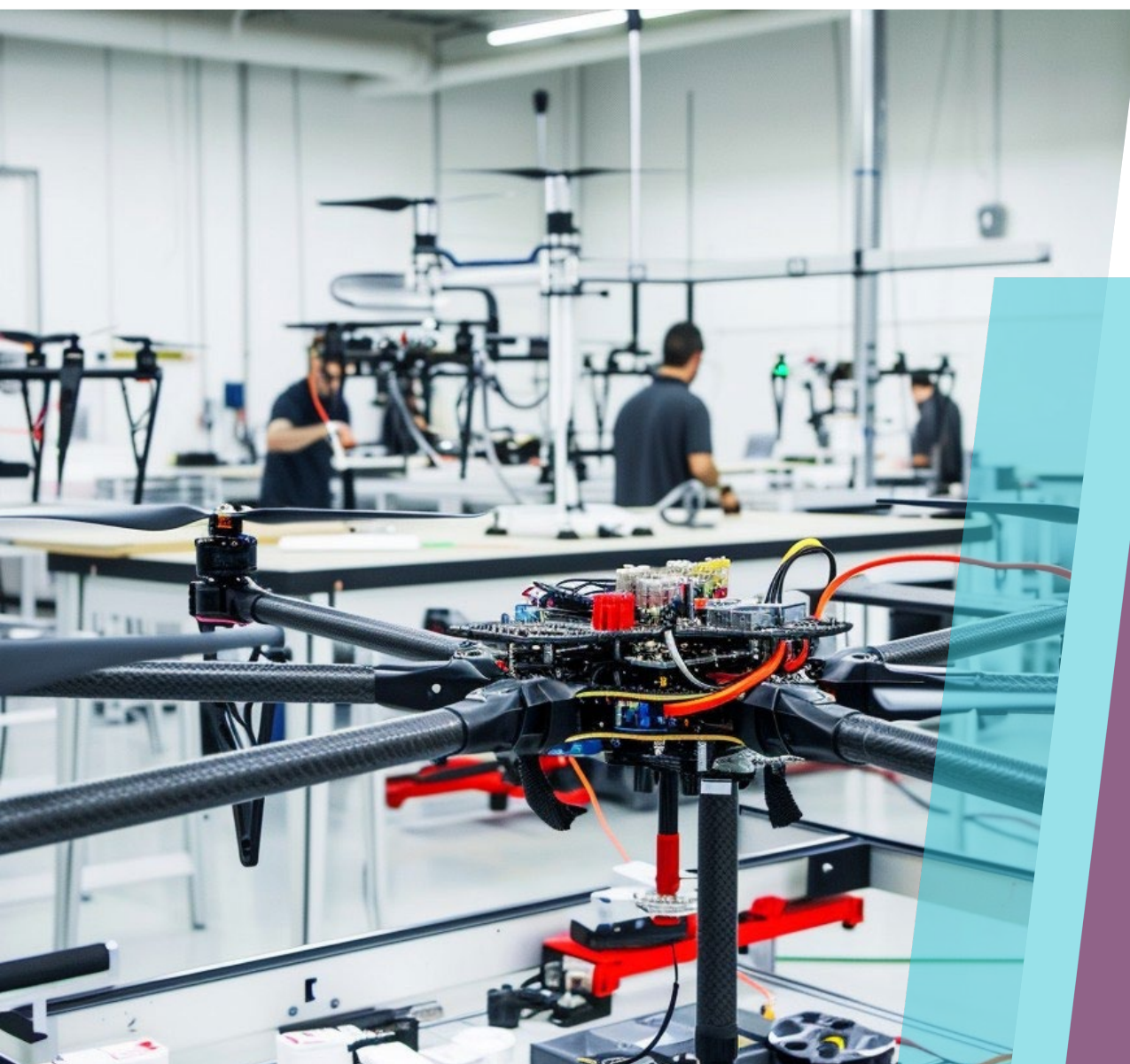


METHODOLOGY AND FREQUENTLY ASKED QUESTIONS (FAQ)

Prognos Dual-Use-Atlas

Dual-Use Employment Potentials in German Industry

By: Markus Mahle, Christian Schoon, Dr. Olaf Arndt, Kamronbek Turgunov



Methodology and Indicators of the Prognos Dual-Use Atlas

The methodology of the Dual-Use Atlas is based on a Prognos Dual-Use Analytical Framework, which pursues a quantitative approach for the first time to systematize the cross-sectoral industry of dual-use goods. On this basis, the Dual-Use Atlas systematically evaluates the employment structure in all of Germany's IHK regions.

