

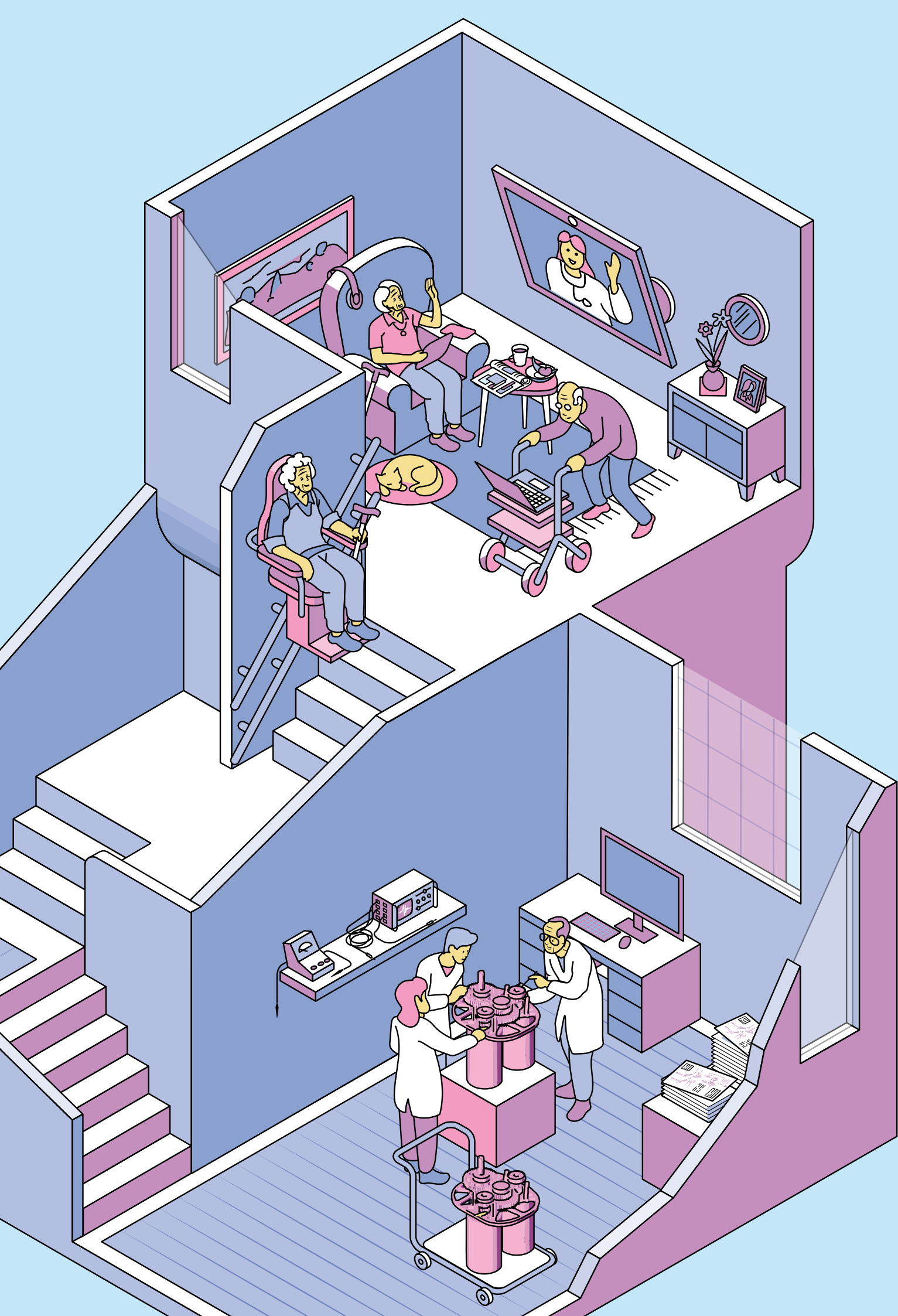
# B 1 Innovation in an Ageing Society



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Demographic ageing creates economic and societal challenges for Germany. The skilled labour shortage will continue to worsen, with negative effects on the innovative power, productivity and growth of the economy. Besides, in an increasingly digitalized society, the participation of older people must be ensured. The financing of social security systems will also become more difficult with an ageing population. To meet these challenges, it will be increasingly important in the future to use the innovation potential of older people. Older people should be offered attractive and flexible options to remain in the labour force beyond retirement, be it as employees or entrepreneurs. To promote the social participation of older people, their digital skills must be improved, and innovations in the health and care system must be promoted to relieve the burden on social security systems.





