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Knowledge Alliances for the Training of Entrepreneurs**

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**Report on Existing Entrepreneurship Approaches**

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## 1. Introduction

Entrepreneurial practices in an established company can be seen as critical means for competitive advantage and improved performance (Kuratko et al., 2001). Today engineers in established companies are seen as producers of innovations linking to the existing product base, while academic researchers play a key role in creating disruptive technological innovations and building technology-based start-ups. Over the past decade, as the importance of the role start-ups play in the knowledge economy has become more apparent, and there has been move towards the practice of engaging of innovators from outside the company by industry, interest in entrepreneurship training and education has increased. It is now a topic high on the agenda of many higher education institutions (HEIs) with many wishing to claim the accolade of being an “entrepreneurial” university.

What appears to be missing is a systematic review of entrepreneurship training on offer to bring together researchers based in academia or in industry. This report presents some findings of a review on the subject. It has been conducted within the framework of the European Commission’s University- Business Cooperation initiative, by a project funded by the Directorate General for Education and Culture (Dg EAC), “HEKATE” (Higher Education and Enterprises: Knowledge Alliances for the Training of Entrepreneurs)<sup>1</sup>. HEKATE aims at supporting the spread of *knowledge alliances* to foster entrepreneurship by encouraging senior R&D managers in research intensive industries to become more pro-actively engaged with universities. The cornerstone of HEKATE is delivery of entrepreneurship training workshops for mixed groups of academic researchers and early career industry practitioners with strong technical backgrounds based strongly on hitherto inaccessible case studies from industry and academia. In preparation of these, a review of entrepreneurship training currently on offer has been undertaken on which this report is based.

The report provides recommendations for the design of entrepreneurship training workshops targeted at early career industry professionals and academic researchers with strong technical backgrounds derived from the conducted study. The study was performed over a three months period and consists of three parts: firstly, in order to understand general demands and drivers in entrepreneurial training, a review of the available entrepreneurship training programmes has been made; secondly, to gain more specific information about the contents of the training programmes, interviews with those involved from companies and academic institutions have been conducted; thirdly, the information from the review and the interviews has been analysed and synthesized to provide recommendations for the workshop

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<sup>1</sup> See: [hekate-project.eu](http://hekate-project.eu)

design. Given the project constraints, not all recommendations can be fully implemented to the HEKATE workshop concept, but are presented here as a basis for further discussion.

In conclusion, the goal of the proposed workshop design is to connect the two groups in learning how to be more entrepreneurial within academic and business settings and to achieve mutual peer-to-peer learning benefits from active collaboration. It is hoped that this study will be useful for generating new ideas in designing an effective entrepreneurial training programme.

## 2. Entrepreneurship training

Over the past decade a lot of attention has been given to entrepreneurship training in both academic and business worlds. Contrary to academia, where many different aspects of entrepreneurship education have been extensively studied, the concept of the entrepreneurship training of the employees within established organisations still has some questions to be studied. Moreover, according to Byrne & Fayolle (2009) there is a lack of consistency in defining entrepreneurial activities within a company among researchers, which results in ambiguous understanding of them.

The terms such as intrapreneurship, corporate entrepreneurship and corporate venturing are most frequently used by researchers describing the phenomenon of entrepreneurship within organisations (Menzel et al. 2007). However, although the above-mentioned terms relate to entrepreneurial activities within organizations, they have different meaning.

### 2.1. Definitions

In this report corporate entrepreneurship (CE) refers to promoting entrepreneurial thinking and behaviour in an established company (Thornberry, 2003; Byrne & Fayolle, 2009). Therefore, CE training can be seen as an attempt to foster entrepreneurial thinking and behaviour of the firm's employees. According to Thornberry (2003) there are four general typologies of the CE, namely:

- Corporate venturing
- Intrapreneuring
- Organizational transformation
- Industry rule-breaking

Corporate venturing refers "to starting a business within a business", usually coming out of the company's core competency or process (*ibid.*). Corporate venturing training programmes normally focus on creating a business plan (Byrne & Fayolle, 2009).

Intrapreneurship, a term first introduced by Pinchot (1985), is an attempt to inculcate the entrepreneurial values into culture and activities of a large company (*ibid.*). Training programmes on intrapreneurship aim to build "intrapreneurs", i.e. employees within the organization that are able to recognize and seize opportunities (Thornberry, 2003).

Organizational transformation is a new arrangement of resources to increase operational efficiency of a company, which results in creating a sustainable value (*ibid.*). The training programmes are normally directed at middle- and senior-level managers.

Finally, industry rule-breaking refers to transformation in a company that results in a change of the whole industry. For instance, Toyota transformed the environment of the automotive industry by introducing high-quality cars at lower production costs (*ibid.*). This type of CE is closely connected to development of the innovative products and processes.

## **2.2. Role of the entrepreneurship training**

It has been proven that entrepreneurial practices in an established company can be seen as critical means for competitive advantages and improved performance (Kuratko et al., 2001), especially for multinational corporations operating in dynamic and changing environments (Menzel et al., 2007). World famous examples of companies that have undertaken entrepreneurial actions at different times include 3M, Dell, Procter&Gamble, Toyota, IBM, Google etc. Furthermore, entrepreneurship and corporate entrepreneurship are, most of the times, the underpinning of technological innovations and company renewal (McFadzean et al. 2005; Menzel et al., 2007).

Doctoral and post-doctoral researchers play a key role in driving technological innovations and building technology-based start-ups, while engineers are seen as producers and developers of innovations in established companies (Menzel et al., 2007). However, there is still a big gap between development of an innovative idea and making it commercially viable or successfully implemented in a business context. It is clear that today's entrepreneurs should not only be the experts in the fields of their competences, but also acquire business skills at least to some extent.

Yet for the corporate entrepreneurs this might not be sufficient. Success of corporate entrepreneurship is more complex and can be affected by management strategy, organizational structure and culture (Hornsby et al., 1993) as well as limited resources and lack of competencies (Byrne & Fayolle, 2009). Nevertheless, potential intrapreneurs should be identified early in their careers, even those of them who lack some of the distinct characteristics and capabilities of an intrapreneur in the beginning (Menzel et al., 2007). These so-called "would-be intrapreneurs" need to be addressed by intrapreneurship programs and trainings.

Unfortunately, relatively few studies have been conducted in the field of entrepreneurship training for doctoral researchers and industry practitioners. There is also no clear evidence of

what type of entrepreneurship training is offered to this group of professionals. It is obvious that teaching entrepreneurship to professionals is different to teaching university students. Therefore, in order to design an entrepreneurship training course targeted at both academic researchers and industry professionals, it is important to analyse current training offers for this group, to find common patterns and trends in offered programmes as well as to understand the current needs for the training.



### 3. The study

This study is divided into three parts. First, the scope of different entrepreneurship training offers is determined. This has been carried out by performing data search and collection. Secondly, specific information on the training content has been obtained through interviews with HEIs and companies providing entrepreneurship training. Finally, based on the analysis of the data in the review and interviews, the gaps and demands in skills' training are identified and reflected in recommendations for the entrepreneurship workshop for academic researchers and early career industry professionals with technical backgrounds.

#### 3.1. Requirements and context

The study was conducted over the period of three months with following milestones: research of the available training offers, interviews, analysis of the results and recommendations.

**Table 1 Initial Activity Plan**

	Dec. 2013 - Jan. 2014	Feb. 2014	Mar. 2014
Activity	Research on available training offers	Interviews	Interviews (cont.) Analysis
Methodology	Data collection Hand outs for EIRMA meeting	Questionnaire design Direct contact Phone interview	Literature review Data analysis Recommendations for the workshop design
Outcome	Review	Interview minutes	Final report

The review on the current entrepreneurship training offers reveals general trends and provides an understanding of the current demands and offers. The data collection was performed gathering the information from academic papers, conferences' reports, internet search, i.e. publicly available information. The selection criteria derived from the project requirements, which are shown below.

