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go-cluster
EXZELLENT VERNETZT!

Cluster Service: Basic and Further Training

How innovation clusters secure the supply of specialists and get them qualified

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1 Well-trained specialists – foundation for work with a secure future

Positive economic development in recent years and demographic change have caused the discussion about bottlenecks in the availability of specialist personnel to take on greater significance. Primarily it is small and medium-sized firms that find it hard to fill vacant positions with suitably well trained staff.[1] Ever-faster innovation cycles, converging industries and new areas of research lead to constantly greater demand for qualified personnel. The workforce is continuously faced with new requirements which it must master in a short time period.

Germany's economy and society are dependent on generating outstanding technological innovations. This ability to improve and renew products, processes and services constantly serves as the foundation for Germany's position as one of the leading industrial nations. Research institutes' and companies' economic performance and success primarily depend on securing the supply of specialists and getting them qualified and able to perform. Yet the process of getting personnel qualified and recruiting them demands much time and effort. Increasingly, small and medium-sized firms lack the financial means and the human resources to give personnel basic and further training while managing the company's core business. In addition, existing paths of vocational training and offers of further vocational qualification often cannot take into account the specific needs of highly-specialist technology firms and innovation networks.

So companies and cluster-management teams frequently find themselves forced to take the initiative themselves in the context of basic and further training.

Not least, as digitisation advances, the requirements that business places on the workforce are increasing all the time; they also challenge cluster-management teams to develop measures that match the profile of needs that their member companies and other players have, while keeping pace with rapid technological development. Here, on the one hand, it can be a matter of rendering support to getting specialists qualified, by giving targeted tuition to current staff members and giving them further training consistent with the state of the art. On the other hand, offers must be provided to secure the supply of specialist personnel. Nurturing the next generation already starts at kindergarten and school age; the task ranges from supplying teaching material to making available a vocational-training place and to providing courses of study.

1 Cf. for instance EY Deutschland 2017 (EY Germany 2017) or the EFI expert commission on reseaarch and innovation, 2016..

2 Cluster initiatives – creative and successful in securing the supply of specialists and in getting them qualified

In this regard clusters, as a regional agglomeration of economic activities in associated business sectors, can be understood as favourable "biotopes"[2] for developing staff. Yet the focus is not on clusters as proposed by Michael E. Porter, i.e. the geographic concentration of firms and research institutes in the same area of industry or technology.[3] Instead the focus is on industrially-operated networks of companies and research institutions managed centrally by a cluster organisation. To some extent these networks form a section, a part of a "comprehensive" cluster as defined by Porter.[4] This is where many of the institutions relevant to this topic meet, and offer specialised vocational training – institutions of higher education, think-tanks, public and private providers of further vocational-training measures, or chambers of commerce and industry. Above all, the interplay of these public and private service providers enables cluster organisations to set up a forum for sounding out and initiating new paths for cooperation.[5] This is especially important in view of increasingly interwoven activities in the context of policy on research, innovation, business and education, within regional innovation systems and clusters.

Cluster management – ideal intermediaries on many levels

Cluster management teams offer their member organisations a wide portfolio of services as part of the provision of support. Along with services in activity areas such as innovation, internationalisation or support in the set-up of a new company, for numerous innovation clusters in the "go-cluster" programme an essential range of tasks is that of obtaining specialist personnel and getting them qualified. [6]

It is crucially important that companies are informed about key qualifications and project-oriented specialist skills for future developments.

Cluster-management teams are especially well-informed about future developments; this comes from being supremely well connected within their sector and in their region, as well as closely exchanging inputs with the member firms. So they can play an important role, both in the conceptual work of producing tailor-made regional service offerings and then in marketing them. Especially in rendering support to small and mid-sized firms, who mostly lack the resources needed for a laborious search to get suitable trainees or well-qualified staff, cluster-management teams can play a valuable role as intermediary. Securing the supply of specialists and getting them qualified also gives cluster-management teams the chance to contribute to financing of cluster management through providing lasting and established services in this activity area.

Cluster initiatives create offers of training that industry needs

In economic-policy terms it is interesting that, by getting private players involved, the focus is primarily on demand-driven offers of training, directed at industry's needs. At an early stage, cluster managers are able to identify new technology topics which can change requirements in terms of workers' qualifications. In dialogue with the stakeholders, cluster managers can develop solutions. They can ascertain the elements of demand that the regional players have, either developing solutions themselves or seeking to exchange inputs with providers of basic and further training. Cluster management teams are advantageous because their offers of basic and further training can address a whole range of firms simultaneously; this prevents any market distortions arising from a subsidy to individual players.

2 Cf. Globisch et al., 2012

3 Cf. Porter 1998, p. 78.

4 Institut für Innovation und Technik (iit) (Institute for Innovation and Technology), (2012)

5 Cf. Porter, 2007

6 Key activities of the cluster management teams are to be found on the Cluster Platform Germany, Clusterplattform Deutschland; online at: www.clusterplattform.de

Securing the supply of specialists and getting them qualified – an established service in the cluster portfolio

Companies cannot have lasting success without well-qualified staff. So for many cluster-management teams, basic and further training rank among the most important activity areas in their cluster work. To counteract the shortage of specialists, the priority is to provide further qualification to (current) specialist staff, and also to secure the supply of (new) staff well trained in their specialisation.

The question arises as to which particular role cluster-management teams can and should play in securing the supply of specialists and in getting them qualified. As regards securing the supply of specialists and proactively targeting them, the aim is to safeguard the next generation and acquire suitable staff for this business sector. Along with analysis of the various business sectors' profiles of needs, this is primarily also about targeting potential new staff that have specialist knowledge in the required specialisations, but also about early nurturing of upcoming talent (in schools, organisations providing vocational training, etc.). In addition, there is the challenge to get the current staff further qualified in future growth areas important to this sector of business.

The key point in this is to take into account digitisation's consequences on the world of work and on the given area of technology, as well as developing and offering particular programmes of basic and further training.

In Germany and elsewhere in Europe, cluster-management teams often cover parts of the whole process aimed at securing provision of specialist personnel and at giving them further training; they provide particular activities in the topics relevant for the cluster initiative.[7] The most important activities are as follows, subdivided into the categories of securing the supply of specialists and of getting specialists qualified respectively:

Activity	Getting specialists qualified	Securing supply of specialists
Organising and implementing events and seminars directed at getting personnel qualified	✓	
Analysing the requirements, specific to the relevant business sector, with regard to basic and further training	✓	✓
Providing support/full conceptual work on measures of basic and further training	✓	✓
Developing or respectively co-initiating complete newly-designated professions, professions with an obligatory training requirement, or courses of study at universities, including at universities of applied sciences	✓	✓
Web-based job tools specially directed at suiting the relevant particular business sector (job portals)		✓
Acting as an intermediary for places on placements and on vocational-training courses		✓
Participation in job fairs		✓
Recruiting specialist personnel and management personnel for organisations participating in clusters		✓

7 Cf. Thomas Lämmer-Gamp, Gerd Meier zu Köcker, Thomas Köhler, Kai Pflanz, Kinscö Iszak (Technopolis Group), 2016

In any given case, which specific measures are to be initiated, depends on the conditions existing within the given cluster initiative. For instance, cluster management teams can search among established service providers' respective qualification activities, courses of tuition, and seminars; the aim is to find what is best suited to solve the cluster participants' specific requirements or problems. Yet they can also develop their own (certifiable) concepts for basic and further training, specific to a given company or network, (where applicable) in cooperation with institutions of basic training and further training. In this it is crucial for the firms and the cluster management that those on the company side or cluster side respectively are aware which key qualifications and project-oriented specialist skills are needed for future developments. The effect that digitisation and connectivity have is to also further speed up innovation processes, thus giving a higher level of significance to "lifelong learning". So there is constantly a need for lifelong learning in adapting both the knowledge and the capacity to apply it.

