Supporting skills for industry through clusters

European Cluster Collaboration Platform Discussion Paper 1

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September 2020

www.clustercollaboration.eu

European Commission

ECCP Discussion Papers

The European Cluster Collaboration Platform (ECCP) is the main hub facilitating cluster cooperation within the EU and beyond. It is supported by the European Commission through the COSME programme.

This Discussion Paper was submitted to the European Expert Group on Clusters on 16/06/20 as an input for their discussions on the role of clusters in upskilling and reskilling the European labour force.

The European Expert Group on Clusters provides the Commission, EU countries and regions with recommendations, advice, and expertise, specifically on how to better use clusters as a strategic tool of industrial policy, interregional collaboration and to integrate SMEs into EU and global value chains.

The members of the group are the EU countries and individual experts appointed in a personal capacity (selected via a call for applications).

Supporting skills for industry through clusters[1]

Executive Summary

Before the COVID-19 pandemic broke, it was widely acknowledged that significant parts of European industry were suffering from skills imbalances and/or concerned about them in the future. Driven by green and digital transitions that are likely to accelerate because of COVID-19, these *skills imbalances are activity-specific and place-specific*.

As the regional building blocks of European industrial innovation and competitiveness, industrial clusters have a central role to play in responding to skills challenges within specific territories, sectors and value chains. Indeed, with the rise of the skills topic to the top of the agenda of many firms, *cluster organisations are experiencing increasing demands from their members* to play a stronger orchestrating role to support reskilling, upskilling and talent attraction.

This discussion paper sets out arguments around why and how industrial clusters and cluster organisations can contribute to address the skills imbalances. Calls for a *human centric approach* to skills built within *regional industrial ecosystems* and resulting in *skills pacts* between key players. It highlights the central role for place-based collaborative dynamics that bring together the strategic intelligence, demands and capacities of a wide range of actors to tailor responses to skills shortages and skills mismatches. While many cluster organisations are already engaged in activities that respond to skills imbalances within their clusters, there is a need to *widen and deepen joint cluster actions* to respond to skills imbalances from the dual green and digital transitions impacting European industry.

A *typology for of actions* for cluster organisations distinguishes between the scope of collaboration required for different actions and the systemic complexity of different actions. This typology is used to identify an illustrative set of *inspiring examples* from existing practice and to identify gaps that can guide new policy measures.

Proposals for concrete policy actions to strengthen the roles of cluster organisations in supporting skills are grouped in four steps: (1) *broaden participation*, (2) *develop services*, (3) *engage regionally* and (4) *connect internationally*. Within each step a distinction is made between measures that could be implemented at the regional/national level and measures that could be implemented at the EU level.

Proposed measures at the EU level include to develop a 'skills hub' for cluster organisations as part of the ECCP, which could include good practice guides, mentoring activities, mapping of skills-related actors and projects, and a common repository of online courses. There is also scope to adjust existing funding instruments (ESCP, ECE, INNOSUP) to leverage joint cluster initiatives as a focal point for developing 'joint cluster skills agendas' across international clusters or for integrating special concern with identifying and addressing skills needs within cross-sectoral industrial value chains.

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1. Introduction: Why skills? Why clusters? Why now?

Skills have risen fast to the top of the agenda for EU industry over the last few years in the context of global technological, environmental and demographic trends. These impact the demand and supply for different types of skills in place-specific ways. On the one hand, digitalisation and climate change (through related circular economy and resource efficiency transformations) are driving changes in which skills are demanded and where. On the other hand, the ageing of Europe's population and internal migration flows influence the supply of skills in specific places. The resulting regional labour market conditions pose new and difficult questions for firms and their workers, as well as for cluster organisations in supporting their members.

While these technological, environmental and demographic trends have picked up speed over the last decade, the advent of the COVID-19 pandemic in early 2020 has placed further and immediate pressures on regional labour markets. In the short term the lockdown of economic activity has provoked new skills mis-matches, for example related to changing demands for online consumption and associated logistics or to new demands from health systems. Many firms have spontaneously reconverted their production to satisfy new, emerging needs by utilizing their workforces in different ways. Yet in the medium and long-term, as regional economies recover from the immediate shock of the pandemic and move to a 'new normal', there is likely to be a premium on new competences alongside increases in unemployment among workers lacking those competences. Specifically, regional labour market imbalances are likely to be affected by reconfigurations in supply chains and by an overall acceleration in trends of digitalisation, automation, teleworking, *etc*.[2]

Before the COVID-19 pandemic, it was widely acknowledged that significant parts of European industry were suffering from skills imbalances and/or concerned about them in the future. Amplified now, these concerns span all Member States, regions and cities. Their scale and importance is reflected in estimates that around 1.1 billion jobs are liable to be radically transformed by technology in the next decade,[3] and that 120 million Europeans will need to upskill or reskill in the next five years (European Commission, 2020a). Alongside the need for 'hard skills' that meet the needs of digital and green transitions, the heightened uncertainty of a post-COVID world will put a premium on agility and adaptability, making it likely that 'soft skills' will also become even more important.

The urgency of these skills challenges was already reflected pre-COVID in a wide range of policy initiatives at sectoral, regional, national and EU levels. In particular, under the blueprint for sectoral cooperation set out by the *New Skills Agenda for Europe* (European Commission, 2016) stakeholders were working together in sector-specific partnerships to develop and implement strategies to address skills gaps.[4] Post-COVID these skills alliances will be a key component of the EU recovery strategy through the development of a new skills pact built around the industrial ecosystems identified as

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[2] See: https://www.mckinsey.com/featured-insights/leadership/the-future-is-not-what-it-used-to-be-thoughts-on-the-shape-of-the-next-normal?sid=3143e82f-7d42-4ec5-9e3d-93204913a581#cid=cl4c-cml

[3] See: https://www.weforum.org/press/2020/01/the-reskilling-revolution-better-skills-better-jobs-better-education-for-a-billion-people-by-2030/

[4] Blueprint alliances in the automotive, maritime technology, space-ego information, textile, clothing, leather and footwear, and tourism sectors began in 2018, and were joined in 2019 by alliances in additive manufacturing, construction, maritime shipping and steel. 3rd and 4th waves of sectors are being rolled out in 2020 and 2021. For more detail, see: https://ec.europa.eu/social/main.jsp?catId=1415&langId=en.

critical to recovery. Such sectoral partnerships reflect the activity-specific nature of skills imbalances, and the uneven distribution of economic activities, combined with differences in skills supply ecosystems at national and regional levels, also means that there is a strong place-specific element. Hence the key role to be played by industrial clusters.