**Table 2 Selection criteria of the training programmes**

Type	Training, workshop, seminar, professional development programme
Duration	Less than 20 days
Participants	PhD students and post-doctoral researchers, employees of established organisations
Focus	Entrepreneurship, intrapreneurship, corporate innovation

A focus was given to short-duration training programmes targeted at participants with technical backgrounds, i.e. engineers in established companies and academic researchers

with degree in engineering. Although some Master and MBA programmes in entrepreneurship comprise innovative teaching techniques and elements, they were omitted from the search due to their duration. Additionally, there is a clear distinction in teaching inexperienced students in an academic environment compared with training professionals in an organisational environment (Byrne & Fayolle, 2009).

The interview phase of the study was conducted over the period February – March 2014 in order to reveal specific details about the entrepreneurship training offered. Potential interviewees from the review were sent an invitation email with a short description of the HEKATE project with a request for an interview. Other interview candidates were approached through the EIRMA network and with the help of Manchester Business School. Interviews were conducted by phone and via Skype-call and lasted half an hour in average. All interviews were held as open discussions focusing on four areas: participants, content of the training, experience and evaluation of the training and, optionally, the gaps in competencies of the early career starters.

Finally, the last stage of the study includes the analysis of the data collected from the review and interviews, conceptual design of the two days entrepreneurship training for young professionals and academic researchers and delivery of the report.

### **3.2. Review of the entrepreneurship training offerings**

Despite the fact that intrapreneurship and entrepreneurship are increasing in prominence, very few training courses met the selection criteria. The search and data collection were restricted because of the lack of access to the companies' internal training offering and limited information about the content of customized training programmes on the universities' websites due to confidentiality reasons. Therefore, it is believed that the real number of training courses matching the selection criteria is much greater.

The review has considered 15 entrepreneurship training offerings targeted at company employees, 20 offered by academic institutions and the rest by professional training organisations. Most training offered target industry professionals and are delivered either as customized programmes designed by HEIs or internal corporate training for mid- and top-level management. Only a few entrepreneurship programmes in the review are specifically designed for PhD and post-doctoral researchers. These programmes provide participants with training on entrepreneurial and basic business skills as well as specific topics of particular relevance for the academic researchers, such as intellectual property (IP) rights, entrepreneurship in a university context and networking skills.

### 3.2.1. Entrepreneurial activities: highlights

Based on the data collected in the review and information obtained from publications, the following common patterns in entrepreneurial activities of companies and academic institutions were observed:

**The bootlegging policy:** bootlegging refers to an individual research initiative in which motivated employees innovate for the benefit of the company, but without explicit approval or officially allocated resources by the company's management (Knight, 1967). The policy was launched by 3M to encourage their technical staff to spend up to 15% of their work time on creative projects of their choice (Schawbel, 2012). The company's effort resulted in the development of the high profile products such as a Scotch Tape and Post-it Notes. Other companies like HP and Google also follow this strategy allowing their employees to spend 10-20% of their work time on projects or ideas of their own devising. Similar examples of company initiatives to encourage employees to work on innovative projects include: brainstorming events "Hackathon" organised by Facebook, corporate business plan competitions in Danfoss and Qualcomm, and science fair "Microsoft Garage" at Microsoft.

**Entrepreneurship Boot Camp:** refers to an intensive entrepreneurial training programme. The boot camps are normally offered to individuals with concrete business ideas to develop their entrepreneurial skills through series of training workshops, turn their ideas into viable businesses under mentorship and coaching and connect them to industry experts and potential investors via pitching event. Originally started in the USA, this type of entrepreneurial training gained high acceptance over the past 3 years in Europe. Boot camps are provided to students, academic researchers as well as employees of the companies, for example Alcatel-Lucent, Janssen Pharmaceuticals, Deutsche Telekom.

**Entrepreneurship training for industry specific needs:** entrepreneurship training becomes more subject-focused. Today more business schools offer custom entrepreneurship training programmes matching individual company's needs. Furthermore, according to Richardson & Hynes (2008) particular skills within an industry sector should be considered when developing a process framework for entrepreneurship education. Indeed, during the data collection process of this study some subject-specific entrepreneurship training programmes for the doctoral and master students were found, for example: "Entrepreneurship in Photonics" offered by Vrije Universiteit Brussel, and the Biotech Entrepreneurship Training Program at Heidelberg University.

**Open innovation platforms:** refers to online platforms for the collection of innovative ideas coming from the employees of a company as well as external users. Innovation platforms are

normally integrated by multinational corporations, such as ThinkPlace by IBM, connect+develop by P&G, U-Partner Open Innovation Submission Portal by Unilever. Some platforms serve as mediums for industry and academia cooperation, involving students to participate in firms' projects under the employees' mentorship, for instance a Finnish online platform "Demola".

Additionally, following the discussions about the entrepreneurship education at HEIs and companies, now more attention is given to the training entrepreneurship educators. Earlier Fayolle (2009) mentioned that only several HEIs in Europe have developed institutional infrastructures including teaching, research and practice-oriented activities. During the data collection for this review numerous programmes for continuing professional development of student teachers were found and seem to be in high demand (European Commission, 2013).

**Table 3 Entrepreneurial activities within companies based on the review**

	Business Competition	Boot camp	Customized programme & internal training	Others (innovation platforms, science fairs etc.)
Entrepreneurial training workshop	x	x	x	
Participants	All employees	All employees + externals	Mid, top managers	All employees + externals
Duration, days	5-7*	2-5	2-17	1-7

\*Corporate business plan competitions run **18-28 months** due to employees' day office duties, discontinuous team working sessions and training courses. However, trainings organized specifically within the context of the business competitions last normally 5-7 days. For instance one-week Entrepreneurship Development Program at MIT is provided to the employees participating in HP and Danfoss corporate business competitions.

### 3.2.2. Content analysis

A detailed analysis of the content of the entrepreneurship training programmes considered in this review reveals four main topics that are more or less common to all: innovation, business acumen, new business opportunities and entrepreneurial thinking<sup>2</sup>.

**Innovation:** innovation management and processes, familiarisation with concepts like phase-gate models, digital prototyping, portfolio management and etc.

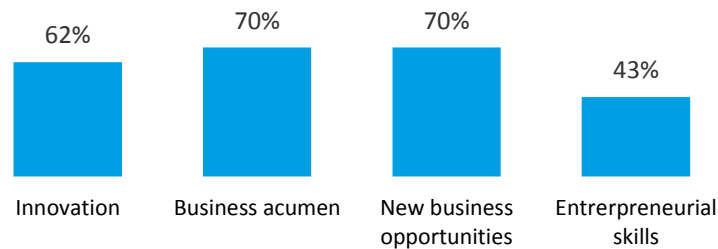
**Business acumen:** financial literacy, writing a business plan, strategic business planning, business management & leadership

**New Business Opportunities:** understanding of the market (customers, competition and trends), recognizing the opportunities, client-facing skills

**Entrepreneurial thinking:** thinking outside the box, problem solving, risk-taking, effectual reasoning, networking, as well as communication and presentation skills.

<sup>2</sup> Annex A. The data is clustered based on the publicly available information, precise accuracy can't be claimed.

The analysis shows that the teaching of entrepreneurial skills is provided in only 43% of all cases reviewed. The main focus is given to the topics such as business acumen (writing a business plan, financial literacy) and business opportunity (understanding a market). This is particular true for entrepreneurship training programmes offered to researchers, where subjects related to business opportunities are given more emphasis.



