



Supporting specialised skills development: Big Data, Internet of Things and Cybersecurity for SMEs

EASME/COSME/2017/007

**Summary Expert Workshop 3
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Introduction – Background to the project

Supporting specialised skills development: big data, Internet of Things (IoT) and cybersecurity for SMEs is a two-year initiative, initiated by the European Commission and the Executive Agency for Small and Medium-sized Enterprises (EASME), and managed by a consortium of Capgemini Consulting, Technopolis Group and the European DIGITAL SME Alliance. This initiative aims to analyse and support SMEs' skills development for big data, IoT and cybersecurity. This initiative will develop a vision, roadmap and monitoring mechanism that can help SMEs to advance skills development in the aforementioned areas.

The consortium initiated a comprehensive data collection on the state-of-play of major technological and market trends concerning big data, IoT, and cybersecurity and the take-up by SMEs in Europe as well as the strategies, policies and initiatives in the EU and the United States related to this subject. This leads to preliminary insights on the extent to which SMEs are able to adopt new technologies, their skills needs, the barriers they face and how they approach skills development.

A series of expert workshops are organised within the context of this initiative to validate findings and to collect input for the design of a shared vision on skills development for SMEs. This workshop was the third in a series of six, and its conclusions are summarised in this report.

The welcoming words were spoken by Sebastiano Toffaletti, Secretary General of the Digital SME Alliance, who pointed out the urgency of this initiative and thanked the full table of experts for joining this session as it will provide input for the long term [budget](#) for the EC in the coming four years.

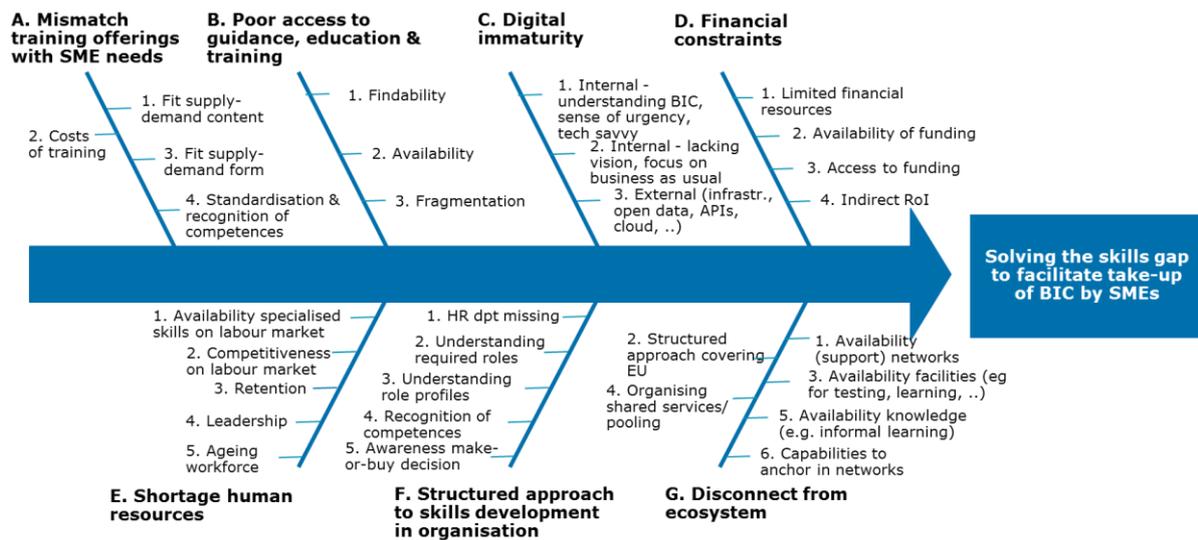
State-of-play regarding skills development by SMEs on Cybersecurity, IoT and Big Data: understanding barriers that hinder skills development

After a tour-de-table to allow participants to introductions and a general introduction of the initiative, Niels van der Linden (Capgemini Invent) introduced the agenda of the day (annex 2). Then he presented the opportunity analysis, current state-of-play as regards adoption of these technologies by SMEs and a comprehensive analysis of barriers that are currently preventing SMEs to deliver on the potential of these technologies. This presentation resulted in a vision statement and seven key lines of action that need to be further detailed in a roadmap moving forward.