Industrial clusters are the regional building blocks of European industrial innovation and competitiveness, as well as enablers of smart specialisation strategies. Cluster organisations are catalysts of collaboration within those clusters. As such they have a central role to play in responding to skills challenges within specific territories, sectors and value chains. With the rise of the skills topic to the top of the agenda of many firms, cluster organisations are experiencing increasing demands from their members to play a stronger orchestrating role to support reskilling, upskilling and talent attraction. Moreover, they are perfectly placed to play that role because they bring together the main actors in regional industrial ecosystems related to specific sectors and/or value chains, both those demanding skills (industry, research) and those most influencing their supply (education, government).

The aim of this short paper is to stimulate discussion by setting out arguments around why and how industrial clusters and cluster organisations can contribute to address the skills imbalances associated with both the digital and green transitions and the COVID-19 pandemic.[5] The paper develops a framework for analysing the role of clusters in responding to skills challenges. This leads to a typology of actions for showcasing inspiring examples of successful practices and for identifying gaps. The paper concludes with proposals for policy measures to strengthen the roles of cluster organisations in supporting skills for industry.

2. Clusters and the skills challenge

The *Industry 2030 High Level Industrial Roundtable* set out a vision under which European industry will be transformed, at a pace never seen before, by progress in technologies such as artificial intelligence, Internet of Things, robotics, automation, biotechnology and 3D printing (European Commission, 2019d). Living with COVID-19 over the coming months and years is likely to accelerate further these changes. The *Industry Roundtable* also warned, however, that a lack of skilled individuals and talents will create a bottleneck in the process of re-shoring manufacturing, and it highlighted the need for better approaches to anticipating and developing skills. Likewise, the OECD's (2019) analysis of regions in industrial transition highlights the need to help workers transition to future-oriented jobs while supporting firms to embrace the digital economy.

In this regard it is not surprising that skilling and reskilling are identified in the *New Industrial Strategy for Europe* as one of eight fundamentals that will be decisive in underpinning the green and digital transition of European industry over the next five years (European Commission, 2020a). The strengthening of industrial ecosystems is a key focus of this strategy, which is supported by the ongoing

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[5] This paper does not undertake detailed analysis of different dimensions of the skills challenge associated with industrial transition or the wide range of specific initiatives that are already underway in response to those challenges. For this level of detailed analysis, there are a range of recent reports that have been developed under the framework of the "skills for industry" initiative (European Commission, 2018, 2019a, 2019b, 2019c, 2020b), by the World Economic Forum (2019) on specific industrial roadmaps for a "reskilling revolution", and by CEDEFOP (2020) on the changing role of Vocational Education and Training (VET), among others.

"skills for industry initiative" (see footnote 2) and by the new *SME Strategy for a Sustainable and Digital Europe* (European Commission, 2020c). The latter sets out a commitment to capacity building among SMEs focused on sustainability, digitalisation and leveraging talent. It explicitly mentions the need for inter-linking industrial clusters to support upskilling, green and digital transition, and internationalisation.

Skills imbalances and the need for collaboration

There are four potential scenarios in terms of skills imbalances (Figure 1). While some places may have imbalances of types 1 (over qualification) and 4 (skills deficit), the fast-changing demands of European industry identified above are predominantly reflected in imbalances of types 2 (skills shortage) and 3 (skills mismatch). Skills shortages require measures oriented to boosting the overall supply of skills, for example the broad soft skills that will become increasingly important to fuel adaptability and agility in a post-COVID world. They can be remedied through investing more in skilling and/or talent attraction in general. Skills mismatches require measures oriented to a better alignment of skills demand and supply and are particularly relevant in the context of digital and green transitions, where skills demand is changing fast. They can be remedied by investing more in targeted re-skilling and/or talent attraction, and through improvements in the adaptability of the skills supply pipeline.

Figure 1: Four scenarios of skills imbalances
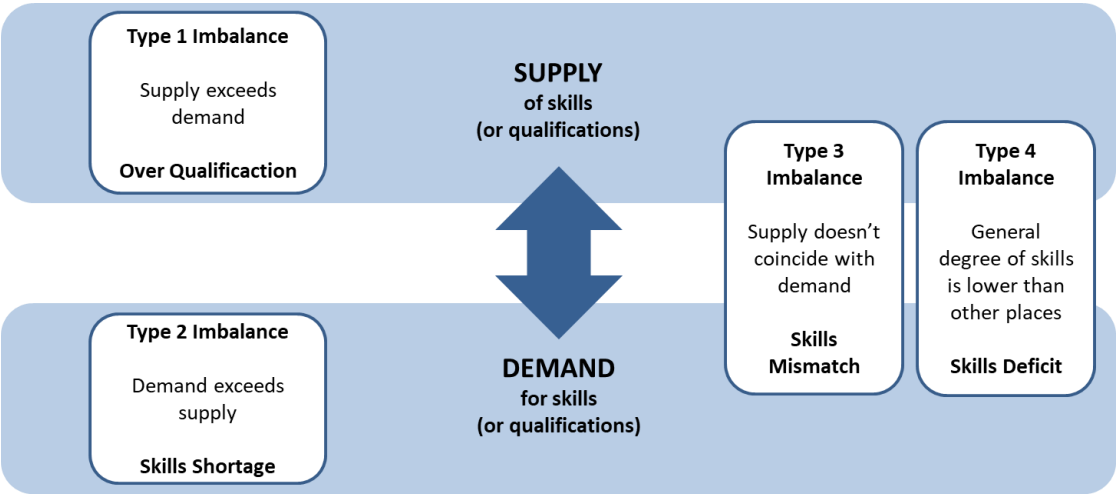
Source: Based on Orkestra (2019), McGuinness et al. (2017), OECD (2017), Green (2013, 2016).

