

# High-Tech Skills for Europe

## Scaling up Best Practices and Re-focusing Funding Programmes and Incentives

EASME/COSME/2016/033

### Interim Report

August 2018



### Interim report, August 2018

A study prepared for the European Commission: Executive Agency for Small and Medium-sized Enterprises (EASME) and the Directorate General Internal Market, Industry, Entrepreneurship and SMEs (GROWTH) by:



# Service Contract: Scaling up Best Practices and Re-focusing Funding Programmes and Incentives - EASME/COSME/2016/033

This service contract is carried out by **empirica GmbH** and **PwC**.



**For more information about this service contract, please contact:**

European Commission  
Executive Agency for Small and Medium-sized Enterprises (EASME)  
Unit A1: COSME –Sector A1.4 - Entrepreneurship  
COV2 11/116, Place Rogier 16  
B-1210 Brussels/Belgium

**Project lead:**

Werner B. Korte  
Director, empirica GmbH  
E-mail: [werner.korte@empirica.com](mailto:werner.korte@empirica.com)

**This report was written and reviewed by:** Werner B. Korte, Jza Abbas, Christine Clemens, Tobias Hüsing (empirica GmbH) with contributions from Erisa Gruda (PwC)

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# 1 Executive summary

## 1.1 Background and introduction

The objective of work in this service contract for the European Commission is to benchmark public policies and funding programmes for high-tech skills development including public-private partnerships, identify best practices and make recommendations for scaling up best practices and re-focusing funding programmes and incentives in Europe specifically related to the acquisition of high-tech skills.

The activities aim to mobilise a large number of stakeholders and Member States contributing to the success of the EU high-tech skills strategy and efforts to facilitate the uptake of digital and key enabling technologies by European enterprises, especially SMEs and start-ups.

The results are supposed to inform policy-makers and business and social leaders regarding more effective policies, partnerships, funding programmes and mechanisms as well as incentives to increase the high-tech talent pool, employment and the competitiveness of the European economy and to contribute to the further evolution and improvement of European and national initiatives on high-tech skills.

The focus will be on high-tech skills which encompass the skills needs related to digital technologies (e-skills) and a group of six key enabling technologies (KETs)<sup>1</sup> including: micro and nanoelectronics, nanotechnology, industrial biotechnology, advanced materials, photonics, and advanced manufacturing technologies.

In this interim report, the description of the state-of-play of the current work is provided. It includes a recapitulation of the objectives of the service contract (chapter 3), an overview of the approach followed in the work carried out so far, including expert consultation, surveys and desk research for identifying and assessing funding schemes and related policies and incentives (chapter 4), and a structured inventory and a typology of funding schemes (chapter 5) followed by some very first and tentative conclusions.

Several annexes include further details from our work. It starts with a list of the more than 100 experts from the informal stakeholder expert group, who have committed themselves to actively contribute to the work in surveys, expert workshops but also in further consultation rounds and through the validation of (interim) results.

This is followed by an annex of the more than 270 funding programmes identified including those more than 60 funding programmes selected as best practice candidates.

The online survey questionnaire agreed on with the European Commission for the first expert survey is provided in a further annex. This online survey is scheduled for May/June 2018 and will gather expert views to help the contractor formulate recommendations regarding the scaling up of best practices and re-focusing funding programmes and incentives in Europe specifically related to the acquisition of high-tech skills. The intended audience of the questionnaire consists of subject matter experts, mainly of the so-called informal stakeholder group which was established at the start of the service contract work.

Finally, detailed, structured descriptions of the best practice funding programmes presented and discussed at workshops in phase 1 of the service contract are provided with each of these following a common description format.

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<sup>1</sup> The new KETs list as outlined by the European Commission in February 2018 encompasses advanced manufacturing technologies, advanced materials and nanotechnologies, life science (as a broader definition of industrial-biotechnology), micro- and nano-electronics and photonics, artificial intelligence, security and connectivity. The two new technologies, namely artificial intelligence and security and connectivity are multi-KETs and crossover KETs. The new definition is retrieved from the Report of the Independent High Level Group on industrial technologies *Re-financing Industry - Defining Innovation*, April (2018) carried out for the Directorate-General for Research and Innovation of the European Commission.

## 1.2 Identification and analysis of relevant funding programmes

Since the start of this activity in summer 2017 the study team carried out an identification and first analysis of around 280 policies, funding programmes, incentives and instruments. Around 70 are currently further analysed. More than 50 expert interviews have already been carried out already (see annex for more details).

The country coverage agreed with the Commission is as follows: DE, FR, UK, ES, IT, PL, NL, SE, FI, EE. However, further interesting cases from other countries (e.g. DK, BE) are also considered. The following table provides an overview of the number of schemes identified in the different countries and those selected as promising practises and currently under further investigation.

Country		Identified programmes	Selected candidate programmes: Digital	Selected candidate programmes: KETs
Germany	DE	55	6	5
France	FR	21	8	3
United Kingdom	UK	29	3	2
Spain	ES	14	4	
Italy	IT	19		
Poland	PL	39	5	
Netherlands	NL	17	5	2
Sweden	SE	46	4	5
Finland	FI	20	2	1
Estonia	EE	11	2	
Denmark	DK	2	2	
Belgium	BE	1		1
Europe	EU	4	4	
USA	US	5	3	
Global		1	1	
<b>Total</b>		<b>284</b>	<b>49</b>	<b>19</b>

The list of all national programmes from EU member states identified in the selected countries is shown in the following table. This is followed by the overview table of 10 philanthropic and CSR-based programmes of global vendors in the USA and in Europe. From these programmes were selected which constitute best practice candidate programmes with a good fit as high-tech skills development funding programmes. To identify these programmes those were excluded which

- Were not specifically policy or funding programme type activities but for instance just awareness raising, promotion or one-off event type activities
- Focussed on more general digital skills training and not specifically on high-tech skills,
- Did not yet start operation or only just started and
- Evidently failed and were discontinued.

However, several of the 'failures' are also described in separate chapters and will serve as 'learning practices' when deriving and developing recommendations at a later stage. Further criteria applied for the selection included the need for a reasonable size of a programme and the availability of at least some information which could help in assessing the programme impact and ideally also some quantitative information helpful in judging about the effectiveness and efficiency of a programme. However, the latter information is very difficult

to obtain in general since only rarely evaluation reports exist and responsible stakeholders are very reluctant in passing on this information.

Altogether 68 best practice candidates were selected including 49 funding programmes with a primary focus on 'digital' and 19 programmes focussing on KET skills.

### *Overview of DIGITAL best practice candidate programmes*

Country	Title of policy initiative / funding programme
DE	Education and further education in business 4.0 - funding line of the JOBSTARTER plus programme (Aus- und Weiterbildung in der Wirtschaft 4.0)
DE	Förderprogramm "go-digital" ("go-digital" funding programme) - 2nd phase
DE	Förderprogramm "go-digital" ("go-digital" funding programme) - Pilot project - 1st phase
DE	NanoTecLearn - E-learning for education and training in micro-nano-integration (project within the technical programme 'Digital Media in Vocational Training')
DE	Software Campus
DE	Supporting the digitalisation in inter-corporate occupational vocational training centres (Förderung von Digitalisierung in überbetrieblichen Berufsbildungsstätten und Kompetenzzentren)
DK	IFD – Innovation Fund Denmark
DK	Industrial PhD
EE	Proge Tiger
EE	Study IT in Estonia
ES	Asesores Digitales
ES	Generation Spain
ES	Profesionales Digitales
ES	Formación postgrado
FI	Digiosaamisen kehittäminen (Digital Skills development)
FI	Demola
FR	École 42
FR	Institut Mines-Télécom
FR	La Grande Ecole du Numérique
FR	Manche Open School
FR	Station F
FR	Thales Station F Cybersecurity Programme
FR	"Industrie 4.0 et Formation pour le futur" by Opicalia
IT	Crescere in Digitale
NL	CA-ICT Foundation, ICT Labor Market Training Fund
NL	Industrial Doctorates
NL	Katapult
NL	Make it Work
NL	Techniekpact
PL	Akademia Zarządzania IT Administracji Publicznej (Academy of Commanding Public IT Administration)
PL	IT FOR SHE
PL	Microsoft and CISCO West Pomeranian for SMEs
PL	Sektor 3.0
PL	Lifelong Learning Centre of New Technologies (CKUNT abbreviation in Polish)
SE	Digitalakademin
SE	E-DIG – Digital lärplattform för den smarta digitala fabriken
SE	Expertkompetens (Expertise for Innovation)
SE	PROMPT
UK	National Software Academy
UK	KTPs (Knowledge Transfer Partnerships)
UK	Alacrity Graduate Entrepreneurship Programme

#### **Note:**

	Programmes presented and discussed at expert workshops in Brussels
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### Overview of KETs best practice candidate programmes

Country	Title of policy initiative / funding programme
BE	imec.academy
DE	Festo Didactic
DE	Digital manufacturing processes - Additional qualification for the future career in INDUSTRY 4.0!(Digitale Fertigungsprozesse - Zusatzqualifikation für die berufliche Zukunft in INDUSTRIE 4.0!)
DE	go-Inno
DE	Education Network High Technology Berlin (ANH Berlin)
DE	NANOFUTURES (WING Initiative)
FI	The Future Makers
FR	L'industrie du futur
FR	Arts et Métiers Acceleration
FR	Arts et Métiers ParisTech
FR	MINATEC
NL	Automotive Centre of Expertise (ACE)
NL	Top technology in secondary vocational education (Toptechniek in Bedrijf in het MBO) (TiB)
SE	Civilingenjör 4.0 Nationell utbildning inom Smart- och uppkopplad industri
SE	Graduate School Produktion2030 (Nationella Forskarskolan Produktion2030)
SE	Industrial PhD 2017
SE	Produktion2030
SE	Wallenberg Autonomous Systems and Software Program (WASP)
UK	Industry Partnership (Trailblazer): Specialization: Science (SIP)
UK	AMRC

#### Note:

	Programmes presented and discussed at expert workshops in Brussels
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## 1.3 Philanthropic and CSR-based programmes of global vendors in Europe and the USA

Large global IT vendors are further relevant stakeholders in the area of digital skills development in general and high-tech skills – especially with respect to digital skills – in particular. Several well-known mainly US companies have started such activities and programmes in the US and are increasingly also moving into Europe and their national European markets with these programmes or even apply them globally. Some of the most well-known programmes and initiatives are described below to illustrate these types of activity, carry out a general assessment and come to a first judgement as to the applicability and positioning in the overall context of future funding of high-tech training activities in Europe.

### Overview of philanthropic and CSR-based programmes of global vendors identified in the USA and Europe

Country	Title of policy initiative / funding programme
USA	SkillSET (founding partners are Accenture, CA Technologies, Cisco, Cognizant, Hewlett Packard Enterprise (HPE), Infosys, Pegasystems, PwC, Salesforce, SAP and Tata Consultancy Services)
USA	Grow with Google
USA	Goodwill Digital Career Accelerator
USA	Facebook Community Boost programme
USA	Facebook Community Boost EU programme
EU	Freeformers and Facebook partnership
EU	#SheMeansBusiness programme (Facebook)
EU	Google 'Growth Engine' Programme
EU	Cisco 'Country Digitization Acceleration' programme



All the philanthropic and CSR-based programmes of global vendors in Europe and the USA can be described as support or funding programmes of ‘donors funding the implementation and operation of a specific new training concept’. Most of them have started in the US where they already have a history. Those started in Europe are mostly rather recent developments with little or no reliable information about their achievements and impact.

Having been started as CSR-based programmes they need to be critically reviewed as to their real ‘substance’ and ambition and whether these will remain announcements and the prospective large numbers of people to be trained will become reality.

Apart from that, these initiatives mostly address and carry out rather general digital skills training. Where they move towards specific (high-tech) skills training, they are strongly related to vendor products and services (e.g. Cisco Networking Academy Program).

All these programmes can, at best, only add and contribute and not replace major funding policies and related programmes of national governments and those from industry – government partnerships mostly embedded in existing institutional education and training structures. The latter need to constantly be adapted to changing requirements and developments which seems to remain a big challenge in many countries.

## 1.4 Further types of funding and incentives supporting skills development in general

In addition to the above types of funding programmes, we could identify a whole range of different general types of funding and incentives supporting skills development addressed to individuals or companies in general.

Some of these can be applied for or apply also when participating in one of the above funding programmes (e.g. tax incentives through the tax levy in the UK which had a positive impact on the SIP – Strategic Industry Partnership Programme or the tax incentives in the Alliance Industrie du Futur in France) subject to the fulfilment of specified entitlement criteria.

Financial and fiscal incentives
a) Grants: training grants which cover payment of tuition fees, or other charges for educational services, including scholarships
b) Course subsidies: fully or partially subsidised courses
c) Loans: awarded to individual participants or enterprises for training purposes
d) Training vouchers: financial support in form of ILAs - Individual Learning Accounts or vouchers for individuals or SMEs
e) Cost reimbursements: repayments to beneficiaries in whole or in part
f) Reduced social contributions: full or partial exemptions to obligatory social contributions
g) Educational leave schemes: paid or unpaid schemes
h) Tax incentives: different types of economic incentives to invest in training: tax allowances, tax exemptions, tax credits, tax relief, tax deferrals.
i) Others (including combinations of the above)

In the vast majority of cases, the general financial and fiscal incentives restrict (financial) support to specific types of target groups, e.g. SMEs or individuals with an income not exceeding a certain (low) threshold, making

it very unlikely that such schemes can be applied in the area of high-tech skills development. These schemes are mostly aimed at more basic types of skills development addressed to unemployed and people without or low levels of skills and qualifications. They are not considered relevant in the present study. Only some (e.g. tax incentives) are partially relevant in cases where these constitute an integral part of one of the above funding programmes as described above.

## 1.5 Typology of relevant high-tech skills funding programmes

In a further step, we aimed at studying and categorising the selected programmes to develop a typology of funding programmes. This typology is used to identify the typical key elements of different types of programmes, their success factors, the ability to scale-up, the transferability potential and more importantly, their sustainability in terms of secured financial capability and governance structures.

The objective was to help gaining a better understanding of the different mechanisms, specifics and overall functioning of these programmes and to find out which of these or which combinations bear the potential for successfully supporting high-tech skills development in the future.

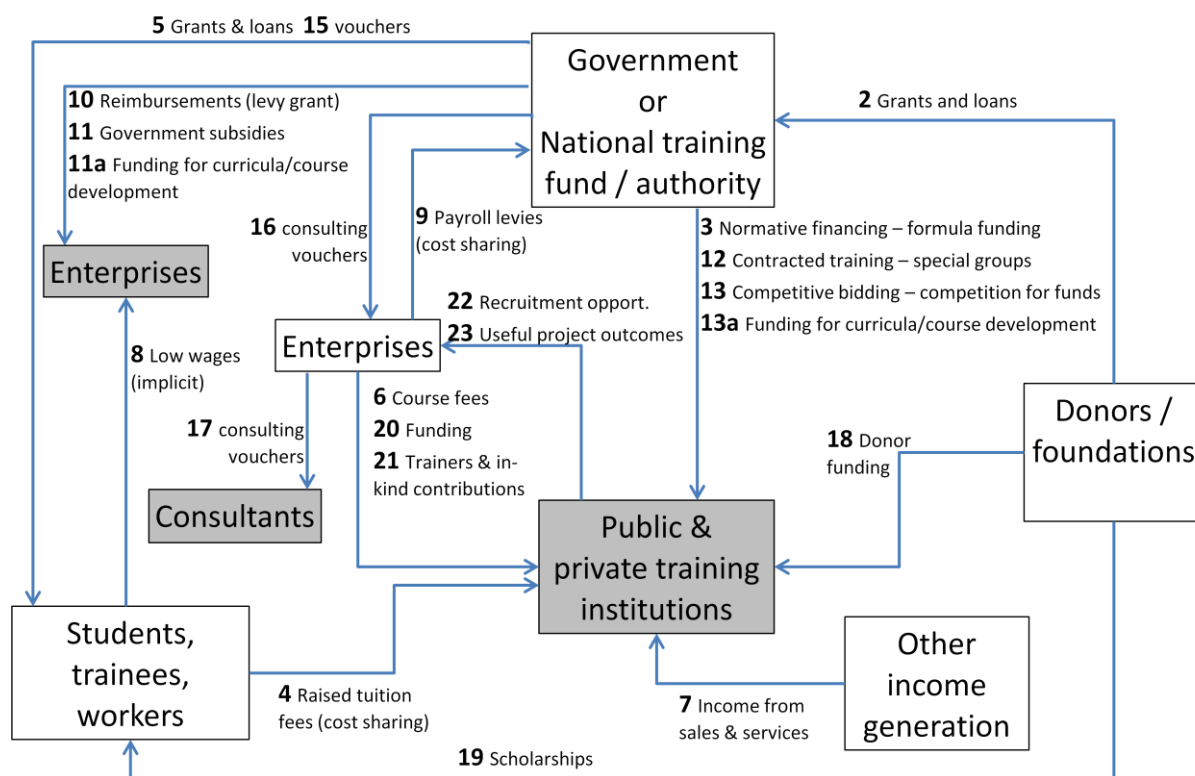
We used and applied the integrated framework recently developed by Ziderman<sup>2</sup> which the author developed after a thorough analysis of the training finance system which he describes as ‘excessively fragmented’. His approach covers the traditional funding mechanisms as well as new, innovative ones (e.g. private training provision, levy-grant schemes, subsidising apprenticeship training). The framework is supposed to combine all the old and new financing mechanisms.

Applying this integrated framework to the funding programmes selected and analysed, it became apparent that it quite nicely covers almost all financing and funding mechanisms in these programmes. With some few additions integrated - which were carried out to make it fully fit the purposes of our activities - the framework has proven to be highly applicable and useful for the purposes of the present study. The value of this framework lies additionally in its integrated system view, rather than piecemeal, and it can rightly be described as an ‘integrated, demand-responsive training markets framework’. It is very helpful in introducing the different funding mechanisms and programmes as a comprehensive, integrated system leading the way to transforming the fragmented, inefficient training systems into an integrated competitive, demand-driven training system<sup>3</sup>.

The framework model developed is depicted in the following figure.

<sup>2</sup> Ziderman, Adrian: Funding Mechanisms for Financing Vocational Training: An Analytical Framework. IZA Policy Paper No. 110. Bonn, 2016, p. 29

<sup>3</sup> See: Ziderman, Adrian: Funding Mechanisms for Financing Vocational Training: An Analytical Framework. IZA Policy Paper No. 110. Bonn, 2016, p. 27-30



**Note:** blue arrows represent funding flows; training providers are indicated by shaded boxes.

The following typology of financing and funding programmes emerged once applying this extended framework. Altogether 10 different types can be distinguished. For illustration purposes, relevant funding programmes are assigned to each type to provide the reader with further information with respect to the still existing variety within each type and concrete cases which can directly be looked at to obtain more information as to the details of each funding programme. The 10 types of funding programmes are:

- Funding for industry in building and running dedicated vocational education centres
- Funding for the co-creation by industry and academia of new courses and curricula
- Funding for of new innovative and alternative teaching/learning systems<sup>4</sup>
- Funding excellence schemes with top universities to draw top academic talent and students
- Funding SME vouchers for consulting contracts and knowledge transfer.
- Funding high tech apprenticeships/traineeships in industry
- Funding the development of open education resources (OER, including MOOCs)
- Funding (lifelong) learners through vouchers, fiscal incentives and/or cost sharing
- Funding upskilling/reskilling programmes for the workforce<sup>5</sup> in particular sectors or regions
- Other

Further analysing the different funding programmes captured under each type allows for a description of the respective characteristics of each type of funding programme along different relevant criteria:

1. Strengths, weaknesses, opportunities and threats (SWOT)
2. Effectiveness

<sup>4</sup> Such as project or challenge based learning approaches, for students who might have difficulties in the traditional system, e.g. Ecole 42's approach, see: [https://en.wikipedia.org/wiki/42\\_\(school\)](https://en.wikipedia.org/wiki/42_(school))

<sup>5</sup> With co-funding from industry

3. Efficiency
4. Impact
5. Scalability (including transferability potential)
6. Sustainability of each funding programme type to then draw a
7. Bottom line and come up with first
8. Conclusions and recommendation as to their future relevance and applicability in general as well as for scaling-up, replication and transferability for

In the first phase we have started this process for two types of funding programmes. The results for one of these programme types is depicted in the figure below.

The work will be continued in phase 2 for the remaining types of funding programmes.

By using this format, the results are presented in an easy to grasp overview format which will allow for a straightforward assessment of the related strengths of each programme type. It will also ease and support the drawing of conclusions and the development and formulation of recommendations at a later stage.

EXCELLENCE					
Title:	Excellence schemes with top universities and high tech industry funded by governments to draw more academic top talent towards industry careers				
Programme type	Ref. no.	Description of funding / support mechanisms (financing flows)	Identified programmes	Effectiveness	Efficiency
Funding excellence schemes with top universities to draw top academic talent and students (PPP for high-tech skills development, developing and offering tailor-made programmes to create future industry leaders)	5	Government or National training fund / authority funding students, trainees, workers through grants & loans	<ul style="list-style-type: none"><li>• Software Campus (DE)</li><li>• Industrial PhD 2017 (SE)</li><li>• Industrial Doctorates (NL)</li><li>• Industrial PhD (DK)</li></ul>	<b>High:</b> The programmes reach the target groups, have successfully mobilised the relevant stakeholders (industry and universities) and the PhD candidates develop industry-relevant high-tech skills. Provision of funding works very well in most cases.	<b>High:</b> Evaluation reports (where these exist) show a high level of satisfaction among all stakeholders. The average cost per PhD candidate varies between 125,000 and 190,000 EUR is likely to be a reasonable investment and good value for money if the majority of candidates further pursue a career in industry or in their own start-ups and are likely to become top level industry leaders in the future.
	12	Government or National training fund / authority to fund public & private training institutions for contracted training of special groups			
	20	Enterprises supporting public & private training institutions through funding			
	21	Enterprises supporting public & private training through own trainers and in-kind contributions			
	22	Public & private training institutions offering partnership programme to enterprises with recruitment opportunities			
	23	Public & private training institutions provide enterprises with useful project outcomes			
Impact	+	The impact on high-tech skills development for future decision makers in industry is considered high, as the scope and focus are on bringing together national leading industrial and academic organisations in this field and fully targeting the high-tech skills topic. The programmes are expected to lead to growth and employment on macroeconomic level. On individual level they equip research talents with commercial insight and experience by working at a company while studying at university. The programmes are designed to create a larger pool of high-tech talents. Cooperation between research institutions and private companies is prone to leading to innovation and exchange of perspectives.			
Scalability	+	Scalability is considered to be high. The programmes can be considered highly scalable regarding the involvement of further industrial companies including larger SMEs, the public sector and additional higher and executive education and training institutions (reaching beyond the top technical universities). Programmes possibly need not only be addressed to PhD but may also include Master students. Replication on a larger scale requires rather high investments should this model be replicated 1:1. Transferability is considered to be rather high. The model offered by the initiative is highly transferable to different contexts, which is demonstrated by the fact that the Dutch programmes was built on the basis of the experiences in Denmark. Replication of the Software Campus in other European regions may also be feasible with less investment and funding.			
Sustainability	+	The programmes can be described as excellence initiatives funded through a combination of private and public sources, integrating industry and higher education and training, with a strong link to practice and mentoring, gaining work experience in a company and practical problem solving through carrying out and leading a project dealing with an issue of relevance for the company. With the present shared funding model the programmes can be considered to be highly sustainable.			

SWOT	STENGTHS:	WEAKNESSES:
	<p>Proximity of university education and industry including corporate top executive training for PhD candidates.</p> <p>Real top management and industry leader candidates as outcome.</p>	<p>Transferability requires quite substantial investments.</p> <p>Danger of lack of sufficient number of candidates when focussing on PhDs only.</p> <p>Comparably high levels of churn of corporate participation have been observed in Germany which may hint to weaknesses, but reasons for this are yet to be identified.</p>
Bottom line and recommendations	OPPORTUNITIES:	THREATS:
	<p>Increasing the pool of industrial leadership talent, strengthening the integration of innovation systems.</p>	<p>Potential misuse of budget when transferring it to universities as just another source of research funding (can be avoided by proceeding according to the Nordic model: employer status of PhD candidate and direct payment).</p>

**Software Campus (DE)**  
**Programme type:** PPP for high-tech skills development, developing and offering tailor-made programmes to create future industry leaders (elite programmes)

**Note:** blue arrows represent funding flows; training providers are indicated by shaded boxes; red texts highlight the relevant funding flows in the case.

## 1.6 Results from the analysis of ‘learning practices’

Several policies and funding programmes were identified which are not necessarily good practice candidates since they do not meet the selection criteria or ceased to continue operation but which - for different reasons - can be seen as ‘learning practices’. These practices help us draw lessons when evaluating the success of funding programmes and defining important elements to watch out and things to avoid for the future in the area of high-tech skills training funding programmes.

Learning practices referred to in this report include the following.

### *Overview of ‘learning practices’ programmes from the UK*

Country	Title of the ‘learning practice’
UK	UK Commission for Employment and Skills (UKCES) <i>[discontinued]</i>
UK	The TechPartnership <i>[discontinued]</i>
UK	LearnDirect <i>[likely to be discontinued]</i>
UK	Industrial Partnerships
UK	City Region Deals

The ‘learning practices’ illustrate how a lack of consistency and stability in the education and training system can negatively impact necessary skills development activities. Furthermore, some of these practices seem to demonstrate that often they manage to continue operating at a rather small scale or no longer once the initial government funding period ceases..

Organisations set up by government to simplify and stabilise the education and training and especially the VET system whose establishment were explicitly welcomed and supported by the OECD are no longer in operation. This now leaves a vacuum in the provision of strategic policy advice to government, based on the input of employers and unions.

Furthermore, the Learndirect case demonstrates an example of the introduction of a well-intended funding programme which failed after it changed governance structure and ownership, resulting in mismanagement and the responsible actors overseeing a catastrophic decline in quality standards. It has also been described by some experts as a systemic failure of public policy.

Finally, further investigations are needed as to the skills development related activities of the City Region Deals proposals. Information on these is very scarce, responsibilities fuzzy, responses poor, concrete implementation and operation of skills training obviously not taking place or at least in doubt. The further analysis will hopefully shed some light on which of these activities continue to be active and successful in terms of high-tech skills development and whether these can be seen as effective and efficient funding mechanisms and programmes.

The analysis of these ‘learning experiences’ so far has already come up with interesting results which provide valuable input for the development of recommendations for the establishment of future-oriented national and European funding programmes in the area of high-tech skills development and thereby help governments – not only in the UK - to learn the lessons and act to ensure that scandals like Learndirect never happen again.



## 2 Introduction

The digitisation of the economy and key enabling technologies are drastically and fundamentally disrupting the way enterprises operate. This is posing new demands in terms of knowledge, skills and competences towards the economy and workforce. Demand for high-tech skills is increasing fast which is resulting in significant shortages at all levels in organisations: technical, professional, management and strategic leadership level.

Member States and EU policies and initiatives need to take these disruptions into consideration and further develop and adapt their programmes and incentives to better anticipate and cope with change and allow individuals and organisations to acquire and/or update these specialised skills and provide the economy with a large talent pool and the high-tech skills and competences needed. Education and training systems in Europe need also to react on these new demands and develop appropriate training offers.

empirica and PwC are analysing the situation at national level and selectively also with respect to relevant programmes at EU level<sup>6</sup> and the synergies between the different instruments with a view to identify successful ones, i.e. best practices. These are identified in order to highlight their potential to be scaled up to become even more successful and sustainable and they may also serve as a guide for re-focusing and improving existing funding programmes and incentives.

The identified policies, policy programmes, financial and fiscal incentives and funding programmes are recorded in a repository which provides for each policy and incentive the sources of information used, a classification by forms of incentives and a structured and brief description according to specific criteria to be developed and agreed on. In a second step, an evaluation of the identified schemes (policies, programmes, initiatives, incentives of different type) is carried out using criteria such as impact, sustainability and scalability.

A best practice selection is carried out following a deeper evaluation of the shortlisted practices using further selection criteria.

This activity is part of the COSME 2016 Work Programme. Since 2016, important developments affecting skills policies and funding in particular took place in the meantime, including:

- Blueprint on sectoral cooperation on skills: six sectoral pilots will start in December 2017 (funded by Erasmus+ and COSME). For the second wave of implementation in 2018, six new sectors have been added (call to be published in October 2017).
- Digital Skills and Jobs Coalition: launched in December 2016 has now 17 national coalitions. Further activities planned at increasing the number of women in IT jobs etc.

Cooperation, synergy and coordination will be established with these two initiatives as well as participation at key events to promote progress and results from the service contact.

The European Commission has announced on 18 September 2017 their new industrial policy strategy<sup>7</sup> that aims at empowering European industries to continue delivering sustainable growth and jobs. The industrial policy strategy aims to bring together existing and new initiatives, to clarify tasks ahead for the actors involved,

<sup>6</sup> At EU level funding opportunities for skills development include: the European Structural and Investment Funds: European Social Fund; European Regional Development Fund; Youth Employment Initiative; European Agricultural Fund for Rural Development; European Maritime and Fisheries Fund; Erasmus+; Horizon2020; European Fund for Strategic Investment; EU Programme for Employment and Social innovation; European Investment Bank's "Skills and Jobs" loan programme"; COSME – Europe's Programme for SMEs; European Globalisation Fund ; and the LIFE Programme. Source: European Commission: Staff Working Document: Analytical underpinning for a New Skills Agenda for Europe Accompanying the Communication from the European Commission "A New Skills Agenda for Europe: Working together to strengthen human capital, employability and competitiveness" {COM(2016) 381 final}, Brussels 10.6.2016, p. 76

[https://ec.europa.eu/info/funding-tenders/european-structural-and-investment-funds\\_en](https://ec.europa.eu/info/funding-tenders/european-structural-and-investment-funds_en)

<sup>7</sup> [https://ec.europa.eu/commission/news/new-industrial-policy-strategy-2017-sep-18\\_en](https://ec.europa.eu/commission/news/new-industrial-policy-strategy-2017-sep-18_en)

to establish an annual Industry Day, the first edition of which took place in February 2017, and a High Level Industrial Roundtable aiming to allow industry and civil society to steer industrial policy actions in the future.

The Industrial Policy Strategy confirmed the extension of the Blueprint for sectoral cooperation on skills to new key industry sectors, such as construction, steel, paper, green technologies and renewable energies, additive manufacturing and maritime shipping. In particular, the strategy confirms the pivotal role of skills and qualification in the deep transformation that European industry is undergoing and in closing the innovation gap that is growing with some of the key competitors.