This primarily affects technology-oriented cluster initiatives because their market position and competitive position depend on new processes and products or services.[8] As intermediaries between business and science, and also because they are especially well-connected and anchored in the region, cluster initiatives provide the opportunity to sensitise universities and other higher-education establishments to the companies' needs. So it is not rare for cluster-management teams to be involved in starting-up new courses of study or to offer on-site visits to member firms for students interested in the relevant specialist area of study. This deepens the young graduates' interest in the relevant technologies, sets up first contacts with potential employers and provides first-hand insights into how things are done at the companies.

8 Cf. Buhl, Meier zu Köcker, 2009.

3 Securing the supply of specialists and getting them qualified – lessons from Germany's practical experience with clusters

For cluster initiatives it is highly important to secure the supply of specialist staff and to get them qualified. On the one hand, this is clear in the analysis of points of emphasis in the activities that form part of the benchmarking interviews conducted by the European Cluster Excellence Initiative (ECEI)[9] among the "go-cluster" programme's members. One of the areas asked about in that context relates to the cluster-management's activities aimed at basicand further training of the staff resources. In all, around 85 per cent of the 'go-cluster' members surveyed stated that they offer activities and services to their members in this regard. This includes specific courses of further training (51 %), provision of support in recruiting specialists and management personnel (50 %), the launch of offers of training at vocational-training centres and higher-education institutions (39 %), and other activities (50 %).[10]

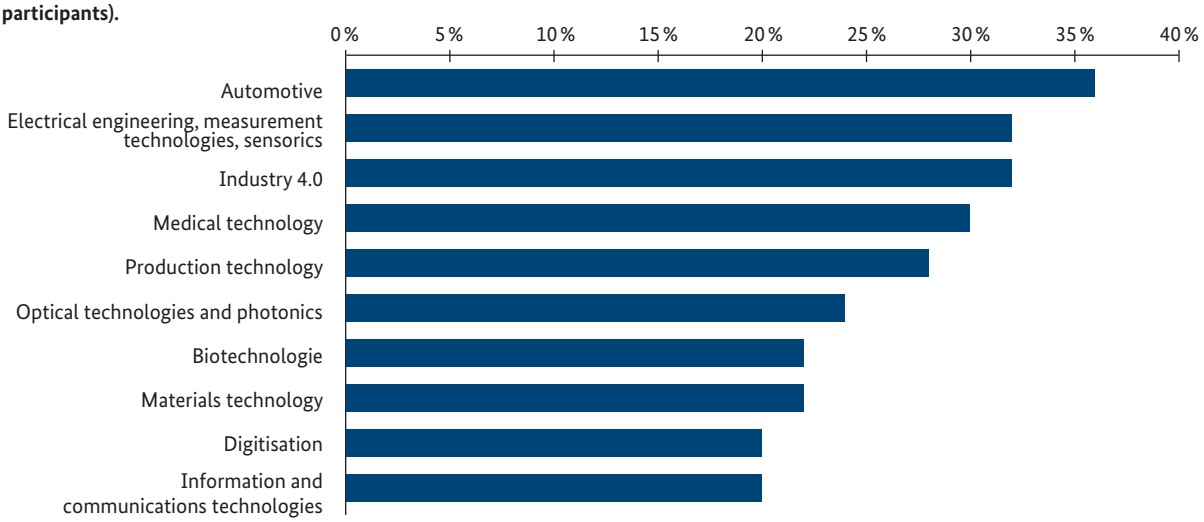
An online survey[11] was also conducted among the best-performing German cluster-management teams in the "go-cluster" programme; more than a half of the member initiatives took part. Behind the 50 cluster initiatives responding to the survey, an average of 160 active cluster participants per initiative are involved.

3.1 Results of the online survey

High level of technology orientation demands a high standard of qualification

The participating cluster initiatives are technologically oriented to a high degree; thus they set high standards in terms of the skills that their member organisations' specialist staff must have. This is clear from the business sectors to which, for survey purposes, the firms are categorised as belonging. [12] In this regard the most important business areas and fields of technology are the automotive industry, followed by electrical engineering, measurement technology and sensorics. Beyond this, what has greatest significance is the topics surrounding Industry 4.0, production technologies and medical technology, as well as optical technologies and photonics. So, all in all, it is business sectors with comparatively high research and development expenditure that are represented, and thus a strong affinity to innovation.[13] So these activity sectors also present challenging demands on the staff's level of basic and further training.

Figure 1: Technological points of emphasis among the participating innovation clusters (allocation to multiple categories possible; expressed as % of all participants).



9 See online at: www.cluster-analysis.org

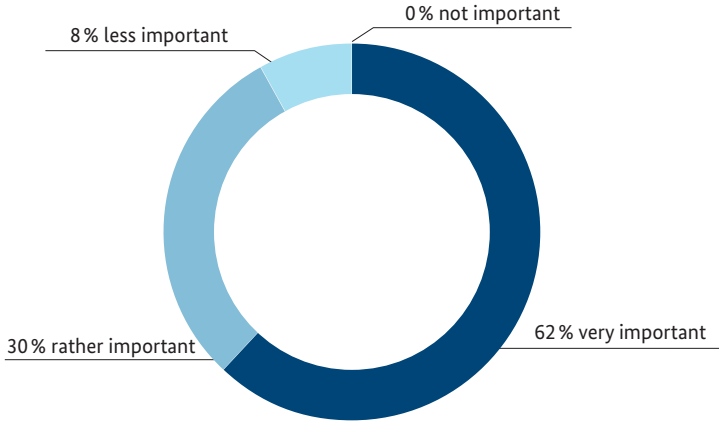
10 In total, 82 benchmarking interviews with "go-cluster" members were taken into account.

11 Remark: the online survey and the subsequent evaluation were conducted in 2017 among the members of the Federal Ministry for Economic Affairs and Energy's "go-cluster" programme.

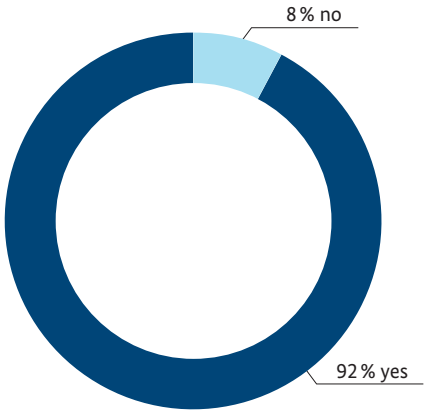
12 Allocation to multiple categories possible

13 Cf. Stifterverband (2016): Wissenschaftsstatistik des Stifterverbandes – FuE nach Branchen (Scientific Statistics of the Association of German Academic Foundations R & D according to business sector), available online at: https://www.stifterverband.org/forschung-und-entwicklung/fue-erhebung-2016

Figure 2: The participating cluster managers' evaluation of the relevance of basic and further training as a topic



Importance of the topic of basic and further training



Involvement in the topic of basic and further training

The significance of specialist personnel for tomorrow

What is very clearly shown is the great relevance of basic training and further training, or respectively of recruiting in the general sense. More than 90 per cent of the surveyed cluster-management teams stated that this topic is important for them. Almost two thirds of participants even evaluated the topic as being "very important" for their work. Only eight per cent viewed the topic as being of little significance. None of the 50 participating cluster-management teams stated that basic and further training play no role for them.