Skills mismatches, in particular, are widespread and have become a semi-permanent feature of our economies, given the pace of the green and digital transitions. Boston Consulting Group (2020), for example, estimates that skills mismatches affect 1.3 billion people worldwide and impose a 6% annual tax on the global economy through lost labour productivity. In response, they argue that the future economy demands a ***human-centric*** approach to skills that makes a transition from 'mass standardisation' to 'mass uniqueness'. The World Economic Forum (2019) makes a similar argument in terms of the need for a reskilling revolution that is necessarily built on the ***ecosystems*** bringing together industry, skills providers and talent. Most recently, the *New Industrial Strategy for Europe* establishes an industrial ecosystem focus and highlights the need for "collective action of industry, Member States, social partners and other stakeholders through a new ***pact for skills*** to contribute to

up- and re-skilling and to unlock public and private investment in the workforce" (European Commission, 2020: 11).

What unites these three core ideas – human centric, ecosystems, skills pact – is the central role for *place-based collaborative dynamics* that bring together the strategic intelligence, demands and capacities of a wide range of actors to *tailor responses to skills shortages and skills mismatches*. In this context industrial clusters, and the cluster organisations that support collaboration within them, can play a critical role for three key reasons:

1. There is a strong *activity-specific* dimension to fine-tuning the match between demand and supply of skills. This is related both to the characteristics of different sectors and to the differential impacts of the green and digital transitions.[6]

2. There is a strong *place-specific* dimension to skills shortages and to fine-tuning the match between demand and supply of skills. This is related to the vastly different institutional, cultural and socioeconomic contexts of different regions, to differences between their industrial and skills ecosystems, and to place-specific elements of technological, climate and demographic transitions.

3. There is a strong *need to collaborate across different types of actors* (large and small firms, educational institutions, government departments and agencies …), both transversally and in vertical value chains. This collaboration can provide the critical mass to address skills shortages and the brokerage necessary to accurately identify needs and effectively fine-tune the match between skills demand and supply.

Industrial clusters are an ideal focus for the collaborative dynamics essential to address regional skills shortages and mismatches. Indeed, one of the key mechanisms through which the actors within industrial clusters draw their dynamism and competitive strength is their place-based and activity-specific labour markets (Rosenfeld, 2004: 15):

> *Clusters, at their most basic level, represent a collection of focused skills and knowledge that are embodied in their labor forces. Across the board, nothing is more important to clusters than their human resources … [and] the innovations, foresight, entrepreneurship, leadership, and productivity of managers, researchers, support staff, and line workers are what give clusters their competitive advantages and sources of growth.*

As key activity-specific intermediaries within their regional industrial ecosystems, cluster organisations can help to match the supply and demand of cluster specific skills, a role that is particularly important in times of heightened uncertainty. Most critically, they can link solutions to skills imbalances with other key and related dimensions around which they are working collaboratively with cluster members, such as knowledge exchange, technology development, the transition of industrial

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[6] This is reflected in the sectoral skills alliances being developed under the blueprint for sectoral cooperation on skills that was set out in the *New Skills Agenda for Europe* (European Commission, 2016), and also in the range of industry-specific roadmaps developed by the World Economic Forum (2019).

processes and new business models. By bringing together the triple helix of firms, education/research and government in an activity-specific and place-specific context, they can provide ***critical mass and brokerage*** to effectively address regional skills imbalances (Figure 2).

Figure 2: Cluster collaboration responding to regional skills shortages and mismatches
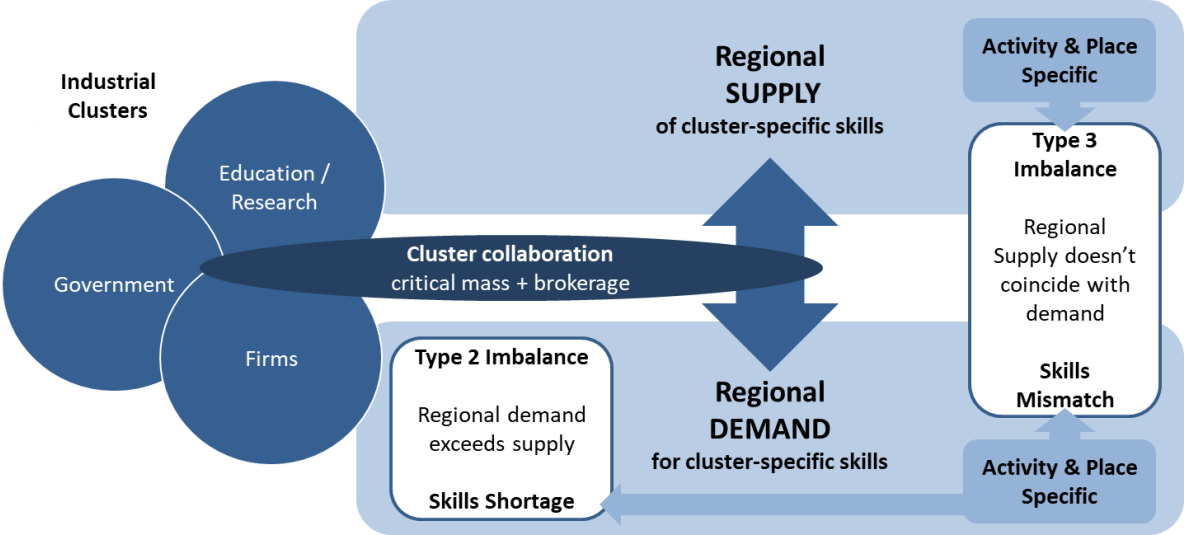
Source: Own elaboration