# B 1 Innovation in an Ageing Society

**D**emographic ageing in Germany, as in other industrialized economies, presents a challenge to innovative power, productivity and growth. However, it also holds opportunities for new developments.

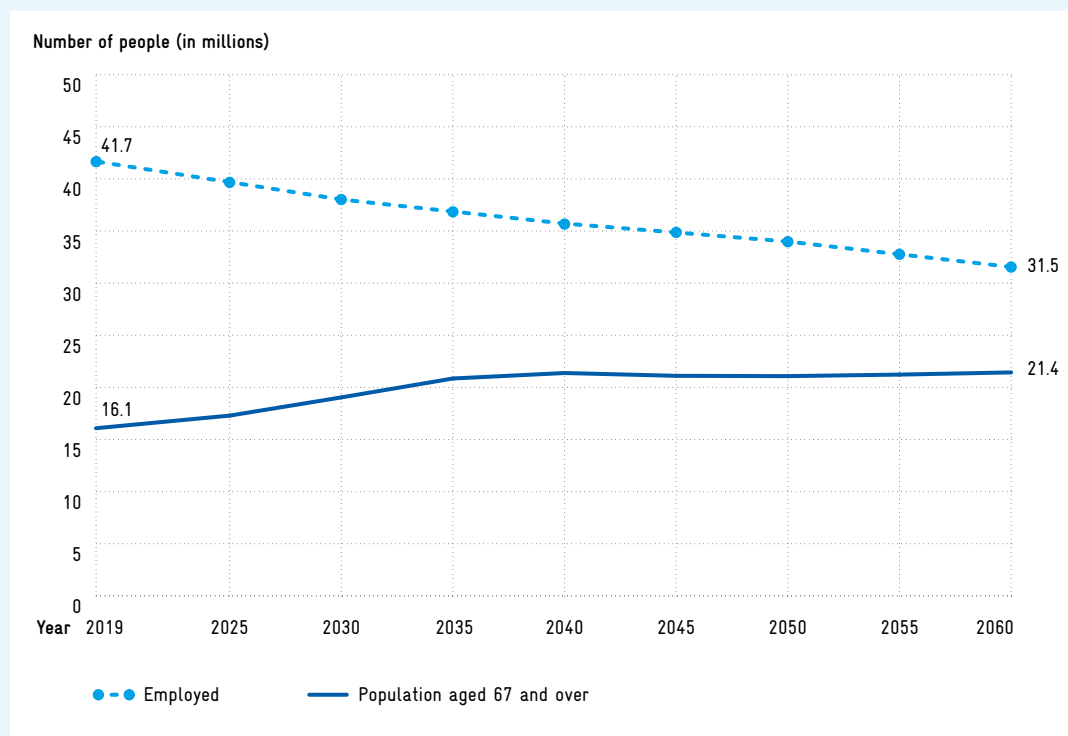
Figure B 1-1 illustrates the projected development of the population aged 67 and over and the number

of people in employment in Germany by 2060.<sup>104</sup> According to this forecast, the number of older people will rise significantly in the coming years due to increased life expectancy. The growing number of older people will result in new potential for innovation, particularly in goods and services that are specifically tailored to this age group.

**Fig. B 1-1 Population and employment forecast, 2019–2060 in millions**



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Legend: According to the forecast, in 2060 there will be 31.5 million people in employment and 21.4 million older people aged 67 and over in Germany.

Source: Labour Force Projection (Variant 2 W2-E01) Destatis (2020); 14th Coordinated Population Projection.

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The number of people in employment is expected to decline significantly in the coming decades, especially as the baby boomers enter retirement. Provided immigration remains at a similar level as before, the already pronounced skilled labour shortage will become even more acute – with negative consequences for the development and application of innovations. To nonetheless maintain the innovative power and, based on this, the productivity and growth of the German economy, it will be of crucial importance to harness the innovation potential of older people.<sup>105</sup> Older people can make a significant contribution to Germany's innovative power through their willingness to remain in employment for longer, be it as employees or entrepreneurs. It is important to create favourable conditions for them to do so.

Demographic ageing entails challenges for social cohesion. The advancing digitalization requires a minimum level of digital competence for participation in social life. If we succeed in improving and continuously developing the digital skills of older people, they will also demand innovative digital products and services, e.g. in the health and care system, and will be able to maintain their social integration for longer. This creates additional opportunities for innovation and new business models for the providers of these products and services.

Demographic ageing also affects the social security systems. In the pension insurance system, fewer and fewer contributors must support a growing number of pensioners. At the same time, an increasing number of people who are ill due to old age and in need of care is putting a strain on the health and care system. Digital innovations provide opportunities to reduce costs and thus relieve the burden on the health and care system. The prerequisite for this, however, is a sufficiently high level of digital competence on the part of the service providers and the service users.