Consistent with the topic's significance, more than 90 per cent of the cluster initiatives taking part are also already involved, in many different ways, in pursuing the most diverse range of activities and services for the firms and organisations within their clusters.[14]

Qualification counts

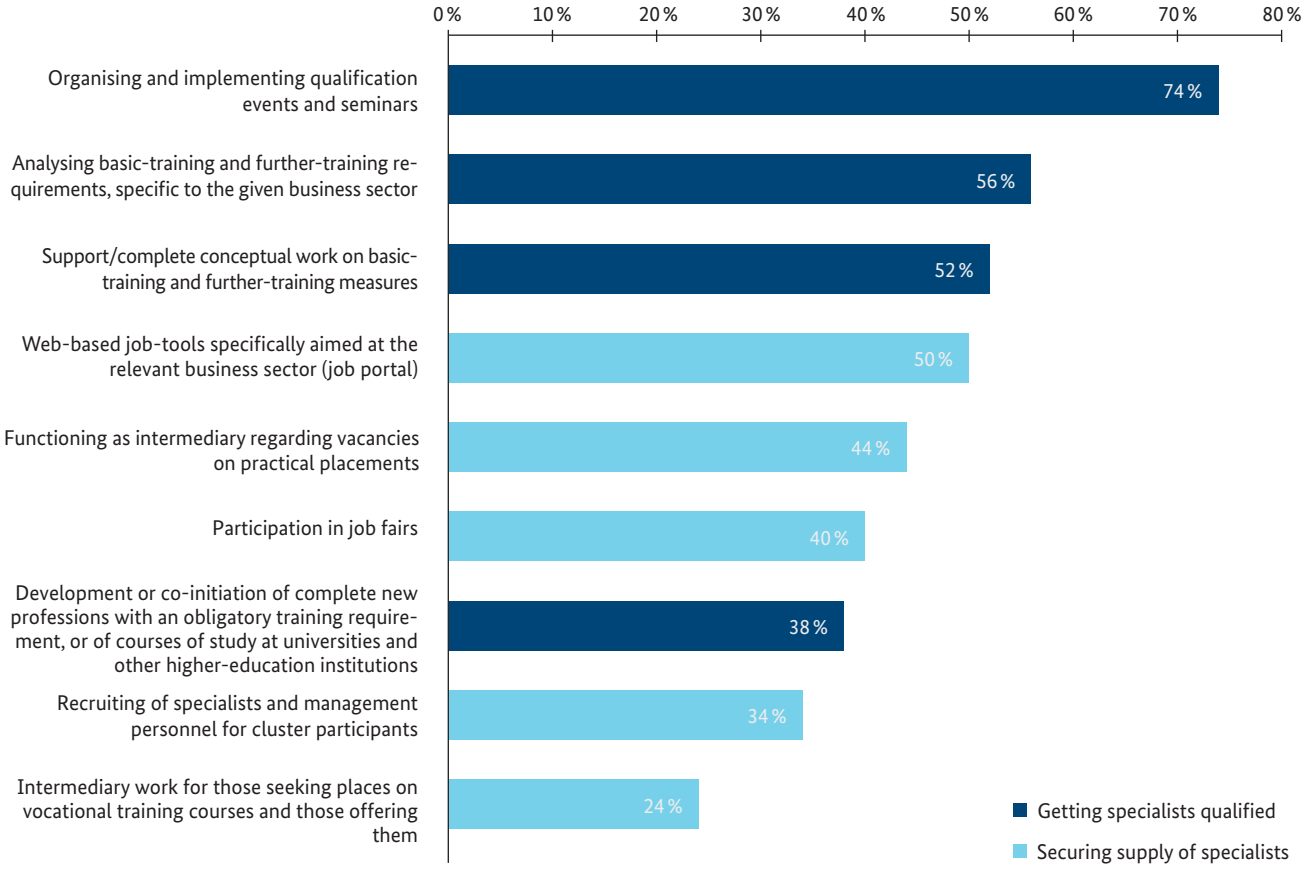
As regards the cluster initiatives' specific individual activities, some clear points of emphasis can be identified. Accordingly, 74 per cent of the cluster-management teams stated that they conduct qualification events and seminars of their own, with offers of tuition forming part of this, for instance. Indeed 80 per cent of the cluster initiatives also plan to continue implementing these and other such activities in the future. Already, more than 50 per cent now perform the full conceptual work on offers to secure the supply of specialists and to get them qualified; almost 60 per cent of cluster initiatives also plan to continue with this in the future. The response values reached are similarly high as regards the analysis of requirements for basic and further vocational training. Yet also specific job portals, specially tailored to the given business area, are stated by 50 per cent of participants as a relevant subject area in which they are active. Overall it is evident that the participating cluster-management teams primarily focus on further training.

A hot topic: small and medium-sized companies

As regards the target groups for the individual measures, it is striking that, as one would expect, the focus of activities is provision of support to small and medium-sized firms. For the most part the measures aim at further development of the specialist personnel within the companies. This is consistent with the stated points of emphasis in the service offerings provided (Figure 3). Thus qualification events, such as the identification of further-training measures specific to the given business sector, and conceptual work on such programmes, are given higher priority than participation in job fairs or the role as intermediary for places on placements or vocational training courses. Yet fostering tomorrow's talent also plays an important role. In this regard, it is clear that what is primarily important in what

14 Please note that cluster managers for whom this topic is of significance tend to be more likely to take part in a survey on this subject.

Figure 3: The most important activities for the participating cluster-management teams, subdivided according to (firstly) securing of supply of specialists and (secondly) getting specialists qualified

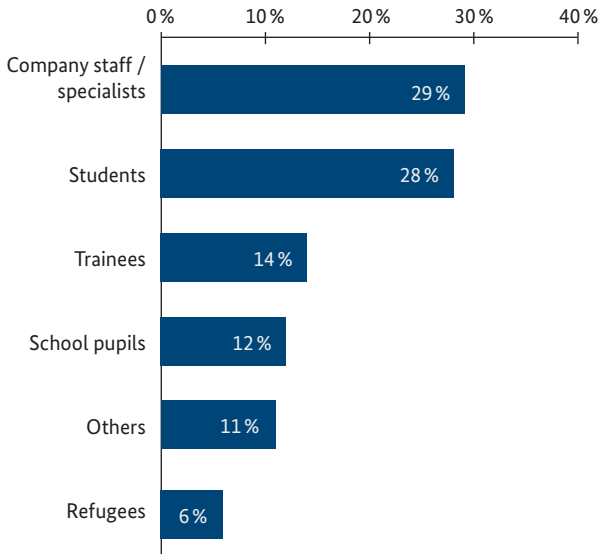


the cluster-management teams offer is next-generation personnel that are highly qualified and available over the short to medium-term.

Students, as tomorrow's qualified team members, are seen as the activities' second most-important target group, at 28 per cent. Integration of refugees that have the prospect of remaining in the country still plays a comparatively small role; they were mentioned by only eleven of the cluster-management teams as a target group for activities aimed at overcoming the shortfall of specialist personnel.

Precisely how these service offerings can look, how such services are integrated into the cluster-management teams' portfolio, and through which services these offers can contribute to sustainable financing of the cluster organisation – examples from the actual practice of the "go-cluster" programme's innovation clusters highlight.

Figure 4: Target groups for the cluster-management teams' individual basic-training and further-training measures



4 Examples of success among members of the “go-cluster” programme

This section presents certain services provided by cluster-management teams in the “go-cluster” programme, divided according to the activity areas: firstlyf securing supply of specialist personnel and recruiting them, and secondly specialist personnel obtaining further vocational qualification.
They serve as examples of success: the aim is that they stimulate ideas on adapting certain formats to match other cluster initiatives’ needs and possibly also on other cluster initiatives adopting them into their own service portfolio.

4.1 Securing the supply of specialists and recruiting them

4.1.1 Kunststoff-Netzwerk Franken (KNF) e.V. – Franconia region’s plastics network // The “My Plastics” Training Initiative

The Franconia region’s plastics network was set up on the initiative of various firms and tool-making businesses based in Franconia (Nuremberg region). This body set itself the goal of raising its individual companies’ competitiveness (by means of cooperation across various areas) and also of helping to improve the plastics sector’s image, by presenting a joint front to the world at large. In the networking the focus, apart from being on strategic topics, is on technology-oriented specialist topics specific to plastics, and also on issues of basic and further training.
With the professional-training initiative **“MyPlastics – Your Future with Plastics”,** founded in 2009, KNF actively gets involved in fostering the next generation of talent. Its aim is to inform school pupils about future career profiles and opportunities for vocational training in the region’s plastics sector.

