Blueprints - SME-University knowledge transfer
University – Industry Interaction Mechanisms 2.0
SME-University knowledge transfer

Improving 1-to-1 knowledge transfer between Universities and SMEs

PROJECT TEAM – SME-UNIVERSITY KNOWLEDGE TRANSFER

IfM-ECS
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SMEs play a very important role in the EU economy. Boosting direct knowledge transfer from universities to SMEs can improve an SME’s business excellence and substantially contribute to EU competitiveness. SMEs have particular requirements from any intervention. The methods used need to be resource- and time-efficient and SMEs usually need to see a direct financial return on any investment. If these criteria are met, this classical open innovation approach can be successfully applied.

This pilot seeks to understand the relevant factors influencing the direct knowledge transfer process (e.g. simplicity of methods, time efficiency of process, trust in facilitator) and find ways to refine them.
UNIVERSITY KNOWLEDGE TRANSFER

STEP 0
Tool development

- Academics conduct extensive research and generate knowledge in terms of publications, case studies etc.
- RTOs work together with academics to codify this knowledge in the most appropriate form (tool) e.g. questionnaires, management frameworks, charts, workshop processes, training courses etc.
- RTOs work together with academics to pilot this tool to several SMEs (3-5) to test and refine it [1].
- RTOs and academics validate the applicability of the tool in multiple sectors and types of companies (with additional 3-5 pilot applications).
- **Decision:** RTOs and academics agree for the readiness of the tool to be applied wider.
- RTOs draft training material for facilitators and supporting documentation to enable the wider application of the tool.

MAIN ACTORS

- University
- RTO
- SMEs

ENABLING ELEMENTS

- Clear problem statement
- Academic theory
- Charts
- Learning outcomes
- Case studies etc.

TIMEFRAME

6-12 months

Example of new research co-developed and converted into a tool

Developing scoring criteria for prioritising innovation projects

<table>
<thead>
<tr>
<th>Opportunity criteria</th>
<th>Opportunity criteria</th>
<th>Opportunity criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can we make more money?</td>
<td>Synergies across business</td>
<td></td>
</tr>
<tr>
<td>Can we sell it?</td>
<td>Size of market (available to us)</td>
<td></td>
</tr>
<tr>
<td>Synergies across business</td>
<td>Market growth potential</td>
<td></td>
</tr>
<tr>
<td>Size of market</td>
<td>Market profitability (margins in the market)</td>
<td></td>
</tr>
<tr>
<td>Market growth potential</td>
<td></td>
<td></td>
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<tr>
<td>Market profitability (margins in the market)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competitive intensity in the market</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opportunity to enter new market</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry maturity / readiness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exclusivity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear customer need</td>
<td>Learning</td>
<td></td>
</tr>
<tr>
<td>Platform for growth</td>
<td>Clear customer need</td>
<td></td>
</tr>
<tr>
<td>Future synergies with other operations</td>
<td>Platform for growth</td>
<td></td>
</tr>
<tr>
<td>Sustainability of competitive advantage</td>
<td>Future synergies with other operations</td>
<td></td>
</tr>
<tr>
<td>IP – can we protect / exploit it?</td>
<td>Business simplification</td>
<td></td>
</tr>
<tr>
<td>Cost reduction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cannibalise existing business</td>
<td>Cost reduction</td>
<td></td>
</tr>
<tr>
<td>Business simplification</td>
<td>Cannibalise existing business</td>
<td></td>
</tr>
<tr>
<td>Learning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPV&gt;0 or other mutually exclusive alternative</td>
<td>Additional contribution to the same customer</td>
<td></td>
</tr>
<tr>
<td>Where the company can offer a differentiated product</td>
<td>Adding value to service offering</td>
<td></td>
</tr>
</tbody>
</table>