## B 1-1 Older People as Innovators

Older people have considerable potential to develop innovative ideas and to help market them. As employees, they engage in the innovation activities of their employers; as entrepreneurs, they market innovative ideas themselves.<sup>106</sup> To demonstrate these correlations empirically, the following section uses data recording older people in age groups based on age, although there are certainly other ways of defining age (cf. box B 1-2).

### Box B 1-2 Dimensions of Age-related Development Processes

There is no generally valid definition of the age at which someone is considered an older person. A distinction is commonly made between three different dimensions of age-related development processes:<sup>107</sup>

- The physiological-biological dimension, characterized by a reduction in physical performance.
- The psychological dimension, which includes cognitive performance. Based on experience and knowledge, increased performance can occur in this dimension with increasing age.

At the same time, performance can also decline due to reduced ability to adapt and adjust.

- The social dimension, which is determined by integration into the social environment. Here, retirement in particular can lead to a loss of activities and contacts. However, it also creates the opportunity for reorientation and the establishment of a new social environment.<sup>108</sup>

Changes in these three dimensions affect the contribution of older people to the innovation process as well as their willingness and ability to use innovations. When and to what extent such changes occur varies from person to person.

## Older Workers Quite Active in Research, Development and Design

To develop new ideas and to launch them on the market as innovations, companies and research institutions use employees who conduct research, development or design activities and thereby contribute their creativity, knowledge and skills to the employer's innovation activities. Figure B 1-3 shows for different age groups the percentage of employees who say they 'frequently' perform research, development or design activities. Across all age groups, 12.6 percent of employees are frequently engaged in these activities. At 13.6 percent, the rate is above average in the age group under 50. Among the over 50s, it initially declines with increasing age and then rises again: For example, the rate in the age group 55 to 59 is 10.3 percent; for those aged 65 or over it is 12.4 percent.<sup>109</sup> The statistics show that older workers are involved in innovation activities to quite a considerable extent and that the share of older workers in research, development or design activities is only slightly below that of the average for all age groups. One explanation for this finding is that occupational groups that frequently conduct research, development or design activities remain in the labour force longer than occupational groups that sometimes or never carry out these tasks.<sup>110</sup>

## Start-Ups by Older People Relatively Often in the Mid- and High-Tech Sector

Older people also contribute to innovation as founders of technology-based companies. Figure B 1-4 provides an international comparison of the share of mid- and high-tech start-ups in the total number of start-ups by younger people up to and including the age of 59 and older people aged 60 and over.<sup>111</sup> Across all the countries considered, the share of mid- and high-tech start-ups<sup>112</sup> among those aged 60 and over is 9.0 percent, slightly higher than the share among those aged up to 59 at 8.5 percent. In Germany, this difference is pronounced at 9.9 percent for those aged 60 and over and 8.4 percent for those aged up to 59.<sup>113</sup> However, the comparatively high percentages for mid- and high-tech start-ups by older people coincide with few start-ups overall in this age group. For example, the start-up rate<sup>114</sup> in the mid- and high-tech sector for those aged 60 and over was only 0.3 percent over the period from 2012 to 2018 in Germany, but for those aged 59 and under it was 0.5 percent.<sup>115</sup>

The innovation contribution of young companies founded by older people alone or in teams can be determined for Germany using data from the IAB/ZEW Start-up Panel.<sup>116</sup> The analysis includes all businesses that were less than four years old at the time of observation and are referred to as recent start-ups hereinafter. For these, the age of the founding entrepreneur, the assignment to the high-tech sector<sup>117</sup> and the introduction of product or process innovations are known. The innovation contribution can be determined using the percentage of recent start-ups with product or process innovations and presented separately for the individual age groups and for assignment to the high-tech sector. The percentages in figure B 1-5 show that the innovation contribution of recent start-ups is largely independent of the age of the entrepreneurs. Around half of all recent start-ups in the high-tech sector feature innovations. At 53.7 percent, the share of recent start-ups among the over 65s is higher than that in the other age groups. In the non-high-tech sector,<sup>118</sup> between 31.9 and 36.9 percent of recent start-ups have introduced product or process innovations across all age groups.

