European Commission

Mapping of Centres of Vocational Excellence

(CoVEs)

ET 2020 Working Group on Vocational Education and Training (VET)

Education and Training

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1.0 Executive Summary

Centres of Vocational Excellence (CoVEs) are developing into an important component of EU VET policy. During late 2018 and early 2019, an exercise was conducted to delineate CoVEs in terms of their main characteristics, with a view to informing the concept and the development of EU support plans. This report presents the findings of this mapping exercise.

Types of CoVEs

Many different types of CoVEs exist. Each CoVE and each CoVE network is unique, reflecting factors such as the structure of the industry and the underlying VET system. Furthermore, each CoVE offers a unique mix of activities. CoVEs have the freedom to adapt to local/regional and sectoral needs in terms of structures, stakeholders and activities, with the aim of increasing VET's responsiveness.

Notwithstanding this diversity, two broad types of CoVEs can be identified:

1. CoVEs that are **'purpose built'** or designated entities as part of national/regional arrangements for vocational excellence, and;

2. CoVEs that are **individual VET providers**, functioning as CoVEs for a region, sub-region or sector.

CoVEs vary in their **sectoral coverage**. Since CoVE networks reflect national and regional economic priorities, they tend to cover sectors undergoing rapid technological and innovation-driven change that countries and regions wish to develop. This means CoVEs may be missing opportunities for innovation in certain fields, e.g. eco-tourism or the transformation of delivery systems in retail.

Teaching and Learning

Areas of teaching and learning where CoVEs are typically active include: developing and/or implementing innovative teaching and training methodologies, including those based on digital technologies (e.g. MOOCs, simulators, etc.); project-based learning; curricula that develop transversal as well as technical skills; provision of both IVET and CVET based on lifelong learning principles, and; collaborations with higher education, from sharing facilities to offering joint qualifications. It is less common for CoVEs to offer trans-national joint VET curricula, continuing professional development for teachers and trainers and guidance and validation of prior learning services.

CoVEs vary in their ambition. Some CoVEs make small, one-off changes to practice whilst others lead large-scale change programmes. In general CoVEs add value to their activities through integration, especially of practice and research.

Cooperation and Partnerships

CoVEs engage in a range of cooperative activities from the provision of placements for students by businesses to sharing equipment and expertise, and, more advanced still, innovation and business incubation activities. The latter activities require the greatest commitment and resources and are less commonly found. Most CoVEs participate in new knowledge creation, but they do so to highly varying degrees. It is rare to find CoVEs with their own research capacity.

International cooperation is common amongst CoVEs. CoVEs are often involved over many years in multiple EU-funded mobility activities and development projects. Most CoVEs are seeking to increase their international activities. Some CoVE networks are themselves international rather than national/regional networks. Participation in national and international skills competitions is a useful tool for raising the attractiveness of and excellence in VET.

Making sure VET provision closely matches the needs of the labour market is a key driver for CoVEs. However, excellence means doing more than this, by deepening exchanges with business and developing more synergistic relationships. In this way VET can become an essential and proactive element of skills ecosystems.

Governance and Funding

CoVEs vary in the degree to which they are 'embedded' in policies for regional development, innovation and smart specialisation. Linking CoVEs to national/regional policies ensures coverage of (sectoral) priorities at this level, but sub-regional priorities might receive less attention. Where there are no national or regional networks, there is a risk of a patchy CoVE landscape when viewed across a country as a whole.

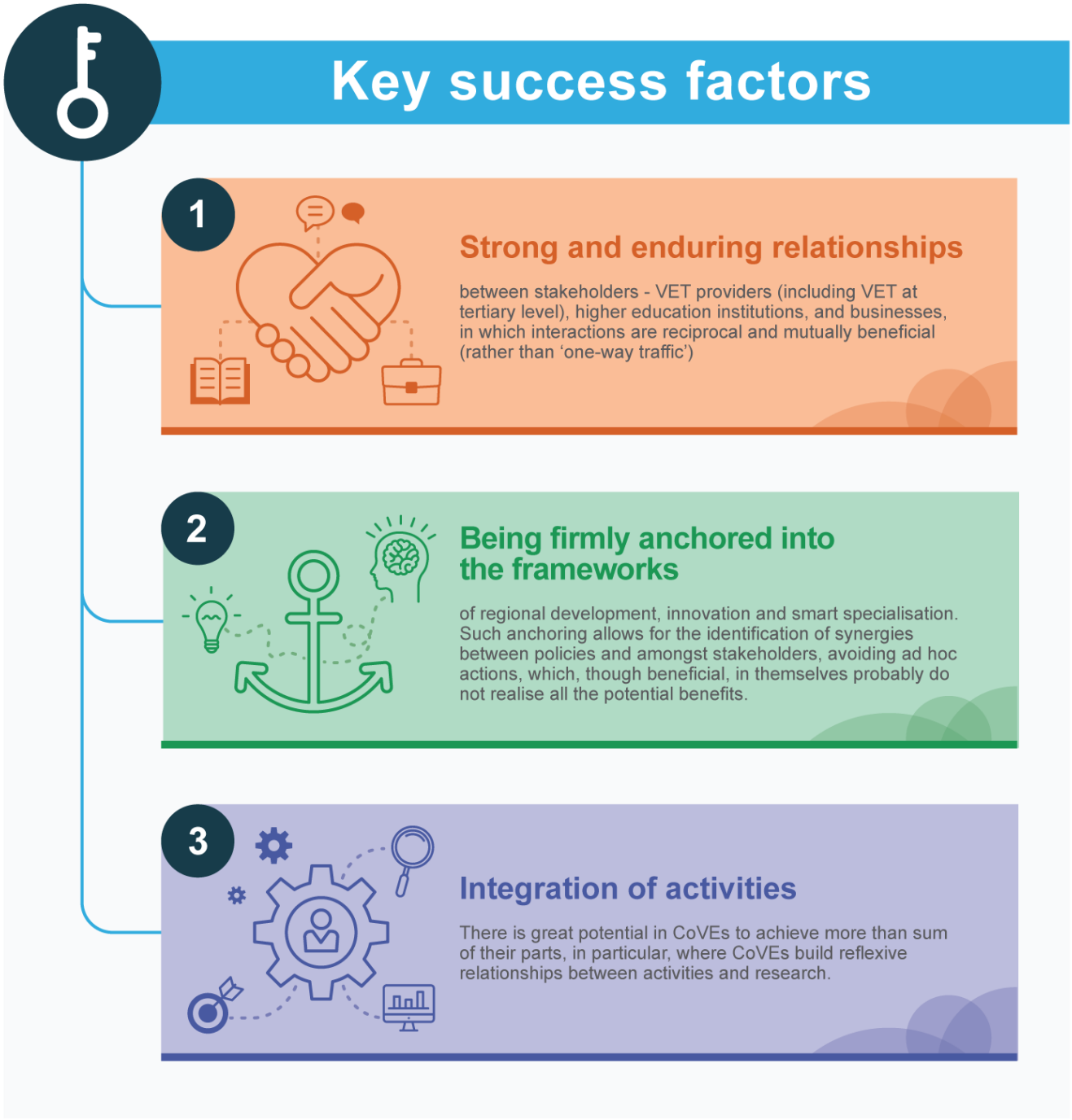
Partnerships form a central component of CoVE governance. They ensure shared ownership of goals and activities, and a common commitment to achieving them, by pooling and sharing resources. CoVEs often form different partnerships for different purposes/activities.

CoVE networks are coordinated to varying degrees and hence sharing takes place across the networks in different ways and to varying extents. Such sharing is probably not available to individual providers acting as CoVEs.

Core public funding for CoVEs tends to be supplemented with project funding and contributions from companies, either through the provision of staff and equipment and other infrastructure (in cash or 'in kind') or by paying for services. European funding plays an important role for CoVEs: it not only supplements funds, but supports innovation in VET.

Development of CoVEs

There are three key factors that underpin the success of CoVEs, shown in the pictogram below.



CoVEs that are **"purpose built"** entities **as part of a national or regional structures** may offer more advantages than individual organisations functioning as CoVEs, although excellence can be found everywhere. Advantages include: being closely linked to regional development, innovation and smart specialisation strategies which gives CoVEs common priorities and national sector coverage; offering networking and sharing opportunities; providing an extra tier of capacity.

Advantages of individual organisations functioning as CoVE's for a region (or sub-region) or sector include: being able to meet local and regional sectoral needs, in addition to national priorities; having potential for social issues to be more prominent.

CoVEs can be seen as falling across a spectrum in terms of their maturity. This provides the basis for developing a **maturity model** that shows how CoVEs might advance from 'setting up foundations' to 'achieving excellence'. The most 'advanced' CoVEs are not only contributing to regional development and smart specialisation strategies, and acting as drivers of innovation in local ecosystems, but are also making an active contribution to the generation of new knowledge.

Conclusions

The CoVE mapping helps us to elaborate a clearer concept of vocational excellence and of the distinctive contribution VET can make to regional development, and also to draw conclusions about how the EU could add value.

Developing vocational excellence in regional development

Vocational excellence means **going beyond what VET would normally be expected to do**. It means, in particular:

- being a proactive player with systematic approaches to engaging with local and regional agendas for sustainability and social and economic development
- having two-way reciprocal exchanges with stakeholders, based on partnerships
- using sustainable funding models involving strong and reliable stakeholder contributions
- ensuring integration of activities, especially between research and teaching and learning.

VET can **contribute to regional development** thanks to a number of factors:

- its **close and practical linkages to businesses** – these can be a source of practical innovative solutions to economic issues
- its **links to all sectors of industry**, traditional as well as hi-tech - these, links give it the potential to help fill gaps in regional development which tends to focus on technology or innovation-driven sectors
- its **role in skills development at all levels** – skills at low and intermediate levels have a vital role to play in supporting innovation, and at higher levels VET is on the increase, combining practical training and theoretical knowledge that complements higher education
- a **client group that includes learners from the widest range of social backgrounds including people who have not succeeded in general academic education and migrants** – this gives VET a unique position to address social topics and to enable industry to tap in to a previously under-utilised resource.

How the EU can support CoVE development

EU level policy, funding and coordination can add value to what is already being done in the following ways:

i. **Enabling upward convergence by:**

- facilitating networking and exchanges of good practices at European level - many CoVEs would benefit from support to move up the value chain of VET excellence;
- bringing together partners at different stages of VET excellence development, e.g. through a European platform or hub;
- implementing a self-assessment tool based on the maturity model – this would enable VET providers to identify areas for development and to access relevant support, e.g. good practice examples, peer learning activities.

ii. **Building capacity to address European priorities and fill gaps by:**

- linking European platforms of CoVEs to sectoral blueprints and sector skills alliances, with a view to developing innovative methodologies for teaching and learning;
- setting up European platforms or hubs with a focus on social issues of concern at European level, e.g. migration and early school leaving;
- dedicating a CoVE platform to the development of excellence in the internationalisation of VET which could focus on, e.g. developing advice and guidance on internationalisation strategies, and trans-national joint curricula and international campuses.

2.0 Introduction

This report presents the findings of an exercise to map Centres of Vocational Excellence (CoVEs) in order to inform the work of the ET2020 VET Working Group. The aim of the exercise was to delineate the broad outlines of CoVEs, in terms of their main characteristics, with a view to informing the concept and development of EU support plans. The main data collection was carried out from mid-November 2018 to mid-February 2019. The approach adopted was to generate sufficient examples of CoVEs to be able to identify the main types of CoVEs and their typical activities[1].

Data was gathered in relation to no less than 19 activities (see section 4 of the data collection template in Annex One) identified through initial discussions with the Commission as being at the heart of vocational excellence. The report identifies the most and least common activities, though it is important to note that in all activities we found examples of centres developing and implementing excellent practice.

Viewed through the prism of wider knowledge of VET systems, it can be seen that some activities involve building on (or extending) the 'core strengths' of VET. Meanwhile, other activities require VET providers to take an extra step to commence new activities that require new forms of expertise and commitment, and the involvement of partners drawn from a wider pool of more diverse backgrounds. CoVEs cover a broad spectrum of activity, and there are quite some differences in the bundles of activities undertaken by the examples. Each has its own, unique combination. CoVEs also fall across a spectrum, from those just starting out on the vocational excellence road, to highly mature and advanced CoVEs.

The report is structured as follows:

- **Chapter 3** provides an introductory overview to CoVEs, demonstrating the broad differences between the two main types of CoVE identified, the varied labels applied to CoVEs and their sector coverage.
- **Chapter 4** moves on to look at CoVEs' teaching and learning activities.
- **Chapter 5** covers activities undertaken in cooperation with businesses, universities and other stakeholders.
- **Chapter 6** addresses governance and funding issues.
- **Chapter 7** looks across the evidence presented to identify key success factors, strengths and weaknesses, and to elaborate a development model.
- **Chapter 8** presents the conclusions.

[1] Details of data collection methods are given in Annex One.

3.0 Overview of CoVEs

This section introduces the structure of CoVEs. Chapters 3, 4 and 5 look at CoVE functions. Many different types of CoVE exist. Indeed, while there are similarities in the broad types they carry-out, they all offer a unique mix of activities. Similarly, in terms of how they are structured, each CoVE and each CoVE network is unique, reflecting factors such as the structure of industry and the underlying VET system. This uniqueness is, in many ways, an intentional design feature. CoVEs have the freedom to adapt to local/regional and sectoral needs in terms of structures, stakeholders and activities, in order to be more responsive.

3.1 Types of CoVEs

In this context, although it is difficult to distinguish between types of CoVE (and any classification will have cases that are difficult or impossible to place), a distinction is made between:

1. those CoVEs that are '**purpose built**' or designated entities as part of national/regional arrangements for vocational excellence and;

2. those CoVEs that are **individual VET providers**, functioning as CoVEs for a region, sub-region or sector.

In reality, the situation is more complex than this schema. Countries with dual systems (e.g. AT, CH, DE) are difficult to place, since they comprise national systems in which there is close cooperation between the worlds of education and business as an essential and intrinsic component and, in this framework, regional and/or sectoral cooperation amongst stakeholders in various networks is commonplace. For the purposes of the mapping, they are included as de facto CoVEs that are 'purpose built' or designated entities as part of national/regional arrangements (type 1 mentioned above).

In some countries where individual VET providers functioning as CoVEs have been identified, it is important to point out that CoVE-type activities may be a requirement of VET providers. In Finland, for example, it is required of all education providers that they work together with local SME's, or more generally with working life. There may also be an expectation in VET provider quality assurance procedures that they will be intrinsic to any high quality VET offer (as in the UK). Feedback from some providers whilst undertaking the mapping suggests that some countries have misgivings about the potential negative side-effects of singling out individual providers in such contexts.

It should also be noted that individual countries can contain more than one CoVE type, and that many CoVEs are members of multiple networks, for example the Šolski center Nova Gorica in Slovenia (see section 6.2).

CoVE types at national level: the case of Romania

Some countries contain a mixture of 'purpose built' CoVEs and individual VET providers. This typically includes countries with evolving VET systems. Within this context, Romania provides an opportune point of departure to explore how different CoVE types co-exist on a national scale.

In Romania, for individual VET providers, dual education has come to represent an innovative approach to delivering initial education and training, provided within a framework that includes public and private organisations. An individual example in **Cluj-Napoca** includes a public-private partnership in dual vocational education within the food service industry. **Raluca Ripan** Technical College, partnering with companies in need of a specialised workforce, has incorporated the training of a large number of students in their curriculum. The internship represents 40%-60% of the school program and takes place exclusively at the premises of the companies with whom the internship contract has been signed. The companies have provided efficient and integrated guidance services and flexible and permeable learning guidelines.

In the context of partnerships, the College also engages with other education providers across Europe to foster trans-national mobility of VET learners and encourage the exchange of good practices across European schools. In the period 2016-2018, for example, the College participated in the Erasmus+ funded 'Healthy We Future Guarantee' project, alongside educational institutions from Lithuania, Spain, Italy and Turkey. The project aimed to promote simple steps for students to acquire a healthier lifestyle, through eating habits and sports activities. Beyond establishing a transfer of good practices between the schools involved in the project, the project partners further disseminated their project outputs to other schools in their respective regions. Raluca Ripan Technical College, for instance, produced and circulated a booklet with information on the negative consequences of obesity, healthy food recipes, and fitness tips, also published on the project's website.

Within a framework that includes public and private organisations, a number of individual Romanian CoVEs have also established innovative approaches to facilitate work placements for VET students with the help of EU funding. In this context, Bucharest's Nicolae Kretzulescu Superior School of Commerce (SSCNK) has partnered with a number of public organisations, including the School Inspectorate of Bucharest, the National Center for TVET Development, the Chamber of Commerce in Bucharest and the Erasmus+ National Agency, in order to facilitate a broad range of work placements for its students. The School further links its facilitation of work placements for students with its objective to promote social inclusion. The School is committed to fostering youth employment, for example, by mapping social entrepreneurship opportunities for its students. In this context, the School has created a network of social entrepreneurship stakeholders at national level. The School also engages in collaborative work between European schools to map international social entrepreneurship opportunities, for example through the Erasmus+ funded DesignThinking project.

At national level, a number of CoVEs also engage in partner networks across regions. **Ion Ghica Targoviste Economic College, for example,** is the coordinator of the COMECOPART partner network. The partnership consists of the Ioan Ghica Economic College of Targoviste, the Andrei Bârseanu Economic College of Brasov, the Nicolae Kretzulescu Commercial School of Bucharest, the Virgil Madgearu Commercial College from Târgu Jiu, the Economic College Dionisie Pop Marţian from Arad and the Economic College from Alba. The network's objectives encompass streamlining the communication system between schools and dissemination of examples of good practice to improve excellence.

Lastly, within the scope of 'purpose built' CoVEs, in **Cluj-Napoca** the city has launched an innovative project to build a knowledge-based economy with a socially resilient working ecosystem for current and future jobs. The project consists of 5 innovative tracks:

1. It promotes 'smart specialisation', aiming to make creative-based industries and related knowledge intensive business services (KIBS) more competitive and engaged in societal change;
2. It enables the transition to work 4.0, providing training and skills development for current and future skills needs, especially for work cycles under high risk of automation;
3. It re-imagines work, connected to both social values and technical potential;
4. It is an instrument to improve the spatial conditions of the local economy, through the regeneration of the Creative Industries Excellence Regional Center (CREIC) area by transforming it into a knowledge-based new part of the city;
5. It introduces experimentations for systematic changes for local value added chains and the new social contract governing the future of work.