Cluster management renders support to this effort from two angles: on the 'MyPlastics' map of vocational-training options, 190 companies now present the training and study opportunities that they offer. In turn, this map is used to produce regionalised lists that MyPlastics distributes on the spot during school visits or at fairs for training and study-courses. In direct discussions, school pupils get information about professions and opportunities in the plastics sector and companies close to them. Since 2009 MyPlastics personnel have visited more than 240 school classes and attended 70 trade fairs.
The network’s modern homepage gives readers detailed information about this business sector and presents eleven professions with an obligatory training requirement, as well as two courses of study; it also puts schoolchildren in the picture about the organisational forms that Germany’s 'dual study' takes. Apart from school visits in the Upper, Central and Lower Franconia regions respectively, the other aspect of activities is to accompany and guide firms that do not yet provide training, as the latter set up vocational-training courses. Firms that still have training places open get suitable trainees offered to them via the training initiative.

So, via the MyPlastics initiative, the cluster-management team draws together the elements of potential for training and the region’s geographically dispersed expertise. Thus it succeeds in developing scope for new kinds of vocational-training concept, by cooperation projects and by exchanging inputs on experiences gained. By now, MyPlastics cooperates with more than 190 companies that provide vocational training; the trend points towards growth.

The MyPlastics-Stand

KNF
KUNSTSTOFF-NETZWERK FRANKEN

Brief Information on Franconia Region’s Plastics Cluster (KNF) e.V.

Cluster participants: 206
State: Bavaria
The innovation cluster’s website:
www.kunststoff-netzwerk-franken.de
Link to the My Plastics cluster service :
www.myplastics.de

4.1.2 foodRegio e.V. – "Make a Start in the Food Business" Training Campaign

foodRegio e.V. is an initiative among North German food-sector companies and institutions. This cluster supports the industry's companies by joint projects, exploiting the potential offered by the north's food business, and by nurturing synergies. foodRegio's tasks include establishing connectivity among the member companies across the nine working groups, arranged by subject; this involves initiating cooperation-based projects, developing offers of tuition that match demand, and also organising and running network events. These events focus on the following: companies in food production, mechanical engineering and plant engineering that supply the food sector, packaging and supplier industries; they also target higher-education institutions, research establishments, and other organisations that direct their efforts at advancing the food sector. In this context the activities attend closely to the members' profile of needs.

With "Make a Start in the Food Business", foodRegio launched an innovative training campaign in November 2013. Its aim is to serve as an intermediary supplying the firms with suitable trainees and future staff, while enabling school leavers and graduates to make their entry into the food sector, through the job-application platform. In a variety of areas of employment, such as sales, production, technology or administration, those interested can find out about the range of career profiles on offer, at www.food-starter.de. With around 450 vocational-training places free, the platform offers a broad spectrum representing Northern Germany's food business. With no complications and just a few clicks, school pupils and students can apply directly to the participating firms.

Brief information on the cluster foodRegio – food business network in Northern Germany

Cluster participants: 69
State: Schleswig-Holstein
The innovation cluster's website:
www.foodregio.de
Link to the cluster service:
www.foodstarter.de

New trainees in Northern Germany's food business: the "Foodstarter" trainees' event, held in Hansa-Park

4.1.3 Windenergie-Agentur (WAB) e.V. (Wind-Energy Agency) – Wind Energy Studies

The wind-energy agency, WAB e.V., draws together companies throughout the wind-energy sector's value chain; WAB serves as the leading network of wind-energy companies in Germany's north-western region; it is also the nationwide point of contact for the offshore wind-energy business. In parallel with expanding wind energy and with promoting the north-west region's economic revitalisation, and in addition to developing offshore wind energy in Germany, the cluster-management operations also contribute to the qualification of technical specialists and management staff for the wind sector. The wind-energy sector offers a high degree of development potential, with an increased level of demand for qualified personnel, also including welders, specialist laminators, engineers or IT specialists. In recent years the cluster-management work has enabled several training establishments to specialise in meeting the wind-energy sector's needs. To this end, the cluster management team advises educational establishments and companies on structuring the profile of certain professions, also advising regional politicians on provision of support to new offers of training. To continue to advance the vocational training and further qualification of specialist personnel, from the outset the wind-energy agency accompanies and guides the set-up of offers of vocational training and qualification measures; it also commissions studies directed at determining the pattern of demand for vocational qualification, and (for instance) organises workshops on attaining "Qualification in the Wind-Energy Sector".

Together with "ForWind", the wind-energy research centre of the universities of Oldenburg, Hanover and Bremen (in cooperation), the cluster initiative has called into being the following course of further studies, to accompany and be combined with participants' employment: "Wind Energy Technology and Management" (Wind Energy Studies). This imparts fundamental specialist knowledge, understanding of the system and also key qualifications; it enables comprehensive understanding of wind energy projects to be gained. Early interaction with experts from companies and from the scientific community gives students the chance to build up a reliable network early on. In addition, a project assignment accompanying the studies, one that entails the planning of a windpark, requires practical implementation of the theoretical knowledge gained. The course of study's concept has already been awarded several distinctions for its "demonstratively positive and identity-shaping effect" (e.g. in 2007, when it received the NorthWest Award from the bank of the State of Bremen); it was also honoured as a "Selected Site 2010" by the "Germany - Land of Ideas" initiative. The wind-energy studies course has been run successfully since the autumn of 2006 and is in its twelfth year of operation.

Brief information on the cluster Windenergie-Agentur (WAB) e.V.

Cluster participants: 300
State: Bremen
The innovation cluster's website:
www.wab.net
Link to the cluster service:
www.windstudium.de

The course of studies on the wind-energy sector is a tremendous success.

4.1.4 Photonics BW e. V. – Atlas of Vocational Training as a Student Guide

Photonics BW e.V. aims to promote the optical technologies as technologies of the future and to give lasting strength to its geographical area as a business location. That is why this cluster initiative offers support in the areas of research, development and application, and basic and advanced training; it also nurtures next-generation talent and engages in publicity work.

To cultivate the supply of qualified new-entrant talent, Photonics BW produces an updated student guide each year. The guide presents school leavers with a comprehensive set of information on the various courses of study within the realm of optical technologies and about the respective educational institutions. This 90-page student guide is a free-of-charge service from Photonics BW; the goal is to make it easier for new students-to-be to get set up in their studies, and also to help to secure the flow of specialists into that business sector's companies. Alongside producing the student guide, and formulating the content of vocational basic training courses, for many years now the cluster has also run the following further-qualification seminars: 'Optical Systems: Design and Simulation' and 'Optics for Lighting: Development and Application', as well as workshops on the latest photonics-related topics.

Brief information on the cluster Photonics BW e. V. – Innovationsnetz Optische Technologien

Cluster participants: 73

State: Baden-Württemberg

The innovation cluster's website:
www.photonicsbw.de

Link to the cluster service:
www.photonicsbw.de/bildung-karriere/studium

MINT information event

4.1.5 Measurement Valley e.V. – Job Fair

In the realm of measurement technology, the Measurement Valley e.V. brings together the activities of companies and scientific-community players in the Göttingen region. Trust-based interaction among cluster participants successfully converts innovative collaboration projects into reality. Cluster management contributes to a strengthened public perception of this sector of professional activity, helping to establish the region as a synonym for measurement-technology expertise. The activities also include taking on a role as intermediary between upcoming new prospective employees and member companies seeking talent.

