Bavarian Ministry of Economic Affairs,
Regional Development and Energy

CLUSTER INITIATIVE BAVARIA

IN THE NETWORK TO SUCCESS

www.stmwi.bayern.de

Cluster Initiative Bavaria

The Cluster Initiative Bavaria is an important component of Bavaria's innovation policy. Bavaria as a whole benefits from the vitality that the clusters bring to innovation, and so does every participating company. Thanks to the professional work of the cluster teams, participation in the clusters provides access to an extensive network incorporating companies of all sizes – from specialized suppliers to producers to service providers – along with distinguished research institutions and universities as well as specialists with outstanding qualifications.

The examples in this brochure impressively illustrate the broad range of services offered by the clusters for the entire value chain in the respective industrial sector. Activities range from workshops and joint trade fair stands to joint projects and continuing education offers. However, networking also extends beyond the respective sector. Cross-cluster projects aimed at realizing synergy effects with other networks are an example. Also, the Zentrum Digitalisierung.Bayern (ZD.B) as a cluster initiative partner focuses and concentrates on the cross-sectoral issue of digitalization within the clusters.

The successes of our clusters justify our continued support for the Cluster Initiative Bavaria. Hopefully, this is an incentive for you to get involved with future technologies and the traditional sectors of Bavaria's economy in one of the 17 clusters.

Hubert Aiwanger
Bavarian State Minister of
Economic Affairs, Regional Development and Energy

Roland Weigert
State Secretary in the Bavarian Ministry of
Economic Affairs, Regional Development and Energy

CLUSTER INITIATIVE BAVARIA

The path to innovation and growth

As part of its cluster policy, the Bavarian State Government supports the establishment of state-wide platforms in high tech industries and traditional key sectors of the Bavarian economy. The central task of the cluster platforms is to interlink enterprises as well as companies and research institutes. The objectives of the cluster platforms are

- to strengthen the entire value chain from research to the end product in Bavaria,
- to promote competitiveness through cooperation,
- to convert research results into new products and services, and
- to ultimately increase the overall innovation dynamics in Bavaria.

The clusters' recipe for success

The cluster policy exploits the context, which has been confirmed by numerous international studies: The competitiveness of companies is very significantly influenced by local factors – in spite of globalization. A dense industry network of well-known companies, ambitious start-ups, specialized suppliers, excellent universities and colleges, focused research institutes, as well as highly qualified specialists, forms an agglomerated innovation potential, concentrated at one location. Clusters build on these unbeatable advantages of geographic proximity and promote them through their daily work: The close interlinking of industry and science in a sector or in a field of technology allows innovative ideas to fall on fertile soil, thrive in an optimal environment, and mature in a favorable climate.

STRUCTURE

Efficient structures

The term »cluster« at this point in time is used quite loosely in common parlance. Bavaria's cluster policy is characterized by the following structures:

17 competence fields

The Cluster Initiative Bavaria was initiated in 2006 and currently supports 17 cluster platforms in significant competence fields within Bavaria's economy. The emphasis is on technology-oriented and industry-oriented innovation clusters. The thematic variety of the cluster initiative indicates the diversity of Bavaria's economy. Consequently, the cluster policy has established itself as an effective instrument for high tech industries, and also for important traditional sectors of the Bavarian economy.

Cluster management

Each cluster platform has a professional cluster management team. Competence and commitment are key elements when it comes to establishing a cluster as a statewide hub for information, communication, coordination, knowledge, transfer, and innovation in the respective field. In every cluster platform, volunteer cluster spokespersons provide support in strategic alignment and control: Cluster spokespersons are outstanding personalities from industry and science who bring their know-how, personal network of relationships, and prestige to cluster activities. In dialog with the cluster management teams and cluster spokespersons, advisory boards and working groups identify topics that provide the enterprises with significant added value and give each cluster a clear competence profile. Quite often, new cooperation and specific research and development projects emerge from such topics. Thus technology transfer succeeds, and in this manner companies for which R&D previously had not been a factor are brought together with knowledge holders.

The professionalism of the Bavarian cluster offices is also reflected by the numerous labels of the European Cluster Excellence Initiative awarded to them by the European Union.

Active overarching networks

The cluster teams strengthen their respective network of enterprises and research institutes throughout Bavaria:

- The cluster policy places special emphasis on networking the Bavarian small and medium-size enterprises (SMEs) – unlike large companies, smaller companies often lack opportunities to find suitable cooperation partners and research institutions, and the possibilities to bring innovations to the market on their own.

- The cluster teams bring companies of all sizes together along the respective value chain. The more lead companies, competent suppliers, and well-versed service providers that participate, the better a cluster functions. Entirely new business contacts and opportunities that would not have been possible without the neutral work of the cluster management teams sometimes develop as a result.

- Bavarian universities and research institutes are also an existential component of the clusters: They participate in the clusters and, with their knowledge, research laboratories, and the know-how of their scientists, researchers, and application-oriented problem solvers, they significantly enhance the capabilities of the clusters.

- The cluster teams expressly integrate all relevant enterprises and research institutes throughout Bavaria. After all, the cluster policy extends to all regions of Bavaria, since the entrepreneurial as well as the scientific excellence in Bavaria is found in the urban centers and also in rural areas.

Cross-cluster projects

Aside from networking efforts within the respective cluster, cooperation between clusters is increasingly gaining importance as well. In what are known as cross-cluster projects, several cluster teams join forces to bundle the innovative capacity of their member companies and institutions for a special project. Highly innovative solutions that would not have been possible without cooperation between the clusters are often developed in these projects.

Ten cross-cluster projects subsidized by the Bavarian Ministry of Economic Affairs were implemented under the Cluster Initiative Bavaria in 2016 through 2018. Two successful examples for this cross-cluster cooperation follow:

Cross-cluster project »HoKuRo« – road mapping process to initiate technology cooperation for biobased wood and plastic materials

Participants

- New Materials Cluster
- Forestry and Wood Cluster

Project content

Preparation of a technology road map to determine the potential of innovative wood-based composite materials. Technologies, applications, and future market opportunities for biobased wood and plastic materials were worked out in the course of expert workshops and interviews. Based on the technology road map prepared on this basis, select companies (wood processing industry, plastic/composite materials industry, technology suppliers/developers from industry and science) were brought together and strategic development cooperation projects were initiated.

Cross-cluster project »Recycling Management in the Construction Industry«

Participants

- Environmental Technology Cluster
- Energy Technology Cluster
- New Materials Cluster

Project content

Construction waste accounts for the bulk of waste accumulation, both nationally and internationally. The construction sector is also considered one of the biggest consumers of resources worldwide. Construction rubble disposal and recycling are therefore more relevant than ever before. Mineral construction waste is an important source of resources for the future. Challenges and potential drivers for more recycling in the construction sector were identified on the basis of expert interviews. Solutions were sought for the energy and resource-efficient disposal and recycling of mineral construction waste in order to stimulate innovations in the areas of construction material recycling and development.

With its consistent focus on digitalization, the Zentrum Digitalisierung.Bayern (ZD.B) is a unique research and cooperation platform in Germany. The purpose of the ZD.B is to strengthen digitalization competencies in science and industry, and to realize the tremendous potential of digital technologies for Bavaria.

The ZD.B accelerates the transfer of knowledge by networking enterprises, start-ups, universities, and research institutions across Bavaria. As part of Bayern Innovativ GmbH, Bavaria's corporation for innovation, technology, and knowledge transfer, the ZD.B expands its sphere of action by converging the existing networks of know-how carriers and users, and by bundling the respective expertise in a wide variety of initiatives. Scientific research by universities and economic innovations in companies are promoted and closely linked by the measures of the ZD.B. Thus the ZD.B helps entrepreneurs and founders master the dynamic pace of digitalization.

Topic platforms

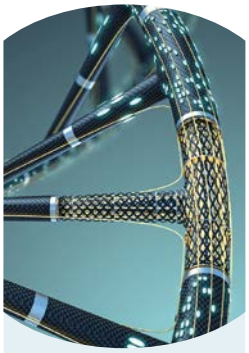
The ZD.B topic platforms for the core topics of digitalization form the operational link between university research, non-university research, and industrial research and development. They bring the various players together and offer an information exchange and activity forum for central digitalization topics. Through networking activities, events, and the initiation of projects, they promote the exchange of subject matter.

The three main objectives of the topic platforms are:

- Exchange of information and transfer of knowledge between research and practice
- Networking industry, science, and public sector players
- Joint project work in research associations

Each topic platform is represented by a team of speakers with industry and science representatives, with operational management by a platform coordinator. Their tasks are the functional design of the topic platforms and the organization of platform activities.

The 17 cluster platforms of the Cluster Initiative Bavaria and the ZD.B, organized in five central megatrends



ZD.B	ENERGY TECHNOLOGY	BIOTECHNOLOGY	CHEMISTRY	AEROSPACE
POWER ELECTRONICS	ENVIRONMENTAL TECHNOLOGY	MEDICAL TECHNOLOGY	FORESTRY AND WOOD	AUTOMOTIVE
SENSOR TECHNOLOGY		FOOD	INDUSTRIAL BIOTECHNOLOGY	RAIL TECHNOLOGY
MECHATRONICS & AUTOMATION			NANOTECHNOLOGY	
			NEW MATERIALS	
			MAI CARBON	
DIGITALIZATION	**ENERGY**	**LIFE SCIENCE & HEALTH**	**MATERIALS**	**MOBILITY**

Cluster Initiative Bavaria

www.cluster-bayern.de

BENEFITS

Activities

Cluster teams within the Cluster Initiative Bavaria are active on multiple levels with their networking efforts:

- They organize the dialog between cluster players, develop key topics, and present a wide variety of industry-specific events, such as conventions, conferences, workshops, meetings, or matching activities.
- They support their members in word and deed, they provide information and reports on market trends, research findings, technologies, and funding opportunities.
- They coordinate the acquisition of national and international financial assistance.
- They initiate and accompany national and international research and development projects.
- They facilitate contacts to national and international networks, organize joint trade fair stands, and establish access to foreign markets.
- Clusters also incorporate start-ups in their networking activities. Thus, both established and newly founded companies benefit from new business opportunities.
- The clusters engage in an ongoing strategy process within their relatively broad thematic framework through feedback with their member companies. New, often disruptive technology trends are taken up and made accessible to the member companies. Bayern Innovativ GmbH, Bavaria's corporation for innovation, technology, and knowledge transfer, provides the clusters with a methodology pool for this purpose (e.g. trend monitoring and technology road mapping).

Clusters create added value

With these multilayer cluster team activities, cluster players experience concrete support and genuine added value. Targeted information and effective networking with other companies in the same value chain as well as the lasting, comprehensive integration of university and non-university research competence creates new impetus and leads to additional partnerships, cooperation, and projects. Thus innovations occur, with which the companies develop new business areas, expand into new markets, and create new jobs. Focused networking contributes to a sustainable increase in competitiveness and the innovative strength of the individual participating companies. Companies in clusters are more innovative, productive, dynamic, and grow faster.

Thus the effective cluster policy also promotes all of Bavaria as an industrial location!

Track record of the cluster policy

The work of the cluster teams is highly successful and they have developed a widespread impact in the Bavarian economy. A look at the key indicators makes it clear just how important and right the cluster policy has been for Bavaria since the launch of the cluster initiative in 2006 (status: December 2019):

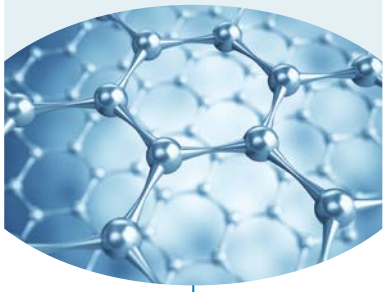
- With more than 12,900 individual events – ranging from major conferences to thematically highly specialized working groups for a small expert audience – the clusters have reached more than 690,000 participants.
- Through countless individual discussions with cluster players, the clusters have been able to initiate more than 2,000 projects with 13,000 project participants.
- In this process the clusters have acquired more than €282 million of federal financial assistance and more than €53 million of EU funding for their member companies.