### **The role of funding for skills development**

Policy at all levels needs to identify viable funding models for high-tech skills development. These need to take into account the scale dimension as well resources and timing issues. Furthermore, issue of quality are crucial followed by governance, monitoring and supervision, business buy-in, business model, scalability, sustainability as further important aspects for consideration.

The present activity therefore sets out to learn from existing initiatives, identify the key success factors, key challenges, and based on that, develop guidelines for future policy making purposes. The extracted results will be of high practical relevance for policy makers, and should enable them to make strategic decisions regarding high-tech skills-related policies and support measures.

The focus will be on high-tech skills which encompass the skills needs related to digital technologies (e-skills) and a group of six key enabling technologies (KETs) including: micro and nanoelectronics, nanotechnology, industrial biotechnology, advanced materials, photonics, and advanced manufacturing technologies.

#### **Definitions and scope:**

High-tech skills encompass the skills needs related to:

- digital technologies (e-skills) and
- a group of six key enabling technologies (KETs) including:
  - micro and nanoelectronics,
  - nanotechnology,
  - industrial biotechnology,
  - advanced materials,
  - photonics, and
  - advanced manufacturing technologies.

The work is covering hard to fill high-level skills needs of enterprises related to new technologies.

The target groups of this work are:

- students,
- professionals,
- managers and
- entrepreneurs in enterprises in all sectors

who would need to acquire and/or update these specialised skills. A particular attention will be put on small and medium sized enterprises (SMEs) and start-ups.

## 2.1 Structure of the report

In this interim report, the description of the state-of-play of the current work is included in the following chapters:

- A recapitulation of the objectives of the service contract (chapter 3)
- An overview of the approach followed in the work carried out so far, including expert consultation, surveys and desk research for identifying and assessing funding schemes and related policies and incentives (chapter 4);
- A structured inventory and a typology of funding schemes (chapter 5);
- Several annexes including
  - overview lists of the experts from the informal stakeholder expert group,
  - funding programmes identified,
  - those funding programmes selected as best practice candidates,
  - the online survey questionnaire and
  - more detailed structured descriptions of best practice funding programmes presented and discussed at workshops in phase 1 of the service contract following a common description format.

### 3 Objectives

The overall objectives are to:

- Benchmark public policies and public-private partnerships,
- Make recommendations for scaling up best practices and re-focusing funding programmes and incentives in Europe
- Mobilise a large number of stakeholders and Member States contributing to the success of the EU high-tech skills strategy and
- Invest efforts to facilitate the uptake of digital and key enabling technologies by European enterprises, especially SMEs and start-ups
- Inform policy-makers and business and social leaders regarding more effective policies, partnerships, funding programmes and incentives to
- Increase the high-tech talent pool, employment and the competitiveness of the European economy and
- Contribute to the further evolution and improvement of European and national initiatives on high-tech skills.

For the 2020+ funding period changes are currently under discussion. Without interfering in the political process, the work will bring a contribution by analysing and documenting best practices and identifying scalable and sustainable mechanisms to support policy makers and stakeholders in improving the effectiveness and efficiency of their funding programmes and incentives.

## 4 Approach, activities and achievements so far

The present chapter describes the approach taken and work in progress for each activity undertaken.

### 4.1 Establishment of an informal expert group

An informal expert group of more than 100 experts from all over Europe has been established. These experts are supposed and have committed themselves to support the partners and the European Commission in this work by actively attending workshops, taking part in online surveys, reviewing documents and giving recommendations. The complete list of experts is shown in the annex.

### 4.2 Identification and analysis of relevant funding programmes

Since the start of this activity in summer 2017 we have carried out an identification and first analysis of around 270 policies, funding programmes, incentives and instruments. Around 70 are currently further analysed. More than 50 expert interviews have already been carried out already (see annex for more details).

The country coverage agreed with the Commission is as follows: DE, FR, UK, ES, IT, PL, NL, SE, FI, EE. However, further interesting cases from other countries (e.g. DK, BE) are also considered. The following table provides an overview of the number of schemes identified in the different countries and those selected as promising practises and currently under further investigation.

Country		Identified programmes	Selected candidate programmes: Digital	Selected candidate programmes: KETs
Germany	DE	55	6	5
France	FR	21	8	3
United Kingdom	UK	29	3	2
Spain	ES	14	4	
Italy	IT	19		
Poland	PL	39	5	
Netherlands	NL	17	5	2
Sweden	SE	46	4	5
Finland	FI	20	2	1
Estonia	EE	11	2	
Denmark	DK	2	2	
Belgium	BE	1		1
Europe	EU	4	4	
USA	US	5	3	
Global		1	1	
<b>Total</b>		<b>284</b>	<b>49</b>	<b>19</b>

The list of all national programmes from EU member states identified in the selected countries is shown in the following table. This is followed by the overview table of 10 philanthropic and CSR-based programmes of global vendors in the USA and in Europe. From these the table of programmes is presented which were selected as best practice candidate programmes following a further analysis of their fit as high-tech skills development funding programmes.

However, several of the 'failures' will serve as 'learning practices' when deriving and developing recommendations at a later stage. This resulted in the selection of 69 best practice candidates including 49 funding programmes with a primary focus on 'digital' and 20 programmes focussing on KET skills.

Further analysis activities for the best practice candidate cases are currently underway as will be further described in subsequent chapters.

**Overview of identified funding programmes**  
(best practice candidates are marked in green)

Country	Title of policy initiative / funding programme
BE	imec.academy
DE	Allianz für Aus- und Weiterbildung 2014 - 2018 (Alliance for Education and Training 2014 - 2018)
DE	"Smart Energy Showcases - Digital Agenda for the Energy Transition" (SINTEG)
DE	Autonomik für Industrie 4.0 (Autonomics for Industry 4.0)
DE	BEN - der Berufsentwicklungsnavigator (The professional development navigator)
DE	Bildungsgutschein (education voucher)
DE	Bildungsprämie (education bonus premium voucher)
DE	Bildungsscheck NRW (Educational check NRW)
DE	Bündnis "Zukunft der Industrie" (Alliance "Future Industry")
DE	Centre of Excellence on securing skilled labour (Kompetenzzentrum Fachkräftesicherung (KOFA)
DE	Cluster-Netzwerke-International (Competiton, 3rd round) with accompanying measures: InterSpiN, MeNeC, The Virtual Cluster Academy, PubliSta
DE	Deutschland Digital 2015
DE	Deutschlands Spitzencluster (Germany's Top Clusters)
DE	Digital manufacturing processes - Additional qualification for the future career in INDUSTRY 4.0!(Digitale Fertigungsprozesse - Zusatzqualifikation für die berufliche Zukunft in INDUSTRIE 4.0!)
DE	Digital Media in Vocational Training (technical program) (Digitale Medien in der beruflichen Bildung (Fachprogramm))
DE	Digitale Agenda 2014-2017
DE	Digitale Strategie 2025 (DE.DIGITAL)
DE	DIV - Deutschland intelligent vernetzt (Focus Group "Intelligent Networking" of the Digital Summit)
DE	Education and further education in business 4.0 - funding line of the JOBSTARTER plus programme (Aus- und Weiterbildung in der Wirtschaft 4.0)
DE	erlebe IT
DE	Fachkräfte für Deutschland (Partnership for skilled professionals)
DE	Fachkräfte Offensive (Qualified Professionals Initiative)
DE	Förderprogramm "go-digital" ("go-digital" funding programme) - 2nd phase
DE	Förderprogramm "go-digital" ("go-digital" funding programme) - Pilot project - 1st phase
DE	General financial incentives for further education in Germany
DE	go-Inno
DE	Hands on Industrie 4.0
DE	Hightech-Strategie 2020
DE	IKT 2020 – Forschung für Innovationen (ICT 2020 programme)
DE	IKT für Elektromobilität III (ICT for electro mobility)
DE	Industrie 4.0
DE	Initiative Berufsbildung 4.0
DE	KURSNET - das Portal für berufliche Aus- und Weiterbildung
DE	Lernende Systeme- Plattform für künstliche Intelligenz (Learning Systems - platform for AI)
DE	MINT Regionen (STEM regions)
DE	MINT Zukunft schaffen (Create MINT Future)
DE	Mittelstand 4.0 - Digitalisierung im Mittelstand (Digitalisation of SMEs)
DE	NanoTecLearn - E-learning for education and training in micro-nano-integration (project within the technical programme 'Digital Media in Vocational Training')
DE	Nationales MINT Forum (National STEM Forum)

Country	Title of policy initiative / funding programme
DE	Platform Smart Living
DE	Rahmenprogramm der Bundesregierung für Forschung und Innovation 2016-2020 „Mikroelektronik aus Deutschland – Innovationstreiber der Digitalisierung“ (framework program of the Federal Government for Research and Innovation 2016-2020 "Microelectronics from Germany - the Innovator of Digitization")
DE	RKW Kompetenzzentrum (RKW Competence Center)
DE	Smart Data
DE	Smart Home
DE	Smart School
DE	Smart Service Welt I & II (SmartServiceWorld)
DE	Software Campus
DE	Supporting the digitalisation in inter-corporate occupational vocational training centres (Förderung von Digitalisierung in überbetrieblichen Berufsbildungsstätten und Kompetenzzentren)
DE	Tax deduction related to further education in Germany
DE	Trusted Cloud
DE	Weiterbildungsprämie (further training grant)
DE	Weiterbildungsstipendium (training scholarship)
DE	Education Network High Technology Berlin (ANH Berlin)
DE	NANOFUTURES (WING Initiative)
DE	Festo Didactic
DK	IFD – Innovation Fund Denmark: Industrial PhD
EE	NutiLabor (SmartLabs)
EE	“Year of Skills” 2017
EE	Centre for Integrated Electronic Systems and Biomedical Engineering
EE	Centre of Excellence in Genomics
EE	Competence Centre ELIKO
EE	e-Governance Academy
EE	Estonian Biocentre
EE	Estonian eXcellence in Computer Science
EE	Estonian Lifelong Learning Strategy 2020
EE	Proge Tiger
EE	Samsung DigiPass
EE	Software Technology and Applications Competence Centre (STACC)
EE	Study IT in Estonia
ES	AceleraTIC
ES	Agenda Digital para España
ES	Agenda para el fortalecimiento del sector industrial en España (Agenda for the strengthening of the industrial sector in Spain)
ES	Asesores Digitales
ES	Formación postgrado
ES	Generation Spain
ES	Industria Conectada 4.0
ES	NanoSpain
ES	Plan de Acción de Empresa Digital 2016-2020
ES	Plan de impulso de la economía digital y los contenidos digitales
ES	Plan de TIC en PYME y comercio electrónico
ES	Profesionales Digitales
ES	Programa de Gestión de la Innovación (free Innovation Management program)
ES	Talent Club
ES	TodoFP
FI	Avainta tekoälykaaan (key to artificial intelligence)
FI	BioDigi
FI	Competence required by digitalisation
FI	Digiosaamisen kehittäminen (Development of Digital Learning)



Country	Title of policy initiative / funding programme
FI	Digiosaamisen kehittäminen (Digital Skills development)
FI	Digiosaava satavuotias Suomi
FI	Digital Excellence Academy
FI	Digitalisaatiolla kilpailukykyä -koulutuksen (Digitalisation for Competitiveness Training)
FI	Digitekijä fast track -erikoistumiskoulutus (Fast Track Specialization Training)
FI	eAMK Oppimisen uusi ekosysteemi (the new ecosystem for learning)
FI	Ecosystem Forum
FI	Hundred
FI	Innovation voucher
FI	Korkeakoulutettujen muuntokoulutuksen määräraha lisätalousarvio 2017
FI	Mehackit
FI	Post Docs in Companies (PoDoCo)
FI	Talent Boost programme
FI	The Future Makers
FI	Demola
FI	Photonics Finland – Finnish Society of Photonics
FR	Plan pour l'inclusion numérique
FR	Arts et Métiers Acceleration
FR	Arts et Métiers ParisTech
FR	Cap Digital
FR	École 42
FR	Education pour numérique
FR	French Tech
xFR	Institut Mines-Télécom
xFR	L'industrie du futur
FR	La Grande Ecole du Numérique
FR	Le Blender
FR	Le plan numérique pour l'éducation
FR	Manche Open School
FR	Orange Digital Academy (Only for Orange employees)
FR	Paquet discal et règlementaire pour les start-ups, por favoriser l'attractivité et la croissance économique
FR	SheMeansBusiness
FR	Station F
FR	Thales Digital Factory
FR	Thales Station F Cybersecurity Programme
FR	"Industrie 4.0 et Formation pour le futur" by Opcalia
FR	NANOEL
FR	MINATEC
IT	Bestr
IT	Confindustria Digitale
IT	Crescere in digitale (Growing in Digital)
IT	Digital and Environmental Skills for Facilities Management (DEFMA)
IT	Digital Italy Agency
IT	Digital Transformation Team
IT	Eccellenze in digitale (Excellence in Digital)
IT	Gaetano Marzotto Award
IT	Industry 4.0 Plan
IT	Istituti Superiori (ITS) - Higher Technical Institutes
IT	ITS Tech Talent Factory Milan
IT	Motorvehicle University of Emilia-Romagna (MUNER)
IT	Programma il Futuro (The Future Programme)

Country	Title of policy initiative / funding programme
IT	Samsung Innovation Camp
IT	VEGA Park (VEnice GAteway for Science and Technology)
IT	Venice Innovation Hub for Re-Startup Manufacturing
IT	Local partnership by ManpowerGroup
IT	Crescere in Digitale
IT	Industria 4.0 – Impresa 4.0 agevolazioni per l’innovazione e lo sviluppo di tecnologie abilitanti
IT	Advanced Training in Key Enabling Technologies and Entrepreneurship
NLxNL	Automotive Centre of Expertise (ACE)
NL	BioHack Academy: BioFactory
NL	CA-ICT Foundation, ICT Labor Market Training Fund
NL	Centres of Expertise
NL	CHILL - Chemolot Innovation and Learning Labs
NL	dutch digital delta Talent Grants
NLx	Industrial Doctorates
NLx	Katapult
NLx	Make it Work
NL	Mechatronics Academy
NL	NWO Physics Industrial Partnership Programmes (IPP)
NL	Regional VO-HO networks
NL	Skills & Technology of the 21st Century
NL	Top technology in secondary vocational education (Toptechniek in Bedrijf in het MBO) (TiB)
NL	Topsectoren - Sectoral Human Capital Agendas
NLx	Techniekpact
NL	Oefenfabriek
PL	(Dobry Pomysł) Good Idea Program
PL	Akademia PARP
PL	Akademia Zarządzania IT Administracji Publicznej (Academy of Commanding Public IT Administration)
PL	COSME
PL	CyberSecIdent
PL	Education and New Technologies
PL	e-learning training
PL	e-obawytel (e-citizen)
PL	Foundation Nowe Technologie (New Technologies)
PL	Fundacja Rozwoju Kardiologii im. Prof. Zbigniewa Religi (Foundation for the Advancement of Cardiology under the name of Prof. Zbigniew Religi)
PL	HORIZON 2020
PL	Industry Cluster Bydgoszcz
PL	INFOSTRATEG
PL	INNOLOT
PL	INNOMED
PL	IT FOR SHE
PL	IT/ICT Promotion Program
PL	Jeden IT - Polish Programmers
PL	klaster IT
PL	Krajowy Fundusz Szkoleniowy (National Training Fund)
PL	Microsoft and CISCO West Pomeranian for SMEs
PL	Network of Regional Specialist Observatories in the Process of Exploring Entrepreneurship
PL	OP Knowledge Education Development
PL	OP Polska Cyfrowa (Digital Poland)
PL	OP Smart Growth
PL	Plan for Responsible Development (pl.: Plan na rzecz odpowiedzialnego rozwoju)
PL	Polish-Norwegian Research Cooperation
PL	Polska 3.0

Country	Title of policy initiative / funding programme
PL	Przemysł 4.0 (Industry 4.0)
PL	Sektor 3.0
PL	Start in Poland
PL	Startup Poland
PL	STRATEGMED
PL	Swiss Contribution: Swish-Polish Cooperation Programme
PL	Szkola Gospodarki Cyfrowej (School of Digital Economy)
PL	Szkolenia by ASSECO (Training by ASSECO)
PL	TECHMATSTRATEG
PL	Technologie wspomagające rozwój bezpiecznej energetyki jądrowej (Technologies Supporting the Development of Secure Nuclear Energy)
PL	Lifelong Learning Centre of New Technologies (CKUNT abbreviation in Polish)
SE	ISACA Sweden Chapters stipendium
SE	Produktionslyftet
SE	Automationsutmaningen
SE	Avans
SE	Checkar för digitalisering
SE	Civilingenjör 4.0 Nationell utbildning inom Smart- och uppkopplad industri
SE	Den smarta digitala fabriken 2016-2018
SE	DesignIT
SE	Diagnos på distans
SE	Digitalakademin
SE	Digitalisering och ledarskap i offentlig förvaltning
SE	E-DIG – Digital lärplattform för den smarta digitala fabriken
SE	Expertkompetens (Expertise for Innovation)
SE	Expertkompetens sociala medier och webbtteknologi för innovation och tillväxt
SE	För ett hållbart digitaliserat Sverige - en digitaliseringsstrategi
SE	Forsknings- och innovationsprojekt - Smartare elektroniksystem 2018
SE	Gjutmagistern
SE	Graduate School Produktion2030 (Nationella Forskarskolan Produktion2030)
SE	IEC
SE	Industrial PhD 2017
SE	Industriklivet
SE	Informator
SE	Internetfonden
SE	Kickstart Digitalisering
SE	Nationell strategi för nanoteknik
SE	Photonics Agenda
SE	ProdEx – Expert i produktionsteknik
SE	Produktion2030
SE	PROMPT
SE	Regionala företagsstöd
SE	Regionalt investeringsstöd
SE	Robotlyftet
SE	Samverkan för kommersiella grafentillämpningar
SE	Smart industri - en nyindustrialiseringsstrategi för Sverige
SE	Smarta Fabriker
SE	Smartare Elektroniksystem
SE	Startup-Sweden - Boot camp för digitala startups
SE	Stora IT-kompetensdagen
SE	Stora IT-kompetenspriset
SE	Strategiska innovationsprogram - samarbete för hållbar innovation
SE	Strategiska innovationsprogrammet för processindustriell IT och automation - PiiA

Country	Title of policy initiative / funding programme
SE	Sverige Digitaliserar!
SE	SwedNanoTech
SE	Uppkopplad industri och nya material
SE	Wallenberg Autonomous Systems and Software Program (WASP)
SE	XPRES - Initiative for excellence in production and research
UK	ADDopt
UK	Aston University Degree Apprenticeship
UK	Black Country Apprenticeships for High Value Manufacturing
UK	British Institute of Technology, England (BITE)
UK	City RegionDeals
UK	Digital Strategy 2017
UK	E.ON Academy
UK	Industrial Strategy Challenge Fund
UK	Industry Partnership (Trailblazer): Specialization: Medicine Manufacturing (MMIP)
UK	Industry Partnership (Trailblazer): Specialization: Science (SIP)
UK	Industry Partnerships (Trailblazers): Overall
UK	ITA (Individual Training Account) (formerly ILA - Individual Learning Account)
UK	Learndirect
UK	Leeds City Region Deal: 14+ Apprenticeship Academy Apprenticeship Hubs
UK	Manchester City Apprenticeship & Skills Hub
UK	My World of Work
UK	National Innovation Centre for Data (NICD)
UK	National Software Academy
UK	National Training Academy for Rail
UK	Oxford Innovation Centres
UK	Professional and Career Development Loans
UK	Skills 4 Growth Programme in Advanced Manufacturing and Engineering (Coventry & Warwickshire)
UK	Skills for Londoners Capital Fund
UK	The apprenticeship levy supporting SIP programmes
UK	The Creative Quarter
UK	The Tech Partnership
UK	University of Cambridge Bioinformatics Training
UK	University of Sheffield Industrial Training Programme
UK	PAiCE (Platforms   Additive Manufacturing   Imaging   Communication   Engineering)
UK	AMRC
UK	KTPs (Knowledge Transfer Partnerships)
UK	Alacrity Graduate Entrepreneurship Programme

#### Overview of philanthropic and CSR-based programmes of global vendors identified in the USA and Europe

Country	Title of policy initiative / funding programme
USA	SkillSET (founding partners are Accenture, CA Technologies, Cisco, Cognizant, Hewlett Packard Enterprise (HPE), Infosys, Pegasystems, PwC, Salesforce, SAP and Tata Consultancy Services)
USA	Grow with Google
USA	Goodwill Digital Career Accelerator
USA	Facebook Community Boost programme
USA	Facebook Community Boost EU programme
EU	Freeformers and Facebook partnership
EU	#SheMeansBusiness programme (Facebook)
EU	Google 'Growth Engine' Programme

Country	Title of policy initiative / funding programme
EU	Cisco 'Country Digitization Acceleration' programme

*Overview of DIGITAL best practice candidate programmes*

Country	Title of policy initiative / funding programme
DE	Education and further education in business 4.0 - funding line of the JOBSTARTER plus programme (Aus- und Weiterbildung in der Wirtschaft 4.0)
DE	Förderprogramm "go-digital" ("go-digital" funding programme) - 2nd phase
DE	Förderprogramm "go-digital" ("go-digital" funding programme) - Pilot project - 1st phase
DE	NanoTecLearn - E-learning for education and training in micro-nano-integration (project within the technical programme 'Digital Media in Vocational Training')
DE	Software Campus
DE	Supporting the digitalisation in inter-corporate occupational vocational training centres (Förderung von Digitalisierung in überbetrieblichen Berufsbildungsstätten und Kompetenzzentren)
DK	IFD – Innovation Fund Denmark
DK	Industrial PhD
EE	Proge Tiger
EE	Study IT in Estonia
ES	Asesores Digitales
ES	Generation Spain
ES	Profesionales Digitales
ES	Formación postgrado
FI	Digiosaamisen kehittäminen (Digital Skills development)
FI	Demola
FR	École 42
FR	Institut Mines-Télécom
FR	La Grande Ecole du Numérique
FR	Manche Open School
FR	Station F
FR	Thales Station F Cybersecurity Programme
FR	"Industrie 4.0 et Formation pour le futur" by Opcalia
IT	Crescere in Digitale
NL	CA-ICT Foundation, ICT Labor Market Training Fund
NL	Industrial Doctorates
NL	Katapult
NL	Make it Work
NL	Techniekpact
PL	Akademia Zarządzania IT Administracji Publicznej (Academy of Commanding Public IT Administration)
PL	IT FOR SHE
PL	Microsoft and CISCO West Pomeranian for SMEs
PL	Sektor 3.0
PL	Lifelong Learning Centre of New Technologies (CKUNT abbreviation in Polish)
SE	Digitalakademin
SE	E-DIG – Digital lärplattform för den smarta digitala fabriken
SE	Expertkompetens (Expertise for Innovation)
SE	PROMPT
UK	National Software Academy
UK	KTPs (Knowledge Transfer Partnerships)
UK	Alacrity Graduate Entrepreneurship Programme

**Note:**

	Programmes presented and discussed at expert workshops in Brussels
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### Overview of KETs best practice candidate programmes

Country	Title of policy initiative / funding programme
BE	imec.academy
DE	Festo Didactic
DE	Digital manufacturing processes - Additional qualification for the future career in INDUSTRY 4.0!(Digitale Fertigungsprozesse - Zusatzqualifikation für die berufliche Zukunft in INDUSTRIE 4.0!)
DE	go-Inno
DE	Education Network High Technology Berlin (ANH Berlin)
DE	NANOFUTURES (WING Initiative)
FI	The Future Makers
FR	L'industrie du futur
FR	MINATEC
FR	Arts et Métiers Acceleration
FR	Arts et Métiers ParisTech
NL	Automotive Centre of Expertise (ACE)
NL	Top technology in secondary vocational education (Toptechniek in Bedrijf in het MBO) (TiB)
SE	Civilingenjör 4.0 Nationell utbildning inom Smart- och uppkopplad industri
SE	Graduate School Produktion2030 (Nationella Forskarskolan Produktion2030)
SE	Industrial PhD 2017
SE	Produktion2030
SE	Wallenberg Autonomous Systems and Software Program (WASP)
UK	Industry Partnership (Trailblazer): Specialization: Science (SIP)
UK	AMRC

**Note:**

	Programmes presented and discussed at expert workshops in Brussels
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## 4.3 Workshops

### 4.3.1 Background and objectives

The objective is to organise four workshops (covering all tasks of WP1 – WP3) with at least 15 experts attending each workshop and coming from government, industry, associations, academia and other relevant stakeholders to gather their views, contributions and feedback on the findings and achievements, foster consensus on progress and work, plus soliciting ideas regarding the next steps and the key elements and messages to be included in the interim and final reports.

Participants for all workshops were and will be carefully selected from the lists of experts and stakeholders from the informal expert group held by the study team and documented in the annex of this Interim Report.

In total four workshops are to be organised as follows:

Workshop & Conference	Month	Proposed date	Venue
Workshop no. 1 *	Month 06	30 <sup>th</sup> January 2018	European Liaison Office of the Deutsches Zentrum für Luft- und Raumfahrt (DLR), Rue du Trône 98, B-1050 Brussels
Workshop no. 2 *	Month 10	16 <sup>th</sup> May 2018	European Liaison Office of the German Research Organisations, Rue du Trône 98, B-1050 Brussels
Workshop no. 3	Month 17	13 <sup>th</sup> December 2018	European Liaison Office of the German Research Organisations, Rue du Trône 98, B-1050 Brussels
Workshop no. 4	Month 21	11 <sup>th</sup> April 2019	

\* = Workshop already completed

At the first two workshops 15 experts presented promising practices of national policies and funding programmes with the aim of critically reviewing and learning from these for scaling up and re-focusing but also supporting improving the effectiveness and efficiency of their funding programmes and incentives.

The workshops were very well attended by members from the informal expert group. The planned number of attendants set in the contract (15) was heavily exceeded and only limited by the available seating capacity (workshop 1: 25 experts and workshop 2: 45 experts).

### 4.3.2 Results

Results from an investigation of existing policies and funding programmes were presented at the workshops. During the first two workshops 15 funding programmes from the pool of best practice candidates were presented and summary descriptions highlighting the major points of relevance developed.

The experts agreed that as a starting point a **policy vision** is needed for the revision of present and the development of **new, more appropriate funding programmes, instruments and mechanisms**. To some extent, this already exists at European level through the different recent European Commission policy documents and Communications in this area. These should be integrated and further developed, streamlined and put forward as a common policy document proposal. The policy vision should be developed in a coordinated fashion involving the different DGs at the Commission dealing with these issues and involving relevant national EU Member State stakeholders and government departments and policy decision makers to achieve an overall European-wide agreement.

Based on that decision and agreement, necessary partnerships, programme types and funding instruments and mechanisms and details need to be developed at national and European level, as to necessary monetary dimensions and budgets to be allocated to specific (new) ways of funding.

One-size-fits-all policies and programmes will not provide the necessary basis and means to address future challenges. Based on a first analysis of identified promising practices, it becomes apparent that the future policy and funding landscape is likely to be multi-faceted with a co-existence and combinations of a multitude of different types of funding programmes and mechanisms.

The results of the first two workshops are documented and made available in separate reports at: <http://leadership2019.eu/publications.html>

### 4.3.3 Future workshops

While workshops 1 and 2 followed an approach of inviting, presenting and discussing best practice candidate funding schemes in expert rounds, workshop 3 will move towards the development of a typology of funding



schemes, focussing on those which have proven successful along certain criteria (effectiveness, efficiency, scalability, sustainability ...), extracting the success factors to best implement and operate such schemes and presenting and discussing these at the workshop. Workshop 4 will focus on learning from the successful cases, start defining elements of relevance for the development of new and innovative funding schemes, develop recommendations and discuss these with experts at the workshop.

## 4.4 Expert interviews

The objective of the desk research together with expert interviews in conjunction with online surveys was to conduct a comprehensive collection of the latest relevant information, data, etc. from reliable sources.

The target set was at least 50 interviews of relevant stakeholders. These should be split across experts in the different fields of high-tech skills (digital and KET skills) to investigate their needs regarding the transformation of their activities and businesses. In a later phase, the expert interviews will be expanded geographically and include contacting relevant experts from other parts of the world, namely the USA.

More than 50 interviews - including experts from different backgrounds and affiliation - were organised and carried out already in the first year of the service contract. The list of the interviewees is shown in the annex. The insights and results of these are fully integrated in the present interim report and the descriptions of the high-tech training programmes identified and analysed.

## 4.5 Online survey

The objective of an online survey for a service contract of the present type is to engage experts throughout Europe on the topic of high-tech skills policies and initiatives. It will be addressed mainly to the members of the informal expert group of more than 100 experts from all over Europe and active in relevant fields for the present study. These experts have committed themselves to support this European Commission initiative. The expert group was established at the start of this activity in autumn 2017.

The survey could either be organised as a data gathering survey for gathering further initiatives and policies not identified or as a feedback survey to ask questions around and get feedback on the initial draft types of initiatives, funding schemes and incentives to obtain an expert validation and expert advice and recommendations for improvement. The decision was taken to proceed with the latter approach which would reveal more valuable results for the work.

The online survey was planned for the month of March 2018. The study team proposed to postpone the survey until May/June 2018 to allow consideration and incorporation of the results from the second workshop and the ongoing and continuous analysis work into to survey questionnaire.