**DIMENSION**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOLUME</td>
<td>Market size</td>
</tr>
<tr>
<td></td>
<td>Our sales potential in a given time</td>
</tr>
<tr>
<td></td>
<td>Synergy opportunities</td>
</tr>
<tr>
<td></td>
<td>Customer benefit</td>
</tr>
<tr>
<td></td>
<td>Competitive intensity in Market</td>
</tr>
<tr>
<td>MARGIN</td>
<td>Margin, or benefit per unit</td>
</tr>
<tr>
<td></td>
<td>Business cost reduction or simplification</td>
</tr>
<tr>
<td></td>
<td>Industry/market readiness</td>
</tr>
<tr>
<td>PLATFORM FOR FUTURE BENEFIT</td>
<td>Market growth</td>
</tr>
<tr>
<td></td>
<td>Future Potential</td>
</tr>
<tr>
<td>INTANGIBLES</td>
<td>Learning potential</td>
</tr>
<tr>
<td></td>
<td>Impact on Brand Image</td>
</tr>
<tr>
<td></td>
<td>Impact on key customer relations</td>
</tr>
</tbody>
</table>

**Reference:** Mitchell et al, 2014
Tool development is an iterative process that:

- Requires both the researcher and the practitioner to work together over a period of time;
- Requires a minimum of 5-10 company pilots to test a tool's stability and effectiveness;
- It needs to demonstrate a clear logic about the inputs required and the outputs delivered; When a tool contains a series of different steps or is composed of different, independently developed tools this becomes critical;
- Often requires changes to the tool structure or delivery process to make it useful and effective.
Facilitators attend an in-house course led by the academic and/or the lead practitioner from the RTO who co-developed the tool with the academic.

The course highlights the key research and theory behind the tool and the steps to be followed when applying the tool.

A facilitator supports the lead practitioner into real company engagements (minimum 2 engagements where the lead practitioner leads and the facilitator supports).

The facilitator leads a real company engagement (minimum 1 engagement where the facilitator leads and the RTO lead practitioner supports).

**Decision:** The RTO lead practitioner agrees if the facilitator is ready to lead new engagements or additional practical experience is required.

Regular in-house courses are established for all trained facilitators to update their knowledge with new practices and theory.

### MAIN ACTORS

- University
- RTO

### ENABLING ELEMENTS

- Facilitators’ guide including theory
- Sequence of application steps with notes
- Case studies, examples etc.

### TIMEFRAME

6-12 months
Facilitator training is a continuous process that aims to:

- Enhance a facilitator’s knowledge of the key aspects of the background research, engagement method and tool application.
- Ensure facilitator’s neutrality and objectivity by reducing or removing any bias and assure SME that any action plan relates directly to the company’s most important needs.
- Ensure that a facilitator follows a clear Quality Assurance process that maintains the integrity of the research and enhances the SME’s experience and engagement in the process.
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STEP 2
Engagement with SME and proposal development

- Start conversations with an SMEs management team.
- Understand the issue(s) an SME may be facing and discuss an appropriate engagement process and suitable tools.
- Draft a proposal for the engagement.
- Decision: Proposal is accepted by both organisations.

MAIN ACTORS
- RTO
- SMEs

ENABLING ELEMENTS
- NDA (if applicable)
- Proposal including scope of work and timeline

TIMEFRAME
2 months
The tool application and the sequence of applying different tools depends on the particular issue(s) the SME is facing. Some of the most commonly used tools have been the following:

- **Business diagnostic** – assessing the company’s performance, prioritising the most important issues and delivering an action plan.

- **Business strategy** – understanding the company’s ambitions, competitive position and core capabilities, different operating options and develop and action plan for achieving an agreed “chosen future”.

- **Innovation for SMEs** – generating and prioritising innovation options and associated projects plans for growth.
# Company examples of tool(s) application

<table>
<thead>
<tr>
<th>FOOD MANUFACTURER</th>
<th>SHEET METAL BUSINESS</th>
<th>HOSPITALITY BUSINESS</th>
<th>CONSTRUCTION MATERIALS COMPANY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PROBLEM</strong></td>
<td>On-time delivery performance typically 50%</td>
<td>Lack of coordination between sales and shop floor on due dates and priorities for work-in-progress</td>
<td>Company just breaking even – needed to grow but unsure how to do this</td>
</tr>
</tbody>
</table>
| **STEPS TAKEN**   | • Analyse pattern of demand for each product  
• Create production schedules to match this demand  
• Introduce ongoing reviews of sales forecasts | • Created a schedule showing plan and progress of all jobs  
• Schedule available to office and shop floor  
• Orders received are loaded into schedule | • Strategy workshops identified different customer groups with varying needs  
• Range of product solutions created to suit each customer group with appropriate price and service levels  
• Internal processes restructured to channel most effort into premium customer | • Assessment undertaken of the company's skills, facilities and technical abilities  
• Strategy workshops identified potential new markets  
• New market chosen and appropriate product development using existing skills and facilities |
| **RESULTS**       | • 99.5% on time delivery  
• Reduced overtime costs  
• Dramatically reduced stress levels | • On-time delivery improved significantly  
• Newly-arrived urgent jobs completed more reliably | • Revenue doubled in one year  
• New staff taken on  
• Profits increased | • New product launched  
• Land acquired for new facilities  
• Staff numbers expected to grow |
EVALUATION AND FEEDBACK

