2Society program is starting to offer analytical evidence of what aspects of the approach are successful and why, and discuss the learning from the project with respect to inbound open innovation. The pilot involves working with 10 SMEs to explore and map knowledge transfer in the form of direct one to one coaching engagements between academia and SMEs. The knowledge transfer in this pilot is carried out by means of applying strategy and technology management tools, which have been developed through research, in a workshop setting using an SME's own business context. Preliminary results are being analysed to show what limits and enables effective knowledge transfer and to understand why and how group coaching helps an SME's innovation activities.

1. Introduction

The advantages of collaboration between industry and universities are widely recognised, allowing both the exchange of tacit scientific knowledge (Cockburn & Henderson 1998) and access to unpublished codified knowledge from the most recent research findings (Fabrizio 2009). Good reasons for industry-university collaboration have been identified (e.g. Lee 2000) and in the last 15 years work in open innovation (e.g. Chesborough 2003) has further demonstrated the benefits of collaboration within a wider innovation eco-system. The challenge is now in making university research fully available to support the needs of business innovation and this concept has been taken up at high political level:

> *"We need open innovation to capitalise on the results of European research and innovation. This means creating the right ecosystems, increasing investment, and bringing more companies and regions into the knowledge economy". [Carlos Moedas, European Commissioner for Research, Science and Innovation]*

The EU Science to Society (S2S) pilots have been designed to be fully consistent with this approach, aiming at developing and testing best practices for the innovative cooperation of academia, research and technology organisations and industry. Within S2S there is a focus on the following kinds of innovation: Co-Creation, Co-location, Collaboration (R&D&I), Inter-sectorial mobility, Collaboration (Big data & Science 2.0), Coaching and training for SMEs, and Knowledge marketplace.

This paper is based on the coaching and training for SMEs pilot of the S2S program and explores how group coaching using university generated knowledge can be seen as a form of inbound organizational innovation (OI) that enables SMEs to improve their innovation activities (Ahn *et al*., 2013; Perkmann & Walsh 2007). This pilot will offer analytical evidence of what aspects of the approach are successful and why, and this paper discuss the emerging learning from the project as a form of inbound open innovation.

Universities see themselves becoming open innovation hubs and acting as trusted intermediaries (Striukova & Rayna 2015) but to our knowledge, there are not many European universities actively involved in knowledge transfer in the form of business processes (e.g. strategy process, innovation process) to SMEs. Therefore, there are not many comparative studies. However, Van de Vrande *et al*. (2009) have found that SMEs do pursue open innovation for market related reasons, such as meeting customer demands and keeping up with competitors, although they encounter cultural and organizational challenges in dealing with increased external contacts. There are studies in knowledge transfer that have looked into the transfer of organised knowledge and know-how, as well as the required communication for enabling this type of transfer (Ouijian and Carne 1987; Senker 1995; Steele *et al.* 1996; Trott *et al.* 1995). In addition, the importance of one-to-one interaction (e.g. Allen 1977), suggests that coaching should be an effective means.

There have been several government support initiatives for SMEs but these have not necessarily have involved direct transfer of academic research and knowledge. The Enterprise European Network is a European initiative supporting SMEs and there are various national initiatives. For example, in the UK there have been Business Link, the Manufacturing Advisory Service (MAS) and more recently the Growth Accelerator programmes. These services frequently involve the provider to both diagnose and implement improvement actions for the recipient SMEs, although the knowledge transfer is often implicit rather than explicit. Often, in these initiatives the provider is a professional organization providing services on a commercial basis rather than an academic institution or an RTO.

2. Literature

This paper focuses on coaching and training of SMEs by academia, which draws on several detailed areas of literature which link with the open innovation field. These are university-industry collaboration, knowledge and technology transfer, coaching and training, and evaluation of outcomes.

2.1 University-industry relationships

University-industry relationships form the context for this study but how do they help shape it?

University industry relationships and open innovation are reviewed by Perkmann & Walsh (2007), who recognise that the nature of university-industry links is very diverse, and as such, propose a research agenda. They suggest that two areas need most attention, the search and match process between companies and universities, and the organisation and management of collaborative relationships. However they focus on either research based collaborations or human resource transfers, rather than the softer process angle that supports SME activity in strategy and innovation. Other work also focuses more on technology based collaboration (e.g. Fabrizio 2007).

Ahn *et al.* (2013), however, in their work investigating OI and firm performance do specifically make the link between inbound innovation and improving innovation based activities within firms. As part of this they see in-sourcing as one of three inflow modes of OI, defined as 'exploiting external knowledge to reduce time-to-market and find new ideas'. Other studies find that both formal and informal knowledge and technology transfer from academia to industry are important with respect to innovation performance (e.g. Grimple and Hussinger 2013). Also investigating university–industry collaboration, Bruneel *et al*. (2010) find that previous experience of collaboration and greater levels of trust help lower collaboration barriers with both SMEs and large companies. Further benefits of university-industry interaction include the ability to enhance absorptive capacity to exploit new and existing knowledge (in terms of products, processes and cost savings) by improved organisation and structure of knowledge transfer and quality of human capital (Bishop *et al.* 2011).