Once per year, the cluster-management team offers a job fair for this, collaborating with HAWK, the Hildesheim/Holzminden/Göttingen University of Applied Sciences and Art. This gives member companies in the cluster the opportunity to establish direct contact with students of, and graduates in, the natural sciences and engineering. It is free of charge to take part in the job fair, for exhibitors and visitors. Companies can use the job fair to present their company and to give information on application procedures. In engaging with the target group directly, HAWK graduates report on their start in professional life.

Brief information on the cluster Measurement Valley e.V.

Cluster participants: 37

State: Lower Saxony

The innovation cluster's website:
www.measurement-valley.de

Link to the cluster service:
https://bit.ly/2qZCF5L

Job fair at HAWK, the Hildesheim/Holzminden/Göttingen University of Applied Sciences and Art

4.1.6 IT FOR WORK e.V. – Job-Opportunities Tour

The IT FOR WORK network of companies brings together the players in the information and communications technology sector of the Rhine-Main-Neckar region. In one organisation, it combines the IT expertise that the region's firms and research organisations have, releasing potential for innovative cooperation projects. As well as rendering support to young IT companies, IT FOR WORK fosters the recruitment of new specialist personnel, with concepts such as the job tour.

The job tour is primarily directed at graduates in the following: information science; information science for business; business and IT; media and information science; and business engineering. It also targets young professionals already working in the IT sector and wanting to find out about new job prospects. Once per year since 2011, the cluster-management team has hosted this recruiting event, in collaboration with Darmstadt Chamber of Industry and Commerce and the City of Darmstadt. For this, a shuttle bus is used to set up direct contact with potential employers, bringing in approximately 100 students and graduates of courses of study with a high level of IT content. In 2017, ten of the 16 participant firms had already taken part in the event, either once or several times. Because of the strong response from the Frankfurt am Main area, the cluster management also decided to offer an additional job tour in Frankfurt, starting in 2018.

The job tour concept offers firms the chance to engage the interest of potential new entry-level staff. Conversely, apart from giving prospective recruits an insight into Darmstadt's digital-business sector, it enables them to cultivate direct contacts with the companies' specialist departments. Firms and students gain from this cluster service, free of charge for the students: some graduates go home the same evening with a contract of employment and the companies have secured recruitment of a qualified new employee.

Brief information on the cluster IT FOR WORK e.V.

Cluster participants: 102
State: Hessen
The innovation cluster's website:
www.it-for-work.de
Link to the cluster service:
www.jobtournee.de

The job-opportunities tour

4.1.7 Carbon Composites e.V. – Bridge-Building Competition

As an alliance of companies and research institutions, Carbon Composites e.V. (CCeV) covers the whole value chain in high-performance composite-fibre materials. It serves as a network of skills directed at promoting the application of composite-fibre materials. CCeV's activities include bringing together experts from science and industry, and also subject-specific working groups on information exchange in the pre-competitive-tender framework, in addition to promoting measures directed at basic and advanced vocational training.

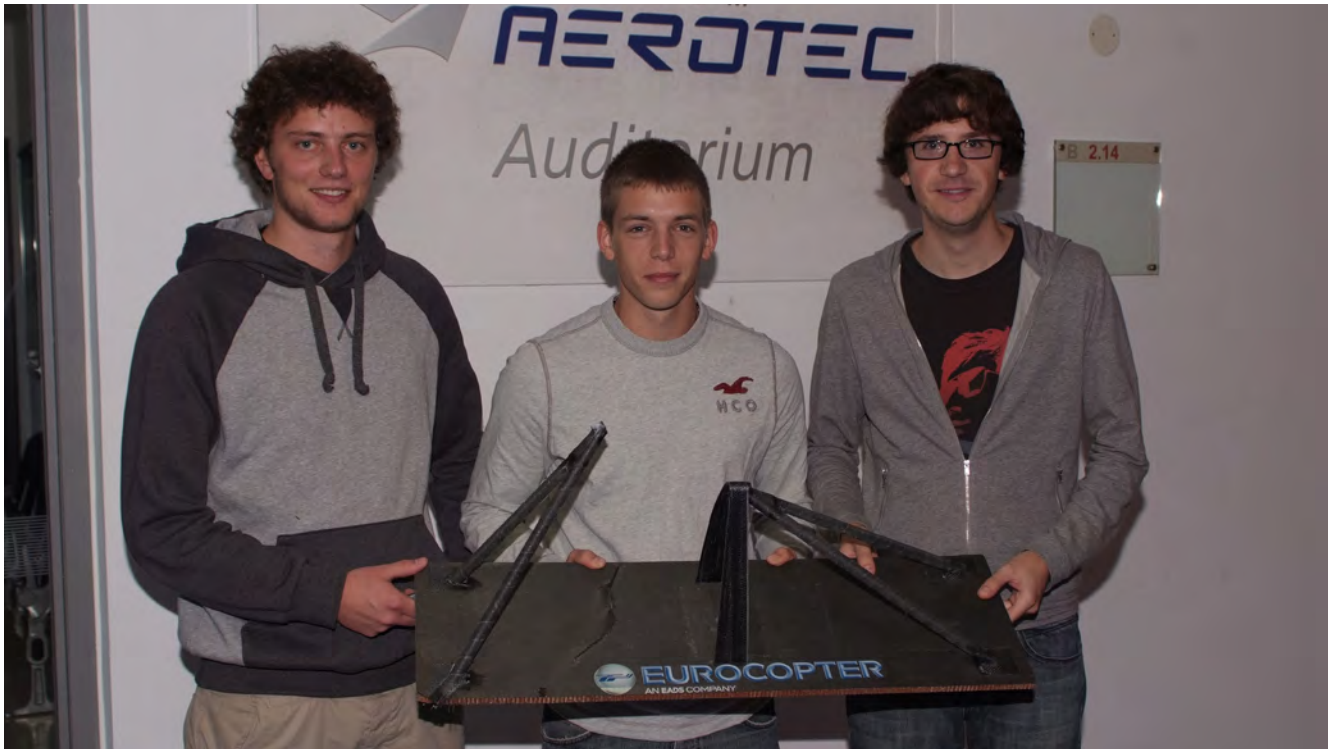
Since 2010, CCeV has taken part in an innovative competition held by a member organisation, the Augsburg University of Applied Sciences, making the subject-matter of composite-fibre materials clearly understood and tangible. In this bridge-building competition, interested trainees, school pupils and students take on a challenging assignment directed towards professional practice. The competition progresses from the conceptual process through to manufacture of a bridge; it encompasses the technical mechanics, the appropriate design in terms of materials, and also execution of the construction. Taking the building of this bridge as an example means that the participants gain fundamental insights into a variety of materials in a wholly practical context, tangibly engaging with the topic of composite-fibre materials.

The competition's highlight is the load test on the bridges, up to their breaking point – always conducted in front of enthusiastic spectators.

CARBON COMPOSITES

Brief information on the cluster Carbon Composites e.V. (CCeV)

Cluster participants: 272
State: Bavaria
The innovation cluster's website:
www.carbon-composites.eu
Link to the cluster service:
www.carbon-composites.eu/de/wissen



Teams from various institutions of higher education and companies competete in the bridge-building contest, supported by Carbon Composites e.V.