The clusters also perform general industry-promoting tasks for the Bavarian State Government, e.g. in the areas of foreign trade and delegation trips.

Service spectrum of the clusters in the Cluster Initiative Bavaria

NETWORKING

Workshops, seminars, and training, also across clusters



TECHNOLOGY SCOUTING

Trend monitoring and digital innovation platforms

QUALIFICATION

Informative, up-to-date, and practical

Cluster Initiative Bavaria

RESEARCH AND DEVELOPMENT PROJECTS

For product and process innovations

ACCESS TO FUNDING

EU, Germany, and Bavaria

ACCESS TO FOREIGN MARKETS

Delegation trips and joint trade fair stands

CLUSTER-PLATFORMS

bavAIRia
Europe's heart of aerospace and navigation

AEROSPACE CLUSTER

Excellence in aviation, aerospace, and space applications

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Bavaria is one of the most prestigious aviation and aerospace locations in Europe. Approximately 38,000 employees generate a turnover of more than €11 billion a year. Bavaria stands for total system capacity and covers the complete value chain in the civil as well as military aviation and aerospace segments – from research and development to production to in-service support and service providers, such as users of aerospace data.

The enterprise landscape ranges from small innovative suppliers to multinational groups; with 18 Bavarian research institutes and universities, the research infrastructure is optimally formed. An extensive start-up community is developing in Bavaria, benefiting from good contacts with customers and clients as well as extensive support on the way to market entry.

Objectives and focus areas

Aviation, aerospace, and aerospace applications are important growth and innovation drivers for the Bavarian economy. bavAIRia e.V. headquartered in Oberpfaffenhofen has extended its cluster management with over 320 members since it was founded in 2006. The predominant objective is to increase international competitiveness of the industry in Bavaria. Prioritized action fields include strategic direction, technology transfer, marketing/international visibility, supply chain management, and the training and further education of specialists. Various event formats are offered, such as working groups, seminars, and bavAIRia business breakfasts devoted to current topics, for example, digitalization, project management, and export control.

Current key topics are:

- Networking industry players on current topics
- Pursuing current issues under Bavaria's aviation/ aerospace strategy (unmanned aircraft systems (UAS), supply chain management, Copernicus, GNSS)
- Knowledge and technology transfer
- National and international projects with Bavarian industry partners and research institutions

The cluster has an extensive network of contacts with companies, research institutions, ministries, public authorities, aerospace agencies, and cluster organizations both domestically and abroad, which is used in particular to support internationalization.

Unmanned aircraft systems

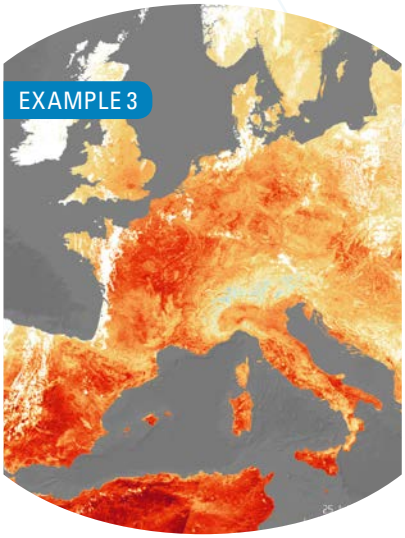
The field of electrical unmanned aircraft systems (UAS) is one of the aviation industry's most dynamic technology drivers. The Bavarian Aviation Strategy 2030 further substantiates this, since UAS is listed as one of five future key technologies. bavAIRia is actively engaged in UAS, a topic with future relevance, and has established the »UAS Forum« as a successful networking event since 2014.

Essential objectives include promoting the acceptance of UAS and minimizing existing development impediments. Another focal point is the ongoing expansion of a pilot and testing center for the lower airspace in Oberpfaffenhofen/Manching, enabling the further development of UAS and their integration into the airspace.

Supply Chain Excellence Initiative

The structural transformation in the aviation supplier industry is driven by the aircraft manufacturers. This bears opportunities but also risks for the supplier landscape, which is primarily characterized by small and midsized enterprises.

To support these companies, bavAIRia together with the aviation associations established the Supply Chain Excellence Initiative and extended it to what has now become a nationwide initiative. The objective of the initiative is to further increase global competitiveness in Bavaria and in Germany. In this regard, the exchange of best practices and programs to improve performance are organized.



CoRdiNet – earth observation for digitalization

The Bavarian Copernicus Office was accepted as a member of the global network of Copernicus Relays by GD GROW, the European Commission's Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs, in 2017. A direct link to the EU, which operates what is currently the world's most comprehensive civil earth observation program, guarantees first-hand information and facilitates support for cluster participants in Bavaria through European projects such as CoRdiNet (Copernicus Relays spanning a digital Network). Targeted information events such as the Copernicus Working Group, webinars, and international networking events ensure that Bavaria maintains its leading digitalization position in the geoinformation field.

Cluster Automotive

AUTOMOTIVE CLUSTER

Shaping | Future | Together

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The Automotive Cluster intensifies collaboration between companies and research institutes. The objectives are to further enhance the innovativeness of Bavaria's automotive industry and to generate new added value.

The service offering includes scouting trends and technologies, finding cooperation partners, technology forums and cluster meetings at the facilities of companies and research institutes, the moderation of working groups and workshops, and the initiation and management of cooperative projects. Furthermore, the cluster as driving force gets involved in activities of Bayern Innovativ GmbH that extend across industries and across technologies.

The cluster takes up topics with relevance for the future, deals intensively with these topics on project level, and supports its players with access to funding programs. In this regard, regional, national, and international key personnel are brought together and all levels of the value chain are integrated as far as possible. The networking of, in particular, small and medium-sized enterprises (SMEs) with vehicle manufacturers and system suppliers as well as scientific institutions is one of the essential aspects of network activities.

The cluster is comprised of more than 500 companies and institutes from the automotive sector and from all competence fields relevant for the automobile.

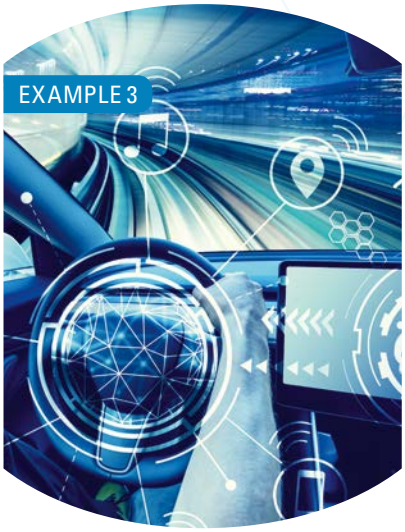
Objectives

- Strengthening regional value creation
- Identification of future technologies
- In-depth study of relevant topic areas
- Intensification of networking between cluster players
- Promotion of open innovation in small and mid-sized businesses
- Strengthening the activities in the topic area of electromobility and mobility concepts
- Accompanying the transformation processes of the automobile industry

Platforms

Aside from networking, platforms such as cluster gatherings, forums, or workshops also serve to identify key topics and to »condense« technology issues.

The cluster is a first-hand source for information concerning trends, technologies, and markets. In addition, the cluster organizes workshops and working groups that have a trust-building effect and establish the basis for future cooperation. In this regard cluster management acts as a neutral moderator.



Best practice internationalization

The Automotive Cluster connects Bavarian mobile value creation players with international networks – in Europe and beyond.
Ten partners from Germany, France, Italy, Austria, Slovenia, and Switzerland within the framework of the INTERREG Alpine Space project »Care-4Tech« have analyzed concepts for smart mobility solutions and contributed cross-national problem-solving approaches in a Smart Mobility Alliance. Virtual living and innovation labs in each of the participating regions now provide innovation and technology transfer platforms. More than fifty new project ideas have already emerged from this. Over the next three years, the Automotive Cluster jointly with the Electromobility Competence Center Bavaria will establish e-hubs with e-mobility rental offers in 15 European regions.

Best practice electromobility

New registrations will be limited to electrical vehicles only in more and more countries over the coming decades. The industry therefore sees itself forced to offer affordable vehicles suitable for everyday use as part of the portfolio. Production capacities along the entire supply chain need to be redesigned. This results in changes in the established vehicle industry as entirely new vehicle concepts are brought to market. The Automotive Cluster is accompanying the implementation of a TU Munich research project culminating in a new vehicle manufacturer. The »aCar« from evum Motors will provide environmentally friendly, economical electromobility appealing to new customer groups, not only in the agricultural sector but also in trades, business, municipal operations, and industry. A Bavarian start-up, now with more than 40 employees.

Best practice supplier innovation days

Supplier innovation days hosted by automobile manufacturers or system suppliers give automobile industry suppliers the opportunity to introduce future-oriented technologies and product ideas directly to users. This platform provides companies with an excellent opportunity to present their innovations in the fields of technology, materials, quality, and processes directly at the facilities of the manufacturer. A targeted advance selection process increases the chances of success.
Developers, purchasers, and innovation managers selectively meet the invited companies at the trade fair stand. A presentation in the course of the accompanying series of lectures provides a basis for further cooperation talks.
The supplier innovation days supported by the cluster constitute an important element for the formation of a high-performance supplier network.

Cluster
Railway Technology

RAILWAY TECHNOLOGY CLUSTER

Innovation network for the entire value chain

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The German rail industry generates annual revenues of approx. €12 billion and thus holds a significant share of the world market. Some of the largest and most significant German rail transport suppliers are located in Bavaria. The industry structure in Bavaria is characterized by global players, such as Siemens Mobility GmbH, Knorr-Bremse SfS GmbH, and a number of innovation-focused, highly specialized SMEs. The largest European rail enterprise, Deutsche Bahn AG, has established its central development center, DB Systemtechnik GmbH, in Bavaria.

Objectives, tasks, and focus areas of the cluster

The cluster bundles the competencies of strong regional railway technology partners along the value chain and strengthens their global competitive position by, for example, initiating innovation projects. Innovative projects are initiated in four steering committees. A number of project groups have been formed for specific project development from within the steering committees.

The topic focus areas of the four steering committees are:

- Infrastructure and energy
- Operation and maintenance
- Train control and protection
- Vehicles

Multiregional events, such as the »Forum Railway Technology Bavaria«, are organized by the Railway Technology Cluster for the further exchange of current developments.

The Railway Technology Cluster is managed by CNA e.V. In addition to the Railway Technology Cluster, CNA also coordinates the Logistics Initiative Bavaria on behalf of the Bavarian State Ministry for Housing, Building, and Transport. CNA aims to strengthen and continuously develop the transport and logistics sector's competitive position along the value chain.

Hybrid shunting locomotives

The successful »Hybrid shunting locomotive« innovation from the Railway Technology Cluster came about in collaboration between ALSTOM Deutschland AG and Deutsche Bahn AG. Through use of hybrid propulsion technology, it was possible to develop a new, environmentally-friendly and energy-efficient generation of shunting locomotives that consume 50 percent less fuel, have 70 percent fewer emissions, and offer annual cost savings ranging from €40,000 to €60,000 per locomotive. An eight-year practical trial has been underway since 2016 in the Model Region Franconia, at the Würzburg and Nuremberg sites. This is where five H3 shunting locomotives with hybrid technology are in service. The Model Region Franconia for innovative rail propulsion systems was founded in 2012 with the involvement of the cluster.

Innotrans trade fair

Due to the great success of joint exhibitors and the network in past years, the Railway Technology Cluster joint trade fair stand has been a fixed component of annual planning since 2008 at Innotrans, the world's largest trade fair for the promotion of rail. The members are enthusiastic about this presentation opportunity. Large companies demonstrate their participation in the network and SMEs can have their own trade fair presence as part of the joint stand in an attractive environment at a reasonable cost. Innotrans Berlin, the leading international trade fair for rail technology, additionally offers an outstanding opportunity for boosting the name recognition of the Railway Technology Cluster beyond the borders of Bavaria.