A root-cause analysis sketches the full picture of barriers

Eurostat data reveals that despite digital skills shortages in various roles within organisations – from leaders to ICT professionals to practitioners and advanced users – very few SMEs provide their employees with training. A comprehensive barrier analysis was performed by the consortium in the form of a so-called fishbone analysis that clusters various barriers in seven main categories.

The aim of this analysis is to be as exhaustive as possible, as it will serve as starting point for generating actions to be included in the roadmap that will support skills development for SMEs on BIC for the coming years. Indeed, it is important to view these barriers in the context of SMEs' different maturity levels. There is a distinction between SMEs that are using basic BIC skills to survive and SMEs that are frontrunners and very much integrating BIC in their business model (referred to as legacy companies and frontrunner companies). Awareness raising, sharing good practice is key to start transformation of all SMEs. Another suggestion made by the audience was to focus funding not only on skills development itself, but also on improving infrastructure.



In the discussion, it was further remarked that the analysis could also include:

- SMEs' lack of assessment and evaluation capabilities: SMEs are depending too much on their security providers and are not capable of asking the right questions
- SMEs can be 'the weakest link' in a chain of companies in a sector and are vulnerable, as hackers, to enter the chain, increasingly target them.
- Security threats are also on the rise due to a.o. Artificial Intelligence and it seems that mitigation is only possible by deploying AI to counter these threats. A recommendation was made by Mr. Sharkov to align with the recommendations of the High-Level group on AI.

Towards a vision on skills development in SMEs as regards Cybersecurity, IoT and Big Data

It is important to realise that skills development is part of an underlying strategic approach: why the adoption of these technologies is beneficial for a company, where/how it should be applied, and how this capability could be developed over time. From that decision, it becomes relevant to understand which competences are needed to build that capability, who should be carrying out a role, and if there are employees that are qualified to take up that role.

VISION

Enabling the increasing adoption of big data, internet of things and cybersecurity by European SMEs via support measures that structurally enhance the supply of necessary skills, strengthen the ecosystem and facilitate capability development.

Supporting measures are needed to:

- Align training offerings with SME needs
- Improve access to guidance and training
- Increase supply of resources
- Stimulate organisational capability building re. big data, internet of things and cybersecurity
- Decrease financial constraints
- Support structured skills development in SMEs (tools and assessments)
- Strengthen SME ecosystems and collaboration of policy, education and enterprises

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The vision statement reflects both essential parts of the challenge: facilitate capability development and increase supply of relevant skills. Furthermore, strengthening the ecosystem is a crucially important element of skills development in SMEs.

This statement is a draft and further feedback is highly appreciated.

During the lively discussion, several points were made to further strengthen the following:

- Increase the focus on how collaboration works, especially at the local level, building on good practice and instruments developed at cities' level (eg Digital Cities Challenge). Eurocities indicated to be available to further support collection of relevant materials.
- Eurocities also suggested to consider developing a map with access points to information and instruments – based on existing hubs, associations, chambers of commerce etc. This could be quite comprehensive, though the role of these intermediaries should be that of the accelerators by connecting SMEs to existing support mechanisms.
- Skills need to be adaptive: skills are rapidly changing over time, now it is about BIC, but new technologies are coming, so adaptability is needed.
- The distinction between hard technical skills and more professional (soft) skills: both are important; There is not only a need for technical skills, but also a combination of both.
- Skillnet Ireland provided a strong example of how the entire cycle to increase cybersecurity from awareness to preparedness, resilience to standards and automation could be created in an affordable way for SMEs (Integrated Cybersecurity Process Model).