In summary, although most studies in university-industry collaboration discuss long term research and technology projects, there is a recognition of diversity in types of relationship and collaboration focus, and the benefits they bring to industry, including in innovation activities.

2.2 Knowledge and technology transfer

A recent survey and interviews aimed at developing an inter-organisational knowledge transfer framework for SMEs (Chen *et al.* 2002) states that SMEs recognise the need for more external and internal knowledge of best practices and processes. In addition, the activity in which they see the greatest need to become involved in is to develop a strategy to obtain more information on customers, suppliers, competitors and other organisations. A review article of knowledge management (KM) practices in SMEs (Durst & Edvardsson 2012) reviews six studies, four concerning companies in the UK, one in Italy and Switzerland, and one looking specifically at internationalising SMEs. The main findings from the six studies show that the characteristics of the SME are important, but that knowledge sharing is most beneficial for SMEs that particularly wish to grow and innovate.

Building on these knowledge transfer needs, the pilot requires an analytical framework within the chosen context. So what are the key factors to take into account to be able to study a knowledge transfer process between a university and an SME with the aim of improving innovation?

Shin *et al*. (2001) state that 'Knowledge flow in an organization is fundamentally driven by communication processes and information flows'. Drawing upon reviews of the innovation literature, they suggest that knowledge flow is most likely to be influenced by four factors: knowledge transferred, source, recipient and context. At an inter-organizational level, Rebentisch & Ferretti (1995) discuss a knowledge asset-based view of technology transfer in international joint ventures in terms of transfer scope, transfer method, knowledge architecture and organizational adaptive ability. Researchers and practitioners interested specifically in the dynamic process of technology transfer have also identified a number of factors for success (e.g Souder 1987; Souder and Padmanabhan 1989). These include the nature of the technology, the characteristics of the giver and receiver, the nature of the communication or relationship between them and the organizational context.

The studies above are not all SME specific. However, looking at the literature on SMEs reveals a similar focus on barriers and enablers for knowledge transfer. An input from the food sector (Braun & Hadwiger 2011) lists challenges of knowledge transfers to SMEs and suggests that these result in sub-optimal exploitation of publicly-funded research in Europe. Drawing upon their experience and knowledge of the literature, they bring together practical process steps to ease knowledge and technology transfer, which could apply to a wide range of University-SME collaborations. The first step is seen as working to build initial trust between the two parties. It is suggested that it is necessary to establish the willingness of the donor to share knowledge and clarify appropriate rewards, as well as checking the willingness of the receiving entity to accept and work with a new process, to be open to new circumstances and to have a commitment to the project. In addition, drawing up a collaboration agreement may help with practical arrangements e.g. on what will

happen if there is a staff change. The practical next steps include ensuring that the donor entity processes the knowledge to make it understandable for non-specialists and in particular for the target entity. This may include translating or interpreting the knowledge. It is suggested that extensive workshops are held to communicate material and that the need to provide intensive assistance to the receiving partner may be necessary, possibly through use of intermediaries such as trade association facilitators and building industry networks of associations, researchers and consultants.

In summary, there is evidence from studies on knowledge transfer between universities and companies, including some on SMEs, which provide guidance on how to structure and support a transfer process. These elements can be used to build the framework for the pilot study.

2.3 Coaching and training for SMEs

What is the difference between coaching and training for SMEs? Executive coaching is generally seen as a one to one interaction between a coach and a member of the SME management team (e.g. Gray & Goregaokar 2008). Training is often either in-company involving a larger number of employees or run as open courses involving one or two employees from a range of companies. We argue that for SMEs, especially when the knowledge to be transferred is broad and strategic in nature, involving a small group of senior executives in workshops that focus on the current situation in the firm, is more aligned to team coaching than group training. As in sport, the members of the management team have different roles to play and knowledge to contribute, and strategy and innovation interventions are likely to be more productive and useful with their inclusion and more likely to promote behavioural change.

The importance of face to face interactions in transferring knowledge to SMEs and to promote learning is discussed by a range of authors. Alstrup (2000) discusses the role of the facilitator in coaching continuous improvement (CI) in small enterprises. Her research suggests that, "in order to create a climate of confidence, consultants hired as external coaches to support CI activities must, on the one hand, respect the owner-manager's need of sovereignty and the short-term, "flexible", style of the small enterprise. At the same time, their role is also to support the long-term learning process. This requires these consultants to strengthen their abilities not only to cope with different and often unforeseen situations, but also to balance short-term and long-term issues".

It can be seen that coaching also supports action learning i.e. using questions to stimulate the development of solutions and actions by participants, and Leitch *et al*. (2009) describe having approaches using 'set facilitators' who leave after the set of people and their aims are established. This echoes the format of short term coaching workshops, where the facilitator introduces and supports the first application of the tool but the context and ownership of the work belongs to the SME management group. Reflection on the role of technology translators between the knowledge base and SME prompts Iles & Yolles (2002) to consider the process following the initial knowledge migration. They see this as involving both knowledge accommodation and knowledgeable action before leading to results within an organisation.

2.4 Evaluation of learning – assessing the impact of the study

The chosen mode of interaction is via coaching and training SMEs which raises the issue of assessment. The 4 level Kirkpatrick (1994) model is widely used in the training world (Paige 2002; Guskey 1998) and aims to measure the impact of training by way of measured change in behaviour and business results.

