

Germany's innovation system

Securing and strengthening Germany's
skills base



Innovations provide an essential basis for maintaining and increasing **sustainable prosperity**. They create new and unforeseen opportunities and help our society overcome global challenges. However, the innovation process is increasingly inhibited by **skills shortages**. Most of those born in the high birthrate years of the 1960s (the baby boomers) will retire in the current decade. It is therefore likely that in future the **size of the potential workforce** will decline sharply or at best stagnate.

Making more efficient use of the existing workforce through education and technical progress has so far resulted in only limited success. Growth in **labour productivity** has therefore slowed

down sharply over the past decades and averages below one per cent per year over the last ten years. The shrinking size of the potential workforce and the worryingly slow increase in labour productivity are posing major challenges to state action.

A successful strategy to address the skills shortage involves a combination of exploiting the potential domestic workforce and promoting skilled worker migration. At the same time, it is important to achieve significant increases in the productivity of the available workers through the use of digitalisation and automation and improvements in education and training.

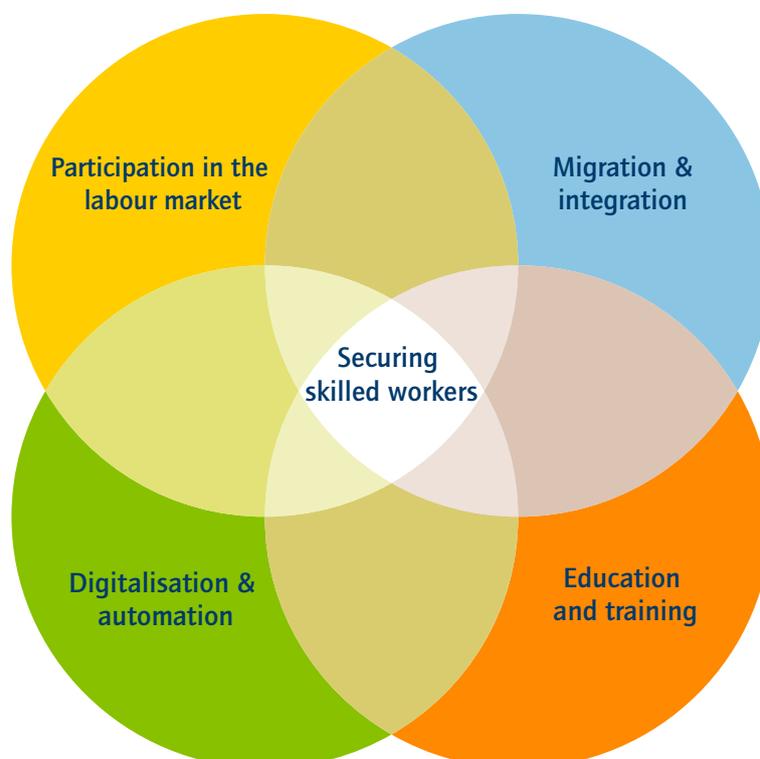


Figure 1: Action areas to secure skilled workers



Participation in the labour market

Germany's working population has now risen to a high of 45.4 million, while unemployment has fallen to 1.3 million. The successful strategy pursued over the past few years has to a great extent enabled the exploitation of much **domestic potential** to increase the volume of work.

One way of securing the skills base is by providing greater support to the remaining **jobseekers** to ease their integration into the labour market. Another way in which growth in work volume could be achieved would be by increasing the number of hours worked by **part-time employees** (numbering over 10 million) and **those in marginal employment** (4.4 million), of whom the majority are women. Substantial expansion of the childcare and

adult care infrastructure would be helpful if part-time workers are to increase their hours. Adjustments would also need to be made to regulatory incentives, such as non-contributory coinsurance for spouses and civil partners.

Older workers are also of vital importance in securing skilled personnel. Worth noting is that the increase in the statutory retirement age has not yet led to an increase in the average retirement age. Open social discourse about modifications to the length of people's working lives and about more flexible working conditions and forms of employment can no longer be avoided if the growing potential of older workers for the labour market is to be utilised.

