



# COMMUNICATION AT ITS BEST

Information and communications technology  
in North Rhine-Westphalia  
Facts. Figures.

## Information and communications technology in North Rhine-Westphalia

### Facts & figures

In North Rhine-Westphalia, information and communications technologies (ICT) are driving the digital transformation of the entire economy. This is where entrepreneurs, researchers and investors, find the ICT know-how to help shape the development of Industry 4.0. With its innovations, the NRW's ICT sector provides new opportunities for value creation and employment and is itself an economic heavyweight. No other federal state has such a high density of companies in this sector, ranging from medium-sized IT companies to software start-ups and telecommunications giants.

The more than 24,600 ICT companies in the state employed around 239,000 people and generated sales of 127 billion euros (2018). This corresponds to over 18 percent of NRW's gross domestic product. The IT sector alone, with its almost 22,100 companies and over 204,000 employees, recorded sales of over EUR 50 billion.

In the telecommunications sector, the most important German telecommunications providers (Deutsche Telekom AG, Vodafone Group and Telefónica (Deutschland)) are based in NRW. With Ericsson and Huawei, the major network equipment providers for the upcoming 5G mobile communications standard are also based in North Rhine-Westphalia, and Oppo, the world's number five mobile communications equipment manufacturer, is opening its future European headquarters in Düsseldorf. In addition, the North Rhine-Westphalian IT sector includes well-established companies such as the Harting Technology Group, G Data Software AG, Materna Information & Communication SE, Adesso AG, to name but a few.

In addition, North Rhine-Westphalia is the top location for the telecommunications industry (telecoms) in Germany. Four big players in the telecoms industry – Deutsche Telekom, Ericsson, Huawei Technologies and Vodafone – have their headquarters on the Rhine. In 2018, the telecommunications industry in North Rhine-Westphalia with its 33,900 employees generated sales of over 76 billion euros.

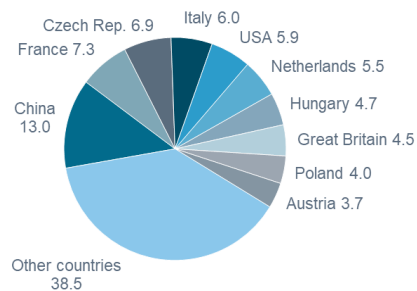
The most important technologies currently being discussed and promoted worldwide – and also in NRW – are artificial intelligence (AI), the next mobile communications standard 5G, IT security technologies and block chain.

- **Artificial intelligence technologies** are said to have considerable growth potential: McKinsey forecasts an increase in Germany's gross domestic product of up to four percent by 2030 – approx. 0.25 percentage points or ten billion euros per year. The strong NRW's industries and fields of application Industry 4.0, Smart Energy, autonomous driving and Smart Health can benefit greatly from this. To this end, the state government together with the Fraunhofer Institute for Intelligent Analysis and Information Systems IAIS has been funding the "**Competence Platform Artificial Intelligence AI.NRW**". In addition, the federal government established one of a total of four AI competence centers in NRW: The "Competence Center Machine-Learning Rhine-Ruhr – ML2R". It links the pioneering research institutions in Germany: the Technical University of Dortmund, the Fraunhofer Institute for Intelligent Analysis and Information Systems IAIS in Sankt Augustin, the University of Bonn and the Fraunhofer Institute for Material Flow and Logistics IML in Dortmund.
- The economic and industrial structure in NRW offers great potential for the use of 5G technologies, especially in the area of Industry 4.0. In NRW, many important players concern themselves with this topic, such as the universities in Aachen, Dortmund, Duisburg-Essen, Wuppertal and Paderborn, but also companies such as E.ON SE, Deutsche Telekom with the 5G House in Bonn, Vodafone GmbH with a 5G Lab in Düsseldorf and Ericsson with its Eurolabs. Politicians have also recognized the economic significance of 5G and, with the Competence Center 5G NRW, have launched a project that contributes to making North Rhine-Westphalia the lead market for 5G: It reduces technical barriers to entry for companies, develops the economic potential for vertical markets – such as automotive and mobility, energy, food and agriculture, smart cities, health care and production and many more – and accelerates the diffusion of innovation.
- NRW is one of the hotspots for **IT security** in Germany. Currently, around 700 scientists are working at 20 research institutions and universities in the field of IT security. NRW-wide there are more than 400 IT security companies, including both big players and numerous SMEs. The most important research institutions are the Horst Görtz Institute for IT Security (HGI) of the Ruhr University, which is recognized throughout Europe, the "Casa" research association at the Ruhr University Bochum and the ifis Institute for Internet Security of the Westphalian University of Applied Sciences. In 2019, the scientific conference also approved the founding of the Max Planck Institute for Cyber Security and Privacy in Bochum.
- With **block chain technology**, data can be stored and transmitted securely and traceably. By 2027, a total of ten percent of the world's gross domestic product could be processed via a block chain. Starting in 2020, the state government of North Rhine-Westphalia is supporting the establishment of a European blockchain institute called **Euro-Chain** at the Dortmund Fraunhofer Institute IML to support industry and other research institutions in implementing these future technologies.