3.1.1 CoVEs as 'purpose built'/designated entities as part of national/regional arrangements

In a number of countries and regions, networks of designated centres have been set up with the specific intention of developing vocational excellence. Such CoVEs have a strong connection to strategies for regional development, innovation and smart specialisation, or are explicit instruments of such strategies. CoVEs can cover single or multiple sectors. These networks take a variety of forms (shaped in part by the underlying national/regional VET system), but the individual CoVEs within such networks tend to involve collaborations between VET providers, companies and universities, with the partners coming together as required to meet identified needs. This leads to much variation between the CoVEs within a network, both in terms of their stakeholders and the precise configuration of activities. The purpose of collaboration, is to go beyond simple provision of 'traditional' VET to better meet business needs through innovative pedagogies and curricula, innovation hubs, business incubators, and so on.

The number of national networks continues to grow, with new initiatives being implemented in Croatia (regional competence centres linked to smart specialisation) and Romania. In Poland, there are 167 Practical Training Centres (PTC) that can respond flexibly to local needs. The centres vary a lot in their activities and modus operandi. They have multi-sectoral specialities but do not necessarily have a regional or national role. In September 2019, PTCs will become Vocational Education Centres with extended activities. Some other national networks have a specific focus, e.g. the five IT VET schools in Bulgaria described in section 5.1.

The examples below show the variety of networks that currently exist in Europe.

Examples of CoVE networks in Europe

National

In the **Netherlands, the Katapult network** is a community of 160 centres of vocational innovation defined as 'action-oriented partnerships between educational institutions, companies, governments and other public organisations [which] primarily focus on: creating an excellent link between education and the labour market, educating innovative and skilled professionals, craftsmen or craftswomen, promoting 'life-long learning' and timely re-skilling, accelerating and enhancing the innovation capacity of companies'. It is a highly flexible 'community for development', with individual centres able to organise themselves as local/regional/national needs demand, in terms of sectoral focus, activities and stakeholders. Sharing across the network is an important part of Katapult and includes peer learning, focus meetings, and impact research. The initiative goes beyond 'traditional' high quality VET through the important role of 'knowledge triangle', defined as combination of research and development (R&D), VET and business/industry.

In **France, les Campus des métiers et des qualifications** (95) cover 'dynamic and job-creating' sectors, e.g. 11 campuses cover tourism across France. There is also a regional dimension, so that within each region there will be several campuses each covering a different sector key to the region. Each campus comprises a large number of partners. There is a lead organisation for each campus, but not necessarily a 'physical' centre. The modes of collaboration are flexible, and include placements of apprentices in companies, equipment/laboratory space sharing and joint organisation/participation in workshops.

In **Italy,** there is a **network of higher technical institutes (ITSs)**. Founded in 2010 as a post-secondary, non-university level training institution, higher technical institutes (ITSs) are classified as 'high technological specialisation schools' that promote a highly specialised education in order to offer students attractive technical skills for the labour market. On behalf of the Ministry of Education (MIUR), the National Institute for Documentation, Innovation and Educational Research (INDIRE) (the Italian Ministry's research organisation) creates and manages the national ITSs' database and national monitoring, and conducts research to investigate the structural, organisational, didactic and development elements practiced in the various ITSs to support them in becoming a system for innovation.

In **Germany, Vocational Educational Centres (Bildungszentren)** are run by German Chambers of Industry and Commerce (Industrie und Handelskammer, IHK), Agriculture (Landwirtschaftskammer, LWK) or Crafts (Handwerkskammer, HWK). The Bildungszentren aim, in particular, to facilitate the school-to-work transition of youth, improve the qualifications of employees at SMEs, increase the quality of vocational education, increase the employability of middle class workers, implement lifelong learning, increase competitiveness of the economy and support innovation and R&D at the company level. The centres aim to provide skills that are rare and on demand for the companies in the relevant sector, in the relevant region. This is secured thanks to close cooperation between the centres, regional authorities and local public employment services, as well as close links to the companies (which co-finance centres' activities). At the same time, an important role of the centres is to boost innovation and support R&D of the companies. Chambers provide the companies with professional advice on innovation development, financing and management (e.g. at HWK there is a network of innovation counsellors BISTECH[2].)

In **Spain,** 150 VET schools across the country form a **network of integrated training centres,** providing both initial vocational training within the education system, and in-company training for people already in employment. The network's main objectives include the design, management and development of training plans for Initial Vocational Training and employment, and the integration and reintegration of workers. Along these lines, the network aims to boost qualification and requalification levels by offering needs-based quality training in all phases of the lifelong learning cycle. It further facilitates the evaluation and accreditation of professional competences acquired by people through professional experience and other procedures outside formal education. VET Integrated Schools have a Social Council, made up of representatives of the administration, representatives of the centres and representatives of the most representative business and trade union organisations. They also have coordination bodies that guarantee the attainment of integrated and quality training across the VET centres, professional information and guidance, the functions of evaluation and recognition of professional competences, as well as the functions of relationships and cooperation with companies.

[2] **https://www.bistech.de**

Regional

In **Belgium-Wallonia, the Centres de Compétence** form a regional network (25 centres across 42 sites), with each centre specialising in a particular sector relevant to a local economic development pole. There is some sectoral overlap between centres; there are 2 for construction, for example, but generally there is one centre per specialisation. They are also able to receive students from other regions within Belgium-Wallonia. Some towns have several centres. Mons, for example, has five. There is coordination across the network to share good practice and achieve synergies. Each centre is a public-private partnership and is a provider in its own right. Centres have been created since 2001.

In **Belgium-Flanders, Regional Technological Centres (RTCs),** created in 2004, act as 'project brokers aligning education, innovative challenges and the labour market', offering support services to the 500 Flemish secondary schools that focus on VET. They create platforms for the exchange of information on a provincial and local scale. RTCs facilitate an optimal transition from education into the labour market. They work cross-sectorally, but still within the educational environment. There is one RTC in every Flemish Province, making five in total. Their network consists of training and teaching institutions, sectors and companies, and is often supported by general agreements, which make superior infrastructure and equipment accessible to the training institutions. The RTCs want to give secondary schools the opportunity to explore state of the art and innovative equipment and processes through cooperation with public and private organisations, in view of providing mainly technical skills.

There is a distinctive variation relating to CoVEs where regional authorities have a lead role and where CoVEs networks, per se (in the sense of separate centres), are not designated. One of these is **Tknika, the Basque Centre for Research and Applied Innovation in VET** in **Spain**. Tknika was set up by the regional government to support local VET providers, universities and companies on a variety of projects in six fields.

- Applied Innovation in the field of Vocational Education and Training (Technology)
- Continuous Improvement (Quality Management)
- Research on Learning Methods and Processes (Learning Methods)
- Entrepreneurship and Change of Management (Entrepreneurship)
- Internationalisation in the field of Vocational Education and Training (Internationalization)#
- Sustainability

Tknika constitutes a highly flexible model, which enables it to work with providers in various constellations. Through networking and direct involvement of the Basque Vocational Training teaching staff, the Centre develops innovative projects in the areas of technology, education and management, and has agreements with individual companies, clusters, universities and institutions, including in other countries. It partners with the Basque Energy Cluster, for example, which seeks to improve competitiveness of energy companies. Tknika is a CoVE in its own right, but supports excellence in VET throughout the Basque Country. In this sense, it can be said to operate its own CoVE network, with examples of vocational excellence being widely distributed across VET providers and companies.

The other example of this regional variation is that of **the Västra Götaland Region** in **Sweden**. Here, the regional authority oversees and coordinates a set of wide-ranging and inter-linked activities. Region Västra Götaland is responsible for growth and development matters, along with healthcare and medical treatment. It works with 49 municipalities, trade and industry, and academia. The smart specialisation strategy is an important driver of activities, and there are eight incubators and six science parks that support development and innovation among companies, academia, institutes and community actors. It operates a regional 'competence platform' to try and match labour supply and demand (see chapter 3). It works with four municipal authorities on several joint development activities, for example, within study and vocational guidance, internship, validation and college development in healthcare and technology. In regional vocational adult education at upper secondary level, and in cooperation with higher education, the regional authority contributes with analyses, reports and forecasts, as well as mapping at regional and sub-regional level. Education co-operation takes place sub-regionally.

3.1.2 Individual VET providers functioning as CoVEs for a region (or sub-region) or sector

In many countries, individual VET providers operate as centres of vocational excellence and there are no national or regional CoVE-type networks related to overarching strategies on regional development, innovation or smart specialisation. In these cases, added value activities such as innovation hubs, business incubators, and R&D projects are woven into the fabric of 'normal' VET provider activities. Typically, CoVEs such as these have an ongoing and evolving portfolio of activities based around projects (normally part-funded by the EU) to support innovation and trans-national mobility of staff and students. Frequently, they specialise in particular sectors and have developed specialised facilities to support them. These CoVEs may cover regions, sub-regions or, in the case of smaller nations, entire countries; Malta, for example. As noted above, in some countries there are national requirements or expectations, as part of quality frameworks that individual providers carry out CoVE-type activities.

Examples of individual VET providers functioning as CoVEs in Europe

In **Finland, Omnia** is the Joint Education Authority for the Espoo Region, owned by three municipalities, and offers upper secondary vocational education and training, apprenticeship training, general upper secondary education, workshops and liberal adult education courses. It has both regional and national responsibilities. Licensed by the Ministry of Education and Culture, it cooperates with ministries (national and foreign), cities, chambers of commerce and entrepreneurs (co-operation agreements are in place with over 2000 companies in the region), as well as trade unions within education and training. Omnia also hosts and sends abroad hundreds of experts and students yearly, manages EU network development projects and participates in different global education networks. In this context, Omnia's VET mobility charter for the years 2016-2020 enables Omnia to link its development work, global networking and international mobility actions closely to its training programmes and learning paths.

In **Lithuania, Vilnius Technological and Business Vocational Training Centre** is a state VET centre with two sectoral practical training centres – the Engineering Industry Sectoral Practical Training Centre and the Energy Sector Practical Training Centre. The Centre provides training programmes, which respond to the needs of the Lithuanian labour market, in particular the demand for IT professionals. It cooperates with various partners, including organisations from public and private sectors. Together with two other organisations, the centre set up a training initiative called Akademija.IT, where theoretical training in two IT directions (Java programmer and software tester) is combined with practical apprenticeships in companies. Akademija.IT cooperates with a range of IT companies.

Malta College of Arts, Science and Technology (MCAST) functions as a COVE for the whole country. A large proportion of provision offered at MCAST corresponds to the six key areas of smart specialisation in Malta (ICT, Business Management and Commerce, Community Services, Engineering and Transport, Applied Sciences and Creative Arts). To do this, it collaborates with a variety of partners, including research institutes, higher education institutions and companies. In addition, MCAST's increasingly focuses on promoting (youth) entrepreneurship.

The **South West College in Northern Ireland (UK)** has vast higher and further (VET) education on offer, delivered in collaboration with both higher education universities as well as companies. Many of the courses and apprenticeships offered at the South West College are in line with Northern Ireland's Framework for Smart Specialisation. In addition, the College has a designated InnoTech centre, which carries out a wide range of activities aimed at innovation development and support for local businesses. Among other forms of assistance, innovation and mentoring support for small and microbusiness as well as government-subsidised needs-based training for staff are offered.

In **Slovenia,** the **Šolski center Nova Gorica** offers a wide choice of educational programmes and training in various fields, including electrical engineering, computer science, woodworking, mechanical engineering, mechatronics, automotive services, transport, health, agriculture, catering, food and economics. The centre also offers a programme of technical gymnasium with three orientations (electrical engineering, mechanical engineering and computer science) to all who choose general education. Additionally, in the field of informatics, mechatronics and agriculture, Nova Gorica goes a step further by introducing post-secondary vocational study. In parallel with formal education, the center carries out a range of other activities for comprehensive professional and personal development, such as participation in sports competitions, and involvement in domestic and international projects, cultural events and knowledge competitions.

Within this category of CoVEs, variants include providers sitting in the private sector and civil society organisations.

- In Portugal, ISQ is in international consulting group comprising a network of subsidiary companies that has developed over the years to provide capacity for its sector, in terms of research, development, and innovation. It is the second biggest VET provider in Portugal, and not only meets needs regionally and nationally, but internationally too. It sets up 'turnkey' training centres, ready for immediate use around the world, which include their construction and layout, training implementation and management models, staff training and training of trainers.

- In the Republic of North Macedonia, the Community Development Institute (CDI) Tetovo is a sustainable civil organisation, which works on building a democratic, integrated and multi-ethnic society, through strengthening the capacities of individuals, organisations and institutions. The experience of CDI is based on more than 20 years' work in the community addressing the needs of citizens and providing help and support in overcoming the challenges. As such, the work of the Institute has a strong social inclusion component, primarily focusing on educating marginalised and low-income citizen through its VET centre, 'Urban VET'. In this context, CDI also provides services for local action and community groups, such as training facilities and office spaces, as well as training resources. Additionally, the CDI delivers Vocational Education and Training for prisoners in Macedonia. To deliver its services, CDI works with a broad range of partners in the area of vocational education, including the Center for Lifelong Learning Skopje, DVV international Germany, Lillehamer University College, and Prof.Dr.Dimitar Tabakov at the Secondary Vocational School of Economics in Sliven, Bulgaria.

3.2 CoVE nomenclature

The variation described above is accompanied by significant variation in how countries label their CoVEs. Sometimes, there is **specific designation** (typically where national/regional networks have been established).

- Competence centres (*Centres de compétence*) in Belgium-Wallonia

- Campuses of occupations and qualifications in France but also referred to as centres of excellence (*pôles d'excellence*) and centres of training (pôles de formation). They are also referred to as clusters/networks and territorial ecosystems

- Centre of research and innovation (Spain, Basque region, Tknika)

- Community for Development (Netherlands, Katapult network) also described as an innovative learning and working community

- Practical Training Centres (*Centra Kształcenia Praktycznego*) in Poland (on September 1, 2019, the Practical Training Centres will become Centres for Vocational Training)

- Higher Technical Institutes (it. *Istituti Tecnici Superiori* - ITS) in Italy

- Partnership for excellence: Šolski center Nova Gorica in Slovenia

Sometimes, there is **no particular CoVE-related designation**.

- In Finland, Omina is described as a multidisciplinary/multisector education provider and regional development centre, and an exemplary hub of education know-how for visitors and official delegations/the home of a unique entrepreneurial hub.

- Vilnius Technological and Business Vocational Training Centre (Vilniaus technologijų ir verslo profesinio mokymo centro nuostatai)

- Malta College of Arts, Science and Technology (MCAST) (though it is also an International Centre of Excellence – a title awarded by the Pearson-owned EDEXCEL, a private multinational education and examination body).

3.3 Sectoral coverage

CoVEs also vary in their sectoral coverage. Overwhelmingly, the focus is on economic sectors. CoVE either have a single sector focus or are multi-sectoral. In networks such as those in France and Belgium– Wallonia, the networks themselves cover many sectors, but the individual centres within them frequently specialise in only a single sector.

The Cornwall Marine Network (CMN), UK aims to improve and grow the prosperity of the Cornish marine sector, to maintain and increase marine job opportunities, to improve the skills of the workforce and to encourage networking within the sector. As such, a programme of training schemes have been developed specifically for the Cornish Marine sector, including apprenticeships, support for young people, short courses, training Grants and National Vocational Qualifications (NVQs). The CMN's Apprenticeship programme is specifically designed to have a long-term and significant impact on the competitiveness of the Cornish marine sector.

Since CoVE networks reflect national and regional economic priorities, they tend to cover sectors undergoing rapid technological and innovation-driven change, the development of which countries and regions wish to encourage. To illustrate this, Table 2.1 provides an overview of the sectors covered by two CoVE networks, namely the French Campuses of Trades and Qualifications (les Campus des Métiers et des Qualifications) and the Competence Centres of Belgium-Wallonia (les Centres de Competence). The majority of the CoVEs cover manufacturing rather than service sectors, with the highest number of CoVEs falling within the sectors of construction and industrial techniques. In particular, a recurrent focus on optimal energy performance (e.g. smart electricity) and 'digital/technological solutions' (e.g. digital design and home automation) can be observed within these programmes. Similarly, a high number of CoVEs specialize in eco-industries and sustainability. Among service-related sectors, ICT, digital and innovative systems were the most frequently covered, with a high number of the remaining CoVEs specialising in the fields of tourism and gastronomy.

Table 3.1 Sector coverage of CoVE Campuses and Competence Centres

Sector	Campuses of trades and qualifications (France)	Competence Centres (Belgium-Wallonia)
Manufacturing		
Construction and industrial techniques	13,5 % (n=13)	32.0% (n=8)
Environment, Sustainable development and Eco-industry	18.7 % (n=18)	8.0% (n= 2)
Transport (maritime/terrestrial)	11,5% (n= 11)	12.0% (n=3)
Cultural, design and creative industry	9.4% (n= 9)	8.0% (n=2)
Space and aeronautics	6.2% (n= 6)	4.0% (n=1)
Chemistry and biotechnologies	5.2% (n=5)	4.0 % (n=1)
Agriculture and agri-business	5.2 % (n=5)	4.0% (n=1)
Manufacturing total	**69,7 % (n = 67)**	**72,0% (n=18)**

Services		
ICT / digital and innovative systems	12.5% (n=12)	12.0% (n=3)
Tourism and gastronomy	11.5% (n= 11)	12.0% % (n=3)
Business services and logistics	3.1% (n= 3)	4.0% (n=1)
Health, social and medico-social services	3.1% (n = 3)	0.0% (n=0)
Services total	**30.2% (n=29)**	**28.0% (n=7)**
	100% (N= 96)	**100 % (N=25)**

This approach means that it is legitimate to question whether CoVEs are missing opportunities for innovation in certain fields; eco-tourism, for example, or the transformation of delivery systems in retail. It is also questionable, given that most jobs in Europe are in services rather than manufacturing, and therefore VET learners are most likely to end up in these sectors. Furthermore, the sector focus of CoVEs runs the risk of overlooking some occupations, which is often where individuals focus their attention, rather than sectors.

The focus on economic sectors means that social issues are relatively neglected. Examples of CoVEs that focus on social topics are rare (exceptions being the community organisation in the Republic of North Macedonia – see section 3.4 - and the Italian network ENAIP, which includes social enterprises – section 4.4.). Social issues seem to be rarely mentioned. This also reflects the nature of regional development, innovation and smart specialisation strategies, which focus on certain sectors with growth potential (the 'traditional' clusters) etc.

There are, however, some examples where hi-tech and high-innovation sectors are applying a focus to social issues. Most of the centres in Belgium-Flanders, for example, focus on the so-called 'hard STEM-sectors' like metal, construction, automotive, wood and heating-cooling (although some centres also offer innovative solutions in care). Social issues are not in the initial scope of the centres, and yet have gained more and more attention in recent years, through innovative STEM-foci. This new way of thinking was introduced in 2015, and will take centre stage in the coming years (2019-2021) with the Belgium-Flanders Innovation in Vocational and Technical Training (InnoVET)-project.[3] As part of the project, innovative curricula for these 'hard' VET sectors will be strongly linked to innovation and to societal and environmental challenges, where future VET professionals will play a key role in solving them.