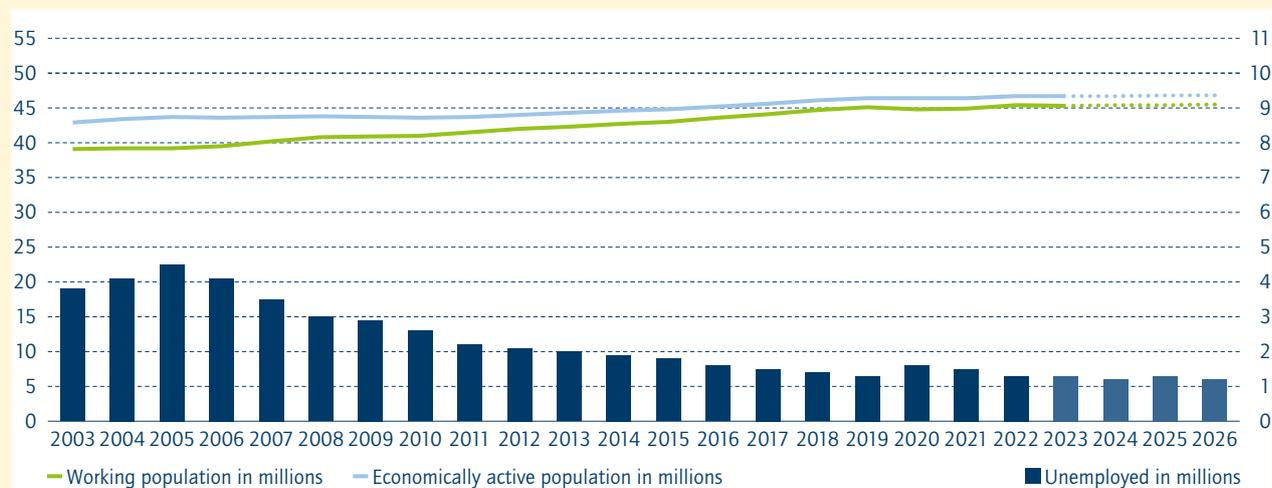


Figure 2: Number of people in the economically active population and in the working population and number of unemployed over the period from 2003 to 2026, using forecast figures from 2023



Migration & integration

Immigration of skilled workers from abroad provides another means by which work volume can be increased. Labour migration from non-EU countries (third countries) offers considerable potential, as migrants from these countries (currently around 40,000 in number) make up only about four per cent of immigrants to Germany. However, if Germany is to achieve a significant increase in the number of migrants from third countries, it will need to enhance the country's attractiveness to immigrants and take active steps to promote itself globally as an open society and a destination that welcomes talented and motivated workers.

However, the administrative procedures which currently form part of the **migration process**, such as **procedures relating to the issuance of visas** and the **recognition procedure**, involve a great deal of bureaucracy which can sometimes take many months. There is an urgent need for these processes to be streamlined, digitised and centralised. As part of the migration process, consideration must also be given to the **families of the skilled workers** and the challenges they face.

Language acquisition is key to the social integration of migrants and, as such, should be more vigorously promoted. There should also be a focus on attracting educational migrants for the German labour market. It is therefore recommended that the acquisition of German language skills is encouraged and reinforced both within and outside Germany. Existing **advertising and information services** for interested skilled workers should be amalgamated and their profile raised.

International students pursuing academic studies in Germany offer great potential for the German labour market and the securing of Germany's skills base. However, when international students are making the transition from study to the labour market, finding a job can present a challenge. To improve the integration of such students into the labour market, the acquisition of German language skills in the course of their studies should be encouraged, while advisory and agency services should be made available to them early in their studies.