**Figure 1 Distribution of the learning contents**

The higher delivery rate of subjects such as “business acumen” and “new business opportunity” can be explained by two reasons. First, the training is targeted at middle- and senior-level managers who undertake leadership roles and deal with strategic decision making. Secondly, it is most often assumed that doctoral and post-doctoral researchers develop business ideas from their research and, hence, need more business-oriented training and guidance in writing business plans or how to adapt their ideas to meet market needs.

### 3.3. Interview data analysis

In total five higher education and research institutions as well as 6 enterprises have taken part in the interviews. Among them, 9 provided information relevant for this study and considered for the analysis. Below is shown a schedule of the nine interviews.

**Table 4 Interviews: general information**

	KIT <sup>3</sup>	Aircraft OEM	iMinds	Umicore	IBM	Allnex	University of Birmingham	Microsoft	Firm X
Date	18.02	24.02	25.02	27.02	5.03	7.03	12.03	21.03	25.03
Location	DE	DE	BE	worldwide	worldwide	worldwide	UK	IR	CH
Profile <sup>4</sup>	A	I	A	I	I	I	A	I	I
Offered since	2014	2010	N.A.	2008	2000	2011	2002	2012	N.A.
Target group <sup>5</sup>	R	E	R	E	E	E	R <sup>6</sup>	E	E
Group size	25	15-20	16	24	16-24	8-12	30-40	15-20	20

<sup>3</sup> Karlsruhe Institute of Technology

<sup>4</sup> “A” stands for an academic institution, “I” for industry firm

<sup>5</sup> “R” stands for doctoral and post-doctoral researchers, “E” stands for company employees

<sup>6</sup> The programme is offered for any members of research staff, including post-doctoral researchers, lecturers, professors etc.

The analysis of the interviews revealed that some entrepreneurship training offered to employees was carried out as response to changes in the external environment or organizational structure. This finding corresponds to the earlier conducted studies stating that external dynamic environments have influence on company's entrepreneurial posture (Byrne & Fayolle, 2009).

The content of the entrepreneurship training provided for company employees and academic researchers by those organisations interviewed most frequently comprised subjects such as innovation and new business opportunities, which reflects the findings drawn from this review. Additionally, the contents were examined for a general focus of the workshops. Table 5 demonstrates two different approaches in entrepreneurship training: entrepreneurship programmes targeted at academic researchers which focus on technology push aspects of the innovation and those for company employees which emphasize a market pull approach and include leadership skills. In summary, company employees are encouraged to think and act entrepreneurially within the framework of the firm's strategic direction and available resources; academic researchers learn how to be entrepreneurial in terms of adapting business ideas developed from results of their research to market needs.

**Table 5 Content topics of the selected programmes**

	Innovation	Business acumen	New business opportunities	Entrepreneurial skills	Focus
KIT	x	x	x		Technology push innovation
Aircraft OEM	x		x		Market pull innovation (consumer-centric)
iMinds	x		x	x	Personalized approach
Umicore	x	x	x	x	Leadership & management
IBM	x		x		Leadership, client-facing skills
Allnex	x			x	Leadership
University of Birmingham		x	x		Technology push innovation
Microsoft	x	x	x	x	Leadership & market pull innovation (strategic planning)
Firm X	x		x		Market pull innovation

It is worth highlighting the training programme for academic researchers provided by iMinds<sup>7</sup>. The training programme provides individual support for each participant to develop commercially viable business ideas out of their research fields. This might result in

<sup>7</sup> [www.iminds.be](http://www.iminds.be)

modification or even a complete change of the initial business idea if there is no market for it. The programme exploits a highly personalized approach to entrepreneurship training contrary to push and pull innovation strategies.

### **3.3.1. Participants**

The target group of the training programmes plays an important role in designing a curriculum of the entrepreneurial training. This study reveals some interesting findings with respect to the target groups of the entrepreneurship training programmes reviewed. First, of those programmes reviewed, there are no entrepreneurship training courses offered to a mixed group, comprising academic researchers and company employees. This is consistent with the different training approaches discussed earlier.

Secondly, the interviews show that entrepreneurship training programmes within companies normally target middle-level managers rather than early career staff. According to Kuratko et al. (2005), middle-level managers are seen as effective facilitators for communication between top- and first-level managers. In other words, they can recognize marketable R&D ideas and present them as compelling business cases to the top management (Aaltio, Menzel, & Ulijn, 2007). Their intermediary position gives them a crucial role in driving entrepreneurial actions within a company.

Thirdly, the average number of participants is 20-25, except for the three specific training programmes provided by Allnex (8-12), iMinds (16) and University of Birmingham (30-40). The small group sizes of the first two programmes derive from the personalized approach taken. The practice of having four teams of four members guided by two coaches has been proven to be the most efficient in iMinds's experience. The training of employees by Allnex provides individual support for the participants in developing their leadership and soft skills. The Medici programme for groups of 30-40 participants has been run by the University of Birmingham for 12 years. The programme employs a concept of round table discussions, suggesting lower level of individual training and a greater focus on encouraging networking.

Finally, the selection process for the participants for entrepreneurship training within companies appears to be quite specific. CE can take place at the corporate, divisional (business units), and project levels (Byrne & Fayolle, 2009), therefore, it is important to distinguish entrepreneurship training offered at the corporate, divisional and projects level. Most often corporate-level entrepreneurship training target employees with high potential to become future leaders, the so called company's talent pool. This group is identified through performance metrics and managerial/HR recommendations. On the other hand,

entrepreneurship training at divisional and project levels target employees of particular business units and can be organized without an active involvement of the HR.

**3.3.2. Format of the training**

Analysis of the interviews shows that some training programmes include preparation and personal coaching, in addition to the face-to-face workshop. Preparation takes the form of individual or group work prior to a face-to-face workshop (f2f). This can be done through case study assignments distributed to participants before the workshop or via an online learning platform. The goal of the preparation is to make a face-to-face workshop more efficient since participants are already familiar with terms and learning materials. Personal coaching is optional and provided to the participants after the actual workshop has taken place.

**Table 6 Structure of the training programmes**

		KIT	Aircraft OEM	iMinds	Umicore	IBM	Allnex	University of Birmingham	Microsoft	Firm X
Preparation	Online learning Platform			x		x				x <sup>8</sup>
	Prior tasks	x	x	x	x				x	
F2F workshop		x	x	x	x	x	x	x	x	x
Personal coaching				x	x					

Additionally, it was noted that some entrepreneurship training programmes follow the problem-based learning (PBL) format of the face-to-face workshops: problem statement, learning methodology, solution development and pitching. Such a workshop format was found more frequently implemented in the short-term corporate training workshops and/or when participants are asked to solve particular issues of the firms’ projects.



**Figure 2 Training format**

**3.3.3. Content**

All interviewees were asked about the agenda, teaching methods and techniques of the entrepreneurial training offerings. Since the interview process followed an open discussion

<sup>8</sup> All learning materials are distributed in advance, sometimes participants asked to prepare small tasks and give a 2 min. solution pitch.



approach and was time-limited, the outcomes of each interview slightly differ from each other. Therefore, the results shown below are approximate.