The 4 levels work as follows (see Figure 1):

Level 1: Reaction - to what degree participants react favourably to the learning event

Level 2: Learning - to what degree participants acquire the intended knowledge, skills and attitudes base on their participation in the learning event.

Level 3: Behaviour - to what degree participants apply what they learned during training when they are back on the job

Level 4: Results - to what degree targeted outcomes occur, as a result of the learning event(s) and subsequent reinforcement

Levels 1 and 2 are essentially the 'feedback sheets' done at the end of a course. Levels 3 and 4 are longer term and happen when the participants return to the workplace. Some of the types of questions look at knowledge before and after or ask participants to score their confidence in using something themselves or teaching others about it.

From every coaching or training workshop there is a level of learning achieved and a level of willingness (or ability) to action the output for a defined business result (or impact). The Kirkpatrick model approach requires you to start the development of the training with the end point in mind i.e. what improvement do you want, therefore what difference in behaviour, attitude, skills do you need, therefore what is the nature of the coaching, training or development you need to put in place, which defines the coaching interaction or training course.

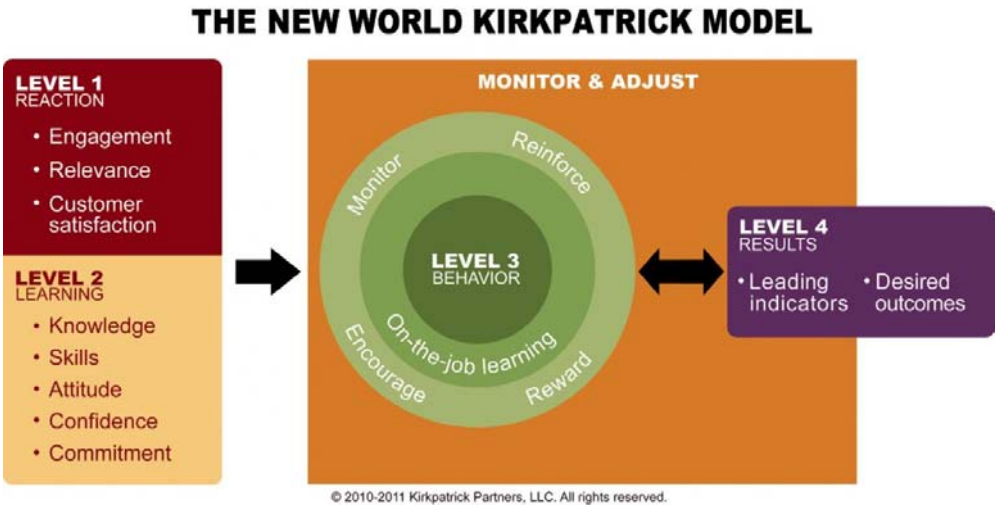

Figure 1. The New World Kirkpatrick Model (1994)

2.5 Gaps identified/focus

The literature often focuses on long term technical projects between large companies and universities (Bishop et al., 2011). Such studies rarely focus on manufacturing SMEs. Those that do lack the granularity to shape support and policy that might help SMEs to perform better. This work looks in a structured manner at 10 companies in action to see how the knowledge transfer process can be made more effective in the business innovation field and to what extent coaching can be considered an effective form of inbound open innovation in this situation.

In particular the aim is:

- To establish whether the companies have improved their innovation activities in the time period examined?
- To explore what limits and enables effective knowledge transfer from academia to SMEs?
- To understand why coaching helps SME's innovation activities more than transfer via other methods (e.g. from open courses or online tools)?
- The details of how companies are achieving their reported impact in improving their innovation activities?

3. Design/methodology/approach

The overall aim of the OI pilot is to explore what limits and enables effective knowledge transfer from academia to SMEs and propose possible solutions and improvements in current practice.

The pilot involves working with 10 SMEs to explore and map knowledge transfer in the form of direct one to one coaching engagements from academia to industry. In addition a comparison/control has been carried out with an open course.

3.1 Knowledge transfer

There are three main elements identified in the literature – the packaging of the knowledge, the facilitator and the process of knowledge transfer. The packaging of the knowledge was done in the form of tools (specially designed templates and/or questionnaires along with defined procedures for their application). The facilitators are experienced and have industrial backgrounds. They have worked extensively with the researchers who generated the original forms of the tools to ensure they are fit for purpose. The tools and procedures have been refined through repeated application by a range of facilitators. The packaged knowledge in this pilot are strategy and technology management tools, which have been developed through research. The primary process or mode of transfer of these tools is through their application in a workshop setting, to the SME's own business context. The main tools are: Prioritisation, Strategy, Marketing planning, Portfolio selection and Roadmapping, as described below and in the examples in Figure 2.