The roles of different cluster actors around skills

The collaborative potential of industrial clusters to respond to skills shortages and mismatches can be understood in greater granularity by briefly considering the three main groups of actors that play key roles with regards to skills: firms; education; research and technology organisations; and government.
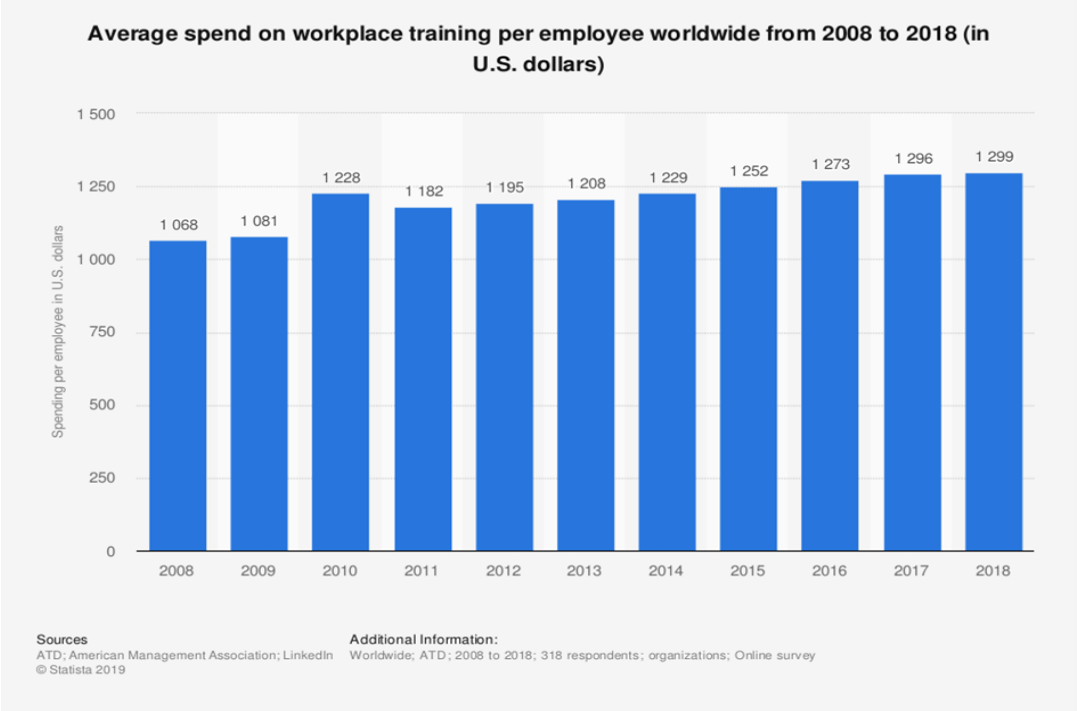
Firms

The firms (including start-ups and entrepreneurs) within industrial clusters are the primary source of demand for skills. Yet they also play an important role in the supply of skills through their own training and workforce development activities (see Figure 3). The role of firms in both the demand and supply side has become progressively more active in recent years due to: (i) the pace of change in labour markets requiring an ongoing 're-skilling revolution' (CEDEFOP, 2009, 2019; Orkestra, 2019; World Economic Forum, 2019); and (ii) the spread of more practically oriented, outcome-based approaches to education and qualifications frameworks.

This has highlighted the importance of **strategic workforce planning** to understand demand needs and supply constraints under different scenarios (World Economic Forum, 2019) and **work-based learning** to adapt the skills of people to the needs of firms and at the same time create a culture of ongoing adaptation to changing needs (Bahl and Dietzen, 2019). While some large firms are well-advanced with these practices, a recent global CEO survey found that only 18% cited 'significant progress' in establishing an upskilling programme (PwC, 2020). Moreover, the more limited resources of many SMEs, and particularly micro enterprises and start-ups, seriously constrain their activities. Policies

providing financial incentives, regulatory frameworks or training support are targeted to address this (Orkestra, 2019), and this is an area where the collaborative dynamics within industrial clusters can be particularly effective in supporting SMEs and entrepreneurs to overcome resource, knowledge and capacity barriers.

Figure 3: Increasing spend on workplace training

Average spend on workplace training per employee worldwide from 2008 to 2018 (in U.S. dollars)

Year	Spending per employee (U.S. dollars)
2008	1 068
2009	1 081
2010	1 228
2011	1 182
2012	1 195
2013	1 208
2014	1 229
2015	1 252
2016	1 273
2017	1 296
2018	1 299

Sources
ATD; American Management Association; LinkedIn
© Statista 2019

Additional Information:
Worldwide; ATD; 2008 to 2018; 318 respondents; organizations; Online survey

Education, Reseach and Technology Organisations

Education, research and technology organisations are typically grouped together as one of the three elements of the triple helix, alongside firms and government. Here we make a distinction between the different roles played by: (i) research and technology organisations, (ii) institutions providing vocational education and training; and (iii) higher education institutions (universities).

Like firms, **research and technology organisations** play roles on both the demand and supply sides for skills. While they represent an important element of the demand for certain types of highly qualified and technical skills, they also contribute to skills development through their activities at the forefront of developing basic and applied knowledge. For example, technology centres are a key feature of the interface between the scientific/technological system and firms in many regional industrial ecosystems. They play important roles in anticipating and transferring technology, knowledge and skills through their interactions with a wide range of firms, and through their bridge into the research conducted at research centres and universities.