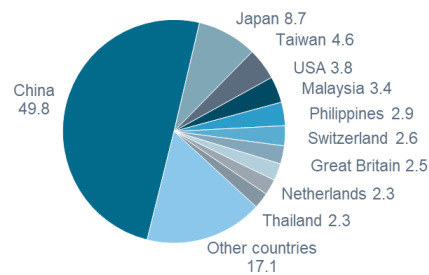
## Foreign trade

At just under 24 billion euros, ICT imports to North Rhine-Westphalia accounted for almost 20 percent of Germany's total imports (2019). Once again, half of the imports came from China; together with the other (South) East Asian states, the figure is even more than two thirds (68.3%). ICT exports also increased, rising to 9.8 billion euros, with European countries also accounting for two thirds (66.3%). Here too, the main buyer country was China, which imported around 1.3 billion euros or 13 percent of North Rhine-Westphalia's ICT goods, followed by France (7.3%) and the Czech Republic (6.9%).

### Customers (in %)



### Suppliers (in %)



Source: IT.NRW, foreign trade statistics for North Rhine-Westphalia; position as at: 2019

## Companies

### Information technology (selection)

- **Atos Information Technology GmbH, Essen**

Established: 1995; sales: €11.6 billion; employees: 108,000, approx.12,000 (Germany-wide)

Atos is a leading provider of digital services with six locations in North Rhine-Westphalia. Atos is Europe's number one in cloud, cyber security and high performance computing and offers comprehensive hybrid cloud, big data, business application and digital workplace solutions.



- **Computacenter AG & Co. oHG, Kerpen**

Established: 1984; sales: €2.2 billion; employees: 6,700 (Germany-wide)

The German subsidiary of Computacenter plc/England is a service provider for Internet and information technology for large corporations. Computacenter advises companies and other organizations on their IT strategy and delivers complete customer-specific computer networks including hardware.



- **Itelligence AG, Bielefeld**

Established: 1989; sales: €1 billion; employees: 9,500

As a leading full-service IT provider, the company is one of the most successful SAP consulting firms worldwide. The range of services extends from SAP strategy consulting and licensing to proprietary SAP industry solutions to application management and hosting services.



- **Materna GmbH, Dortmund**

Established: 1980; sales: €324 million; employees: 2,300

Materna is a pan-European company in the field of IT services and covers the entire spectrum of services offered by a full-service provider in the premium segment, from consulting to implementation and operation.



#### Telecommunications (selection)

- **Deutsche Telekom AG, Bonn**

Established: 1995; sales: €80.5 billion; employees: 211,000 (worldwide)

Deutsche Telekom is one of the world's leading integrated telecommunications companies with more than 184 million mobile customers worldwide (over 46 million of them in Germany), 28 million fixed-network lines and over 21 million broadband lines (including nearly 14 million in Germany).