## Start-ups by Older People More Likely Involving Market Novelties

If the aspect of quality in innovations is taken into account and only market novelties are considered,<sup>119</sup> then the high innovation contribution of recent start-ups by older people becomes clear.<sup>120</sup> Figure B 1-6 shows the percentage of recent start-ups with market novelties differentiated by age groups of the entrepreneurs<sup>121</sup> for the periods from 2006 to 2012 and from 2013 to 2020. In both periods, the percentages in the age groups of 50 years and older are higher than the percentages of those under 50 years of age. In the age group 65 and over, the shares of recent start-ups with market novelties are far above average at 14.1 percent in the period from 2006 to 2012 and 13.4 percent in the period from 2013 to 2020.

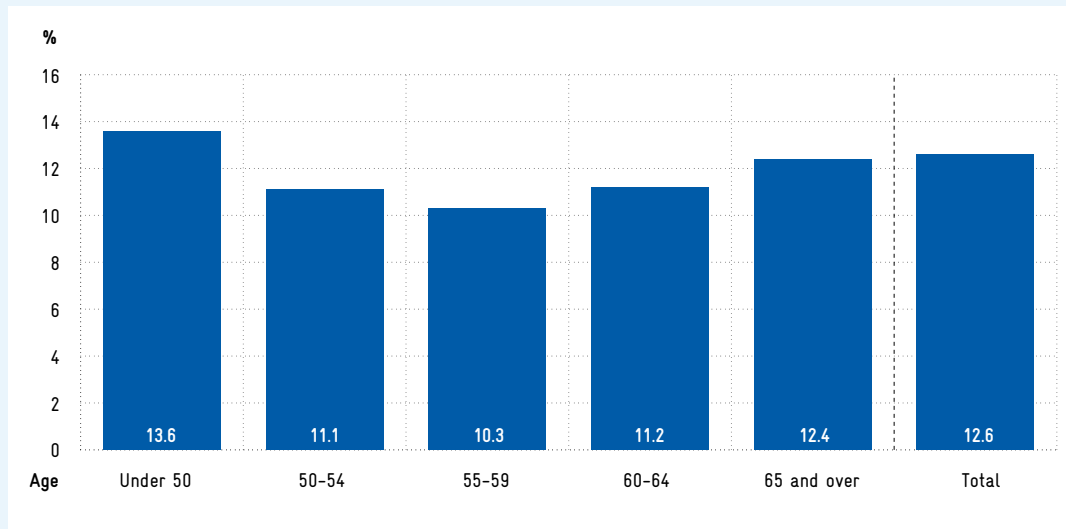
## More Pronounced R&D Activities in Recent Start-ups by Older People

The higher innovation contribution of recent start-ups by older people is associated with more regular and more pronounced research and development (R&D) activities. Figure B 1-7 shows for recent start-ups not only the amount of annual R&D expenditure but also the share of enterprises

**Fig. B1-3** Percentage of dependent employees who frequently perform the task 'Research, Development, Design Activities', by age group



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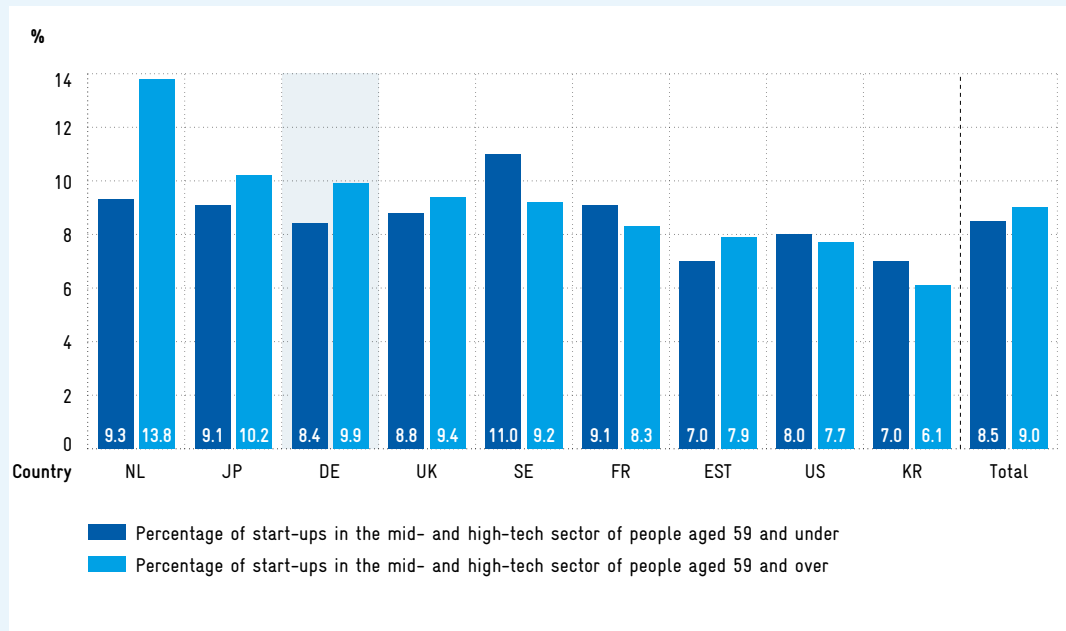