4.1.8 OLEC e.V. – SolarCup Oldenburg

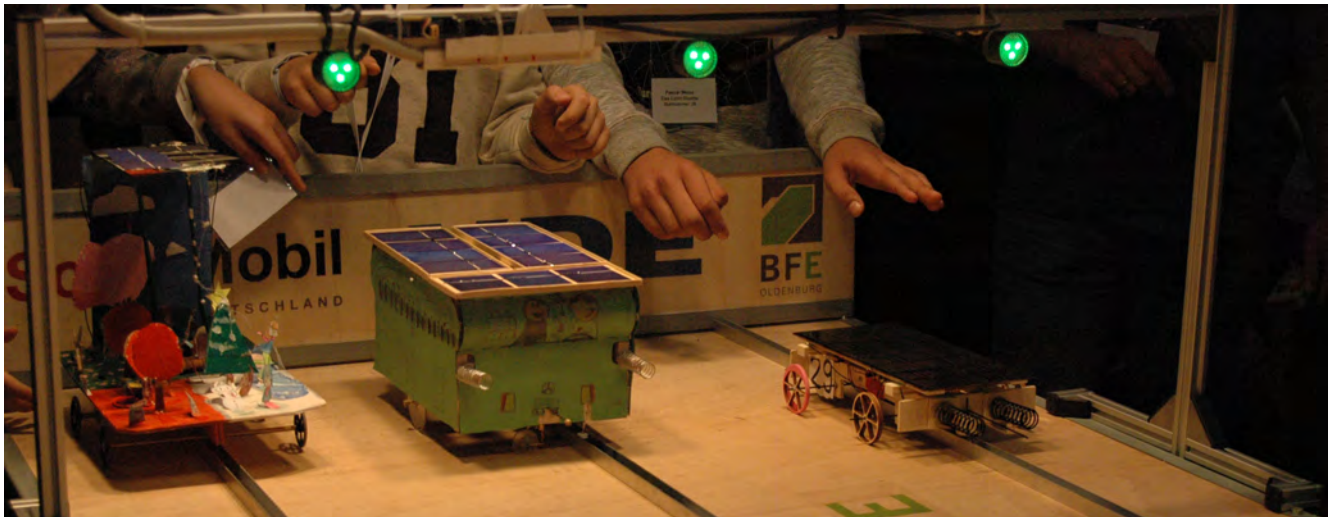
The Oldenburg-based energy cluster OLEC e.V. is the largest cross-technology energy network in Germany's north-west. Its members include companies, institutions, higher-education establishments and other educational organisations, and municipal authorities. The background is the energy-sector members' extensive expertise and competences; against that background the cluster's emphasis is on renewable energies and on integrating them efficiently into energy systems of the future. The Oldenburg energy cluster (OLEC) creates connectivity, linking up crucial players from the region; its role is also to be a dialogue platform for Lower Saxony as it makes the switchover in energy use.

To introduce young people to renewable energy technologies, the cluster-management team launched the SolarCup school pupils' competition in 2013. This competition is directed at pupils ranging from the fourth to the thirteenth year of school. In teams of three, drawn up from classes or working groups in four different classes of evaluation, the participant teams take each other on. Each uses a track around ten meters long to show the merits of a solar vehicle that they themselves have designed and constructed. For the joint development and construction of the solar vehicles, the teams have from August to November. In this competition, the cluster uses a contest to awaken interest in renewable energies, raising this business sector's public profile. In itself the competition is not new and has been held nationwide for many years now. Yet what is new in Oldenburg is that, alongside school pupils, teams of trainees from vocational-training schools and companies can take part, as can children and adolescents in the context of a "free class" without a teacher designated to them for this. The goal is to highlight topics such as renewable energies, technology and sustainability, along with these issues' importance for our future, making them tangibly relevant to as wide a group of interested people as possible. OLEC's network structure is important in this. There is close, fruitful collaboration between companies, educational establishments, including higher-education institutions, and municipalities. Therefore, since the SolarCup Oldenburg was launched, around 500 young people have been able to be reached and motivated to take part in the Cup competition and and engage with this subject matter. The Cup continues to be highly popular; by now it is hard to imagine the north-west's calendar of events without it.

OLEC
Energie bewegt den Nordwesten

Brief information on the cluster Oldenburger Energiecluster OLEC e.V.

Cluster participants: 56
State: Lower Saxony
The innovation cluster's website:
www.energiecluster.de
Link to the cluster service:
www.energiecluster.de/656-0-Solarcup-Oldenburg.html



Impressions from the 5th Oldenburg SolarCup, in 2017

4.2 Basic and further qualification of specialists

4.2.1 Franconia Region's Plastics Network (KNF) – Exclusive Offers of Further Training

Alongside the above-mentioned training initiative "MyPlastics – Your Future with Plastics", KNF's services regarding basic and further training also include specialist forums and seminars, as well as exclusive further-training offers spanning longer periods.

Here the cluster initiative addresses not only one target group; rather, it offers services for trainees and also entrants from other backgrounds, as well as specialist personnel and management in the plastics sector. The various offers are always tailored precisely to the respective group's individual needs.

The series of seminars for plastics-sector process coordinators was launched on a targeted basis for specialist staff and management operating at communication-oriented interfaces. Here, first and foremost, care is taken to instruct the staff in areas of knowledge mostly not communicated sufficiently in traditional training. For instance, this includes imparting knowledge of communicative elements and skills needed in interaction with other firms and departments, in running the daily business. In a total of eleven seminars, the emphasis is on giving the specialists an insight into the various areas of expertise in the plastics sector as a whole.

This means that generalists' knowledge is conveyed throughout the value chain, resulting in greater efficiency in projects that span interfaces and specialisations. This further-training programme last for around two years. At intervals of around two months, the individual seminars take place at the network's individual member companies. To date, 54 staff members have already used this cluster service and this further training programme is in progress for the fifth time. Care is taken to ensure an effective group size, not above 16 people.

For entrants to this business from other sectors, the cluster management offers further training to become a suitably-qualified specialist in injection-moulding production. This series of seminars conveys a comprehensive overview of injection-moulding manufacture to production-department staff. They gain the necessary knowledge about the periphery, the machine technology, the tools involved and the process, through to the materials. This further training enables entrants from other backgrounds to set machines up for operation; then, through continuous further training, they learn to run more diverse, more technically intensive activity sequences in the company. This further training lasts around 1.5 years. The seminars take place at intervals of around 1.5 months, also at network-member companies. This series of events draws much interest and is being run for the fourth set of students in 2018, with 13 participants.

Further training as a specialist in injection moulding production

KNF
KUNSTSTOFF-NETZWERK FRANKEN

Brief information on the cluster Kunststoff-Netzwerk Franken (KNF) e.V.

Cluster participants: 206

State: Bavaria

The innovation cluster's websites:
www.kunststoff-netzwerk-franken.de

Link to the cluster service 'Prozesskoordinator':
www.kunststoff-netzwerk-franken.de/prozesskoordinator

Link to the cluster service "Fachkraft Spritzgieß-Produktion":
www.kunststoff-netzwerk-franken.de/gepruefte-fachkraft-spritzgiess-produktion

4.2.2 Carbon Composites e.V. – Trainee Programme

Since its formation in 2007, Carbon Composites e.V. (CCeV) has been emphasising the importance of basic and further training in composite-fibre technology. As composite-fibre materials gain significance in more and more sectors, such as aerospace, automotive, or wind power, staff increasingly face new requirements in terms of manufacturing techniques and qualifications.

With its variety of offers and services on the topics of basic training, further training, trainee programme, etc., CCeV helps its members to stay competitive. In its further-training programme, the association offers its own seminars and also its member companies' events.

In the trainee programme, also begun in 2007, CCeV strives to satisfy the industry's strong demand for young, committed, well-trained engineers. The target group for this vocational-advancement programme, taking place alongside participants' studies, is students wanting to complete a specialist training course in composite-fibre materials. Over the programme's two semesters, firstly the theoretical foundations are communicated; these are then applied in the context of a concluding assignment. Thus CCeV gives its trainees the chance to get into contact with established specialists from the member companies. Apart from the overview that students gain on the latest moves in research and development, the member firms have the opportunity to contact committed upcoming specialists at an early stage, thereby gaining skilled entry-level personnel for their future. In 2018 the tenth CCeV trainee programme is in progress; in all, 137 young people have thus undergone this process of familiarisation with composite-fibre technology.