Driving innovation and improving competences in Swedish SMEs

A presentation by [Malin Rosqvist](#), Senior project manager Research Institute of Sweden RISE ICT/SICS Västerås

Malin shared her rich experience from various research projects that were aimed at innovating current higher education offers to better match needs of enterprises, especially SMEs. In her view, there is a change required in the education system, for instance to be able to address different target groups (not only students), to increase mobility of (scarce) experts, to professionalise relation with industry and incentivise collaboration, to improve knowledge transfer from collaborative research projects, to test new methods (eg MOOCs).

Her presentation provides a thorough overview of SME's constraints, how higher education is currently set up, various example projects and what they delivered as well as stakeholders' benefits.

Stakeholders' benefits

Stakeholders	Outcome/Result	Effects/Value
Companies	<ul style="list-style-type: none"> Educated employees New cooperation 	<ul style="list-style-type: none"> Increased competitiveness Increased innovation New products & services
Students/ Employees	<ul style="list-style-type: none"> Increased competence Projects Expanded network 	<ul style="list-style-type: none"> Specialist competence Increased effectiveness Improved career possibilities Personal development
Trainers/ Researchers	<ul style="list-style-type: none"> Increased competence Expanded network Increased understanding of industrial needs Ideas for R&D projects 	<ul style="list-style-type: none"> Improved teaching competence Research projects Increased competitiveness Improved technical transfer
Universities	<ul style="list-style-type: none"> Student efforts New courses New cooperation models 	<ul style="list-style-type: none"> Courses for professionals (LLL) Broader offer of courses Pedagogical development Research projects Increased competitiveness Adjustment to a new and changing market Improved teacher competence

SME perspective

- Courses developed in collaboration between industry and academia
- No cost for students or companies
- Web-based & part time (life/work balance)
- Strengthening networks between companies (and academics)
- Direct access to cutting edge research and research collaboration
- Access to networks, clusters, joint activities
- Teaming up with customers
- Company development (processes, methods) and innovation (new products).

Furthermore, Malin addressed in her conclusion a series of barriers that need to be addressed. Some further points raised in the discussion:

- As an adult it's hard to access a university to follow a course.
- Industry sets the agenda but it starts with good researchers from university, they shape the course in collaboration with industry.
- If industry sets the agenda and sets the content, how does that interact with academic values, like freedom of thought, objectivity etc.?
- Situation could be different in e.g. Universities of Applied Sciences, as made clear by the Utrecht UoAS, which have a much stronger connection to industry and where teachers and industry experts are regularly paired to combine in-depth knowledge and teaching skills and bring an optimal course.
- What seems to not have been researched so far is the motives of SMES to participate in a training. From experience, it seems that individuals find courses by themselves, rather than by recommendation from an employer – but how they search and on which grounds the selection is made is unclear and could deliver interesting insights.

Cybersecurity skills needs, profiles and concrete tools; a report-out of ECSO Working Group 5

A presentation by [Jan Wessels](#), Information security officer Rabobank and [Csaba Virág](#), Head of Cybersecurity Competence Center Hungary

The afternoon presentations were both addressing cybersecurity, starting with a report-out on findings and ongoing work within the European Cyber Security Organisation (ECSO) working group on education and skills.

ECSO's European Human Resources Network for Cyber (EHR4CYBER) Task Force creates awareness among decision makers (private companies, regional / local administrations, national / EU administrations) about the need to develop education and training measures, which will address the demand in the cyber security field. The target is to increase public and private spending in the relevant field to foster more possibilities of such education and training those recruiters are looking for, both in private and public sectors.

The network also works on a common benchmarking system in cyber security recruitment, foster collaboration through the exchange of best practices, look into harmonisation of education and training procedures across Europe, develop and harmonise certification for diploma and specialties, as well as support the recruitment process of cyber security specialists. Their focus is on professionalisation of cyber security professionals. Recent reports can be found here: [ECSO Working Group 5](#).