**Table 7 Content elements and teaching methods**

	KIT	Aircraft OEM	iMinds	Umicore	IBM	Allnex	University of Birmingham	Microsoft	Firm X
Group discussions	x	x	x	x	x	x	x	x	x
Peer learning	x		x	x	x		x	x	x
Pitching	x	x	x	x		x	x	x	x
Success stories	x	x	x	x	x		x	x	
Q&A, feedback	x	x	x	x	x	x		x	x
Case study	x	x	x	x	x	x	x		
Coaching	x	x	x	x	x			x	x
RWP <sup>9</sup>	x		x	x			x	x	x
Business game				x					
Role play					x	x			
Field trip				x					

The group discussions, pitching event, success stories told by guest speakers (role models), case studies as well as feedback sessions seem to be the most frequent teaching methods used. Computer business games seem rare in current entrepreneurship training programmes but highly appreciated by participants according to the experience of Umicore. A traditional 15-minutes Power Point presentation is replaced with “The Dragon’s Den”<sup>10</sup> event. The participants pitch their ideas to a jury consisting of business angels, senior managers, and industry experts, answer questions and receive feedback. Therefore, it is no longer about providing a description and background information about the business idea, but rather “selling” it in a precise and succinct way. The results of interviews suggest that pitching the idea takes 2 to 8 min. depending on the training programme. Such simulation of the business world provides participants with experience closer to the real and provides an opportunity for networking with industry experts and potential investors.

It is important to note that there appears to be a trend for entrepreneurship training programmes to deploy experiential learning techniques, e.g. field trips, working on real-world projects, pitching to the jury of executive managers and business angels, role modeling, meeting industry experts and successful entrepreneurs etc. This style of training promotes emotional interest in learning, especially if participants work on the current firm’s projects or fields of interest, and hence is effective in terms of implementation of learned skills.

<sup>9</sup> “RWP” stands for real-world projects: real business issues in a firm or research fields.

<sup>10</sup> A television series, where entrepreneurs have three minutes to pitch their business ideas to a panel of successful venture capitalists looking to invest their own cash (Source: BBC).

### 3.3.4. Teaching resources

The size of the training staff depends on duration of the training programme, format, content and number of participants. The more subjects presented within the face-to-face workshop, the more training staff needed. The trainer models observed within interviews are: coach, content instructor, and guest speaker. The roles of coaches and instructors are undertaken by industry experts (IP attorneys, management consultants, senior managers etc.), university professors as well as external professional coaches. Guest speakers are normally business angels and/or senior managers that invited to share their stories and experiences.

**Table 8 Training staff: overview**

	KIT	Aircraft OEM	iMinds	Umicore	IBM	Allnex	University of Birmingham	Microsoft	Firm X
Coach	x4	x1	x2	>1	x1	N.A.	x4	x1	x2
Instructor	x3		x1	N.A.	x1	N.A.	x13		
Guest Speaker	x1	x1	x1	x1	x1	N.A.	x1	x1	
<b>Total</b>	<b>8</b>	<b>2</b>	<b>4</b>	<b>&gt;2</b>	<b>3</b>	<b>N.A.</b>	<b>18</b>	<b>2</b>	<b>2</b>

*N.A. refers to "data not available"*

The table below provides an overview of the training staff provided for each training programme reviewed and compares the duration of programmes with the number of facilitators. On average, two facilitators are used per training day (jury members are not taken into consideration).

**Table 9 Training staff: amount**

	KIT	Aircraft OEM	iMinds	Umicore	IBM	Allnex	University of Birmingham	Microsoft	Firm X
Training staff, total	8	2	4	>2	3	N.A.	18	2	2
Days, total	4	1-2	4	15	6	1-7 <sup>11</sup>	7	4	2
<b>Training staff / Day</b>	<b>3-4</b>	<b>2</b>	<b>3</b>	<b>N.A.</b>	<b>2</b>	<b>N.A.</b>	<b>4</b>	<b>2</b>	<b>2</b>

Depending on the format of the f2f workshop, there are three combinations of the training facilitation observed within the given programmes.

<sup>11</sup> The number depends on the country

**Table 10 Training staff: combination**

<b>Instructor + Coach + (Guest Speaker)</b>	Instructor provides and explains a methodology and tools to use for solving a problem. A Coach provides guidance and consulting to participants during the group work as well as facilitates the development of skills. Guest speaker might be invited to share his/her own experience of dealing with a problem.
<b>Instructor/Coach + Guest Speaker</b>	The role of the instructor is combined with the role of the coach. This combination is frequently observed within the 1-2 days f2f workshops for employees. A Guest speaker, normally a middle- or senior-level manager, provides storytelling and/or introduces to the case study. A Instructor/coach facilitates the discussions and group work.
<b>Instructor/Coach + Instructor/Coach</b>	This type of workshop's facilitation is often met within corporate entrepreneurial trainings. Two facilitators (normally middle- and senior-level managers) of different business units guide the workshop. Differently to the instructor+coach combination both facilitators participate in training at the same time.

### **3.3.5. Team building and collaboration**

The same method for team building was used, which was generally to assign participants to groups in advance by the training facilitator according to the criteria:

- Heterogeneous educational/professional backgrounds
- Diverse universities/ departments/ business units
- No prior collaboration.

Working in cross-professional groups fosters networking among peers and enhances the learning experience. The programme facilitators anticipated that the participants would keep in touch after the workshop and benefit from the relationships formed during the training. However, only few had the means to track and follow up the effect of networking and peer-learning.

### **3.3.6. Evaluation and change over time**

All those interviewed were asked about the evaluation methods, adaptation and revision of the training programme over time, their opinion of the experience of running the training programme and its uniqueness and possible weaknesses. Evaluation refers to measuring the effectiveness of the training programme based on selected parameters. These parameters are set by the programme's coordinator and vary from programme to programme. For this study the integrated model of training evaluation and effectiveness designed by Alvarez et al. (2004) is taken as a reference point. The model measures effectiveness of the training by connecting three components: training content & design, change in learners and organisational pay-offs. A table below displays what constructs of the programme effectiveness evaluated most frequently within the given training programmes.

**Table 11 Evaluation of the training programmes**

	KIT	Aircraft OEM	iMinds	Umicore	IBM	Allnex	University of Birmingham	Microsoft	Firm X
Training content & design	x	x	x	x	x	x	x	x	x
Changes in learners	x		x	x	x	N.A.	(x)	x	(x)
Organizational pay-offs		x	x	x	x	N.A.		x	(x)

*(x) Attempt to evaluate has small success rate*

Most of the time the training effectiveness is assessed through feedback evaluation forms distributed at the end of the programme. Some programme coordinators evaluate the reaction to the training content by distributing the Kirkpatrick's smiley sheets during the workshop. Much more complex is evaluating changes in learners and organizational payoffs. One of the methods frequently used by programme coordinators is a written feedback. Participants of the workshops are asked to provide a feedback after a period of time (3, 6, or 12 months). It is, however, not always an effective practice for measuring the changes, as some of the interviewees observed small response rate and poor feedback content. In case of the training programmes for academic researchers, programme coordinators attempt to determine their further interest in entrepreneurship by tracking their participation in other training events.

Another common way to measure an organizational payoff among the companies is a feedback from a direct supervisor of a delegate (3, 6, or 12 months after the training). Such feedback would reflect a change in performance of a delegate after participating in the workshop and benefits for a project or business unit. Organisational payoffs are also evaluated through the participants' career progression, business ideas registered in the innovation platforms and business projects derived from the participants' ideas which are implemented. Similarly to companies, academic institutions evaluate the effectiveness of the training through technology transfer offices and patent portfolio.