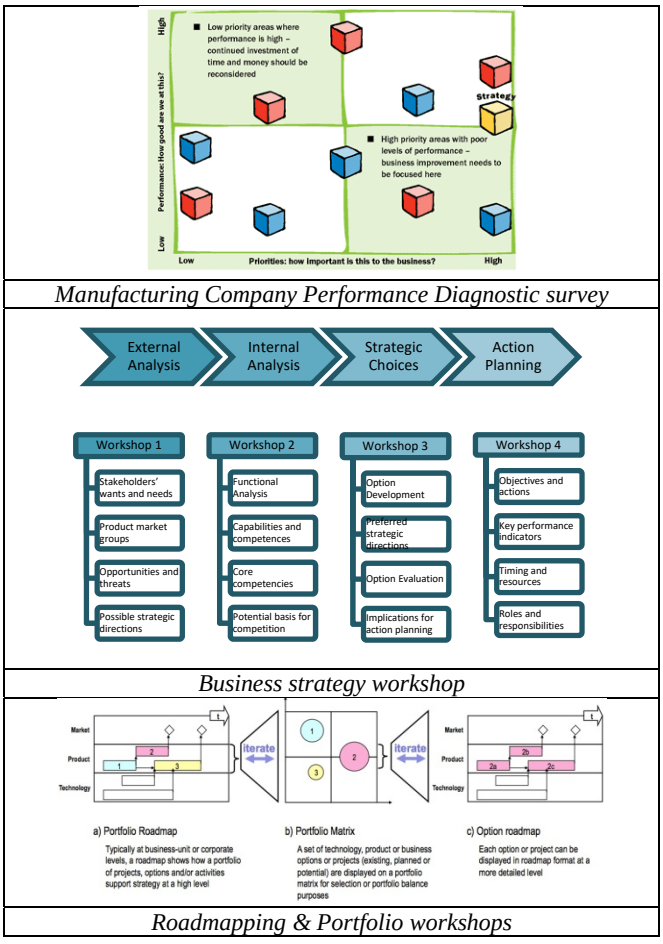

Figure 2. Examples of tools used in pilot

Prioritisation tool: This identifies business priorities and analyses performance across the business by means of interviews with senior managers and functional leaders. The findings are presented at a workshop and reviewed in detail with the management team. These results are graphically represented and easy to understand, providing a powerful communication tool which helps to build communication and consensus across the business and enables managers to compare their priorities with their colleagues (Ford *et al*. 2005a; Ford *et al*. 2005b).

Strategy tool: This fast and effective approach to business strategy development results in a clear vision for the future of the business, a shared understanding of which markets and product groups to focus on, the competitive position within those markets and a prioritised set of capability development projects. The process has four key steps, using a structured

yet creative approach to generate and review ideas leading to the identification of clear strategic options and a shared ownership of – and commitment to – the direction the company should take (Platts 1995; Platts 2005; Tan & Platts 2005).

Marketing planning tool: This helps companies take a systematic approach to market analysis and strategic marketing planning, and the allocation of resources and activities. This is achieved by taking a modular approach that breaks down the process into manageable components that can be combined and configured to the business's requirements (Dissel *et al.* 2009; Probert *et al*. 2013; Ilevbare 2015).

Portfolio selection tool: This provides a company with a standard set of criteria for ranking projects and selecting an appropriate portfolio. The criteria, grouped broadly into 'opportunity' criteria and 'feasibility' criteria, are customised during a workshop for a company based on its circumstances. This can then be used to compare projects and plan a way forward (Mitchell *et al*. 2014; Mitchell *et al*.2018; Farrukh *et al.* 2014).

Roadmapping: This is a powerful technique that has become integral to creating and delivering strategy and innovation in many organisations. The graphical and collaborative nature of roadmaps supports strategic alignment and dialogue between functions in the firm and between organisations. The power of roadmapping lies in its flexibility, which can provide clarity and alignment of specific needs at all levels, including functional, organisation-wide and even collaboration between organisations (Phaal *et al*. 2001; Farrukh et al. 2003; Phaal *et al*. 2004; Phaal *et al*. 2010).

3.2 Assessment of interaction

Based on the literature and S2S programme objectives, a summary framework for assessment and two question-based frameworks were developed to assess the results from the point of view of the SME: Part 1 (30 questions) to measure immediate impact and Part 2 (17 questions) to measure longer term impact 3-6 months later. The frameworks cover generic company data and the four assessment levels using the Kirkpatrick (1994) training evaluation model: reaction, learning, behaviour change and results. The summary assessment framework is shown in Table 1, while the details of the questions are shown in Tables 2 & 3. Each question is scored 1-5 with scaling statements present for scores of 1, 3 and 5 to guide responses.

Table 1. Summary framework for assessment of interaction

Framework Part 1 – immediate feedback after workshop				
Impact	**Company data Q1-12**	**Feedback on Process Q13-21**	**Feedback on Tool Q 22-25**	**Feedback on Facilitator Q 26-30**
Generic	Generic baseline	Generic		
Level 1		Reaction - customer satisfaction	Reaction – engagement Reaction - relevance	Reaction – customer satisfaction
Level 2		Learning - knowledge		

Framework Part 2 – feedback after 3-6 months				
Impact	**Company data Q1-11**	**Feedback on Process Q12-17**	**Feedback on Tool Q12-17**	**Feedback on Facilitator n/a**
Generic	Generic change in baseline			
Level 3		Behaviour	Behaviour	
Level 4		Results	Results	