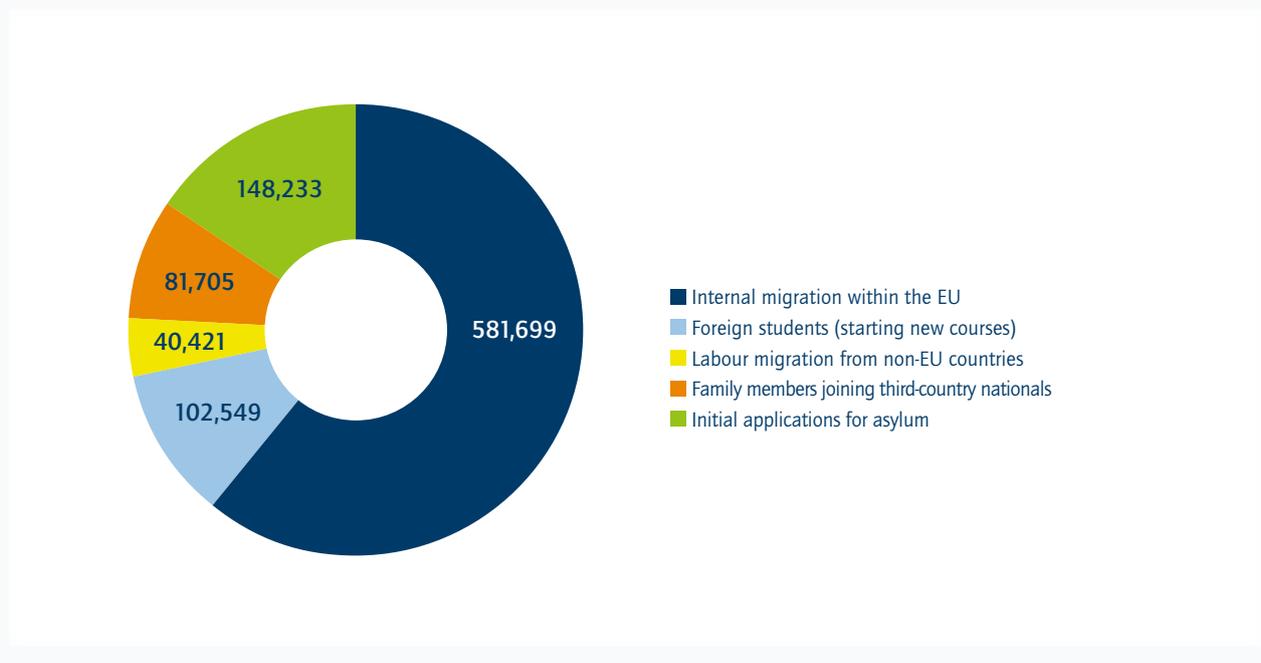


Figure 3: Migrant groups for the year 2021



Digitalisation & automation

Digitalisation and automation have the potential to offset the lack of availability of human labour. Advances in technical development mean that more and more activities, even in expert professions, can be replaced by the use of automated solutions. However, this will require highly-specialised IT professionals and in 2022 Germany already needed an extra 137,000 of these.

Another difficulty lies in the rapid development and expansion of the **physical and digital infrastructure**. Germany lags behind other EU Member States both in terms of fibre-optic network coverage and the digitalisation of public administration. There are also major path dependencies as a result of extensively interconnected non-digital processes. To incentivise digitalisation in companies and households, it is necessary to conduct a thorough

digital transformation of **government services**. It is advisable that this transformation is driven forward swiftly and decisively, particularly with respect to identity services, standards and interfaces.

Another important aspect is the digitalisation of **small and medium-sized enterprises (SMEs)** and **local government units** that are still in the initial stages of their digitalisation journey. What is required here is targeted encouragement through support services.

Existing **data protection** laws are very complex and represent an increasing obstacle to digitalisation. Consequently, there is a need to simplify data protection law and its interpretation for users.

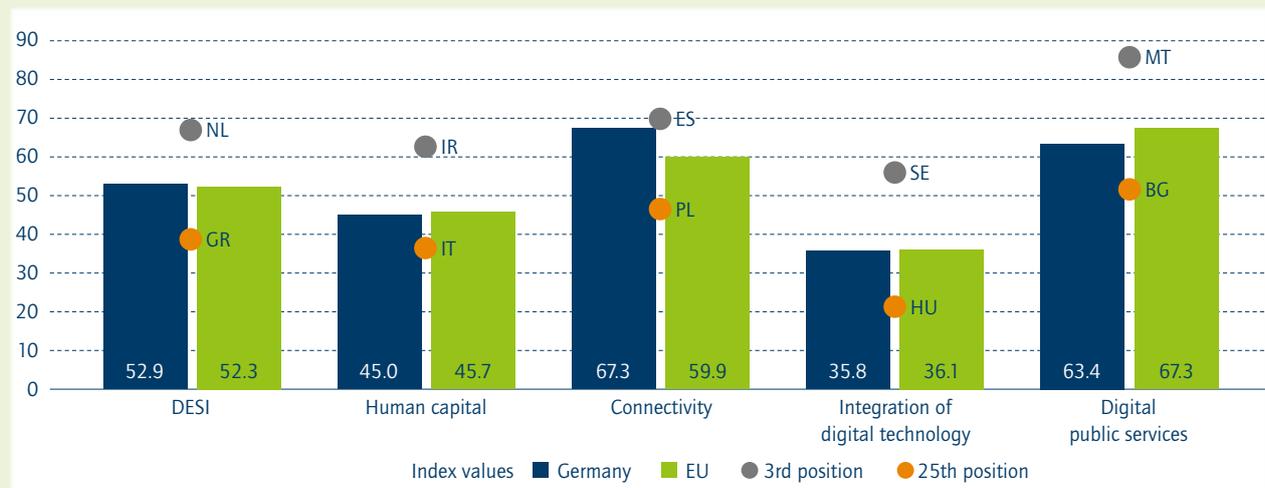


Figure 4: Results from the Digital Economy and Society Index (DESI) 2022 for Germany compared with other EU Member States



Education and training

Ultimately, a functioning innovation system requires not just a sufficient work volume, but above all effective work performance. This is where **education and training** are essential. However, 5.9 per cent of young people in Germany currently leave school without any qualifications and 20 per cent of school pupils do not have vital minimum skills.