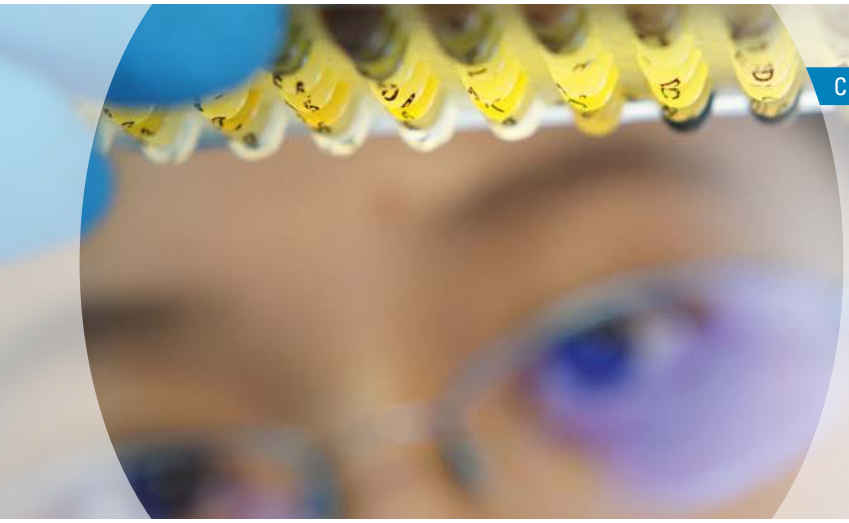
ERCI – European Railway Clusters Initiative

For collaboration on the European level, the Railway Technology Cluster has come together since 2010 with fourteen European rail technology innovation clusters with the objectives of exploiting synergy effects, learning from best practice examples, and further extending the network. Overall, the competitive ability of the regions is to be increased and collaboration on the European level is to be supported. Participants in the ERCI network come from twelve European countries: Belgium, Denmark, Germany, England, France, Italy, Austria, Poland, Serbia, Sweden, Spain, and Turkey. Like the Railway Technology Cluster, all partner networks are innovation-driven and pursue the goal of networking representatives from industry and science, thereby initiating innovative projects.

CLUSTER
BIOTECHNOLOGY
BAVARIA

BIOTECHNOLOGY CLUSTER

Innovations for health



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With more than 240 companies active in the area of biotechnology and nearly 170 additional companies from the pharmaceutical sector as well as clinical research and development, Bavaria takes a leading position in medical and biopharmaceutical biotechnology in Germany.

The Biotechnology Cluster bundles the strengths of the sites in Munich/Martinsried (including Planegg-Martinsried and Freising-Weihenstephan), Regensburg, and Northern Bavaria (Würzburg, Erlangen/Nuremberg, Bayreuth), and actively integrates institutes from other Bavarian regions in the Bavaria-wide network.

The focus of the cluster's work is the identification, through active technology and product scouting by local partners at academic institutions, of research projects that can be commercialized. For promising ideas, the cluster organization offers the m4 Award as a special, Bavaria-wide funding program for project validation with the goal of founding an enterprise. Eight enterprises have already been founded by winning teams in the course of five tender offers to date.

A knowledge-based, highly innovative industry has developed over the past 20 years. Its international importance is expressed through a global network of cooperation partners.

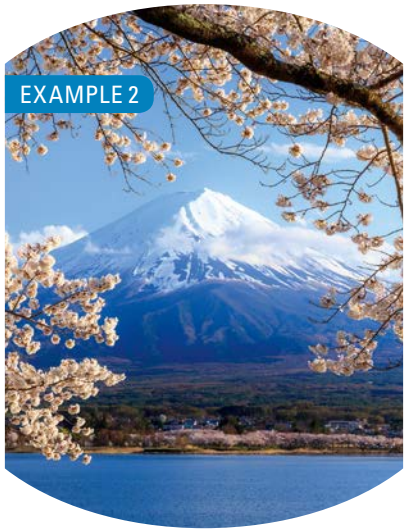
In the extremely protracted, high-risk, and expensive product development cycles for new medications, Bavaria has been able to establish itself as a location for the early identification and validation of suitable drug candidates.

In addition to a number of successful SMEs with specific products or technology offerings, one of Europe's largest research and production facilities for biopharmaceuticals – Roche in Penzberg with currently more than 6,000 employees – is located south of Munich. The complete value chain, from research to pre-clinical and clinical development to production, is a particular characteristic of this industry that is firmly rooted in Bavaria.

Another key focal point of the network is the international image and presentation of the latest technologies and products of Bavarian companies along with the excellent scientific basis of research institutions in Bavaria.

Sites with a biomedicine focus

Erlangen-Nuremberg – The European Metropolitan Region Nuremberg (EMN) is a leading international medical technology site with specialized research institutes, global market leaders, and young companies.
Munich – Most of Bavaria's biotechnology and pharmaceutical companies are located in the greater Munich region – with a focus on the development of therapeutics and diagnostics. New medications for personalized medicine are identified using big data and AI.
Regensburg – The BioRegio Regensburg is Bavaria's second-largest biotechnology region. Here the BioPark Regensburg, which also heads the »Healthcare Regensburg« initiative, is the nucleus for success stories.
Würzburg – In addition to biomedical science excellence, Würzburg offers laboratory space and a comprehensive support program for start-ups at the IGZ (Innovations- und Gründerzentrum Würzburg).



International bridges: Bavaria – Japan

InnoMuNiCH (Innovations through Munich-Nippon Cooperations in Healthcare) wants to accelerate global biopharmaceutical innovations by bundling German-Japanese competencies in research and development. Two projects identified by Bio^{M} during the concept phase are being funded by the Federal Ministry of Education and Research (BMBF) over three years within the framework of the »Internationalization of Leading Clusters, Future Projects, and Comparable Networks« initiative. The Munich companies Immunic AG and Bicoll GmbH assume leading roles in the respective consortia. Bicoll will use the funding to test a novel chip technology for the personalized therapy of inflammatory diseases. Immunic AG intends to study the effect of low-molecular active substances on the cell metabolism and their influence on the development of T-helper cells and relevant proteins.

EXAMPLE 3

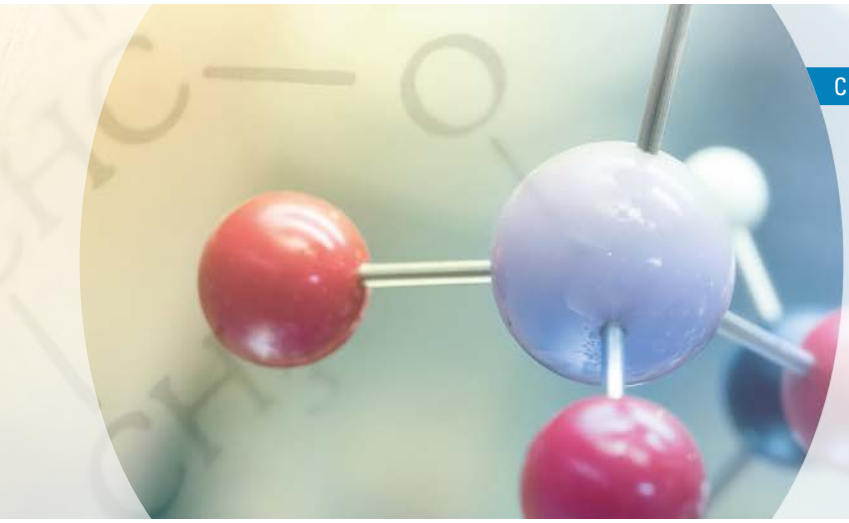
DigiMed Bayern: Biotechnology meets digitalization

DigiMed Bayern was launched at the end of 2018 with more than €20 million in funding from the Bavarian State Ministry of Health and Care. The German Heart Center Munich is in charge of scientific management. Cluster-Organisation Bio^{M} is the director. DigiMed Bayern combines extensive data sets of patients with atherosclerotic diseases such as coronary heart disease, a stroke, or genetic risk factors. Subsequently, these data sets are supplemented using highly modern molecular multi-omics characterization. An ethically and legally compliant, high-security, sustainable IT infrastructure is being fundamentally devised and implemented for the integrative analysis of the resulting big data. Patients and persons at risk will therefore benefit from the prediction of disease risks, targeted prevention, diagnosis, and treatment.

Chemie Cluster Bayern

CHEMISTRY CLUSTER

Bavaria's engine for chemical innovation



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The Chemistry Cluster Bavaria (CCB) is an established network of companies and research institutes of the Bavarian chemical industry. Covering global players, a strong SME base, and innovative research institutes, the cluster members cover virtually the entire service spectrum of chemical suppliers.

Tasks and objectives

The CCB promotes product and process innovations for new, cross-industry markets with a focus on value creation for its members. It provides support with the acquisition of funding through the »ConTact« contact center, the coordination of R&D collaboration, and the identification of new sales markets. Marketable solutions for innovative technologies and materials are developed in collaboration between large and small companies, universities, and institutes.

Business Chemistry & Innovation Platform

Sales and innovation requirements from various industries, such as aviation and aerospace, the paint and coatings industry, raw materials extraction, or the consumer goods sector are determined and coordinated with cluster members throughout Europe within the »Business Chemistry & Innovation Platform« initiative. Each year the Business Chemistry & Innovation Platform produces a variety of new industrial applications.

Network management

The CCB lives from the high level of activity of its members and close cooperation with regional and international networks and partners. Thanks to its broad range of contacts, the CCB is able to respond to special requirements and find appropriate solutions in collaboration with its members. Regular events, such as technical forums on specific topics, workshops, and start-up days, provide opportunities to obtain and exchange information on current topics.

ConTact – technology promotion & project financing

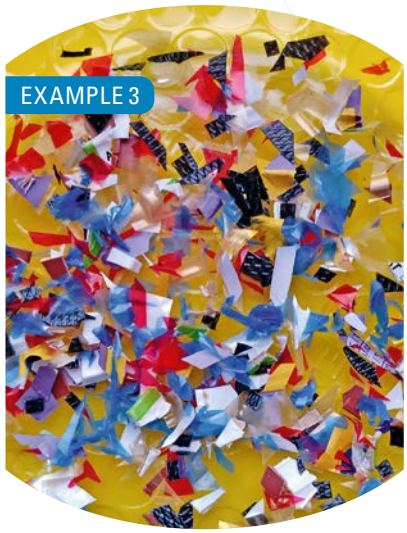
The joint contact center with the University of Bayreuth (ConTact) supports members with individual funding advice and project acquisition. A key role played by ConTact is the targeted initiation and accompaniment of cooperative projects between companies and research institutions. ConTact provides advice on appropriate funding programs, assists with project and consortium development in the application phase, and is also available for professional project management.

Bioeconomy

The Bioeconomy 2020 science year began with the adoption of the national bioeconomy strategy. As an active partner in two international projects, AlpLinkBioEco and POWER 4BIO, the Chemistry Cluster has also been dedicated to this topic for several years. In the Interreg project AlpLinkBioEco, 14 project partners are working on a strategy for a biobased economy across regional boundaries with the goal of identifying and implementing new, cross-industry value chains in the alpine region. POWER4BIO aims to support regions in the transition towards a biobased economy. New regional bioeconomy strategies are developed for this purpose and existing ones are revised. Bioeconomy is an opportunity for the entire chemical industry to further develop sustainable processes, products, and production.

Network management – start-ups meet established enterprises

Over the last few years the Chemistry Cluster has developed a strong network in the start-up scene. Promoting direct contact and bringing together start-ups with suitable member companies helps to overcome obstacles in approaching one another and also enables constructive exchange of information. Thus the CCB serves as a catalyst for innovations and new applications. There has been initial success in the areas of functional surfaces and the digitalization of existing production and transport processes. Feasibility studies for both topics are currently being conducted in the course of industrial applied research under the auspices of the Chemistry Cluster.