The structure and outline of the questionnaire agreed on with the Commission is as follows:

Topic / Issue	Question / Description
General demand	1. Do you agree or disagree that in your country there are difficulties for employers to find employees with relevant high-tech skills?
Funding measures	<p>2) In addition to formal education, public authorities may support various measures to enhance high-tech skills of the workforce and / or to increase the supply of high tech talent. Which measures are most efficient and cost effective? Please choose (drag and drop), and rank the following funding measures. Which measures are most efficient and cost effective?</p> <p>Funding for industry in building and running dedicated vocational education centres</p> <ul style="list-style-type: none"> <li>• Funding for the co-creation by industry and academia of new courses and</li> </ul>

Topic / Issue	Question / Description
	<p>curricula</p> <ul style="list-style-type: none"> <li>• Funding for of new innovative and alternative teaching/learning systems<sup>8</sup></li> <li>• Funding excellence schemes with top universities to draw top academic talent and students</li> <li>• Funding SME vouchers for consulting contracts and knowledge transfer.</li> <li>• Funding high tech apprenticeships/traineeships in industry</li> <li>• Funding the development of open education resources (OER, including MOOCs)</li> <li>• Funding (lifelong) learners through vouchers, fiscal incentives and/or cost sharing</li> <li>• Funding upskilling/reskilling programmes for the workforce<sup>9</sup> in particular sectors or regions</li> </ul> <p>Other (please specify)</p>
<b>Policy measures/ Focus</b>	<p>3) Which type of high-tech skills should especially be the focus of funding measures? Please choose and rank up the following skills areas.</p> <ul style="list-style-type: none"> <li>• STEM skills</li> <li>• ICT professional skills<sup>10</sup></li> <li>• Basic ICT user skills (digital literacy)</li> <li>• Advanced ICT user skills</li> <li>• Advanced KETs skills<sup>11</sup></li> <li>• Soft skills<sup>12</sup></li> </ul> <p>Leadership skills<sup>13</sup></p>
<b>Satisfaction with current education and training offers</b>	<p>4) How satisfied are you currently with the high tech skills provided by the following education and training organisations/institutions in your country?</p> <ol style="list-style-type: none"> <li>Higher education: universities, degree education</li> <li>Higher education: universities, life-long learning education and training</li> <li>Vocational education and training (VET), vocational degree education</li> <li>K-12 education foundations of STEM skills</li> <li>Executive education: business schools, executive and professional courses</li> <li>Vendor-based training programmes, certification courses</li> <li>Industry-led training centres (also in Public Private Partnership)</li> <li>Consultants: training and support for company owners and executives</li> </ol> <p>i) Further education and training programmes of other training providers</p>
	<p>5) Which education and training providers should preferably be supported by government funds? Please allocate 100 percent of a hypothetical <u>additional</u><sup>14</sup> public budget aiming at enhancing high-tech skills. You may leave cells blank to indicate no funding should be made.</p> <ol style="list-style-type: none"> <li>Higher education: universities, for degree education</li> </ol>

<sup>8</sup> Such as project or challenge based learning approaches, for students who might have difficulties in the traditional system, e.g. Ecole 42's approach, see: [https://en.wikipedia.org/wiki/42\\_\(school\)](https://en.wikipedia.org/wiki/42_(school))

<sup>9</sup> With co-funding from industry

<sup>10</sup> Software engineering, application development, networks operations, system administration, cloud computing, cyber security, IoT, data analytics, artificial intelligence, AI, IT management etc.

<sup>11</sup> Engineering and professional skills in: micro-electronics; nanotechnology; industrial biotechnology; advanced materials, photonics, and advanced manufacturing technologies

<sup>12</sup> Problem solving, critical thinking, communication, teamwork etc.

<sup>13</sup> Here especially: having strategic vision for technology, digital transformation, and taking innovations to market

<sup>14</sup> i.e. Taking as a given the existing funding for schools and universities

Topic / Issue	Question / Description
	<ul style="list-style-type: none"> <li>b) Higher education: universities, for life-long learning education and training</li> <li>c) Vocational education and training (VET), for vocational degree education</li> <li>d) K-12 education foundations of STEM skills</li> <li>e) Executive education: business schools, executive and professional courses</li> <li>f) Providers of vendor-based training programmes, certification courses</li> <li>g) Industry-led training centres (also if Public Private Partnership)</li> <li>h) Consultants who provide training and support for company owners or top-level executives</li> <li>i) Further education and training providers</li> </ul>
<b>Instruments</b>	<p>6) Which of the following incentives addressed to individuals or companies (SMEs) are the most appropriate? Please tick one box per row.</p> <ul style="list-style-type: none"> <li>a) Grants: training grants which cover payment of tuition fees, or other charges for educational services, including scholarships</li> <li>b) Course subsidies: fully or partially subsidised courses</li> <li>c) Loans: awarded to individual participants or enterprises for training purposes</li> <li>d) Training vouchers: financial support in form of ILAs - Individual Learning Accounts or vouchers for individuals or SMEs</li> <li>e) Cost reimbursements: repayments to beneficiaries in whole or in part</li> <li>f) Reduced social contributions: full or partial exemptions to obligatory social contributions</li> <li>g) Educational leave schemes: paid or unpaid schemes</li> <li>h) Tax incentives: different types of economic incentives to invest in training: tax allowances, tax exemptions, tax credits, tax relief, tax deferrals.</li> <li>i) Others (including combinations of the above) – Please specify: ...</li> </ul>
<b>Recommendations</b>	<p>7) Given the topics addressed in this questionnaire, do you have any potential recommendations one could give to policy makers regarding the funding for high tech skills?</p>

The full questionnaire is shown in the annex to this report.

## 5 The European funding programme landscape for high-tech skills development

In the present chapter, firstly an overview of high-tech skills funding programmes in Europe is given, followed secondly, by philanthropic and CSR-based programmes of global vendors in Europe and the USA. Thirdly, and in addition to the above types of funding programmes, a whole range of different general types of funding and incentives supporting skills development addressed to individuals or companies in general were identified. These are briefly outlined as well and – where appropriate – related to the specific high-tech skills funding programmes. Fourthly, a typology of relevant high-tech skills funding programmes is developed and described. This typology is built on the integrated framework recently developed by Ziderman<sup>15</sup> which the author developed after a thorough analysis of the training finance system. This framework with its further developments and extensions by empirica has proven suitable and fully applicable in the context of the present service contract. Fifthly, results from the application of the integrated framework are described which include a first typology of funding programmes in 10 types and an assessment of the different funding programmes captured under each type. Sixthly, this is complemented by an analysis of ‘learning practices’, i.e. past funding programmes which ceased to exist but from which one can learn for the development of future funding programmes, mechanisms and incentives. The assessment was carried out along relevant criteria to assess for each funding programme type their SWOTs, effectiveness, efficiency, impact, scalability and sustainability and then draw some first conclusions and develop recommendations with respect to the future applicability for funding high-tech skills development, thereby increasing the respective talent pool for Europe to remain competitive at a global level.

### 5.1 Overview of dedicated high-tech skills funding programmes in Europe

Based on an analysis carried out for the identified promising practices, it becomes apparent that the funding programme landscape is multi-faceted with a co-existence and combinations of a multitude of different types of funding programmes and mechanisms. The range of funding programmes is very broad as can be illustrated by describing each of the most relevant promising practices in a few words each with the aim to allow grasping the key elements in order to get an informative and expressive overview. The result is presented herewith:

1. New and innovative (free) peer-to-peer learning programmes without curricula entirely funded by an investment from a donor like école 42 in France.
2. Tri-partite ecosystem development partnerships for joint problem solving or case handling and thereby professional skill development like DEMOLA which started in Finland and is now operating in around 15 countries. Demola is a model in which academic students along with business staff carry out fast co-creation projects following open innovation rules. Demola is integrated in university curricula and business co-operation in 58 academic institutions in 15 countries (status: March 2018). The co-creation services of Demola are used by over 600 companies yearly.
3. Co-development programmes for professional skills development like Expertkompetens in Sweden with projects like PROMPT and several others funded through this programme.
4. Katapult, a Dutch network of more than 150 partnerships (so-called centres of expertise) between education and business with 50,000 students, 4,500 companies and 4,000 teachers participating

<sup>15</sup> Ziderman, Adrian: Funding Mechanisms for Financing Vocational Training: An Analytical Framework. IZA Policy Paper No. 110. Bonn, 2016, p. 29

and constantly growing since it was established in 2016 through fund of the Ministry of Education, Culture and Science and the Ministry of Economic Affairs with the objective to improve cooperation between education and business by professionals from the business community providing training lessons or students doing research for an SME during their training. Government and private sector have joined forces to accelerate change and invest in conversion of the workforce through Centres of Expertise (Higher Education) and Centres for Innovative Craftsmanship (Vocational Education) for more than 15 years now in collaboration between entrepreneurs, vocational schools, higher education institutions and government in various sectors offering – amongst others - nine to 12 months of intensive skills training to apprentices.

5. Industrie 4.0 et Formation pour le future is claimed to be a programme developed and tailored to the needs of industry and run by Opcalia in France which aims at developing professional competences of employees to adapt to the high-tech trends and boost their career with a primary training focus on automation, robotics, co-robotics, 3D printing, artificial intelligence and big data. Opcalia funds up to 70% of the training programmes and deliver certifications to participants.
6. The ‘Advanced Training in Key Enabling Technologies and Entrepreneurship’ programme of Sapienza University in Italy is an excellence programme closely involving key industry partners with the objective to develop knowledge, and high qualified competences on some of the Key Enabling Technologies such as nanotechnology, microelectronics with a focus on combining these technologies for generating new business models.
7. Excellence programmes for PhD skills development within a cooperation of university and industry followed by a career in industry instead of university like the Industrial Doctorates and IPP programmes in the Netherlands, the Industrial PhD 2017 programme in Sweden or the programme Software Campus in Germany, or IFD, Denmark
8. The national graduate school funded by the WASP - Wallenberg Autonomous Systems and Software Program closely interacting with Swedish industry. The intention of this joint effort is to raise the knowledge level in Sweden in areas such as vehicles, robots and complex software-intensive systems with the intelligence to achieve autonomy in interactions with humans, and include industrial PhD students as an important component generating at least 100 new PhDs, with at least 50 of those being industrial PhD students.
9. The Knowledge Transfer Partnership (KTP) is a tri-partite ecosystem development partnership connecting industry, higher education institutions and research organisations which focuses on multi-KETs. It was initiated by the United Kingdom’s Technology Strategy Board, now Innovate UK and has been set up to ease the transition of graduates into the labour market, to increase the extent of knowledge transfer between academia and small businesses, and to increase the chances of graduates to get a job.
10. Career exploration programmes of High-Tech U (HTU), a global programme run by SEMI the global industry association representing the electronics manufacturing supply chain.
11. Academies like the Imec.academy in Belgium - imec’s learning institute - which offers specialized courses on nanoelectronics and digital technology and at the same engages in research on educational technology allowing its technical training programs to combine world-class expertise with hands-on applications for industry, academia and the (imec) employees.
12. The AMRC Training Centre at the University of Sheffield’s AMRC Group is a centre of excellence for industry-focused machining and materials research providing training in the practical and academic skills that manufacturing companies need to compete globally, from apprenticeship

- through to doctorate and MBA level with options available from level 3 engineering apprenticeships to level 6 degree-level apprenticeships with are about 250 apprentices each year and more than 240 associated employers. The AMRC Training Centre secured government backing for the Training Centre in 2013 and operates with an additional strong industry financing.
13. The IT Academy in Estonia which is, among other things, an industry and government funded academy developing and offering education and OERs (IT)
  14. The MINATEC innovation campus in France is a joint effort of research institutes and local government offering graduate, undergraduate programmes as well as further educational tracks to train students and technicians from the KETs area in management skills, and programmes that place PhD's in companies. The MINATEC Innovation Campus shows how KETs skills issues can be addressed by academia and local government jointly establishing KETs research and education centres, especially the KETs challenges related to educational programmes not being fully aligned with industry needs, to too little awareness of KETs when students make critical choices, to KETs careers not being perceived as attractive and prestigious, and to limited opportunities to study KETs in Europe.
  15. The network ANH Education Network High Technology Berlin (Aus- und Weiterbildungsnetzwerk Hochtechnologie) offers free training, targeted advice and support in photonics to small and medium-sized enterprises, advice in all matters regarding vocational training in the high-tech area (whereby vocational trainings have a particular focus on photonics and micro-systems technology), consultancy and support for companies and institutes in vocational education and training, tailor-made courses for further training. It additionally provides opportunities for young people to explore STEM (science, technology, engineering, and mathematics) professions and get first-hand information about jobs and career prospects by visiting associated school laboratories and companies. They can also apply for an apprenticeship within the partner companies via the network's main office at FBH – Ferdinand Braun Institut.
  16. Accelerators and incubators addressed to start-up support and skills training and development including schemes like Station F in France hosting incubator and accelerator programmes from major institutions and organisations enhanced by plus own programmes for vulnerable groups of people commonly neglected, and also offering financial assistance and loans. Examples of accelerators hosted come from well-known global players like Microsoft and Facebook but also the Thales Cybersecurity Programme selecting candidates following a rigorous selection process or the Arts et Métiers Acceleration hardware accelerator programme which offers grants and financial assistance to start-ups.
  17. The Alacrity Graduate Entrepreneurship Programme offered by the Alacrity Foundation of the Welsh government provides tax free stipends and delivers mentoring and support to graduates in emerging technologies and running a successful business through a 12-month programme that provides graduates with practical business training, software skills and mentoring so that they can develop as entrepreneurs and launch their own UK based technology companies.
  18. Support programmes like the German government programme Supporting the digitalisation in inter-corporate occupational vocational training centres (Förderung von Digitalisierung in überbetrieblichen Berufsbildungsstätten und Kompetenzzentren) for the development and testing of innovative vocational training concepts based on digital equipment in inter-corporate occupational vocational training centres to become competence centres on digitalisation and

- associated innovative training with the aim to thereby motivate for replication and wide dissemination throughout vocational training institutions.
19. Funding for regional projects in Germany to support small and medium enterprises on issues related to dual vocational training on topics related to 'digitalisation' and providing advice on how to develop related company-internal training methodically and didactically as in the JOBSTARTER Plus funding line on Education and further education in business 4.0 (Aus- und Weiterbildung in der Wirtschaft 4.0) which can be illustrated by the project.
  20. Digital manufacturing processes - Additional qualification for the future career in INDUSTRY 4.0! (Digitale Fertigungsprozesse - Zusatzqualifikation für die berufliche Zukunft in INDUSTRIE 4.0!) is a JOBSTARTER Plus project. The additional qualification module for the future career in INDUSTRY 4.0! targeted at ambitious trainees in the technical-industrial occupations in the 2nd year of apprenticeship training in Germany especially from SMEs helps secure the availability of advanced manufacturing process specialists with specialist knowledge of the future. The programme provides adaptation support for dual vocational training. Apprentices get to know the production network in the "Smart Factory" along the value-added process.
  21. Industrial Partnerships (Trailblazers) in the UK bringing together employers across an industry sector to lead the development of skills, with a focus on growth and competitiveness. These were established for different sectors in the United Kingdom offering apprenticeships from Level 2 to 6 (Level 5 – 8 under development) following the 'earn and learn' principle set-up by the UK government funding with matching funds from industry. A typical example is the SIP – Science Industry Partnership and its Industry Degree Scheme and SMART Apprenticeships programmes having received an initial government funding of GBP 52 for setting up and piloting the scheme and being one of eight such partnerships throughout the country.
  22. City Region Deals in the UK (<https://beta.gov.scot/policies/cities-regions/city-region-deals/>) which are agreements between the Scottish Government, the UK Government and local government designed to bring about long-term strategic approaches to improving regional economies. Each deal is tailored to its city region, reflecting its individual economic strengths and weaknesses, and comprises a programme of interventions to support positive, transformative change. Many of these include skills development in general or high-tech skills training related activities. Examples include the Leeds City Region Deal with a 14+ Apprenticeship Academy Apprenticeship Hubs, the Manchester City Apprenticeship & Skills Hub and the Black Country Apprenticeships for High Value Manufacturing.
  23. Top technology in secondary vocational education (Toptechniek in Bedrijf in het MBO) (TiB) programme set up in 2012 by the Dutch the Ministry of Education, Culture and Science and the Ministry of Economic Affairs through which seventeen self-appointed regions received a three-year incentive contribution to develop a regional vision including a plan for strong cooperation between VMBO, MBO and the business community to train sufficient professionals for the regional labour market. Meanwhile 21 regional VMBO-MBO networks are working on their ambitions to train more professionals for the future. Some regions focus strongly on the development of continuous VMBO-MBO curricula, while other regions focus more on lifelong learning from primary education to the workplace. There are networks that have set up their approach to the manufacturing industry, while others focus their arrows on installation, construction or transport. Each region has its own identity and therefore its own strategy.



24. The Technology Pact (Techniekpact) is a joint initiative and public-private partnership of central government, the business community, the trade unions, and the education community and five regions each developing their own Technology Pact to increase the number of technically educated people in the Netherlands, improve the alignment between secondary education, vocational education and higher education, help primary education teachers improve their skills in the area of Science & Technology education, strengthen public-private partnerships in support of primary and secondary education, make optimal use of technically-skilled staff and their talents and retain them for individual companies.
25. The ProgeTiger programme in Estonia founded by the Information Technology Foundation for Education (HITSA) and the Estonian Ministry of Education and Research as a supportive initiative for educational institutions in 2012 with the goal to enhance learners' technological literacy and digital skills, help students understand the basics of technological creativity and the relationships among technologies, support the development of problem-solving skills and to achieve better learning outcomes in general – in preschool, general and vocational education domains with a special focus on activities related to integration of three thematic fields - engineering sciences, design and technology (D&T), and information and communications technology (ICT) into the teaching and learning of different subjects and extracurricular activities.
26. Study IT in Estonia, is a cooperation programme run by the Republic of Estonia, universities and IT industry for securing necessary skilled labour force for the ICT sector and for creating preconditions for Estonia's growth through ICT, contributing to educating tomorrow's university graduates so they are highly qualified and valued specialists on the Estonian and international labour markets supported by a scholarship fund which provides financial support to the brightest students. Universities also offer university-specific tuition waivers and other support.
27. Programmes like the Arts et Métiers ParisTech offer training in engineering subjects by a higher engineering school in partnership with an industrial engineering institute and industrial companies which are addressed to apprentices to obtain a higher degree
28. Programmes addressed to the manufacturing industry like Produktion2030 in Sweden funding collaboration activities between industry, academia and research institutes with levels of co-financing from industry above 50% with the two education and training-related projects Civilingenjör 4.0 developing and introducing new course module for Master level education in engineering, with a strong focus on Industry 4.0-related topics and the Graduate School Produktion2030 (Nationella Forskarskolan Produktion2030) which has developed and introduced a number of courses to become part of the so-called "Special Produktion2030 offer" which are offered free or at fee-reduced rates to members enrolled at university.
29. Programmes supporting the development of knowledge and learning platforms for technicians, masters, students as well as experts and engineers with or without a didactic background as teachers like German NanoTecLearn (E-learning for education and training in micro-nano-integration) in Germany, which enables a targeted and efficient knowledge update in the field of micro-nano-integration, now offered by different universities and training centres and put to practical use in industrial companies to manage their in-house knowledge and use it for their in-house training.
30. E-DIG Digital lärplattform för den smarta digitala fabriken is a web-based learning platform for digitalisation in development, operation and change of production with combined education opportunities addressed to industry to strengthen digitalisation skills in Swedish industry. The



project is part of Vinnovas programme Den smarta digitala fabriken, which aims to promote the digitalisation of Swedish industry.

31. Similar activities include the virtual repository of several hundred (online) training programmes for high-tech skills development including those addressed to vulnerable groups of people and receiving financial support from the government like La Grande École du Numérique in France.
32. Schemes like the Manche Open School in France offer innovative and intensive non-academic training lasting 6 months with an additional 2 months internship which are aimed mainly at people who have left the school system and people in professional reconversion.
33. We can also observe support activities of large global consulting organisations. McKinsey & Company is offering 'Generation' - a youth employment programme offered in several countries worldwide including Spain in Europe. In Spain funding for this programme is through public programs, e.g. obtained by cooperating with European Social Fund intermediaries, such as EOI (Escuela de Organización Industrial) and Fundación INCYDE (Chamber of Commerce Foundation), which cover up to 92% of total program costs. McKinsey supports the Foundation by covering the 8% gap of public funds as well as the Foundation costs and is continuously looking for donors and other new sources of funding to support scale-up.
34. A further example addressed to disadvantaged youngsters is the JOBLINGE programme funded by the JPMorgan Chase Foundation and the Boston Consulting Group encouraging youths to explore the STEM subjects.
35. Funding programmes supporting the high-tech skills training and development of women like IT for SHE run by a foundation (Perspektywy Education Foundation) in Poland or the Talent Club in Spain offering IT-related qualification and training from a portfolio of over 40 certifications which has been piloted by APMG together with several associations.
36. Scholarship support programmes – co-financed through the European Regional Development Fund of ESF - providing grants to students making use of specific training programme offers in the field of the digital economy like the Formación Postgrado programme in Spain.
37. Industry initiatives like the Festo Didactic 'Transfer Factory' offering higher education institutes and companies with access to the technology and applications of Industry 4.0 through a research and teaching platform (the MSP Transfer Factory) demonstrating the advanced manufacturing and production of tomorrow in a locally controlled intelligent network especially developed for flexible training in a wide range of technologies and subjects.
38. Voucher-based systems for bringing innovation competences into SMEs like go-inno and go-digital, both from Germany including a government 50% subsidy for consultant and skills development work of around 20 days for an SME to train and support them on 'digitalisation', and matched by an additional 50% of the overall budget from an SME. A similar programme exists in Spain called Asesores Digitales operated by red.es (the Ministry of Energy, Tourism and Digital Agenda). The Italian region Basilicata supported by the Italian government has recently published a public notice called 'Industria 4.0 – Impresa 4.0 agevolazioni per l'innovazione e lo sviluppo di tecnologie abilitanti' through which SMEs and micro enterprises can obtain financial support through a voucher entitling them to receive support, advice and training in the development of KETs to optimise production and automation processes etc.
39. Tax-based systems like the apprenticeship levy supporting SIP programmes in the UK or the Alliance Industrie du Futur in France offering companies (SMEs) investing in the modernization of their production capacities tax benefits and an option to get additional development loans.

40. The Digital Academy (Digitalakademin) founded by Almi Företagspartner and Google offering free courses in IT skills development, both online and physical education constituting the Swedish activity of Google's 'Growth Engine' programme which has been implemented in many further European countries under different names.
41. As part of Facebook's flagship #SheMeansBusiness programme, Facebook plans to provide digital skills training to more than 15,000 women in France. The programme intends to encourage entrepreneurship through developing networks, mentoring, partner-led training programmes and inspiring relatable role models. It is already active in the UK and Italy and will be rolled out in Ireland, Spain and Sweden in 2018.
42. Through its Facebook Community Boost EU program launched in January 2018, Facebook will work with small businesses and start-ups to help them grow and hire. It is based on the US program launched last year. Facebook will open three new community skills hubs in Spain, Poland and Italy, to train 1 million people and business owners across the EU by 2020. The hubs will run in partnership with local organisations, offering training in digital skills, media literacy and online safety to underrepresented groups. They follow the successful model of Facebook's Digitales Lernzentrum in Berlin, which opened last year in partnership with the ReDI School of Digital Integration and other organisations. The school works with refugees, the elderly and other community groups in Germany to offer courses from basic coding classes to professional development classes.
43. Facebook together with Freeformers will offer training to 300,000 people across the EU in UK, France, Germany, Poland, Italy and Spain from 2018 onwards (<https://freeformers.com/media/blog/freeformers-partners-with-facebook/>) using the Freeformers Future Workforce Model (<https://freeformers.com/products/future-workforce-model/>) to help individuals acquire the attributes to be employable, successful and productive in a digital world. For 75,000 people, this training will be in person, and the rest will be online. All training will be tailored to each person, so someone with very strong skills could be taught how to code, while others might learn how to open a bank account online.
44. Samsung Digi Pass is a free of charge 5-month digital and life-skills training programme developed by Samsung Electronics Baltics in cooperation with the Tallinn University and Youth Union for vocational school students aged 14 to 19 in Estonia aimed to reduce youth unemployment and to increase the number of high-level professionals in various sectors by enabling youngsters acquire the digital and social competencies that will make them valuable employees in the future including real hands-on work experience through developing digital projects, such as apps and online platforms in teams, training of social skills, self-regulation, interpersonal communication, leadership and teamwork, planning and decision-making.
45. Sektor 3 in Poland, which is a programme oriented towards the knowledge and skills of Polish NGO representatives in the area of practical use of information and communication technologies (ICT).
46. The Automotive Centre of Expertise (ACE) is a knowledge centre focused on automotive innovation set up as cooperation between Fontys University of Applied Sciences, University of Applied Sciences Arnhem and Nijmegen and University of Applied Sciences Rotterdam and funded by the government. It is one of multiple centres of expertise focusing on different subjects. The centres operate in both, higher vocational education and higher professional education. The vocational education centres have a strong connection to the employment market.

47. Make IT Work has been set up as a re-training project as part of the CA-ICT funding programme of the Dutch government addressed to universities for retraining people with an ICT background in another area of ICT to address and solve the unemployment issues in the ICT sector. Hogeschool Amsterdam set up an IT professional re-training programme for higher IT positions, which - after the termination of a 2-year funding period - needs to run on its own as a university offer without any further funding.
48. The National Software Academy, Wales, which is a Higher Education institution, offering innovative degrees in software development.

### 5.1.1 Activities in the USA

**Grow with Google** is a Google philanthropic programme aimed at the United States, with free training and tools designed to get a job in light of rapid technological change. The Grow with Google website (<https://grow.google/>) has sections with several programmes for students, teachers, local businesses, job seekers, developers, and start-ups. One particular training programme is offering 50,000 Udacity scholarships for Android and web development, split between developers with no qualifications and those who already have experience.

**Goodwill Digital Career Accelerator** is the result of Google giving a grant to Goodwill, the United States' largest workforce development non-profit, to launch the Goodwill Digital Career Accelerator in the USA. It is the largest grant Google.org has ever given to a single organisation. Through this grant and with the assistance of 1,000 Google volunteers, Goodwill plans to offer 1.2 million people digital skills and career opportunities in all 156 Goodwills across every state over the next three years that will enable them to become more marketable and advance in today's labour market. Goodwill was the winner of an open invitation to non-profits to submit their ideas to address economic opportunity in Pittsburgh to the Pittsburgh Impact Challenge.

**Facebook Community Boost** is a programme to help US small businesses grow and to equip more people with the digital skills they need to compete in the new economy which was launched in 2017. Facebook Community Boost plans to visit 30 US cities in 2018, including Houston, St. Louis, Albuquerque, Des Moines and Greenville, South Carolina. Facebook plans to work with local organizations to provide digital skills and training for people in need of work, to advise entrepreneurs how to get started and to help existing local businesses and nonprofits get the most out of the internet. Since 2011, Facebook has invested more than \$1 billion to support small businesses. Boost Your Business has trained more than 60,000 small businesses in the US and hundreds of thousands more around the world. More than 1 million small businesses have used Facebook's free online learning hub, Blueprint, and more than 70 million small businesses use the free Pages tool to create an online presence. Facebook recently created a digital marketing curriculum that is supposed to help train 3,000 Michigan residents in digital skills development over the next two years.

At the Davos World Economic Forum Summit in 2018 Accenture, CA Technologies, Cisco, Cognizant, Hewlett Packard Enterprise (HPE), Infosys, Pegasystems, PwC, Salesforce, SAP and Tata Consultancy Services launched the IT Industry Skills Initiative SkillSET to meet the global skills gap challenge and address job displacement arising from automation and the Fourth Industrial Revolution. SkillSET calls itself the first ever IT industry initiative to bring competitive training content together on one platform. To empower people to address fast-changing skill requirements, initiative partner companies are opening up key elements of their individual training libraries into one centralized portal. Users will have access, free of charge. SkillSET is hosted on the EdCast AI-powered Knowledge Cloud platform. **The initiative will initially target the US market, with plans to scale to other geographies and build industry and public-sector partnerships in 2018 and beyond.**

### 5.1.2 Activities in Europe

**Freeformers and Facebook partnership** is an initiative in which Facebook together with Freeformers plan to offer training to 300,000 people across the EU in UK, France, Germany, Poland, Italy and Spain from 2018 onwards (<https://freeformers.com/media/blog/freeformers-partners-with-facebook/>) using the Freeformers' Future Workforce Model (<https://freeformers.com/products/future-workforce-model/>) to help individuals acquire the attributes to be employable, successful and productive in a digital world. For 75,000 people, this training is supposed to be in person, and the rest will be online. All training is said to be tailored to each person, so someone with very strong skills could be taught how to code, while others might learn how to open a bank account online.

As part of Facebook's flagship **#SheMeansBusiness programme**, the company plans to provide digital skills training to more than 15,000 women in France. The programme is planned to encourage entrepreneurship through developing networks, mentoring, partner-led training programs and inspiring relatable role models. It is already active in the UK and Italy and will be rolled out in Ireland, Spain and Sweden in 2018.

The **Google 'Growth Engine' programme** has been implemented in many European countries under different names. It is designed to help individuals and businesses succeed online. The digital skills training programme is delivered through both online and offline training in all EU28 Member States. Digital Workshop, an online learning platform, provides each visitor with a plan that is specifically tailored to the gaps in their knowledge and desired learning pace. Google states that the Growth Engine skills offline programmes address local economical and societal challenges through the development of partnerships within local ecosystems and with multiple levels of government (<https://growthengine.withgoogle.com/intl/en-eu>).

**Cisco** is using its '**Country Digitization Acceleration' programme** and strategy coupled with some major investment to establish long-term partnerships with national leadership, industry and academia to accelerate the national digitization agenda in these countries. Part of the related activities include investments in universities and the extended use of Cisco's Networking Academy. The 'Country Digitization Acceleration' programme has already been established in Europe in countries like France, the UK, Germany, Portugal and Luxembourg.

**Samsung Digi Pass** is a free of charge 5-month digital and life-skills training programme developed by Samsung Electronics Baltics in cooperation with the Tallinn University and Youth Union for vocational school students aged 14 to 19 in Estonia aimed to reduce youth unemployment and to increase the number of high-level professionals in various sectors by enabling youngsters acquire the digital and social competencies that will make them valuable employees in the future including real hands-on work experience through developing digital projects, such as apps and online platforms in teams, training of social skills, self-regulation, interpersonal communication, leadership and teamwork, planning and decision-making.

### 5.1.3 First general assessment

All the philanthropic and CSR-based programmes of global vendors in Europe and the USA can be described as support or funding programmes of 'donors funding the implementation and operation of a specific new training concept'. Most of them have started in the US where they already have a history. Those started in Europe are mostly rather recent developments with little or no reliable information about their achievements and impact.

Having started as CSR-based programmes, they need to be critically reviewed as to their real 'substance' and ambition and whether these will remain announcements and the prospective large numbers of people to be trained will become reality.

Apart from that, these initiatives mostly address and carry out rather general digital skills training. Where they move towards specific (high-tech) skills training, they are strongly related to vendor products and services (e.g. Cisco Networking Academy Program).

All these programmes can, at best, only add and contribute and not replace major funding policies and related programmes of national governments and those from industry – government partnerships mostly embedded in existing institutional education and training structures. The latter need to constantly be adapted to changing requirements and developments, which seems to remain a big challenge in many countries.