3.4 Conclusions

This section has introduced CoVEs and shown the enormous variety of interpretations of vocational excellence that exist in Europe. Excellence is pursued through a variety of structures, most notably designated national/regional networks or individual providers functioning as CoVEs. Despite, or perhaps because of, such variety, this section has also highlighted the potential for gaps to exist in the case of sectoral coverage and social issues. In the next sections, we look in more detail at three areas of CoVE activity; teaching and learning, cooperation with businesses, universities and other stakeholders, and, finally, governance and finance, to identify the typical activities pursued by CoVEs, as well as any further gaps that may exist.

[3] For more information on the national CoVE network in Beligum-Flanders, InnoVET (Innovation in Vocational and Technical Training), please see page 23.

4.0 Teaching and learning

This section examines the typical activities and common characteristics of how CoVEs pursue excellence in a cluster of activities related to teaching and learning. It covers the following topics;

- labour market relevance;
- lifelong learning, IVET and CVET;
- innovation and project-based learning;
- innovative curricula and pedagogy focused on transversal competences;
- trans-national joint curricula;
- higher level VET programmes and pathways;
- investing in the continuing professional development of teachers and trainers;
- guidance and validation of non-formal and informal learning.

4.1 Labour market relevance

Tuning VET to better meet demand for skills in the labour market is a common underpinning theme to all CoVEs. Indeed, it is a key driver of their activities. One of the rationales for the CoVE networks in Belgium-Wallonia, France, and in Italy, for example, was to get closer to the labour market, not least by forming partnerships involving businesses in ways that best suit their needs. In all these systems, there is flexibility to address sectors, occupations and skills needs as partners see fit, leading to variation in the composition, goals and activities of individual CoVEs.

Outside of CoVEs, there is great variation between countries/regions in terms of their general skill anticipation mechanisms[4]. CoVEs use the data generated by these mechanisms and supplement it with more detailed, local information about skills needs at a much more granular level than is normally captured by standard statistical tools which use standard sectoral and occupational categories (though efforts are underway to address these issues at national and European levels[5]). Furthermore, by bringing together VET and business in regular dialogue, CoVEs ensure that not only skill demand, but also skill supply, is taken into account. A good example of this is given in the box below.

[4] **http://www.cedefop.europa.eu/en/events-and-projects/events/skills-anticipation-methods-and-practices**
[5] e.g. **http://www.cedefop.europa.eu/en/events-and-projects/projects/big-data-analysis-online-vacancies**

The regional 'competence platform' of Västra Götaland Region, Sweden

Since 2010, the Västra Götaland region has been commissioned by the Swedish Government to provide a competence platform in Västra Götaland, which seeks to match labour supply and demand. The competence platform is a part of a national strategy for regional growth that has been carried out in all Swedish regions.

The competence platform aims to contribute to:

- increased knowledge of the education system and skills supply;
- coordination of needs analyses in the competence supply and education area;
- increased collaboration on supply of skills and education planning;
- increased knowledge about the supply and demand of different forms of education based on the national goals of the various forms and the authorities' responsibility.

The need for a comprehensive approach was demonstrated in a 2009 overview of education programmes, which looked at which programmes were being conducted, and how many people were studying them. It showed a lack of knowledge, forecasts and data, both in the medium and long term, for existing skills needs at regional level. It made it difficult, both at national and local level, to decide on the direction of skills training going forward.

In order to avoid being in a similar situation again, together with the other metropolitan regions (Malmö and Stockholm) and Statistics Sweden, labour market and education forecasts were drawn up at regional and sub-regional levels, with a view to 2020. This was the first time such forecasts had been made at regional level in Sweden.

Collaboration on education has also been developed in Västra Götaland. Educational institutions cooperate in multiple ways, gathering information and data about the education provided and the skills and competences learners acquire. This makes it easier to identify skills shortages, at both local and regional level.

An advantage of the platform is that the regional authority of Västra Götaland acts as a neutral party vis-à-vis the municipal level, the national level and the social partners, in issues of competence supply.

It should be noted that businesses' participation in CoVEs seems to outweigh that of trades unions, with examples of trade union involvement being hard to find, unless there are strong traditions and/or institutional arrangements for social partner involvement, such as in countries with dual systems. In Iceland, trade unions sponsor members' participation in continuing education courses at Reykjavik Technical College.

4.2 Lifelong learning, IVET and CVET

It is typical for the work of CoVEs to be underpinned by lifelong learning principles. This can be an explicit goal, as in the campuses initiative in France, for example, and can also reflect a national culture, philosophy and approach to education and training in general (which may explain the Scandinavian prominence amongst the examples provided later in this section). Examples from Italy provide a good illustration of the range of approaches that can exist.

Access to lifelong learning in Italy: the examples of IAL, CIOFS-FP and SCF VET.

The Innovazione Apprendimento Lavoro (IAL network) is one of the most extensive Italian networks of social enterprises working in VET and lifelong learning. The network is in constant dialogue with companies, and provides services along the entire education and training chain, including complementary services aimed at social inclusion and reintegration into the labour market for youth and adults.

Among other services, the IAL centres offer:

- vocational guidance;
- continuous training;
- upskilling and reskilling paths for workers, the unemployed and workers at risk of unemployment;
- programmes and activities aimed at local development and social inclusion.

The IAL network also directs specific efforts towards the social and labour market inclusion of disabled persons and other vulnerable groups. As a result, 11% of their courses in 2017 were addressed at promoting social and professional inclusion.

Similarly, through the implementation of educational activities, workshops, projects and services, the non-profit organisation **CIOFS-FP** is active in vocational training, guidance, certification of skills, social inclusion, employability promotion, job integration and equal opportunities. One of the main targets is youth, especially those belonging to vulnerable groups facing social exclusion, poverty or discrimination. This includes NEETs (not in education, employment or training) with low educational attainment, youth with special needs, early school leavers and migrant youth.

Another non-profit organisation, **Scuola Centrale Formazione (SCF)**, joins 46 organisations managing a total of 96 VET centres in 11 Italian regions. SCF activities include providing targeted programmes for the unemployed and disadvantaged groups, including migrants, the disabled and ex-prisoners. Examples of activities include alphabetisation for migrants, cultural mediation and apprenticeships.

The extent to which these principles shape provision varies, especially the degree to which both IVET and CVET programmes/qualifications are available through CoVEs. The availability of IVET and CVET depends, at least in part, on the nature of the wider education and training system, and how CoVEs are positioned within it. In some cases, such as in Belgium-Flanders and Belgium-Wallonia, the examples focus on adult learners, including people in unemployment. In the Netherlands, in 'Chemelot Innovation and Learning Labs' (CHILL), one of the CoVEs in the Katapult network, initial VET qualifications are offered by CHILL partners, whilst CHILL itself has developed a toolbox with more than thirty practical training programmes and workshops. All of these are available on an individual or group basis to industry professionals, and all of them are 100% customizable to the needs of individual companies. In Spain, a VET Integrated Schools network was set up in 2008, and to date comprises 150 VET schools that integrate the entire range of existing professional training.

An example of one such school is given in the box below.

Integrating IVET and CVET: the example of the regional Centre for Innovation for Vocational Training of Aragón (CIFPA)

Belonging to the Spanish network of integrated training centres, the regional **Centre for Innovation for Vocational Training of Aragón (CIFPA)** aims to promote technological and methodological innovation processes in the Vocational Training system of the **Autonomous Community of Aragon**, and to operate as a National Reference Centre for Commercial Logistics and Transport Management. To this end, one of the Centre's main fields of action is aiding VET centres in Aragón in managing their technical and transversal training. CIFPA also develops various lines of action to stimulate internationalisation, particularly through the promotion of international projects, international training practices for VET students and travel abroad for teachers. CIFPA further undertakes the coordination of regional innovation and research projects in VET. In this context, CIFPA manages a variety of Working Groups, including on innovation methodologies, quality and excellence in VET and the use of drones in VET. With the support of the Aragonese Development Institute and the Emprender Foundation in Aragón, the Centre is also in the process of introducing various spaces for the development of business projects that cannot be accommodated in business' own centres, in order to stimulate entrepreneurship in the region. A synopsis of other regional CoVE initiatives across Europe is presented below.

The provision of purchasable tailored training for companies is common. The inter-company training centre, Šolski center Nova Gorica, Slovenia, for example, offers formal adult learning and lifelong professional and practical oriented training. This includes upskilling and reskilling for a variety of target groups, such as employed and unemployed individuals, companies, craftsmen and teachers. More broadly, the training center aims to facilitate mobility among different positions of work in modern industry, stimulate personal growth and help respond to the wider challenges of modern society. Concrete services offered include:

- career counselling;
- international mobility support;
- practical work training;
- project-based and innovation-led learning;
- practical training for teachers in companies;
- training for mentors in companies
- initiatives that offer support for migrants.

Within this context, the Šolski center Nova Gorica also integrates various types of vocational education, including secondary and higher, as well as initial and continuing VET for youth and adults. As further testimony to its broad reach, the Biotechnical School's cooperation extends to primary schools, societies (e.g. the Olive Association, the Slovenian Beekeepers' Association and the Biodynamic Association), the local community, the Chamber of Agriculture and other chambers within the Consortium of Biotechnical Schools of Slovenia.

Other CoVEs go further and have dedicated lifelong learning centres. The functions of these centres can vary; some of them bring together relevant provision, others (typically involving higher VET institutions) conduct research, feeding it back in to CoVE activities. Another approach is to integrate provision and research, as follows.

(i) Centres focused on provision

Such centres are used by CoVEs to bring together and promote lifelong learning opportunities to adult learners, and help to distinguish them from IVET. They can include special access, validation and support tools for people who need to upskill or re-skill.

The Lifelong Learning Centre at Dundalk Institute of Technology is a resource for the whole community in the Northeast of Ireland, offering a range of opportunities for people to get help with their career and skill development, or their personal growth. It also promotes the need for learning for its own sake. The range of academic and other learning opportunities on offer not only includes dozens of courses, which have proved popular over the years, but also introduces some new choices, reflecting the requirement to adapt to the changing educational and training needs of a dynamic society.

The following are examples of this.

- The Institute's Lifelong Learning Centre coordinates provision of over fifty professional development and lifelong learning part-time courses.
- Courses are offered within the Springboard + Scheme, an initiative to help people to gain qualifications and up-skill in sectors where skills shortages have been identified.
- The Institute has an entry track for Mature Students (23+), where applications are considered on the basis of Portfolio Assessment. Dundalk Institute of Technology actively encourages applications on mature grounds, and reserves a minimum of 20% of places on all programmes for applicants who access the programme via the mature entry route. They offer a specialised induction process for mature students on entry and provide a range of learning supports designed to assist mature students in reaching their full potential.
- The Institute offers courses through Apprenticeship schemes in carpentry/joinery, electricity, motor mechanics and plumbing (ending with Advanced Craft Certificate).

(ii) Lifelong learning research centres

These centres conduct research for widespread dissemination, but also feed it back in to their own CoVE activities. This approach is most likely where CoVEs involve higher-level VET institutions for whom research is an intrinsic activity.

Lifelong Learning Centres for Research & Development: the Nordic countries

VIA University College, Denmark

The **VIA research centre** examines how learning and career planning develops through life. The centre has three programmes: vocational education, prior learning assessment and career guidance.

The Programme for Vocational Education has the following research areas:

- types of knowledge and learning;
- the professional vocational education.

Jönköping University, Sweden

Within the School of Education and Communication, there is a **National Centre for Lifelong Learning** named **Encell**. Encell was set up in 2001, on the initiative of the government, and constitutes one of eight national competence centres for lifelong learning in Sweden.

(iii) Centres integrating provision and research

These centres have a distinctive and innovative approach that seeks to break down the barriers between different types of learners and learning, whilst making research an intrinsic element so that provision can constantly evolve to meet changing needs.

Omnia, in **Finland** offers a wide range of services with a focus to support lifelong learning: vocational upper secondary education, professional career-related and apprenticeship training, general upper secondary education, corporate training workshops and liberal adult education courses. In particular, InnoOmnia, a flagship for vocational learning, opened its doors in August 2011. InnoOmnia is a lifelong learning hub located on the Omnia Kirkkokatu campus, offering a unique combination of services to empower teachers, students and entrepreneurs, increase innovation at the grassroots level and ensure high quality VET education through providing:

- entrepreneurship support for present/would-be entrepreneurs, mainly from arts and crafts or the service sector;
- work-based/on-the-job learning programs and projects for vocational education (VET) upper secondary students;
- innovation, and piloting new pedagogy for vocational teaching and learning e.g. gamification, mobile learning, entrepreneurial teaching methods;
- teacher and school leader professional development for K-12 and vocational sectors.

All spaces are learning spaces and everyone is both a learner and a teacher.

4.3 Innovation and project-based learning

It is typical for CoVEs to be active in developing and/or implementing innovative teaching and training methodologies, including those based on digital technologies (e.g. MOOC's, simulators, etc.). It is common for this to include project-based learning that brings inter-disciplinary approaches and VET learners from different fields of study (e.g. design, marketing, engineering) to solve real work problems/challenges. Such project-based learning requires deeper partnerships and close collaboration within institutions. CoVEs, depending on their stage of development, may be 'recipients' of innovations or 'developers' of innovations.

In the **Czech Republic, the Smíchov secondary technical school (SPSS)** is a successful secondary industrial school. Based in Prague, the school currently educates over 600 pupils from Prague and Central Bohemia in information technology.

In order to facilitate project-based learning at SPSS, a digital management and communication system called the Virtual School has been created. The Virtual School is a closed system that is used exclusively for school staff and students. Each class has its own electronic bulletin board where information from teachers and peers about projects can be posted.

Supporting study materials are placed in the virtual school system for practically all subjects. The system is also used by students to add comments and questions to the teacher. In this context, a section of the virtual school also includes an archive of graduation projects, which can be both a source of inspiration and potential study material for younger students.

Innovation in teaching and training can range from one-off changes in practice, in response to skills needs in particular sectors, through to ongoing and large-scale change programmes. E-learning methods are quite commonly found, and often form part of the standard 'toolbox' of CoVEs that can be deployed according to circumstances. The Technifutur Centre de Compétence in Belgium-Wallonia, for example, use e-learning in various forms, depending on the needs of the company. After an identification of needs, the most appropriate form of e-learning is chosen, such as Catalogue, Blended Learning, Rapid e-Learning, Webcasts or Serious Gaming. Elsewhere, CoVE networks can deploy innovations to deal with particular challenges; a kind of added value 'gap filling'. In Belgium-Flanders, innovative teaching and training methodologies are introduced by the Regional Technological Centres (RTCs) in sectors where legal or ethical impediments hinder pupils from practicing their skills in a real workplace environments, such as in the chemical sector, or in working with patients in real care situations. RTCs provide access to simulated learning environments, such as virtual welding, a virtual walk in a chemical plant where the trainee can alter default settings and ascertain the results of the changed settings on the process, or training with robot-care babies.

CoVE innovation is also common achieved through project-participation, a typical example of which is shown below.

In **Greece,** a **network of nine VET schools** have been funded to develop creative collective projects (action plans) that promote science, technology and culture in the local community. They are equipped with teleconference and tele-education infrastructure to enable them to network and exchange good practices with each other and the local community. These nine schools now promote the full-scale implementation of the programme by sharing their experience and supporting other schools through meetings and teleconferences, thus actively contributing to the development of a cooperative culture between VET schools in the country.

Innovation can also occur through the provision of special training facilities, perhaps shared with universities and research institutes. (These can overlap with incubators, which are discussed in the next chapter). Such facilities are highly facilitative of project-based learning.

South West College in **Northern Ireland (UK)** has a number of separate, highly equipped centres which provide innovative training methodologies. Image, for example, is SWC's creative technologies studio, with advanced technologies at the disposal of students intended to 'facilitate pre-incubation for those wishing to develop their ideas'. The Idea/Makerspace studio provides physical resources, with high-end design and manufacturing equipment for community members to design, create and manufacture products.

Strukovna škola Vice Vlatkovića in **Croatia** has a Solar Energy Education Centre, and is soon to be a Regional Centre for Competence in Mechanical Engineering. As a Regional Centre of Competence, the School is planning to open a new auto mechanic workshop and a fully equipped office for mechatronics, the latter of which will be a shared facility with the Zadar University (there are plans to open a Mechatronic track).

Other CoVEs go a step further and set up special facilities or centres whose goals include innovation as a constant activity. One of the purposes of InnoOmnia, already described above, is to increase innovation at grassroots level by piloting new pedagogy for vocational teaching and learning, such as gamification, mobile learning and entrepreneurial teaching methods. The Work for Adults 2.0 project, for example, funded within Erasmus+ KA2, is aimed at developing social media and digital learning solutions as a motivator and authenticator in adult learners' work-based learning. An example from another CoVE is given in the box below.

As part of the CoVE activities in the **Västra Götaland Region, Sweden, Smart Factories (Smarta Fabriker)** is a platform for creating expertise and spreading knowledge about industrial digitisation. Smart Factories is a collaboration between schools and businesses, run by the Gothenburg Technical College, which acts as an intermediary between the various actors in the project, consisting of companies, academia, organisations and schools. The project is closely related to the Government's (2016) new industrialisation strategy.

The purpose of the project is to:

- increase the attractiveness of technology and occupations within industrial companies;
- develop skills and secure skills supply;
- ensure Swedish industry's competitiveness in a global market.

The goal of Smarta Fabriker is to create competence and spread knowledge about industrial digitisation by:

- carrying out activities with school and business;
- improving and developing demonstrators of a smart factory;
- driving and developing regional networks in industrial digitisation.

To demonstrate what a smart factory is, a mini-factory and associated exhibition have been built. The factory was designed and built by students at different levels of competency, and around 50 companies contributed with supervision and components. During the spring of 2017, 80 students worked on the factory together for approximately 21,000 hours. Students have also participated in activities and conducted workshops with teachers and students from preschool, elementary school, upper secondary school, polytechnics and professionals from companies.

Project-based learning is an integral part of CoVE activity. In Bulgaria, at the Vocational High School of Computer Technologies and Systems based in the town of Pravetz, project-based learning is a significant part of the innovative methods of teaching, as well as of the preparation for and participation in competitions in the field of informatics, special interest clubs (robotics for example) and the diploma project for graduation.

Competitions are one tool used by CoVEs to encourage project-based learning. In Serbia, Subotica Tech-College of Applied Sciences is one of the organisers, along with the Economics University of Subotica, of BizKod. BizKod is a competition for Subotica students who have business ideas in the field of programming. The competition is a way to promote entrepreneurship of students. BizKod invites teams that consist both of students of business/economy (marketing) and those of technical studies. This interdisciplinary approach aims at developing and testing applied technologies in the business environment.