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Table 2: Framework Part 1- Question set for immediately after the Engagement/Workshop

Questions about the company					
Company questions – Generic	**1**	Year company was established	**7**	Investments on facilities (over the past 1 year)	
	2	Number of employees	**8**	Number of collaborations or projects established with outside organisations	
	3	Annual Revenues	**9**	Awareness of importance of Management techniques	
	4	Gross profit	**10**	Number of people in management team	
	5	Investments on R&D (in the past 1 year)	**11**	MD experience outside company (previous employment)	
	6	Investments on new equipment (in past 1 year)	**12**	Management team experience outside company (previous employment)	
Questions about the process			**Questions about the tool**		
Process questions – Generic	**13**	Was the length of the process correct?	**Level 1: Reaction - Engagement**	**22**	I found the tool engaging
	14	Was the process easy to follow/ understand?		**23**	Was the structure/sequence of the tool good?
	15	Was the process structured or appropriately to achieve outcomes (i.e. enough guidance or too open ended)?		**24**	Was the language used appropriate?
	16	In your view, were the objectives of the process achieved?	**Level 1: Reaction - Relevance**	**25**	Tool easy to follow/understand - I understood the purpose of the tool
Level 1: Reaction- Customer Satisfaction	**17**	I received helpful information prior to the process/workshop	**Questions about the facilitator**		
	18	I found my participation worthwhile	**Level 1: Reaction - Customer Satisfaction**	**26**	Facilitator knowledge
	19	I would recommend this process/workshop to other organisations		**27**	Ability to provide examples/clarifications
Level 2: Learning Knowledge	**20**	I believe the output of the process/workshop is important to succeeding as an organisation		**28**	Neutrality
	21	The workshop provided useful insights		**29**	Organised/disorganised
				30	The facilitation style of the consultant contributed to my experience

Table 3: Framework Part 2- Question set for 3-6 months after the Engagement/Workshop

Questions about the company										
Company questions -Generic	**1**	Number of employees	**6**	Investments on facilities						
	2	Annual Revenues	**7**	New products developed						
	3	Gross profit	**8**	New processes implemented						
	4	Investments on R&D	**9**	New markets entered						
	5	Investments on new equipment	**10**	New services deployed						
Questions about the process & tool			**1**		**2**	**3**	**4**	**5**		**N/A**
Level 3: Behaviour	**11**	Since the initial workshop(s), have any of the company's behaviours changed in a way that positively enables or influences your strategy?	No change in behaviour			Some changes have been made but additional changes are required		Major behavioural change		
	12	Do you now have a clearer picture of your goals and expectations as a result of the process?	The goals are still unclear			Some clarity has been obtained		Major behavioural change		
	13	Are you applying what you learnt during the workshop(s) to your work?	I have not applied anything to my work			I have applied some new knowledge to my work		I have applied a lot of new knowledge to my work		
	14	Is anything being done differently as a result of the workshop(s)?	Nothing			Some small changes have been introduced		Some major initiatives have started as a result of the workshop		
Level 4: Results	**15**	Are there any positive results or impacts that result from the workshop(s)?	No positive results have been noticed			Some positive results have been noticed		Many/all positive results have been noticed		
	16	Are there any measures / KPIs linked to your strategy as a result of the workshops?	No new link between KPIs and strategy			Some KPIs linked to strategy but not all		Very clear link between KPIs and strategy		
	17	To what degree do you expect targeted outcomes to occur as a result of the workshops?	No targeted outcomes will occur			Some targeted outcomes will occur		Many/all targeted outcomes will occur		

3.3 Measures

The assessment looks at the success of knowledge transfer in terms of process measures and output measures.

The process measures are reaction (level 1) and learning (level 2) data which are combined to give success factors, bottlenecks and hurdles, and practicability.

The output measures used are 3 specific KPIs: a. innovativeness (number of new products, services, processes, markets), b. growth (% increase in number of employees and/or turnover and/or profit) and c. output effectiveness (results and customer satisfaction), which are derived from differences in the generic company data collected at the workshop and 3-6 months later, combined with the behaviour (level 3) and results (level 4) data.

In addition, there is a plan to undertake an additional interview step in order to give more in-depth insight into how the improvements were made. This will provide descriptive details on the level 3 and level 4 scores.

4. Results

Results of the pilots are currently being analysed to understand how coaching as a form of inbound OI helps SMEs to learn and improve, and propose possible solutions for improvements on current practice. The framework is being used in two situations, one to one coaching (Part 1 & 2) and open courses (Part 1).

4.1 One to one coaching for single companies - 10 SMEs in total

The assessment framework (Parts 1&2) is being used to structure the data capture from tool application with each of the 10 SMEs. The main tools used have been the prioritization and strategy tools. The coaching environment means the whole time is spent working with company data to give company specific insights. Table 4 show the SMEs that took part in the pilot, the tools used and the facilitators leading the engagement.