## 5.2 Further types of funding and incentives supporting skills development in general

In addition to the above types of funding programmes, we could identify a whole range of different general types of funding and incentives supporting skills development addressed to individuals or companies in general.

Some of these can be applied for or apply also when participating in one of the above funding programmes (e.g. tax incentives through the tax levy in the UK which had a positive impact on the SIP – Strategic Industry Partnership Programme or the tax incentives in the Alliance Industrie du Futur in France) subject to the fulfilment of specified entitlement criteria.

The more general schemes include training grants which cover payment of tuition fees, or other charges for educational services, including scholarships, course subsidies (fully or partially subsidised courses), loans awarded to individual participants or enterprises for training purposes, cost reimbursements with repayments to beneficiaries in whole or in part, reduced social contributions with full or partial exemptions to obligatory social contributions, paid or unpaid educational leave schemes, training vouchers (with/without relationship to Individual Learning Accounts (ILA)) which can take the form of financial support in form of ILAs or vouchers for individuals or SMEs, tax incentives which include different types of economic incentives to invest in training such as tax allowances, tax exemptions, tax credits, tax relief, tax deferrals and finally combinations of the above.

These general schemes will be presented here for reasons of completeness and only by using the example of Germany. By using Germany as an example the vast majority of existing general types of financial and fiscal incentives in Europe including voucher-based schemes are covered since identical or very similar schemes exist throughout Europe.

### 5.2.1 Financial incentives

**Financial incentives** for further education in Germany are offered by the employment agency, the Federal government and most Federal states (Laender) and especially to individuals working at SMEs (max. 250 employees) or the companies. Typically, the reimbursement of cost ranges between 50-70% of the actual costs and up to a maximum of between 2,000 and 4,500 Euro. Generally, the taxable gross annual income has to be in a certain range and not exceed EUR 30,000 (EUR 60,000 with joint assessment). Many of these schemes are financed through the ESF.

### 5.2.2 General tax deductions

The **general tax deduction opportunities** related to further education in Germany range up to a maximum of 4000 Euro/year deductible from the annual income.

### 5.2.3 Education vouchers

**Bildungsgutschein (education voucher):** The Education voucher (Bildungsgutschein) is issued by the employment agency or the job centre and is geared towards a specific educational goal. The educational voucher can be redeemed by certified providers and is used for billing with the employment agency or job centre.

### 5.2.4 Further training grants

**Weiterbildungsprämie (further training grant):** Further training grant is an incentive for a retraining, where job-seekers receive up to 2,500 Euro extra. The prerequisite is that retraining leads to a recognized professional qualification - such as the chambers of commerce retraining at different training institutions. The money is paid by the employment agency or the job centre - the sum is not assigned and is at free disposal of the individual.

### 5.2.5 Training scholarship

**Weiterbildungsstipendium (training scholarship):** The training scholarship (Weiterbildungsstipendium) is a continuing education fellowship aimed at young people under 25 who have successfully completed their training. The aim is the career advancement through qualification or the step into self-employment. As a scholarship holder, up to EUR 6,000 are eligible for funding, which can be spread over various training courses over a period of three years. In some cases, this can also be used to finance a career-accompanying study program.

### 5.2.6 Educational check

**Bildungsscheck NRW (Educational check NRW):** The Educational check North Rhine-Westphalia (NRW) (Bildungsscheck NRW) is taken as an example. It promotes continuing education with a maximum of 500 Euro. With the application permit, certain groups are deliberately preferred: immigrants, employees without professional qualifications, professional returners, older workers and atypically employed persons (e.g. temporary workers). In addition, the taxable gross annual income may not exceed EUR 30,000 (EUR 60,000 with joint assessment). Another criterion is that one must be employed in a company with less than 250 employees. The Ministry of Labour, Integration and Social Affairs of the State of North Rhine-Westphalia is responsible for the NRW education checklist. Similar schemes also exist in the other German Länder (regions).

### 5.2.7 Education bonus premium voucher

**Bildungsprämie (education bonus premium voucher):** The education bonus premium voucher (Bildungsprämie) supports people in the financing of a vocational training course. Premium vouchers are issued annually (instead of only once every two years as it was practiced until June 2017). There is no longer an age limit. This allows people below 25 years of age and working pensioners to receive a bonus voucher. Prerequisites are that they are working at least 15 hours a week and earn a taxable income of a maximum of EUR 20,000 (couples being jointly assessed: EUR 40,000). The funding amounts to 50% of the training event fees, but a maximum of 500 Euro. Premium vouchers can be used in most of the federal states regardless of the amount of the event fees (the so-called 1,000-Euro limit). This is an ESF co-funded scheme.

### 5.2.8 First general assessment

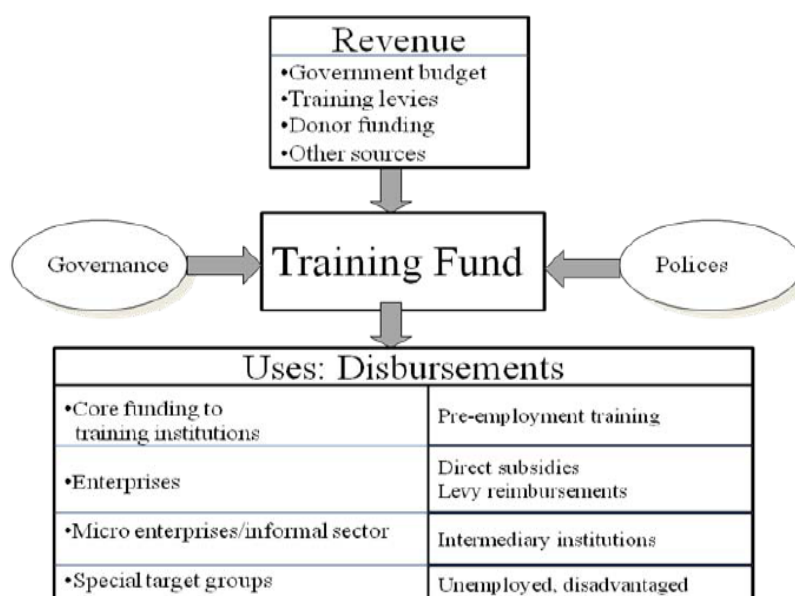
In the vast majority of cases, the general financial and fiscal incentives restrict (financial) support to specific types of target groups, e.g. SMEs or individuals with an income not exceeding a certain (low) threshold, making

it very unlikely that such schemes can be applied in the area of high-tech skills development. These schemes are mostly aimed at more basic types of skills development addressed to unemployed and people without or low levels of skills and qualifications. They are not considered relevant in the present study. Only some (e.g. tax incentives) are partially relevant in cases where these constitute an integral part of one of the above funding programmes as described above.

### 5.3 Typology of relevant high-tech skills funding programmes

In a further step we aimed at studying and categorising the selected programmes to develop a typology of funding programmes to then in a further step identify the typical key elements of different types of programmes but also their success factors, the ability to scale-up, the transferability potential and very importantly their sustainability in terms of secured financial capability but also governance structures. The objective was to help gaining a better understanding of the different mechanisms, specifics and overall functioning of these programmes and to find out which of these or which combinations bear the potential for successfully supporting high-tech skills development in the future.

Authors like Johanson and Zidermann<sup>16</sup> in their work on national training funds and funding mechanisms for financing training have used the term ‘training fund’ and describe this as “a dedicated stock or flow of financing outside normal government budgetary channels for the purpose of developing productive skills for work” which “provide an institutional framework for collecting and allocating funding to training providers” whereby “the functions may differ, but training funds often have the same objectives, coverage and modus operandi”<sup>17</sup>. Ziderman in describing the diversity of sources of funding – including public, private and donor sources –, financing flows and the diversity of beneficiaries of fund expenditure started to develop a corresponding framework of activities depicted in the following figure.<sup>18</sup>



<sup>16</sup> Johanson, Robert: A Review of National Training Funds. The World Bank Social Protection & Labour Discussion Paper No. 0922, Washington D.C., 2009; Ziderman, Adrian: Ziderman, Adrian: Financing Vocational Training in Sub-Saharan Africa. African Region Human Development Series. The World Bank, Washington, D.C. 2003; Ziderman, Adrian: Funding Mechanisms for Financing Vocational Training: An Analytical Framework. IZA Policy Paper No. 110. Bonn, 2016

<sup>17</sup> Johanson, Robert: A Review of National Training Funds. The World Bank Social Protection & Labour Discussion Paper No. 0922, Washington D.C., 2009, p. 3

<sup>18</sup> Ziderman, Adrian 2003; taken from Johanson 2009



This framework may help in developing an appropriate framework for and a typology of high-tech skills development funding programmes.

A starting point could also be building on the different purposes and objectives of such funding programmes which Johanson describes as follows<sup>19</sup>:

1. Unify and coordinate various sources of revenue, i.e. pooling of income from different sources;
2. Mobilize resources and increase revenue available for training;
3. Build pre-employment training systems and capacities;
4. Expand the volume of employer-based training by encouraging enterprises to invest more in worker training;
5. Provide equality of opportunity for access to training services by disadvantaged populations;
6. Improve the relevance of training, e.g. allocate funds according to employer priorities and market needs;
7. Raise the quality of training, e.g. through accreditation of training providers and specification of performance conditions;
8. Use training resources efficiently, e.g. lower the unit costs of training;
9. Develop competitive training markets; and
10. Foster involvement by employers and collaboration among stakeholders.

He continues to build categories of funding programmes as described below. Each category aims at different clients and represents a response to different training needs and policy objectives<sup>20</sup>:

1. “Core funding for pre-employment training in training institutions constitutes the primary and most traditional use. This pertains mainly to formal sector occupations and employment.
2. The second use can be for training of workers in enterprises, through apprenticeships, on-the-job training or training off the premises. This constitutes the bulk of training provided through training levies.
3. Third, training funds may offer services to build the skills and productivity of people working in microenterprises and the informal sector. Given the small scale of such operators, the way to reach them is often through intermediaries, such as informal sector associations. Training for the needs of micro-enterprises and the informal sector has generally been neglected in traditional training programs.
4. Fourth, training funds may open a funding window to train the unemployed or disadvantaged groups. Such training traditionally has been regarded as a government responsibility, but competitive contracting for such training is becoming a preferred mechanism to finance it.”

Although these approaches lead some way for the present study they do not fully cover the entirety of funding programme types identified in our work.

It is against this background that we decided to use and apply the integrated framework recently developed by Ziderman<sup>21</sup> which the author developed after a thorough analysis of the training finance system which he describes as ‘excessively fragmented’. His approach covers the traditional funding mechanisms as well as new, innovative ones (e.g. private training provision, levy-grant schemes, subsidising apprenticeship training). The

<sup>19</sup> Taken from: Johanson, Robert: A Review of National Training Funds. The World Bank Social Protection & Labour Discussion Paper No. 0922, Washington D.C., 2009, p. 5

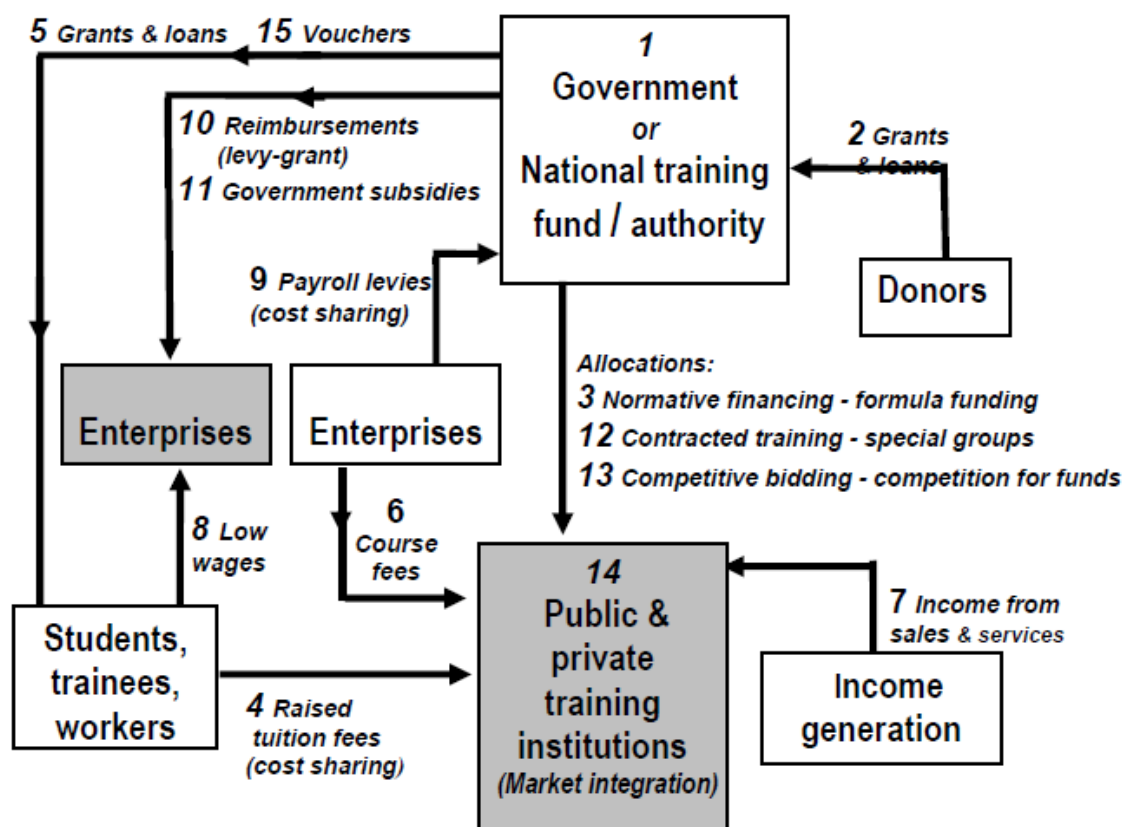
<sup>20</sup> Taken from: Johanson, Robert: A Review of National Training Funds. The World Bank Social Protection & Labour Discussion Paper No. 0922, Washington D.C., 2009, p. 7

<sup>21</sup> Ziderman, Adrian: Funding Mechanisms for Financing Vocational Training: An Analytical Framework. IZA Policy Paper No. 110. Bonn, 2016, p. 29



framework is supposed to combine all the old and new financing mechanisms. It will hopefully also cover all the training funding programmes for high-tech skills development identified in our work and studied in the present report. This would make it applicable for further structuring and analysing the European high-tech skills training and development landscape.

The financing flows, in such an integrated framework, are set out in the schematic form in the figure below.



*Note: Black arrows represent funding flows  
Training providers are indicated by the shaded boxes*

The illustration shows that<sup>22</sup>

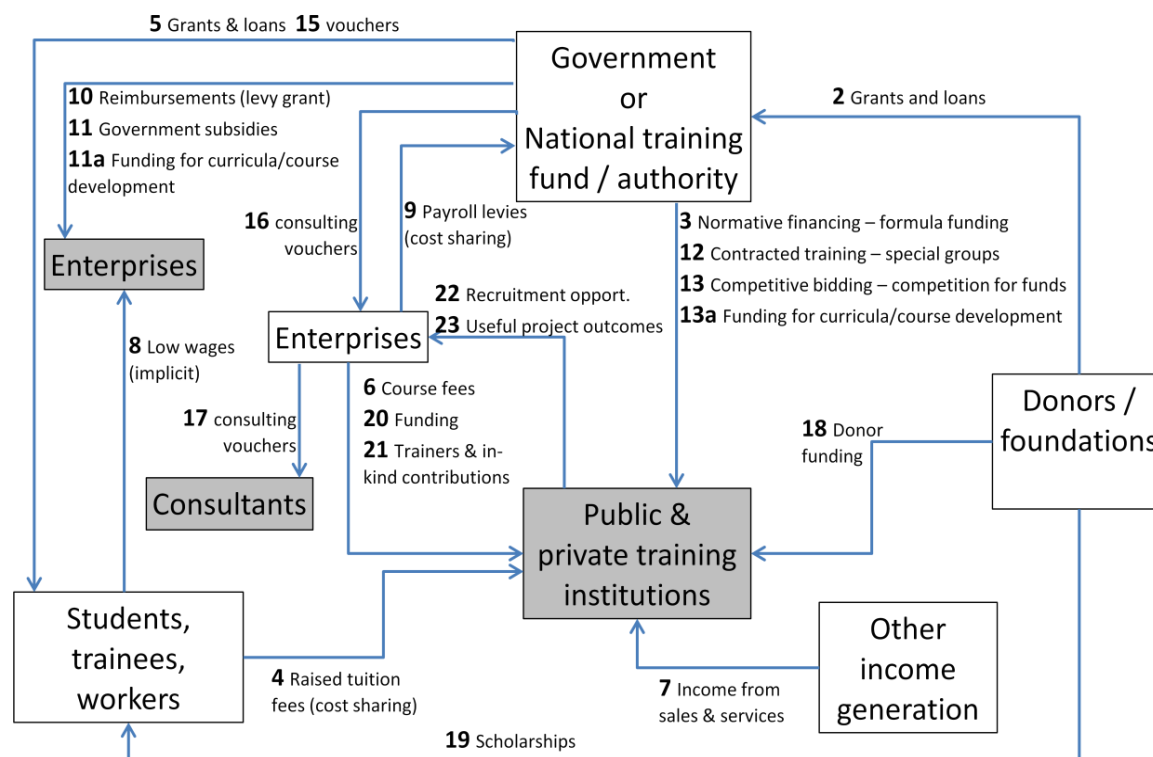
1. Government funding of training (institutions) is made either directly or via a national training authority (Ziderman calls these 'national training fund' (or NTA)) (1).
2. Where available, donor funding is supplied centrally to the government or training authority and not to individual institutions (2).
3. Core financing of public training institutions is based on normative financing (3).
4. Greater cost sharing is introduced in public training institutions, through augmented course fees closer towards competitive levels (4); this is
5. Facilitated by the availability of selective scholarships for the poor or student/trainee loans (5).
6. Additional income for public training institutions derives from fee payments for tailor-made courses for firms (6) and from
7. Income generation activities (7).

<sup>22</sup> Taken and expanded from: Ziderman, Adrian: Funding Mechanisms for Financing Vocational Training: An Analytical Framework. IZA Policy Paper No. 110. Bonn, 2016, p. 28

8. On-the-job training within firms is partially financed by workers through low wages (8).
9. Payroll levies on firms may be used, to either augment national funding for training (9) or may
10. Constitute part of a levy-grant scheme to encourage enterprises to train more (10).
11. Alternatively, government subsidies may be used to augment enterprise training (11).
12. Contract financing of designated government programs (such as for the unemployed) are made available to both public and private and training institutions (12);
13. Competitive bidding for funds (13) would
14. Further enhance market integration of public and private training providers on a competitive basis (14);
15. Finally, training vouchers addressed and given to individuals or specific types of organisations (e.g. SMEs) constitute another popular funding instrument throughout Europe.

## 5.4 Results from the application of the integrated framework

Applying this integrated framework to the funding programmes selected and analysed, it became apparent that it quite nicely covers almost all financing and funding mechanisms in these programmes. With some few additions integrated - which were carried out to make it fully fit the purposes of our activities - the framework has proven to be highly applicable and useful for the purposes of the present study. The value of this framework resides in its integrated system view, rather than piecemeal, and it can rightly be described as an 'integrated, demand-responsive training markets framework'. It is very helpful in introducing the different funding mechanisms and programmes as a comprehensive, integrated system leading the way to transforming the fragmented, inefficient training systems into an integrated competitive, demand-driven training system<sup>23</sup>.



**Note:** blue arrows represent funding flows; training providers are indicated by shaded boxes.

<sup>23</sup> See: Ziderman, Adrian: Funding Mechanisms for Financing Vocational Training: An Analytical Framework. IZA Policy Paper No. 110. Bonn, 2016, p. 27-30

## 5.5 Typology

The following typology of financing and funding programmes emerged once applying this extended framework. Altogether, 10 different types have been distinguished. The 10 types of funding programmes are:

- Funding for industry in building and running dedicated vocational education centres
- Funding for the co-creation by industry and academia of new courses and curricula
- Funding for of new innovative and alternative teaching/learning systems<sup>24</sup>
- Funding excellence schemes with top universities to draw top academic talent and students
- Funding SME vouchers for consulting contracts and knowledge transfer.
- Funding high tech apprenticeships/traineeships in industry
- Funding the development of open education resources (OER, including MOOCs)
- Funding (lifelong) learners through vouchers, fiscal incentives and/or cost sharing
- Funding upskilling/reskilling programmes for the workforce<sup>25</sup> in particular sectors or regions
- Other

Type of financing and funding programmes	Examples of relevant funding programmes
<b>Funding for industry in building and running dedicated vocational education centres</b>	<p>ANH Education Network High Technology Berlin (DE)</p> <p>Supporting the digitalisation in inter-corporate occupational vocational training centres (Förderung von Digitalisierung in überbetrieblichen Berufsbildungsstätten und Kompetenzzentren) (DE)</p> <p><b>Imec.academy (BE)</b></p> <p>Advanced Training in Key Enabling Technologies and Entrepreneurship (IT)</p> <p><b>Automotive Centre of Expertise (ACE) (NL)</b></p> <p>AMRC Training Centre (UK)</p> <p><b>Industrial Partnerships (Trailblazers) (UK)</b></p> <p>City Region Deals (UK)</p> <p>Top technology in secondary vocational education (Toptechniek in Bedrijf in het MBO) (NL)</p> <p>ProgeTiger programme (EE)</p> <p>The Technology Pact (Techniekpact) (NL)</p> <p>National Software Academy, Wales (UK)</p>
<b>Funding for the co-creation by industry and academia of new courses and curricula</b>	<p><b>Imec.academy (BE)</b></p> <p>ANH Education Network High Technology Berlin (DE)</p> <p>NanoTecLearn (DE)</p> <p>Supporting the digitalisation in inter-corporate occupational vocational training centres (Förderung von Digitalisierung in überbetrieblichen Berufsbildungsstätten und Kompetenzzentren) (DE)</p> <p>La Grande École du Numérique (FR)</p> <p>Arts et Métiers ParisTech (FR)</p> <p>MINATEC innovation campus (FR)</p> <p>Produktion2030 / Graduate School Produktion2030 (Nationella Forskarskolan Produktion2030) (SE)</p>

<sup>24</sup> Such as project or challenge based learning approaches, for students who might have difficulties in the traditional system, e.g. Ecole 42's approach, se: [https://en.wikipedia.org/wiki/42\\_\(school\)](https://en.wikipedia.org/wiki/42_(school))

<sup>25</sup> With co-funding from industry

Type of financing and funding programmes	Examples of relevant funding programmes
	<p>E-DIG Digital lärplattform för den smarta digitala fabriken (SE)</p> <p><b>Expertkompetens / PROMPT (SE)</b></p> <p>WASP - Wallenberg Autonomous Systems and Software Program - graduate school and affiliate PhD program (SE)</p>
Funding for of new innovative and alternative teaching/learning systems	<p>Study IT in Estonia (EE)</p> <p>Generation (ES)</p> <p><b>école 42 (FR)</b></p> <p>Manche Open School (FR)</p> <p>Thales Cybersecurity Programme (FR)</p> <p>Talent Club (ES)</p>
Funding excellence schemes with top universities to draw top academic talent and students	<p><b>Software Campus (DE)</b></p> <p>IFD Industrial PhD (DK)</p> <p><b>Industrial Doctorates and IPP programmes (NL)</b></p> <p><b>Industrial PhD 2017 (SE)</b></p> <p>WASP - Wallenberg Autonomous Systems and Software Program - graduate school and affiliate PhD program (SE)</p>
Funding SME vouchers for consulting contracts and knowledge transfer	<p><b>go-inno (DE)</b></p> <p><b>go-digital (DE)</b></p> <p>Asesores Digitales (ES)</p> <p><b>Alliance Industrie du Futur (FR)</b></p> <p>Industria 4.0 – Impresa 4.0 agevolazioni per l’innovazione e lo sviluppo di tecnologie abilitanti’ (IT)</p> <p>Knowledge Transfer Partnership (KTP) (UK)</p>
Funding high tech apprenticeships/traineeships in industry	<p>Knowledge Transfer Partnership (KTP) (UK)</p> <p>ANH Education Network High Technology Berlin (DE)</p> <p>Supporting the digitalisation in inter-corporate occupational vocational training centres (Förderung von Digitalisierung in überbetrieblichen Berufsbildungsstätten und Kompetenzzentren) (DE)</p> <p><b>Education and further education in business 4.0 (Aus- und Weiterbildung in der Wirtschaft 4.0) (DE)</b></p> <p><b>Digital manufacturing processes - Additional qualification for the future career in INDUSTRY 4.0! (Digitale Fertigungsprozesse - Zusatzqualifikation für die berufliche Zukunft in INDUSTRIE 4.0!) (DE)</b></p> <p>Advanced Training in Key Enabling Technologies and Entrepreneurship (IT)</p> <p><b>The apprenticeship levy supporting SIP programmes (UK)</b></p>
Funding the development of open education resources (OER, including MOOCs)	<p><b>Imec.academy (BE)</b></p> <p>NanoTecLearn (DE)</p> <p>La Grande École du Numérique (FR)</p> <p>E-DIG Digital lärplattform för den smarta digitala fabriken (SE)</p>
Funding (lifelong) learners through vouchers, fiscal incentives and/or cost sharing	<p>Study IT in Estonia (EE)</p> <p>Formación Postgrado (ES)</p> <p><b>Make IT Work / CA-ICT (NL)</b></p> <p><b>The apprenticeship levy supporting SIP programmes (UK)</b></p>

Type of financing and funding programmes	Examples of relevant funding programmes
<b>Funding upskilling/reskilling programmes for the workforce in particular sectors or regions</b>	Formación Postgrado (ES) Katapult (NL) <b>Make IT Work / CA-ICT (NL)</b> Sektor 3 (PL) <b>IT for SHE (PL)</b> Alacrity Graduate Entrepreneurship Programme (UK)
<b>Other</b>	Festo Didactic 'Transfer Factory' (DE) NanoFutures <b>DEMOLA (FI and others)</b> Station F (FR) Arts et Métiers Acceleration (FR) Digital Academy (Digitalakademin) (SE) Facebook Community Boost EU program (EU) Samsung Digi Pass (EE) Freeformers Future Workforce Model (EU) #SheMeansBusiness programme (FR)
<b>Note:</b>	Funding programmes highlighted in <b>bold</b> were presented and discussed at expert workshops in Brussels

## 5.6 Assessment

Further analysing the different funding programmes captured under each type allows for a description of the respective characteristics of each type of funding programme along different relevant criteria:

- Strengths, weaknesses, opportunities and threats (SWOT)
- Effectiveness
- Efficiency
- Impact
- Scalability (including transferability potential)
- Sustainability of each funding programme type to then draw a
- Bottom line and come up with first
- Conclusions and recommendation as to their future relevance and applicability in general as well as for scaling-up, replication and transferability for

In the first phase we have started this process for two types of funding programmes, namely:


Type of financing and funding programmes	Examples of relevant funding programmes
<b>Excellence schemes with top universities and high tech industry to draw more academic top talent towards industry careers</b>	<b>Software Campus (DE)</b> <b>Industrial PhD 2017 (SE)</b> <b>Industrial Doctorates (NL)</b> Industrial PhD (DK) WASP - Wallenberg Autonomous Systems and Software Program - graduate school and affiliate PhD program (SE)

Type of financing and funding programmes	Examples of relevant funding programmes
SME vouchers for a large number of smaller consulting contracts and knowledge transfer in high tech to SMEs	<b>Go-Inno (DE)</b> <b>Go-Digital (DE)</b> Asesores Digitales (ES) <b>Alliance Industrie du Futur (FR)</b> Industria 4.0 – Impresa 4.0 agevolazioni per l'innovazione e lo sviluppo di tecnologie abilitanti (IT)

**Note:** funding programmes highlighted in **bold** have been presented and discussed at phase 1 workshops with experts from the informal stakeholder expert group. The work will be continued in phase 2 for the remaining types of funding programmes.

By using this format, the results are presented in an easy to grasp overview format which will allow for a straightforward assessment of the related strengths of each programme type. It will also ease and support the drawing of conclusions and the development and formulation of recommendations at a later stage.

EXCELLENCE					
Title:	Excellence schemes with top universities and high tech industry funded by governments to draw more academic top talent towards industry careers				
Programme type	Ref. no.	Description of funding / support mechanisms (financing flows)	Identified programmes	Effectiveness	Efficiency
Funding excellence schemes with top universities to draw top academic talent and students (PPP for high-tech skills development, developing and offering tailor-made programmes to create future industry leaders)	5	Government or National training fund / authority funding students, trainees, workers through grants & loans	<ul style="list-style-type: none"><li>Software Campus (DE)</li><li>Industrial PhD 2017 (SE)</li><li>Industrial Doctorates (NL)</li><li>Industrial PhD (DK)</li></ul>	<b>High:</b> The programmes reach the target groups, have successfully mobilised the relevant stakeholders (industry and universities) and the PhD candidates develop industry-relevant high-tech skills. Provision of funding works very well in most cases.	<b>High:</b> Evaluation reports (where these exist) show a high level of satisfaction among all stakeholders. The average cost per PhD candidate varies between 125,000 and 190,000 EUR is likely to be a reasonable investment and good value for money if the majority of candidates further pursue a career in industry or in their own start-ups and are likely to become top level industry leaders in the future.
	12	Government or National training fund / authority to fund public & private training institutions for contracted training of special groups			
	20	Enterprises supporting public & private training institutions through funding			
	21	Enterprises supporting public & private training through own trainers and in-kind contributions			
	22	Public & private training institutions offering partnership programme to enterprises with recruitment opportunities			
	23	Public & private training institutions provide enterprises with useful project outcomes			
Impact	+	The impact on high-tech skills development for future decision makers in industry is considered high, as the scope and focus are on bringing together national leading industrial and academic organisations in this field and fully targeting the high-tech skills topic. The programmes are expected to lead to growth and employment on macroeconomic level. On individual level they equip research talents with commercial insight and experience by working at a company while studying at university. The programmes are designed to create a larger pool of high-tech talents. Cooperation between research institutions and private companies is prone to leading to innovation and exchange of perspectives.			
Scalability	+	Scalability is considered to be high. The programmes can be considered highly scalable regarding the involvement of further industrial companies including larger SMEs, the public sector and additional higher and executive education and training institutions (reaching beyond the top technical universities). Programmes possibly need not only be addressed to PhD but may also include Master students. Replication on a larger scale requires rather high investments should this model be replicated 1:1. Transferability is considered to be rather high. The model offered by the initiative is highly transferable to different contexts, which is demonstrated by the fact that the Dutch programmes was built on the basis of the experiences in Denmark. Replication of the Software Campus in other European regions may also be feasible with less investment and funding.			
Sustainability	+	The programmes can be described as excellence initiatives funded through a combination of private and public sources, integrating industry and higher education and training, with a strong link to practice and mentoring, gaining work experience in a company and practical problem solving through carrying out and leading a project dealing with an issue of relevance for the company. With the present shared funding model the programmes can be considered to be highly sustainable.			