- **Ericsson GmbH, Düsseldorf**

Established: 1991; sales: €500 million; employees: 1,113

Ericsson is the world leader in communications technology and services, including 5G. 40 percent of global mobile phone traffic is handled by Ericsson network technology. In 2018, the Ericsson IoT Business Lab was opened in Herzogenrath near Aachen, Germany, with a research focus on Internet of Things (IoT).



- **Huawei Technologies Deutschland GmbH, Düsseldorf**

Established: 2001; sales: €1.6 billion; employees: 831

Huawei is a leading global provider of telecommunications solutions. The portfolio includes network infrastructure, software, as well as mobile devices such as smartphones or tablet PCs. The European headquarters is located in Düsseldorf. With 196,000 employees worldwide, the company generated sales of 111 billion euros (2019).



- **Vodafone GmbH, Düsseldorf**

Established: 1999; sales: €10.7 billion; employees: 16,000

Vodafone Deutschland is the first fully integrated communications group in Germany. The company provides consumer and business customers with products and services in the areas of mobile communications, fixed-network, data services and broadband Internet and supplies more than 48.0 million mobile communications and 6.9 million fixed-network and 14 million television customers.



## University & research landscape

### Universities (selection)

In the winter semester 2019/2020, more than 93,000 students were enrolled in computer science, electrical engineering and information technology.

- **RWTH Aachen University**

Established: 1870; students: 45,900 (of which computer science: 4,102); courses: 175

With approx. 30 chairs and institutes, the Computer Science Department offers a very wide range of courses ranging from IT security and computer-aided learning to software engineering. Once again first place in the CHE University Ranking 2020 as the best university in the fields of applied computer science, media computer science, software engineering and computer science teaching.

- **Technical University Dortmund**

Established: 1968; students: 33,600 (of which computer science: 5,864); courses: 238

The Dortmund Faculty of Computer Science was one of the first university computer science institutions in Germany. Today, it is one of the largest computer science faculties in Germany and, with the Informatik Centrum Dortmund e.V. (ICD) and the Fraunhofer Institute for Software and Systems Engineering (ISST), it also offers research and technology transfer for and into the economy.

- **Heinrich Heine University Düsseldorf**

Established: 1965; students: 37,400 (of which computer science: 5,911); courses: 85

Established in 2002, the subject computer science at the Faculty of Mathematics and Natural Sciences is well networked with its focus on bioinformatics in the central research area "Life and Biosciences" of the university. Düsseldorf's computer science is characterized by its special activities in the field of research – with participation in various European and German research networks.

- **University of Hagen**

Established: 1974; students: 65,100 (of which computer science: 12,481); courses: 31

The Faculty of Mathematics and Computer Science comprises 20 subject areas, and together with the Faculty of Economics they offer distance students degrees in computer science and business informatics up to doctoral and postdoctoral degrees.

- **University of Paderborn**

Established: 1972; students: 20,200 (of which computer science: 2,409);

courses: 228

At the "University of the Information Society", 18 professors and 200 research assistants offer a variety of specialization opportunities for the Bachelor's and Master's programs, particularly in special subject areas such as "Cyber Physical Systems" or "Distributed Computing".

#### Courses (selection)

University	Course
RWTH Aachen University	<ul style="list-style-type: none"> <li>• Computer Science, B.Sc., M.Sc.</li> <li>• Computational Engineering Science, B.Sc., M.Sc.</li> <li>• Computational Social Systems, M.Sc.</li> <li>• Media Informatics, M.Sc.</li> <li>• Data Science, M.Sc.</li> </ul>
Technical University Dortmund	<ul style="list-style-type: none"> <li>• Computer Science, B.Sc., M.Sc.</li> <li>• Applied Computer Science, B.Sc., M.Sc.</li> <li>• Teaching Computer Science, B.A., M.Ed.</li> <li>• Data Analysis, Data Science, B.Sc., M.Sc.</li> </ul>
Heinrich Heine University Düsseldorf	<ul style="list-style-type: none"> <li>• Computer Science, B.Sc., M.Sc.</li> <li>• Computer Science/Mathematics, Double B.Sc.</li> </ul>
University of Hagen	<ul style="list-style-type: none"> <li>• Computer Science, B.Sc., M.Sc.</li> <li>• Practical Computer Science, M.Sc.</li> <li>• Business Informatics, B.Sc. M.Sc.</li> </ul>
University of Paderborn	<ul style="list-style-type: none"> <li>• Computer Engineering, B.Sc., M.Sc.</li> <li>• Business Informatics, B.Sc., M.Sc.</li> <li>• Computer Science, B.Sc., M.Sc.</li> </ul>