Table 4. Companies in coaching pilot

Company	Type	Country	Size (people)	Year formed	Tools used	Facilitator
1	Precision contract manufacturer	UK	70	1998	Prioritisation	A
2	Scientific instrument sales/distribution service provider	UK	10	2003	Marketing planning	B
3	Electronics enclosures	UK	70	1987	Prioritisation & Strategy	C
4	Control systems	UK	43	1986	Prioritisation & Strategy	C
5	Machining	UK	75	1994	Prioritisation & Strategy	C
6	Machining	Austria	75	1994	Prioritisation & Strategy	D
7	Technology consulting service provider	Austria	6	2014	Prioritisation, Portfolio selection & Strategy	D
8	Industrial machines & tools	Austria	13	2010	Prioritisation	D
9	Design & building cutting machines	UK	28	1965	Roadmapping	E
10	R&D consultancy	Spain	23	1987	Prioritisation	A

4.2 Open course for small group of companies – 20 SMEs in total, one day course

The assessment framework (Part 1) was used in conjunction with a one day open courses with a small group of SMEs. The tools used have been Portfolio selection and the Marketing planning toolkit. There is less engagement with the companies own situations, as smaller amounts of sample data are taken from each company present to demonstrate method in the wider multi-company group.

4.3 Analysis

To answer the questions identified following the literature review, see below and Tables 5-7.

4.3.1 KPIs

To establish whether the companies have improved their innovation activities in the time period examined (3-6 months or up to one year)? This is done by looking at the coached companies results against the main KPIs. These were calculated from the generic data collected before and after the workshops. The measures are a. Innovativeness, b. Growth, and c. Output effectiveness. So far data has been received from a small number of companies but full results will be collected by the end of the year. See Table 5.

Table 5: KPI Data collected to date for pilot companies

A. Innovativeness (*after 1 year)

Innovativeness metrics	Zero (0)	1 to 2:	3 or more
New products		1*	
New services		2	
New processes			3*
New markets			4*

B. Growth

Growth metrics	Less than 1%	1% - 5%	More than 5%
No of employees		1.1%	
Turnover increase	-		
Profit increase	-		
Contribution/ employee	-		

C. Output effectiveness

Output effectiveness metrics	Score 1-2	Score 3	Score 4-5
Are there any positive results/impacts as a result from the workshop/engagement		3.9	
Are there any measures/KPIs link to the company strategy as a result of the workshop?		3.8	
To what degree do we expect targeted outcomes to occur as a result of the workshop / tool			4.4

4.3.2 Scoring of tool, process and facilitator

To explore what limits and enables effective knowledge transfer from academia to SMEs? This is done by looking at the success factors and obstacles or bottlenecks by looking at the **scoring** given to the following aspects in effective coaching of the 10 SMEs: the way knowledge is packaged (the tool), the knowledge transfer process, and the facilitator. See Table 6 for details of the four main success factors and hurdles.

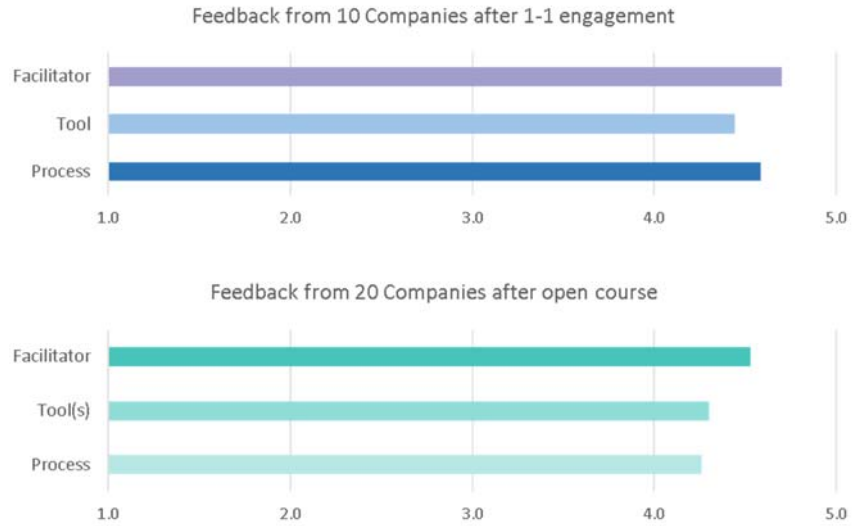
Table 6: Success factors and hurdles from scoring in process, tool and facilitator

Success factors (above average scoring in category)	**Bottlenecks and hurdles (below average scoring in category)**
The process was easy to follow/understand (4.8/4.6 av. process) Process design that is time efficient and enables a clear path and analysis between data input, data output and decisions	*I received helpful information prior to the process/workshop (4.1/4.6)* More emphasis needs to be placed in explaining upfront what is required from an SME in terms of data and time and examples of potential outputs.
I found my participation worthwhile (5.0/4.6 av. process) Participants having the opportunity to express their views in a neutral environment	*I found the tool engaging (4.2/4.4)* More emphasis needs to be placed on the tool design, and ease of use, without expecting users to use complicated instructions.
The language used was appropriate (4.7/4.4 av. tool) Minimisation/elimination of academic jargon and terminology	*I believe the output of the process/workshop is important to succeeding as an organisation (4.4/4.6)* Also relating to point one above, where expected outputs should be clear upfront with examples, case studies etc. Also there is a time lag for tangible outcomes to be realised, so managing expectations is critical.
Facilitator knowledge (4.9/4.7 av. facilitator) Facilitators who have industry experience and can relate to real business issues. They also have the ability to offer several examples to clarify concepts.	*The workshop provided useful insights (4.4/4.6)* Insights are normally reached after sufficient reflection time, so consideration needs to be provided as how to achieve this.