Brief information on the cluster Carbon Composites e.V. (CCeV)

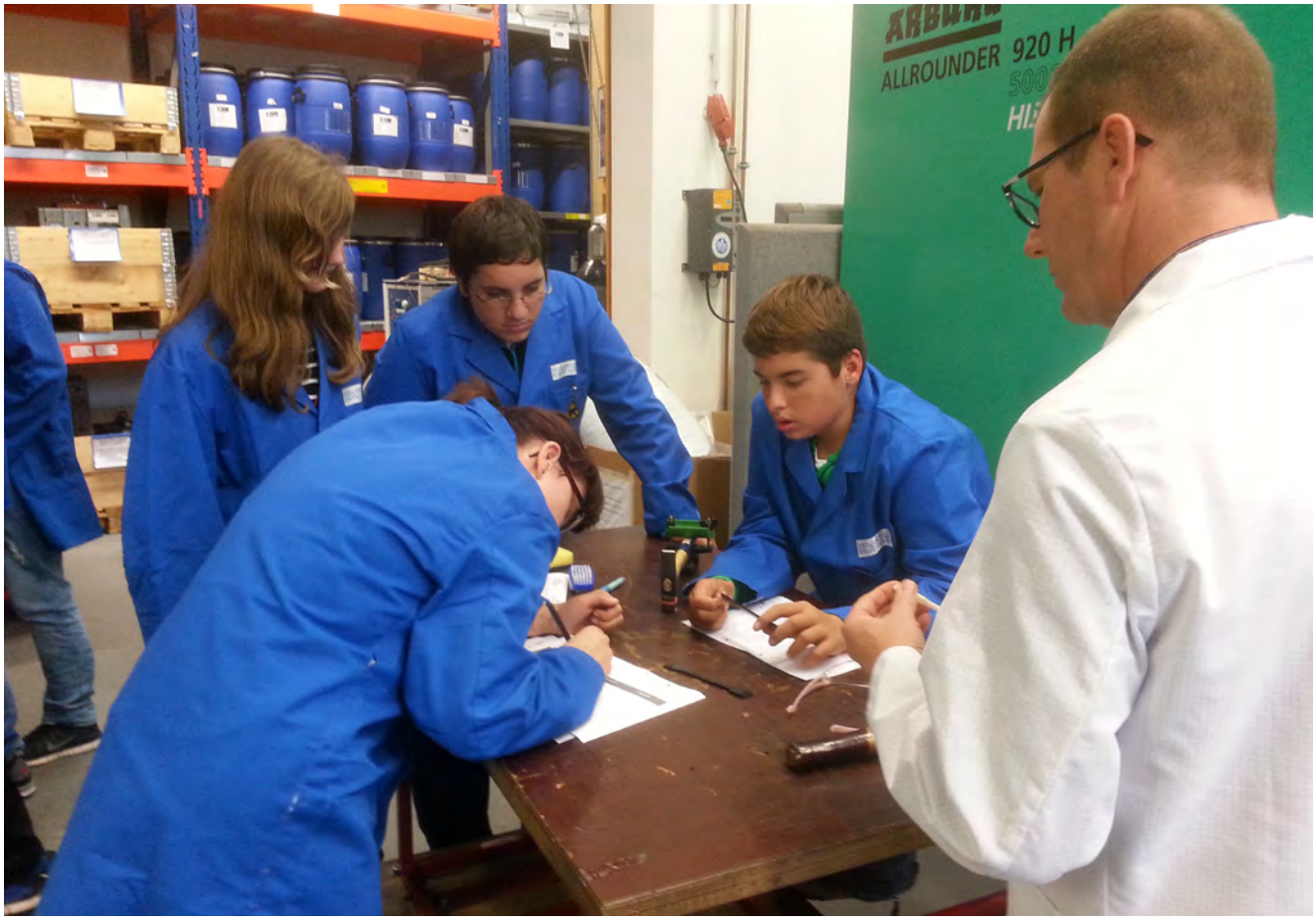
Cluster participants: 272
State: Bavaria
The innovation cluster's websites:
www.carbon-composites.eu
Link to the cluster service:
ww.carbon-composites.eu/de/wisse/

Participants in the trainee programme

4.2.3 Plastics Institute for SMEs in NRW - Polymer Training Centre

The "Plastics Institute Lüdenscheid" cluster is a well-functioning, constantly growing network, aimed at sustainability and kept in operation wholly by industry funding. By grouping together the competences of various companies and institutions throughout the technological value chain, the goal is to stimulate and to secure the participants' growth, employment and competitiveness. Since its foundation, the points of emphasis in the subject matter have been plastics technology and surface technology. This includes educating and advising, researching and developing, testing and analysing, and projects spanning across organisations, in the following technology areas: application technology/process integration; materials techniques / new materials; basic training and advanced training; products / licences; the technology of testing and of analysis; surface technology on preformed parts; as well as tool technology and layering technology. The cluster includes companies and research institutions from different activity sectors, working on joint research and development projects, so-called "projects for communities of companies"; the cluster also organises offers of training for the members.

The cluster-management team offers a comprehensive programme of basic and further training for plastics processing, specifically tailored to the needs of that sector's companies. Each year around 300 events are held in the tuition areas, on more than 70 different technical topics, including the cluster members' own lecturers and external ones; in addition to seminars, this includes specialist forums and tuition programmes lasting a week. So each year more than 2,500 seminar participants come to Lüdenscheid for these activities. There are also around 150 tuition events specific to particular companies; in this context, whole departments from a company get a training programme tailored to their needs, of which the practical element mostly comprises more than 50 per cent.



Group work

The Plastics Institute Lüdenscheid invested more than 5 Million Euro. in the Lüdenscheid facility for the training concept aimed at securing the supply of specialists. It is appropriate to point out the building and operation of the Polymer Training Centre (PTC) here. On five floors, the newly-conceived PTC provides a technical facility, laboratory and seminar areas, and offers tuition specifically on plastics technology, thereby adding to the plastics institute's already very extensive offer of vocational training opportunities.

At all times around 50 students are enrolled in the face-to-face based and distance-learning-based study courses; these are run in cooperation with the PTC by (Southern Westphalia's) Fachhochschule Südwestfalen University of Applied Sciences. Another of the PTC's points of emphasis is to attract specialists as companies' new incoming talent. This already starts at school age, with seventh-year classes from non-vocational schools being invited to complete a circuit of activities based on working practice. On both days of a two-day event, 300 school pupils get tasks related to plastics-technology; they must then solve these by getting around the course. By now 25 local schools and ten local firms take part in the event, held regularly since 2006. In addition, ninth-year and tenth-year pupils meet up in the technical centre that collaborates with the PTC, to simulate the company-internal activity sequence of a plastics producer; an injection-moulding machine is used there. By now, the official status of 'non-school place of learning' has been given by the municipal-district government to this opportunity to promote learning of MINT subject matter. The activity takes place twice weekly for 25-30 school pupils.

The PTC also hosts the vocational-training courses qualifying participants to become a "plastics-technology process manager (Chamber of Industry and Commerce)"; this course has certification from the South Westphalia Chamber of Industry and Commerce in Hagen, with more than 40 people taking and successfully completing it since 2015. Also, to date 25 participants have taken a course in Lüdenscheid, unique in Germany, that enables galvanisers of plastics to gain a technical-master qualification. Six more specialist vocational-training courses following this pattern, and planned to include the topics of 3D printing and construction technology, are now being prepared.

As a consistent principle, all the training activities take place in close cooperation with the schools, the Chamber of Industry and Commerce, the vocational-training colleges, and universities of applied sciences. For the further-training courses, there is direct cooperation with industry, with the Chamber of Industry and Commerce, and with other training organisations. The aim, apart from purely imparting practical and theoretical learning content in the PTC environment, is also to organise accommodation for the participants, and also food and drink. This enables trainees, students, company employees and lecturers to come together to work; this way, the participants not only get an insight into plastics technology; they also experience the region up close. With the Polymer Training Centre, the cluster-management team provides an unique concept specific to plastics technology, giving basic training and advanced training unmatched in terms of their type and orientation.