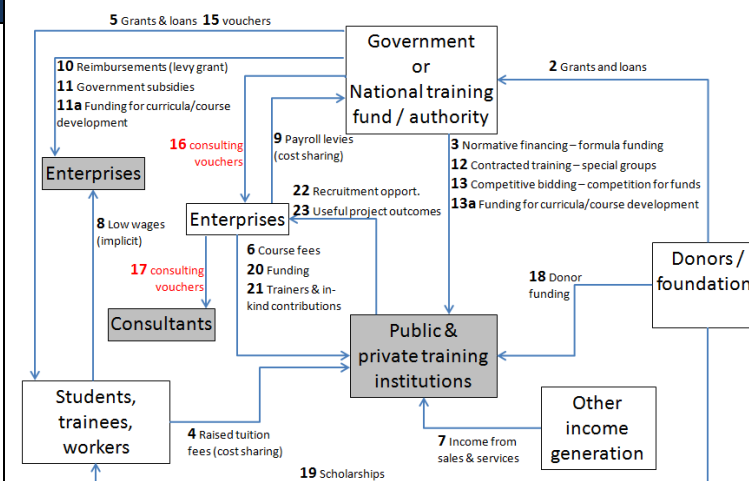
EXCELLENCE					
Title:	Excellence schemes with top universities and high tech industry funded by governments to draw more academic top talent towards industry careers				
Programme type	Ref. no.	Description of funding / support mechanisms (financing flows)	Identified programmes	Effectiveness	Efficiency
SWOT		STENGTHS:	WEAKNESSES:	 <p><b>Software Campus (DE)</b> <u>Programme type:</u> PPP for high-tech skills development, developing and offering tailor-made programmes to create future industry leaders (elite programmes)</p> <p><i>Note: blue arrows represent funding flows; training providers are indicated by shaded boxes; red texts highlight the relevant funding flows in the case.</i></p>	
		Proximity of university education and industry including corporate top executive training for PhD candidates.  Real top management and industry leader candidates as outcome.	Transferability requires quite substantial investments.  Danger of lack of sufficient number of candidates when focussing on PhDs only.  Comparably high levels of churn of corporate participation have been observed in Germany which may hint to weaknesses, but reasons for this are yet to be identified.		
		OPPORTUNITIES:	THREATS:		
		Increasing the pool of industrial leadership talent, strengthening the integration of innovation systems.	Potential misuse of budget when transferring it to universities as just another source of research funding (can be avoided by proceeding according to the Nordic model: employer status of PhD candidate and direct payment).		
Bottom line and recommendations		The programmes reach the target groups, have successfully mobilised the relevant stakeholders (industry and universities) and had and have an impact since the PhD candidates develop industry-relevant high-tech skills, cooperation between research institutions and private companies is seen as leading to innovation and exchange of perspectives and the programmes are creating a larger pool of high-tech talents with most of them becoming candidates for top-level leadership positions in industry or starting their own business.  Provision of funding works very well. Evaluation reports (where these exist) show a high level of satisfaction among all stakeholders.  The programmes require a reasonable investment and can be seen as good value for money if the majority of candidates further pursue a career in industry or in their own start-ups and are likely to become top level industry leaders in the future. With the present shared funding model the programmes can considered to be highly			



EXCELLENCE					
<b>Title:</b>	Excellence schemes with top universities and high tech industry funded by governments to draw more academic top talent towards industry careers				
Programme type	Ref. no.	Description of funding / support mechanisms (financing flows)	Identified programmes	Effectiveness	Efficiency
		sustainable.			

VOUCHER					
Title:	SME vouchers for a large number of smaller consulting contracts and knowledge transfer in high tech to SMEs				
Programme type	Ref. no.	Description of funding / support mechanisms (financing flows)	Identified programmes	Effectiveness	Efficiency
<b>Funding SME vouchers for consulting contracts and knowledge transfer</b> (SME vouchers for a large number of smaller consulting contracts and knowledge transfer in high tech to SMEs)	16	Government or National training fund / authority (part) financing training and support through consultants through consulting vouchers	<ul style="list-style-type: none"><li>Go-inno (DE)</li><li>Go-digital (DE)</li><li>Asesores Digitales (ES)</li><li>Industria 4.0 – Impresa 4.0 agevolazioni per l’innovazione e lo sviluppo di tecnologie abilitanti (IT)</li></ul>	<b>High:</b> The programmes reach the target groups and have successfully transferred the necessary knowledge to SMEs. In many cases the current operation has been optimised through lessons learned. Provision of funding (payment of consultants) works very well and in some cases (go-digital, go-inno) this is carried out fully online and basically without any bureaucracy.	<b>High:</b> Evaluation reports (where these exist) show a high level of satisfaction among all stakeholders. Depending on the programme the average funding per SME is between 5,000 to 8,000 Euro which is between 50% - 80% of the total cost. Complementary funding from the SMEs therefore varies between 20% - 50%. This can be seen as a very reasonable investment of public money and good value for money.
	17	Enterprises (part) financing training and support through consultants through consulting vouchers			
<b>Impact</b>	+	The impact on high-tech skills development for SMEs in industry is considered high. The programmes are successful in technological knowledge and know-how transfer. For the go-inno programme 66% of SMEs state that only the public funding was the trigger for starting the initiative. SME executives and decision makers get successful training and advise on digitisation and digital transformation (see: go-digital) as well as the introduction and development of the enabling technologies (KETs) for industry 4.0 (see: Industria 4.0, go-inno).			
<b>Scalability</b>	+	Scalability is considered to be high. Depending on further demand in the market and in industry the programmes can be considered highly scalable regarding the involvement of further industrial companies, especially SMEs and further consulting organisations.			

VOUCHER			
		<p>These are straightforward programmes with a very low level of administrative and bureaucratic effort to be spent since (in the cases from Germany) a number of lessons learnt led to successful incremental changes of the programme to lower the threshold for SMEs to apply for funding. It is a comparatively small funding provided per case which allows for creating an impact already with smaller investments by public authorities.</p> <p>Replication on a larger scale requires rather small or at maximum very reasonable investments.</p> <p>Transferability is considered to be high. The model offered by the initiatives is highly transferable to different contexts, which is also demonstrated by the fact that all the different national programmes have huge similarities.</p>	
Sustainability	+	<p>With the present shared funding model the programmes can be considered to be highly sustainable. Sustainability is also demonstrated by the fact that the German go-digital programme has already entered its second phase with more than twice as many expected applicants compared to the first phase. The go-inno programme is already running successfully since 2010 and it looks as if it could be continued even after the lifetime of the present phase which is set to 2020.</p>	
SWOT	STRENGTHS:		WEAKNESSES:
	<p>Flexibility: highly customised solutions through individual consulting contracts.</p> <p>Small public investment per case (approx. 8,000 Euro/contract).</p> <p>Many 'lessons learned', i.e. high transferability potential.</p> <p>Straightforward implementation and operation.</p> <p>Own partial SME investment minimises free-riding risks,</p> <p>Low level of bureaucracy.</p>		<p>Licensing / QA of consultants necessary, which could otherwise be left to market forces.</p> <p>Free-riding effects still possible crowding out regular demand.</p>
	OPPORTUNITIES:		THREATS:
	<p>Encourage and enable access to knowledge which otherwise might be exclusive to corporate clients through consultants for the underserved market segment of SMEs.</p>		<p>Artificially creating a lower tier market for consultancy.</p> <p>Risk of collusion between SMEs and consultant.</p>



#### Go-digital (DE)

**Programme type:** SME vouchers for a large number of smaller consulting contracts and knowledge transfer in high tech to SMEs

**Note:** blue arrows represent funding flows; training providers are indicated by shaded boxes; red texts highlight the relevant funding flows in the case.

VOUCHER				
Bottom line and recommendations		Rather low-cost digitisation and digital transformation support for SMEs.		
		<p>The programmes reach the target groups, have successfully mobilised the relevant SME stakeholders to take part-funded advice and know-how transfer opportunities to make their businesses future-proof.</p> <p>Provision of funding works very well. Evaluation reports (where these exist) show a high level of satisfaction among all stakeholders.</p> <p>The programmes require a small investment per case and can be seen as good value for money which is confirmed by evaluation reports where these exist.</p> <p>With the present shared funding model the programmes can considered to be highly sustainable.</p>		

These are the results from work in progress after completion of phase 1.

The work will be continued in phase 2 with a more intensive analysis of the different best practice cases allocated to the different funding programme types which should then reveal the respective strengths and weaknesses but also reliable information on the impact, scalability and sustainability of each type of programme and the individual programmes themselves to end up with recommendations as to their capabilities and suitability as future-oriented funding programmes.

Further types of programmes and funding or investment mechanisms may be identified in the course of the future work, evaluated and decisions taken as to their appropriateness for consideration and inclusion in the overall integrated analysis model and framework.

The results will undergo a further multi-step evaluation and validation with experts from the informal expert group and beyond. For this purpose two online surveys will be organised and carried out and a further two expert workshops organised and held in Brussels.

## 5.7 Results from the analysis of ‘learning practices’

Several policies and funding programmes were identified which are not necessarily good practice candidates since they do not meet the selection criteria or ceased to continue operation but which - for different reasons - can be seen as ‘learning practices’. These practices help us draw lessons when evaluating the success of funding programmes and defining important elements to watch out and things to avoid for the future in the area of high-tech skills training funding programmes.

The UK seems to be a country with a number of interesting policies and funding programmes in the skills area which for different reasons ceased to exist. We nevertheless have analysed some of them since the country and its policy as well as the funding programmes no longer pursued constitute good ‘learning practices’. Understanding the reasons for and learning from such examples and failures will be of importance in the process of deriving and developing recommendations.

Learning practices referred to in this section include the following.

### *Overview of ‘learning practices’ programmes from the UK*

Country	Title of the ‘learning practice’
UK	UK Commission for Employment and Skills (UKCES) <i>[discontinued]</i>
UK	The TechPartnership <i>[discontinued]</i>
UK	LearnDirect <i>[likely to be discontinued]</i>
UK	Industrial Partnerships
UK	City Region Deals

### 5.7.1 The UK skills policy landscape

In the last three decades the UK has seen 61 Secretaries of State responsible for skills and employment policy (compared with 18 for schools policy and 16 for higher education). Between them, they produced 13 major Acts of Parliament. The policy area has been moved between departments or been shared with multiple departments no fewer than 10 times since the 1980s. This means that the Government has created a growing

lack of “organisational memory” at political and official levels.<sup>26</sup> This has contributed to a lack of consistency and stability in the system.

The government is trying to create more stability. In a recent interview with the authors of this report, a UK government expert described the UK skills policy landscape still as “quite varied with a lot of activity much of which is not transparent”. He pointed out that there have also been “quite a few recent changes with much of the BIS (now BEIS) skills activity moving to the Department for Education and the Department for Digital, Culture, Media & Sport (DCMS) leading on digital skills”.

Government have stated that they wanted to “put control back into the hands of employers so they will gain the skilled workforce they need to compete globally” and started the UK vocational skills reforms. These have been underway for the last three years and are transforming the skills system and putting employers “in the driving seat”.

Further rather recent developments include the closure of the UK Commission for Employment and Skills (UKCES) and The Tech Partnership which may leave a vacuum in this policy field.

The **UK Commission for Employment and Skills (UKCES)** was a non-departmental public body that provided advice on skills and employment policy to the UK Government and the Devolved Administrations. Government funding for UKCES was withdrawn in late 2016 which led to its inevitable closure in March 2017.

On 4th October 2017 it was announced that the **Tech Partnership** would cease its operations in September 2018. The Tech Partnership, and its predecessor organisation e-skills UK, played key roles in driving up digital skills across the UK. Led by a partnership of industry leaders – CEOs from across the digital industries and CIOs from right across the economy – they worked with educators, government and other stakeholders to ensure the UK has the digital skills to thrive in the global economy.

In interviews carried out as part of our work it became apparent that the government recognises a need to develop a better understanding of digital skills activity (both public and private) and also to better coordinate activity. It is argued that the recent Digital Strategy sets out HMG digital skills initiatives and the intention to establish a Digital Skills Partnership to help coordinate this activity.

## 5.7.2 VET in the UK

### Background

The OECD report from 2009<sup>27</sup> described the specific strengths of the VET system in England and Wales as a system committed to a steep improvement in the level of workplace skills, with substantial resources having been made available for this task, the conscious attempt to engage employers, VET policy making being dynamic and innovative as well as flexible and allowing for tailor-made training solutions for employers. In the 2015 OECD report it is stated that “higher apprenticeships are growing fast and are highly valued by employers and students. They could play a very important role in raising the status of the whole apprenticeship sector.”<sup>28</sup>

The challenges described in the 2009 report included the ones of employer engagement, the need for a very strong lead from government to deliver set targets, policy structures being both more complex and unsustainable then in most OECD countries inhibiting employer engagement, fragmented, with inadequate attention to international experience. The OECD report explicitly welcomes and supports the establishment of the UK Commission for Employment and Skills (UKCES) for simplifying and stabilising the UK VET system. The 2015 OECD report even states that “England enjoys a strong base of research expertise, and good data. The UK Commission for Employment and Skills (UKCES) plays an important role in providing strategic policy advice to

<sup>26</sup> Malcom Skingle, gsk presentation at High-Tech Skills for Europe workshop on 30<sup>th</sup> January 2018 in Brussels

<sup>27</sup> OECD: Learning for Jobs – OECD Reviews of Vocational Education and Training: England and Wales, 2009

<sup>28</sup> OECD Reviews of Vocational Education and Training – Key Messages and Country Summaries. 2015, p. 33

government, based on the input of employers and unions.”<sup>29</sup> It therefore came as a surprise that the UKCES has recently been closed (see above).

Finally, the OECD also already in 2009 recommended the use of compulsive measures including training levies to encourage employer support for training closely linked to the apprenticeship system. Such a levy system is now in operation in the UK.

## Some key initiatives

### Industry Partnerships

An Industrial Partnership brings together employers across an industry sector to lead the development of skills, with a focus on growth and competitiveness. Eight partnerships have been set up in the UK covering the aerospace, automotive, creative, nuclear, digital, energy & efficiency, science and tunnelling (construction) industries. Each industrial partnership is chaired by a major employer and is a platform for businesses of all shapes and sizes in the sector to define and influence skills priorities. While the shape and scope of each partnership is defined by its employers, all partnerships share a commitment to tackling skills shortages, testing innovative training solutions with their sector, and overcoming the skills shortages that have restrained the entire set of sectors from achieving their potential. They are supported by trade unions, trade and professional bodies and sector skills councils. Through collaborative action, they aim to improve the skills and employability of their current and future workforce, and in doing so increase productivity, build their capacity to innovate, and strengthen their position.

The 8 pilot industrial partnerships had the following commitments to be achieved by the end of the funding period in March 2017:

- define and co-ordinate the skills and talents needed by their industries and the people who will work in them now and in the future.
- engage 16,000 young people to find out about or experience working in these sectors.
- provide continuous professional development to 44,000 people in work by delivering nearly 9,000 apprenticeships.
- support 3,100 people to become higher skilled / specialists in industry targeted areas.
- continue to lead the development of new trailblazer standards.

Government is providing funding for the initial phase (2013 – 2017) of establishing Industrial Partnerships. The partnerships were funded up to March 2017 through a co-investment model, with the Government investing £131 million through its Employer Ownership Pilot (EOP) fund. The fund is managed by the Skills Funding Agency, part of the Department for Business Innovation and Skills. Government investment is matched by cash and in-kind from the employers, creating a total fund of £354 million: for every £1 of Government investment, businesses are investing £1.70.

It is unknown to the authors of the present report how well the different Industry Partnerships are still performing. Hardly any or no information is made available. It appears as if most of the Industry Partnerships are operating at a rather small level or no longer after the initial government funding period came to an end.

The Science Industry Partnership (SIP) can be seen as a positive example and has also been considered in the present study as a best practice candidate funding programme. It successfully uses the UK tax system with its apprenticeship levy. SIP can be seen as an example of what needs to be done and in place to be successful what - apparently – was not achieved in the other Industry Partnerships.

<sup>29</sup> OECD Reviews of Vocational Education and Training – Key Messages and Country Summaries. 2015, p. 33

The UK government with matching funds from industry spent 52 million GBP (<https://www.gov.uk/government/news/52-million-boost-for-skills-and-training-in-uk-science-sectors>) for getting the SIP partnership and membership organisation set up and operational which was preceded by an 18 months phase of needs and requirements analysis.

SIP managed to keep momentum, despite the fact that all government money came to an end. SIP offers apprenticeships from Level 2 to 6 (Level 5 – 8 under development) following the ‘earn and learn’ principle.

The UK tax system with its apprenticeship levy has been very supportive since it allows companies offering apprenticeships to claim back their contribution. It came into effect in April 2017 after the UK government’s promise of 3 million new apprentices by 2020. The levy applies to employers in England, who have an annual pay bill above £3m. The levy is 0.5 per cent of the annual pay bill. All employers will receive a £15,000 annual allowance, to be offset against the bill. This effectively means that employers with an annual pay bill of £3m or less pay no levy. From May 2017 employers not paying the levy, who offer apprenticeships to 16 to 18 year olds, receive 100 per cent of the cost of the training from the Government, up to the maximum funding bands. Employers will have to pay 10 per cent of the cost of the apprenticeship training for those aged 19 and over and the Government will pay the remaining 90 per cent, up to the maximum funding bands. This support applies to all age groups. For non-levy businesses with less than 50 employees there is also a new £1000 incentive towards apprenticeships for taking on someone aged 16 to 18.

Experts see the apprenticeship levy on large employers as a good plan to urge them to offer apprenticeships which allows them to claim the money back for training. However, a year after its launch, the media and press report that the apprenticeship levy is not applied as the instrument it was meant to be used for. According to The Guardian “the Open University found that businesses paid £1.39bn into the levy but drew down just £108m for training, because they wrote off the levy as just another tax”. It continues by stating the obviously “some employers reject the new higher standards for apprenticeships that were introduced with the levy. They have been unwilling to create quality apprenticeships that must last at least a year, with a day a week for training courses. What companies had previously badged “apprenticeships” were often low-quality internal training of older staff. Research by the Resolution Foundation found that fewer than half of the trainees even knew they were apprentices.”<sup>30</sup>

These are important results from the introduction and application of a funding programme in combination with a fiscal incentive / levy programme which provide valuable information for the development of recommendations.

### **Learndirect**

Learndirect Ltd is a private company owned by the private equity firm Lloyds Development Capital (LDC). It was formerly owned by the Ufi Charitable Trust, a not-for-profit organisation and privatised by David Cameron’s coalition government in 2011 by selling it to and its parent Ufi Limited to LDC. Learndirect has a network of learning centres in England and Wales, and also runs some courses online. In March 2017, Ofsted inspectors gave the company the lowest possible rating, leading to Learndirect seeking court review and an injunction on the publication of this poor result. The court lifted the reporting restriction on 14 August 2017.<sup>31</sup> Subsequently, the Department for Education stated that it would withdraw all funding from Learndirect, placing the future of the organisation at risk.<sup>32</sup>

<sup>30</sup> Toynbee, Polly (9 April 2018): Young people are being cheated of the skills needed to get good jobs. The Guardian: <https://www.theguardian.com/commentisfree/2018/apr/09/young-people-cheated-skills-jobs-brexite-education> (retrived 23 April 2018)

<sup>31</sup> Ponsford, Dominic (14 August 2017). "FE Week successfully challenges training giant Learndirect's legal gag on revealing damning Ofsted report". The Press Gazette: <http://www.pressgazette.co.uk/fe-week-successfully-challenges-training-giant-learndirects-legal-gag-stopping-it-from-reporting-damning-ofsted-report/> (retrieved 23 April 2018).

<sup>32</sup> Neate, Rupert (16 August 2017). "Department for Education pulls all Learndirect contracts and funding". The Guardian: <https://www.theguardian.com/education/2017/aug/15/government-pulls-all-learndirect-contracts-and-funding> (retrived 23 April 2018)

Learndirect has become the biggest recent scandal in VET in the UK. Learndirect's owners and managers were accused of raking in millions of pounds of taxpayers' money while overseeing a "catastrophic decline" in standards.<sup>33</sup> An anonymous expert describes it as "a case of quasi-systematic failure, improvisation and amateurism".

*The Institute for Public Policy Research (IPPR) think tank calculated that the Learndirect has received £631m of public money since its controversial privatisation. An FT/FE Week investigation found that in the four years since it was sold off, its parent company spent 84% of its cash generated by the operating business, most of which came from the taxpayer, on payments to managers and financiers.*

*Joe Dromey, a senior research fellow at the IPPR, said it was "truly shocking" that Learndirect's owners, which ultimately include Lloyds Bank, appear to have "raked in vast amounts of public money, extracted tens of millions of pounds from Learndirect, loaded the company with debt, overseen a catastrophic decline in standards, and tried to stop the truth coming out". "The owners of Learndirect have some very serious questions to answer," he said. "This should be investigated by the Public Accounts Committee, and if Learndirect goes down, government should seek urgently to reclaim as much public funding as possible from their irresponsible owners."*

*Dromey said that not only was the alleged mismanagement at Learndirect shocking, it was also the result of the systemic failure of public policy. "It was the government which privatised Learndirect, encouraged competition, reduced controls on quality and slashed funding in the system. They set the conditions in which this disaster played out. Government must urgently learn the lessons of the scandal at Learndirect, and act to ensure it never happens again."*

**Taken from:** Neate, Rupert (16 August 2017). "Department for Education pulls all Learndirect contracts and funding". The Guardian: <https://www.theguardian.com/education/2017/aug/15/government-pulls-all-learndirect-contracts-and-funding> (retrieved 23 April 2018)

Again, these are important results from the introduction of a funding programme and its change of governance structure and ownership which provide valuable information for the development of recommendations.

### City Region Deals

A City Region Deal is an agreement between government and a city. It gives the city and its surrounding area certain powers and freedom to:

- take charge and responsibility of decisions that affect their area,
- do what they think is best to help businesses grow,
- create economic growth,
- decide how public money should be spent.

A larger number of such deals have been proposed (and set up) since 2015.<sup>34</sup> Several of these proposals have a skills component but it is unknown, how much of them relate to high-tech skills development.

Two examples from the first wave include the 'Leeds City 14-24 Apprenticeship Academy' and 'Manchester City Apprenticeship & Skills'. The Leeds City 14-24 Apprenticeship Academy is described as a flagship initiative for a proposal to build the Academy with support from the government and the region's business partners. It is a wider apprenticeship proposition which includes the 14-24 Apprenticeship Academy (investment of £6.2m) and an Apprenticeship Training Agency, especially for SMEs (£8m) as well as business-to-business campaigns.

<sup>33</sup> Neate, Rupert (16 August 2017). "Department for Education pulls all Learndirect contracts and funding". The Guardian: <https://www.theguardian.com/education/2017/aug/15/government-pulls-all-learndirect-contracts-and-funding> (retrieved 23 April 2018)

<sup>34</sup> Ward, Matthew: City Deals. Briefing Paper, Number 7158, 22 November 2017, House of Commons Library



The Manchester City Apprenticeship & Skills scheme is a proposal to engage SMEs in delivering 6,000 new apprentices. The proposal is to work with a population of up to 100 employers over 2 years, at a cost of £2.8m. The Project "Capacity Building: Advanced and Higher Level Apprenticeships" which aims to stimulate demand for advanced and higher level apprenticeships at levels 3, 4 and 5 is for example launched by the Hub.

### 5.7.3 First general assessment

The 'learning practices' illustrate how a lack of consistency and stability in the education and training system can negatively impact necessary skills development activities. Furthermore, some of these practices seem to demonstrate that often they manage to continue operating at a rather small scale or no longer once the initial government funding period ceases.

Organisations set up by government to simplify and stabilise the education and training and especially the VET system whose establishment were explicitly welcomed and supported by the OECD are no longer in operation. This now leaves a vacuum in the provision of strategic policy advice to government, based on the input of employers and unions.

Furthermore, the Learndirect case demonstrates an example of the introduction of a well-intended funding programme which failed after it changed governance structure and ownership, resulting in mismanagement and the responsible actors overseeing a catastrophic decline in quality standards. It has also been described by some experts as a systemic failure of public policy.

Finally, further investigations are needed as to the skills development related activities of the City Region Deals proposals. Information on these is very scarce, responsibilities fuzzy, responses poor, concrete implementation and operation of skills training obviously not taking place or at least in doubt. The further analysis will hopefully shed some light on which of these activities continue to be active and successful in terms of high-tech skills development and whether these can be seen as effective and efficient funding mechanisms and programmes.

The analysis of these 'learning experiences' so far has already come up with interesting results which provide valuable input for the development of recommendations for the establishment of future-oriented national and European funding programmes in the area of high-tech skills development and thereby help governments – not only in the UK – to learn the lessons and act to ensure that scandals like Learndirect never happen again.

## 6 First results and conclusions

The activities under the present service contract are approaching the end of phase 1. The current status and progress of work does not yet allow for drawing solid conclusions and recommendations. Those developed in the present chapter need to be seen as first and tentative ones based on the results from the first analysis of the large number of funding programmes and two experts workshops carried out in Brussels.

### 6.1 Vision

There is broad agreement among the experts involved and consulted that as a starting point a policy vision is needed for the revision of present and the development of new, more appropriate funding programmes, instruments and mechanisms. To some extent, this already exists through the different recent European Commission policy documents and Communications in this area. These should be integrated and further developed, streamlined and put forward as a common policy document proposal. It should be developed in a coordinated fashion involving the different DGs at the Commission dealing with these issues and involving relevant national EU Member State stakeholders and government departments and policy decision makers to achieve an overall European-wide agreement.

Based on that decision and agreement, necessary partnerships, programme types and funding instruments and mechanisms but also fiscal incentives and levies and details as to necessary monetary dimensions, i.e. budgets to be allocated to specific (new) ways of funding, need to be developed. Existing programmes need to carefully analysed for their suitability for future use. One-size-fits-all policies and programmes will not provide the necessary basis and means to address future challenges.

### 6.2 Funding programme landscape and typology

Based on the phase 1 activities and the first analysis of identified promising practices it becomes apparent that the future policy and funding programme landscape is likely to continue to be multi-faceted with a co-existence and combinations of different types of funding programmes and incentives.

A segmentation and classification of the best practice candidate programmes revealed the typology described in chapter 5.5. The typology is based on an integrated framework describing the diversity of sources of funding – including public, private and donor sources – and the diversity of beneficiaries of fund expenditure based on the work from Ziderman<sup>35</sup> and expanded by the authors of the present report.

The best practice programmes allocated to each of the different types bear the most promising potential to reduce the high-tech skills gaps and highlight important elements which need to be in place to be successful either by continuing these programmes more or less in the existing format or with some necessary adaptations or in developing new funding programmes. The list of funding programmes include selected best practice programmes and instruments which have been in place for many years or even decades, but also several relatively recent programmes with new funding types, which are somewhat disruptive and move away from ‘business as usual’ as further outlined above.

The team has started to further describe the different types of funding programmes based on information or at least some indication of the impact, effectiveness and efficiency, scalability and sustainability of each programme which could be obtained in an intensive research and interviews with experts and those

<sup>35</sup> Ziderman, Adrian 2003; taken from Johanson 2009

individuals responsible for or running the programmes. Unfortunately, this type of information is often not disclosed by the organisations operating these programmes and not even in interviews. The same holds true for evaluation reports which could contain this information but which are regularly not made available to the public or do not exist since many programmes have not (yet) been evaluated.

The first results of this effort are described above in the main body of the report. The work has been started in phase 1 and is ongoing. It is still too early to derive more than tentative conclusions and develop recommendations.

## 6.3 Tentative conclusions

### 6.3.1 Coexistence of established and proven plus new and disruptive programmes

After the presentation and discussion of different best practice funding programmes agreement became apparent among experts on the need for keeping ‘long time established and proven’ funding models and programmes but at the same time implementing innovative, remarkable and sometimes disruptive funding models following new principles.

All programmes need to have at least a mid/long-term perspective and should not focus on but move away from ‘quick fixes’ and national or European interventions with only short-term effects.

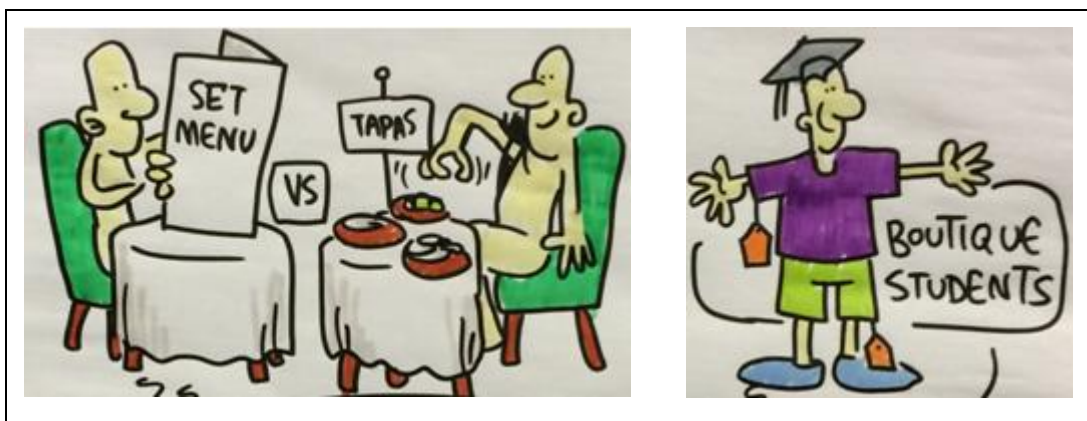
This may include thinking beyond existing structures and formats in the present education and training landscape and systems and may even include downgrading the (perception of the) importance of existing Bachelor and Master type of programmes as part of the initial higher education.