**Table 12 Strengths and challenges of the programmes' facilitation**

	Strengths	Lessons learned and challenges
KIT	<p>Strong focus on doctoral and post-doctoral researchers</p> <p>Tailored curriculum matching researchers' learning needs</p>	<p>Less theory, more real-world examples (industry experts)</p> <p>Team building prior to the training in an informal environment results in a faster workshop dynamic.</p> <p>Academic researchers with strong technical backgrounds express resistance and distrust in a trainer without one</p> <p>Participants expect the workshop to be more about finances and marketing rather than opportunity recognition</p>
Aircraft OEM	<p>Interactive working sessions</p> <p>Consumer-centric innovation</p> <p>Simple and generic workshop agenda</p>	<p>Presentation is replaced with pitching</p> <p>More interaction</p>
iMinds	<p>Focus on peer learning and coaching</p> <p>Contextual + personal learning approach</p>	N.A.
Umicore	<p>Thorough selection of the participants, hence high-level of performance</p> <p>International and diversified topics</p> <p>Challenging programme</p> <p>Top professional teaching staff (professional training organisation)</p>	<p>2 internal managers must be present at the beginning and end of the training</p> <p>Prior assignments were not performed by participants, therefore now they are distributed during the f2f workshop</p>
IBM	<p>Co-facilitation of learning facilitator and technical leader / executive</p> <p>Blended learning methodology: self-paced and face-to-face learning approach</p> <p>Strong learning methodology</p> <p>Mix of individual development and strengthening technical communities</p>	<p>Technical professionals learn best from their peers and technical leaders</p> <p>Technical professionals are not in their comfort zone when put in practical learning exercises (e.g. role plays with feedback) but they admit that they learn most out of it</p> <p>Active learning proved to be effective, i.e. more exercises &amp; practical involvement</p>
Allnex	<p>Small groups, hence individual support during the training</p>	<p>Clear structure of the information presented by trainers</p>
University of Birmingham	<p>A lot of different trainers</p> <p>Mixed group of participants from different universities</p> <p>Network building</p>	<p>Prior reading of the case studies was rarely done, therefore omitted from requirements</p> <p>More commitment in alumni management and network</p>
Microsoft	<p>Personalised and relevant for work learning</p> <p>Ongoing series of conversations</p> <p>Sharing stories and work challenges</p>	<p>More workshops with peer companies (external guest speakers)</p> <p>More time for individual development</p>
Firm X	<p>Working on real cases</p> <p>Motivation through bringing impact to the project</p>	<p>Difficult to evaluate the effectiveness of the training in terms of changes and payoffs due to the small rate of valid responses to the feedbacks sent to the participants after 3 months.</p>

In summary, based on the experiences of running the entrepreneurship training programmes considered in this study, there are three messages to take note of. Firstly, most interviewees stressed the importance of **simulation of real-world** situations, i.e. experiential learning. The workshops should mirror reality. This is done by inviting industry experts, entrepreneurs, senior managers to the workshops as trainers, storytellers (i.e. guest-speakers) or as members of the jury panel during the pitching event. Additionally, interviewees from companies highlighted a positive experience of inviting participants from a peer or outside-the-industry company to the workshop. Secondly, f2f workshops should be as **interactive** as possible in order to keep participants motivated, involving them in lively discussions, working on a case study, using computer simulation games or role-playing, i.e. facilitating active learning. Finally, almost all interviewees mentioned challenges with measuring post-training effects and shift in participants' behaviour over the long term. The **evaluation of the effectiveness** of the training programme in a long term involves longitudinal and continuous observation, which involves maintaining relations with participants and keeping track of their careers' development.

**3.3.7. Gaps and missing skills**

In order to design a training workshop that would be beneficial for the both parties, industry and academia, it is important to understand what skills and competencies fresh graduates are perceived to lack when they start working in industry and what skills can be trained before they start working. With this mind, some of those interviewed were asked their views on this. The results of the interviews are displayed in the table below.

**Table 13 Gaps in competencies and missing skills**

Gaps in competencies and missing skills	
<b>Umicore</b>	Influencing skills (bringing the message across)
<b>IBM</b>	Communication skills Listening skills Client-facing skills Personal Leadership skills Expressing own point of view
<b>Allnex</b>	Communication skills Leadership skills Social skills Understanding the key financial indicators Organisational skills: effective guiding of the meetings

Gaps in competences and missing skills	
Microsoft	Communication skills Presentation skills: being able to pitch the idea or to hold a right conversation with diverse audience (peers, senior managers, customers) and not get trapped in details Strategic thinking and planning
Firm X	Basic business knowledge (finances, marketing) Organizational skills: control over resources

Summarizing all the answers, fresh graduates with technical backgrounds lack certain soft skills when they start working in companies. Apparently career-starters with strong technical backgrounds most often need to improve their communication skills. Some interviewees highlighted more specific aspects such as ability to convey a message or express one's own point of view, listening skills, control over resources or strategic thinking and planning.

Such a consistency in the respondents' answers can be interpreted as a demand in training of particular soft skills and, should, therefore, be strongly considered when designing the workshop content. Interestingly, according to the content analysis of the training programmes given in this review, training of entrepreneurship skills, which can be referred to soft skills, was less frequently addressed.

A further subject for discussion which arose is whether there is a gap in industry's needs and the academic education of engineers. Some interviewees mentioned that nowadays strong expertise in only one field is not enough and more multidisciplinary skills are needed. The question is then, whether certain soft skills can be trained prior to career start considering the difference in business and academia settings and how.

### 3.4. Conclusions and implications

This chapter summarizes the points derived from the review and analysis of the interviews with regard to the challenge to design a 2-day entrepreneurship workshop for a mixed group, i.e. early career engineers in established companies and academic researchers.

1. A shift in entrepreneurship training has been observed towards open and inviting environment. A framework, where students and academic researchers are exposed to real-world situations by inviting industry experts and successful entrepreneurs is seen as a necessity for effective training. But a reverse strategy of connecting industry to academia and other external parties through entrepreneurial activities is still quite rare. This tendency was observed by the entrepreneurial boot camps run by Alcatel-Lucent and collaborative projects like online platform "Demola".

2. Elements of active and experiential learning in combination with personalized approaches are widely used and seem to be appreciated as providing effective entrepreneurship training for academic researchers and managers. As observed from the review, entrepreneurship training is becoming more customized and highly-dependent on the group of participants, industry sector and individual demands. In other words, a training content should allow facilitators to bring learning closer to an individual's professional experience. That means that participants would be more motivated and interested in learning because the obtained knowledge can be directly applied their area of work.

In the case of a mixed group of participants working in different settings, such a personalized approach in entrepreneurship training is problematic. Training programmes discussed earlier targeted at one group from one setting, i.e. either employees of an established organisation or researchers in an academic setting. A question is then how to make the content valuable for a heterogenous group with different backgrounds in terms of direct knowledge application yet personalized. On the other hand, having a mixed group of participants can be seen as an advantage for peer-learning. Because the participants come from two different working settings, a dynamic exchange of different professional experiences would be expected.

3. An entrepreneurship workshop should also provide training in certain soft skills. As the analysis of the interviews shows, effective communication and presentation skills are essential for today's engineers. Some enterprise representatives mentioned that engineers starting their careers today must go beyond their academic backgrounds. It would, therefore, be sensible to train entrepreneurial thinking skills in addition to other subjects of entrepreneurship.

4. One of the biggest challenges of the most training programmes is the evaluation of the training's effectiveness in the longer term. The goal of the most entrepreneurship training programmes is not only to transfer knowledge, but also to connect participants with each other and establish a bridge for further collaboration and communication. Therefore, in order to track the impact of the training and sustained networking between the participants, a communication channel between the participants of the workshop and programme's coordinators should be established and maintained.

These points draw attention to several questions that should be considered for the concept design of the entrepreneurship training derived from this study. In particular these questions relate to the HEKATE project requirements that were initially set, for instance target group and duration of the workshop:



- How to make a workshop more personalized for the two groups?
- What are the mutual benefits of peer learning i.e. what can academic researchers learn from early career company engineers and vice versa?
- What skills and aspects of entrepreneurship can be realistically trained given the duration of workshop and mixed group of participants?
- How to successfully track the training effectiveness after the training delivery?

## 4. Recommendations for the workshop design

This chapter provides ideas of designing an entrepreneurship training workshop for industry practitioners and academic researchers together with recommendations for the evaluation process.