3.1 The Prognos Dual-Use Analytical Framework

The aim of the methodological approach is to present the dual-use economy, which has not previously been systematically captured, in a transparent, quantifiable, and regionally differentiated manner. For this purpose, the **dual-use economy is delineated, structured, and evaluated using official statistics along a data-based, multi-stage analytical approach**. The core of the methodology is the combination of different data sources and classification systems to systematically assign dual-use goods to industries and thus to economic indicators such as production, value added, and employment.

The Prognos Dual-Use Analytical Framework is based on definitions in the literature and **official definitions** of the Federal Office of Economics and Export Control and the European Union. Dual-use goods are defined as products, technologies, and software with a **dual purpose** that can be used both in civilian applications and in military or security-relevant contexts.

The starting point for the analysis is the EU Dual-Use Goods List, which systematically captures the relevant products with dual purpose. Export controls for dual-use goods are governed by **Delegated Regulation (EU) 2025/2003 ("EU Dual-Use VO")**. It contains a more than 200-page export control list that is regularly updated. All dual-use goods on this list ("listed goods") are subject to an inspection or authorization obligation by the Federal Office of Economics and Export Control when exported to a non-EU member state.

This goods list was decoded by Prognos and linked via several intermediate steps with existing classifications of official statistics. Specifically, goods are assigned to commodity groups in **foreign trade statistics**, to **production statistics**, and finally to the **industrial classification system**. Herein, a consistent connection between specific dual-use goods, industry structures, and ultimately to macroeconomic indicators is systematically established. The basis for further analysis is the calculation of **dual-use shares within individual industries**. Since these typically include both dual-use and purely civilian products, the production statistics are used to determine what share of the respective industry relates to dual-use goods. These share values are then used to quantify the economic significance of dual use along key indicators such as production value and employment subject to social security contributions. Since dual-use goods in many industries cannot be clearly delineated, the calculated shares are reliable approximations based on the best possible data-based assignment. For sub-areas with limited data availability or missing direct linkage to production statistics, such as information and communication technology and software, secondary sources are additionally consulted to enable reliable approximations (Caviggioli, De Marco & Scellato, 2018, 2020).

3.2 Indicators and Calculation of the Dual-Use Atlas

For the Dual-Use Atlas, Prognos has chosen a quantitative approach based on employment statistics. Statistical data is used to show in which IHK regions known and new growth potentials of dual-use goods are to be expected and where particularly favorable conditions for future value creation and regional development exist.

Data Sources

The data basis for the Dual-Use Atlas consists of official statistics from the federal and state statistical offices as well as an evaluation of the **statistics on employment subject to social security contributions** at the place of work of the Federal Employment Agency with the **reference date of 30th of June 2025**.

The employment statistics provide data in detailed spatial breakdowns and at the level of the industrial classification system (NACE/WZ08), enabling detailed evaluations by region and industry. For the sectoral delineation, the employment figures are drawn from the two-digit industrial classification (divisions). A total of 19 dual-use-relevant industrial sectors are considered, including 16 from manufacturing and three from the ICT sector. The data quality is high due to the special evaluation. Isolated data protection restrictions were interpolated and verified plausibly in an iterative process.

Spatial Reference Unit

The chambers of commerce and industry (IHK) districts represent functionally grown economic spaces that reflect local industrial conditions. They are oriented towards administrative municipal, city, and district boundaries as well as established regions. The **79 IHK regions** were therefore used as the spatial reference level and defined based on the respective websites at district boundaries and, in isolated cases, at municipal boundaries. A further reason for the choice of spatial reference unit lies in data availability. The IHK regions offer significantly higher data availability in employment statistics than at district level, since smaller spatial units are more frequently subject to data protection-related restrictions.

At the same time, the use of IHK regions is subject to limitations. The regions differ in part in their spatial extent and economic size; whereby different economic structures exist within individual IHK districts. Small-scale focal points and local concentrations of dual-use potentials may therefore be partially obscured.