In all likelihood, the transformation of business models, markets and occupations will continue to gain momentum. In a future impacted by volatility, it will be **basic skills** in particular that will provide the foundation for the necessary adjustments to individuals' lives and career paths and these should therefore be consistently promoted. Against this backdrop, it seems to make sense to ensure that those groups of people especially affected by this problem are targeted and given the greatest possible encouragement. Overall, it is particularly important to provide people with the **skills to choose the right career** - through enhanced practical content and increased labour market transparency.

Individuals acquiring further qualifications do so as part of their **lifelong learning**. It should be noted here that people who already have higher levels of educational attainment are also more frequent participants in further training or continuing professional development (CPD). If we want to be better at exploiting the innovation potential of society, we need to provide targeted early-stage support and encouragement to low-skilled workers.

The structure of education as a single large block restricts the flexibility to react to changing needs during workers' professional lives. Greater **modularisation** of education and training could increase the applicability of existing qualifications.

The multiplicity of education policies and public and private advisory services currently available have resulted in a lack of transparency. A common **training platform** could provide significantly easier access to educational and advisory services.



Figure 5: Levels of educational attainment in Germany's population from 2011 to 2021



Conclusion on securing skilled workers

The German economy will only be able to remain internationally competitive as a location for business and innovation and to maintain and increase sustainable prosperity if it succeeds in securing its skills base. In all four action areas, there are a number of economic and labour market policy options that each offer a certain potential to reinforce the skills base.

If these impending skills shortages are to be countered effectively, applying a limited selection of these levers will not suffice.

On the contrary, it may be observed that potentially the most powerful levers are those which challenge traditional structures and processes the most. Unless we are prepared to fundamentally question these, to openly discuss potential conflicting aims (e.g. with regard to the organisation of working time, working lives and the streamlining of the administrative apparatus as a result of digitalisation) and to challenge existing privilege, it will not really be possible to ensure the effectiveness of the German innovation system and thereby achieve the desired level of prosperity.

Illustration credits:

Figure 1: own presentation; **Figure 2:** Federal Statistical Office of Germany: *Bevölkerung und Erwerbstätigkeit (Inländer), Zeitreihe, 2023b*; German Federal Ministry of Labour and Social Affairs: *Fachkräftemonitoring für das BMAS: Mittelfristprognose bis 2026, 2022*; **Figure 3:** German Federal Ministry of the Interior and Community (pub.)/German Federal Office for Migration and Refugees: *Migrationsbericht der Bundesregierung. Migrationsbericht 2021, Berlin: 2022*; **Figure 4:** European Commission: *The Digital Economy and Society Index – Countries' performance in digitisation, 2022*; **Figure 5:** Federal Statistical Office of Germany: *Bildungsstand, 2020*; Federal Statistical Office of Germany: *12211-0100 Bevölkerung ab 15 Jahren in Hauptwohnsitzhaushalten: Deutschland, Jahre, Geschlecht, Altersgruppen, Allgemeine Schulausbildung, 2023d, Genesis-Online Datenlizenz by-2-0.*

Series editor: acatech – National Academy of Science and Engineering, 2023

Munich Office

Karolinenplatz 4
80333 Munich | Germany
T +49 (0)89/52 03 09-0
F +49 (0)89/52 03 09-900

Berlin Office

Pariser Platz 4a
10117 Berlin | Germany
T +49 (0)30/2 06 30 96-0
F +49 (0)30/2 06 30 96-11

Brussels Office

Rue d'Egmont/Egmontstraat 13
1000 Brussels | Belgium
T +32 (0)2/2 13 81-80
F +32 (0)2/2 13 81-89

www.acatech.de
info@acatech.de

Committee of Board and Vice Presidents: Prof. Dr. Ann-Kristin Achleitner, Prof. Dr. Ursula Gather, Dr. Stefan Oschmann, Manfred Rauhmeier, Prof. Dr. Christoph M. Schmidt, Prof. Dr.-Ing. Thomas Weber, Prof. Dr.-Ing. Johann-Dietrich Wörner

Board acc. to § 26 BGB: Prof. Dr.-Ing. Johann-Dietrich Wörner, Prof. Dr.-Ing. Thomas Weber, Manfred Rauhmeier

This executive summary is based on: Achleitner, A.-K./Kussel, G./Pavleka, S./Schmidt, C. M.: *Innovationssystem Deutschland – Die Fachkräftesicherung in Deutschland unterstützen* (acatech STUDIE), Munich 2023. DOI: https://doi.org/10.48669/aca_2023-11