### 4.1. Concept

The main goal of the HEKATE project is to build a connection between academia and business worlds. The entrepreneurship training workshop should, therefore, encourage and facilitate networking during and after the training.

Analysis of the interviews reveals a positive experience in keeping training as interactive as possible and implementing real-world business situations. At the same time, to make entrepreneurship training effective and useful for future application, it should be designed around the individual's experience and have a direct impact on their work and aspirations. It is important to note, that all entrepreneurship training programmes analysed in this study were offered to a homogeneous group of participants (either academic researchers or industry practitioners), while the workshop planned within the HEKATE project targets a mixed group of participants. This poses a challenge on how to integrate the different learning elements to cover the different ways of the knowledge application influenced by knowledge application.

Another challenge is the short duration of the training (only 2 days). In order to increase efficiency and dynamics, some programmes require assignments to be prepared and self-learning through online platform ahead of the workshop. This approach may improve the effectiveness of the workshops and reduce the number of elements to be covered, which allows participants to focus on mastering and repetition of the once learned material.

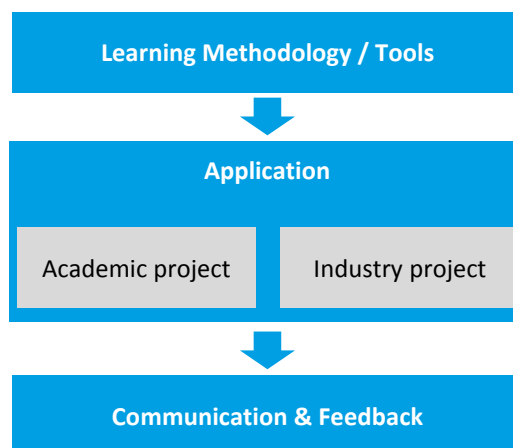


Figure 3 Framework of the workshop

Figure 3 displays the format of the workshop for a mixed group. A PBL-format is not fully implementable due to the short duration of the planned workshop and the fast it is addressing a mixed target group. The framework, however, follows a pattern: methodology – application. As it is shown, there are two application settings. The participants learn a methodology and apply it first, in context of a research project, and secondly, in the context of a real business project. Both applications would imply personalised contexts in learning, yet at the same time, expose the participants to working on a real business project. Furthermore, participants train soft skills such as communication and presentation to different stakeholders. In order to simulate an entrepreneurial environment, a pitching event should be organized, where participants pitch their ideas to the external company managers representing a board of directors. To make the workshop running at a faster pace, participants can be asked to prepare assignments and tasks prior to the workshop.

**4.2. Content**

Normally entrepreneurship training programmes focus on four main areas of entrepreneurship: idea generation, market evaluation, planning, launch and growth<sup>12</sup>. Due to the limited duration of the workshop, a focus should be directed rather on one or two areas of entrepreneurship and its practical application. The workshop can, then be, designed around the topics of idea generation and/or market evaluation supported by development of some entrepreneurial soft skills.

A table below summarizes recommendations on teaching methods and training facilitation.

**Table 14 Content of the workshop**

<b>Goal</b>	Facilitating communication between researchers and early career engineers
<b>Teaching methods</b>	<ul style="list-style-type: none"> <li>- Active learning and experiential learning (pitching, role-playing, solving real case problem, guest speakers)</li> <li>- Peer learning (group work, discussions, feedback)</li> <li>- Personalized learning (application to own research and work fields)</li> </ul>
<b>Team building</b>	Mixed multidisciplinary teams
<b>Training facilitation</b>	Teaching, coaching, role-modeling

The workshop agenda follows a PBL-format suggested earlier. Based on feedbacks provided by companies interviewed, the workshop aims to fill the gaps in soft skills of early career engineers and academic researchers. The agenda is, therefore, designed around interaction and communication, in particular: learning how to interact with different stakeholders,

<sup>12</sup> Source: The Duke Entrepreneurship Manual: A Resource for Entrepreneurs <http://www.dukeeven.com/Home/entrepreneurship-overview---a-framework>

bringing a message in a precise way. This can be done through role play, pitch training, 360° feedbacks, Q&A sessions, group discussions and networking with external industry experts and entrepreneurs.

Furthermore, the structure of the workshop contains two ways for practical application of the skills learned. Each academic researcher works together with a company practitioner in a tandem team. The teams first, apply the methodologies and tools learned to the researchers' business ideas, and then, to the business ideas derived from industry. Each team then pitches both ideas to the jury members. Another recommendation would be to implement preparation prior to face-to-face workshop, in order to increase the time efficiency of the workshop. In addition, each participant should come up with a business idea derived from the research or work fields prior to the workshop.

<b>Learning methodology</b>	<b>IDEA Generation (E. g. Design Thinking Process, creativity techniques)</b>	<b>Learning methodology</b>	<b>Business Opportunity Evaluation (E. g. SWOT analysis, Business model canvas etc.)</b>
<b>Application</b>	<b>Practitioner's project</b>	<b>Application</b>	<b>Researcher's project</b>
Training Facilitation	Teaching, coaching	Training Facilitation	Teaching, coaching
Method	Group work, peer learning	Method	Group work, peer learning
<b>Motivation</b>	<b>Success Story: example of being entrepreneurial within company / research</b>	<b>Motivation</b>	<b>Role play: stakeholder management game</b>
<b>Learning methodology</b>	<b>Communication and Presentation skills</b>	<b>Learning methodology</b>	<b>Pitching (E.g. Elevator pitch)</b>
<b>Application</b>	<b>Practitioner's project</b>	<b>Application</b>	<b>Researcher's project</b>
Training Facilitation	Teaching, coaching	Training Facilitation	Teaching, coaching
Method	Group work, films	Method	Group work, films
<b>Pitching &amp; Feedback, Q&amp;A</b>	<b>Getting a message across in 2 min. and receiving a feedback</b>	<b>Pitching &amp; Feedback, Q&amp;A</b>	<b>Getting a message across in 2 min. and receiving a feedback</b>
<b>Evaluation and wrap-up</b>			

**Figure 4 The workshop concept**

The suggested sequence of the learning methodologies and their application is based on the analysis of the interview responses concerning training content. The focus of interest for academic researchers may well be that they have an interest in developing a business idea derived from their research work. Their interest may be more orientated towards what is

needed to adapt the ideas to a market, i.e. tools and methodologies for evaluation of the business opportunity. Early career engineers, on the other hand, have a greater exposure to different business processes, but perhaps need training in entrepreneurial thinking to see the gaps and opportunities for the new ideas in a company context. In summary, participants learn how to be entrepreneurial in both academic and business setting and what resources and skills are required for that.

A motivational element in the concept refers to an eye-opener event, for instance storytelling, role play, computer business games, discussions, i.e. something that provides proactive interaction between the participants and active learning. Taking into account the feedbacks of the companies concerning the skills they find missing in fresh graduates, a greater focus should be given on training communication and presentation skills. It is recommended to expose participants to learning different techniques for training on influencing, presentation, negotiation and (or) communication skills. A subject as well as techniques can be chosen by a training facilitator; important is that the participants learn how to convey their key messages in a precise and effective way to different stakeholders.

As a wrap-up session to the workshop, it might be useful to “remind” participants of what they have learned and invite to discussions about their personal experience of the workshop. Such a session would provide a facilitator with an opportunity to ask participants about few points relevant for the workshop’s assessment and receive an immediate answer.

### **4.3. Evaluation process**

Assessment of the adult education programmes typically comprises of the evaluation of 8 components: participants needs, learning context, programme goals, staffing, participation, programmes, materials and outcomes (Knox, 1998). Most interviewees recognize difficulties in evaluating the outcomes and the long-term effectiveness of the training.