Map Base and Class Divisions

The representation of the maps is based on geodata and layers from the Federal Agency for Cartography and Geodesy. Specifically, Prognos processed the outlines of municipalities and districts into IHK regions and used these for cartographic representation. The class divisions of the regional share and Germany share were based on **class intervals of equal size as possible** (equidistant classes) and **natural breaks in the distribution** of values.

For the overall index, the classes were formed based on natural breaks in the distribution to make structural differences between regions visible. The top class includes the ten highest-ranked regions in the overall index.

Index Calculation

The assessment of regional dual-use employment potential is based on two indicators:

- The **Regional share** indicates what proportion of employees in manufacturing and the ICT sector in a region were employed in dual-use-capable industries in 2025. It answers the question: How important is dual use within the region?
- The **Germany share** indicates how high the region's share is of total employment in dual-use-capable industries in Germany. It indirectly reflects the absolute potential and size of the region. It answers the question: How important is the region for dual use in Germany?

Both indicators are first normalized to a scale of 0 to 100. Subsequently, the unweighted arithmetic mean of the two scaled values is formed, which in turn is renormalized to a scale of 0 to 100. The resulting **overall index** thus maps both dimensions equally, where 0 represents the lowest and 100 the highest value. This index is calculated both for the overall dual-use potential and for individual industries.

FAQ – Dual-Use-Atlas

Answers to Frequently Asked Questions on the Interpretation and Methodology of the Prognos Dual-Use-Atlas

What is Dual Use?

Dual-use goods refer to products, technologies, and software with a **dual purpose**. They can be used both for civilian applications and in military or security-relevant contexts. These include, for example, sensor technology, robotics, artificial intelligence, satellite technology, or certain components from mechanical and automotive engineering. Many of these technologies are initially developed for civilian markets and later find additional security-relevant applications.

Is there an official definition of dual-use goods?

The Prognos Dual-Use Analytics is based on definitions in the literature and official definitions of the Federal Office of Economics and Export Control and the European Union. The starting point is the **EU Dual-Use Goods List**, which systematically captures the relevant products with dual purpose. Export controls for dual-use goods are governed by Delegated Regulation (EU) 2025/2003 ("EU Dual-Use Regulation").

Does Dual Use mean a militarization of the economy and innovation?

No. Many dual-use goods and technologies are originally developed for civilian markets and only later deployed in additional application fields. The focus is therefore not on the militarization of innovations, but rather on the question of how existing technological strengths can contribute to increasing security, resilience, and crisis resilience. This includes not only defense but also civil security tasks – such as disaster protection, crisis management, protection of critical infrastructure, or cybersecurity. **Dual use expands the context of use of existing competencies and goods.**

How does Dual Use differ from defense production?

While defense companies specifically manufacture military goods, many dual-use technologies are originally specific to civilian markets. The focus is therefore not on individual weapons, security, or defense systems, but on the underlying technologies, components, and competencies. Dual-use goods are **often supplier components** for defense production as well as industrially used products in B2B and B2C markets. A sensor, for example, can be deployed in an industrial facility, in disaster protection, in the protection of critical infrastructure, or in a military system. The Dual-Use Atlas therefore considers not defense production in the narrow sense, but the **broader industrial and technological base** from which such applications can emerge.

What opportunities arise from dual-use markets?

Dual-use markets give companies **access to new customers, application fields, and funding opportunities**. At the same time, additional growth opportunities arise. The development of sophisticated security applications can accelerate innovation processes and strengthen technological competencies. Many companies can build on existing products and capabilities. Dual use is therefore often a further development of existing strengths and not a complete strategic change.

Why is the topic of Dual Use currently relevant?

The dual-use economy has increasing significance for **industrial transformation, technological competitiveness, and high-quality employment**. Especially for the struggling German industry, dual use can represent a strategy for building or securing value creation and employment.

Can companies without ties to the defense industry also benefit from Dual Use?

Yes. Many dual-use technologies come from industries whose companies traditionally have no connection to the defense industry. Companies often already possess competencies that can also be deployed in security-relevant applications. What matters less is the previous market position than the **technological connectivity**. This opens up new perspectives for many medium-sized companies as well.

What is the Dual-Use Atlas?

The Dual-Use Atlas is the first **Germany-wide analysis of the dual-use economy as a cross-sectoral industry**. It makes visible in which regions employment potentials exist in industries whose technologies, products, or competencies can be used both civilly and militarily.