While there are a range of different models of **Vocational Education and Training** (VET) systems across Europe, in general VET is closest to the immediate skills needs of local firms, which means that VET

institutions are typically able to respond more quickly to changing local skills demands. They play an important bridging role in industrial ecosystems in terms of orienting skills development to the needs of business, often working closely with firms to develop models of 'dual training'. As such, a strong policy focus on Centres of Vocational Excellence (CoVEs) has emerged (European Commission, 2019e; Hazelkorn and Edwards, 2019). This highlights the variety of roles that VET can play in driving responses to skills imbalances, such as developing anticipation mechanisms to maintain labour market relevance, leading curriculum innovation (for example around project-based learning) and promoting lifelong learning. Indeed, the higher levels of VET help continual development of the knowledge, skills and competences that enable people to manage and adapt to changing work contexts, a feature that will surely become even more critical post-COVID. Finally, much VET is increasingly also linked to support for the diffusion of innovation and applied research, especially among SMEs.

Universities typically operate in a more international environment. They are usually further from the direct needs of local firms, and the nature of their degree programmes mean that there is a greater time lag in their response to changing skills demands. However, many universities use mechanisms such as internships to provide a link with local businesses and some are taking more radical steps to integrate their learning programmes with business needs through dual degree programmes or industrial PhD programmes that link into regional smart specialisation strategies (Elena-Pérez *et al.*, 2017). University alumni networks can also play an important role in developing collaboration with firms and providing more flexible short courses that facilitate lifelong learning (Orkestra, 2019). Finally, universities themselves act as important regional magnets for talent attraction through their international student populations (although this works both ways, as they also enable local talent to move out of the region).

Overall, it is widely acknowledged that "the education system needs to find new approaches to the personalized training of future employees, considering their skills and knowledge, as well as employers' continually changing requirements" (Boston Consulting Group, 2019). Moreover, living with COVID poses new challenges in terms of the transition to sustainable forms of distance and blended learning that are capable of building both hard and soft skills with less face-to-face contact. The collaborative dynamics within industrial clusters can help to support a **human-centric transition towards more agile and adaptable skills supply** in this challenging context.

Government
In its business case for a reskilling revolution, the World Economic Forum (2019) highlights the benefits to government from focusing **investment on reskilling** as opposed to the welfare spending associated with unemployment. Indeed, when it comes to investment in skills, governments at different levels (national, regional, local) are important actors in industrial ecosystems. Their funding, regulatory frameworks and other policies influence the behaviour and capacity of both educational institutions and firms in response to skills imbalances. Government is also the key player with regards curriculum development in the pre-sixteen education system and a range of complementary, yet critical, elements such as careers advisory services and the interface between the education and welfare systems.

While interaction between government, educational institutions and firms is important to varying degrees in developing all the above education-related policies, it is in the explicit field of economic development policy where the role of collaborative dynamics in industrial clusters is most evident. Economic development agencies often develop explicit policies towards **talent attraction**, for instance, which benefit from close coordination with local businesses and education, research and technology organisations. They also usually play a leading role in developing the **smart specialisation strategies** that facilitate regional industrial transition. Industrial clusters and cluster policies are intimately linked with these territorial strategies (European Commission, 2013; Wilson, 2019), in which investment in human resources for research and innovation – through firms, universities and VET – are a fundamental element (European Commission, 2012; Hazelkorn and Edwards, 2019; Navarro and Retegi, 2018).

3. A typology of actions for cluster organisations

Many industrial clusters across Europe are supported by cluster organisations and other types of cluster initiatives that play an intermediary role in facilitating collaborative dynamics and strategic networking. Over 1000 such cluster organisations have already registered themselves on the European Cluster Collaboration Platform to build networks internationally. Yet cluster organisations undoubtedly face challenges in supporting their members responding to skills challenges. They have resource constraints and need to combine and prioritise among a range of other support services and collaborative networking activities. They can also find themselves 'in the middle' of the quite different cultures that exist among industry members and among educational institutions. Nevertheless, the added value that they can provide in this area is illustrated clearly in the above analysis of the roles of each of the main groups of cluster actors. While many cluster organisations are already engaged in activities that respond to skills imbalances within their clusters, there is a need to **widen and deepen joint cluster actions to respond to skills imbalances** from the green and digital transitions impacting European industry in a post-COVID context.

The aim of this section is to propose a typology of actions for cluster organisations that can be used to identify inspiring examples from existing practice and to identify gaps that can guide new policy measures. Building on the framework set out in Figure 2, cluster collaboration is an effective way of addressing skills shortages and/or skills mismatches for two fundamental reasons:

1. It enables a *critical mass* of actors to work together on challenges that only the largest firms have sufficient scale to address alone.

2. It enables *brokerage* across the different strategic intelligence, needs and capacities related to skills held by each different actor.

This combination of critical mass and brokerage interact to mitigate the short-term market pressures that otherwise make business cooperation in such long-term ventures difficult. In terms of specific actions that build on the critical mass and brokerage capacity of industrial clusters, several types of

actions have been identified under the 'skills for industry' initiative (European Commission, 2018). Building on those, it is useful to distinguish between:

- The *scope of collaboration* required for different actions: individual, collaborative (within regional / national industrial ecosystem) and collaborative (with international partners).

- The *systemic complexity* of different actions: actions oriented to changing whole skills ecosystems are more complex than actions oriented to addressing specific elements within skills ecosystems.

The actions of cluster organisations can therefore be arranged in a typology shown in Figure 4, which positions them according to the scope of collaboration and the systemic complexity of the actions.