Microplastics

The new EU project »LimnoPlast« at the University of Bayreuth (coordinator: Prof. Dr. Christian Laforsch) received significant support from ConTact during the preparation and coordination of the application. Furthermore, the CCB is solely responsible for the overall project management and the successful implementation. LimnoPlast aims to approach the topic of »microplastics in freshwater ecosystems« from a holistic perspective.
15 young researchers from very different environmental, natural, and social sciences disciplines will be trained to tackle the complex plastics issue within the framework of the Marie Skłodowska-Curie Innovative Training Network (MSCA-ITN), investigating microplastics from the sources to the effects to technology-based and social solutions.

Cluster
Energy technology

ENERGY TECHNOLOGY CLUSTER

A strong network for the energy sector

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Be it mobility, living, or working: Energy is indispensable. Energy ensures that our basic needs are met, and it is a prerequisite for a functioning economy. The transition from fossil fuels to a supply of sustainably generated power has become one of the leading challenges of our decade. At the same time, energy technology is a major economic factor: Germany's energy technology sector with around 250,000 employees generates turnaround of about €13.4 billion.

The objective of the Energy Technology Cluster is to push collaboration between companies and scientific institutions to boost new developments and to take advantage of these challenges for the transformation of the energy industry.

Future topics

- Energy efficiency
- energy storage
- energy ecosystem considerations

Participating in the cluster activities opens up for players opportunities for the regional, national, and international networking, the exchange of experiences between industries, and the launch of joint projects.

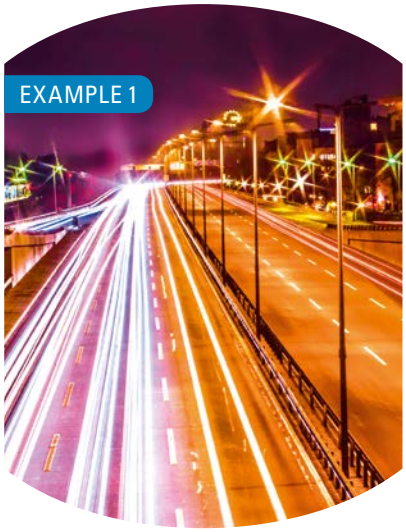
Benefits

- Knowledge transfer and cooperation partner brokering
- events, joint trade fair stands, and trade shows
- Project initiation and support

The Energy Technology Cluster organizes focused conventions, forums, and cluster gatherings to provide information about trends in science, industry, and the political context. Beyond that, the cluster actively participates in national and international projects, moderates working groups, coordinates joint projects with industry and science partners, and prepares professional studies on current energy topics.

By working with other networks and clusters (cross-cluster projects), the Energy Technology Cluster has access to all relevant sectors. This supports the comprehensive networking of its players and partners along with the presentation of their own projects at trade shows, trade fairs, and conventions.

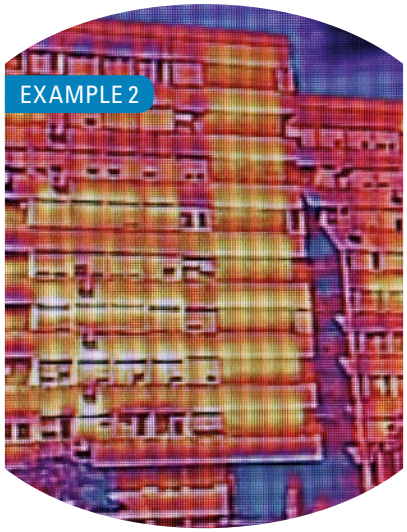
Daily energy news and industry events are published on the web platform. In the »Energy Transition« portal, professional articles by renowned authors provide information about energy generation and supply topics as well as corresponding technologies.



Energy system analysis

The »Energy System Analysis KOSiNeK« project investigates various aspects of the energy transition in view of the target year 2023. Different versions of energy systems are examined, also under consideration of international interactions.

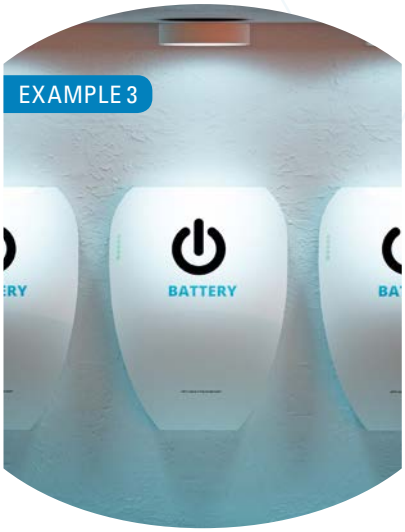
www.bayern-innovativ.de/cluster-energietechnik/seite/kosinek-energiesystemanalyse



Energy-efficient networks

BEEN-i, the Bavarian Energy Efficiency Network Initiative, supports the creation of networks. Participating companies exchange their experiences with the goal of improving energy efficiency. A Coordination Office Allocated to the Energy Technology Cluster coordinates the initiative.

www.been-i.de



Energy transition blog

The Energy Technology Cluster's »Energy Transition« blog provides information concerning essential components of the energy transition in brief, generally comprehensible professional articles.

www.bayern-innovativ.de/seite/energiewende

Cluster
Food

FOOD CLUSTER

Tradition and innovation for a leading position

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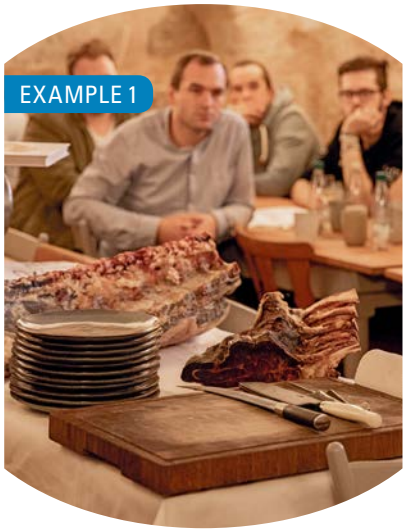
The agriculture and food sector in Bavaria, with sales of approximately €100 billion and over 700,000 jobs, is among the industries with the highest sales and one of the most labor-intensive. Traditions, combined with ultra-modern manufacturing procedures and innovations as well as effective systems for quality assurance and traceability, guarantee a leading position for the Bavarian food industry in Europe.

With the objective of increasing the competitive ability and innovation capacity of Bavaria's nutrition sector, the Food Cluster focuses on promoting innovations in the food industry. Activities and event formats encompass cross-sectoral as well as industry-specific topics. The cluster is involved in topics with relevance for the future, such as digitalization in production and retail, as well as with regional and traditional food products from Bavaria. The knowledge and expertise of universities, colleges, and research institutions is delivered in a practical manner for specific target groups, thereby enabling the transfer of knowledge to production and manufacturing.

Small to midsize enterprises are the primary target group. They in particular reach their limits or are subject to personnel bottlenecks when it comes to finding innovative, problem-solving approaches for their specific needs. The Food Cluster supports these companies with new project ideas and innovative measures, project management, professional execution, and marketing.

As the network's central platform, the cluster brings the players in the nutrition and food sector together: agriculture, the food craftwork, the producing food business, science and research, retail, service providers, and consumers. The Food Cluster also has a strong network on the international level that is committed to the concerns and requirements of companies in the agri-food industry. Presence at international trade fairs, trips abroad, or contact mediation to enterprises in other countries – the Food Cluster finds the right contact person. Likewise, the cluster forwards inquiries from abroad to competent partners in Bavaria.



Food Lab

The Food Lab Room Zero was established as the creative unit of the Food Cluster. Experts from science, trades, and gastronomy get together on several dates that can be freely chosen. Lab members work together in changing, interdisciplinary teams to gain new information about foods and their preparation. The experts examine the basic concepts of taste. The knowledge generated in Room Zero is shared online through a blog, making it comprehensible and usable for gastronomy, the food trade, and the food industry. Establishing a new identity for Bavarian cuisine is the long-term objective. Thus the Food Cluster makes a contribution to advancing new ideas and innovations.

Future Food

In industry-specific and cross-sector events, the Future Food element prepares the latest scientific findings and research results with practical relevance for companies, making them usable for innovations. The technical forums of the Bavarian food trades, such as the meat forum and beer forum, represent an important event format. This type of event defines itself as an innovation driver for Bavaria's food trade. Future Food Days are another event series. They identify the conceivable and likely developments in the food sector over the coming years. The cluster with its international orientation is also a supporter of the Global Food Summit. This event is held annually to discuss the global transformation process through disruptive innovations along the food process chain.

Food Start-ups

The Food Start-ups program is dedicated to supporting new enterprises. It focuses on promoting start-ups in the field of agriculture (see photo: Munich farmer's association with quinoa harvest) and start-ups with innovative products for food retailing. In recent years, the Food Cluster organized the NEXTLEVEL! contest. It comprised a crowdfunding component and a food start-up pitch in front of a top-class jury with potential investors. With the crowdfunding contest, the Food Cluster enables the funding of innovative food start-ups whose projects convince the crowd and thereby have a lasting impact on consumers. Establishing the Food Cluster as the first point of contact for food start-ups in Bavaria is the goal.

Cluster Forst und Holz in Bayern

FORESTRY AND WOOD CLUSTER

Climate protection, economic growth, and future opportunities for Bavaria and its rural areas

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With annual sales of €37 billion, a labor force of 196,000, and 22,500 businesses, the forestry, wood and paper sector is a key industry in Bavaria. Thanks to its high growth in sales, the sector is able to maintain its fourth place in comparison to other sectors of the processing trade in Bavaria, behind vehicle construction and mechanical engineering as well as the manufacturers of electronic equipment. This is driven in particular by wood construction, furniture manufacturing, and the sawmill industry.

In national and international comparisons, strengths include the extensive timber reserves and timber growth, the efficient businesses, the outstanding level of training of the workforce, as well as accredited teaching, research, and certification institutions.

Due to the number and variety of industry players, networking is of particular importance. Among other things, the value chain includes the forestry industry, the wood processing industry, the predominantly internationally active pulp and paper industry, the wood craftsmanship sector, and the wood energy sector.

New impetus through product and process innovations, as well as a cross-sector image initiative, should contribute to sustainably strengthening a lead industry of rural areas.

The significance of and appreciation for the renewable raw material, wood, particularly in the construction industry, will continue to increase in coming years, in light of the energy transition and climate protection efforts.

Current work focus areas

- Initiation of new networks, as well as extension of existing networks between science and industry along the forestry-wood-paper value chain
- Establishment of systematic innovation management for the industry
- Technology transfer and cooperation in the area of research and development
- Support and professionalization of Bavarian regional initiatives
- Management of expert panels on forward-looking topics such as »building with wood«, »bioeconomy« or »use of hardwood«
- Coordination of the image initiative »proHolz Bayern«, (proWood Bavaria), in which all sub-industries of the forestry, wood, and paper sector work together
- Support of the forestry multipliers in communication
- Public relations, trade fair participation, presentations, and contact talks

Innovation management

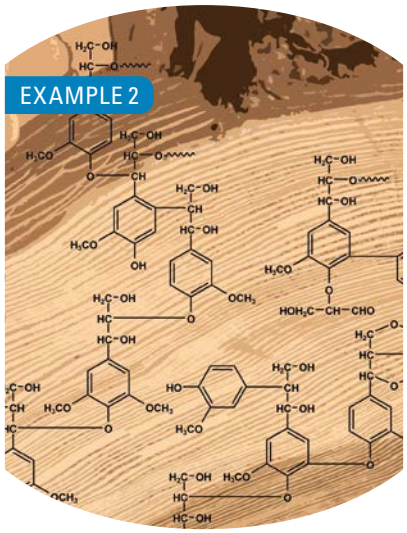
Innovations are our future. proHolz Tirol, Uni Innsbruck, Holzforum Allgäu, and the Forestry and Wood Cluster have joined forces under the Bavaria-Austria INTERREG program in the Inno4Wood project for the cross-border promotion of innovations in the forestry and wood industry.