At the corporate level, programme coordinators endeavour to track a change in the behaviour of participants by asking their direct managers for feedback on performance and through self-assessment sheets. Educational institutions have to make more effort in staying in contact with the participants in order to track their further career steps. Despite effort put into this, the effectiveness of these practices is not always high. Therefore, there is a need to reflect and possibly develop, effective tools and practices for the evaluation of the training.

According to Byrne & Fayolle (2009), the assessment of the entrepreneurship training should be conducted before, during and after the training in order to evaluate a change in behaviour before and after exposure to training. Thus, in addition to traditional evaluation of the content and design of the training workshop through feedback questionnaires and Kirkpatrick’s smile

sheets (2006), it is advised to establish a communicational channel between the participants and programme's coordinator in order to keep track of the changes in learners' behaviours and organizational pay-offs. For instance, such a communication channel can be linked to a delegate's profile in one of the professional social network platforms (LinkedIn, XING), where the career paths are displayed.

#### **4.4. Conclusions**

The report presents a concept of the entrepreneurship training workshop for academic researchers and early-career industry professionals based on the results of a review of existing workshops and interviews. This concept attempts to provide a first outline on the content design as a baseline to further development. Although, the proposed concept in some aspects may look novel in comparison to typical programme currently on offer, it has been derived from the same framework. The basic idea of the concept is to introduce a methodology and let the participants apply this to on their own projects.

This approach in entrepreneurship training is used by most educators. The only fundamental difference here is the target group. Since the main goal of the HEKATE-project is to build knowledge alliances for the training of entrepreneurs between industry partners and academic organisations, it is crucial to design a workshop agenda around the idea of bridging the gap between these sectors. Therefore, the proposed concept of the workshop aims at connecting two parties in learning how to be more entrepreneurial within academia and business settings as well as gaining mutual learning benefits from active collaboration.

## **5. Summary and recommendations for further research**

This study has been conducted within the framework of the European project “HEKATE” and is aimed at providing recommendations for the conceptual design of the entrepreneurship training workshop targeted at academic researchers and early career industry practitioners with technical backgrounds. Within the study, in order to understand the market of current entrepreneurship training offered, two analyses have been conducted. First, the analysis of the review shows the general scope of the given entrepreneurship training programmes targeted at researchers and industry professionals. Second, a closer look on the training contents and teaching techniques has been taken through performing series of interviews with HEIs and enterprises offering entrepreneurial trainings.

### **5.1. Implementation issues**

From the analyses, common trends in the content and training methodologies have been identified and synthesized in the recommendations. However, it appears that it will be a challenge to accommodate the derived recommendations to the HEKATE workshop design in full. Specifically, the challenge is to find the balance between working on general versus specific cases. The trend in entrepreneurship training appears to be towards a more personalised approach with elements of experiential and active learning. The training programmes focus on particular learning needs of the target group or company’s strategic directions. For a mixed group of participants, it is suggested to implement an individual experiential learning twice, i.e. first for the ideas from researchers’ studies and, second, for the ideas coming from industry based young professionals. Although such a concept is theoretically possible, there are some fundamental issues to be considered.

First of all, the matter of confidentiality concerning the projects of industry practitioners must be considered, which can be particularly problematic, if participants come from one industry segment or competing companies. To avoid this problem, an asymmetric approach in training can be taken: instead of the round, where teams work on ideas of industry practitioners, a real project case can be provided by one of the external companies. The teams would be asked to find an innovative solution to one of the company’s issues. This approach avoids the need to deal with confidentiality, but puts two professional groups in unequal learning experiences.

Secondly, another important topic to be raised is a benefit for both types of participants from peer learning. Industry practitioners can share their knowledge and experience on working in a business setting with academic researchers that might have little prior exposure to it. The question is: what can early career industry engineers learn from working with academic

researchers? Contrary to industry practitioners, academic researchers often work on longer term projects with no immediate impact and possess deep expertise in one technical field. In theory, if both tandem partners work in one technical segment (e.g. researcher in lightweight materials for airplane cabin and practitioner in airplane cabin design), a practitioner can benefit from learning about the latest technology trends in this segment. But such a match of practitioner and researcher requires the training to be targeted towards very specific groups.

Additionally, most academic researchers dealing with a lot of scientific publications develop strong critical thinking skills and persistence in following the ideas. That means that they constantly refine their initial ideas and hypotheses, seek more information, perfect the methods and approaches used and are able to derive conclusions in efficient way. Most industry employees have no time to conduct deeper research and are constrained in their freedom to drive their ideas towards implementation if there are no management support and special resources allocation. Critical thinking and persistence are equally important as financial literacy and business planning as far as entrepreneurial success is concerned. Therefore, these can be seen as the benefit that young professionals can gain from collaboration with academic researchers. In summary, apart from learning tools and techniques in entrepreneurship, the two groups can experience learning from each other's professional experiences. For that reason, the topic of mutual benefit from collaborating should be considered more carefully to give a clearer picture of the learning outcomes for the two groups and can be used to guide the content design.

Thirdly, it is recommended that some of prior preparation to the workshop be included, though it will need to be taken into account that the preparation is not always performed by participants. It is, therefore, advised to keep the prior assignments and tasks straightforward and not too time consuming. Ideally, it would be more efficient if tandem teams would talk about the ideas in advance, but such a communication might already be an effort for both parties.

Finally, it is important to consider a scenario, when researchers and practitioners haven't yet developed any business ideas. Especially if both have just started their research and project works, the expectation that they have come up with potential business ideas should not be high. As a preventive action, only candidates with ideas derived from research study or meant to solve a problem at corporate level can be invited to the workshop.

## **5.2. Constraints**

Given the project complexity and the time available to carry out this assignment in the context of the HEKATE project plan, this study has some limitations. It has concentrated



more on the analysis of the interview data and less on desk research concerning the aspects of entrepreneurship training. In particular, more work is needed to form recommendations for the evaluation methods of the training effectiveness based on existing literature.

Additionally, it is important to highlight that the study reviews entrepreneurial activities at corporate level<sup>13</sup>, neglecting those that may take place at divisional or project levels. Most enterprise representatives interviewed are employees from the HR department and training centres, therefore the information provided relates to the entrepreneurship activities at corporate level. Another approach would be to directly interview project leaders and R&D directors to better understand their requirements for training and what they consider is missing in their competencies of their staff, particularly those, fresh graduates from university.

Lastly, in contrast to the target groups of the proposed HEKATE workshop, participants of the discussed corporate training programmes were mostly middle-level managers. Early career engineers have different work responsibilities and goals to middle-level managers, therefore an entrepreneurship training targeted at the first group would also have a different focus. The question of whether and how companies should approach a subject of entrepreneurship training for early career engineers within the corporate setting could be a subject for further research.

The limitations discussed and issues identified for the implementation of the proposed workshop concept require further discussion. It is hoped though that the conducted study can be useful for generating new ideas in entrepreneurship training and can serve as a source for designing an effective entrepreneurial training programme.

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<sup>13</sup> Exception is the workshop provided by Aircraft OEM that is specifically organized through one department and do not represent the official training landscape of the whole company.