Figure 4: A typology of actions for cluster organisations to support skills

Collaboration Scope / Timing/Complexity	Acting Alone (basic service provision)	Acting in Collaboration (regional / national)	Acting in Collaboration (international)
Low-Medium Complexity	• Raise awareness of skills imbalances **(ST/MT)** • Provide strategic intelligence on regional and/or sectoral trends (roadmapping, foresight, market analysis) **(ST/MT)** • Communicate information on funding programmes and/or training inititatives **(ST/MT)** • Design and implement *ad hoc* training activities (e.g. cloud computing, cyber security, circular economy, resource efficiency, soft skills, entrepreneurial skills) **(ST/MT/LT)**	• Connect actors (especially SMEs) to identify and articulate skills needs (fast mapping, dialogue, networking events, platforms ...) **(ST/MT/LT)** • Design and implement integrated training activities (in collaboration with educational institutions) **(ST/MT/LT)** • Support talent attraction measures **(ST/MT/LT)** • Support VET and university curriculum development / fine-tuining **(MT/LT)** • Support standards development **(MT/LT)**	• Undertake global benchmarking analysis with other clusters **(ST/MT/LT)** • Facilitate inter-cluster experience exchange **(ST/MT)**
High Complexity	• Develop strategic monitoring frameworks related to cluster-specific skills **(MT/LT)**	• Broker regional skills strategies / alliances / pacts **(MT/LT)** • Develop and support regional strategies for investment in skills **(MT/LT)** • Develop and support regional strategies for talent attraction **(MT/LT)**	• Build international partnerships with clusters and/or universities **(MT/LT)** • Broker international skills alliances / pacts **(MT/LT)**

Source: Own elaboration (ST = short term; MT = medium term; LT = long term)

Timing is a third dimension that is transversal to the six categories of the typology. While it is possible to develop many of the low-medium complexity actions in either the short, medium or long term (depending on aims, needs and resources), others can only be delivered in the medium or long term. The high complexity actions all require a medium-long term approach.

Starting with the left-most column of Figure 3, cluster organisations can support their members by **acting alone** to provide basic skills-related services to their members. Many of these actions are of low-medium complexity and can typically be developed in the short-medium term. They include awareness raising around skills imbalances both among and beyond members, communicating information around funding programmes and/or training initiatives, monitoring regional and/or sectoral trends to provide strategic intelligence to members (road-mapping, foresight, market analysis…), and facilitating/providing specific *ad hoc* training activities (for example, short sessions related to digitalisation or circular economy). In the medium-long term they can develop more sophisticated strategic monitoring frameworks related to cluster-specific skills.

There is another group of actions that involve **acting in close collaboration** with member firms, educational institutions and government agencies to identify and articulate emerging skills demands and connect actors with different parts of the solutions to address those demands. This can be achieved through close dialogue with and between members, exercises to quickly map current / near future skills needs, networking events or using online platforms. These activities in turn can lead the way to more specific collaborative activities around things such as the design and implementation of integrated training activities in partnership with education organisations, the implementation of talent attraction measures, the fine-tuning of VET or university curricula or the development of cluster-specific skills standards. In the medium-long term, more complex collaborative actions can be oriented to systemic solutions through the brokerage of regional skills alliances, pacts and strategies – also involving, for example trade unions – or the development of comprehensive territorial strategies for talent attraction or skills investment.

Finally, there are actions that can be developed through **collaborating with international partners**. Less complex actions include undertaking benchmarking of cluster-specific skills trends and responses in partnership with other clusters or facilitating inter-cluster experience exchanges. In the longer term, more complex actions may look to build stable international partnerships or broker international skills alliances or pacts between industrial clusters in different countries and/or involving leading international universities.

4. Inspiring cluster practices

Its always important to learn from what is already happening in pioneering regions and clusters. A range of interesting practices where industrial clusters are the focus for actions to address skills imbalances have been highlighted in recent studies by the European Cluster Observatory (2016), European Observatory of Clusters and Industrial Change (2019) and 'skills for industry' initiative (European Commission, 2018). A scan of the websites of cluster organisations across Europe also quickly reveals that many of them offer different combinations of the basic services related to skills included in the first column of the above typology. Here the focus is on highlighting some of the less common inspiring practices that correspond to the collaborative part of the typology. Table 1 below is

by no means exhaustive and is designed to be illustrative and to generate discussion around other such examples that might be highlighted.

Table 1: Illustrative inspiring practices supporting skills through clusters

Type of Action	Brief description of an inspiring practice
Regional Collaboration / Low-Medium Complexity (ST/MT)	**eNCUENTRA Programme** This is an example of a regional collaboration designed to inspire, guide, train and recruit people into fulfilling digital skills needs. It was launched following a study that identified digital skills gaps in Aragon (Spain). It is led by the ICT cluster organisation (iDia) and partners include firms with ICT needs from a range of sectors, local and national government, and media firms. The programme moves through phases of dissemination, engagement and expert guidance directed at young people (and especially young women), leading to the provision of a range of technical and transversal training courses in collaboration with firms, and ultimately to internships and recruitment. **More information:** https://www.idia.es/programa-encuentra-cursos-empleo/
Regional Collaboration / Low-Medium Complexity (ST/MT)	**Masters in Packaging Management** This is an example of regional collaboration between a cluster organisation and a local university to develop new training activities that address the specific needs of cluster firms. The packaging cluster in Catalonia (Spain), in collaboration with IQS Executive Education (Ramon Llull University), has developed a 9-month (60 ECTS) Masters Programme in Packing Management. It is designed to directly meet the skills needs of the cluster members by train packaging manufacturing experts, with knowledge of packaging technology combined with operations management. **More information:** https://www.packagingcluster.com/en/training/master-packaging-management/
Regional Collaboration / Low-Medium Complexity (ST/MT)	**Skills for the Regions Innovation Bureau** This is an example of how a national level 'network of networks' can support the development of a range of regional level skills initiatives and alliances. An initiative of the Federal Ministry of Labour and Social Affairs (Germany), the bureau provides support for regional networks and actors who want to collaborate to secure skilled workers in their regions. Many of the participating regional networks are led by cluster organisations such as technology clusters OWL in OstWestfalenLippe and Sensorik in Bavaria. They receive support to develop regional skills coalitions that respond to specific imbalances in their regional skills ecosystems and form the basis for a range of specific measures such as networking and dialogue events, planning of training needs, training activities, experience exchanges and inputs from expert consultants. **More information:** https://www.fachkraeftebuero.de/
Regional Collaboration / High Complexity (MT/LT)	**AS-Fabrik Alliance** This is an example of a city-level collaboration to build a skills ecosystem for current and future workers in the knowledge intensive business services sector in Bilbao (Spain). It is being developed by an alliance comprising local government actors, university research centres and two cluster organisations (ICT cluster GAIA, and audio-visual cluster EIKEN) and has leveraged initial funding from the ERDF Urban Innovative Actions programme. The alliance is focused on building a "factory for the creation of advanced services for industry" which will develop the virtual and physical infrastructure required to identify the mid-term needs of local manufacturing with regards Industry 4.0, implement interdisciplinary training programmes for students, entrepreneurs and professionals, build a long-term methodology for collaborative working and support related start-ups. **More information:** https://www.uia-initiative.eu/en/uia-cities/bilbao