4.4 Innovative curricula and pedagogy focused on transversal competences

CoVEs universally recognise the need to keep up to date, not just with changes in the technical skills needs of industry, but also with transversal competences, sometimes referred to as '21st century' competences. It is a common for CoVEs to embed these competences in their programmes, often being kick-started by individual, externally funded projects. Entrepreneurship is prominent in this respect. There are a number of examples of individual CoVEs operating in this way.

Since 2005, **Malta College of Arts, Science and Technology (MCAST)** has worked to promote entrepreneurship training in its VET courses, as well as to introduce separate entrepreneurship courses across its institutes. MCAST's increasingly focuses on promoting (youth) entrepreneurship, through:

- incorporating entrepreneurship aspects into its existing VET courses and creating dedicated courses to the subject;
- setting up a business incubator to help students set up their own businesses;
- providing tailor-made training courses to young companies;
- establishing an Apprenticeship Programme.

In **Croatia, Strukovna škola Vice Vlatkovića** has been offering support and education in the digital and financial skills necessary for successful entrepreneurship through the project '(P)ostanimofinancijsko i digitalnopismeni'. The school played the leading role in the project, which was implemented in five other institutions (three secondary schools and two adult learning institutes). The school is one of the 'experimental schools' within the 'School for Life' Project (financed by the European Social Fund). The project consists of testing new curriculum approaches from the perspective of their value and applicability on the market. It focuses on problem solving skills and increasing students' satisfaction from learning.

In the **Republic of North Macedonia,** the **Community Development Institute Tetovo** has participated in the development of an online platform providing tools and training in social entrepreneurship, available in Macedonia through the EU-funded SEED (Social Entrepreneurship in European Dimension) programme. SEED-OER's objective is to enhance social enterprises' competitiveness and reinforce their potential in the EU by developing an OER platform including relevant training solutions tailored to specific needs of the sector, and complemented by a repository of best practices, case studies and lessons learned. The SEED-OER will become a focal point and platform for exchange of practices, knowledge and opportunities for social entrepreneurs across the EU. SEED-OER will not only provide practical tools and training resources, but also become a social entrepreneurship accelerator.

Montenegro's HEC faculty for international management in the tourism and hotel industry offer specialised courses, designed for entrepreneurial development, in hospitality and leadership skills. The HEC faculty further emphasises courses that will give a grounding in financial elements in the hospitality business, such as accounting, financial management, cost control and business statistics.

VIA University College in **Denmark** was chosen by the Danish Foundation for Entrepreneurship as the most entrepreneurial institution of higher education of 2018. VIA works strategically with entrepreneurship and innovation in all of its 42 educational programmes, including programmes that are traditionally not focused on developing students in this area. In particular, VIA has put specific efforts into integrating entrepreneurship in the general curricula, and not as a separate activity, for more than 19,000 students. Faculty members have been trained to teach courses in entrepreneurship and VIA offers special electives and courses on entrepreneurship. They have also established student entrepreneurship centres on most campuses. One specific goal is to enable more students to establish their own companies – which more and more students across programmes do. In addition, VIA participates in a number of EU-funded development projects in the area of student entrepreneurship and innovation. One hundred mentors have also been trained as part of VIA's vocational business educational programmes, which provide VET students with tailored career guidance.

National CoVE networks can also support such developments, as demonstrated in the box below.

Belgium-Flanders - Through the latest partnership with the Department of Education, **InnoVET (Innovation in Vocational and Technical Training)** will form a link between societal challenges, 21st century skills, consortiums of VET-schools, institutions for higher education and businesses. Aimed at the professionalisation of teachers in practical and technical subjects, the programme (planned to last at least three years, up to 2021) will provide a portfolio of at least 50 innovative curricula which will be shared with 500 VET schools. 21st century skills are key in the new InnoVET-programme. Transversal competences like problem solving, cooperative skills, robotics and IT etc. will hold a central place in the innovative projects that schools will jointly develop with their external partners, and that will be dispersed over all 500 VET-schools. The Regional Technological Centres will oversee these projects, where transversal competences will be the joint glue.

4.5 Trans-national joint curricula

Trans-national joint curricula are rare amongst CoVEs. Many CoVEs have international strategies and associated activities (as discussed in the next chapter), but even those that are highly active, with many international projects, may not take the step into developing joint curricula. A rare exception to this is VIA in Denmark, which offers double degrees (parallel study programmes) in collaboration with international educational institutions. This is part of a national initiative to develop broader cooperation with international partners. VIA has been very successful in developing double degrees in countries such as China and Romania.

More typical are the types of activities being carried out in Slovenia by the Šolski center Nova Gorica, explored in the box below.

Typical CoVE trans-national curriculum development activities: the example of Šolski center Nova Gorica, Slovenia

The **Šolski center Nova Gorica** is introducing innovative work-based learning models with personalised tutoring, as well as innovative work-related projects, in the framework of an Erasmus+ KA 3 project, RAY. Part of the project involves sharing the products through international mobility and a virtual campus. In addition, the BoQua Project (European Qualification Concept 'Professional Career Specialist') aims at the development of a new and Europe-wide uniform qualification concept for professionals who are active in the field of 'vocational orientation' (e.g. teachers, social pedagogues, professional advisers). The project's products should contribute to improving the quality of work in the field, and make the experts' qualification and the implementation of vocational orientation at schools, consulting institutions, and within the framework of open youth work Europe-wide, more comparable.

4.6 Higher level VET programmes and pathways

There is significant variation in this CoVE element. To some extent, the possibilities for CoVEs are determined by national legislation on what types of legally constituted bodies/organisations can provide what types of programme at what level; in some countries, this is highly circumscribed, whilst in others there is greater autonomy, including for collaboration and the provision of joint degrees, for example.

In some CoVE networks, higher education pathways are not part of the CoVE system. In Belgium-Wallonia, for example, some centres provide courses both at a beginner, as well as expert and advanced levels, and no evidence could be identified for programmes being offered in partnership with higher education institutions. Other CoVEs identified for this mapping exercise (for example Jönköping University, VIA, and Dundalk Institute of Technology, as demonstrated in the box below), are providers of higher level VET programmes (at EQF level 5 and above) whilst others, including the French and Dutch networks, include such providers alongside other 'general/academic' universities. French campuses provide higher-level VET programmes, including for learners (often adults) who have not finished their studies or wish to re-qualify to take up studies. In the Netherlands, the CHILL, which is part of the Katapult network, was created as a cooperation of companies from the chemical industry (DSM, SABIC), vocational services providers (Arcus College, Leewenborgh Opleidingen) and universities (Zuyd University of Applied Sciences, Maastricht University). Higher level VET programmes are provided by CHILL partners and founding members, Maastricht University and Zuid University of Applied Sciences.

Collaborations with higher education are commonplace, and can range from sharing facilities for teaching purposes through to offering joint qualifications. In the UK (Northern Ireland), South West College offer specialisations (in the areas of manufacturing, health care and engineering) which include higher education degrees offered jointly with Queen's Belfast University and Ulster University. They also offer regular further education courses and apprenticeships in the same areas. The box below shows, in detail, how an individual institution can be a provider of both programmes and pathways.

The Irish Dundalk Institute of Technology (DkIT) – providing both higher level VET programmes and pathways into university

- The Institute is a learning institution providing higher-level VET programmes (advanced craft certificates, undergraduate and post-graduate courses). DkIT offers courses from Levels 6 to 10 on the Irish National Framework of Qualifications (a system of 10 levels) equivalent to EQF levels 5 and above.
- One year add-on courses are offered to those seeking a continuation course from Higher Cert to Bachelors to Honours Bachelors.
- DkIT has a Strategic Alliance with Dublin City University, which supports both institutes' ambitious research agendas and ensures greater access and progression opportunities for learners from all backgrounds. At postgraduate level, Postgraduate Diplomas, Masters Degrees and PhDs can be undertaken.
- DkIT is a member of the North East Further Education Alliance and enables students to access higher level programmes through the initiative.

4.7 Investing in the continuing professional development of teachers and trainers

The continuing professional development (CPD) of teachers and trainers is an essential issue for CoVEs. Without high quality and innovative teaching and training, basic CoVE goals will not be achieved. Teachers and trainers need to keep up-to-date with both their pedagogical and technical skills. Nonetheless, CPD's prominence varies in CoVEs.

CoVEs like Strukovna škola Vice Vlatkovića, Croatia, put strong emphasis on facilitating continuous education of teachers and trainers by providing subscriptions to relevant industry and pedagogic journals, and participating in teacher training and education organised by the Education Ministry and ASSO (Agency for Vocational Training and Adult Education). Significantly, the school also participates in projects that develop new teaching skills among teachers (this is one of the ways CoVE's distinguish themselves from other providers). The project E-MOBILE, for example, is a component of teachers' education/development which allows them to expand their teaching portfolios with new elements (financial and digital literacy). Similarly, at OsloMet in Norway, a large share of courses are targeted at VET teachers, and include five 'combined' continuing and further education courses supported by the Ministry of Education within the Vocational Training Promotion programme. These include courses such as 'Application of new technology in vocational subjects' and 'innovation pedagogy and learning management in vocational subjects'.

Other CoVEs and CoVE networks go further. Teachers and trainers are one of the target groups of the Centres de Compétence in Belgium-Wallonia, where courses are offered to VET teachers at secondary and higher level to align teaching with industry needs. In Belgium-Flanders, the Regional Technological Centres seek to enhance the technological competences of the teachers in initial VET-education. This is achieved by offering them teach-the-teacher programmes in a phased, as well as continuous, approach, which included a 'STEM-pathway' during 2016-18, in order to develop and strengthen their skills for the 21st century and keep them up to speed with the latest technological developments. Since the start of 2019, this has been rolled up into the 'InnoVET' programme, focusing on innovation in VET. Furthermore, discussions are currently in progress around the idea of shifting the focus of RTCs from pupils on to teachers as the primary way of seeking VET excellence from September 2020.

A high value-added approach taken by some CoVEs is to undertake research into the role of VET teachers and trainers that can then feed back into teacher training programmes. CPD and the development of innovative teaching and training methodologies are thus integrated. An example of this is given in the box below.

At **VIA University College in Denmark,** the Society and Social Work department generates knowledge about social and pedagogical initiatives for at-risk groups. Practice-related projects carried out examine and develop the socio-pedagogical and socio-professional offers to children, youth and adults. The aim is to create and further develop well-functioning initiatives for at-risk groups in Denmark, while working with a preventative approach in relation to being at risk. Knowledge about socio-pedagogical and socio-professional work is created in close cooperation with educational programmes and practice, and the results are shared with students, practitioners and researchers in Denmark and internationally.

4.8 Guidance and validation of non-formal and informal learning

Evidence on the topics of both guidance and validation is scarce. Arrangements are likely to reflect wider, national/regional arrangements, and, in many countries, guidance and validation might be taken for granted as activities integrated into the work of VET providers, although it may also be carried out by separate organisations. Validation currently shows widespread variation in its state of development and availability[6], and this is reflected in CoVEs.

In some countries, guidance and validation are intrinsic to VET provision. In Germany, for example, providing guidance is one of the areas of competences of Vocational Educational Centres (Bildungszentren), which are run by German Chambers. The VELIKOM project, implemented by the centres, is an initiative for validation of prior learning. Similarly, in Austria, the regional Chambers in the federal provinces each run a career guidance centre concerned especially with vocational guidance and counselling. In doing so, a lot of consulting services and tools have been developed, above all the career information website 'BIC.at'.

Where there are organised networks of CoVEs, guidance and validation can be network requirements. In France, one of the stipulated functions of the campuses is to provide information on the possibilities of validation of prior learning. In Belgium-Wallonia, Centres de Compétence can be accredited centres for validation of prior learning, as in the case of the Technifutur CoVE.

In VET systems with high provider autonomy, there can be much variation in guidance and validation provision, depending on national arrangements. In Ireland, the Dundalk Institute of Technology (DkIT) provides validation of prior learning in accordance with its own Recognition of Prior Learning Policy and Practice guidelines. DkIT's Careers and Employability Centre provides individualised guidance services in the area of career development, and run workshops on skills relevant to the job market. Workshops include career bootcamps, career insights and professional networking opportunities. In Sweden, the Västra Götaland Region has developed and implemented 'Validation West', an Interreg-funded regional validation scheme involving all relevant stakeholders, including HEIs based on the 'KUB' model.

In some countries and CoVEs, validation may be available for some sectors/occupations only, as in Latvia where Riga Technical College provides validation of prior learning for a set of professions (Programming Technician, Computer Systems Technician, Electronics Technician, Telecom Technician, Secretary, Customer Service Specialist, Electrician, Mechanic and Carpenter).

[6] **http://www.cedefop.europa.eu/en/events-and-projects/projects/validation-non-formal-and-informal-learning/european-inventory**

At the other extreme, in Denmark, VIA hosts the national programme for prior learning, and runs a Knowledge Centre for Educational and Vocational Guidance, as explored in the box below.

VIA University College in Denmark hosts the national programme for prior learning

Established in 2007 with support from the Ministry of Education, the programme addresses research and development tasks nationally and internationally, aimed at increasing professionalism and quality of work in the recognition of prior learning. This is being achieved through cooperation with Danish and international research institutions.

The programme's main tasks are:

- development and research projects;
- conferences and seminars;
- competence development;
- consultancy dissemination and dialogue on prior learning.

VIA's Knowledge Centre for Educational and Vocational Guidance's Programme for Career Guidance researches:

- guidance in primary school and assessment of training readiness;
- career guidance in education in a lifelong learning perspective;
- career guidance of adults in a lifelong learning perspective;
- connections in counselling activities and organisation of guidance;
- supervisor roles and guidance perspectives in digital media.

4.9 Conclusion

Amongst the teaching and learning activities discussed above, some are more common than others. It is typical for CoVEs to be active in developing and/or implementing innovative teaching and training methodologies, including those based on digital technologies (e.g. MOOC's, simulators, etc.). They also promote project-based learning, as well as curricula that develop transversal, as well as technical, skills. It is also common to offer both IVET and CVET provision and to be based on lifelong learning principles. Regarding higher level VET programmes and pathways, there is significant variation. This partly reflects variations in national legislation on what types of legally constituted bodies/organisations can provide what types of programme at what level. Notwithstanding this issue, collaborations with higher education are commonplace, ranging from sharing facilities through to offering joint qualifications.

Overall, it is less common for CoVEs to offer trans-national joint VET curricula, continuing professional development for teachers and trainers and guidance and validation of prior learning services, although, with the exception of trans-national joint curricula, these activities are important parts of the offer of some CoVEs. One reason why CPD guidance and validation might not feature prominently is that they may be the responsibility of other stakeholders.

Looking across CoVEs and activities, a number of general points emerge.

- First, it is evident that CoVEs vary in how ambitious they are in respect to the activities analysed, such that we can identify a range of activities, from what might be called ‘basic’ activities to more ‘advanced’ activities. CoVEs may be ‘recipients’ of innovations or ‘developers’ of innovations; they may make small, one-off changes to practice or ongoing and large scale change programmes; they may provide tailored training for companies or put in place lifelong learning centres.

- Secondly, some CoVEs add value to their activities through integration, especially of practice and research. As shown in relation to both lifelong learning centres and the CPD of teachers and trainers, some CoVEs are distinguished by a reflexive approach, whereby regular and systematic approaches to research identify ways of developing excellence that are fed back into real-world practice.

- Thirdly, the most salient gap amongst teaching and learning activities is in the area of trans-national joint curricula. Such curricula take considerable time and effort to design and implement, as evidenced by experience in higher education in the previous EU programme, Erasmus Mundus. This is an area where EU intervention is likely to add value.

- Finally, we should not forget that the nature of VET systems has an influence on the types of activities undertaken by CoVEs. This is especially apparent in relation to the degree to which both IVET and CVET programmes/qualifications are available through CoVEs, and the relationship to higher education noted above.

5.0 Cooperation and partnerships

In this section, we examine those activities that can only be achieved effectively in close cooperation with a range of stakeholders. Areas covered include:

- exchanging people and equipment;
- supporting innovation and business start-ups;
- new knowledge creation and dissemination;
- international cooperation;
- participation in skills competitions.

5.1 Exchanging people and equipment

In CoVEs, collaboration with businesses does not simply involve ensuring that VET provision matches the needs of the labour market. After all, it is quite typical for VET providers to have multi-stakeholder governing boards designed, in part, to help ensure skill demand and supply have a good match. In CoVEs, however, this 'normal' level and type of engagement of stakeholders is enhanced with further cooperation and partnership with businesses. This is driven by a desire to make sure provision is better tuned to the skills needs of businesses, especially where they are undergoing rapid change. In its most basic form, this further cooperation and partnership involves the exchange of people (staff, students) and equipment.

There are a number of characteristics related to the sharing of equipment and expertise that warrant attention. First, it should be noted that in some VET systems, this type of cooperation is institutionalised (as in countries with dual systems, for example) or is a requirement of VET providers (in Finland, for example, it is required of all education providers that they work together with local SME's, or more generally with working life). There may also be an expectation in VET provider quality assurance procedures that sharing of equipment and expertise will be intrinsic to any high quality VET offer (as in the UK).

Secondly, in its most elementary, though still highly valuable form, cooperation with businesses takes place for **apprenticeships or traineeships**. This is institutionalised in countries with dual systems, and is growing elsewhere. In Serbia, the Subotica Tech-College of Applied Sciences organised courses to reskill employees of one company (Termometal) who lacked specific qualifications when entering the EU market; the company approached the school, requesting tailored made courses, which resulted in the establishment of close cooperation between the two, with student placements at the company in a dual education model.

Thirdly, a most common form of collaboration is the **donation or sharing of equipment**. At its most basic level, this improves VET quality by enabling students to gain experience in, or learn on, up-to-date equipment. Normally, such activities are focused on particular sectors or technologies.

The **Practical Training Centre (PTC)** in **Krosno, Poland** cooperates with the State Higher Vocational School in Krosno, which has specialised laboratories equipped with modern laboratory equipment at PTC's facilities. Cooperation has been established with companies such as Szwed, Siemens and Sandvik, which provide the Centre with the most modern equipment, enabling training at the highest level. It gives development prospects and meets high criteria for educating future employees of production plants in the region.

In **Belgium-Flanders,** where the **Regional Technological Centres** focus on the initial/compulsory phase of VET, an example of a highly appreciated innovative project is 'The Factory of the Future' at RTC Vlaams-Brabant, which has involved the creation of a 'technology truck' equipped with the newest production technologies. This truck has been stationed in 25 schools annually in order to enable pupils to explore Industry 4.0 technology in a safe, didactical environment. Partners are RTM Vlaams-Brabant (sectoral training), Siemens, SICK, FANUC Robotics, EXMORE, Ultimo, Beckhoff Automation bvba, Limtec+/Anttec, UCLL, and VDAB.