Objectives

- Networking and strengthening the cluster and R&D structures
- Easier access to research and innovation competencies

Results

- A final brochure
- Innovation prize for eight companies
- Visits to 65 innovative companies and research institutions by wood ambassadors
- Barcamp with 200 students, scientists, and companies



Bioeconomy

Wood can serve as an important alternative to fossil raw materials and energy carriers. Efforts towards a technology transformation are therefore being made in cooperation with the Bioeconomy Advisory Council and other research and scientific institutions.

Objectives

- Networking companies and research institutions
- Rapid development of research results into product and process innovations
- Better market penetration for biobased products on a wood basis

Results

- Three cross-cluster projects with the Chemistry Cluster, New Materials Cluster, and Environmental Technology Cluster
- Two major technology transfer events
- An agenda for »Establishing a wood-based bioeconomy in Bavaria«

proHolz – Wood Passage

proHolz Bayern is dedicated to an active forestry sector and the sustainable use of wood. In a successful cooperation project, the Wood Passage was developed jointly with proHolz Austria and Lignum Switzerland. The exhibit first presented at the BAU trade fair symbolizes the path from tree to house. A winner of two architecture prizes, the passage is presented in busy downtown areas and at trade fairs. Four wooden »gates« invite access and guide the audience to information boards about the positive impact of wood construction on climate protection and resource conservation. The Wood Passage is just one example of various exhibitions, events, and intensive media relations to communicate the future opportunities of using wood.

INDUSTRIAL BIOTECHNOLOGY CLUSTER

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The Industrial Biotechnology Cluster lays the foundations and supplies ideas for trendsetting developments in many different industries. Aside from biotechnology companies and research institutions, this also includes firms in the engineering sciences, the automobile, aviation, chemicals, and lubricant industries, paper, adhesive, and environmental technologies, nanobiotechnology, and bioinformatics.

Mission and objective

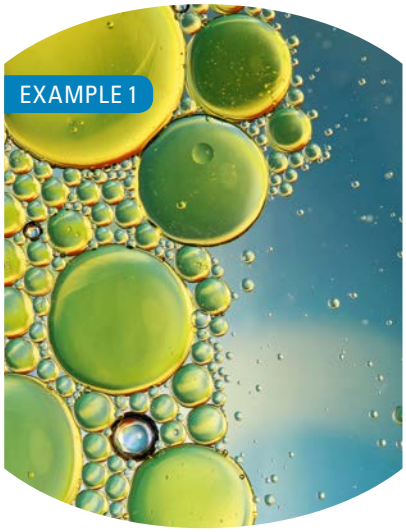
Industrial biotechnology offers numerous approaches that harbor the potential to produce a wide variety of products using environmentally friendly, resource-conserving biocatalytic methods. Using renewable raw materials or also CO_2 makes industrial production ecological and can simultaneously maintain or boost the competitiveness of a site.

In order to promote this approach, the cluster assists its members with research and development projects, organizes events for the public and industry audiences, supports start-ups, engages in site marketing, provides information about relevant activities, and creates opportunities for dialog between politics, industry, and science.

The cluster office is operated by Industrielle Biotechnologie Bayern Netzwerk GmbH (IBB Netzwerk GmbH) based in Munich.

Examples of work focus areas

- Sustainable biopolymers
  - Innovative additives for environmentally friendly lubricants
  - Biobased fibers
  - High-performance adhesives made of biopolymers
- Utilization of waste and CO_2
  - Food ingredients made of apple pomace
  - Bio-butanol made of mill byproducts
  - Biotenside production using waste materials
  - Lubricant production using CO_2
- Digitalization of biotechnology
  - Model-based glucose sensor
  - In silico prediction of optimized biological control structures
  - Online control of product quality in a protein production process
- Progressive biofuels
  - Cellulose ethanol
  - Algae kerosene
- Modern industrial proteins
- Biocompatible IoT solutions for biotechnology



IBP project

The IBP project was one of five winners across Germany in the »Bio-Industrie 2021« contest sponsored by the Federal Ministry of Education and Research (BMBF). IBB Netzwerk GmbH (the office of the Industrial Biotechnology Cluster) was founded based on this award. It has been supported by industrial enterprises and the state of Bavaria from the outset.
The objective of the IBP project was the biotechnology production of biogenic building blocks, such as ethanol and acetate, as well as performance proteins, meaning those used for industrial applications. 14 R&D projects were carried out within the IBP with public sector support in the period from 2008 to 2013.
At the end of this funding period, the established network was able to expand its activities to numerous other industrial biotechnology and sustainable economy areas.

EU projects SUNLIQUID and LIGNOFLAG

Sustainability and environmental acceptability manifest very clearly in the biotechnology approach pursued by Clariant AG to produce second-generation bioethanol (cellulose ethanol) from waste materials such as straw.
After the feasibility of the process was proven on a semi-industrial scale with the pilot plant in Straubing, self-sustaining industrial production is to be demonstrated as well in the SUNLIQUID and LIGNOFLAG projects funded by the EU. The process does not need any external supply of energy and reduces CO_2 emissions by up to 95 percent. Thus, the resulting innovation cannot only lead to an economic upswing and greater energy independence, but also offers tremendous ecological potential for climate protection.

Site marketing: Industrial Biotechnology Forum

The Industrial Biotechnology Forum (IBF) is an international conference series. The IBF was held for the second time in 2018. About 150 participants from science, industry, and politics gathered in Garching near Munich to network and learn about the latest developments in industrial biotechnology.
Leading international experts spoke on the topics of Enzyme Catalysis, Metabolic Engineering, Synthetic Biotechnology, Bioprocess Engineering/Upscaling, Bioinformatic Trends in Biotechnology, and Bioseparation Engineering. The event was held under the auspices of the Bavarian Ministry of Economic Affairs, which also invited to an evening reception.
Going forward, the IBF will carry on with focal points that have a greater industry relevance.

POWER ELECTRONICS CLUSTER

Energy-efficient control of power flow

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The role of power electronics is the conversion of one form of electrical energy into another form needed for a specific application as efficiently as possible, as well as the control of the power flow. Thus it is a key technology for growth industries in the areas of mechanical engineering, electrical engineering, and the automotive sector. Approximately 545 companies and institutes with roughly 110,000 jobs in Bavaria are directly involved in research and development, production, sales, and services in the field of power electronics.

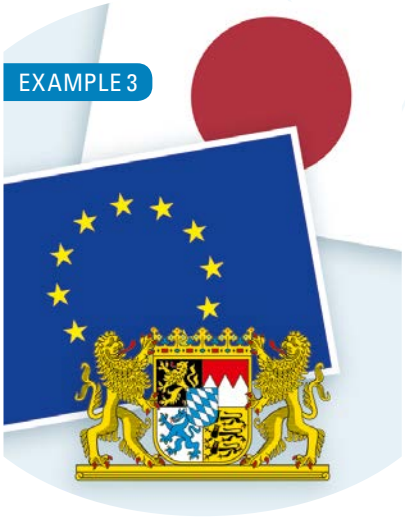
The Power Electronics Cluster within ECPE e.V. organizes specialist events, initiates and accompanies cooperation and research projects, sponsors joint trade fair participation, and executes qualification measures as well as recruitment measures for secondary education students, teachers, and university students.

Focus areas

- Power semiconductor devices (Si, SiC, GaN))
- Passive devices (inductors, capacitors, substrates)
- Circuit and control concepts
- Packaging and interconnection technology, new materials
- System integration, miniaturization
- Thermal management, reliability, and EMC
- Development tools, design, and simulation
- Test and measurement techniques
- Production technologies and Industry 4.0

Key applications

- Intelligent power supplies with extended functionality
- Energy-efficient devices and systems, power management
- Electrical drives (industrial drives, railway technology)
- Automation technology and robotics
- Electromobility
- Grid integration of renewable energies
- Electrical transmission and distributed networks (smart grids with storage integration)



Cluster events: seminars and training courses

Since 2006, the cluster in the course of specialist events such as training courses, seminars, joint trade fair stands, and expert talks has offered the opportunity

- for companies and research institutes to present their innovative solution approaches for current power electronics issues, and
- for employees of companies and research institutes to obtain qualifications in different areas of power electronics.

Event topics include the fundamentals of power electronics, devices, switching concepts, thermal management, drivers and protective circuits, control technology, EMC, packaging and interconnection technology, design and simulation tools, and testing technology.

IsoGap research project

The cluster supports its players through the initiation, conceptual design, and accompaniment of research and application projects in collaboration with companies and research institutions.

The IsoGap project examines high-temperature materials and reliability tests for the new generation of wide bandgap power electronics, where fast switching speeds and a high energy density impose special requirements on the packaging and interconnection technology.

An offshoot of the Cluster Internationalization, IsoGap also encompasses an international component with the exchange of information and materials with a Japanese partner association from the Kansai region.

Cluster Internationalization – cooperation with Japan

The Power Electronics Cluster in cooperation with the European research network ECPE organizes numerous platforms to network cluster players with the European power electronics community. Examples include international workshops in the cluster region, a joint trade fair stand at Europe's leading power electronics fair, and research projects.

In the course of the internationalization measure sponsored by the Federal Ministry of Education and Research (BMBF), the cluster has been strengthening cooperation with Japan since 2016. The two innovation regions are jointly working on the wide bandgap power semiconductors, silicon carbide and gallium nitride, with coordinated strategies and joint projects aimed at achieving a breakthrough.

MAI CARBON CLUSTER

MAI Carbon – bundled competence for CFRP applications

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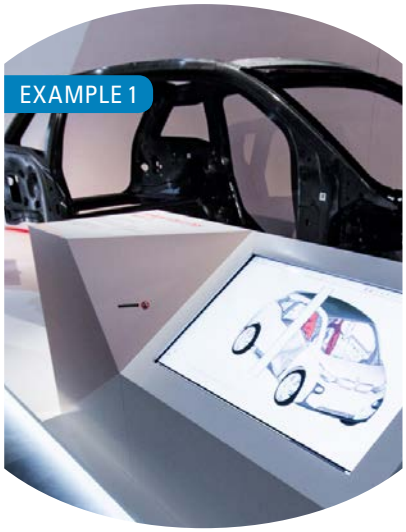
The MAI Carbon Cluster of Composites United e.V. (CU) in Bavaria pursues the objective of implementing lightweight construction technologies on an industrial scale for various user sectors. To achieve this goal, spring innovations throughout the complete component life cycle are required, i.e. starting from fiber and matrix material, through the manufacture of components and product systems, to coherent recycling concepts.

Currently more than 130 partners – who are also CU members – bundle their knowledge to further extend the technology leadership for the use of CFRP components in mass production, and to make Bavaria the world leader in the area of fiber composite technology. Intensive collaboration between well-known major companies and technology leaders of the application industries – automotive engineering, aviation and aerospace, mechanical engineering and plant construction – along with fiber manufacturers and manufacturers of semi-finished products makes the MAI Carbon Cluster unique.

Thus Bavaria has become a leading innovation center for fiber composite materials, attracting companies from all over the world. MAI Carbon networks them and provides the framework for collaboration across sectors based on mutual trust.

Cluster as a motor for the region

The concentration of all relevant companies and institutions along the value chain of future materials with carbon fiber reinforcement is a noteworthy and unique selling proposition in the tri-city area of Munich, Augsburg and Ingolstadt (MAI). Thus an ideal basis is available to leverage carbon composites material technology in various industries, such as the automotive industry, aviation and aerospace, but also mechanical engineering. The prerequisite in this regard is a networked and concerted approach coordinated by the MAI Carbon Cluster. MAI Carbon also builds bridges in international value chains and promotes demand-driven global market access in cooperation with partners. Another important aspect of the cluster's work is the ongoing further development of educational content, ranging from early childhood education to bachelor or master courses of study.