4.3.3 Coaching

To understand why coaching helps SME's innovation activities more than training via open courses? The **role** of the following aspects in effective coaching of SMEs: the way knowledge is packaged (the tool), the knowledge transfer process, and the facilitator. This is done by comparing **scores** from coaching with **scores** from open courses. See Figure 3.

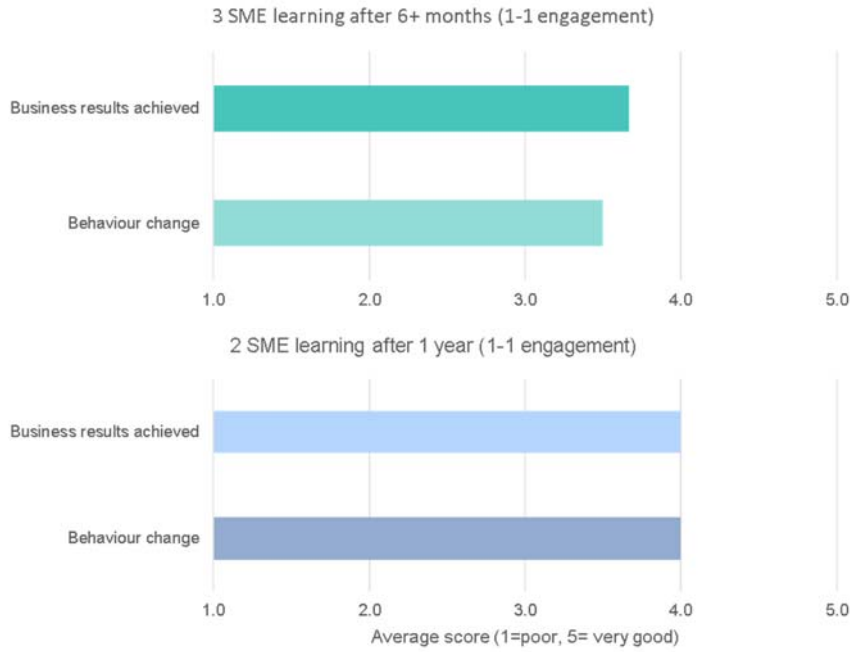
Figure 3: SME scores from 1-1 engagement and open course



4.3.4 Behaviour and results

The details of how companies are achieving their reported impact in improving their innovation activities? This is assessed by looking at the positive changes in behaviour and results evident in the longer term assessment of the interaction. Outline results for 3 SMEs are shown below but we also plan to collect more descriptive data in support of this performance data. See Figure 4 which compares data collected so far from this project (3 SMEs) with results from another similar project (2 SMEs) over a longer time period.

Figure 4: SME Learning after 6-12 months



5. Discussion

This work is looking in a structured manner at 10 companies in action to see how the knowledge transfer process can be made more effective in the business innovation field and to what extent coaching can be considered an effective form of inbound open innovation. The summary insights from the analysis to date are shown below. In addition while there is further work to be done, in terms of completing the data collection and finalising the results, there are some preliminary recommendations for improving the process and summarised benefits for all the partners involved in this type of interaction, whether RTOs, academics or SMEs.

5.1 Insights from analysis of the tool-based knowledge transfer process

5.1.1 KPIs (generic data and level 4)

To establish whether the companies have improved their innovation activities in the time period examined.
The results with respect to the Innovativeness and Growth KPIs are encouraging but more data is needed before comparisons with the original base line can be made. The scoring for Output effectiveness is highly positive.

5.1.2 Scoring (levels 1 and 2)

To explore what limits and enables effective knowledge transfer from academia to SMEs.
The preliminary results suggest that to be effective, the process must be time efficient and the tool must have inherent logic, however, it can be seen that the facilitator is an integral part of the picture. Companies need to be convinced that the facilitator is credible, they value an interaction that has depth and breadth of experience and includes relevant examples of what other companies have done. The facilitator needs to explain not only the tool and the ordering of the activities to participants but also to ensure they are able to see immediate value and learning opportunities.

5.1.3 Coaching (levels 1 and 2)

To understand why coaching helps SME's innovation activities more than transfer via other methods.
The results for direct coaching appeared stronger than the results for the open course training. Looking at the open course scoring, the facilitator and tool scored well, but the process was lower, which would suggest that the Level 2 learning achieved was lower. Although data on changes in behaviour and results are not collected for this group to date, lower levels might be expected there too.

5.1.4 Behaviour and results (levels 3 and 4)

The details of how companies are achieving their reported impact in improving their innovation activities.
Only a small amount of follow up data has been collected to date, but the scoring for behaviour and results is high. The intention is to supplement the data collection with interviews to obtain more qualitative details.