In **Hungary,** the **Budapest Centre of Technical Vocational Training** has received equipment support from the industrial control and automation company, FESTO. A recent example includes an Industry 4.0 compliant modular training bench. Beyond the sharing of hardware and software, however, FESTO also provides relevant curriculum and supports the training of the Centres' instructors, to ensure that students receive in-demand knowledge with practical, goal-oriented training in Industry 4.0. Within this framework of cooperation, FESTO and the Centre jointly provide students with a common proof of skills acquisition.

Slovakia's national network of excellent VET providers, labelled **Centres of Excellence for VET (CoVET),** aims to create public-private partnerships between schools and companies in order to deliver high quality training, both in IVET and CVET programmes. The schools cooperate with the companies via Dual Education Treaties, and teachers at the schools train in-company trainers in pedagogy and psychology. In exchange, VET school teachers can also attain the qualification of in-company trainers through company-hosted training, and specialists from companies are allowed to teach at the schools for 10 hours per week without a pedagogical degree.

The fourth characteristic to note is that cooperation with stakeholders not only involves the sharing of equipment, but can also **involve the exchange of expertise**. At the Reykjavik Technical College, in Iceland, 'mentoring' or supervision is provided by representatives of businesses. In the Multimedia School, for example, business people participate in the training programme by assisting students in their final projects. In the first and second semester, the students build basic knowledge. In the third semester, they choose the field for specialisation and in the fourth semester, they prepare one major independent project, supported by teachers and representatives of businesses. In Bulgaria, at the Vocational High School of Computer Technologies and Systems in the town of Pravetz, businesses support the professional development, guidance and counselling of IVET students (14-18 years old).

The fifth feature to note is that with CoVEs, the flow of resources and expertise tends to go beyond simply one-way sharing, so that two-way exchanges are commonplace. In these arrangements, all parties - VET providers, business, universities - are 'givers' and 'receivers' of support, optimising the added value in mutually beneficial exchanges. The Business School at Jönköping University in Sweden, for example, has extensive collaboration involving two-way exchanges, and in Germany, the IHK Schwaben together with the Augsburg University of Applied Science implemented a project, 'Hands on Innovation', in which IT students developed IT applications for 13 companies from the region. CoVEs also provide an opportunity for exchanges to be systematically built in to the fabric of activities. In Belgium-Flanders, two Regional Technological Centres (RTC Oost-Vlaanderen and RTC West-Vlaanderen) have created communities where teachers and representatives of companies can meet and exchange knowledge and experience.

In Cyprus in 2017, the Cyprus Productivity Centre (CPC) signed a Memorandum of Understanding with the Cyprus Institute (CyI) for the use of Virtual Reality Equipment. CyI is a leader in the area of exploiting Virtual Reality technologies, and works with one of the world's leading research teams, the National Centre for Supercomputing Applications, at the University of Illinois at Urbana-Champaign. Through its professors, students and technicians, CyI will work with CPC on the best possible uses of its virtual reality equipment, which will be used both for CPC's engineering training programmes, as well as in various CyI research projects. This includes future joint projects developed within the context of the CyI-CPC cooperation framework.

On the initiative of employers, the **Practical Training Centre in Krosno, Poland** hosts the Centre for Technical Education (HTEC), aimed primarily at the education of highly qualified operators and programmers with the implementation of innovative solutions. Thanks to the support of the Abplanalp company, regular meetings are held with representatives of regional industry, and students can count on wide support in the form of scholarships, programmes certifying skills, and the acquisition of practical knowledge. Local entrepreneurs can take advantage of the training opportunities offered at the HTEC and obtain specialist technological advice for their employees. The machines and devices with high technological and teaching parameters in new laboratories serve VET students, students of higher education institutions, as well as employees of many companies who can improve their professional qualifications there.

The sixth feature to note is that SMEs typically receive special attention in CoVEs. The exchange of equipment and expertise discussed above tends to involve larger companies for reasons related to time, resources and capacity. SMEs are commonly a target group for CoVEs, however, as they are an important source of employment and a potential provider of apprenticeships places for VET learners, as well as offering the opportunity for learners to develop entrepreneurship skills. They struggle to get involved in such activities, however, as they lack time and resources. CoVEs can therefore provide specific targeted support to SMEs. The box below illustrates the range of approaches to supporting CoVEs that exists.

CoVE activities focused on SMEs

The School of Engineering is one of four schools that are part of **Jönköping University, Sweden**. The school's vision centres on developing and spreading new technology and knowledge that reinforces the international competitiveness of small and medium-sized enterprises. More specifically, the School of Engineering focuses on preparing students for achievement in business and developing specific working methods aimed at small and medium-sized enterprises. Courses have a broad technical knowledge base to equip students with engineering skills and to stimulate entrepreneurial spirit. The educational programmes are unique in that they also provide knowledge from topic areas other than technology, such as leadership, communication, business and ecology.

In the **Basque Country** in **Spain,** Tknika operates the TKgune network, through which businesses, in particular SMEs, have access both to services (expertise) and to infrastructure. The TKgune network is divided into five strategic environments: manufacturing, automation, automotive, energy and creative industries. The TKgune network is a part of the Euskadi Vocational Training Technological Innovation System, developed by Tknika and implemented together with Basque vocational centres.

In **Austria,** the **Austrian Economic Chambers** (Wirtschaftskammer Őesterreich, WKŐ) provide counselling services for SMEs to support their engagement in R&D activities. Moreover, financial support is also available based on specific project needs ('KMU-Paket FGG').

In **Portugal, ISQ** has been involved in many international projects targeting SMEs. These include:

- mobile APPs for in-company VET trainers to facilitate the participation of SMEs in apprenticeships;
- a European ECVET Curriculum and a set of training modules on management of apprenticeships for SMEs;
- an innovative Mobile Instructional Learning APPs designed to train teachers and educators from VET schools in training providers and intermediary bodies to use and design multi-level Mobile Learning APPs;
- a multilingual e-learning platform with innovative e-learning courses and OER on management of apprenticeships for SMEs;
- a guide for validation, certification and accreditation of management of apprenticeships for SMEs in Europe;
- a flexible learning package for work-based learning aimed at providing fundamental technical knowledge on the topic of Industry 4.0 for current and future (VET students/ apprentices) SME employees.

Finally, it should be noted that sharing people and equipment can also facilitate more elaborate and value added activities, such as those shown below. Activities such as these begin to take us into the next type of collaboration, where facilities seek to encourage innovation and support business start-ups, which are discussed in the next section.

Dundalk Institute of Technology in **Ireland** shares its state of the art research facilities with companies through joint research projects and real life industry and business case studies, conducted by the students for the companies. One company (Ergo), for example, committed over EUR 1 million to establish a research and development division for the further development of software solutions for the financial services sector. The research activity has focussed on developing Ergo software components that simplify complex business processes.

5.2 Supporting innovation and business start-ups

Going a step beyond the sharing of equipment and people to enable VET provision to better meet labour market needs, some CoVEs undertake activities in cooperation with other stakeholders where innovation can be encouraged, stimulated and shared, and where new businesses can be launched. Typically, this takes the form of physical centres, but provision can also be made in the form of virtual environments and the provision of counselling and support. Sometimes innovation centres and business incubation occur in the same centre; sometimes they are physically separated. Most often, it is difficult to differentiate between the two, which reflects wider developments.

'Business incubators can be called innovation centres, pepinieres d'enterprises, technopoles or science parks. […] Modern incubators […] aim to foster a sense of community. They usually have a mix of hot desking zones, dedicated coworking spaces and offices for start-ups. They may also have social areas, or even a café or restaurant, that is open to the public, since the goal is to be a part of the local community, not hidden from it[7] '

For mapping purposes, however, it is worth distinguishing between the two whilst bearing this caveat in mind.

Innovation centres provide platforms for VET learners to be involved in the latest developments in industry and technology, developing valuable technical and transversal skills in the process of working on new products and processes from which businesses and universities benefit. Close working with businesses and universities is intrinsic to these activities. In Austria, for example, Chambers aim to support innovation of the companies in the sector. They provide innovation counselling (e.g. BISTECH) and implement projects where VET learners develop services demanded by local companies (e.g. 'Hands on Innovation' project).

[7] **https://smallbusiness.co.uk/how-business-incubators-help-boost-growth-and-innovation-2471907/**
See also Forbes' highlighting of a "new wave of innovation hubs" (**https://www.forbes.com/sites/michellegreenwald/2018/04/02/a-new-wave-of-innovation-hubs-sweeping-the-world/#69bd6bf91265**)

The range of innovation activities is illustrated below.

Examples to illustrate the range of innovation and business incubation activities

In **Spain, CIFP Politécnico de Santiago,** which offers both initial and continual VET, carries out innovation projects in fields such as robotics and electricity, and has installed a smart (domotic) house with a company (Schneider) on their premises. It also has an audiovisual media lab which has merited an innovation prize and use of which is shared with the local companies. It is considered a reference for innovation in its area, and is well networked with the enterprises nearby. Not only does it collaborate with the surrounding enterprises, but also with other schools, and it also takes part in competitions. Regular visits to the local business incubator are organised with the aim of fostering entrepreneurship.

Luxembourg's VET initiative **'Skills Bridge'** is labelled as an initiative to support local companies in developing the digital skills of their employees so they are capable of adapting to the digital transformation of the labour market. Once the participating companies have identified their core issues related to digitalisation, the initiative supports them in taking the necessary action, with an individual approach planned for each company.

In **Poland,** the **Krosno Practical Training Centre (PTC)** is a member of the Aviation Valley Association of entrepreneurs from South Eastern Poland, the largest and most well-known industrial cluster in Poland, and also a member of the EACP (European Aerospace Cluster Partnership). Two Regional Centres for Vocational Education and Modern Technologies operate at the PTC in Krosno – one for mechanics and one for aviation. In modern and well-equipped labs, many course-based forms of education are carried out for VET students, students of higher education institutions and employees of companies who can improve their qualifications (based on a cooperation agreement with the Aviation Valley and modern technology companies). The PTC in Krosno is also an authorised examination centre that can conduct external VET examinations.

Serbia's Subotica Tech-College of Applied Sciences participates in iDEA Lab, a Tempus-sponsored project which aims to develop iDEA Lab as a physical and virtual environment for generating, developing and commercialising innovative students' ideas. This is achieved through relevant training, mentoring and technology at their disposal. Following the entrepreneurial route (start-ups), or in collaboration with companies (open innovation), it fosters collaboration between universities and enterprises, advances the employment potential of graduates and enhances companies' innovativeness. iDEAlab is a creative co-working space, open for students, with the aim of providing adequate spacing and equipment for specialist courses, as well as to help students finish their diploma work. Students and other potential iDEAlab users are able to develop their ideas through work with experienced mentors. Modern technology such as a 3D scanner, 3D printers, Arduino and LEGO Mindstorm kits are available.

Business incubators provide opportunities for students to gain entrepreneurship and other transversal skills, and also for students to launch business ideas into the market. Incubators provide space, as well as a range of other services, such as mentoring and help with funding. In such environments, learning can be formal as well as informal. Jönköping University, for example, has established opportunities for students to start a business during their period of study, in cooperation with the Business Lab located in the nearby Science Park Jönköping. Each year, students and researchers of Jönköping University set up about 50 enterprises. Such support is not limited to current VET students, but often also extends to alumni and VET teachers and trainers.

The Brewhouse Incubator in Gothenburg, Sweden: providing informal as well as formal learning opportunities.

This incubator was established in 2004 and forms part of a range of business start-up and support activities coodinated at a regional level by Västra Götaland. It aims to make Western Sweden a creative, artistic and entrepreneurial hub. It contains innovative event and concert venues, and studio and office space in a renovated factory environment. It hosts around 60 companies in the creative industries, providing incubator activities/business support for start-ups, as well as award-winning talent development projects like the Brewhouse Big Band, a full-scale county band for young people aged 15-25, which has won several national awards. Brewhouse also participates in other associations and platforms which widen the learning opportunities available. These include CSR West Sweden, which is a platform for learning, collaboration and exchange of experience for sustainable development, as well as being a partner of West Pride, an association that enhances the lives of LGBTQ people through art and culture, and which has its office at Brewhouse.

Innovation centres and business incubators tend to be found at the level of individual CoVEs. An interesting issue relates to the extent to which CoVE networks support innovation and business incubation. Examples of how this can take place are shown below.

In **Belgium-Flanders**, the **Regional Technological Centres** work together with local SMEs in order to create local partnerships between SMEs and schools within their communities. Notably, the InnoVET-project aims to start from societal/technical challenges, which will be jointly tackled in a collaborative network of schools, SMEs and institutes for higher education, and which will inform all parties of the continuous need for rethinking their internal processes, external partnerships and methodological approaches. Recent projects include:
an electrical cart with loading device;

- the mobile solar panel tester: a new, simplified way of testing solar panels to reach optimum efficiency;
- easy charging green driving: an alternative windmill to supply green energy to E-bikes;
- the smart heat pump on earth heat: how technology can sensitise towards a sustainable attitude by linking intelligent heat pumps to heat baskets with sensors that indicate CO2-reduction;
- an earthquake-resistant climate station: an example of technology which will make us act pro-actively by anticipating to climate changes;
- the clear house number: a modular and low energy house number, which assists emergency services in tracking the correct address;
- the single house 2.0: a house designed for one person, with a focus on renewable energy.;
- the R-ISO roofdetector: a detector for earthing deficiencies with solar panels;
- the energetic electronic floor: transforming the movements of feet into sustainable electrical energy.

In **Switzerland**, the VET-landscape offers examples of particularly dense and well-established local/regional clusters of VET stakeholders cooperating. In the city of **Baden**, for example, there is a significant concentration of VET providers and VET schools, other renowned education institutions, large international companies, specialised SMEs, innovation centres and research centres. These stakeholders cooperate with each other through formalised cooperation agreements, the apprenticeship system or through non-formalised cooperation to support knowledge and technology transfer.

The institutions **Technopark Aargau** and **Hightech Zentrum Aargau,** for instance, share facilities in Brugg, close to Baden. Technopark Aargau is a public-private partnership hub promoting and supporting start-ups, mainly in the field of technology and research. Similarly, Hightech Zentrum Aargau was launched as part of the Hightech Aargau programme by the cantonal government, aiming to facilitate access to technology for SMEs. Both institutions maintain close cooperation with local businesses, universities and other VET providers. Such public-private cooperation networks create an innovative ecosystem for various high-tech sectors in the Baden area.

5.3 New knowledge creation and dissemination

Whilst collaboration with universities and business is common amongst CoVEs, it can be difficult to judge the extent to which this translates into – or is focused on – the creation and dissemination of new knowledge. In this context, several aspects of new knowledge creation and dissemination involving CoVEs warrant attention.

First, it is helpful to distinguish between new knowledge that might be created on an unplanned and/or ad hoc basis as an indirect benefit of general cooperation and systematic and planned activities, and the deliberate intention of new knowledge creation through 'knowledge triangles'. CoVEs vary in the extent to which new knowledge creation is ongoing and systematic, or more ad hoc in nature. General cooperation with universities is well illustrated by the example from Lithuania in the box below.

In **Lithuania, Vilnius Technological and Business Vocational Training Centre** manages sectoral practical training centres that offer various opportunities, including to universities and research centres. These include:

- **Execution of qualitative studies by integrating practical training opportunities.**
  According to the needs of higher education institutions, the Centre organises study visits, informal training programs and courses.
- **Utilisation of the infrastructure of sectoral practical training centres and equipment in practical training workshops and laboratories.**
  Teachers and their students are invited to hold seminars and workshops, and organise laboratory work on the premises of the training centre.
- **Student practice organisation and consultations during laboratory work.**
  Students from higher education institutions can conduct research and work in the premises of the sectoral centres. The training centre provides student supervision and counselling during student placements.

In contrast, some CoVEs have an 'in-house' capacity for knowledge creation. In the Basque Country, Spain, Tknika places innovation and applied research at the heart of its activities, and provides an excellent illustration of how applied research in VET can contribute to new knowledge creation.

In the **Basque Country, Spain**, applied innovation in the field of Vocational Education and Training (Technology) is one of the six areas of **Tknika**'s activity through which it seeks to contribute to regional strategies for innovation and smart specialisation. The objective is to reduce the time between technological innovation and the realisation of social benefits, and to research technologies to develop new market niches. With this end in mind, the Department of Applied Innovation is involved in a range of projects, for example the development of ways to use drones in VET, as well as the integration of 3D printing, scanning and reverse engineering technologies in the Basque VET system (Ikaslab). To focus on two projects in more detail, the Additive Manufacturing projects seek to develop additive manufacturing technologies and implement them through VET centres as one of the key aspects of advanced manufacturing in the Basque Country.

To achieve this, Tknika seeks to understand state of the art technologies and processes in additive manufacturing, achieve mastery of plasma manufacturing processes, become a reference point for vocational training centres and develop and expand the use of additive manufacturing amongst both VET centres and companies. Through the 'Internet of Machines' project, Tknika is seeking to identify the needs of vocational training teachers and to train them to meet the industry's new needs. Specific objectives include:

- analysing the protocols and architectures adopted by industry for smart factories, and proposing solutions for communication with cloud platforms;
- collaborating with networking and automation equipment manufacturers to stay abreast of innovations related to Industry 4.0;
- carrying out training so that FPeuskadi (Basque Country Vocational Education and Training) teachers can drive professional profiles adapted to the new manufacturing paradigm.

In CoVEs that are higher VET institutions or universities of applied science, knowledge creation is often an intrinsic activity. Such capacity can also come from partners within a CoVE. VIA in Denmark carries out applied research in cooperation with public and private partners in Denmark, and internationally in six research areas:

- Health and healthcare
- Pedagogy
- Teaching and learning
- Social studies and management
- Engineering, energy and environment
- Design, film and animation
- Business and entrepreneurship

The second aspect of knowledge creation and dissemination amongst CoVEs that should be highlighted is that it is often closely related to innovation hubs, technology diffusion centres and incubators. This brings CoVEs into collaboration with businesses and universities, with a focus on seeking new business processes and products in response to market demands and/or technological developments.