### 6.3.2 Spectrum of future high-tech skills funding programmes

At this stage, it is too early to describe the necessary entire spectrum and range of funding programmes. What has become apparent already is that in order to be successful, policy requires the implementation of a rather broad spectrum of programmes ranging from top-level excellence programmes to the more technical ones at VET-level and instruments like vouchers addressed to and supporting SMEs and individuals. Additionally, tax incentives or levies have proven to be suitable and successful in goal achievement in some policy contexts.

### 6.3.3 Unbundling of education with a trend towards smaller learning packages

The current unbundling of education, the growing demand for short and focussed learning resulting from the trend towards smaller learning packages (e.g. learning ‘nuggets’ or ‘tapas’ or modules) has already found a supply, in MOOCs and elsewhere, of targeted courses of shorter duration catering for an adult and returning higher education clientele. These (life-long) learners, who have already gained practical experience and witnessed or at least started a professional career, have also been termed “boutique students”, picking trainings they think most appropriate to enhance their competence portfolio.



*Source: European Institute for Innovation and Technology: illustrations of a presentation by Werner B. Korte, empirica at the EIT – European Institute for Innovation and Technology - Education Roundtable on 6<sup>th</sup> May 2015 in Budapest*

#### 6.3.4 Learning from failures

Luckily, the team could identify a range of funding programmes which can be described as failures from which we could learn. These 'learning practices' provide a richness of information on management and governance structures and types of organisations and institutions which need to take responsibility to successfully run high-tech skills funding programmes and provide and at the same time ensure continuity and stability over a longer period of time. The insights gained will find their way into the recommendations.

#### 6.3.5 European funding for cross-country implementation of (national) programmes

Experts expressed the view that European Commission support and funding for cross-country implementation of (national) programmes and instruments that have proven to be sustainable, scalable and allow for transferability (this requires a better understanding of the necessary conditions for replication which need to be in place to achieve a successful transfer) would be an interesting option to be pursued and implemented by the Commission. Many initiatives presented at the workshops already have an international / global approach and as such 'built-in' transferability.

#### 6.3.6 Funding programme rules and regulations to ensure involvement of key experts

Funding programmes also need to be critically reviewed with a view as to the types of activities related to skills development for the future included but especially those excluded from funding (e.g. the H2020 programme is not allowed to fund curricula development).

Furthermore, funding rules and regulations need to be analysed with a view of evaluating their appropriateness for attracting the key experts and stakeholders to most professionally carry out these tasks and whether these act as facilitators or constraints (e.g. Erasmus + programme setting very low maximum daily rates for experts to run for instance the Knowledge Alliance or Strategy Alliance activities and projects which is excluding specific types of experts probably well-placed to do the job).

#### 6.3.7 European Commission one-stop-shop supporting high-tech skills development, supporting scalability and replication of success stories

In interviews at workshops and in consultation activities experts also expressed the desire for the Commission to create an online one-stop shop for best practice presentation, programmes from different public and private providers, corporations and vendors resulting from the present 'High-tech skills for Europe' activity

which could be used as an online learning tool and thereby help learning on the one hand but also adopting and scaling up successful initiatives and programmes and ensuring their implementation also in other European countries where these currently do not yet exist.

## 7 Annexes

### 7.1 High-tech skills funding programmes: Best practice candidates

#### 7.1.1 DIGITAL best practice candidate programmes

JOBSTARTER plus – Funding programme for company-based vocational education and training (VET)	
Country	Germany
Short description& objectives	<p><b>JOBSTARTER plus: Funding programme for company-based vocational education and training (VET)</b></p> <p>The Federal Ministry of Education and Research is supporting the improvement of the regional training structures through the JOBSTARTER plus programme. This programme (and its predecessor JOBSTARTER) has already supplied funding for more than 430 innovative projects (Since 2006, 123 since 2014) in vocational education and training. All these projects are helping to create additional traineeships in the regions and are offering various measures to support companies that have little or no experience with training, for example, companies in the sector of high technology. They also support companies to enhance or stabilize their engagement in VET. The core instrument of the projects' activities is the External Training Management. Other goals of the funding e.g.: integration of migrants and refugees, integration of student dropouts in the dual training and improvement of regional structures.</p> <p><b>Programme structure and the volume of funding</b></p> <p>JOBSTARTER contributes to achieve the goals of the National Alliance for Initial and Further Training 2015-2018 – Pact for Career Training and Skilled Manpower Development in Germany.</p> <p><b>Funding at regional level</b></p> <p>JOBSTARTER provides funding for regional projects which help to create additional in-company traineeships in small and medium-sized enterprises (SMEs) as well as to recruit suitable trainees. Improved cooperation between local stakeholders is supposed to strengthen regional responsibility for vocational education and training and at the same time contribute to structural developments.</p> <p><b>Selection of projects</b></p> <p>Projects are selected via annual calls for proposals. These are based on the respective current funding announcement, which defines the conditions for funding and lays down thematic priorities. The projects are implemented, among others, by chambers of trade and industry, local and educational institutions, unions, municipalities and companies.</p> <p><b>Digitisation</b></p> <p>One of the current lines of funding: "Initial and Continuing VET in the 'Economy 4.0' – Structures of support for SMEs in the process of adjustment of Vocational Education". 20 regional projects support small and medium enterprises on issues related to dual vocational training on topics related to "digitisation" and "automation", providing advice on how to develop related company-internal training methodically and didactically.</p>

## JOBSTARTER plus – Funding programme for company-based vocational education and training (VET)

Duration	JOBSTARTER plus: 2014-2022
Budget	2014-2020: 108,8 million Euros (of which 61 million Euros are co-financed by the European Social Fund)
No. of applicants	300
No. of approved projects	123
Type of funding	Financial grants for personnel costs and business trips
Main stakeholders	Federal Ministry of Education and Research (BMBF) Federal Institute for Vocational Education and Training (BIBB)
Stakeholder(s) from	Industry, VET training providers, chambers, unions
Main target group	Small and medium-sized enterprises, micro and small enterprises
Impact	<ul style="list-style-type: none"> <li>About 64.000 training places acquired</li> <li>Establishment of <b>sustainable cooperation structures and networks</b> of the VET stakeholders in the regions beyond the period of funding</li> <li>Strengthening of the <b>regional responsibility</b> of the stakeholders of the dual VET system</li> <li>Establishment of training structures in <b>specific economic sectors</b></li> <li>Development and testing of <b>additional qualifications</b></li> <li>Improvement of the <b>attractiveness of VET</b></li> <li>Strengthening of in-company VET in the <b>migrant community</b></li> <li>Stabilization and increase of SME's readiness and capability to enter vocational training</li> </ul>
URL	<a href="http://www.jobstarter.de">www.jobstarter.de</a>

## „go-digital" funding programme (Förderprogramm "go-digital")

Country	Germany
Short description& objectives	<p>go-digital is a voucher-based subsidy system (an application process is not required), including a government 50% subsidy (approx. 12.500 Euro) for consultant work of around 20 days for an SME to train and support them on 'digitalisation', and matched by an additional 50% of the overall budget from an SME. The authorised consultant receives the voucher and the government share of the money after completion of work and the additional 50% from the SME. The programmes operates with a low level of bureaucracy and effort to be spent due to an online form completion through the consultant for voucher receipt and dealing with the financial issues after completion of the work. "go-digital" is targeted at small and medium-sized enterprises (SMEs) in the commercial sector and the trades with its three modules "IT security", "digital market definition" and "digitized business processes". The programme provides consulting and training services to keep pace with the technological and social developments in the area of online commerce, business day digitization and the increasing security requirements for digital networking.</p> <p>Supported are consulting / training services in a selected main module with, if</p>

„go-digital" funding programme (Förderprogramm "go-digital")	
	<p>necessary, secondary modules with a subsidy rate of 50 percent to a maximum daily consultancy rate of 1,100 Euros. The maximum amount of funding is 30 days in a period of half a year. The "go-digital" program was successfully implemented in 2015/16 in the model regions of Saxony (including the Halle area) and in the Ruhr area. Model projects were successfully completed in 2015/16. In the period 2015/16, 277 consultancy projects with a total volume of EUR 2,275,324 were funded. A total of 178 authorization applications were submitted by the consultants, 151 of which were approved.</p> <p>The 2nd phase was launched in September 2017 with a budget of around 5 million Euro. As of November 2017 several thousand SMEs showed an interest and around 400 applications were already submitted. For the coming years an annual budget of between 10-12 million Euro has been given as a potential budget figure.</p>
<b>Duration</b>	<p>Pilot phase: 2015 – 2016</p> <p>Phase 2: 2017 – ongoing</p> <p>approx. 400 are expected to be funded in the ongoing phase 2 which started in 2017. Budget: phase 1 (2015-2016): 2.275 million Euro,</p>
<b>Budget</b>	<p>Phase 1: 2.275.324 Euro</p> <p>Phase 2: 5.000.000 Euro</p>
<b>No. of applicants</b>	<p>Phase 1: 178</p> <p>Phase 2: 400 (expected)</p>
<b>No. of approved applicants</b>	<p>Phase 1: 151 with 277 funded projects</p> <p>Phase 2: 400 expected</p>
<b>Type of funding</b>	50% public funding by BMWi
<b>Main stakeholders</b>	Federal Ministry for Economic Affairs and Energy (BMWi)
<b>Stakeholder(s) from</b>	Government
<b>Scope 1</b>	National
<b>Scope 2</b>	Digital
<b>Main target group</b>	Industry: SMEs only
<b>Impact</b>	<p>Phase 1 results are judged as successful since evidence could be provided that with an investment of around just 8.000 Euro real impact could be achieved in terms of enabling SMEs to keep pace with digital developments in their area of business. It resulted in the implementation and operation of a second phase of the programme with a substantially higher budget. Implementation of phase 2 resulted in a few procedural and administrative changes which helped to minimize bureaucracy and keep access requirements at an absolute minimum level making it very easy for SMEs to make best use of the subsidy.</p>
<b>Scalability (and transferability)</b>	<p>Scalability is seen as a straightforward activity and therefore judged as high. As demonstrated through the move from phase 1 to 2 a linear increase of the overall budget increased the number of applicants benefiting from the programme in the same way. There seems to be an even higher demand in industry bearing the potential for even further expanding the subsidy voucher system. This will be decided on after the first year of operation of phase 2 probably in late 2018/early 2019.</p>



## „go-digital" funding programme (Förderprogramm "go-digital")

<b>Sustainability</b>	As long as government continues this type of programme sustainability is deemed high since this is a programme with a very modest investment per applicant and at the same time helping to make a difference to the way SMEs familiarise themselves with latest digital developments and operate in the further digitalised industrial world. Similar schemes exist in other countries with similar results and achievements.
<b>URL</b>	<a href="https://www.bmwi.de/Redaktion/DE/Artikel/Digitale-Welt/foerderprogramm-go-digital.html">https://www.bmwi.de/Redaktion/DE/Artikel/Digitale-Welt/foerderprogramm-go-digital.html</a>

## Software Campus – Leadership skills excellence programme for ICT talents

<b>Country</b>	Germany
<b>Short description&amp; objectives</b>	<p>Software Campus is a unique cooperation between government, education and industry that supports young researchers in ICT. Each participant leads his or her own ICT project, which is funded by the Ministry of Education and Research. Apart from that, the candidates receive high quality leadership training by the participating industry partners. Therefore, they collaborate with a partner company, where they are mentored by an experienced manager and contribute with their research.</p> <p>Software Campus was originated from the idea to create a new generation of leaders with an advanced ICT background since the new leaders have to have both economic competences and excellent ICT skills.</p> <p>A total of 21 stakeholders, consisting of universities, research institutions and companies, contribute to the multi-stakeholder partnership. Industry partners<sup>[1]</sup> include major names such as Huawei, ZEISS, TRUMPF, Merck, Software AG and Datev. It was a major priority to include companies from different economic sectors and foster a platform for precompetitive work.</p> <p>The first steps for Software Campus were taken at the German National IT Summit in 2010. Industry, universities and the Federal Government have set up Software Campus in order to promote the development potential of young talents and to help create a new generation of managers with an advanced ICT background. Software Campus is aimed at outstanding PhD and Master students of information technology from other disciplines with the relevant IT knowledge. Software Campus seeks to bring together the most successful leadership trainings provided by the industry partners involved.</p> <p>The concept of Software Campus rests on five interlinked pillars:</p> <ol style="list-style-type: none"> <li>1. Participants are given the task of realizing ICT projects of their own. They are in charge of personally managing the entire process of their IT projects with the assistance of partners from research and industry: from project planning to the application for funds to management and team coordination all the way to the conclusion of the project. Every project is funded by the German Federal</li> </ol>

<sup>[1]</sup> <http://www.softwarecampus.de/partner/>

## Software Campus – Leadership skills excellence programme for ICT talents

	<p>Ministry of Education and Research for a maximum project term of two years, with the bestowal of grants up to €100,000.</p> <ol style="list-style-type: none"> <li>Participants are given the opportunity to further develop their leadership skills, methodology expertise, social skills and personal skills within the scope of a six-module program in the Executive training programs. Software Campus' industry partners are contributing their most successful executive training methods to the programme to systematically and strategically enhance the participants' inherently existing potential.</li> <li>All participants are personally supported by an executive of their partner from the industry within the scope of a confidential and protected relationship. This Mentoring provides the participants with insights into the everyday work life of senior IT executives. That way, they learn management skills from the industry's top decision makers, including strategy development; technology, innovation and patent management; or human resource management. In addition to the mentoring, the participants are also entrusted into the capable hands of professional experts.</li> <li>During the internship phase of Software Campus participants get the opportunity to gain practical experience by exploring the application aspects of their research projects while obtaining valuable insights into the in-company processes of their industry partners. Moreover, they get the chance to personally build up their networks at the company by brushing up existing contacts and establishing new contacts.</li> <li>Every participant immediately becomes part of an active network of current and future IT executives, founders of leading German IT companies and renowned experts from science and research. The alumni of Software Campus will establish a future network of their own, and they are the future holders of responsible positions.</li> </ol> <p>A first target was to include around 100 ICT PhD students from ICT-related disciplines into the programme by the end of 2012. By 2014 a total of 159 PhD students had entered the Software Campus. By 2017 260 students have entered the programme, 83 graduated already.</p> <p>The total budget amounts to €50 million, funded by the Federal Ministry of Education and Research in addition to the mostly in kind contributions of the industry partners amounting to about the same budget.</p> <p>Industry partners include major names such as DATEV eG, Scheer Holding, ZEISS, Huawei, TRUMPF, Rohde &amp; Schwarz, Software AG, Merck and Holtzbrinck Publishing Group. Academic partners are TU Berlin, TU Darmstadt, Karlsruher Institute für Technologie, TU München, Deutsches Forschungszentrum für Künstliche Intelligenz, Fraunhofer IuK-Verbund, Ludwigs-Maximilians-Universität München, Friedrich-Alexander-Universität Erlangen-Nürnberg, Universität Stuttgart, TU-Dresden, and Universität Paderborn.</p>
<b>Duration</b>	2011 - Ongoing
<b>Budget</b>	50,000,000 Euro (with 25,000,000 Euro from the Federal Ministry of Education and

Software Campus – Leadership skills excellence programme for ICT talents	
	Research)
<b>No. of applicants</b>	500
<b>No. of approved applicants</b>	260 (by 2017)
<b>Type of funding</b>	Each PhD or Master candidate and project is funded by the German Federal Ministry of Education and Research for a maximum project term of two years, with the bestowal of grants up to €100,000 for the university employing the PhD candidate.
<b>Main stakeholders</b>	Federal Ministry for Education and Research (BMBF); programme managed by: EIT ICT Labs Germany GmbH and DLR
<b>Stakeholder(s) from</b>	Large industrial companies, mostly multi-nationals Technical universities and research institutes
<b>Scope 1</b>	National
<b>Scope 2</b>	Digital leadership
<b>Main target group</b>	PhD candidates and Master students with computer science background
<b>Impact</b>	The impact on high-tech skills development for future top decision makers in industry is considered high, as the scope and focus of the Software Campus is bringing together national top players in this field and fully targeting the high-tech skills topic.
<b>Scalability (and transferability)</b>	<ul style="list-style-type: none"> <li>Scalability is considered to be high. The initiative is considered to be highly scalable towards an involvement of further industrial companies including larger SMEs, the public sector and further higher and executive education and training institutions (reaching beyond the top technical universities) and possibly not only addressed to PhD but also Master students, should this be desired by its founders and operators, to attract more actors and achieve larger coverage. Replication on a larger scale requires rather high investments should this model be replicated 1:1.</li> <li>Transferability is considered to be rather high. The model offered by the initiative is highly transferable to different contexts. The strong dependence on a cooperation model of the above actors and the necessity of rather substantial funding could make it challenging to transfer to other geographical regions. However, replication of the Software Campus in other European regions may also be feasible with less investment and funding.</li> </ul>
<b>Sustainability</b>	<p>Software Campus is one of the very few leadership skills development excellence initiatives funded through a combination of private and public sources, integrating industry and higher education and training, with a strong link to practice and mentoring, gaining work experience in a company and practical problem solving through carrying out and leading a project dealing with an issue of relevance for the company.</p> <p>With the present shared funding model it can be considered to be highly sustainable.</p>

## Software Campus – Leadership skills excellence programme for ICT talents

URL

<http://www.softwarecampus.de/start/>

## IFD - Innovation Fund Denmark: Talent programme: Industrial PhD

Country

Denmark

Short description&amp; objectives

Innovation Fund Denmark exists since 2014. It invests in new knowledge and technology creating growth and employment in Denmark. In 2017, Innovation Fund Denmark invested DKK 1.25bn (approx. 170 million Euro) in new initiatives to create growth and employment in Denmark. Innovation Fund Denmark is running three overall programmes:

1. Grand Solutions - for substantial investments and long-term projects/partnerships where the focus is on research, technology, experimental development and market development;
2. InnoBooster - for small enterprises and entrepreneurs with sound development plans and
3. Talents - for recent graduates or postgraduate researchers aiming to become entrepreneurs or to secure a research career in the private sector.

In the 'Talent' programme investments in talents are carried out through InnoFounder which is for entrepreneurs with a good idea and who just finished their higher education or are about to finish. 'Industrial PhD' focuses on research talents with courage in a career in business. The scheme provides work experience in a company while studying at the university.

IFD provides grants for business PhDs or post-doc projects. An Industrial PhD funded by IFD is a three-year business-oriented research project and PhD education, conducted in collaboration between a company, an Industrial PhD candidate and a university.

An Industrial PhD student is employed in the private sector company and enrolled at the university. The private sector company applies for funding for the project from Innovation Fund Denmark, and the student is employed by the company and receives a salary during the entire Industrial PhD project. The student shares her/his working time between the company and the university, and spends all the work time on the Industrial PhD project. The project allows the Industrial PhD to carry out a research project where results are applied in an enterprise setting. The company gets a candidate able to carry out a high quality research project and create results that can lead to commercial gain. At the same time, the company strengthens its relations to existing and new collaboration partners at the university. The public sector research institution strengthens its relations to the business sector, and a foundation for new research is created.

A business postdoctoral project is made up of a collaboration activity between companies and public research institutions regarding the solution of a specific research and development tasks. An Industrial Postdoc is employed in the private

## IFD - Innovation Fund Denmark: Talent programme: Industrial PhD

	sector company and collaborates with the research institution. The private sector company applies for project funding from Innovation Fund Denmark. The Industrial Postdoc is employed with a salary in the company during the project. The project gives the Industrial Postdoc a unique competency boost in her/his career development by combining research competencies with a business sector mindset and experiences. The company has the possibility of solving specific research and development tasks whilst strengthening its relations to existing and new collaboration partners at universities. The public sector research institution strengthens its relations to the business sector, and a foundation for new research is created.
<b>Duration</b>	1970 – ongoing
<b>Budget</b>	21 million euro pr. year
<b>No. of applicants</b>	155 per year, 2160 applicants since 2002
<b>No. of approved applicants</b>	98 approved applications in average pr. year
<b>Type of funding</b>	The private sector company applies for funding for the project from Innovation Fund Denmark, and the student is employed by the company and receives a salary during the entire Industrial PhD project. The student shares her/his working time between the company and the university, and spends all the work time on the Industrial PhD project. The project allows the Industrial PhD to carry out a research project where results are applied in an enterprise setting.
<b>Main stakeholders</b>	Danish companies or companies with a branch in Denmark, Danish and international universities, entrepreneurs, Danish Ministry of Higher Education and Science, The Danish Business Authority (incl. the Market Development Fund), local growth houses (Væksthuse),
<b>Stakeholder(s) from</b>	Government, industry, universities
<b>Scope 1</b>	National
<b>Scope 2</b>	Digital leadership
<b>Main target group</b>	PhD candidates and companies
<b>Impact</b>	The programme leads to growth and employment on a macroeconomic level and on individual level it develops research talents with a commercial insight. Individuals educated at a high level and gain insight into 2 different sectors by working at a company and studying at university, creating a bigger pool of talents (medium impact). Cooperation between research institutions and private companies is seen as leading to innovation and exchange of perspectives. The impact on the individual level is estimated to be high, on society as a whole the impact is estimated as medium.
<b>Scalability (and transferability)</b>	Scalability is considered to be medium. The programme could easily be expanded if more funding was allocated but it is not given, that there would be enough qualified applicants. But in the administrative sense, the programme can easily be scaled up. There is no up-scaling plan and no such plan foreseen. An expansion could include

## IFD - Innovation Fund Denmark: Talent programme: Industrial PhD

	<p>companies not located or having a branch in Denmark, but this is not seen as relevant for the Danish society.</p> <p>Transferability is considered to be high. The programme could easily be transferred to another country.</p>
<b>Sustainability</b>	The financial commitment is secured in the long term. Funding is only coming from public authorities.
<b>URL</b>	<a href="https://innovationsfonden.dk/en/applications?category[]=1">https://innovationsfonden.dk/en/applications?category[]=1</a> <a href="https://innovationsfonden.dk/en/application/erhvervsphd">https://innovationsfonden.dk/en/application/erhvervsphd</a>

## Demola - Innovation Ecosystem combining the talent of students with company R&D activities and university research

<b>Country</b>	Finland, Sweden, Denmark, Norway, Spain, France, Lithuania, Latvia, Hungary, Portugal, Mexico, Namibia, South Africa and Japan
<b>Short description&amp; objectives</b>	<p><b>Demola is an international organisation that facilitates co-creation projects between university students and companies, either locally or internationally.</b></p> <p>Demola is an alliance of various partners including universities, their faculties, researchers and students, as well as companies, local agencies and a growing number of Demola Centers around the globe which is truly international and interdisciplinary. It operates a co-creation concept that is geared to solve real challenges. Every project has an outcome – be it a new concept, a demo, or a prototype. The project results enable better further investment decisions in innovative concepts. If the partner company finds the outcome useful, the company can license or purchase the outcome, and take it for further development. The Demola process and professional facilitation ensures that the work is systematic and runs on schedule. This way, the work itself can be as creative as possible, but the process keeps things under control both in terms of time and deliverable. Demola is a framework that makes it easy for partners to come in and cooperate. Each partner has a clear role, and the work is guided by simple procedures. Contracts, intellectual property rights, licensing models, and other legal requirements are in place and meet international business standards and practices.</p> <p><b>Demola offers new ways and practices for collaboration between businesses, students and universities. For companies and other organisations, Demola offers an opportunity to test and co-create innovative solutions with multidisciplinary university student teams and researchers.</b> The Demola was launched in Tampere, Finland in 2008 and has subsequently expanded to 14 countries in Europe, Latin America, Africa and Asia.</p> <p><b>Projects and challenges are developed jointly by companies, public sector and universities. Multidisciplinary teams are formed from students from multiple universities and participating staff from partner companies and organisations. Demola is internationally part of universities' education and research processes providing an unique opportunity to create inspiring combinations of knowledge.</b> Numerous laboratories of Demola alliance universities are as well available to the Demola co-creation teams. A typical local Demola site carries out about 30-100 projects per year with variety of students and project partners</p>

## Demola - Innovation Ecosystem combining the talent of students with company R&D activities and university research

	<p>Demola's roots lay in Tampere and was initiated by major industry partners such as Nokia and local universities. <b>Part of initial development was enabled by ERDF funding.</b> The idea generated from a shortcoming identified by decision-makers in industry, namely the impression that <b>more practical, multidisciplinary and co-creation oriented innovation environments are needed</b> and that the previous ones were too inward-looking. In response, leading international innovation centres were studied and the Demola concept developed with the goal to deliver concrete results in more customer focused, down-to-earth, agile, cost-efficient and effective way, <b>making best use of innovative methods of collaboration between talented students, companies and universities.</b></p> <p>Companies and other organisations operating as partners benefit from fresh ideas and approaches to challenge their current perspectives as well as from access to a pool of young talents eager to collaborate in real-life projects for developing solutions to challenges defined with the partner. <b>University students benefit from the opportunity to add real-life work experience into the conventional path towards a career and from opportunities to establish their start-ups based on Demola project results.</b> Demola sites are run by local partners together with global network with extensive experience in supporting innovation processes and start-up creation. In 2012, the Demola Network received the Baltic Sea Region Innovation Award.</p>
Duration	2008 – Ongoing
No. of approved applicants	10 000+
Type of funding	Service fees from the partner organisations, university education and research operations.
Main stakeholders	Demola alliance partners
Stakeholder(s) from	Industry, universities
Scope 1	International
Scope 2	Digital
Main target group	Industry, universities, students
Impact	<p>The key results of Demola highlight the engagement of more than 1000 partner companies and more than 70% of the results claimed for business use and further development. In addition, new jobs and new companies have been created.</p> <p>Demola sites have had <b>significant impact on creating new culture of cooperation</b> between experts from multiple knowledge areas as well as supported university business cooperation. Also several corporate partners have developed internal innovation processes based on their learnings from Demola cooperation.</p>
Scalability	<p>Scalability is considered to be high. The initiative is considered to be highly scalable towards an involvement of further industrial companies including SMEs larger corporations, the public sector and further higher and executive education and training institutions. Replication on a larger scale requires rather high investments should this model be replicated 1:1.</p> <p>The Demola project approach is highly transferrable to other industry-university settings. The key features that should be considered are the neutral location (not in the university, not in a business), the approach to ownership of results</p>

Demola - Innovation Ecosystem combining the talent of students with company R&D activities and university research	
	balancing industry and student perspectives and the staffing of the facility.
Sustainability	<p>Demola operates on a region-wide basis and opens new opportunities via its international ecosystem and as such is highly sustainable since <b>it can be operated on a reasonable and limited budget</b>. The model was developed in Tampere, Finland where all three universities and City of Tampere were engaged in the project.</p> <p>The establishment of Demola as a neutral ground location, not dependent on any one partner or university, has allowed flexibility in growth and has given confidence to potential new partners when joining. <b>Running in a cost-efficient and agile manner has allowed quick reactions to changing environments and events</b>. Focusing on producing concrete demo results has helped to lead a change in the mind-set of innovation thinking in local environments.</p>
URL	<a href="https://www.demola.net/">https://www.demola.net/</a>

École 42	
Country	France (Paris) , USA (Fremont, California)
Short description& objectives	<p>École 42 aspires to find and educate talents in the IT area and wants to fill the gap of IT professionals in today's France economy. École 42 wants to do this regardless of the social or school background, giving a chance to young people (from 18 to 30 years old) without any diploma who are motivated to learn more about coding and develop labour efficient skills. Selection takes place on the basis of talent and motivation, no diploma is required.</p> <p>École 42 is a private information-technology school in France and in the U.S. which was created in 2013. It is founded by Xavier Niel, Nicolas Sadirac, Florian Bucher and Kwame Yamgnane and funded by Xavier Niel, a French telecom tycoon. The training at École 42 takes approximately 3 years. The training is accessible to every young person who is interested in ICT, no matter whether he or she possesses an academic degree.</p> <p>The final selection of the candidates who want to become a student at École 42 consists of a four-week intensive computer programming course called piscine (engl.: swimming-pool). Only the most motivated candidates succeed. Through this process, 3.000 students out of 70.000 candidates are selected for the piscine. Only 900 remain as the new incoming group. The selection process takes place three times per year (July, August, and September, 1000 each time).</p> <p>The training of École 42 is based on a system of self education, namely peer-to-peer- and project-based learning. There are no teachers at École 42 and no lectures. The program is completely free of charge and does not issue any diploma or degree. The purpose of École 42 is to provide a full three-year long computer specialist education to young people in preparation for digital jobs in the dedicated sector, and in the other sectors as well as part of the unavoidable digital transformation. The overall goal is to increase the number of digitally-skilled employees in France.</p> <p>École 42 offers many opportunities for the professional integration of its students, i.e. enterprise-projects and internships:</p> <ul style="list-style-type: none"> <li>• After the first year: mandatory internship, 4 to 6 months</li> <li>• After two years: optional internship, part-time</li> </ul>



École 42	
	<ul style="list-style-type: none"> <li>At the end of the formation: mandatory internship, 6 months</li> </ul>
Duration	2013 - Ongoing
Budget	70 million euros for 10 years (2013-2023) – Paris campus
No. of applicants	70,000 (2017)
No. of approved applicants	900 (2017); since 2013, 3500 students have been enrolled, nearly 900 each year
Type of funding	The program is funded by the French billionaire and entrepreneur Xavier Niel
Main stakeholders	Xavier Niel, Nicolas Sadirac, Florian Bucher, Kwame Yamgnane
Stakeholder(s) from	--
Scope 1	(Inter)National: France and USA
Scope 2	Digital
Main target group	Young people (from 18 to 30 years old) without any diploma who are motivated to learn more about coding and develop labour efficient skills
Impact	<p>Since 2013, 3500 students have enrolled, nearly 900 each year. Today (2017), 75 students completed the full curriculum, and 600 launched their career before the end of the curriculum, due to very good job opportunities.</p> <p>École 42 receives very good feedback from companies: the expected skills are present and fit the needs of the market and 1/3 of the companies after the first internship state that the students are 100% ready to launch their career.</p>
Scalability (and transferability)	Setting up and running comparable programmes requires a substantial investment. Xavier Niel has decided to also start the programme in the US. Further plans on up-scaling are not known at present.
Sustainability	The programme funding is secured as long as Xavier Niel is willing to fund it, or decide to change the present funding model (e.g. use of another individual/company funding, royalties from partnerships, ...). One of the major influence factors of this could be the success of the École 42-graduates in the labour market.
URL	

Industrial Doctorates	
Country	Netherlands
Short description& objectives	<p>The State Secretary for Education, Culture and Science recently made a financial boost available to benefit a programme for PhD students who partly work at knowledge institutions and partly in industry: Industrial Doctorates. This call is open to researchers from all scientific domains in cooperation with companies. This can be any type of company and especially Small and Medium Enterprises (SMEs) are invited to join.</p> <p>The aim of this Industrial Doctorates call is to make intensive collaboration possible in PhD projects within both a knowledge institution and a company in every scientific area. This will strengthen or create the scientific knowledge acquired and the collaboration in a PPP and contributes to talent development in research. Additionally it provides an opportunity to apply or further develop the scientific</p>

Industrial Doctorates	
	knowledge acquired relatively quickly (parallel to or after the doctoral research) and to make optimal use of the knowledge from a company in the research. This programme is still at the pilot stage.
<b>Duration</b>	2017 - ongoing
<b>Budget</b>	The maximum grant from The Netherlands Organisation for Scientific Research (NWO) that can be applied for per project is 222,563 euros. This budget is primarily intended for the personnel costs (217,563 Euro) and the associated bench fee (5,000 Euro) for a PhD project for a period of maximum four years on the basis of a full time appointment at a knowledge institution recognised by NWO. In the case of non-standard appointments and associated costs (shorter, smaller, longer due to part time appointment), the amounts stated in the proposal must be calculated in proportion to a full time appointment. In the case of a part-time appointment, the maximum period to complete the doctoral research is five years. An overview of all the financing programmes that candidate can apply for is provided here: <a href="https://www.nwo.nl/onderzoek-en-resultaten/programmas/">https://www.nwo.nl/onderzoek-en-resultaten/programmas/</a>
<b>No. of applicants</b>	The main specific conditions that apply are: <ul style="list-style-type: none"> <li>• In the budget, a distinction is drawn between graduating or graduated master's students (compartment I) and employees who are already employed by the participating company (compartment II);</li> <li>• the proposal may not be submitted for positions that are currently vacant;</li> <li>• the proposal must relate to existing public-private partnerships (PPP) or create a new convincing PPP;</li> <li>• each main applicant may only submit one application per round;</li> <li>• in each project co-funding by the company is required (less in case of an SME);</li> <li>• each company may be awarded a maximum of one project in each compartment.</li> </ul>
<b>Type of funding</b>	Government and industry
<b>Main stakeholders</b>	Government and NWO
<b>Stakeholder(s) from</b>	Industry and government
<b>Scope 1</b>	National
<b>Scope 2</b>	Digital
<b>Main target group</b>	Industry and universities
<b>URL</b>	<a href="http://www.stw.nl/en/content/industrial-doctorates">http://www.stw.nl/en/content/industrial-doctorates</a>

Make IT Work!	
<b>Country</b>	Netherlands
<b>Short description&amp; objectives</b>	Make IT Work is an initiative which makes it possible for highly educated people (bachelor HBO) with no specific IT background to retrain to an IT position at higher professional education level and start directly in a job. Students are selected for Make IT Work through a tool. Employers and prospective students meet during an employers' market. When the employer and the candidate have an agreement, the candidate can participate as a student in the retraining to become a Software Engineer, Cyber Security Specialist or Business Analytics Specialist. In addition to programming, attention will also be paid to cooperation and communication skills. The aim of the project is to offer the course participants a good and up-to-date course in the first part, so that the course participants can start working at one of the participating companies or institutions in the second part of the retraining.