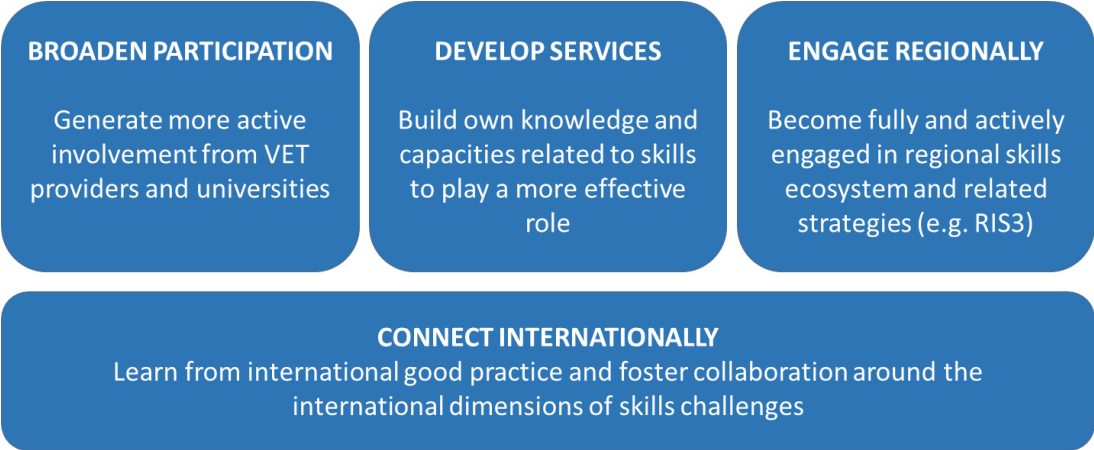|	
International Collaboration / Low-Medium Complexity **(ST/MT/LT)**	**European Aerospace Cluster Partnership** This is an example of how an international alliance of cluster organisations can work together across their regional skills ecosystems to address common skills challenges. They were pioneers in developing a skills hub in 2013 which met in six workshops with the aim of understanding and addressing gaps in VET systems with respect to the aerospace sector. Today they have a permanent working group on skills which is focused on issues such as facilitating mobility between industry and academia, promoting international internships for students, supporting good HR practice in SMEs and developing best practice exchanges. **More information:** http://www.eacp-aero.eu/
International Collaboration / Low-Medium Complexity **(ST/MT/LT)**	**Mini MBA in Human Centred Manufacturing** This is an example of an international collaboration between a cluster organisation and a university to develop training activities focused on the needs of cluster firms. A collaboration between the engineering and tooling cluster (Portugal) and the University of Manchester (UK), the course is targeted at industry managers and includes an international mission to Manchester to visit UK companies. It is designed to reinforce relational and technical skills among managers in a way that combined scientific knowledge with technical knowledge to boost sector-specific R&D engagement. **More information:** http://app.toolingportugal.com/en/
International Collaboration / High Complexity **(MT/LT)**	**DIHUB Cloud** This is an example of leveraging funding for Centres for Vocational Excellence (CoVEs) under the Erasmus+ programme to build an international network of regional skills ecosystems. DIHUB will consist of 5 interconnected nodes (in Finland, Bulgaria, Croatia, Estonia and Portugal) and is geared towards providing an innovative training programme for students, VET providers and companies in the field of cloud technologies. Partners are VET centres, universities, employers' associations and chambers of commerce, and include a Portuguese cluster organisation (TICE.PT). **More information:** https://dihubcloud.eu
International Collaboration / High Complexity **(MT/LT)**	**METIS (Microelectronics, Training Industry and Skills)** This is an example of leveraging funding from the Erasmus+ programme to build a long-term international sector skills alliance. It is a 4-year project that brings together 20 partners with the aim of bridging the skills gap in microelectronics. The project is rooted in the largest microelectronics cluster in Europe, Silicon Saxony (Germany), and extends internationally with partners from across Europe. It focuses on the gap between industry and education, with the goal of building a long-term action plan, monitoring observatory and skills council to develop innovative VET solutions and address the needs of the European microelectronics sector. **More information:** http://www.metis4skills.eu/

Source: Own elaboration based on input from the European Expert Group on Clusters subgroup on skills and desk research.

5. Policy measures

This section builds on the previous analysis to identify a range of potential policy measures to better leverage the roles that industrial clusters and their organisations can play in addressing regional skills imbalances. These measures are mapped out in four steps that cluster organisations can make to better support skills in industry (Figure 5): broaden participation, develop services, engage regionally and connect internationally. With regards concrete policy measures to support cluster organisations to take these steps, a distinction is made between measures that could be implemented at the regional/national level (depending on the specific cluster policy context in each Member State), and

measures that could be implemented at the EU level (using existing instruments and in some cases developing new, stand-alone actions).