In the **Netherlands, 'Chemelot Innovation and Learning Labs' (CHILL)** is part of the 'Katapult' network, a community of 160 centres of cooperation between entrepreneurs, vocational schools, higher education institutions and government in various sectors. CHILL offers an innovative learning, work and research environment where companies (from start-ups to multinationals) and knowledge institutes (from intermediate vocational education institutes to universities) can work together to develop new knowledge and new products. The initiative concerns one of the top industries of the Netherlands, and is located in the Brightlands Chemelot Campus in Sittard-Geleen, known worldwide as one of the largest and most innovative chemical innovation sites in Europe. CHILL provides four lab and research facilities; a processing lab for materials and 3D printing, a materials characterisation lab, an analysis and synthesis lab and a lab for biology and molecular technology. They offer training programs and workshops, host a knowledge network ('Material Science') which focuses on linking innovation and learning on polymetric materials' applications in energy, construction and healthcare, as well as providing opportunities for companies for talent acquisition. At CHILL, students, teachers, researchers and industry professionals work closely together and contribute equally to solve real world commercial business questions. The CHILL instructors are creating new education materials deriving from this venture, which play an eminent role in adapting the vocational curriculum to the demands of the chemical industry of the future. CHILL delivers practically oriented results. CHILL students from the University of Applied Sciences and colleges, for example, have developed commercially viable tests involving DNA markers/receivers for chemotherapy and lung tumours.

Thirdly, with their focus on excellence in teaching and learning, it is common for CoVEs to be involved in activities to develop new knowledge in pedagogies, learning environments etc. as discussed in the chapter on teaching and learning. In Latvia, Riga Technical College has, since 2003, organised yearly international conferences on Higher Professional Education in Theory and Practice, and published scientific articles written by lecturers from Latvia and abroad, doctoral students and postgraduates.

Finally, EU funding, notably Erasmus+, is frequently cited by CoVEs in relation to knowledge creation and innovation. An example is the Erasmus+ RAY project already cited, in which Šolski center Nova Gorica participates. The main project results include an innovative work based learning/apprenticeship model and a VET teacher-in-company trainer partnership model, with clear definition on partners' and targets' roles, responsibilities and activities, which will be integrated into educational and working process at schools and in companies.

5.4 International cooperation

International cooperation is commonplace amongst CoVEs, and seen as an essential part of their activities, rather than a desirable add-on. This reflects the wider global perspectives of these centres, which see international activities as a means of widening the horizons of students and offering opportunities to engage with the latest thinking in relation to innovations in industry and also teaching and learning. Most international activity takes place in Europe, and involves the mobility of staff and students, and participation in European development projects. Concrete actions in respect of international campuses/academies (or joint degrees, as above) are rare (see the box below for an example).

In general, CoVEs are seeking to increase their international activities. South West College in the UK (Northern Ireland), for example, will 'over the next three years build capacity to create a body of work outside this region'. It is also becoming more common for CoVEs to look beyond Europe, as reflected in South West College, whose website announces that 'the college is currently creating partnerships in new and developing markets such as Brazil, Russia, The Gulf Region, China, Eurasia and India.'

Although international engagement is ubiquitous, CoVEs' level of engagement varies. In France, one of the objectives of the Campuses of Professions and Qualifications is to instil European and international 'openness' in trainees and develop their mobility. The development of cross-border practices and strategies for international student exchange is highly encouraged, and financing from Erasmus and Erasmus+ is suggested for use by campus members.

Interestingly, international activities do not appear to be one of the activities that is coordinated at a strategic level in national/regional networks. In the German dual system, however, there is a network of more than 40 mobility centres supporting 'borderless VET'. These are mainly located in chambers of industry and commerce and skilled craft chambers. Thanks to the network and some EU co-funding, mobility advisors (Mobilitätsberater) are available to advise and support companies, apprentices and young, skilled blue-collar workers in spending time working abroad. Together, they are working to build up a culture of mobility among German companies.

CoVE's typically have their own international plans and strategies. The box below depicts the range of these ambitions, from an individual provider in Poland with an action plan focussed on mobility (which is a typical illustration of the types of goals often pursued), to the ambitious plans of the Tknika research and development organisation in Spain. CoVEs are often involved in multiple EU-funded mobility activities and development projects, with an evolving stream of activity over many years, which means participation in multiple international networks.

Examples of the range of international activity in CoVEs

- **Poland:** The **Krosno Practical Training Centre** has started internationalisation of school institutions and adaptation of the didactic process to the needs of the international labour market. To this end, in 2014, the European School Development Plan (EPR) was developed, providing for international cooperation including education in the mechanical, mechatronic, automotive and aerospace industries. One of the main goals has been to enable students, graduates and staff to acquire knowledge and experience through cooperation with other countries (Austria, Spain, Portugal and Ireland, for example, as part of the Erasmus+ programme and the Operational Programme).
- **Spain, Basque Country:** One of the areas of **Tknika's** work is internationalisation, based on an internationalisation strategy. This, in turn, is based on support for Basque companies abroad, management of international projects (with a focus on mobility), collaboration on international projects and participation in international networks. Among other things, Tknika offers support to Basque companies abroad by carrying out training strategies oriented towards employees of those companies. The courses may be offered both in Tknika's vocational centres as well as in destination countries through the Vocational Education and Training International Basque Campus (VETIBAC).

Some CoVEs networks are themselves international rather than national/regional networks. Several of these have been identified in Italy (an example of which is given in the box below).

An example of an international CoVE network: the ENAIP NET consortium in Italy

The ENAIP NET consortium brings together the ENAIP centres of four Italian regions (Piemonte, Lombardia, Veneto, Friuli Venezia Giulia), as well as the national ENAIP social enterprise. The consortium represents 89 VET centres, more than 1,400 employees and more than 40,000 students each year. It aims to spread excellence throughout the network by jointly acting in international projects, and joining and actively participating in some of the most relevant European VET associations, such as EVTA, EfVET and EVBB.

EU project funding can enable CoVEs to replicate the types of partnerships they have in their own countries trans-nationally. The Erasmus+ RAY project already mentioned includes the following partners representing VET providers, companies, regional authorities and research bodies:

- Šolski center Nova Gorica (School centre Nova Gorica), Slovenia;
- MAHLE Electric Drives Slovenija d.o.o.;
- RRA SEVERNE PRIMORSKE Regijska ravojna agencija d.o.o. (Regional development agency), Slovenija;
- Center Republike Slovenije za poklicno izobraževanje (National Institute for VET), Slovenia;
- Satakunnan kouluskuntayhtymä, Sataedu, Finland;
- Prizztech Ltd, Finland;
- Tknika, Spain.

5.5 Participation in skills competitions

Participation in national and international **skills competitions is a useful tool for** increasing the attractiveness and excellence of VET, but it is by no means universally embraced amongst CoVEs. In Belgium-Flanders, for example, only some of the RTC are involved in competitions like the 'Flemish (Junior) STEM Olympiad' and 'Technics Tournament'. Meanwhile, some CoVEs wholeheartedly embrace competition participation, as the box below demonstrates.

Participation in skills competitions: the example of Subotica Tech-College of Applied Sciences, Serbia

In recent years, students have participated in a wide range of competitions, both at home and abroad, including:

- National Competition of Engineering Schools, Subotica, 2017;
- Start Up Weekend, Novi Sad, 2016;
- Best New Innovations, VTS Subotica, 2016;
- Student competition in programming, BIZKOD, VTS Subotica, 2016;
- Programming competition, 'Safety Code Hackathon', FON Belgrade, 2016;
- National finals, 'Imagine Cup', Belgrade, 2015;
- 'Engineer Run', Hungary, 2013;
- 'Imagine Cup', Sydney, Australia, 2012.

5.6 Conclusions

Making sure VET provision closely matches the needs of the labour market is an important driver for CoVEs, but the evidence included in this section suggests that excellence means going a step further than this, deepening exchanges with business and developing more synergistic relationships. In such circumstances, VET is not just 'more responsive' to business needs, but becomes an essential and proactive element of skills ecosystems.

The most rudimentary cooperation is the provision of placements for students by businesses, as in apprenticeships, but this blends into sharing equipment and expertise, which, in turn, blends into innovation and business incubation activities. We distinguish between these different types of activity, but in practice there are no 'hard borders' between them. Indeed, an individual CoVE is likely to contain elements of all three, with some sectors attracting the full range, whilst in other sectors the focus is on placement-type cooperation.

It must be stressed that all of these activities add value and can be sources of excellence. There are, however, various ways of increasing the added value. The exchange of equipment and expertise, for example, is likely to bring the greatest benefits when it is two-way, i.e. when VET is not simply the recipient of materials, equipment or staff time from businesses, but engages in a reciprocal relationship. Furthermore, innovation and business incubation have a different type of relationship to economic development, one that is arguably stronger, more proactive and more direct than VET provision that responds to business skills needs.

At the same time, these value added activities require greater commitment and resources. It is, perhaps, not surprising then that whilst business collaboration is commonplace and institutionalised in some VET systems (e.g. the dual system), it is less likely for CoVEs to be involved as innovation hubs or business incubators. It is less likely, still, that they will be involved in the creation and dissemination of new knowledge in partnership with other stakeholders, such as through joint research and development activities with universities, research and development units in companies, and research bodies.

Regarding new knowledge creation, whilst most CoVEs participate in this, they do so to highly varying degrees, and having in place a capacity for ongoing research, as in the case of universities, is less commonly found. An important question surrounds whether this matters, in terms of improving vocational excellence. The answer is that it might, insofar as it would be beneficial for CoVEs to have automatic access to high quality research facilities and/or access to opportunities to share expertise. This might be facilitated at European as well as national levels.

International cooperation is commonplace amongst CoVEs, and seen as an essential part of their activities, rather than a desirable add-on. CoVEs are often involved in multiple EU-funded mobility activities and development projects, with an evolving stream of activity over many years. This means participation in multiple international networks. In general, CoVEs are seeking to increase their international activities, and some CoVE networks are themselves international rather than national/regional networks. Whilst international engagement is ubiquitous, CoVEs' level of engagement varies. Interestingly, international activities do not appear to be one of the activities that is coordinated at a strategic level in national/regional networks. Again, this is an area where European support might help to add value.

Participation in national and international skills competitions is a useful tool for raising the attractiveness of and excellence in VET, but it is by no means universally embraced amongst CoVEs.

6.0 Governance and funding

There are a number of aspects to the governance and funding of CoVEs that warrant attention, including the policy context for CoVEs provided by wider strategies related to regional development, innovation and smart specialisation strategies, the role of partnerships in governance arrangements and the balance between public and private funding and the role of EU funding in CoVE activities.

6.1 CoVE policy context: relationship to regional development, innovation and smart specialisation strategies

There is some variation in the degree to which the examples are 'embedded' in strategies of regional development, innovation and smart specialisation. Sometimes the link is implicit, and strategies provide a wider context, whilst on other occasions the examples are explicit tools of the strategies, (examples of which are shown in the box below).

Example of CoVEs embedded in wider innovation and competitiveness policies

- **France, Campuses of Professions and Qualifications**: Set up by the French government in 2013 under the law of orientation and programming for the refoundation of the School of the Republic (*loi d'orientation et de programmation pour la refondation de l'École de la République*), the objective of the initiative is to set up networks of institutions who work together to train a labour pool required to implement France's national and regional social and economic strategies. The campuses' activity sectors are aligned with priorities charted out in these policies. Specifically, the campuses aim to be thematically aligned with the Competitiveness Clusters (*pôles de compétitivité*) policy of the French government, which is aimed at capacity building in innovation. The policy aims to do this by supporting the set-up of publicly subsidised groupings of enterprises, laboratories and training centres focused on specific themes, representing a sister initiative of the campuses.
- **Italy: ITS**'s are established as a wide joint effort with local and regional authorities, education and training institutions, and private enterprises, aimed at ensuring the adaptability of the education system so as to provide valuable knowledge and sound skills. The educational provision of the higher technical institutes answers the industry's need for new, high-level technical and technological skills to promote innovation processes. ITS's must be linked to the six technological areas that are considered strategic for the country's growth (sustainable mobility, energy efficiency, innovative technologies for cultural heritage and tourism, information and communication technologies, new life technologies, new technologies for 'Made in Italy' products) and are aligned to the regional smart specialisation areas. ITS outputs are tailored to the particular features of businesses within those six technological areas in their localities.

Perhaps understandably, CoVE networks tend to have more explicit relationships with wider strategies than individual providers, acting as CoVEs since they flow from government policy making. One way in which this connection manifests itself is in CoVEs being required to cover sectors specified in national and regional strategies.

Where systems allow for flexibility amongst CoVEs, as in the Netherlands' Katapult system, there can be variation in whether national sectoral or regional needs are addressed: in this case, some centres meet national sectoral needs, as illustrated elsewhere in this report, whilst others meet regional needs.

Example of how CoVEs in a national network can support regional needs

Many initiatives in the **Dutch Katapult network** involve cooperation with regional governments in pursuit of implementing regional strategies. Between 2013 and 2016, for example, three Dutch northern provinces and ten regional municipalities joined the Centre of Expertise Healthy Ageing. The provinces participate in several innovation workplaces to help set their future agenda. The transitions in health care and social services urge regional governments and municipalities to adapt their policies within the context of current and future innovations. From the viewpoint of preventive medicine, regions also play a role in sports and culture to promote Healthy Ageing.

Individual providers acting as CoVEs rely on their own initiative, and that of other stakeholders in their locality or region. Whilst they tend to ensure that their activities are coherent with wider strategies, they are not necessarily explicit tools of those strategies as a whole. It is also possible, however, that they implement programmes funded through wider strategies, and hence are closely linked to them in this way. The 'InnovateUs' programme, for example, as well as South West College's participation in it, are directly referred to in Northern Ireland's Innovation Strategy 2014-2025.

Individual providers, as well as CoVE networks, including the network of ITSs in Italy and the Centres de Compétences in Belgium-Wallonia, may also be part-funded by European programmes such as the ESF, which links them into wider strategic frameworks (in this case, the ESF Operational Programmes).

In dual system countries, the general view appears to be that stakeholders would not be able fully to achieve their goals in terms of VET excellence without having regard for wider strategies.

In some countries, regional development and smart specialisation strategies are still to be implemented, though there may be other strategies that provide a context. In the Republic of North Macedonia, for example, there are not yet any regional development and smart specialisation strategies, but there is a national ICT strategy. In Bulgaria, national networks are being established which provide a context for CoVEs (see box below). In the UK, regional development agencies and their associated policies were abolished in 2010, with their responsibilities being devolved to Local Economic Partnerships, which are 'voluntary' entities bringing together various combinations of stakeholders and complicating an already complex and variable picture with respect to vocational excellence[8].

Supporting excellence through national networks in IT and e-mobility in Bulgaria

There are 5 centres in Bulgaria that are part of a newly established national programme, 'Training for IT careers'. The centres provide software training for students in the last three years of their upper secondary education (X-XII grade) to acquire a full VET qualification within three school years, instead of five. The state educational standard of the profession, 'applied programming', the development of the curriculum and the training of students and teachers have been developed and are conducted cooperatively in local networks of IT sector companies, VET schools and higher education institutions. The network is financed through the national budget. A similar network/cluster has also been developed in the sector of e-mobility - the Electric Vehicles Industrial Cluster (EVIC)[9] - which has signed a Memorandum of understanding with the Ministry of Education and Science. For the time being, efforts are focused on developing the capacity of each network, as well as the school, in particular, as a training institution, not only for its students. Developing additional partnerships can upgrade the functions of the school/network.

[8] It is worth noting that the UK example comes from Northern Ireland, which has different policy and governance frameworks to the rest of the UK, including having a Department for Regional Development.

[9] **http://www.emic-bg.org**

Vocational excellence can also be linked to regional development through stand-alone project initiatives launched by CoVEs. The Estonian VET provider Tallinn Polytechnic, for example, participated in the 'ICT Security in Vocational Education' (ITSVET) project as a partner, realised in cooperation with other public and private VET providers, ICT employers in the region and a number of vocational education regulatory bodies across Europe. The project aimed to map ICT security skills currently needed by employers, and worked closely with relevant employers to map regional needs.

It is worth remarking that the coordination of CoVEs with wider strategies will rely, to some extent, on the situation regarding inter-ministerial cooperation, as well as cooperation across the different geographical levels of government (national, regional and local), although this was not researched as part of the mapping. VET, regional development, innovation and smart specialisation sit in different policy domains with their own policy communities, and the degree of inter-ministerial cooperation varies considerably. In some situations, it may not be easy to achieve coordination and coherence across policy domains and governmental levels.

A related issue under the topic of CoVEs' relationship to wider policies concerns their degree of engagement with overall national skills governance systems. This was not probed as part of the mapping exercise, but is worth commenting on; first, skills governance systems are still in development in many countries[10]. Secondly, many CoVEs reference their ability to respond to skills needs on account of their close relationship with individual businesses or clusters of businesses. Finally, we did not encounter many references to such systems, an important exception being the 'Competence Platform' of the Västra Götaland Region in Sweden, reported on at the start of the chapter on teaching and learning. This stands out for, among other things, its ability to bring together actors on both the labour supply and demand sides, acting as a 'neutral broker'.

6.2 Governance: partnerships and leadership

Partnerships between the public and private sectors in some form, and to some degree, are typical of CoVEs, and such partnerships frequently lead CoVEs[11]. There are a large variety of different types of partnership, although it is useful to distinguish between two models.

Firstly, CoVEs may comprise partnerships formed explicitly to act as centres of excellence. This is common in CoVE networks, as the examples below show

In **Belgium–Wallonia,** each **competence centre** in the network is a VET provider with its own facilities. The network is coordinated by the public employment service for Wallonia (Forem), but the constituent centres are public-private partnerships focusing on particular sectors.

In the **Netherlands, Katapult** is a community of 160 centres of cooperation between entrepreneurs, vocational schools, higher education institutions and government in various sectors. In total, over 50,000 students, 6,000 companies and 4,000 teachers participate in this network, which aims to improve cooperation between the government and private sector to keep up with innovation and continuously changing job requirements. The initiative goes beyond 'traditional' high quality VET through the important role of 'knowledge triangle', defined as a combination of research and development, VET and business/industry.

In **Italy,** the **Higher Technical Institutes (it. Istituti Tecnici Superiori - ITS)** are mixed public-private foundations comprising local authorities, schools, training institutions, relevant enterprises, universities and research bodies.

[10] http://www.cedefop.europa.eu/en/events-and-projects/events/skills-anticipation-methods-and-practices

[11] It is quite typical for VET providers to have multi-stakeholder governing boards but this level and type of engagement of stakeholders is different to that envisaged for CoVEs, though it should not be overlooked.

The second model is for single providers to act as lead organisations with a variety of partnerships to deal with specific sectors or issues. In effect, these single providers act as 'hubs' or 'umbrellas' for a package of activities, which may cover a variety of sectors, and support for which might come from time-limited projects which may change. This type of model can be found in CoVE networks (as in the examples from France and Croatia, shown in the box below) but is most common where there are not established national or regional CoVE systems. Dual system countries also fit into this model, broadly speaking, whilst acknowledging that individual Chambers are part of a national system of Chambers pursuing vocational excellence in similar ways.

In **France,** the **campuses of occupations and qualifications** comprise a wide range of partners, including local and regional authorities, schools, continuing education institutions and apprenticeship training centres, universities, research laboratories, companies and professional organisations, including the social partners, and trade unions. Each campus has a lead organisation, which is frequently a school.