## Make IT Work!

	<p>The students follow intensive training in a full-time course of four months, 1 month orientate and then work for six months, where they go to school one more day a week. The employer pays the retraining costs and offers an employment contract of six months for 32/40 hours per week with a market-based salary.</p> <p>In 2015 the Amsterdam University of Applied Sciences started with Make IT Work for the direction of Software Engineer. At the beginning of April 2017, Make IT Work, in collaboration with Hilversum Media Campus and MyBit, started the retraining to software engineer in the media. As of February 2018, the conversion courses Cyber Security and Business Analytics will also be offered by the Hogeschool van Amsterdam.</p> <p>The programme was part of the region plan that has been set up by the Economic Board of Amsterdam. Within this sector plan ten measures are taken to educate or re-train people for sectors filled with chances with chances and opportunities. The metropol region of Amsterdam, the ministry of employment and social cases and the employers all invest in the programme.</p> <p>This project is for the re-training of educated professionals in ICT. Half of the retraining costs are paid by the Ministry of Social Affairs and Employment the other half is financed by the employer, whereby the latter amounts to 6,000 Euro per employee. In September 2017 the government defrayment stops and at this moment the Hva runs the programme stand alone without any commercial companies. Employers payment is still 6.000 euro without any other fee cost. USP of this project is that we have all within the Hva (hunting and selection, education and connect with all our companies who are involved)</p>
<b>Duration</b>	2015 - ongoing
<b>Budget</b>	The total budget is unknown. Re-training subsidy: 6,000 Euro per employee
<b>No. of applicants</b>	<p>Profile of applicants:</p> <ul style="list-style-type: none"> <li>• Diploma from a higher professional education institute or university.</li> <li>• Knowledge of Dutch and English</li> <li>• Good analytical skills.</li> <li>• Good communication and advising skills</li> <li>• Ability to work accurately</li> <li>• Ability to work independently as well as in a team.</li> <li>• Proactive attitude</li> <li>• Available for 40 hours a week</li> </ul> <p>Training can only start when 10+ persons enrolled.</p>
<b>No. of approved applicants</b>	More than 200 students follow the program and work within the IT departments of participating companies, 97 percent still work at the company where they started at the beginning of the Make IT Work re-training. The 12 <sup>th</sup> course will start on 16 <sup>th</sup> of April 2018.
<b>Type of funding</b>	There is no funding of the programme anymore (until September 2017 there was funding through the government).
<b>Main stakeholders</b>	Main and only stakeholder is University of Applied Sciences of Amsterdam
<b>Stakeholder(s) from</b>	Universities, companies (formerly also government)
<b>Scope 1</b>	National
<b>Scope 2</b>	Digital
<b>Main target group</b>	Commercial Companies, students, universities
<b>Impact</b>	More than 200 students follow the programme
<b>Scalability (and transferability)</b>	Instruction of working together with other universities throughout the Netherlands

## Make IT Work!

	with the aim to expand the programme
<b>Sustainability</b>	Unknown at present

## Techniekpact

<b>Country</b>	Netherlands
<b>Short description&amp; objectives</b>	<p>The Technology Pact is a joint initiative of central government, the business community, the trade unions, and the education community and the regions. The five regions of the Netherlands have their own Technology Pact. Participants are the Ministry of Economic Affairs, the Ministry of Education, Culture and Science, the Ministry of Social Affairs and Employment, the Confederation of Netherlands Industry and Employers (VNO-NCW), MKB Nederland, FME Association, Metaalunie, the top sectors, the technology industries, FNV, CNV, PO-Raad, VO-Raad, the Netherlands Association of VET Colleges, the AOC Council, the Netherlands Association of Universities of Applied Sciences, the Association of Universities in the Netherlands, 3TU.Federation, NRTTO, Interstedelijk Studenten Overleg, the five regions (North, East, Southeast, Southwest Wing and Northwest Wing).</p> <p>Techniekpact aims at:</p> <ul style="list-style-type: none"> <li>- Improving the alignment between secondary education, vocational education and higher education.</li> <li>- Help primary education teachers improve their skills in the area of Science &amp; Technology education.</li> <li>- Strengthen public-private partnerships in support of primary and secondary education.</li> <li>- Make optimal use of technically-skilled staff and their talents and retain them for individual companies</li> <li>- and the overall technology sector by investing in sustainable employability</li> </ul> <p>The purpose of the Techniekpact programme is to increase the number of technically educated people in the Netherlands. The first technical pact was signed in 2013, by employers, educational institutes and the government.</p> <p>However, after all the work people put into to fulfil this goal, some vacancies in the technical sector are still hard to fill. The Executing Institute for Employees Insurance published statistics which clearly showed that there would still be rather large shortage in multiple technical and ICT jobs by 2020. That is the reason why the Dutch government made the second technical pact and signed it on the 18<sup>th</sup> of April 2016 with the following guidelines and 12 goals:</p> <ol style="list-style-type: none"> <li>1. All the primary schools to teach the subject: Science and technology.</li> <li>2. Teacher training to improve their skills in the subject science and technology.</li> <li>3. Strengthen public private partnerships within education.</li> <li>4. Ensure that significantly more students in secondary education aim for a more technical skills profile.</li> <li>5. Improve alignment of secondary education and higher vocational and higher professional education.</li> <li>6. Professionalise teachers working in secondary education. More teachers with a relevant master.</li> <li>7. Educational institutes and companies to cooperate when training teachers.</li> <li>8. Making the public partnerships in higher vocational education more sustainable.</li> <li>9. Schools and companies to cooperate when deciding on the programmes in schools.</li> <li>10. Integral cooperation of regional and sectoral networks.</li> </ol>

Techniekpact	
	<p>11. Cooperation between higher educational institutes and companies and more attention to international technical talent.</p> <p>12. Maintaining craftsman by investing in sustainability.</p>
Duration	2013 - ongoing
Budget	<p>There is no overall budget available for implementation the Techniekpact. However, it is known that public and private institutions support the project through:</p> <ul style="list-style-type: none"> <li>- Regional Investment Fund MBO (Regionaal investeringsfonds mbo) for sustainable public-private cooperation in vocational education. Central government, employers and the region will each contribute EUR 100 million.</li> <li>- Regulation Sector Plans (Regeling Sectorplannen) for tackling unemployment reduction and improvement of functioning of the labour market.</li> <li>- (Impuls Teachers Deficiencies (Impuls Leraren Tekortvakken) for the development of an integrated approach to train teachers in the teaching of science and technology education.)</li> </ul> <p>Businesses in the designated top sectors will make 1,000 scholarships available annually for technology-related study programmes at the universities of applied sciences and research universities</p>
No. of applicants	No figures provided by the representative at the Ministry of Economy
No. of approved applicants	No figures provided.
Type of funding	Public-private partnership
Main stakeholders	Ministry of Education, Ministry of Economic Affairs, Ministry of Social Affairs and Employment, pupils of primary and secondary school, students
Stakeholder(s) from	Industry, education and training institutions, government, trade unions, primary and secondary schools,
Scope 1	National
Scope 2	Digital, ICT and engineering
Main target group	Industry and universities
Impact	<p>4,2 % of the primary schools offer T&amp;S</p> <p>22% of the students studying at the level of basic vocational and sector vocational education choose a Beta profile.</p> <p>50% of the students studying at the level of higher professional education and university choose for a beta profile.</p> <p>32 % of higher vocational students choose a technical study.</p> <p>29% of higher professional students and university students choose a beta technique subject.</p> <p>3% subject focused 2nd degree teacher.</p>
Scalability (and transferability)	<p>The results of this project appear to be highly scalable.</p> <p>The initiative has already a national scope and is coordinated by representatives from the Dutch government, employers, employees, top sectors and education. By dynamically adapting to the need of the different regions of the Netherlands, the Techniekpact ensures flexibility and adaptability of its activities.</p> <p>The National Technology Pact Steering group has formulated a future expansion plan and specific targets until 2020. Among these, the initiative aims at increasing the appeal of transfers and learning to vocational and higher professional education, with focus on women.</p> <p>Further expansion of the Twente technology pact monitor to include the entire Overijssel region and – if possible – East, and alignment of the entire chain with learning pathways and routes are also key areas for attention</p> <p>The business community aims to offer work placement positions or apprenticeships</p>

Techniekpact	
	to all students in technical vocational programmes. This expansion effort will help to ensure and maintain a 30 percent intake rate at technical vocational programmes. Moreover, existing inspirational examples in the area of cross-sectoral and intersectoral mobility will be shared with other technical education and research funds.
<b>Sustainability</b>	<p>The activity is perceived as highly sustainable. The continuity of this initiative depends on the successful collaboration between the public and private sector. By stimulating and facilitating PPPs within the (vocational) education community, the Technology Pact ensures the sustainability of existing infrastructures.</p> <p>90 PPPs have been established since 2013. These centres can count on a stable financial support by educational institutions, the business community and government authorities.</p> <p>All the involved partners are jointly responsible for safeguarding the sustainability of these collaborations and ensuring that successful centres can independently maintain their quality standards.</p>
<b>URL</b>	<a href="https://www.techniekpact.nl/">https://www.techniekpact.nl/</a>

IT FOR SHE	
<b>Country</b>	Poland
<b>Short description&amp; objectives</b>	<p>IT for SHE is a programme which aims to increase the participation of women in the high tech industry, by helping talented female students from IT faculties to enter the labour market. There are three main actions of the programme. The first is the Women in Tech Camp where the 130 best IT female students in Poland take part in a hackathon, workshops and mentoring. The second action is the Kids in IT, where 50 volunteer female students from IT departments teach 1,000 kids in rural areas basic coding, how to use 3D printers, Arduino programming and robot building. The third element is the Mentoring Program for female IT students, which is run by representatives of technology companies in Poland. The selected women get to work with mentors for six months on their professional and personal development.</p> <p>In 2017, IT for SHE was awarded with European the Digital Skills Award 2017 in the "Women in IT" category and thereby acknowledged as the most successful programme in Europe for women in IT.</p> <p>The 3 main actions of the program IT for SHE are:</p> <ol style="list-style-type: none"> <li>The largest in Europe, 5-days inspirational <b>"Women in Tech Camp"</b> for 130 IT girls</li> </ol> <p>In September 130 girls from entire Poland were invited for a 5-days "Women in Tech Camp," full of inspiration, activities and networking. The participants of the camp were the best IT students from Poland. The tech camp program consisted of: 1<sup>st</sup> Day – Welcome Day – with Women in Tech Hackathon, Artificial Intelligence Workshop and integration workshops, 2<sup>nd</sup> Day – Tech skills Day – 40 tech workshops run by specialists from partner companies, 3<sup>rd</sup> Day – Role Models and Mentoring Day – presentations by 6 great women from the IT industry and a short mentoring session with 80 mentors from tech companies from all around Poland, 4<sup>th</sup> Day – Career and soft skills Day – soft skills workshops, 5<sup>th</sup> Day – Final Day – Inspiration to take away – How to solve social problems by new technologies – final session with participation from international organisations like UNICEF, Amnesty International, PAH and social activism in the area of new technologies.</p>

## IT FOR SHE

	<p>More about Women in Tech Camp agenda: <a href="http://camp.itforshe.pl/">http://camp.itforshe.pl/</a></p> <p>II. <b>1000 Kids in IT – Volunteering Campaign</b> encouraging young women, female IT students, to teach children from small towns and villages programming and new technologies.</p> <p>Last summer 50 volunteers (female students from IT departments) from 19 Polish technical universities visited for 5 days primary school children from small towns and villages in Poland and to teach them programming and technology – for free. The children learned, among others: basic coding, using of 3D printers, Arduino programming and robot (LEGO) building. Key element is the fact, that kids from small communities, their parents and teachers were able to observe the young female students in the role of experts in the fields of IT and new technologies. It was a great inspiration for little girls to invent their own professional future.</p> <p>The movie about the IT for SHE Voluntary Program: <a href="https://youtu.be/3NwJslS-Sls">https://youtu.be/3NwJslS-Sls</a></p> <p>III. <b>Mentoring Program</b> for female IT students, run by representatives of the best technology companies in Poland</p> <p>Female students and graduates of faculties of all Polish technical universities and the IT departments of universities were encouraged for application to IT Mentoring Program. They had a possibility to select one of 35 great mentors – employees of partner companies (from tech and HR fields) and work with them for 6 months on their professional and personal development. During the program there was opportunity to develop skills in the field of: programming, new technologies, project management, career planning and leadership. It was a unique, individual relationship with high profile experts from the top IT companies (partners are from Cisco, Intel, Ericsson, Citi, Google, Samsung, P&amp;G, Goldman Sachs)</p> <p>Profiles of mentors participating in the program: <a href="http://itforshe.pl/program-mentoringowy/teksty/4-mentoring">http://itforshe.pl/program-mentoringowy/teksty/4-mentoring</a></p> <p>IV. <b>Women in Tech Summit</b> – the greatest event for women in technologies in this part of Europe, planned for 27-28 November 2018 in Warsaw. It will gather 1000 women, those just entering the high-tech world and those already stepping up on a career ladder. The idea of the conference is to present the potential women bring into the high-tech industry, IT, science, and the start-up world, and their contribution to the creation of the efficient ecosystem of innovations. Women in Tech Summit will be the place for ambitious women who want to gain newest tech-knowledge, broaden their professional contacts and advance their career in the high-tech industry. There will be grants for young talented women from Ukraine, Belarus, Russia and Central Asia to cover their travel costs and attendance.</p> <p>Along with the conference and networking meetings, there will be a Career Fair, where high-tech companies will present their job offers and universities their postgraduate and specialist courses.</p>
<b>Duration</b>	ongoing
<b>Budget</b>	EUR 100,000
<b>No. of applicants</b>	600
<b>No. of approved applicants</b>	300
<b>Type of funding</b>	Private – high tech industry
<b>Main stakeholders</b>	<p>Perspektywy Education Foundation:</p> <p><a href="http://www.perspektywy.org">http://www.perspektywy.org</a></p> <p><a href="http://www.perspektywy.org/index.php?option=com_content&amp;task=view&amp;id=38&amp;Itemid=34">http://www.perspektywy.org/index.php?option=com_content&amp;task=view&amp;id=38&amp;Itemid=34</a></p>



IT FOR SHE	
Stakeholder(s) from	Industry, non-profit organisation
Scope 1	National
Scope 2	Digital
Main target group	Female computer science students and professionals, kids from small cities – both genders
Impact	<p>This year (2017) 130 students participated in the Women in Tech Camp; they expanded their knowledge and skills and became volunteers. This way a network for women in IT was created – women who support the IT for SHE project and are its ambassadors in the media. During classes for children we could present women as IT experts. This is a very important aspect, as in many places the stereotypes that women are no good in technology are still active. The beneficiaries of our program also include children from small towns – thanks to modern teaching aids they learned a lot about new technologies. They still keep in touch with the volunteers and eagerly wait for future meetings. The schools gained new approaches to teaching computer science.</p> <p>We are also planning for the program to result in the special initiative – Women in Tech Summit 2018</p>
Scalability (and transferability)	<p>The scalability of the project is strong – especially the “volunteering” part. It will be enough to encourage not 50 but e.g. 250 IT students to participate and we will be able to inspire not 1000 children from small towns and underprivileged families (like we did last year), but 10,000!</p> <p>There is a potential for scalability also in the project’s partnership structure, allowing create its mutations in further regions. We have received a proposal to create something similar in Germany, basing it on the willingness to cooperate in the joint pool of high-tech industry partners.</p>
Sustainability	The project is supported by partnership with high-tech industry representatives and by the Perspektywy Education Foundation – a non-profit organisation, along with volunteer activity. No public institutions are involved in it.
URL	<a href="http://www.itforshe.pl/">http://www.itforshe.pl/</a>

Expertkompetens (Graduate Professional Development Program)	
Country	Sweden
Short description& objectives	<p>The purpose of the Expertkompetens programme is to raise the expertise for knowledge-intensive business development and innovation among key individuals in companies. The objective is to develop and deliver courses on master level or higher where the expertise in strong research environments matches the strategic needs for expertise in companies. The prerequisites for applying for funding are that the applicant HEI has to have a strong research and educational environment, is going to involve and engage the target group companies right from the start, and can prove that the institution is financially sustainable in the long-term.</p> <p>The funding programme enables the development of research-related courses and education programmes for advanced-level professionals. This requires close collaboration between academic environment and companies in programme development work.</p> <p>In the recent round of the funding programme 6 projects were selected and now</p>



## Expertkompetens (Graduate Professional Development Program)

	<p>receive funding. These have developed and now offer professional training programmes on:</p> <ul style="list-style-type: none"> <li>• Remote monitoring and diagnostics of electrical/mechanical systems/products</li> <li>• Master's Education in software development (PROMPT)</li> <li>• Social Media and Web Technologies for Innovation</li> <li>• Expert in Production Engineering</li> <li>• Sustainable Wood Building Technology</li> <li>• Online Master in Cast Metals Engineering.</li> </ul> <p>Expertkompetens supports the development of education and training for advanced-level professionals. Courses and programs are developed by matching the skills and development needs of the business community with the knowledge and skills found in strong academic environments. As the course participants are professionals, high demands are placed on flexible forms of education. This means that, through the support of the program, universities can develop leading positions in the international development and generation shift of online education. For companies, it means that employees can acquire relevant knowledge at the university, including research results generated there or globally. The developed courses will be incorporated into the institution's regular education programme and quality assured according to regular routines. The purpose of the programme is to provide professionals and companies with expertise for knowledge-intensive business development and innovation.</p> <p>Co-production in course and programme development involves 8 universities and about 20 research institutes and trade organisations, &gt;150 companies (SME as well as large companies like GKN Aerospace Sweden, Combitech Engineering, SCANIA, Ericsson, Telenor, Siemens Industrial Turbomachinery, ABB, SAAB, SKF, Volvo Powertrain, Skanska, Volvo Construction Equipment, Atlas Copco RockDrills, Alstrom Power Sweden)</p> <p>The following professional training programmes are typical ones which can be used to illustrate the type of programmes funded through the Expertkompetens funding programme:</p> <ul style="list-style-type: none"> <li>• PROMPT: <a href="http://www.promptedu.se/">http://www.promptedu.se/</a></li> <li>• Expertkompetens sociala medier och webbt teknologi för innovation och tillväxt: <a href="https://lnu.se/mot-linneuniversitetet/Organisation/fakulteten-for-teknik/utbildning/expertkompetens-sociala-medier-och-webbt teknologi-for-innovation-och-tillvaxt/">https://lnu.se/mot-linneuniversitetet/Organisation/fakulteten-for-teknik/utbildning/expertkompetens-sociala-medier-och-webbt teknologi-for-innovation-och-tillvaxt/</a></li> <li>• Diagnos på distans: <a href="https://www.bth.se/om-bth/organisation/fakulteten-for-teknikvetenskaper/tisb/diagnos-pa-distans/">https://www.bth.se/om-bth/organisation/fakulteten-for-teknikvetenskaper/tisb/diagnos-pa-distans/</a></li> <li>• Gjutmagistern: <a href="http://ju.se/studera/kompetensutveckling---uppdragsutbildning/tekniska-hogskolan/aktuella-utbildningar/program-och-kurser-inom-det-gjuteritekniska-området/projektet-gjutmagistern.html">http://ju.se/studera/kompetensutveckling---uppdragsutbildning/tekniska-hogskolan/aktuella-utbildningar/program-och-kurser-inom-det-gjuteritekniska-området/projektet-gjutmagistern.html</a></li> <li>• ProdEx – Expert i produktionsteknik: <a href="https://www.hv.se/forskning/forskningsprojekt/teknik/prodex---expert-i-produktionsteknik/">https://www.hv.se/forskning/forskningsprojekt/teknik/prodex---expert-i-produktionsteknik/</a></li> </ul> <p>The submission deadline for the current (2017) step 1 call (Step 1 includes the investigation, planning and commencement of the education activities whereas step 2 comprises the development and implementation of the entire planned course offer / training programme) for submissions is 18 January 2018.</p>
<b>Duration</b>	Ongoing
<b>Budget</b>	All applications/projects that fulfil the requirements are accepted. (Financial

Expertkompetens (Graduate Professional Development Program)	
	<p>resources are not a limiting factor)</p> <p>The budget per project ranges from 2 – 5 million Euro.</p>
<b>No. of applicants</b>	About five applications from HEIs per year.
<b>No. of approved applicants</b>	<p>Six projects at HEIs in step 2 and two projects in step 1. No project has yet been completed.</p> <p>Depending on program, i.e. on area of competence and involved industry, the number of students following courses (of typically 3-5 ECTS), is 50-150 per year.</p> <p>Students represent approx. 300 companies, whereof 50 % also participated in course development.</p>
<b>Type of funding</b>	The HEI receives funds for their costs for developing industry relevant flexible courses. This comprises costs for analysing the needs of development and expertise in the industry target group, developing digital pedagogic methods and training of academic staff in flexible learning methods. KK Stiftelsen also provides 50% of the costs of running the courses twice. Thereafter the courses are financed through the regular state system for financing higher education or by related companies in commissioned programs. The participating companies must cover their own contributions in the development work.
<b>Main stakeholders</b>	KK-stiftelsen (Stiftelsen för kunskaps- och kompetensutveckling)
<b>Stakeholder(s) from</b>	Industry and universities
<b>Scope 1</b>	National
<b>Scope 2</b>	Digital
<b>Main target group</b>	Industry and universities
<b>Impact</b>	<p>Examples of results so far:</p> <p>Until 2016 the total number of students following courses are &gt;1000 and they represent about 300 different companies (50% of the companies have also participated in the course development).</p> <p>Courses becoming part of companies learning system - GKN Aerospace Sweden has integrated programme courses into their strategic assessment of competence as well as into their competence developing process</p> <p>After completing courses employees have advanced within their organizations – 25% of the students in the Gjutmagistern/Online Master in Cast Metals Engineering have advanced within their organizations.</p> <p>Developing work directly related to training activities in courses have resulted in new products/processes</p> <p>The project PROMPT received the “European Digital Skills Award 2016”</p> <p>Since new business relevant research based knowledge are crucial for competitiveness the impact cannot be overestimated. Flexible online courses on a high academic level are a new option for most companies and employees. This requires a new behaviour among employees – which always takes time to develop - to take advantage of this option. Therefore, we foresee a growing number of students from industry in the coming years. This can be exemplified by the Volvo Group University which supports and encourages employees to follow courses in the programme.</p>
<b>Scalability (and transferability)</b>	The courses are web-based with digital lectures, e-meetings and discussions forums. Typically, there are also one or two f2f meetings for introduction and laboratory

Expertkompetens (Graduate Professional Development Program)	
	work. Some courses are fully online, and open for international students. In principle, the courses have built-in scalability.
Sustainability	Provided that the courses are updated and in line with the needs in industry, sustainability is considered to be high.
URL	<a href="http://www.kks.se/vart-erbjudande/vara-program/expertkompetens/">http://www.kks.se/vart-erbjudande/vara-program/expertkompetens/</a> ; <a href="http://www.kks.se/vart-erbjudande/vara-program/expertkompetens/expertkompetens-vidareutbildning-for-yrkesverksamma-hogutbildade/">http://www.kks.se/vart-erbjudande/vara-program/expertkompetens/expertkompetens-vidareutbildning-for-yrkesverksamma-hogutbildade/</a>

### 7.1.2 KETs best practice candidate programmes

Imec.academy	
Country	Belgium
Short description& objectives	<p>IMEC INTERNATIONAL is a world-leading high-tech research centre driving the digital economy combining longstanding leadership in microchip technology with in-depth expertise in software and ICT. It performs world-leading research in nanoelectronics and delivers industry-relevant technology solutions. Imec is headquartered in Leuven, Belgium, and has offices in Belgium, the Netherlands, Taiwan, USA, China, India and Japan. The staff of about 2,500 people includes almost 800 industrial residents and guest researchers. Imec has been a global leader in the domain of nanoelectronics for more than 30 years, and has innovated applications in smart systems for the Internet of Things (IoT), Internet of Health, and Internet of Power. It has built an extensive and worldwide partner network, as well as in Flanders, and has generated successful spin-offs. Imec created the Imec.academy, imec's learning institute, which offers specialized courses on nanoelectronics and digital technology and engages in research on educational technology. Its technical training programs combine world-class expertise with hands-on applications for the local and international industry, academia and the imec employees. With its smart education research, imec strives to increase learning effectiveness by using smart technologies. Imec.academy has 20 courses on open offer per year. The offer is continuously growing, especially due to online offerings. All the courses are IP-free and contain knowledge that is a direct outcome of Imec's R&amp;D and application domains.</p> <p>The main objectives of imec.academy are:</p> <ol style="list-style-type: none"> <li>1. Enable imec in establishing a learning ecosystem to increase employees' abilities and achieve goals. How? By providing a qualitative learning offering, supported by smart technologies.</li> <li>2. Enrich industries and academia to explore the impact of disruptive technologies on core activities by being a top-level education partner, sharing key R&amp;D expertise, insights and findings.</li> <li>3. Inspire emerging markets to explore &amp; experience the benefits of having imec as a</li> </ol>

Imec.academy	
	<p>future R&amp;D partner by sharing key insights through a variety of knowledge sharing activities.</p> <p>4. Identify and explore smart learning technologies that can disrupt the current landscape by being a key research and business partner for smart education projects.</p>
<b>Duration</b>	1984 - ongoing
<b>Budget</b>	Imec.academy creates >1 million Euro revenues/year (including customised programmes abroad).
<b>No. of applicants</b>	See below
<b>No. of approved applicants</b>	The around 20 courses are attended by more than >500 participants/year.
<b>Type of funding</b>	<p>Government and external revenues.</p> <p>Funding institutions (imec as a whole): Industry (70%), Flemish government (10-15%), European projects (rest).</p> <p>Imec.academy receives its funding mostly by generating revenue with its open offer, offering customized courses for external customers and by supporting and participating in EC programmes. This includes the EUROPRACTICE IC Service funded through the H2020 program which brings ASIC design and manufacturing capability within the technical and financial reach of any European company and academia. The EUROPRACTICE IC Service, offered by IMEC and Fraunhofer, offers low-cost ASIC prototyping and ASIC small volume production ramp-up to high volume production through Multi Project Wafer - MPW - and dedicated wafer runs. In addition training of engineers and researchers on IC design and relevant process technologies is an essential part of the EUROPRACTICE programme.</p>
<b>Main stakeholders</b>	Imec.academy, Flemish government, industry partners
<b>Stakeholder(s) from</b>	Government, industry, universities
<b>Scope 1</b>	Global
<b>Scope 2</b>	KETs and digital
<b>Main target group</b>	Students, professionals, industry
<b>Impact</b>	The impact is both towards the imec staff by providing a learning and development offer that creates the skills set to perform world-class R&D, customer intimacy and operational excellence in everything that imec does. imec.academy also helps to increase the branding of imec in its eco system by sharing first-hand IP free R&D results and helping its partners in educating their employees.
<b>Scalability (and transferability)</b>	The replicability of the imec.academy is questioned since it would require a very substantial upfront investment and the willingness of partners to share their knowledge which is doubted.
<b>Sustainability</b>	Imec.academy is building a new business model that helps to secure a base revenue beyond the open offer by using and offering more online and blended types of

Imec.academy	
	learning. Also a continues search for new markets for the customized programs helps to secure a continues grow of the revenue.
URL	<a href="https://www.imec-int.com/en/academy">https://www.imec-int.com/en/academy</a>

Automotive Centre of Expertise	
Country	Netherlands
Short description& objectives	<p>The Automotive centre of expertise is a knowledge centre focused on automotive innovation. It has been set up as cooperation between Fontys University of Applied Sciences, University of Applied Sciences Arnhem and Nijmegen and University of Applied Sciences Rotterdam. It was set up in 2011 with these objectives in mind:</p> <ol style="list-style-type: none"> <li>1. Increasing the amount of students choosing an automotive Higher professional education programme.</li> <li>2. Increasing the amount of people that have an automotive background that find jobs in the automotive companies.</li> <li>3. Increasing the quality of education and focusing more question based education.</li> <li>4. Strengthening practice based research within higher professional education.</li> </ol> <p>Automotive centre of expertise is part of a bigger programme, and in the Netherlands you can find multiple centres of expertise focusing on different subjects. These centres of expertise fall under the educational institutes and get their funding via the government. These centres are meant to give the educational institutes a focus on their research.</p> <p>They are present in both higher vocational education and higher professional education. The vocational education centres have a strong connection to the employment market. These centres for innovative craftsmanship for vocational education and centres of expertise for higher professional education should grow into internationally well known centres where only the best students study.</p> <p>The Dutch government, specifically the ministries of education, culture and research and economics, will in the forthcoming years provide 28 million Euro for these centres.</p>
	2011 - ongoing
Budget	<p>For the centres of expertise programme there has been 28 million Euro provided by the government. Co-funded by the Ministry of Education and the Netherlands Enterprise Agency. The latter provides funding in terms of subsidies for every R&amp;D-intensive project of ACE. Additional funding comes from the (low) tuition fees and business partners. The public finance will last for 2 more years and is at approx. 1 million Euro/year.</p> <p>The overall annual budget is 3 million Euro.</p>
No. of applicants	Universities themselves choose the top students that later participate in the programme; the initiative itself does not have such information.
No. of approved applicants	1200
Type of funding	Public-private partnership
Main stakeholders	Government and industry, MBO/HBO students, research
Stakeholder(s) from	Industry and government
Scope 1	National
Scope 2	Automotive

## Automotive Centre of Expertise

<b>Main target group</b>	Industry and universities
<b>Impact</b>	<p>Recently, a letter was written by the secretary of the minister of economics which contained a very short mid-term review. It was stated that the Higher professional education institutes and the universities do their best to implement the programme. To conduct this mid-term review a review commission was set up. They based this information on the yearly reports from different institutes and the extra information the institutes gave about their progress. Also conversations were held with the different institutes.</p> <p>All the institutes have succeeded in focusing more on their point of interest. This means that all the institutes are allowed to keep the contribution they received from the selective budget.</p>
<b>Scalability (and transferability)</b>	Scalability is considered as high. They intend to become the Automotive Centre of Expertise for Benelux, not merely NL. The current CEO intends to maintain the initiative focused only in the automotive sector. It is easily transferrable in other countries due to the relatively simple business model.
<b>Sustainability</b>	Sustainability is perceived as high. It started in 2011 and now is fully operational with plans for extension. The Ministry of Education and the Netherlands Enterprise Agency have had a long-term vision in supporting the programme. Multiple streams of funding make it easily sustainable.
<b>URL</b>	<a href="https://www.rijksoverheid.nl/actueel/nieuws/2010/07/15/rijk-investeert-28-miljoen-in-kenniseconomie">https://www.rijksoverheid.nl/actueel/nieuws/2010/07/15/rijk-investeert-28-miljoen-in-kenniseconomie</a> <a href="https://www.acemobility.nl/">https://www.acemobility.nl/</a> <a href="https://www.zuyd.nl/onderzoek/centres-of-expertise">https://www.zuyd.nl/onderzoek/centres-of-expertise</a> <a href="https://fontys.nl/Innovatie-en-o">https://fontys.nl/Innovatie-en-o</a>

## JOBSTARTER - Digital manufacturing processes - Additional qualification for the future career in INDUSTRY 4.0! (Digitale Fertigungsprozesse - Zusatzqualifikation für die berufliche Zukunft in INDUSTRIE 4.0!)