5.2 Recommendations for improving the tool-based knowledge transfer process

5.2.1 Success factors and enablers

The main success factors and enablers for a one-to-one knowledge transfer process to SMEs were:

- The facilitators should have industry experience so that they can relate to real business issues. They should also have the ability to offer several examples to clarify concepts. The facilitators should also combine good academic knowledge and credentials to be able to engage with the academic community, understand the new knowledge to be transferred and facilitate the knowledge packaging in appropriate forms.
- The knowledge transfer process needs to be designed to be time efficient, to follow a clear logic and facilitate a clear analysis between data input, data output and decisions.
- The participants should have the opportunity to express their views in a neutral environment.
- There should be minimization or ideally elimination of academic jargon and terminology.

5.2.2 Bottlenecks and hurdles

The main bottlenecks and hurdles for a one-to-one knowledge transfer process to SMEs were:

- Initial lack of understanding by the SME as to what the potential outputs from the process will be and the possible business benefits. More emphasis needs to be placed in explaining upfront what is required from an SME in terms of data and time and examples of potential outputs.
- Related to the previous point, information should be provided upfront with examples, case studies etc. of the potential business benefits an SME could achieve by engaging in such an activity. Also, there is a time lag for tangible outcomes to be realised, so managing expectations is critical.
- More emphasis needs to be placed on the tool design, and ease of use, without expecting users to follow complicated instructions.
- Insights are normally reached after sufficient reflection time, so consideration needs to be provided as how to achieve this.

5.2.3 Barriers for open courses

The barriers for knowledge transfer through open courses (i.e. multi-company) were similar to those for one-to-one (facilitator-company) interactions but with important differences:

- Generally, more time was required for learning and reflecting on new material, as the examples and cases provided are generic and not immediately related to specific company issues.
- SMEs still require a lot of information in advance of the open course to explain the expected learning outcomes, providing examples of potential outputs and relevant case studies.

5.2.4 Recommendations

Hence the main recommendations are:

- RTOs need to employ facilitators who combine both academic credentials (in order to understand the research knowledge and methodologies) and industrial experience (in order to gain the trust of the SMEs).
- The knowledge transfer process needs to be time-efficient ideally implemented in small steps of a maximum of one day duration for each step.

- Tools are an important element of the transfer process as they codify and summarise the academic knowledge in a suitable form. The tool development is an iterative process that requires both the academic and the practitioner to **work together** over a period of time; it also needs to involve SMEs in the pilot phase to ensure relevance.
- The tools that are used for the transfer process need to be user-friendly, possibly "self-facilitating" with minimum academic jargon.
- The transfer process needs to allow sufficient reflection time for the SME team for refinement and alignment before decisions are made.
- Engage participants into the process by asking them to provide data, analyse information, use the tools and make decisions, etc.
- Explain in advance what outputs are expected, in what format and within what timeframe and manage expectations.

5.3 Benefits for partners in applying the tool-based knowledge transfer process

5.3.1 RTOs

The main benefits for RTOs when applying the approach of this pilot were:

- Easy to organise engagement (most SMEs do not require NDAs, framework agreements and complex contracts)
- Access to a large number of companies
- Can develop deeper understanding of industrial needs quicker
- Can test and validate academic models and tools faster

5.3.2 Academics

The main benefits for academics when applying the approach of this pilot were:

- Enhance their knowledge about innovation management
- Access to a large number of companies that could be used as case studies

5.3.3 SMEs

The main benefits for SMEs when applying the approach of this pilot were:

- Have custom-made and focused improvement plans that address their specific needs
- Grow their business without increasing costs
- Focus on real growth (jobs and revenues) rather than just productivity output

6. Conclusions

This work is looking in a structured manner at 10 SME companies in action to see how the knowledge transfer process can be made more effective in the business innovation field and to what extent coaching can be considered an effective form of inbound open innovation. Although we are still collecting some of the longer term data, so some of our analysis is preliminary, the current points are apparent:

- SMEs are important for employment and growth in EU. They make up over 99 % of all enterprises, account for around 66% of total employment, and contribute 57% of value added in the EU.
- Innovation management is an integral part of strategic thinking in firms, but there is a lack of practice-based knowledge about innovation management in smaller firms. This pilot explored in a structured manner the business process knowledge transfer process to SMEs, the aspects that influence the transfer, the enablers and barriers that can facilitate or reduce its effectiveness and to what extent coaching can be considered an effective form of inbound open innovation.
- Three key dimensions of business process knowledge transfer to SMEs were investigated: the actual transfer process, the facilitator and the tools used to package and deliver the academic knowledge. This pilot supports the important role the one-to-one knowledge transfer process has for SMEs and highlights the key role that experienced facilitators, who combine both academic knowledge and industrial experience, play in the process.
- Both the tools and the transfer process need to be designed to be SME-friendly and respect the limited time SMEs normally have to engage in knowledge exchange activities. Although the data collected on behavior change and business results is not extensive, initial indications show that the SMEs need time to reflect, learn

and implement changes in their business. Any coaching and knowledge transfer process will need to need to allow sufficient time for SMEs to implement the learnings and achieve positive change.

- Although one-to-one engagements are a useful knowledge transfer method for SMEs, these are not easily scalable. Open courses could be used as a reasonable and more scalable alternative. For open courses tools become more important and should be designed to be "self-facilitating" and incorporate suitable explanations and examples to aid SME learning.

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