#### Research institutes (selection)

Eight Fraunhofer Institutes based in NRW conduct research in the ICT sector. One focus of ICT research is in Sankt Augustin. The Fraunhofer Institutes there analyze, research and develop user-oriented information cooperation and simulation systems:



- **Fraunhofer Institute for Applied Information Technology FIT**  
Established: 1968; employees: 200; [www.fit.fraunhofer.de](http://www.fit.fraunhofer.de)
- **Fraunhofer Institute for Intelligent Analysis and Information Systems IAIS**  
Established: 2006; employees: 300; [www.iais.fraunhofer.de](http://www.iais.fraunhofer.de)
- **Fraunhofer Institute for Algorithms and Scientific Computing SCAI**  
Established: 1992; employees: 180; [www.scai.fraunhofer.de](http://www.scai.fraunhofer.de).

There are two more Fraunhofer Institutes operating in Dortmund:

- **Fraunhofer Institute for Software and Systems Engineering ISST**  
Established: 1992; employees: 95; [www.isst.fraunhofer.de](http://www.isst.fraunhofer.de)  
With its Digital Business Engineering model, the ISST is able to support companies with their digital transformation.
- **Fraunhofer Institute for Material Flow and Logistics IML**  
Established: 1981; employees: 565; [www.iml.fraunhofer.de](http://www.iml.fraunhofer.de)  
The IML is regarded as the prime address in holistic logistics research.
- The Fraunhofer Institutes in Aachen, Bonn and Duisburg research and develop pilot products for users from all areas of commerce, industry and administration:
- **Fraunhofer Institute for Production Technology IPT, Aachen**  
Established: 1980; employees: 471; [www.ipt.fraunhofer.de](http://www.ipt.fraunhofer.de)
- **Fraunhofer Institute for Communication, Information Processing and Ergonomics FKIE, Bonn**  
Established: 1963; employees: 489; [www.fkie.fraunhofer.de](http://www.fkie.fraunhofer.de)
- **Fraunhofer Institute for Microelectronic Circuits and Systems IMS, Duisburg**  
Established: 1984; employees: 240; [www.ims.fraunhofer.de](http://www.ims.fraunhofer.de)
- **The Paderborn Fraunhofer Institute** researches the development of intelligent products, production systems and services for Industry 4.0:
- **Fraunhofer Institute for Mechatronic Systems Design IEM**  
Established: 2011; employees: 200; [www.iem.fraunhofer.de](http://www.iem.fraunhofer.de)

## Clusters & networks (selection)

- **Competence Center 5G.NRW, [www.5g.nrw](http://www.5g.nrw)**  
The Competence Center 5G.NRW contributes to developing North Rhine-Westphalia into the lead market for 5G: It reduces technical barriers to entry for companies, develops the economic potential for vertical markets – such as automotive and mobility, energy, food and agriculture, smart cities, healthcare and production and many more – and accelerates the diffusion of innovation. Under the consortium leadership of SIKoM+ at the University of Wuppertal, the University of Duisburg-Essen, the Technical University of Dortmund and the FIR at RWTH Aachen University are involved in the project.