## References

- Aaltio, I., Menzel, H., & Ulijn, J. (2007, December). On the way to creativity: engineers as intrapreneurs in organizations. 732-743.
- Alvarez, K., Salas, E., & Garofano, C. (2004). An integrated model of training evaluation and effectiveness. *Human Resource Development Review*, 385-416.
- Byrne, J., & Fayolle, A. (2009, June 3). Corporate entrepreneurship training evaluation. *Industry & Higher Education*, pp. 163-174.
- European Commission. (2011). *Intrapreneurship concept and its importance in Lifelong Learning*. Lifelong Learning Programme.
- European Commission. (2013). *Entrepreneurship Education – A Guide for Educators*. Bruxelles: Entrepreneurship and Social Economy Unit.
- Fayolle, A. (2009). *Entrepreneurship Education in Europe: Trends and Challenges*. Halle: UNIVERSITIES, INNOVATION AND ENTREPRENEURSHIP: GOOD PRACTICE WORKSHOP.
- Garavan, T. N., & O'Cinneide, B. (1994, 18 8). Entrepreneurship Education and Training Programmes: A Review and Evaluation - Part 1. *Journal of European Industrial Training*, pp. 3-12.
- Horsnby, J. S., Kuratko, D. F., & Zahra, S. A. (2002). Middle managers' perception of the internal environment for corporate entrepreneurship: assessing a measurement scale. *Journal of Business Venturing*, pp. 253-273.
- Kirkpatrick, D. (2006, August). Seven keys to unlock the four levels of evaluation. *Performance Improvement*, pp. 5-8.
- Knight, K. (1967). A Descriptive Model of the Intra-Firm Innovation Process. *The Journal of Business*, pp. 478-496.
- Knox, A. B. (1998). *Evaluating Adult and Continuing Education*. Ohio, USA: ERIC Clearinghouse on Adult Career, and Vocational Education.
- McFadzean, E., O'Loughlin, A., & Shaw, E. (2005). Corporate entrepreneurship and innovation part 1: the missing link. *European Journal of Innovation Management*, pp. 350-372.
- Reid, K., & Ferguson, D. M. (2011). *Enhancing the Entrepreneurial Mindset of Freshman Engineers*. American Society for Engineering Education.
- Richardson, I., & Hynes, B. (2008, Vol. 50 No. 3). Entrepreneurship education: towards an industry sector approach. *Education + Training*, pp. 188-198.
- Schawbel, D. (2012, July 29). *TechCrunch*. Retrieved March 31, How Big Companies Are Becoming Entrepreneurial, from <http://techcrunch.com/2012/07/29/how-big-companies-are-becoming-entrepreneurial/>
- Sharma, P., & Chrisman, J. J. (1999, Spring). Toward a Reconciliation of the Definitional Issues in the Field of Corporate Entrepreneurship. *Entrepreneurship Theory and Practice*, pp. 11-27.
- Thornberry, N. E. (2003, 22 4). Corporate entrepreneurship: teaching managers to be entrepreneurs. *Journal of Management*, pp. 329-344.
- Timmerman, M. W. (2013). A Course Developed to Teach Entrepreneurship for High Technology Ventures. *OPEN 2013: NCIIA's 17th Annual Conference* (pp. 1-10). Washington, DC: La Salle University.
- Wolcott, R. C., & Lippitz, M. J. (2007, Fall). The Four Models of Corporate Entrepreneurship. *MIT Sloan Management Review*, pp. 74-82.

**Annex**

## Annex 1 The review on entrepreneurial training offerings

No	Organisation	Programme	Target Group	Type	Duration	Innovation	Business acumen	New business opportunities	Entrepreneurial skills
1	MIT Sloan	Entrepreneurship Development Program	industry	CM*	5 days		x	x	
2	Board of Innovation	2-day training in Corporate Innovation, the start-up way	industry	training	2 days	x	x		x
3	Pinchot & Company	Business Innovation Accelerator	industry	training	3-4 days		x		
4	Vrije Universiteit Brussel	Intensive Training on Entrepreneurship in Photonics	PhD	training	2 w.***		x	x	
5	Danfoss	Man on the Moon	industry	BC**	18 m.	x	x	x	x
6	Hewlett-Packard	Flashpoint	industry	BC	18 m.	x	x	x	x
7	Qualcomm	Venture Fest	industry	BC	28 m.***	x	x	x	x
8	Facebook	Hackathons	industry	brain storming	1 day				
9	Microsoft	EDC Intrapreneurial Programme	industry	training	4 days	x	x	x	x
10	Stanford University	Stanford Executive Institute	industry	CM	1 w.		x		
11	TU Berlin	Produktpropeller: Technologiescreening	PhD	training		x		x	
12	Tampere University of Technology	The Demola - a Finnish open innovation platform	industry, students	innovation platform		x		x	
13	EMLyon	Strategy and Entrepreneurship training program (Driving disruptive strategy and Innovation)	executive industry	CM	4 days	x			x
14	Orange S.A.	Intrapreneurship	industry 5+	training	3 w.		x		x
15	Cranfield University	Entrepreneurship and Business Growth	industry 5+	CM	6 days		x		
16	Nottingham University Business School	Entrepreneurship in Practice	industry 5+	CM	5 days	x	x	x	x

\*CM stands for Custom Programme

\*\*BC stand for business plan competition

\*\*\* m. stands for month, w. stands for weeks

No	Organisation	Programme	Target Group	Type	Duration	Innovation	Business acumen	New business opportunities	Entrepreneurial skills
17	University of Cambridge	Cambridge-Unilever Sustainability Leadership Programme	executive industry	CM	4 days	x	x	x	
18	IBM	Emerging Technical Leaders learning path <sup>14</sup>	industry	training	6 days	x		x	x
19	Karlsruhe Institute of Technology	PhD Spring School on Technology Innovation and Entrepreneurship	PhD	training	4 days	x	x	x	
20	Alcatel-Lucent, DCU Ryan Academy	Open Innovation Boot Camp	industry, PhD	boot camp	5 days	x	x		
21	ESCP Europe	The Entrepreneurial Leadership Programme: Unternehmenschule	industry	CM	3-12 days		x		x
22	Flanders Business School	GROWTH ACCELERATOR PROGRAM	industry	training	8 days	x		x	
23	Deutsche Telekom AG	UQBATE Startup Days	industry	boot camp	2 days			x	
24	Imperial College Business School	Entrepreneurship and Growth	industry	CM			x	x	
25	University of Birmingham	Medici - The Enterprise Training Programme	PhD	training	7 days		x	x	
26	DuPont	Market Driven Growth Program	industry	training	4 days	x	x	x	
27	iMinds (IBBT)	Entrepreneurial Development Program	PhD, all	boot camp	5 days		x	x	x
28	iMinds (IBBT)	Opportunity Recognition Workshop	PhD	training	4 days	x		x	x
29	Vlerick Leuven Gent Management School	Executive Master Class in Innovation and Entrepreneurship	industry, PhD	customized programme	12 days	x	x	x	x
30	Umicore	Entrepreneurs for tomorrow	industry 5+	training	15 days	x	x	x	x
31	Janssen Pharmaceuticals	Entrepreneurial Boot Camp	industry	boot camp			x	x	
32	Solvay Business School	FROM RESEARCH TO BUSINESS	PhD	training	4 days	x	x	x	

<sup>14</sup> The programme includes series of workshops: Technical Leader Launchpad (10 hours of self-paced virtual learning), Technical Leader in YOU (2 days of f2f workshop), Becoming a Technical Leader (3 days of f2f workshop).

No	Organisation	Programme	Target Group	Type	Duration	Innovation	Business acumen	New business opportunities	Entrepreneurial skills
33	Aircraft OEM	Cabin Market Trends & Innovation <sup>15</sup>	industry	training	1-2 days	x		x	
34	Babson	Entrepreneurial Leadership	industry	CM	1-2 w.	x	x	x	x
35	Babson	THE ENTREPRENEUR'S BOOT CAMP: A DEEP DIVE FOR NEW VENTURES	industry	boot camp	4 days		x	x	x
36	Firm X	Innovation Workshop	industry 5+	training	2 days	x		x	
37	Allnex	Leadership Training	industry	training	1-7 days	x			x

<sup>15</sup> The workshop is provided within the series of training workshops