In **Croatia,** 25 **regional centres of competence** are being established to build partnerships focused on specific issues/goals/sectors. Schools selected as regional centres are expected to become leaders in vocational education in their respective areas. Each centre is expected to form a network.

Omnia, in **Finland,** is a not-for-profit organisation owned by three municipalities. Its modus operandi is, in part, to act as an umbrella for a number of projects or centres such as the InnoOmnia Hub and Omnia AI Lab. It also participates in or coordinates the following international networks in the education sector, such as:

- ChiNet, an educational network between Finland and China;
- the European Pathway network;
- the KEVA network, which consists of 14 vocational education providers;
- the HANAKO Finland-Japan network for vocational education;
- the India Network for vocational education and training in Finland;
- the Window to Russia network;
- the Korea TechNet network, focusing on developing cooperation in the technical field of vocational education and training in Finland and Korea.

South West College (SWC) in **Northern Ireland (UK)** operates in partnership with a large number of stakeholders:

- higher education institutions, Queen's University Belfast and Ulster University (with whom South West College offers Higher Education courses);
- the Northern Ireland government (SWC implements some of the government funded programmes);
- local authorities Mid Ulster and Cookstown District Councils (the South West College was commissioned by the former to deliver specialist one-to-one innovation support to local businesses);
- local companies (apprenticeships, training and mentoring support for companies etc.);
- InterTradeIreland (with which SWC implements the FUSION programme);
- other colleges and universities in Northern Ireland, Southern Ireland and Europe (from which Innotech welcomes students for work placements)

Some individual providers have national or regional responsibilities and participate in partnerships at regional, national and European levels. An excellent example of this is shown in the box below.

In **Slovenia, Nova Gorica School Centre (Šolski center Nova Gorica/ŠCNG)** is a very active member in partnerships at three levels.

At regional level, it is one of the crucial actors in the partnership for regional development. For this purpose, it connects a network of around 450 employers, including the employment service, chamber of commerce, chamber of crafts, regional development agency and technological park, 7 regional municipalities, the trade union for the welding working force, the University of Nova Gorica, and various clubs.

At national level, ŠCNG is one of the main actors in the Consortium of Slovenian school centres, which consists of the seven biggest Slovenian VET centres. It also connects very successfully with the Consortium of biotechnical schools and Consortium of services in Slovenia. For 11 years they have collaborated in large ESF projects dealing with modernisation and innovation in VET, connecting VET providers with employers, continuous professional training for teachers, and lifelong learning.

At the international level, ŠCNG is a representative of the Consortium of Slovenian school centres in the board of EUproVET, the European association of VET providers. ŠCNG has a large network of European educational institutions and companies, which has been spreading since 1999 when it started participating in EU funded projects.

Sometimes a regional authority may be in the lead in stimulating and coordinating activities for vocational excellence, as in the cases of Tknika in the Basque Country in Spain and Region Västra Götaland, in Sweden (discussed in section 2.1.1).

Since partnerships are a dominant mode of governance, a question that arises is where CoVEs sit in relation to national VET systems. Related to this topic is whether CoVEs are VET providers in their own right.

CoVEs sit in different positions with respect to national VET systems. In some cases, we might describe CoVEs as being 'additions' to the main VET system, providing an alternative modus operandi to meeting labour market needs by bringing partners together to form, in effect, 'new' VET providers. This is the case in Belgium-Wallonia where each competence centre in the network is a VET provider with its own facilities. The network is coordinated by the public employment service for Wallonia (Forem), but the constituent centres are public-private partnerships focusing on particular sectors. In Belgium-Flanders, the Regional Technological Centres are not formal VET-training providers in their own right, but through these partnerships, they are a key partner in making a broad and innovative training menu, accessible to both pupils and teachers.

Where CoVEs are based on individual providers, they are, by definition, part and parcel of local VET provision; although individual activities, innovation centres etc. enable them to reach out to other stakeholders to draw in additional resources. Some countries and regions (partly because of their small size) have individual organisations that operate as the main VET providers and also as the examples of centres of vocational excellence. Organisations such as the Malta College of Arts, Science and Technology, whilst having multiple stakeholders involved in their governance, form partnerships with other stakeholders to undertake developmental and innovation projects with specific funding, often EU. In dual system countries, CoVE-type activities are an integral part of the system.

CoVE networks may also use mixed models, as in Poland, where the Practical Training Centres are part of the school system, although 49 out of 167 operate independently and five are non-public PTCs.

This 'positioning' of CoVEs in relation to VET systems can also affect their funding. Funding is discussed in the next section, but at this point it is worth noting the case of Italy, where the ITS's are funded through the Operational Programmes of the ESF, owing to the fact that they sit adjacent to the main school system and its funding streams.

6.3 Funding

6.3.1 Public and private funding

From available evidence, the public sector is observed to be the most important provider of funds, with the private sector contributing additional, but important, further funding. This distribution is partially explained by the high number of state-owned vocational schools among the CoVEs overall. The Riga Technical College (RTC) and the Oslo Metropolitan University (OsloMet), for instance, are state universities fully financed from public funds.

Despite the core funding deriving from the public sector, a majority of CoVEs can still be seen to benefit from a mix of public-private financing. Bulgaria's Technology school 'Electronic Systems' are public schools with an additional share of funds derived from private sector co-funding. In line with these mixed funding structures, in Belgium, the Flemish Department of Education and Training also finances the Regional Technological Centres (Regionale Technologische Centra) on a structural basis, via a Government decree and a management agreement. Here, the RTCs are legally bound to increase their core public funds by co-funding from companies and other sectoral funds. Similarly, Iceland's Technical College Reykjavik is a private school, with the Ministry of Education providing a majority of funds through a service agreement. On a larger scale, in Sweden, the state is responsible for financing the bulk of Higher Vocational Education as a whole through state grants and study financing. Within this funding framework, the private sector is estimated to contribute about one third of overall funding through the contribution of work-based learning, participation as lecturers and through the donation of machines and other resources.

In some cases, the private sector also has a primary role in the contribution of funds. In Germany, for instance, the Vocational Educational Centres (Bildungszentren) are jointly run by the German Chambers of Industry and Commerce, Agriculture and Crafts. Here, the companies contribute to financing the centres through the membership contributions they pay to the chambers, with regional authorities only providing supplementary funding. Along the same lines, the Austrian apprenticeships initiative 'Lehrlingsstellen' at the Austrian Economic Chambers is primarily funded from members' contributions.

The Turkish Union of Chambers and Commodity Exchanges (TOBB) is in the process of entering a public-private sector joint management model, in which it will coordinate 81 vocational high schools across all provinces in Turkey, as part of a protocol signed with the Turkish Education Ministry. As such, work-placements for students will be arranged through the associate companies of TOBB. A 'Protocol Implementation Board' is further foreseen, which will guide the school administrations and the curriculum, based on the needs of the relevant industries. The idea behind the new vocational education model is to better link vocational training with developments in the labour market and to increase financial and expert support from the private sector.

Most private funding appears to come from companies donating equipment and buying, training or paying for training centres or innovation hubs/business incubators to be set up. Funding is typically related to co-financing of specific projects or ad hoc donations as opposed to structural, long-term contributions. Bulgaria's Technology school, for example, cooperates on a needs-basis with companies that provide the school with high-tech equipment and technologies. Within this context, SAP Labs Bulgaria recently equipped a computer class with personal computers and provided Lego robots for robotics education for the school. In the same way, Belgium's Regional Technological Centres often contact sectoral partners to co-invest in projects tailored to the needs of the schools, as well as to the demands of the labour market. The cooperation with the sector often leads to co-investment in the projects by private enterprises within that sector, both financial (e.g. buying training) and in-kind (e.g. by investing expertise or equipment).

Some CoVEs have also ensured the attraction of foreign investment, for example through the purchasing of training and learner study visits. Here, the Slovenian Nova Gorica School Centre has signed a memorandum of understanding with the German supplier to the automotive industry, 'MAHLE'. The areas of cooperation involve education and training of MAHLE employees in the fields of internal combustion, mechatronics and electronic systems for heat ventilation and air conditioning, e-mobility, ICT programming, and circular economy.

6.3.2 European Union funding

Beyond domestic means of funding CoVEs, there is a widespread use of EU funds. This ranges from the use of Erasmus+, through to the use of ESF, ERDF and Interreg. More often than not, this funding is used to supplement core funds, or to support one-off investments. In a few cases, however, as in the Italian ITS and Belgium-Wallonia networks, European funding plays a central role, primarily through the Erasmus+ and ESF operational programmes.

In the Republic of North Macedonia, for example, the Community Development Institute Tetovo funds its activities primarily through Erasmus+ financed projects and various other international and national development agencies and foundations (more than 20 in total spread over several years). By the same token, the Riga Technical College has signed a cooperation agreement with the State Employment Agency for training financed entirely by the ESF. Overall, the use of ESF funding ranges from the implementation of environmental friendly policies and occupational safety, to training targeted at specific groups.

Among the EU funds, Erasmus+ appears to be the most commonly used for project-based support, underpinning the importance of transnational mobility in VET. Spain's CIFP Santiago Polytechnic, for example, takes part in a range of Erasmus+ KA1 projects for the mobility of both students and teachers in Intermediate and Higher VET. Moreover, through its involvement in Erasmus+ projects, ISQ in Portugal promotes innovative teaching and training methodologies. OsloMet also participates in dozens of EU-funded projects, mainly financed by Horizon and Erasmus+. Although slightly less frequently engaged, ERDF has also proven crucial in funding CoVE infrastructure. Riga Technical College, for instance, has used ERDF financing to modernise, acquire and equip new training laboratories.

Erasmus+ example

Through its involvement in Erasmus+ projects, ISQ in Portugal promotes innovative teaching and training methodologies, such as:

- an online learning platform that will host competence and confidence building open education resources introducing women to the world of coding ('LIFT: Ladies Code Their Future' project);
- ICT-based training course with open educational resources and integrating modern digital solutions into the VET process (EMVOI project);
- an innovative Training Pack (Myself&Europe project) for promoting an active European citizenship for disadvantaged youngsters with diverse backgrounds (curriculum, innovative toolbox for trainers and teachers; innovative toolbox for youngsters);
- LINK-Inc Handbook on new approaches and innovative methodologies for trainers and mentors to address cultural and ethnic diversity in VET, in order to foster equity and inclusion in work-based learning.

ESF example:

- Between 2009 and 2014, MCAST in Malta, together with the Fraunhofer Institute in Germany, implemented an ESF-supported project entitled 'Professional Development Programmes for MCAST Staff & Students' Top-Up Degrees', aimed at the setting up of higher level VET programmes across MCAST, as well as VET programmes for teachers and university professors.

ERDF example:

- In Latvia, ERDF financing has been used to acquire, modernise and equip new training laboratories. Alongside more traditional items, such as ventilation equipment, efficient lighting and sound systems, ERDF funding was also used to acquire 'modern technical equipment for qualified car service specialist training'.

Table 6.1 An overview of EU funds used to support CoVES and their purposes

Erasmus+	ESF	ERDF	INTERREG	Other EU funding
Portugal - ISQ: funds innovative teaching and training methodologies (online learning platform, ICT-based training course, LINK-INCH Handbook).	**Italy** - ITS RED Academy: co-founded one of the courses offered.	**Belgium** - Competence Centres: ad-hoc funding of Technifutur for acquisition of new infrastructure, personnel and organisation, etc.	**Belgium** -Competence Centres: ad-hoc project funding of Technifutur.	**Norway** - Oslomet: Active in 16 different projects funded by Horizon 2020. Two researchers have also received funding to stay in the UK through Horizon 2020.
Iceland - Technical College Reykjavik: funded opportunities for students to take part of their studies and/or internships abroad.	**Malta** - MCAST: co-funded scheme setting up of higher-level VET programmes across MCAST.	**Poland** - Practical Training Centre in Krosno: funded modernisation of building and laboratory equipment.	**Norway** - OsloMet: receives funding for cross-border cooperation through Interreg IV A.	**Bulgaria** - TUES: three-year KNORK project funded by Lifelong Learning Program.
Belgium - Competence Centres: Technifutur partakes in the 'European Trainer's Training for Excellence' project, allowing training centres to visit one another and share good practices.	**Germany** - Vocational Educational Centres: funded project aiming to support companies in implementing environmentally friendly policies and occupational safety.	**Lithuania** - Vilnius Technological and Business Vocational Training Centre: co-funded equipment for two practical training centres (for energy and engineering).	**Slovenia** - NGSC: receives funding through Interreg V-A to foster cross-border cooperation.	**Republic of North Macedonia** - CDI:
Norway - OsloMet: as an Erasmus+ Partner University, it participates in several Erasmus+ funded projects, as well as funded internships and studies abroad.				
Republic of North Macedonia - CDI: funded a number of capacity-building projects in the field of higher education supporting the modernisation, accessibility and internationalisation of higher education at CDI.	**Belgium** - Competence Centres: funds provide courses for specific target groups e.g. unemployed, youth, economically inactive.	**Belgium** - Competence Centres: funds provision of co-funded MIC-Goriška regija project to build a new learning facility (5,500 square meters).		
Spain - CIFP Santiago Polytechnic: the centre takes part in different Erasmus + KA1 projects for the mobility of both students and teachers in Intermediate and Higher VET.	**Bulgaria** - TUES: took part in the project 'Student Internship'. Co-funded with Human Resources Development Operating Program			
Republic of North Macedonia - CDI: funded a number of capacity-building projects in the field of higher education supporting the modernisation, accessibility and internationalisation of higher education at CDI.	**Romania** - Ion Ghica Economic College: 6 projects funded through ESF - POSDRU (initial and continuing vocational training).			
Romania - Ştefan Odobleja College: funded several projects for the college, the latest being a practical training in Mechanics and Computer Aided Design for a group of 25 students in Cyprus, for a period of three weeks.				
Romania - SPGK: funded a 2017 study visit for the school to collaborate with other similar institutions in EU countries and disseminate best practices in the field of quality assurance of WBL and ML.				

6.4 Conclusions

An important finding from the mapping is the extent to which CoVEs vary in their 'embeddedness' in policies for regional development, innovation and smart specialisation. Embeddedness in national/regional policy is likely to have advantages and disadvantages. CoVEs need to balance meeting national needs and, at the same, time being flexible to local needs. In some countries, CoVEs need to cover national sectoral priorities. Whilst this ensures national coverage of sectors, it might arguably come at the expense of meeting sub-regional priorities, and, in any case, there might be variability in level of activity and 'performance' within national systems. On the other hand, where there are no national or regional CoVE networks, and wider strategies provide a backdrop to CoVE activity, there is a risk of a very patchy landscape in relation to meeting sectoral needs when viewed across a country as a whole.

As noted in chapter two, there is a relative neglect of social topics amongst CoVEs, and this might be partly due to CoVEs being linked to strategies focused on economic priorities. It is these policies that do not always reflect social needs sufficiently, which is probably a result of such policies being part of economic/employment domains rather than social policy domains.

Another important finding is the extent to which partnerships form a central component of CoVE governance. Indeed, partnerships perform a vital function for CoVEs. They ensure there is shared ownership of goals and activities, and a common commitment to achieving them, by pooling and sharing resources. Indeed, CoVEs are often not only led by partnerships, but form different partnerships for different purposes/activities, which can lead to quite complex landscapes of excellence.

An important question that arises from this is the extent to which there is sharing within and across CoVEs. CoVE networks are coordinated to varying degrees and, related to this, sharing takes place across the networks in different ways and to varying extents. Sharing is clearly a benefit of CoVE networks that is probably not available to individual providers acting as CoVEs.

In relation to funding, it is evident that, in general, core public funding for CoVEs is supplemented with project funding and contributions from companies, either through the provision of staff and equipment and other infrastructure (in cash or 'in kind') or by paying for services. Furthermore, it is clear that CoVE networks are funded over and above 'mainstream' VET provision to provide additional facilities and staffing. Evidently, such additional capacity is not available to individual providers functioning as CoVEs where there are no national or regionally supported networks. Individual organisations functioning as CoVEs have to build their own networks.

European funding plays an important role. It does not merely supplement funds (or in some cases support core funding), but plays an important role in relation to supporting innovation in VET.

7.0 Development of CoVEs

In this section, we draw together the findings presented above to provide insights into the factors behind CoVE success, and the strengths and weaknesses of different types of CoVEs. We also use the evidence to build a model of how CoVEs might mature and develop from basic types of CoVE into more advanced types. It should be noted that evidence on causal factors could not be gathered directly, given the scope and timescale of the mapping, and so the analysis is based on extrapolation and conjecture from the evidence using wider experience of VET.

7.1 Key success factors

From available evidence, we can say that the key to a CoVE's success includes:

- **Strong and enduring relationships** between stakeholders - VET providers (including VET at tertiary level), higher education institutions, and businesses, in which interactions are reciprocal and mutually beneficial (rather than 'one-way traffic')
- **Being firmly anchored into the frameworks of regional development, innovation and smart specialisation**. Such anchoring allows for the identification of synergies between policies and amongst stakeholders, avoiding ad hoc actions, which, though beneficial, in themselves probably do not realise all the potential benefits.
- **Integration of activities**. There is great potential in CoVEs to achieve more than sum of their parts, in particular, where CoVEs build reflexive relationships between activities and research.

7.2 Strengths and weaknesses of different types of CoVEs

In section 2, two main types of CoVE were identified. CoVEs are 'purpose built' entities as part of a national or regional structure, comprising multiple CoVE's and individual organisations functioning as CoVE's for a region (or sub-region) or sector. Against a number of criteria, there are some significant differences between these two types, and these provide an opportunity to assess their relative strengths and weaknesses, as shown in the table below. This analysis suggests that CoVEs that are purpose built entities may offer more advantages than individual organisations functioning as CoVEs, whilst recognising that excellence may be found amongst both types of CoVE.

Table 7.1 Strengths and weaknesses of different types of CoVEs

	CoVE's as "purpose built" entities, as part of a national or regional structure comprising multiple CoVE's	Individual organisations functioning as CoVE's for a region (or sub-region) or sector
Relationship to regional development, innovation and smart specialisation strategies	+ CoVEs likely to be closely linked to regional development, innovation and smart specialisation strategies, leading to coherence across CoVEs in terms of being aimed at common priorities and, perhaps, a common set of sectors. − Sub-regional priorities and social issues might not be prioritised if these are not included in regional strategies (which tend to focus on economic priorities).	+ Able to meet local and regional sectoral needs, in addition to national priorities. + Potential for social issues to be more to the forefront. − Individual providers likely to have a more variable relationship to wider policies.
Skills anticipation	+ Strong potential to link systematically into skill anticipation systems. + Local enough to fine tune provision within the parameters of national/regional policy.	+ Skill anticipation mechanisms likely to be based on local as well as national knowledge. − Individual providers likely to have a more variable relationship to skill anticipation systems.
Coverage	+ Ensures national coverage of sectors. − There may be variability between CoVEs in level of activity and 'performance'.	− Across a country, the picture of excellence is likely to be patchy, with gaps in availability of CoVEs from place to place.
Networking	+ Networking and sharing opportunities come 'ready made', often facilitated by the network.	− CoVEs have to build own networks and platform for sharing (though national governments and/or regional authorities may provide support for this).
Resourcing	+ Network may have core funding, providing an extra tier of capacity.	− Greater reliance on the initiative of individual providers to source funds; do not have the support of wider network. − Where there are small providers, capacity for higher cost CoVE-type activities may be limited, e.g. innovation hubs, business incubators, unless state provides support.