- **BITKOM Network NRW**, [www.bitkom.org](http://www.bitkom.org)  
Germany's largest high-tech network and the state of NRW are working together to promote the further development of forward-looking ICT topics in NRW. By 2020, for example, the state wants to take a leading position in the field of cyber-physical systems. North Rhine-Westphalia is also setting important trends in the field of secure information technology. The network comprises around 300 members.
- **DWNRW-Hubs**, [www.digitalewirtschaft.nrw.de](http://www.digitalewirtschaft.nrw.de)  
The DWNRW hubs in Aachen, Bonn, Düsseldorf/Rhineland, Cologne, Münsterland and the Ruhr Area support local activities with regard to the local establishment of incubators for the digital economy and their supraregional networking and cooperation. They serve as a central point of contact for start-ups in order to provide these facilities for settlement with start up financing and access to a relevant network, as well as the necessary (human) resources and industrial contacts. The aim of the DWNRW networks is to bring together the actors from start-ups, medium-sized companies and large enterprises and to facilitate exchanges of an operational and/or financial nature.
- **eco – Association of the Internet Industry**, [www.eco.de](http://www.eco.de)  
With more than 1,100 international member companies, eco is the largest association of the Internet industry in Europe. Since 1995, the association, headquartered in Cologne, has been helping to shape the development of the Internet in Germany, promoting new technologies, infrastructures and markets and determining framework conditions.
- **it's OWL – Intelligent Technical Systems OstWestfalenLippe**, [www.its-owl.de](http://www.its-owl.de)  
More than 200 companies, universities and other partners have joined forces in the technology network. With the support of the state of North Rhine-Westphalia, projects worth 100 million euros will be implemented between 2018 and 2023. The focal points are artificial intelligence, digital platforms, digital twin and Work 4.0, which won awards in the German government's Leading-Edge Cluster Competition.
- **Competence Network for Artificial Intelligence**  
[www.iais.fraunhofer.de](http://www.iais.fraunhofer.de)  
NRW is striving to become a leading region in the fields of data science, machine learning and AI and wants to massively expand excellent research, technology transfer for companies and academic education and training with the AI competence network. To this end, the state cooperates with the Fraunhofer Institute for Intelligent Analysis and Information Systems IAIS in Sankt Augustin, which as an office coordinates the competencies in the field of artificial intelligence at important locations (Bonn region, Rhein-Sieg district, Aachen, Bielefeld, Bochum, Düsseldorf, Dortmund, Jülich, Münster, Paderborn, Siegen and Wuppertal).







- **networker NRW**, [www.networker-nrw.de](http://www.networker-nrw.de)  
The association, founded in 2000, provides a network of personal contacts for entrepreneurs from the IT and media sectors and stands for information, co-operation and partnership; it has 190 members.



## Trade fairs & events (selection)

- **ANGA COM, Cologne**; [www.angacom.de](http://www.angacom.de); *next dates: June 08-10, 2021*;  
*frequency: annual*  
With 500 exhibitors and more than 20,000 participants (2019), ANGA COM is Europe's leading business platform for broadband and content providers. The exhibition and congress program are aimed at network operators, manufacturers, service providers, program providers, consulting firms, public authorities and other institutions in the telecommunications and media industry. Moved to 2021.
- **dmexco, Cologne**; [www.dmexco.de](http://www.dmexco.de); *next dates: September 23-24, 2020*;  
*frequency: annual*  
dmexco has been the world's leading trade fair and conference for the digital economy since 2009. Due to the corona pandemic, the trade fair took place on September 23 and 24, 2020 (10am-10pm) **purely digitally** as dmexco@home! This new event platform made it possible to participate in dmexco 2020 easily and directly from home and to network with partners from all over the world.
- **EuroCIS, Düsseldorf**; [www.eurocis.com](http://www.eurocis.com); *next dates: March 16–18, 2021*;  
*frequency: annual*  
The EuroCIS trade fair is the international trade fair for information technology and security in retail – "Retail Technology". In 2019, 482 exhibitors from 39 countries presented their latest retail-specific solutions and the latest state of IT future to around 13,000 experts from 94 nations.
- **IT Security Day NRW, Wuppertal**; [www.it-sicherheitstag-nrw.de](http://www.it-sicherheitstag-nrw.de); *next dates: December 2, 2020*; *frequency: annual*  
The IT Security Day is a specialist congress focusing on data, information and IT security. It is organized by the chambers of industry and commerce in NRW. It is aimed specifically at small and medium-sized companies.



## Imprint



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