KUNSTSTOFF INSTITUT LÜDENSCHEID

Brief information on the cluster Plastics Institute for SMEs in NRW

Clusterakteure: 391

State: North Rhine-Westphalia

The innovation cluster's websites:
www.kunststoff-institut-luedenscheid.de

Link to the cluster service:
www.kunststoff-institut-luedenscheid.de/bilden-beraten

5 Conclusion

Innovative cluster-management teams have a wide range of services open to them, that can be offered to render support to the companies and other cluster participants. These include measures that accompany innovation, the implementation of R&D projects, and activities effective in publicity terms for the respective business sector; in addition, services related to basic training and further training form part of this.

The survey held among the "go-cluster" programme members and also the practical examples show that, for many cluster initiatives, the topic of basic training and further training ranks among cluster work's most important tasks: over 90 per cent of the cluster initiatives in the survey stated that this topic is of significance to them. This is primarily due to member companies' demand. The firms are mostly small and medium-sized operations, yet characterised by a high degree of innovative power within their respective sector. To stay competitive on the market, they need well trained staff that can keep pace with the latest state of the art and with the rapid progress dictated by digitisation. For instance the growing connectivity of machines or the Internet of Things demand specialists who know how to work effectively with autonomously-operating machines, or who are qualified for crucial security aspects of such interconnected systems.

Using seminars and further-training measures, cluster organisations can make offers available that are highly-specialised and appropriate to the given skill set, of a kind often not offered with this content by educational institutions directed at more general tuition.
For this purpose, cluster initiatives also collaborate closely with public and private providers of education, including universities. For instance the Bremerhaven wind-energy agency provides targeted advice to educational institutions in the structuring of requirement profiles for particular professions; thus it has already proved itself able to get several educational establishments specialised in meeting the wind-energy sector's needs.

Yet technical progress is not the sole area of activity in which there is a need for cluster-management teams to get involved. There is often also a shortage of specialist personnel in regions with low levels of innovation. Added to this, together with challenging economic starting conditions for certain regions, certain branches of business activity also lack attractiveness. Cluster initiatives can tackle this by acting as an intermediary at an early stage, imparting information on given business sectors and activity profiles for certain professions in these spheres of technology. For instance, particular initiatives launched by the cluster-management team put this into effect - such as Carbon Composites' bridge-building competition. This gets school pupils and trainees building a model bridge, to get them engaged with the topic of composite-fibre materials on a basis that is aimed at professional practice.
Measures such as this, with a high publicity impact, can strengthen interest in this business sector, attracting potential specialists for its future. Yet many companies perceive a shortage of interested, motivated trainees. To meet companies' demand in this regard, several cluster-management teams have set up job portals that are appropriate to the target group and specific to the respective business sector; an example is the "foodRegio" network in Northern Germany for the food sector, with its "Foodstarter" training campaign.

The decisive factor for successful services is close contact with the companies and the other players in the clusters. This is the only way that cluster-management teams can know which key qualifications are needed for future projects, for instance, and where the greatest challenges to companies are. Here cluster initiatives can bring together the demand for offers relating to basic and further training; in this way they act as a mouthpiece for local companies in a given sector in relation to higher education and chambers of commerce; alternatively, the clusters can formulate their own offers. Simultaneously they are an important partner for providers of basic training and further training measures, when the task is target-group-oriented marketing of these offers. They can thereby serve as a regional link, with a targeted interface role. What distinguishes the activities of successful cluster management is that they are based on a future-oriented cluster strategy with key areas of action. So particular success goes to measures not driven by chance but rather built up strategically, one upon another.

Not all cluster services can simply be transferred to other cluster initiatives. Framework conditions – always a factor – must be borne in mind, including (among others) the region's economic power, the prevailing political background or also the given business sector's attractiveness and innovative power. Cluster-management teams integrate into the regional innovation system and have extensive knowledge of their member firms' needs. Therefore it is clear that they can contribute decisively to success, also in mastering future challenges such as the shortage of specialist personnel.

Measures serving as examples in the context of “targeting new specialists”
• Analysing the qualitative shortage of specialists in relation to the given business sector • Participating in job fairs aimed at recruiting new recruits • Targeted campaigns directed at graduates and trainees, through offers made in collaboration with universities and with the cluster initiative’s member companies (e.g. “job shuttle”)
Measures serving as examples in the context of “basic training and further training of specialists”
Basic:
• Developing an autonomous (online-based) information exchange, connecting those seeking and those offering training-course places • Participating in the development of vocational-training courses • Acting as an intermediary for places on placements and vocational-training courses • Developing or co-initiating courses of study at universities and other higher-education institutions
Further:
• Analysing requirements for basic and further training courses, specific to given business sectors • Providing support / full conceptual process on measures aimed at basic and advanced training • Organising and implementing events and seminars on qualification

6 Literature and sources

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7 The "go cluster" programme

"go-cluster" is the measure of excellence on cluster policy from Germany's Federal Ministry for Economic Affairs and Energy (BMWi), bringing together the top-performing national clusters of innovation. The innovation clusters command excellent structures. They render support, well-attuned to demand, to the players participating in the clusters, spanning various fields of activity. The clusters forming part of the "go-cluster" programme are front-runners in innovation, reflecting Germany's high degree of expertise across numerous business sectors and fields of technology.

The "go-cluster" programme provides support to the innovation clusters in their ongoing development towards becoming internationally excellent organisations, through provision of advice and services. Innovative cluster services such as "cross-cluster" concepts are nurtured. Europe-wide and international networking among innovation clusters is strengthened.

As a point of principle, the programme is aimed at all high-performance innovation clusters from Germany. A precondition of acceptance is fulfilment of excellence criteria in the realms of "structure and composition", "cluster management and structure", "activities and cooperations" and also "visibility and effects". Acceptance is given via an application process. The application documents are available on the Web at www.go-cluster.de.

Whether for cluster managers, cluster members or representatives from politics, business and the scientific community: for every target group, "go-cluster" offers services directed at matching the client's demand. For innovation clusters taking part in the programme, the following free-of-charge service and provision of advice are available:

- Attestation to the innovation cluster's quality and performance-capability, through uniform evaluation criteria, taking the European quality standards as their orientation
- Use of the registered "go-cluster" brand wording and brand visual image, as a seal of quality,
- Bearing the costs for the European benchmarking and certification process, to obtain the bronze label and silver label of the European Cluster Excellence Initiative (ECEI);
- Effective presentation of the innovation clusters in publicity terms, on the central Internet portal for Federal Government policy, "Cluster Platform Germany";
- Provision of individual advice on topics such as further development of strategy, financing, further development of the service offering, sustainability and stability of cluster structures
- Seminars on the latest cluster-management topics and cluster instruments;
- Presentation of the cluster work and selected innovative successes to the general public (events, newsletters, Internet portals);
- Integration and increased level of visibility in the Federal Government's economic-policy initiatives
- Networking activities with the high-performance innovation clusters from Germany and Europe..

The Cluster Platform Germany is the joint information portal of the Federal Ministry for Economic Affairs and Energy and the Federal Ministry of Education and Research respectively. It provides you with a user-friendly, compact overview of the cluster-related activities at individual state level, German national level, and EU level. Germany's diversity of clusters is also presented by means of a research tool that offers various search categories.

Are you interested in the "go-cluster" programme?
Do you have questions?
Information, advice and service offers:
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Steinplatz 1
10623 Berlin
Hotline: +49 30 310078-387
E-Mail: info@go-cluster.de
www.clusterplattform.de

www.bmwi.de