MAI Skelett

MAI Carbon has already initiated and coordinated more than 50 R&D projects. Cycle times, cost reduction, and waste avoidance during production are examples of important parameters for the further development of CFRP. A new design was investigated in the MAI Skelett project based on the cowl of the BMW i3. The results: With at least the same performance of the current component, it was possible to reduce the cycle time to 75 seconds. Manufacturing costs decreased by more than 60 percent. Thus, using a real component, the project proves that development potential can be leveraged and that using CFRP is also technically possible in large-scale production. Two additional projects followed: MAI Multiskelett pursues the further development of the production process. MAI Rapidskelett combines the skeleton construction with additive manufacturing, making low costs possible for small quantities and leading to individual productivity.

MAI Carbon Project Forum

The MAI Carbon Cluster holds its MAI Carbon Project Forum annually with great success. This event aims to inform cluster members about the current state of ongoing projects and to present the results of cluster projects that have been completed. The generated knowledge spillover represents considerable added value for the cluster partners.
Naturally, the planned content of new projects is presented as well. To ensure the future influx of new projects, the project forum also focuses on networking and bringing potential project partners together. This is accomplished through the selective presentation of project ideas and funding programs. As evidenced by around 600 participants in the last few years, this proven format is very well received by the members.

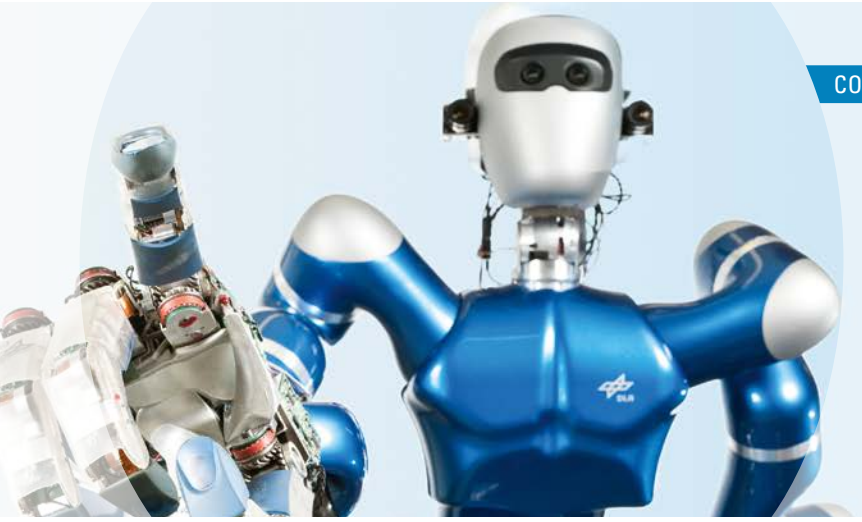
Internationalization of MAI Carbon

MAI Carbon's internationalization measures pursue the objective of opening up transnational market access. Here the focus is on realizing this in the interest of the MAI Carbon partners and tailored to suit market needs. Close collaboration with the USA and South Korea has been ongoing for years. The MAI iTeCH project pursues the objective of educating specialists in South Korea so they are technically, personally, and socially able to perform the practical planning, implementation, and verification of operating processes. This approach primarily benefits German industry on site as well as domestic Korean organizations. Cross-national R&D cooperation projects are also initiated between the partners, joint stands are organized at international trade fairs, and far-reaching social media campaigns are carried out.

Cluster
Mechatronics
and automation

MECHATRONICS & AUTOMATION CLUSTER

The core of Industry 4.0



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Through the integration of IT in electromechanical systems, the mechatronics paradigm has had a lasting impact on innovation in many sectors. Today it forms the basis for the digitalization of products, processes, and business models – and therefore also for Industry 4.0. In Bavaria, this applies to industrial key sectors with approximately 50 percent of all industry employees.

The cluster has established itself as a communication and cooperation platform of leading experts for mechatronics & automation in science and industry. Cluster players have conducted more than 50 research and innovation projects to date, focusing on mechanical engineering and plant construction, the electrical and electronics industry, medicine, and vehicle technology. Thus, the cluster provides valuable support in the digitalization of the product creation process and, with its »mechatronikakademie«, is dedicated to the adequate qualification of current and future specialists.

Cluster topics of strategic importance are handled by SITs (Strategic Innovation Teams). The definition of these topics and participation in the SITs are among the leading benefits of cluster membership. More than 200 members from industry and science in conjunction with Bavaria's economic and innovation policy support the positioning of »their« cluster as a successful private-public partnership and as a location factor for an innovative Bavaria.

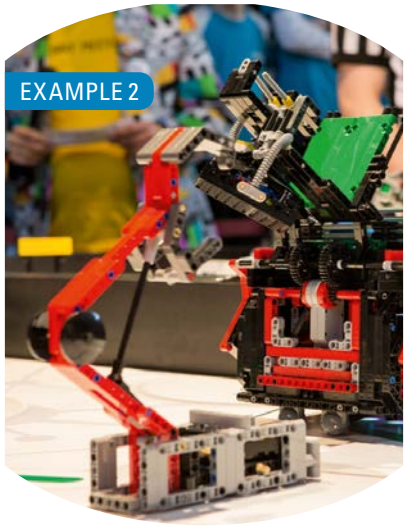
Focus areas

- Safety in production
- Mechatronic drive technology
- Industrial additive manufacturing
- Digitalization and Industry 4.0
- Collaborative robotics
- AI in production

Cluster management creates spaces where companies, research and educational institutions, and other players can gather and work together. Offers include technical and networking events, the previously mentioned working groups, and cooperation projects, for instance in product and process innovation or internationalization. Cluster members also present their innovative capacity through joint exhibition stands at regional trade fairs and leading international fairs or publications in cluster media.

Realizing genuine benefits in companies through digitalization

The »Mittelstand 4.0-Kompetenzzentrum Augsburg«, in which the cluster takes part as a project partner, assists small to midsize enterprises with digitalization. Competence center experts conducted a potential analysis jointly with the company STABILO. The result: A manufacturing execution system (MES) is to be introduced in order to obtain a better overview of the entire value chain and realize more detailed control of production. Christoph Krauß, Project Engineer at STABILO, expects digitalization to lead to greater flexibility and transparency, and confirms: »It was helpful for us to gain a neutral, external perspective. The fact that further recommendations also align with our plans shows us that we are on the right track.«



Recruiting tomorrow's experts

Qualified and motivated specialists are the basis for innovative companies to succeed in the market. This applies in particular for future topics such as Industry 4.0, digitalization, and artificial intelligence. To counteract the looming shortage of skilled workers in technical and natural sciences occupations, the cluster has been committed to the topic of qualification for years. Aside from various lifelong learning offers, it is primarily dedicated to supporting students in the MINT fields (mathematics, informatics, natural sciences, and technology). Thus the cluster is the longtime organizer of the First® Lego® League regional contest in southern Bavaria, a global research and robotics competition for teams of students aged 10 to 16 years. Since 2018, the cluster in cooperation with Augsburg University has also held the First® Lego® League junior for teams of elementary school students.

Sharing knowledge and boosting success through cooperation

Based on the conviction that cooperation leads to innovation, the cluster has been engaged in international research projects for its members for several years already. Among these is the »InnoPeer AVM« project funded by the EU, in which a cross-national qualification program for »Advanced Value Manufacturing« (AVM) was developed. Those interested can complete the three-stage program from basic courses to practical strategy camps and model factories, and obtain a certificate. The program's middle level, the in-depth courses on the topics of technologies, HR, and organization management as well as new business models, can be taken independently at any time and place. This is made possible through project cooperation with the Virtual University of Bavaria, which offers the courses through its online platform.

MEDICAL TECHNOLOGY CLUSTER

High tech in an international growth industry

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With worldwide sales of approximately €320 billion and annual growth rates of 5 to 6 percent, medical technology is one of the key industries of the future. Bavaria is home to more than 500 dedicated medical technology companies with approximately €10 billion in sales. Additionally there are about 500 enterprises in the medical technology supplier and service provider segments, with total sales of approximately €5 billion. Around 80,000 highly qualified employees work in this industry overall. Bavaria therefore takes on a leading role in Germany and Europe. Businesses in Bavaria generate approximately one third of Germany's production. As a matter of fact, more than 3 percent of the world's medical technology comes from Bavaria.
This medical technology and clinical expertise is complemented by a top-class medical-clinical infrastructure.

The focused cooperation and application-oriented networking of technologists and physicians are essential pillars for innovation. This is why the Bavarian Ministry of Economic Affairs, Regional Development and Energy promotes the medical technology cluster platform. Two well-established, very successful organizations in Bavaria are the joint sponsors of this cluster: Forum MedTech Pharma e.V. is the largest interdisciplinary network in Bavaria, Germany, and Europe in the area of medical technology and the healthcare industry with more than 500 members.

The association promotes cooperation, brokers contacts, and provides information on the latest trends and innovations in the course of cluster management.

Medical Valley European Metropolitan Region Nuremberg (EMN) is a leading international cluster in the medical technology field. Functioning as a cluster management organization since 2007, Medical Valley EMN e.V. is an amalgamation of currently 210 members from industry, science, healthcare, networks, and politics. The central tasks of cluster management are further development, coordination, and marketing of the cluster.

Focus areas

World-class research and development projects in particular will be stimulated and implemented over the next few years, accelerating the digitalization of healthcare, utilizing cross-industry innovation approaches, promoting internationalization in healthcare, and supporting start-ups during the founding phase and establishment in the market. Among other things, consortia will be assisted with funding acquisition and successful network platforms such as the MedTech Summit Conference and expert groups will be expanded.

Promotion of research

The Bavarian Medical Technology Cluster actively supports the implementation of ideas in innovative products through funding acquisition under Bavarian and national funding programs, such as Bavaria's »Life Science Medical Technology« (LSM) research program, which provides a funding volume of up to €5 million per year. Numerous programs have already been launched in prior years, for example on these topics

- Personalized intraocular lenses to optimize treatment results in cataract and refractive lens surgery
- Companion app for breast cancer patients
- Telemedicine urology in care

Network platforms

The MedTech Summit Conference in cooperation with the MedtecLIVE trade fair has developed into one of Europe's leading networking platforms. A considerable proportion of topics and innovation projects addressed at the convention are fed by cluster activities. This is to be further expanded over the coming years, and is intended to help create a positive innovation environment through broad-based networking and cross-regional visibility, further increasing the quantity and improving the quality of innovation projects.
The Medical Valley Innovation Night as a multidisciplinary networking event will offer participants an annual impetus regarding future-oriented topics along with presentations on groundbreaking research work, inspiring cooperation projects and top-class start-ups. Cooperation is intended to emerge from networking between partners.

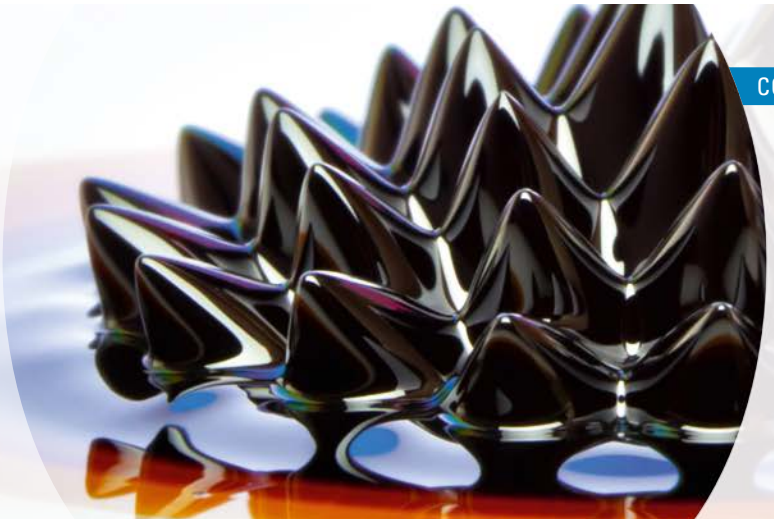
Expert groups

Expert discussions of closely focused, important technology and application topics are being offered with the expert group format. The transdisciplinary expert panels are made up of top-class representatives from companies, clinics, and research institutions. Thus the development of project ideas and the formation of new project consortia can be selectively promoted. Topics cover a wide variety of healthcare segments, from education and innovation in care to organic electronics and additive manufacturing to robotics and artificial intelligence. The Approval Competence Pool, which is open to all interested companies, also meets regularly to talk about the latest relevant issues in the area of regulation and approva.