7.3 Maturity model

The evidence provided in this report provides a basis for elaborating a model to show how CoVEs might advance from the stage of 'setting up foundations' to 'achieving excellence'. On this basis, the most 'advanced' CoVEs are not only contributing to regional development and smart specialisation strategies, and acting as drivers of innovation in local ecosystems, but are also making an active contribution to the generation of new knowledge. Centres may also be regarded as CoVEs, however, if they support economic and social development and specialisation by ensuring provision is responsive to labour market needs, i.e. 'doing the same better'. This approach may also help to define the CoVEs concept to be as wide and inclusive as possible, so as to encourage participation in the forthcoming platforms. Ensuring activities are high quality is a horizontal issue that runs through all three stages of the model. This model would also provide the Commission with a basis for deciding which level of excellence might be supported through funding. We might summarise the stages in the development model as shown below.

Table 7.2 Maturity model for CoVE development

	Setting up foundations Improving on what VET normally does, with close linkages to the labour market	**Developing added value** Engaged with regional strategic development and collaborating with a wide range of stakeholders	**Achieving excellence** Co-creating local skills ecosystems, and local innovation and regional development. Strong VET internationalisation dimension. **The "self-reflexive CoVE"**
Teaching and learning	Curricula and programmes closely attuned to needs of the labour market. CVET offered alongside IVET based on lifelong learning principles. Improving VET quality through innovative pedagogies. Pathways to higher level VET only occasionally available. CPD of teachers and trainers encouraged. Being aware of education and VET related international, European and national quality standards, and self-assessing internal practices towards them.	Playing active role in skill anticipation mechanisms to ensure close match of VET to labour market needs. Increasing integration of IVET and CVET on lifelong learning principles. Adopting more systematic approaches to innovating in teaching and learning. Pathways to higher level VET being systematically developed. Innovations in teaching and learning being linked into CPD. Implementing a quality management system and seeking third party accredited certification to validate it.	Engaged in a synergistic relationship with skill anticipation mechanisms. Lifelong learning centres integrate provision; little or no distinction between IVET and CVET. Not only innovating but conducting research, or engaging with others, in conducting research into effective teaching and learning methodologies. Innovation includes trans-national joint curricula. Pathways to higher level VET an intrinsic part of the offer. Feedback mechanisms established between CPD practice and research. Guidance and validation services form an integral part of the VET offer to all students. Integrating different management systems (e.g. quality, innovation, social responsibility, environment, health and safety, etc.) and seeking third party accredited certification to validate their implementation.
Cooperation and partnerships	Placements in companies, some provision of equipment and expertise by companies. New knowledge created on an ad hoc basis or as a by-product of other activities and fed back into practice. Participating in international projects, mainly focused on mobility.	Two-way, reciprocal relationship with businesses in sharing equipment and expertise. Participating in innovation hubs, technology diffusion centres, business incubators. Creating and disseminating knowledge through (EU and nationally funded) projects. Participating in international projects, focused on mobility and innovation.	Playing leading role in innovation hubs, technology diffusion centres, business incubators; VET learners have automatic opportunity to engage in business incubation activities. New knowledge creation linked to organised research programmes/centres. International activities include international campuses/academies; being a key player in foreign investment projects.
Governance and financing	Many ad hoc partnerships focused on time-limited projects. Ad hoc resource contributions from private sector. Use of funding to implement short term projects to address specific problems.	Member of numerous regional and national networks. Developing sources of funding in private sector. Use of funding to implement a quality management system to assure, control and ensure continuous improvement of the VET services provided.	Coherent and well-coordinated approach to partnerships. Sustainable funding models involving strong and reliable contributions from private sector. Use of funding to integrate different management systems (e.g. quality, innovation, social responsibility, environment, health and safety, etc.) to assure excellence and sustainability of the VET services provided.

8.0 Conclusions

In this final chapter, we turn attention to a set of broader questions, addressing them based on the evidence presented.

8.1 Understanding vocational excellence

The mapping exercise enables the formulation of a deeper understanding of vocational excellence that takes into account (a) how it is currently understood across Europe, where there are different approaches to VET and where VET sits in different contexts and (b) the ambitions expressed by Member States through the Copenhagen process and other strategic documents, such as ET 2020, to improve the quality and excellence of VET provision.

On this basis, vocational excellence involves going beyond what VET would normally be expected to do. Vocational excellence means going beyond provision that is well tuned to the needs to the labour market, and which meets the needs of citizens for professional career pathways through lifelong learning. It means having in place strategic and systematic plans and processes for engaging with local and regional agendas for sustainability and social and economic development. It means moving from a position of passive responsiveness to the needs of stakeholders, to being a proactive player in skills anticipation and the formulation and implementation of regional development and innovation strategies. The dominant modus operandi is two-way reciprocal exchanges with stakeholders, based on partnerships and sustainable funding models involving strong and reliable stakeholder contributions. Participation in innovation hubs, technology diffusion centres and business incubators is part of everyday practice. Developing innovative solutions to social, economic and environmental issues is the norm, and there are feedback loops in place so that VET providers continually learn, innovate and adjust their provision through research into the most appropriate teaching and learning methods, leading to the creation of new knowledge. Distinctions between IVET and CVET disappear, whilst pathways to higher levels of education and training are widely available and easy to access. There is a systematic approach to internationalisation of provision.

8.2 VET as a key player in regional development

There are a number of features of VET which make (or could make) it well positioned to contribute to regional development processes. First, VET has close and practical linkages to businesses. These links give it the potential to apply innovations and knowledge to economic and social issues in practical ways. VET also has links to all sectors of industry, traditional as well as hi-tech or highly innovative ones, and this means VET has potential to help fill gaps in regional development, innovation and smart specialisation strategies which tend to focus on technology or innovation-driven sectors. Finally, VET develops skills at all levels. Traditionally, it has been focused in most countries on skills at low and intermediate levels, and these are frequently overlooked in knowledge triangles even though they have a vital role to play in supporting innovation in the wider economy. Furthermore, VET at higher levels is on the increase across Europe, and its combination of practical training and theoretical knowledge means it is well positioned to complement the orientation of much higher education.

8.3 Applying the CoVE concept to societal challenges

The mapping has clearly highlighted the focus of CoVEs on economic, rather than social challenges. VET is well placed to correct this imbalance. In many countries, the 'traditional' client group of VET comes from those people who have not succeeded in general academic education, which gives it a unique position to address social topics and to enable industry to tap in to a previously under-utilised resource. Widening access and opening up pathways to higher VET are already on the VET agenda.

The mapping has also identified examples where attention has been directed not at the development of new business products or processes (where companies' profit motive naturally plays a part), but on the application of new technologies and processes to social issues such as ageing (where the profit motive may be weaker). The incentive to undertake such activities probably needs to come from the public sector, by seeking ways of both identifying the most important social topics to address and finding appropriate funding. Many of the biggest social issues are pan-European (e.g. migration, early school leaving) and this suggests that EU intervention could add value.

8.4 How the EU can support CoVE development

The mapping has highlighted that there are clearly weaker and stronger countries when it comes not just to the development of activities, but to the development of coherent packages of activities and overall approaches to vocational excellence that ensure the strong integration of activities. It is such integration, and the presence of feedback between practice and research, that separate the more advanced CoVEs from the rest. The mapping has also shone a light on the gaps that exist. These gaps are social and sectoral, as just mentioned, but also include the international/European dimension of most centres, where there is typically scope to build up activities. An important question is, in what way can EU level support (policy and funding) and coordination add value to what is already being done – including what a platform could do and what value would it add?

On the basis of the foregoing, there are two main areas where EU level support and coordination could add value.

(i) Enabling upward convergence

Many centres would benefit from support to reach beyond the core aspects of their work and move up the value chain of VET excellence. CoVEs are at various positions on the maturity model described in Table 7.2. To make progress, VET providers need appropriate support to integrate higher added value activities, such as innovation hubs and business incubators, and the creation of new knowledge into their existing provision, such as through the exchange of good practices at European level.

There is also a need to stimulate a European-wide improvement of VET provision and contribution to local development. This could be done by bringing together partners at different stages of VET excellence development. An EU-funded European hub could play an important role in such processes. Furthermore, a self-assessment tool based on the maturity model would enable VET providers to plot their position on the different elements of excellence and to access relevant support materials, such as good practice examples or peer learning activities.

(ii) Building capacity to address European priorities and fill gaps

Regional and national CoVE networks add a level of capacity to enable the pursuit of VET excellence tied to regional and national priorities. A valuable tier of capacity could be added at European level to address three needs that have been identified through the mapping exercise.

First, linkages between CoVEs at European level currently depend on European project funding, leading to a pattern of involvement that varies across sectors and countries and which, naturally, does not systematically address European sectoral needs. Europe has a number of needs in relation to the development of sectors to enable it to be competitive in global markets. It would add value to harness vocational excellence at European level in pursuit of these goals. European platforms of CoVEs could be linked, for example, to sectoral blueprints and sector skills alliances, with a view to developing innovative methodologies for teaching and learning.

Secondly, CoVEs currently tend to focus on economic rather than social issues. European platforms could be set up with a focus on social issues of concern at European level, e.g. migration and early school leaving. This would support the development and propagation of new ways of addressing these topics in VET, as well as raising the profile of the topics.

Thirdly, international activity is a priority for CoVEs, but is often in the process of development, which could be aided through EU-level action. A CoVE platform could be dedicated to the development of excellence in the internationalisation of VET, building on the EU level work already done on how to achieve excellence in trans-national mobility. It could focus on developing advice and guidance on the implementation of internationalisation strategies, and specifically on how to design and implement trans-national joint curricula and international campuses. Links could be made between this platform and the platforms on social and economic issues described above.

Annex One: Collection of CoVE examples – methodology

The methods adopted enabled a comprehensive sweep of available information in a short timescale. The approach comprised (i) identification of examples against the criteria in the template, provided below; (ii) drawing on expertise in the VET WG and DGVT; (ii) template compilation and validation by relevant in-country officials. Examples in the Explanatory Note provided a starting point in some countries, but we considerably widened the search beyond them (including where an example is new and information covering issues in the template is currently limited, e.g. in Croatia, UK, Romania).

Feedback from members of the ET2020 WG was that the method generated good examples, which have and are being validated by relevant in-country officials, where available.

ELEMENT ONE: IDENTIFYING EXAMPLES THROUGH DESK RESEARCH

The following steps were followed:

i. **Obtain overview of VET system and developments** in each country, e.g. based on Cedefop documentation.

ii. **Use online keyword searches** for examples of vocational excellence in each country concerned. Searches use a wide variety of terms including: 'vocational excellence', 'best vocational school/training', 'vocational education academia cooperation', 'vocational education business cooperation', 'vocational education innovation', etc.

iii. **Search for any reports on business-academia-VET cooperation** in each country (including identifying clusters that have educational partners – e.g. in the case of Croatia, wood processing and aluminium processing, in Serbia, IT etc.)

iv. **Search of EU programme websites,** e.g. Erasmus+, to identify relevant projects and their project promoters and partner organisations that might lead to examples

v. The above methods often led to **individual VET provider websites,** which were then reviewed. This also identified EU projects and led to identifying partner organisations with similar profile in other countries.

ELEMENT TWO: USING EXPERTISE IN THE VET WG and DGVT

In parallel with the above, members of the VET WG and DGVT were asked to signal their interest in assisting the mapping. VET WG members were e-mailed by EC with a request for assistance on 14 November 2018 (subsequently reminded at the webinar on 5 December 2018). Expressions of support via the VET WG have been received from AT, BE, ES, FI, IT, SE, SK, PL, UK. Personal approaches to encourage contributions were also made at the VET WG meeting on 24 - 25 January 2019 (some members also wanted clarifications on how to approach the identification of examples, notably dual system countries, which argue that CoVE-type activities are built in to the system), and inputs generated. An email was sent to the DGVT in early January 2019 and generated input from BG. It should be noted that some countries (e.g. EL, FI) expressed reluctance to identify CoVEs as it would single out individual examples. ETF also provided country contacts to assist in candidate countries.

ELEMENT THREE: COMPLETING THE TEMPLATE & VALIDATION

Having identified examples, the template was populated with relevant information. Completed templates were sent to VET WG members who had expressed interest, asking them to validate them - to confirm the selection, fill in gaps, confirm/correct data - or to pass the template to a relevant colleague.

Data Collection Template

1a	**Name or title of example** *(Note to researcher: please highlight the manner in which the initiative is labelled, e.g. as an 'Innovation Hub' or 'Partnership for Excellence'. If they are not labelled under any particular title, or they are part of a wider initiative like 'Katapult' in the Netherlands, please briefly clarify the situation).*	
1b	**How is the initiative labelled?** *(Note to researcher: please highlight the manner in which the initiative is labelled, e.g. as an 'Innovation Hub' or 'Partnership for Excellence'. If they are not labelled under any particular title, or they are part of a wider initiative like 'Katapult' in the Netherlands, please briefly clarify the situation).*	
1c	**What is the lead organisation of this example and which partners do they work with?** (*Note to researcher: please take into account partnerships with any of the following organisations - Initial and continuing VET providers, tertiary education institutions including universities of applied sciences and polytechnics, research institutions, science parks, companies, chambers and their associations, social partners, national and regional authorities and development agencies, public employment services, etc.)*	
1d	**How is the initiative funded? (e.g. through public funds, Sectoral Funds, private investment, income generating activities, etc.)**	
1e	**Has EU support been used for this example? If so, please explain in what way.**	
2a	**Why is this a good example of vocational excellence linked systemically to innovation/smart specialisation/regional development?** *(Note to researcher: Include in your rationale how the example contributes to relevant national and/or regional strategy(ies))*	
2b	**Does this example contain the following elements? If yes, please explain how the example contributes to the various elements.**	
	a) Supporting **regional development** and **smart specialisation strategies**, working together with other education and training institutions (e.g. universities and polytechnics), as well as companies to provide a wide portfolio and level of skills required to implement those strategies.	
	b) Being drivers of i**nnovation in local eco-systems**, within a framework that includes public and private organisations, as well as the coordination and sharing of infrastructure and resources, aimed at providing the transversal and technical skills to support innovation, as well as innovative learning processes and products, for both initial as well as continuing vocational education and training.	
	c) Actively participating in **knowledge triangles** with universities, research centres, and businesses, aimed at being at the forefront of research and technological developments, allowing the rapid update of training curricula and qualifications.	
3	**Does the example have a focus, e.g. on particular sectors or social issues? Which sector(s) or social issue(s)?** *(Note to researcher: CoVEs may focus not just on economic sectors but also on social topics, e.g. migrant integration).*	

4	**Provide an overview description of the key features of vocational excellence in the example** *(Note to researcher: We need descriptions that are (a) far more detailed than those in the 'Explanatory Note' and (b) which show why provision is different to 'normal', high quality VET in general – the latter is important because the descriptions of some examples in the 'Explanatory Note', e.g. from Belgium and Croatia, do not do this very well; we need more depth such as that provided in, for example, the examples from Spain/Basque Country, Denmark and Germany)*	
	1. Providing people with labour market relevant skills, in a **lifelong learning** continuum approach. Combining offers of **initial VET** qualifications with offers of **continuing training** (for upskilling and reskilling).	
	2. Providing **higher level VET** programmes: developing **pathways** to higher level programmes in conjunction with higher education institutions.	
	3. Establishing **business-education partnerships** for: apprenticeships, internships, sharing of equipment, exchanges of staff and teachers between companies and VET centres, etc.	
	4. **Working together with local SME's** by sharing equipment and creating incentives for staff to engage in applied research and development projects with the involvement of the VET learners, and by providing SMEs with technical support, tools, methodologies and training to improve their apprenticeship offer and up-skilling/re-skilling offer for adults.	
	5. Development, introduction or presence of **joint VET curricula**, together with other VET providers and companies in various countries, bringing the very best know-how from each partner and facilitating recognition.	
	6. Development, introduction or presence of **internationalisation strategies** to foster trans-national mobility of VET learners, as well as teachers and trainers, with or without Erasmus+ support. This could also include preparatory work to facilitate mobility, such as teaching programmes or courses on EU studies, to help better understand Europe's integration process and its place in a globalised world (e.g. inspired on the Jean Monnet actions).	
	7. Development, introduction or presence of **innovative teaching and training methodologies,** including those based on digital technologies (e.g. MOOC's, simulators, etc.).	
	8. Development, introduction or presence of innovative curricula and pedagogies focused not just on technical skills but also on **transversal competences**, e.g. entrepreneurship.	
	9. Investing in the **continuing professional development of teachers and trainers,** for both pedagogical skills as well as technical skills.	
	10. Development, introduction or presence of **project-based learning** that brings together inter-disciplinary approaches and VET learners from different fields of study (e.g. design, marketing, engineering) to solve real work problems/challenges.	
	11. Providing **guidance services**, as well as **validation** of prior learning.	

	12. Development, introduction or presence of **business incubators** for VET learners to develop their entrepreneurship skills and projects.	
	13. Acting as or supporting **innovation hubs** and **technology diffusion centres**, which might support companies of any size, while sharing equipment and creating incentives for staff to work together with local SME's in applied research and development projects, with the involvement of the VET learners.	
	14. Supporting the interest of **foreign investment projects** by ensuring timely provision of skills for companies investing locally.	
	15. Development, introduction or presence of **'International VET campus/academies'** for learners, teachers and trainers, leaders in VET institutions, as well as for people considering future vocational study options. These could be focused on specific occupational fields, or products.	
	16. Participating in national and international **skills competitions**, aimed at raising the attractiveness and excellence of VET.	
	17. Contributing to the creation and dissemination of **new knowledge** in partnership with other stakeholders, e.g. through joint R&D with universities, R&D units in companies, research bodies etc.	
	18. Making use of **EU financial instruments and funds** to support infrastructure investments to modernise VET centres with advanced equipment (including simulators, and high-tech equipment).	
	19. Developing **sustainable financial models** that combine public funding and income generating activities for the Centres of Vocational Excellence.	

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