- Normally feedback is collected from the SME immediately after the engagement.
- The feedback is typically in the form of a questionnaire that contains questions around the pre-engagement activities, the value to the participant and the organisation, the delivery process and the logistics.
- Occasionally, feedback from the SME is asked after a period of time (12+ months), where actual business results (revenues, number of employees, innovations etc.) are collected.

MAIN ACTORS

- University
- RTO
- SMEs

ENABLING ELEMENTS

- Questionnaires

TIMEFRAME

12-36 months
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STEP 1 - 4

CHALLENGES & TIPS

- RTOs employing facilitators who combine both academic credentials and understand the research methodologies and industrial experience.
- Developing time-efficient engagement processes.
- Creating user-friendly tools with minimum academic jargon to facilitate the knowledge transfer.
Learning points

● Most important findings
  ▪ Providing all participants the opportunity to express their views in a neutral environment.
  ▪ Having facilitators who have industry experience and can relate to real business issues. They also have the ability to offer several examples to clarify concepts and provide insights.
  ▪ Having an engagement process that is time efficient, has a clear logic between data input, data output and decisions and requires minimum pre-work from the participants.
  ▪ Minimisation/elimination of academic jargon and terminology.

● Most important recommendations
  ▪ Communication with the SME in explaining upfront what is required in terms of data and time and examples of potential outputs.
  ▪ Emphasis needs to be placed on the tool design, and ease of use, without expecting users to follow complicated instructions.
  ▪ Manage the company’s expectation on time required to achieve tangible outcomes after the process is completed.
  ▪ Allow reflection time in order to gain insights.
References

Further details - Example of new research integrated into an existing tool (step 0)

<table>
<thead>
<tr>
<th>Indirect External Forces IDENTIFIED BY AN SME – BEFORE INTEGRATION OF NEW RESEARCH</th>
<th>Indirect External Forces IDENTIFIED BY AN SME – AFTER INTEGRATION OF NEW RESEARCH</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social</strong></td>
<td><strong>Social</strong></td>
</tr>
<tr>
<td>1 Year</td>
<td>2-4 Years</td>
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<td></td>
<td></td>
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<tr>
<td><strong>Technological</strong></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td><strong>Ethical</strong></td>
<td></td>
</tr>
<tr>
<td>THREAT: Behaviour of supermarkets- Retail ethics</td>
<td></td>
</tr>
<tr>
<td><strong>Political</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Legal</strong></td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Environmental</strong></td>
<td>OPPORTUNITY: Falling oil prices dropping through to energy prices</td>
</tr>
</tbody>
</table>
Further details - Example of new research integrated into an existing tool (step 0)

- A PhD research was integrated into the SME Strategy workshop toolkit as an additional step.
- This step added 10 min to the overall process but considerably enhanced the output (see next slide).
- It encouraged SMEs to consider external forces that may have an impact on the company strategy.
- This considerably enhanced the strategic actions the SME put in place.