<b>Country</b>	Germany
<b>Short description&amp; objectives</b>	<p>With the project “Additional Qualification ‘Digital Manufacturing Processes’”, the Young Talent Foundation for Mechanical Engineering responds to the changes in the mechanical and plant engineering industry with regard to Industry 4.0 and the associated challenges and opportunities in the design of a future-oriented education. Apprentices are prepared for a fully digitized workplace during their training.</p> <p>The target group for the additional qualification ‘Digital Manufacturing Processes’ are ambitious trainees in the industrial and technical professions of mechanical and plant engineering. To start the additional qualification, the trainees should be in the 2nd or 3rd year of training. The additional qualification not only benefits the participants themselves, but also aims to make dual training in mechanical engineering more attractive for young people in the long term and at the same time to secure the demand for skilled workers in small and medium-sized companies. In particular, these companies are often for economic reasons unable to adequately respond to industrial developments with an</p>

## JOBSTARTER - Digital manufacturing processes - Additional qualification for the future career in INDUSTRY 4.0! (Digitale Fertigungsprozesse - Zusatzqualifikation für die berufliche Zukunft in INDUSTRIE 4.0!)

	<p>adaptation qualification for their employees, employees and trainees.</p> <p>The qualification comprises 200 teaching units and will be implemented within 15 months of training. Within these 15 months, 7 modules will be completed by the apprentices. Each of them will be completed with a learning success examination:</p> <ul style="list-style-type: none"> <li>• M1: service and maintenance processes</li> <li>• M2: Automation technology</li> <li>• M3: Fundamentals of Data Protection and Data Security</li> <li>• M4: design and manufacture with CAD / CAM systems</li> <li>• M5: designing CNC manufacturing processes</li> <li>• M6: additive manufacturing processes</li> <li>• M7: Economic Contexts of Industry 4.0</li> </ul> <p>Upon successful completion and passing of the exam, the participants will receive an IHK (chamber of commerce) certificate and a certificate from the Young Talent Foundation for Mechanical Engineering "Additional qualification - Digital production processes" in addition to their professional qualification. The high quality of the additional qualification and the special commitment of the participants are thus adequately and verifiably documented and recommended for corresponding positions in the company.</p> <p>The qualification takes place at the Carl Miele vocational college in Gütersloh and at the Berufskolleg Kreis Höxter in Brakel.</p> <p>With currently 34 participants in the first round (Dec 2016 - Feb 2018), the original target of 25 trainees was clearly exceeded and proves the high demand for well-trained and future-oriented skilled workers. The second run will start in March 2018 and the young talent foundation Mechanical Engineering expects a similar high response.</p>
<b>Duration</b>	2016 – 2019
<b>Budget</b>	499.000,-€
<b>No. of applicants</b>	34
<b>No. of approved applicants</b>	1st round: 34 apprentices; 2nd round: 43 (as of 28 <sup>th</sup> February 2018)
<b>Type of funding</b>	The Federal Ministry of Education and Research (BMBF) is funding the second funding round of the "JOBSTARTER plus - Training for the Future" program from federal funds and funds from the European Social Fund (ESF). The promotion of the JOBSTARTER plus program from the ESF is based on Regulation (EU) No 1304/2013 of the European Parliament and of the Council of 17 December 2013 (ESF Regulation) and Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013 (General Structural Funds Regulation).
<b>Main stakeholders</b>	<p>Federal Ministry of Education and Research (BMBF)</p> <p>Federal Institute for Vocational Education and Training (BIBB)</p> <p>Young talent foundation Maschinenbau in Ostwestfalen / Young Talent Foundation for Mechanical Engineering</p>

<b>JOBSTARTER - Digital manufacturing processes - Additional qualification for the future career in INDUSTRY 4.0! (Digitale Fertigungsprozesse - Zusatzqualifikation für die berufliche Zukunft in INDUSTRIE 4.0!)</b>	
<b>Stakeholder(s) from</b>	Industry, VET training providers
<b>Scope 1</b>	National
<b>Scope 2</b>	Advanced Manufacturing Technologies
<b>Main target group</b>	Apprentices, VET students
<b>Impact</b>	<p>For the participants, there are no costs for the additional qualification. The additional qualification gives young people the opportunity to develop the processes of a smart factory along the value chain and to acquire unique expertise for future changes in the sense of Industry 4.0. And this already during your training. Thus, they already set themselves apart from the competition during their training for their professional career, which is a great advantage for all participants.</p> <p>As a lot of digitalization will change in the future, these young people will find a way that will help them, their business and the economy in the future to deal with these changes.</p> <p>Experience of a first-time apprentice: An apprentice of an SME was already integrated by his training company into a digitalization group before completing his training and the additional qualification. After graduation, the trainee takes over project responsibility in the field of digitization.</p> <p>There will be changes in the field of digitization, and apprentices will start learning and learning about these changes directly during their training. Many companies need professionals and well-trained skilled workers. Thus, the individual participants have a competitive advantage over other trainees.</p> <p>The additional qualification not only benefits the participants themselves, but also aims to make dual training in mechanical engineering more attractive for young people in the long term and at the same time to secure the demand for skilled workers in small and medium-sized companies. In particular, these companies are often for economic reasons unable to adequately respond to industrial developments with an adaptation qualification for their employees, employees and trainees.</p> <p>In addition, the company is more attractive in the external presentation, because they offer their potential trainees this option of additional qualification.</p> <p>The target regions Gütersloh / Beckum and Brakel are characterized by a strong medium-sized economy. Over 70% are small and medium-sized companies. The goal is logical to make dual training more attractive. This can be achieved with the additional qualification 'Digital Manufacturing Processes', as it gives trainees better career opportunities. The additional qualification increases the knowledge and competences of the trainees on the one hand, which brings greater satisfaction with the work situation and strengthens the motivation. On the other hand, companies are increasing their attractiveness for future applicants for apprenticeships in this field. The additional qualification thus represents a competitive advantage in the competition for the High Potentials. In addition, through the transfer of knowledge, the companies additionally receive qualified specialists in the field of digital production processes.</p>
<b>Scalability (and transferability)</b>	Due to the high level of networking and the degree of familiarity of the young talent foundation mechanical engineering in industry, a transfer to other target



## JOBSTARTER - Digital manufacturing processes - Additional qualification for the future career in INDUSTRY 4.0! (Digitale Fertigungsprozesse - Zusatzqualifikation für die berufliche Zukunft in INDUSTRIE 4.0!)

	<p>regions is possible. The project managers work closely with the industrial and social partners from the outset to achieve a wide dissemination of the results. The transferability into further training companies is ensured by the practical relevance and connection of the association to its members and their customers. A transfer to neighbouring training occupations such as cutting machine operator already took place in the course of the project. Workers 'and employers' organizations of the metal industry are involved in the transfer.</p> <p>Due to the high demand, a transfer to other occupational groups took place during the first phase of the project. In addition to the actually intended occupational field of the industrial mechanic, other occupational groups have been added. For the second round, all technical and industrial apprentices can take part in the additional qualification in the second and third year of apprenticeship.</p> <p>Since autumn 2017, the Young Engineers' Foundation for Mechanical Engineering and the Ministry of Economic Affairs and Education have been working hard to establish this additional qualification as a pilot model in other regions in North Rhine-Westphalia. In mid-2018, 30 vocational colleges (5-6 vocational colleges in each district) in the Federal State of North-Rhine Westphalia (with a population of 16 million citizens) are to train teachers and trainers from the region to implement the additional qualification in their vocational colleges as of mid-2019.</p>
<b>Sustainability</b>	<p>At present there is no such type of additional qualification of this kind available for trainees. However, training in digitization in the future will be necessary for all companies. The participating companies use the additional qualification to bring in future digitization experts. In the future, these professionals will be able to support digitization in the company as a point of contact and in training new colleagues.</p> <p>Further regions have been and will be informed and acquired during the entire project period. At trade fairs or industry events, the project is reported about and advice is given. Together with the IHK (chambers of commerce) Bielefeld and Münster a certificate for the additional qualification was adopted. The alternative would have been to change in the overall training framework, but this would have taken many years, and the pace of rapid innovation in digitization could not have been addressed in a timely fashion.</p> <p>This is a fully funded project and during the project period any type of marketing is not considered.</p>
<b>URL</b>	<a href="https://www.jobstarter.de/de/zusatzqualifikationen-49.php">https://www.jobstarter.de/de/zusatzqualifikationen-49.php</a>

## Alliance Industrie du Futur

<b>Country</b>	France (Paris)
<b>Short description&amp; objectives</b>	<p>On July 20, 2015, the Alliance Industrie du Futur was officially created. Its role is to support French companies and especially SMEs in the modernization of their industrial processes and the transformation of their economic model by new, digital and non-digital technologies. It has two exceptional measures to support companies that will invest in the modernization of their production capacities:</p>

## Alliance Industrie du Futur

	<ul style="list-style-type: none"> <li>• € 2.5 billion in tax benefits for companies investing in their production capacities and;</li> <li>• € 2.1 billion of additional development loans distributed by Bpifrance to SMEs and mid-cap companies.</li> </ul> <p>The alliance created several working groups. The objective of the working group GT 03: 'Man and Industry of the Future' of the Alliance Industrie du Futur is about the impact of the digitisation of the value chain on the organisation of work and the implications on the provision of initial and continuous training. The Future Industry Alliance brings together public and private actors. It was founded by 11 founding members. It now has 34 active or associate members in 4 colleges: academic organizations, technological research organizations, professional organizations and corporate finance organizations.</p>
<b>Duration</b>	2017 - Ongoing
<b>Budget</b>	In total, several billion Euros massive investment programme; of this 150 million investment will be in vocational training for coming years
<b>No. of applicants</b>	e.g. 4000 companies went through the digital check
<b>No. of approved applicants</b>	
<b>Type of funding</b>	Different measures, including tax benefits and loans
<b>Main stakeholders</b>	Industry
<b>Stakeholder(s) from</b>	Industry
<b>Scope 1</b>	National: France
<b>Scope 2</b>	Digital
<b>Main target group</b>	Industry
<b>Impact</b>	To be seen
<b>Scalability (and transferability)</b>	To be seen
<b>Sustainability</b>	
<b>URL</b>	<a href="http://www.industrie-dufutur.org/">http://www.industrie-dufutur.org/</a> ; <a href="http://www.industrie-dufutur.org/aif/">http://www.industrie-dufutur.org/aif/</a>

## Industrial PhD 2017

<b>Country</b>	Sweden
<b>Short description&amp; objectives</b>	<p>The Industrial PhD 2017 programme offers grants funding an industry doctoral or licentiate student's research, in collaboration between industry and academia. The grant runs for two to five years and shall result in a doctorate (Ph.D.) or licentiate exam. SSF expects to fund 12-24 projects each with between SEK 1.25 and SEK 2.5 million each (including indirect costs) in this call for proposals. The student shall work at least 80% of their working time at the company for the entire period of the grant. Two persons shall serve as supervisors for the doctoral or licentiate student during the period of the grant – one at the higher education institution (HEI) and one at the company. The overall budget of the programme is around 3 million euros (SEK 30 million) which would result in an average grant of around 125.00 Euro. There are</p>

## Industrial PhD 2017

	<p>three different types of grants:</p> <ol style="list-style-type: none"> <li>1. Industrial PhD 4-5 years –2,5 million SEK</li> <li>2. The person has a licentiate degree and will obtain a PhD after two years – 1,25 million SEK</li> <li>3. Licentiate degree in two years – 1,25 million SEK</li> </ol>
<b>Duration</b>	2017 - 2022
<b>Budget</b>	Around 3 million euros (30 million SEK)
<b>No. of applicants</b>	Approx. 60 (call 2018 is open now)
<b>No. of approved applicants</b>	Between 12-24 can be approved/call. 48 approved PhD-projects is running now (from 2014-2017)
<b>Type of funding</b>	Grant from SSF to HEI. This grant cover approx. 50% of total PhD budget.
<b>Main stakeholders</b>	Stiftelsen för Strategisk Forskning (Swedish Foundation for Strategic Research, SSF)
<b>Stakeholder(s) from</b>	Non-profit organisation
<b>Scope 1</b>	National
<b>Scope 2</b>	KETs, Digital
<b>Main target group</b>	Universities, students
<b>Impact</b>	The purpose of the programmes is to contribute to needs driven excellent research within SSF's areas of activity and to foster cross-fertilization between academia and industry. This can also lead to greater knowledge of the different conditions under which people work in academia and industry. Examples of KPIs are patent, technology transfer, new co-operation HEI and industry, co-publications industry-academia.
<b>Scalability (and transferability)</b>	The programme is sustainable. The board of the SSF decides on the budget annually.
<b>Sustainability</b>	SSF board decides annually on budget and Calls for Proposals (Call text). The program started 2014 and has annual calls. SSF have a contract with the HEI which regulate the conditions of the grant. HEI and the company have a separate contract regulating IP, economic conditions and other issues.
<b>URL</b>	<a href="https://strategiska.se/utlysningar/utlysningar-under-beredning/industrial-phd-2017/">https://strategiska.se/utlysningar/utlysningar-under-beredning/industrial-phd-2017/</a>

## Science Industry Partnership (SIP)

<b>Country</b>	UK
<b>Short description&amp; objectives</b>	<p>The Science Industry Partnership (SIP) is one of the eight industrial partnerships in the UK bringing together employers across an industry sector to lead the development of skills, with a focus on growth and competitiveness. It is chaired by GlaxoSmithKline aims to design the vocational training and skills programmes needed by the life sciences and industrial science sectors. It supports Government strategies for Life and Industrial Sciences. To build a globally competitive science-based industry in the UK the sector needs a supply of young people with capability, drive and ambition. In addition the partnership will</p>

## Science Industry Partnership (SIP)

	<p>support the development of the existing workforce to acquire the skills needed to adopt new technologies and innovate new products and services. The SIP is running six employer designed and driven pilot skills programmes. The <b>Industry Degree Scheme</b> and <b>SMART Apprenticeships</b> are just two examples of the innovative skills programmes led by the partnership; both providing practical experience within businesses that play an active role in shaping the learning to meet business and learner needs.</p> <p>The SIP also aims to create a Skills Strategy for the sector; aligning to the Government strategies; running an Employer Board and a number of sub groups working with stakeholders and partners to design and deliver skills solutions, creating an accredited network of training providers including centres of excellence, and developing an employer owned system for accrediting new qualifications and assessment.</p> <p>SIP is the lead strategic employer member forum for science industry skills. Its main goal is to meet the sector demand for a skills workforce at every level, utilizing the home skills market. Its Operational Plan includes the following targets:</p> <ul style="list-style-type: none"> <li>- Apprenticeships: ambition is for 20,000 apprentices in the next 5 years</li> <li>- Influence on a new system for Apprenticeship Levy to support members</li> <li>- Project Funding: new opportunities, so far raised £348k in operational phase</li> <li>- Careers: build an active network of SIP Careers Ambassadors</li> <li>- Innovation in Skills: build a responsive online platform to ensure innovation in skills</li> <li>- Skills Strategy, Workforce Development and Higher Education etc.</li> </ul> <p>Since 2015, the SIP has supported or delivered:</p> <ul style="list-style-type: none"> <li>- 7,500 new Apprenticeship starts in the science sector</li> <li>- £765,000 of skills investment through funded projects</li> <li>- 376 new SIP Ambassadors for industry</li> <li>- 170 new science industry placements and a national network of skills partners investing in skills</li> <li>- 6 new Apprenticeship Standards ranging from Level 2- Level 6</li> <li>- With a further 7 Standards in development including Level 5- Level 8</li> <li>- 3 best practice brochures published for employers, apprentices and students</li> <li>- A range of policy and position papers on skills issues submitted to Government including the Sector Deals for Life Sciences and Industrial Sciences.</li> </ul> <p>By 2020, the SIP's ambition is to see:</p> <ul style="list-style-type: none"> <li>- 20,000 Apprentices into the science sector</li> <li>- £3m of new investment on skills programmes into the sector</li> <li>- 1000 new SIP Ambassadors for industry</li> <li>- 300 new science industry placements</li> <li>- A national network of skills partners investing in skills</li> <li>- A suite of Apprenticeship Standards for occupations required by Industry</li> <li>- An annual SIP Survey on apprenticeships (inc data on levy raised and spent) published October 2018.</li> <li>- Occupational map regularly updated and work to develop and publicise a plan for new standards completed.</li> </ul>
<b>Duration</b>	2015 – ongoing
<b>Budget</b>	The UK government - with matching funds from industry - spent 52 million GBP ( <a href="https://www.gov.uk/government/news/52-million-boost-for-skills-and-training-in-uk-science-sectors">https://www.gov.uk/government/news/52-million-boost-for-skills-and-training-in-uk-science-sectors</a> ) for getting the partnership and membership organisation set up and operational which was preceded by an 18 months phase of needs and

Science Industry Partnership (SIP)	
	requirements analysis. SIP managed to keep momentum, despite the fact that all government money came to an end.
No. of applicants	<< to be done >>
No. of approved applicants	<< to be done >>
Type of funding	The UK tax system with its apprenticeship levy has been very supportive since it allows companies offering apprenticeships to claim back their contribution. It came into effect in April 2017 after the UK government's promise of 3 million new apprentices by 2020. The levy applies to employers in England, who have an annual pay bill above £3m. The levy is 0.5 per cent of the annual pay bill. All employers will receive a £15,000 annual allowance, to be offset against the bill. This effectively means that employers with an annual pay bill of £3m or less pay no levy. From May 2017 employers not paying the levy, who offer apprenticeships to 16 to 18 year olds, receive 100 per cent of the cost of the training from the Government, up to the maximum funding bands. Employers will have to pay 10 per cent of the cost of the apprenticeship training for those aged 19 and over and the Government will pay the remaining 90 per cent, up to the maximum funding bands. This support applies to all age groups. For non-levy businesses with less than 50 employees there is also a new £1000 incentive towards apprenticeships for taking on someone aged 16 to 18.
Main stakeholders	Government, industry, SIP chaired by GlaxoSmithKline
Stakeholder(s) from	Government and industry
Scope 1	National
Scope 2	Digital, KETs
Main target group	Industry, professionals, apprentices
Impact	<p>Since 2015, the SIP has supported or delivered:</p> <ul style="list-style-type: none"> <li>- 7,500 new Apprenticeship starts in the science sector</li> <li>- £765,000 of skills investment through funded projects</li> <li>- 376 new SIP Ambassadors for industry</li> <li>- 170 new science industry placements and a national network of skills partners investing in skills</li> <li>- 6 new Apprenticeship Standards ranging from Level 2- Level 6</li> <li>- With a further 7 Standards in development including Level 5- Level 8</li> <li>- 3 best practice brochures published for employers, apprentices and students</li> <li>- A range of policy and position papers on skills issues submitted to Government including the Sector Deals for Life Sciences and Industrial Sciences.</li> </ul>
URL	<a href="https://www.gov.uk/guidance/industrial-partnerships-an-overview#science">https://www.gov.uk/guidance/industrial-partnerships-an-overview#science</a> <a href="http://www.scienceindustrypartnership.com/">http://www.scienceindustrypartnership.com/</a>

## 7.2 Draft online survey questionnaire

# High-Tech Skills for Europe

## Scaling up Best Practices and Re-focusing Funding Programmes and Incentive

Service Contract

No. EASME/COSME/2016/033

This is an internal working document written by empirica drafting survey questions for an online survey which, once the questionnaire is agreed on, will be programmed, tested and run gathering expert views to help the contractor formulate recommendations regarding the scaling up of best practices and re-focusing funding programmes and incentives in Europe specifically related to the acquisition of high-tech skills.

The intended audience of the questionnaire consists of subject matter experts, mainly of the so-called informal stakeholder group which was established at the start of the service contract work.

### Invitation e-mail

(tbd)

### Draft survey questionnaire

Intro (tbd)

#### DEFINITIONS (to be used in the online questionnaire intro tbd)

##### High-tech skills

High-tech skills encompass the skills needs related to:

- Digital technologies (digital skills or e-skills) and
- A group of six key enabling technologies (KETs skills) including:
  - Micro and nanoelectronics,
  - Nanotechnology,
  - Industrial biotechnology,
  - Advanced materials,
  - Photonics, and
  - Advanced manufacturing technologies.

## QUESTIONS

### GENERAL DEMAND

DEMAND for high-tech skills

- 1) Do you agree or disagree that in your country there are difficulties for employers to find employees with relevant high-tech skills?

Response options:

- Strongly agree
- Agree
- Disagree
- Strongly disagree

### FUNDING MEASURES

- 2) In addition to formal education, public authorities may support various measures to enhance high-tech skills of the workforce and / or to increase the supply of high tech talent. Which measures are most efficient and cost effective?

Please choose (drag and drop), and rank the following funding measures.

1 means most effective.

- Funding for industry in building and running dedicated vocational education centres
- Funding for the co-creation by industry and academia of new courses and curricula
- Funding for of new innovative and alternative teaching/learning systems<sup>36</sup>
- Funding excellence schemes with top universities to draw top academic talent and students
- Funding SME vouchers for consulting contracts and knowledge transfer.
- Funding high tech apprenticeships/traineeships in industry
- Funding the development of open education resources (OER, including MOOCs)
- Funding (lifelong) learners through vouchers, fiscal incentives and/or cost sharing
- Funding upskilling/reskilling programmes for the workforce<sup>37</sup> in particular sectors or regions
- Other (please specify)

1	
2	
3	
4	
5	
6	

<sup>36</sup> Such as project or challenge based learning approaches, for students who might have difficulties in the traditional system, e.g. Ecole 42's approach, se: [https://en.wikipedia.org/wiki/42\\_\(school\)](https://en.wikipedia.org/wiki/42_(school))

<sup>37</sup> With co-funding from industry

7	
8	
9	
10	

## FOCUS

3) Which type of high-tech skills should especially be the focus of funding measures?  
Please choose and rank up the following skills areas

- STEM skills
- ICT professional skills<sup>38</sup>
- Basic ICT user skills (digital literacy)
- Advanced ICT user skills
- Advanced KETs skills<sup>39</sup>
- Soft skills<sup>40</sup>
- Leadership skills<sup>41</sup>

1	(drag and drop, items to be moved around in this list)
2	
3	
4	
5	
6	
7	

## SATISFACTION with current education and training offers

4) How satisfied are you with high tech skills provided by education and training organisations?

High-tech skills education and training providers	Very satisfied ++	Somewhat satisfied +	Neutral 0	Somewhat dissatisfied -	Very dissatisfied --
a) Higher education: universities, degree education	( )	( )	( )	( )	( )

<sup>38</sup> Software engineering, application development, networks operations, system administration, cloud computing, cyber security, IoT, data analytics, artificial intelligence, AI, IT management etc.

<sup>39</sup> Engineering and professional skills in: micro-electronics; nanotechnology; industrial biotechnology; advanced materials, photonics, and advanced manufacturing technologies

<sup>40</sup> Problem solving, critical thinking, communication, teamwork etc.

<sup>41</sup> Here especially: having strategic vision for technology, digital transformation, and taking innovations to market



b) Higher education: universities, life-long learning education and training	( )	( )	( )	( )	( )
c) Vocational education and training (VET), vocational degree education	( )	( )	( )	( )	( )
d) K-12 education foundations of STEM skills	( )	( )	( )	( )	( )
e) Executive education: business schools, executive and professional courses	( )	( )	( )	( )	( )
f) Vendor-based training programmes, certification courses	( )	( )	( )	( )	( )
g) Industry-led training centres (also in Public Private Partnership)	( )	( )	( )	( )	( )
h) Consultants: training and support for company owners and executives	( )	( )	( )	( )	( )
i) Further education and training programmes of other training providers	( )	( )	( )	( )	( )

- 5) Which education and training providers should preferably be supported by government funds? Please allocate 100 percent of a hypothetical additional<sup>42</sup> public budget aiming at enhancing high-tech skills. You may leave cells blank to indicate no funding should be made.

Training and education providers	Percentage
a) Higher education: universities, for degree education	__%
b) Higher education: universities, for life-long learning education and training	__%
c) Vocational education and training (VET), for vocational degree education	__%
d) K-12 education foundations of STEM skills	__%
e) Executive education: business schools, executive and professional courses	__%
f) Providers of vendor-based training programmes, certification courses	__%
g) Industry-led training centres (also if Public Private Partnership)	__%
h) Consultants who provide training and support for company owners or top-level executives	__%
i) Further education and training providers	__%
<b>Still to be allocated</b>	<b>100% (this is to be dynamic in the questionnaire, i.e. the figure goes down as percentages are allocated)</b>

<sup>42</sup> i.e. Taking as a given the existing funding for schools and universities

## INSTRUMENTS

6) Which of the following incentives addressed to individuals or companies (SMEs) are the most appropriate? Please tick one box per row

Financial and fiscal incentives	Not fit for purpose (1)	Fit for purpose in exceptional cases (2)	Moderately fit for purpose (3)	Fit for purpose in many cases (4)	Perfectly fit for purpose (5)
j) Grants: training grants which cover payment of tuition fees, or other charges for educational services, including scholarships	( )	( )	( )	( )	( )
k) Course subsidies: fully or partially subsidised courses	( )	( )	( )	( )	( )
l) Loans: awarded to individual participants or enterprises for training purposes	( )	( )	( )	( )	( )
m) Training vouchers: financial support in form of ILAs - Individual Learning Accounts or vouchers for individuals or SMEs	( )	( )	( )	( )	( )
n) Cost reimbursements: repayments to beneficiaries in whole or in part	( )	( )	( )	( )	( )
o) Reduced social contributions: full or partial exemptions to obligatory social contributions	( )	( )	( )	( )	( )
p) Educational leave schemes: paid or unpaid schemes	( )	( )	( )	( )	( )
q) Tax incentives: different types of economic incentives to invest in training: tax allowances, tax exemptions, tax credits, tax relief, tax deferrals.	( )	( )	( )	( )	( )
r) Others (including combinations of the above) – Please specify: ...	( )	( )	( )	( )	( )

## RECOMMENDATIONS

- 7) Given the topics addressed in this questionnaire, do you have any potential recommendations one could give to policy makers regarding the funding for high tech skills? Please specify:

## POSSIBLE INTERVIEW AND QUOTATION of STATEMENTS

- 8) Are we allowed to call you to get further information
- 9) Can we quote from your written recommendations?

Please tick the relevant box

- ☐ Anonymously
- ☐ By name
- ☐ Not at all

## CONTACT DETAILS (voluntary)

- Name, surname
- Organisation or field of activity
- Role
- E-mail address
- Telephone number