Cluster
Nanotechnology

NANOTECHNOLOGY CLUSTER

Future technology for key industries



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The predicted billion euro market for nanotechnology has become a reality. There is virtually no segment of the economy that does not benefit from nanotechnology: Information and communication, production, energy, transport industry, health, and construction, among others. As a key technology of the 21st century, nanotechnology is one of the most crucial innovation drivers worldwide and offers new products or product features, as well as totally new solutions.

This is where the Nanotechnology Cluster comes in, promoting the efficient networking of industry, science, politics, and education, as well as the transfer of knowledge and technology between stakeholders for the innovation process. Small to midsized enterprises in particular are of central significance for the implementation of such innovations. Consequently, cluster work also focuses on SMEs and on the stimulation and realization of specific research and development projects. Originating from its strong roots in Bavaria, the cluster is also active on the national and international level with its networks and projects.

Focus areas

Focus areas of cluster tasks relate to the core areas of concrete implementation of the potential offered by nanotechnology. The central components of cluster work include the introduction of innovative process technologies, the cost-effective integration in existing production processes, technology-oriented project management, customer-oriented innovation management, and the realization of interdisciplinary synergie.

Core competencies

- Point of contact for nanotechnology:
  Solution provider for complex nanotechnology matters
- Network initiation and support:
  Professional exchange between stakeholders through the establishment and organization of competence networks
- Management of nano-specific projects:
  Support for product development processes from the idea to complete project management
- Organization of nanotechnology expert events:
  Conferences, seminars, and network meetings as the perfect platform for efficient technology transfer
- Workshops:
  Customer-specific workshop offers
  (innovation development, troubleshooting...)

Sustainable competence networks

The cluster initiates and organizes competence networks to promote professional exchanges between stakeholders. In terms of content, they examine specialized nanotechnology fields. From material-oriented networks such as NanoSilver or NanoCarbon over NanoAnalytics to NanoInk, the networks and their partners have developed further in various industries. The partners benefit from intensive networking and the initiation of R&D projects. Innovative processes are illuminated and product developments are accelerated in the projects. They offer trend-setting innovations in the product portfolio and often a unique selling proposition in the market. Sustainable internationalization is also realized through trade fair presentations and events. Thanks to successful leadership, all networks are carried on independently after the funding runs out.

Point of contact for nanotechnology

Nanotechnology applications are very differentiated across industries. In the development of materials and products, nanotechnology often tips the scales when it comes to carving out a crucial advantage through outstanding material properties compared to conventional technologies. Few companies have the required know-how for the handling of nanotechnologies and their applications. That is why the cluster established a point of contact for complex nanotechnology issues. Here the initial situation is analyzed jointly with the companies and concrete proposed solutions to corresponding problems are worked out. The result may encompass simple matchmaking with a partner, an innovation development or troubleshooting workshop, or take the form of a comprehensive project with the integration of various competencies.

European Center for Dispersion Technologies (EZD)

Dispersing is of vital significance for the subsequent industrial treatment of basic materials in the area of process technology. Consequently, the Nanotechnology Cluster initiated and executed the founding activities for the EZD in Selb together with the Kunststoff-Zentrum SKZ (German Plastic Center). Through funding provided by the Bavarian Ministry of Economic Affairs, Regional Development and Energy, it was possible to form the EZD in 2014. A competent team with outstanding experimental equipment has been established here. The team specializes in the production and characterization of micro-scale and nanoscale dispersions. The EZD (www.ezd.eu) offers development services for the industry. The EZD and Nanotechnology Cluster work closely together in the networks and numerous R&D project.

Cluster
New Materials

NEW MATERIALS CLUSTER

From materials to innovations

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Bavaria is one of the international leaders in the field of new materials and has the best prerequisites to play the leading role in the future. The New Materials Cluster is the Bavarian-wide information, communication, and cooperation platform in the new materials field. It analyzes technology trends in the areas of materials and processes in order to realize potential for material and product innovations.

By successfully networking experts in the field of science with industry decision makers in all sectors, the cluster establishes platforms that serve as innovation catalysts. The New Materials Cluster promotes cooperation between all players along the entire value chain. Impetus is provided for new ideas and innovations, gaps in value chains are filled, and networks are successfully established.

This is done within the scope of overarching core topics:

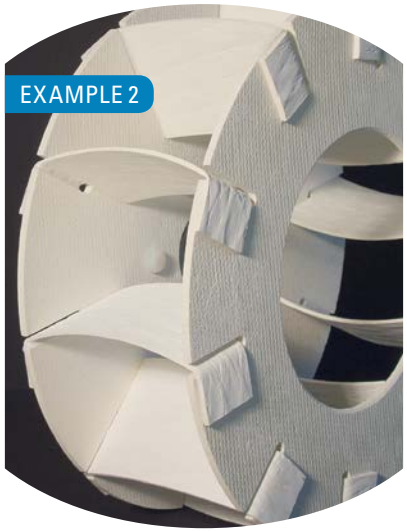
- Additive manufacturing
- Lightweight and multi-material design
- Resource efficiency and sustainability

Within the framework of these core topics, polymers, metallic materials, fiber composites, technical ceramics and glass, and functionalized surfaces and technical textiles, for example, are combined with material and process development subject matter, also with regard to the use of AI.

Offers are consistently aligned with the needs of cluster players. Close cooperation with regional networks and initiatives is a key pillar.

New materials for additive manufacturing

Additive manufacturing is a new technology with great potential for the production of complex components. As a novel manufacturing technology, it imposes special requirements on substance and material development since, for example, the microstructure of materials has to be designed to obtain the component's desired properties and functionality.
This new manufacturing technology is already being tested and applied in the medical technology, mechanical engineering, aviation, and automotive fields, among others. The central Additive Manufacturing Coordination Office was launched and established to examine the technology from the feedstock to the finished component. Working groups were initiated and additive manufacturing development topics studied in cooperation with long-term partners such as MTU, Audi, KSB, and Siemens as well as research institutes.



Ceramic Matrix Composites (CMC)

Ceramic matrix composite (CMC) components can be produced with thin walls, are ideal for lightweight construction, and are mostly used for high-temperature applications. Manufacturers of ceramic reinforcement fibers are found in the USA and Japan. These fibers are unavailable to European manufacturers, or only at high prices.
The Fraunhofer-Center for High Temperature Materials and Design HTL in Bayreuth opened a technical center with a fiber pilot plant in April of 2019. Cooperation with numerous industry partners ensures that the fibers can be quickly implemented in products. Research and development efforts are also underway to develop cost-effective production techniques in order to reduce component prices. Now the industry is tasked with developing and testing fields of application.

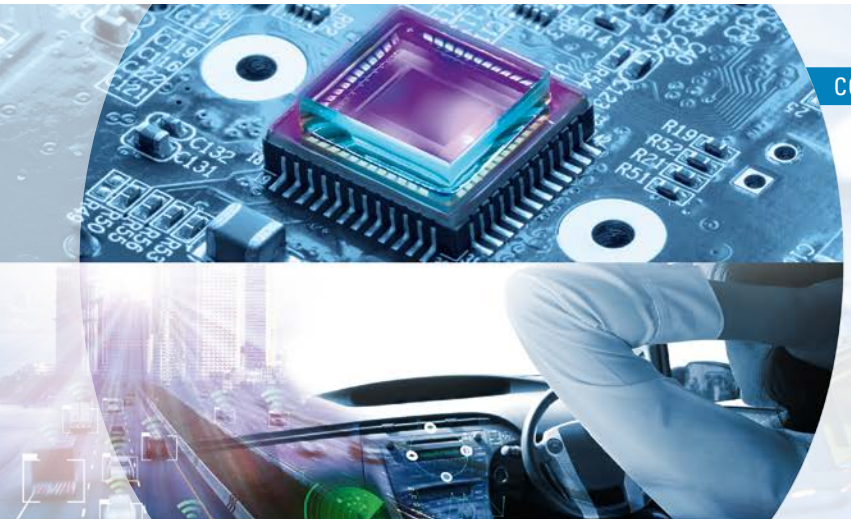
Closing material and substance cycles

Seeing a building slated for demolition as a valuable source of raw materials, rather than a waste product, was the objective of the »Recycling Management in the Construction Industry« project. Possible solutions for the energy and resource-efficient recycling of mineral construction waste were sought in cooperation with the Energy Technology Cluster, the Environmental Technology Cluster, and experts from the construction industry and materials sector as well as the environmental sector. Trendsetting technologies, future challenges, and demands, especially for thermal insulation composite systems, were identified in detail and discussed at the cross-industry level. A road map identifying possible ways to accomplish the complete recycling of this waste fraction was prepared in the course of an expert workshop.

Cluster
Sensor Technology

SENSOR TECHNOLGY CLUSTER

Intelligent sensor systems made in Bavaria



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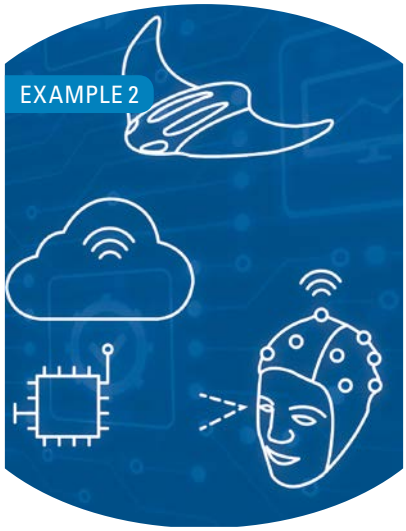
Future trends and technologies could not be realized without sensors as the »sensory organs« of technology. As a trailblazer and supporting pillar of digitalization, sensor technology is a key technology of the 21st century. Concrete solution approaches in the field of (industrial) artificial intelligence and for a smart extension of our living and working environments, from energy-efficient cities, autonomous mobility, and sustainable ecosystems to automation and new collaborative systems, are based on data supplied by sensors and evaluated by measurement technology. When they are equipped with the required artificial intelligence, sensors also enable approaches for entirely new, data-driven business models and services.

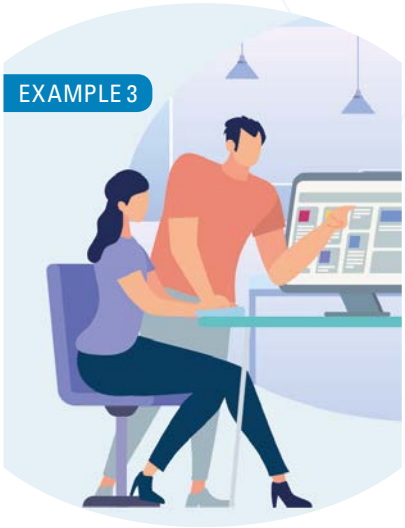
In this economically significant and rapidly growing industry sector, Bavaria has numerous outstanding technology partners driving the development of intelligent sensor systems. Bavaria assumes a leading role on the national stage. The pronounced sensor technology expertise of Bavarian universities and research institutions along with highly specialized trade fairs complete Bavaria's profile as a leading sensor technology site. The mission of the sensor technology network is to continuously expand Bavaria's technology and market leadership worldwide under the leading strategy of »Intelligent Sensor Systems Made in Bavaria«.

Strategische Partnerschaft Sensorik e.V. (SPS) and the Sensor Technology Cluster have been bundling Bavaria's sensor technology expertise for more than 15 years. About 90 members and 250 partners include numerous internationally leading, highly innovative companies and institutions. They support the sensor technology network with a comprehensive range of services for operational and strategic matters. All activities have always been based on the needs of the players themselves, communicated to network management through close interaction with the members.