Their aim is to:

- Understand (map) what exists at local/national level, and what are the best practices, needs, and recommendations when it comes to **cyber security recruitment** in Europe.
- Understand (map) the **demand** side, what are the needs and means to fulfill demands, in-house trainings and careers.
- Understand (map) the **supply** side, how any professionals are trained, how they are recruited, how they choose career, how flexible is the EU market in regards of relocation.

The results of this working group are highly relevant for the current initiative as it will define detailed job profiles and requirements, and contribute to simulation environment/platform for capacity building for SMEs.

Some comments/questions raised during the discussion:

- There is a need to make the certification market more transparent and allow SMEs to understand which certification can be trusted and what the certification brings for the enterprise.
- Perhaps there is a parallel learning here with the Big Data Value Association (BDVA) working group that has been working on a data science skills recognition system based upon open badges and Edison EDSF (see: www.big-data-value.eu/skills/skills-recognition-program) and an overview of available master programmes on big data in Europe (www.bigdataprofessional.eu)
- The role of insurance companies should be further investigated in the context of the current initiative: insurance companies historically have been imposing requirements on SMEs and could drive higher standards of cybersecurity within the SMEs. In Ireland it appears that insurance companies are not only interested in mapping their insurance policies to the standard of the CRA, but also see a market opportunity. It is relevant to explore which mechanisms could be considered. What kind of obligations do SMEs have before getting reimbursed? What kind of standards, compliance, behaviors?
- Besides insurance companies, also accountants could proof a relevant intermediary in pushing for improvements with their SME clients

Cyber Resilience Centre in Brainport Eindhoven

A presentation by [Robert-Jan Marringa](#), Project Lead Brainport Development, Two for Innovation

Robert-Jan explained the rationale and creation of the Cyber Resilience Centre in the Brainport Eindhoven region. One of the most tech-savvy and innovative regions of Europe, and with a number of large tech companies and a lively start-up and SME scene.

The objective of this initiative is to strengthen the chain of organisations by increasing security levels of the SMEs – which are to a certain extent the weakest link in that regional supply chain. Information exchange and cooperation are the key to cyber resilience. It is of paramount importance to the digital resilience of organisations to have all proper information at their disposal in a timely manner. At the same time, SME's in the high-tech manufacturing industry are not/hardly able to make their own company cyber-resilient while this is necessary to maintain the 'license to operate'.

The project developed a growth model which aims to establish trust amongst members of the Centre, facilitate and increase information exchange and hence build a resilient supply chain of companies. The approach and services were further explained, as well as the cost model and future organisational model. It is the first sectoral initiative to connect to the national critical infrastructure information sharing and analysis centres (supported by the National Cyber Security Centre).

The main focus is on high-tech manufacturing and in the future the food-sector is on the agenda. Brainport is convinced that a sectoral approach is essential to strengthen ecosystems, and that larger companies need to lead the way in such approaches.

Conclusions & Next steps

The various presentations offered ample room for discussion amongst the experts to further deepen the insights of the current analysis as well as providing suggestions for activities in the coming months. This has brought forward valuable input for the study and at the same time participants were able to exchange experiences and learnings to help their respective activities.

The interim-report of this initiative is expected to be distributed in February/March and will be shared for review with stakeholders. The next workshop will be on **11 April**, 14 June and 19 September 2019.