- Regulation / Legislation
- Public Sector Spending
- Pro-Manufacturing Policy
- European Union (EU)
- Taxes
- ‘Green’ Policies
- Political Elections
- Unemployment
- Health & Safety

- Ageing Population
- Population Growth
- Health & Obesity
- Social Media
- Diversity Intolerance
- Disaffected Youth
- Consumerism
- Materialism

- Bio-technology
- Additive Manufacturing
- Open-source IP
- Cloud Computing
- Automation
- Internet of Things
- Big Data
- Machine Learning (AI)
- Electric Vehicles

- Sustainability
- Pollution
- Carbon
- ISO 14001
- Climate Change
- Circular Economy
- Land-use Conflict
- Natural Disasters

- Skills Gap
- Minimum Wage
- Retirement / Pensions
- Apprenticeships
- Foreign labour
- Maternity/Paternity

- Energy / Electricity
- Oil prices
- Materials / Commodities
- Waste
- Water
- Recycling
- Disposal

- Trade Blocs
- Viruses or Diseases
- Rise of BRICS
- Land 'grabs'
- War / Terrorism

- Recession / Recovery
- Exchange Rates
- Interest Rates
- Access to Capital
- £ vs €

- Competitors
- Suppliers
- Customers
- Collaboration
- Outsourcing/Reshoring
- Localisation
## Further details - Benefits at a glance (MTP programme)

<table>
<thead>
<tr>
<th>Company sector</th>
<th>Length of project</th>
<th>Revenue £</th>
<th>Employees</th>
<th>Revenue per employee</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Before</td>
<td>After</td>
<td>Before</td>
<td>After</td>
</tr>
<tr>
<td>Industrial electronics</td>
<td>9 months</td>
<td>1.2m</td>
<td>2.2m</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>Refrigeration</td>
<td>18 months</td>
<td>750k</td>
<td>2.1m</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Food</td>
<td>18 months</td>
<td>3m</td>
<td>4.8m</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>Chemical Treatment</td>
<td>12 months</td>
<td>1.7m</td>
<td>3.5</td>
<td>25</td>
<td>45</td>
</tr>
<tr>
<td>Laboratory equipment</td>
<td>12 months</td>
<td>5m</td>
<td>6.2m</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>Smart metering</td>
<td>6 months</td>
<td>2.3m but falling</td>
<td>2.3m but raising</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Materials handling</td>
<td>4 years</td>
<td>10m not profitable</td>
<td>16m profitable</td>
<td>140</td>
<td>150</td>
</tr>
<tr>
<td>Food</td>
<td>18 months</td>
<td>6.8m</td>
<td>8.4m</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>Packaging</td>
<td>18 months</td>
<td>3.2m</td>
<td>4.1m</td>
<td>48</td>
<td>48</td>
</tr>
<tr>
<td>Capital equipment</td>
<td>2 years</td>
<td>12m</td>
<td>35m</td>
<td>70</td>
<td>70</td>
</tr>
</tbody>
</table>
Further details - Benefits at a glance (PrISMS program)

IfM ECS worked with 120 companies over three years during the PrISMS programme. The results from this programme were:

- Help create **126 new** jobs.
- **Safeguard 246 jobs.**
- Increase the **cumulative turnover** for 60 SMEs by £**18.8m (14%)** by improving the business strategy and capability development of these companies.
- **Reduce energy consumption** and minimise the environmental impact of manufacturing processes.
- Provide **feedback for new academic research** and develop new business support tools.
- Transfer knowledge and skills to the SMEs to enable the companies to continue to improve after **PrISMS**.
A recent article from the food sector (Braun & Hadwiger 2011) refers to EC/EU documents and lists challenges of knowledge transfers to SMEs (see Table 1) and suggests that this results in sub-optimal exploitation of publicly-funded research in Europe.

<table>
<thead>
<tr>
<th>DONOR SIDE</th>
<th>Most common barriers met when intending to transfer knowledge</th>
<th>RECEIVER SIDE</th>
<th>Most common barriers met when intending to receive knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assumed benefits of possessing knowledge exclusively (Bruneel, D’Este &amp; Salter 2010)</td>
<td>Lack of trust (Bruneel et al 2010; Grunert et al 2008; Santoro &amp; Gopalakrishnan 2000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of ability to transfer knowledge to a non-specialist (Quillien &amp; Vidal, 2003)</td>
<td>Lack of structures for knowledge processing (Santoro &amp; Gopalakrishnan, 2000).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of face-to-face contact to industry partner (Bruneel et al 2010)</td>
<td>Lack of knowledge concerning the know-how transfer process (Santoro &amp; Gopalakrishnan 2000)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Challenges of Knowledge Transfer to SMEs (from Braun & Hadwiger 2011)