Focus areas

- Intelligent sensor and measuring technology
- Digitalization and digital transformation
- Safety and security
- Automotive and automation
- Electronic systems





Technology innovation through networking

SPS promotes sensor technology research and development through consulting, networking, and by converging the know-how of suitable players along with the acquisition of funding for cooperation projects. The focus of concentrated collaboration with the members is on realizing the shared vision of »Intelligent Sensor Systems Made in Bavaria«. Among others, a recent study not only provided political recommendations for technology funding, but also guidelines for forward-looking, future-oriented road mapping. SPS helps members with their decision-making in the development of innovative, internationally competitive products and services. Interdisciplinary and cross-sectoral networking approaches that are indispensable in this context are taken into account.

High-tech expertise meets network know-how

The direct interaction of an experienced, interdisciplinary network team with technology experts in the cluster office is a unique selling proposition and guarantor of success: The wholly-owned subsidiary Sensorik-Bayern GmbH supports SPS and all network members as a research partner and development service provider. This combination not only enables networking between players but also helps drive the development of future technologies such as industrial IoT (IIoT), big data, blockchain, and even bionics with cluster management in projects – an innovation center that benefits the entire network. Technologies that have already been realized include, among others, a high-performance IIoT measurement system for the intelligent state monitoring of systems and machines, medical technology solutions, and innovative sensor systems in the robotics field.

Organization and personnel development

Looking beyond one's own field of work is a permanent part of collaboration in the sensor technology network. As a technology cluster, the network also examined complex issues such as demographic change and Work 4.0 early on. Thanks to a flexible range of services, members can be assisted with strategic road mapping and the resulting competency development needs can often be addressed more quickly than through classic occupational training. Blended modeling and design thinking workshops, certification courses, and seminar series in the blended learning format (including »Agilität³« (Agility), »Big Data Architect«, and »Lotsen für Digitales Lernen (IHK)« (Pilots for Digital Learning)) reflect the relevance of the offers. Success is ensured thanks to high practical relevance and individual employee coaching as a complement to face-to-face training and online learning phases.

UmweltCluster Bayern

ENVIRONMENTAL TECHNOLOGY CLUSTER

Impetus for the growth industry of the 21st century

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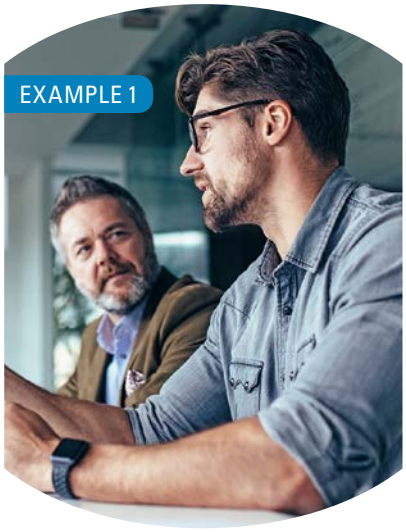
Efficient environmental technologies are the foundation of successful environmental protection. Bavarian companies develop internationally competitive, innovative products and methods. Including technologies for CO_2 reduction and energy efficiency, Bavaria's environmental industry generates sales of around €50 billion per year. Its significance is similar to that of vehicle construction and mechanical engineering. The environmental technology sector in Bavaria is extremely well positioned with approximately 9,400 companies, mainly SMEs. They offer products and services ranging from planning, development, and engineering to plant construction and modernization on the international environmental market. It's no coincidence that Bavarian companies are so successful: Protecting natural resources has a long tradition in Bavaria, the first federal state to establish its own ministry for environmental protection back in 1970.

Since 2006, the Environmental Technology Cluster Bavaria's has developed into the industry network for the Bavarian environmental sector. For its more than 200 members, the Environmental Technology Cluster provides a forum for exchanging information about industry trends, an innovation platform for initiating joint projects, and a launch pad for doing business abroad. Promoting the competitiveness, innovative capacity, and internationalization of the members is the goal. The cluster initiates and organizes numerous cooperation offers and continuing education projects for its members, thereby establishing the basis for active networking and lively communication. Thus the Environmental Technology Cluster adds genuine and perceptible value for Bavaria's environmental technology sector.

Focus areas

The Environmental Technology Cluster Bavaria concentrates on six focal points, with one objective: Converging the competencies of its members along the value chain in order to develop solutions for environmental technology challenges.

- Waste and recycling
- Alternative energy production
- Air pollution control
- Resource efficiency and material flow management
- Water and wastewater
- Land reclamation and environmental remediation



Forum and innovation platform

The Environmental Technology Cluster's work aims to strengthen and expand the environmental sector in Bavaria through networking, transfer, and increased cooperation. We see projects as building blocks to prompt innovations and implement sustainable solutions to improve the environment. Cooperation between science, industry, and the public sector promotes sustainable, positive changes. The exchange of experience, knowledge, and ideas between our members and partners forms the basis for innovative solutions and provides access to new customers and markets. Exploring current issues is particularly important to us – for instance in the form of events, projects, and working groups, including the circular economy, digitalization, and packaging fields. Thus the cluster's work genuinely adds value and actively promotes the innovative capacity of its members.

Launch pad for business abroad

International markets are increasingly gaining importance for Bavarian environmental technology companies because they offer considerable growth opportunities for products and services beyond the domestic market. Bavarian companies have a wealth of know-how and expertise for handling global challenges such as climate change and urbanization. That is why the Environmental Technology Cluster supports its members on the way to conducting business abroad and, for foreign partners, is the point of contact for environmental technology »Made in Bavaria«. Our services include: Personal consulting and establishing contact, country-specific information and specialist events, project development, and funding acquisition as well as the exchange of information about target markets between members.

Lighthouse Project

Progress feeds on visions! We are convinced of that. And: Innovative ideas require support.
The »Environmental Technology Cluster Lighthouse Project« designation identifies projects that make an exemplary contribution to the development of environmental technology in Bavaria, point out development directions, and attest to entrepreneurial valor and visionary thinking. Applicants from Bavaria can take part with projects, methods, concepts, or developments of an innovative nature. Award-winning projects benefit from marketing through the Environmental Technology Cluster's network – at trade fairs and events, for example, through publications in the trade press, an awards ceremony, as co-exhibitor at the IFAT Cluster trade fair stand, and by using the »Environmental Technology Cluster Lighthouse Project« logo. Eleven successful projects have already been presented with the award.

ADDITIONAL LINKS

Bavarian Research and Innovation Agency

The Bavarian Research and Innovation Agency (BayFIA) is a joint initiative of the Bavarian Ministry of Economic Affairs and the Bavarian Ministry of Science. As a consortium of the Bavarian Research Alliance, Bavarian Research Foundation, Bavarian Patent Alliance, and Bayern Innovativ including Projektträger Bayern, it is Bavaria's central point of contact for research and technology funding. With the synergistic interaction of these four partners in the Bavarian Research and Innovation Agency, the Bavarian State Government pursues three strategic objectives:

- More efficient and more transparent shaping of the overall system of technology transfer in Bavaria
- Extension of qualified funding consultation in promoting technology, to activate a higher implementation potential of innovations in Bavarian companies, in particular in the SMEs
- Increased acquisition of EU funding, primarily through universities, as well as SMEs, particularly by forming consortia from science and industry

www.forschung-innovation-bayern.de

bayern innovativ

Bayern Innovativ GmbH

Bayern Innovativ GmbH is Bavaria's organization for innovation, technology, and knowledge transfer. It supports players from industry and science in all stages of the value chain by providing customized services to boost innovation dynamics. In this regard, Bayern Innovativ operates at the interfaces of various industries and technologies. The goal is to build an ecosystem of dynamic networks to accelerate the innovation process. In addition to the organization's own clusters – namely Energy Technology, Automotive and New Materials – the activities focus on cross-clustering with other Bavarian clusters and networking with key players in Bavaria's innovation landscape.

www.bayern-innovativ.de

Bayern International

Bayern International as an enterprise of the state of Bavaria supports Bavarian SMEs with around 100 projects worldwide each year. In cooperation with the Bavarian Ministry of Economic Affairs and with domestic and foreign partners, Bayern International organizes Bavaria's participation in trade fairs, the delegation trips of the Bavarian Ministry of Economic Affairs, and delegation visits here in Bavaria.

An always current event database with all projects for Bavarian companies and their export success is found at **www.bayern-international.de**.

Key to Bavaria company database

The »Key to Bavaria« foreign trade database provides comprehensive information about Bavarian companies and institutions in research, technology transfer, and network management free of charge. These company data allow potential business partners worldwide to search for specific Bavarian products and services as well as technology partners. The online company database is available in two languages.

www.keytobavaria.de

Invest in Bavaria

Since 1999 Invest in Bavaria has been supporting German and foreign companies in establishing or expanding a location in Bavaria.

Invest in Bavaria compiles specific information, helps to find the optimal location in Bavaria, and mediates the contacts that are required for project realization – for instance, contacts to government agencies and industry associations, as well as to important local networks.

The services offered by Invest in Bavaria are free of charge; all inquiries are treated confidentially, of course.

www.invest-in-bavaria.com

Gründerland Bayern

Gründerland Bayern

Gründerland Bayern is an initiative of the Bavarian Ministry of Economic Affairs, Regional Development and Energy. It supports (budding) entrepreneurs with services in the areas of financing and funding, consulting and coaching, networks and infrastructure, and the founding of an enterprise.

The initiative is aimed at founders in all industries and any founding phase – from preparing a business plan to looking for the right financing to the growth phase. It assists with both start-ups and company succession. The extensive network of SMEs, corporations, scientific institutions, and founders is the initiative's strength.

www.gruenderland.bayern

Clusterplattform Deutschland

Clusterplattform Deutschland

As an initiative of the Federal Ministry for Economic Affairs and Energy and the Federal Ministry of Education and Research, the Clusterplattform Deutschland website includes an overview of cluster promotion measures and initiatives at the national, state, and European levels. A map of Germany shows the German leading-edge clusters and the most efficient cluster management organizations in the »go-cluster« program sponsored by the Federal Ministry for Economic Affairs and Energy.

www.clusterplattform.de

Federal Ministry of Education and Research

Funding database of the Federal Ministry for Economic Affairs and Energy

With the funding database of the Federal Ministry for Economic Affairs and Energy on the Internet, the federal government provides an overview of the subsidy programs offered by the federal government, federal states, and European Union.

www.foerderdatenbank.de

Federal Ministry
for Economic Affairs
and Energy

Cluster competitions sponsored by the Federal Ministry of Education and Research

In accordance with the principle of »Strengthening strengths«, the Federal Ministry of Education and Research supports with competitions top-performing clusters on their way to inclusion in the international leading-edge group.

In the leading-edge cluster competition (2007 – 2017), open to any topic, a total of 15 national clusters were funded with €40 million each for five years in three rounds of funding. At the time, three Bavarian clusters received a total funding volume of €120 million for innovation and future topics in Bavaria: Münchner Biotech Cluster (therapeutics and diagnostics for personalized medicine), Medical Valley EMN (center of excellence for medical technology), and MAI Carbon (carbon fiber reinforced plastics in the tri-city area of Munich, Augsburg and Ingolstadt).

www.spitzencluster.de

The funding initiative »Internationalization of Leading-Edge Clusters, Future Projects, and Comparable Networks« (2015 – 2022) is aimed at enabling (leading-edge) clusters to extend existing international cooperation and realize innovation breakthroughs in joint research projects. It is funded by the Federal Ministry of Education and Research with up to €4 million respectively over five years. Five Bavarian clusters successfully asserted themselves: BioM (Biotechnology), Power Electronics, Mechatronics & Automation, Medical Valley (Medical Technology), and MAI Carbon.

www.cluster-networks-international.de

With the future cluster initiative launched in 2019 under the motto »Clusters4Future – innovation networks for our future«, the experiences from previous cluster and network-oriented funding approaches are collected and aligned with the fundamental results of cutting-edge research that are only on the cusp of implementation. Once again in the course of a competition that is open to any topic, Clusters4Future creates a new generation of regional innovation networks.

www.bmbf.de/zukunftscluster

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Notice

This brochure is intended equally for persons of all genders. Consistent gender-neutral wording of the text is omitted in the interest of better readability.

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