Figure 5: What cluster organisations can do to support skills for industry

BROADEN PARTICIPATION

Generate more active involvement from VET providers and universities

DEVELOP SERVICES

Build own knowledge and capacities related to skills to play a more effective role

ENGAGE REGIONALLY

Become fully and actively engaged in regional skills ecosystem and related strategies (e.g. RIS3)

CONNECT INTERNATIONALLY
Learn from international good practice and foster collaboration around the international dimensions of skills challenges

Broaden Participation

An important first step is to broaden the participation base of cluster organisations and generate more active involvement, particularly from VET providers and universities. Indeed, the key role of cluster organisations is to connect the actors within industrial clusters and foster collaboration between them. A barrier to doing this with regards to skills in many clusters is the lack of active involvement of educational, technology and research institutions.

	Potential policy measures to generate active engagement of education organisations in clusters
Regional / National Level	• Communication actions targeted to raise awareness of the roles played by cluster organisations among education, research and technology organisations • Policy incentives (e.g. subsidies for the fees) to encourage VET providers and universities to join relevant cluster organisations in their regions • Policy incentives (e.g. subsidised call for projects) for cluster organisations to undertake fast mapping excercises of the skills needs of their members and their links to the regional skills ecosystem, identifying key potential partnerships • Policy incentives (e.g. subsidised call for projects) to widen the use of internships to forge stronger linkages between VET providers / universities and firms, using cluster organisations as key intermediaries
EU Level	• Communication actions targeted to raise awareness of the roles played by cluster organisations among education, research and technology organisations • Awareness raising around how cluster organisations can leverage Erasmus+, CoVEs and other EU relevant instruments to bring cluster organisations and educational institutions together (e.g. designing projects in which cluster organisations are core partners) • Use of the ECCP to map and highlight links between cluster organisations and key skills-related projects and initiatives with participation from VETs and Universities (Erasmus+, CoVEs, etc.)

Develop services

A second step is for cluster organisations to build their own knowledge and capacities related to skills imbalances so that they can play a more effective role in this area. This will enable them to develop and/or enhance the basic services related to skills that they can provide to their members (the left-most column of the typology in Figure 4).

	Potential policy measures to support clusters develop skills-related services
Regional / National Level	• Provision of methodological support and/or training to cluster organisations around key elements such as near future skills needs mapping, foresight or roadmapping • Policy incentives (e.g. subsidised call for projects) to support cluster organisations in developing specific training that meets their members needs with regards issues related to the green and digital transitions (e.g. cloud computing, cyber security, circular economy, resource efficiency)
EU Level	• Development of a dedicated 'good practice guide' to support and inspire cluster organisations in the development of skills-related services • Provision of common infrastructure and training for cluster organisations to quickly create online courses for their members and scale up the new wave of online training activities • Use the ECCP to develop a common repository of online courses, with related possibilities for recommendations, validations and mentoring between cluster organisations • Use the ECCP to map and highlight links between cluster organisations and the digital skills activities related to the Digital Europe Programme and Digital Innovation Hubs • Awareness raising around how cluster organisations can leverage the Interreg programme and other relevant EU instruments to exchange good practices related to skills-related services

Engage regionally

A third step is to ensure that cluster organisations are fully and effectively engaged in their regional skills ecosystems. It is difficult to take this step without having taken the first two steps, as this engagement requires both knowledge around skills agendas on the side of the cluster organisation and recognition of the value of the cluster organisation's activities on the side of VET centres, universities and other players in the regional ecosystem.

	Potential policy measures to enhance the engagement of clusters in regional skills ecosystems
Regional / National Level	• Establish a forum for inter-cluster collaboration at regional level oriented to sharing intelligence and developing joint skills agendas • Policy incentives (e.g. subsidised call for projects) to support cluster organisations in jointly developing training that meets cross-cutting skills needs of their members (e.g. soft skills related to collaboration, entrepreneurial skills) • Actively engage cluster organisations in forums related to the implementation of regional smart specialisation strategies (and related excercises of foresight, infrastructure and investment planning, etc.) • Encourage the development of links between cluster organisations and other key actors in regional skills ecosystems (e.g. through subsidised calls for projects in collaboration), ultimately oriented to developing regional skills pacts

EU Level	• Develop a methodological guide for cluster organisations to support them in becoming key players in their regional skills ecosystems • Use the ECCP to facilitate mentoring among cluster organisations around how they can become key players in their regional skills ecosystems • Use the ECCP to maps and highlight linkages between cluster organisations and the regional institutions and infrastructures most relevant for digital and ecological transitions (digital innovation hubs, resource efficiency actors, etc.)

Connect internationally

A fourth step, best taken in parallel with the other steps is to develop and/or maintain international connections geared towards addressing skills imbalances. This is important both because an international outlook can always support learning and good practice, and because skills imbalances are not only a regional issue but also extend internationally.

	Potential policy measures for international cluster learning and networking on skills
Regional / National Level	• Integration of funding to support international peer learning related to national/regional skills agendas into cluster policy programmes • Awareness raising around the need for international peer learning to support the roles that regional clusters can play in skills agendas, including information about the various opportunities at EU level
EU Level	• Use the ECCP as a 'skills hub' for cluster organisations, facilitating connections, experience exchange, partner identification and learning (e.g. integrating some of the EU-level proposals already mentioned in other steps) • Adjust existing COSME instruments (ESCP, ECE) to leverage joint cluster initiatives as a focal point for developing 'joint cluster skills agendas' across international clusters that share activity-specific skills challenges and can benefit from strategic collaboration • Build on the H2020 Innosup programme to make it more responsive in quickly mapping and developing cross-sectoral industrial value chains, integrating special concern with analysing and developing solutions for the skills needs for value chain strenghening and international competitiveness

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