What does the study show?

The study shows **employees in dual-use-capable industrial and ICT sectors** by region. It makes clear where in Germany a particularly high proportion of employees already work today in dual-use-relevant industrial sectors. It shows which regions have particularly good conditions for the development and production of dual-use goods. It also shows the **significance of individual regions for the overall German dual-use system** and the role of dual use within the respective regional economic structure.

What do we understand by dual-use potential?

The dual-use potential does not show which companies manufacture defense goods or security-relevant products today. It shows rather where there are many employees in industries whose products, technologies, or competencies are fundamentally also suitable for civil security, defense, or other security-relevant applications. The dual-use potential thus describes the **capacity, based on employees in industries or regions, to produce dual-use goods**. It shows where relevant preconditions for future value creation and associated jobs already exist today. It remains a potential value and provides no information about what individual companies produce.

Why was the focus on dual-use-capable employees chosen?

The focus on employment was chosen because employment data is comparably available for all regions and shows where **industrial and technological competencies** are concentrated. The Dual-Use Atlas therefore does not enumerate individual defense products or companies but makes visible in which regions many people work in industries that are fundamentally also relevant for civil security, defense, or other security-relevant applications.

Can the dual-use potential be activated from one day to the next?

High dual-use employment potential does not automatically mean that new markets or business models will emerge in the short term. Entry into dual-use markets frequently requires **technological adaptations, regulatory know-how, new networks, and suitable customer and market access**. This is more of a medium- to long-term development process than a short-term given.

What does the study not address?

The basis of the industry selection is product groups captured in export controls as dual-use goods. These product groups were methodologically transferred to industrial sectors. Therefore, the Atlas shows in which industries and regions corresponding potentials exist, but not which **specific products individual companies** produce or what they are used for. The study refers **neither to specific defense contracts nor to actual production quantities** of dual-use goods.

What does the Dual-Use Atlas show specifically, and what does the map material tell us?

The Atlas shows the **spatial distribution of employees subject to social security contributions** in 2025 who work in industries that could produce dual-use goods. It thus makes the dual-use economy and regional specializations visible. It illustrates which regions are particularly strongly oriented towards corresponding industries and what contribution they make to the overall German potential.

For whom are the results relevant?

The results are equally relevant for **policymakers, economic development agencies, chambers of commerce, companies, and research institutions**. They provide important information about **regional strengths and development potentials** in a strategically significant economic area. Regions can use the results for location development and transformation strategies. Furthermore, the Atlas creates a **sound basis for public debates about industrial future fields**. For military, security-relevant, or civil security actors, the Atlas also provides initial orientation on in which regions potential supplier and competency structures exist.

What added value does the Dual-Use Atlas provide?

It helps economic development agencies, IHKs, and regions to recognize their **strengths and development prospects**. Companies receive references to **relevant industry clusters, technology fields, and potential cooperation partners**. Political actors receive support through the results in shaping industrial, innovation, and structural policy. The results enable more targeted promotion of regional competencies, identification of future industries, and a data-based discussion of the role of dual use for competitiveness, value creation, and employment. The Atlas thus provides a new **knowledge base for strategic decisions in business and policymaking**.

Are the results transferable?

Yes. The underlying methodology can fundamentally be transferred **to other spatial levels**, from districts through federal states to individual economic regions. Furthermore, the approach can also be applied to further economic indicators, provided that suitable data bases are available. The **methodology is flexible and scalable**. It thus presents diverse possibilities for further investigations.

What distinguishes this study from others?

The Dual-Use Atlas is the first study to examine the dual-use economy **Germany-wide systematically, methodically well-founded, and regionally differentiated**. While many analyses look at individual industries or technology fields, the Atlas captures **the entire cross-sectoral industry** in a uniform, transparent approach. The basis is a systematic linking of dual-use-relevant product groups with official economic and employment statistics.

What is meant by “regional share” and “Germany share” in the Dual-Use Atlas?

The **Germany share** describes the contribution of a region to total German dual-use employment. It shows which regions have a particularly large significance Germany-wide for the dual-use economy. The **regional share** considers instead the significance of the dual-use economy within a region itself. It makes visible how strongly the regional economic structure is oriented towards corresponding industries. **Both indicators complement each other and enable different perspectives** on the results.