Annex A: List of workshop participants

	First Name	Name	Title/Role	Organisation
1	Christoph	Riedmann	Policy advisor	Eurochambres
2	Stefan	Schumacher	Director	Voice e.V. (Association of the IT Users SME)
3	Fredrik	Asplund	Researcher	ICES, the KTH Innovative Centre for Embedded Systems.
4	Nik	Swoboda	Professor	University of Madrid
5	Rainer	Wendt	Owner	Masventa, Bitmi
6	Austeja	Trinkunaite	Secretary-general	CEPIS
7	Ernestina	Menasalvas	Lead of BDVA Task Force 9: Skills and Education	Big Data Value Association
8	Bernadette	Degrendele	smart cities project coordinator	Eurocities
9	Malin	Rosqvist	research project manager	RISE SICS Västerås
10	Brikena	Xhomaqi	director	Lifelong Learning Platform
11	Maria	de Saudade Brito Pontes	Researcher	KU Leuven
12	Luc	Hendrickx	Competitiveness of Enterprises & External Relations, Legal Affairs	SMEUnited
13	Agata	Boutanos	Representative	Polish Union of Entrepreneurs and Employers (ZPP)
14	Guido	Ongena	Senior researcher HU Data Lab	University of Applied Sciences Utrecht
15	George	Sharkov	Director, National Cyber Security Coordinator	Bulgarian government - European Software Institute Center Eastern Europe (ESI CEE)
16	Jan	Wessels	Information Security Officer	Rabobank
17	Csaba	Virag	Head	Cybersecurity Competence Center Hungary
18	Gerard	Doyle	Network manager, Cybersecurity Skills Initiative	Technology Ireland ICT Skillnet
19	Robert Jan	Marringa	Project Lead Brainport Development	Two For Innovation
20	Constantinos	Tsiourtos	Director	Cyprus Cybersecurity
21	André	Richier	Principal administrator	European Commission, DG GROW
22	Ivan	Katsarski	Project officer	European Commission, EASME
23	Claudia	Gonzalez Cobos	Intern	European Parliament, Secretariat of the Committee on Regional Development
24	Fabio	Massimo	Chair, board member	TC428, Digital SME Alliance
25	Paul	Roevens	Owner	Lead-IT
26	Dritan	Mezini	Chair	Albanian SME association
Consortium				
27	Sebastiano	Toffaletti	Secretary-general	Digital SME Alliance
28	Niels	van der Linden	Principal consultant	Capgemini Invent
29	Annika	Linck	Project officer	Digital SME Alliance
30	Paresa	Markianidou	Senior researcher/consultant	Technopolis Group
31	Frans	van Meel		Capgemini Invent
32	Marit	Blank		Capgemini Invent

Annex B: Agenda

Workshop 3

Boosting security, data and IoT skills of SMEs

The European Commission and EASME took the initiative to analyse and support SMEs' skills development for Big Data, Internet of Things and Cybersecurity.

This initiative is managed by a consortium of Capgemini Invent, Technopolis Group and the European DIGITAL SME Alliance. Together with SMEs and other stakeholders, this initiative will develop a vision, identify support measures, prepare a roadmap and design a monitoring mechanism. The aim is to contribute to strengthening SMEs' workforce adaptability and capacity for the short to medium term.

The objective of the workshop is to discuss the consolidated analysis of the current state-of-play in Europe, to further build the shared vision and to identify and validate supporting measures aimed at fostering skills development for SMEs.

Date: 8 February 2019, 11.00 – 16.00 hrs.

Location: DIGITAL SME Alliance, Rue de du Commerce 123, 1000 Brussels, Belgium

Agenda

11.00 hrs	Introduction & objectives of the workshop	André Richier , European Commission;
11.15 hrs	Progress update & key findings so far on development of a vision, roadmap and toolbox.	Niels van der Linden , Capgemini Invent Sebastiano Toffaletti , European Digital SME Alliance
		<i>Followed by a group discussion fuelled and moderated by the Consortium</i>
12.15 hrs	Driving innovation and improving competences in Swedish SMEs	Malin Rosqvist , Senior project manager Research Institute of Sweden RISE ICT/SICS Västerås
13.00 hrs	Lunch	
13.45 hrs	Cybersecurity skills needs, profiles and concrete tools; a report-out of ECSO Working Group 5	Jan Wessels , Information security officer Rabobank Csaba Virág , Head of Cybersecurity Competence Center Hungary
14.30 hrs	Cyber Resilience Centre in Brainport Eindhoven	Robert-Jan Marringa , Project Lead Brainport Development, Two For Innovation
15.15 hrs	Conclusions & recommendations	Niels van der Linden , Capgemini Invent
16.00 hrs	Closure	