How is a result to be interpreted and what does a result not say?

A high result indicates **above-average dual-use-capable employment**. This can be attributable either to high specialization within the region or to a particularly large contribution to the Germany-wide potential. The results allow a comparison of dual-use potential between regions.

What does rank indicate?

The rank in the Dual-Use Atlas is **not a quality judgment** about a region. **A lower placement means neither that a region is economically weak, nor that it is less resilient or security-relevant.** The Dual-Use Atlas measures dual-use employment potential based on the regional industry structure. Regions can therefore be very strongly positioned in other future fields, technologies, or economic areas without achieving leading positions in the Dual-Use Atlas. The Dual-Use Atlas thus answers the question about a region's position in the German dual-use system and not the question of whether a region is generally "well" or "poorly" positioned.

Does high dual-use potential automatically mean economic success?

No. High dual-use employment potential does **not automatically** mean that **new value creation** can be generated in the region in the short term, nor that new markets or business models will emerge. Entry into dual-use markets frequently requires technological adaptations, regulatory know-how, new networks, and suitable customer and market access – and is a medium- to long-term design task.

Are there surprises in the top 10?

Yes. In addition to well-known industrial locations, **regions can also be found in the top positions that have not previously been directly associated with the dual-use economy.** The results show that high Germany shares and high regional shares do not necessarily occur in the same areas. Some regions have a large absolute employment potential, while others stand out through particularly strong specialization.

Why are so many southern German regions in the top rankings?

Southern German regions **traditionally have a strong industrial base** as well as a high concentration of technology-intensive industries. Particularly in the areas of mechanical engineering, automotive manufacturing, electronics, and information and communication technologies, large employment concentrations exist there. Many of these industries simultaneously have close ties to dual-use applications. This results in both high employee numbers and specialization advantages.

What methodological approach was chosen?

The aim of the methodological approach is to present the dual-use economy in a transparent, quantifiable, and regionally differentiated manner along a **data-based, multi-stage analytical approach** using **official statistics.**

What Industries were explored?

The **manufacturing sector and the information and communication technology (ICT) sector** were examined. The focus is on economic areas that have particular significance for industrial transformation and employment. Pre- and post-production services such as logistics or parts of the creative industries could not be included. In total, 19 industries from manufacturing and ICT were considered.

Which industries are most relevant for dual-use employment potential?

The starting point of the analysis is product groups captured in export controls as dual-use goods. These were linked via official classifications with industries in economic statistics. **The largest dual-use employment potentials** are found in **mechanical engineering**, in **electrical engineering**, in **automotive manufacturing**, and in **information and communication technologies.** Many of the products and technologies developed there can be used both in civilian applications and for security-relevant purposes. At the same time, these industries provide **important technological foundations** for numerous other value chains. They thus form the backbone of the German dual-use economy.

Are classic defense products included in the calculation?

Partly. The basis of the calculation is product groups captured in export controls as dual-use goods, which are subsequently transferred to industrial sectors in economic statistics. In these industries, **security- or defense-related products** can also be included, such as weapons, ammunition, or military vehicles. However, the official production and employment statistics in many cases do not differentiate according to whether a product is used civilly, for security purposes, or militarily. **Individual clearly delineated positions** such as the manufacture of weapons, ammunition, and parts thereof were considered insofar as they are shown in the underlying statistics.

Why were companies in the regions not asked for their assessment?

The aim of the study was to create the same methodological foundation for all regions of Germany. This enables **objective and reliable comparisons**. Company surveys provide valuable insights but are frequently characterized by subjective restrictions. Additionally, possible **confidentiality requirements** regarding the development and market maturity of dual-use goods of companies must be considered.

What is the Prognos Dual-Use Analytical Framework?

The **EU Dual-Use Goods List of Delegated Regulation (EU) 2025/2003** ("EU Dual-Use Regulation") was decoded by Prognos and linked via several intermediate steps with existing classifications of official statistics. The dual-use goods are linked through a **conversion table** of the **Federal Office of Economics and Export Control (BAFA)** with **commodity groups of foreign trade statistics**. These commodity numbers can be linked with the **production statistics** at federal level and finally with the **industrial classification system**. The basis for further analysis is the calculation of dual-use shares within individual industries, which is used for regionalization with further indicators.

What limitations exist in the Dual-Use Analytical Framework?

The analysis works with official statistics. **However, these data are not available everywhere in the same level of detail.** Therefore, product groups from foreign trade statistics must be transferred step by step to industries and subsequently to regions. With this "recoding," details are inevitably lost. Not every individual product can be clearly assigned. The results are therefore **not a point-accurate measurement of individual enterprises** or products, but a methodically sound **approximation of regional dual-use potential**.

How were the rankings and the overall index calculated?

The core components of the Dual-Use Atlas are the **Germany share** and the **regional share** overall and per industry. Both indicators were **normalized** – the region with the highest value receives the index value 100 and the region with the lowest value receives the index value 0. The overall index is based on an **unweighted arithmetic mean**. The Germany share and the regional share are equally weighted and combined into an overall result. The index was renormalized and the region with the highest value receives rank 1, the region with the lowest value rank 79.

How were the classes in the maps determined?

The class divisions of the regional share and Germany share were based on **class intervals of equal size as possible** (equidistant classes) and **natural breaks in the distribution of values**. For the overall index, the classes were formed based on natural breaks in the distribution. The top class includes the ten highest-ranked regions.

Which data could not be used and why?

To ensure comparability of all regions, the Dual-Use Atlas deliberately relies on **official and nationally available statistics**. Data that are not collected as area-wide statistics with comparable data for all 79 IHK regions or districts and independent cities cannot be considered in the Dual-Use Atlas. Not included were, for example, regional data on gross value added, research and development activities, defense contracts, or security-relevant company revenues. We regret this and are working with many official bodies to improve data availability.

Are there also data at the level of districts and independent cities?

Yes. **An evaluation at the level of districts and independent cities is fundamentally possible.** In individual cases, however, depending on the type of data, there may be confidentiality cases and anonymizations in official statistics.

Which data sources were used?

The data for calculating the Dual-Use Atlas come from official sources of the **Federal and State Statistics (Destatis)** (including conversion tables from WA2023 to GP2019 and WZ08, production statistics in manufacturing). For the Dual-Use Atlas itself, **employment data from the Federal Employment Agency** were used, with a special evaluation requested with the corresponding regional delineation. The representation of the maps is based on geodata from the Federal Agency for Cartography and Geodesy.

How current are the data?

The Dual-Use Atlas is based on the **most recent available data**. The Data collection cutoff was February 2026. The basis of the Dual-Use Atlas is employment data with reference date June 30th 2025. The results thus reflect the currently available slate of data.

Why were the IHK regions used as the spatial delineation and not city or district levels?

The IHK regions reflect **functional economic and labor market areas** that go beyond administrative boundaries. They enable an economic analysis of regional structures and are a familiar frame of reference for many companies. Furthermore, **area-wide data availability at industry level** is guaranteed for IHK districts compared to the 401 districts and independent cities.

How were the IHK regions delineated?

The delineation is based on a **search of all 79 IHK websites** and the delineation provided there. The IHK regions are based on **city and district boundaries** and, for some IHKs, on **municipal boundaries**.

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Were there earlier editions of the Dual-Use-Atlas?

No. This is the **first edition** of the Dual-Use Atlas.

Are there any special evaluations for my IHK or individual region?

Yes. Based on our methodology, we can create **specific evaluations for your region** – for example for IHK areas, districts, cities, or individually defined sub-areas. This gives you a sound data basis for your strategic questions and planning. Please contact us at markus.mahle@prognos.com or presse@prognos.com – we will jointly assess which evaluation makes sense for your region.

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Prognos Dual-Use-Atlas

Dual-Use Employment Potential in German Industry

More Info
About the
Atlas



Publisher

Prognos AG
Goethestraße 85
10623 Berlin
Deutschland

Telefon: +49 30 52 00 59-210
Fax: +49 30 52 00 59-201
E-Mail: info@prognos.com
X: [Prognos AG](#)
LinkedIn: [@Prognos_AG](#)

www.prognos.com

Authors

Markus Mahle
Christian Schoon
Dr. Olaf Arndt
Kamronbek Turgunov

Supported by Marcel Mayimona

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Leon Schneider
Editing/proofreading: Corina Alt
Media strategy & coordination: Tina Oßwald
Press contact: Fiona Elbing

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