Answer to the question: I would now like to list a few selected activities. Please tell me how often these activities occur in your work, whether frequently, sometimes or never. Task Research, Development, Design Activities.  
Legend: For the years 2006, 2012 and 2018, an average of 12.4 percent of dependent employees in the age group 65 years and over were frequently engaged in research, development or design activities.  
Source: BIBB/BAuA Employment Survey 2006, 2012 and 2018. Own calculations. Own representation. N=53.132.  
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**Fig. B1-4** Percentage of start-ups in the mid- and high-tech sector among all start-ups by country and age group of entrepreneurs



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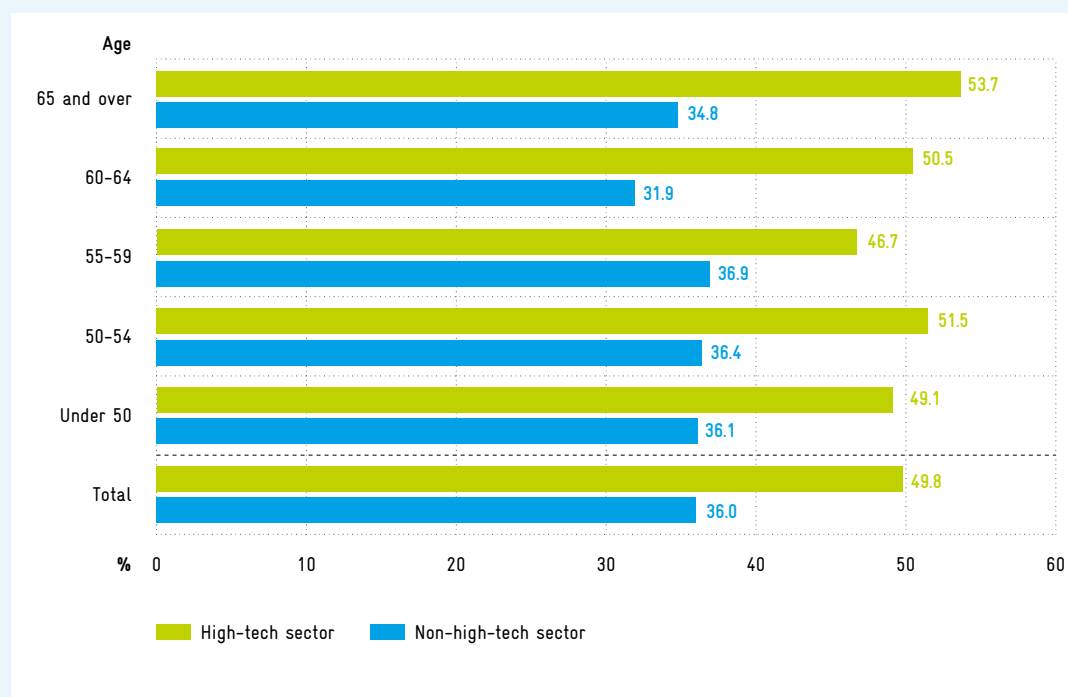


All other start-ups are in the no- and low-tech sector. TEATEC (Total Early Stage Entrepreneurial Activity in a Technology Sector) is recorded. This takes into account entrepreneurs who, at the time of the survey, are in the process of establishing a company or are the owner of a company that is no more than 42 months old in the mid- or high-tech sector.  
Legend: Among entrepreneurs aged at least 60 in Germany, the share of start-ups in the mid- and high-tech sector is 9.9 percent, among those aged up to 59 it is 8.4 percent.  
Source: Global Entrepreneurship Monitor 2012 to 2018. Own calculations. Own representation.  
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**Fig. B 1-5 Percentage of recent start-ups with product or process innovations by age group of entrepreneurs**



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Product or process innovations (yes/no) of recent start-ups (average values for the years 2007 to 2020, projection). Recent start-ups are those that were less than four years old at the time of observation. The high-tech sector is defined by the following industries: cutting-edge technology in manufacturing, high-value technology in manufacturing, technology-intensive service providers and software. The non-high-tech sector is defined by the following industries: Non-technology-intensive industries in manufacturing, knowledge-intensive service providers, creative consumer-related service providers, construction and finishing trades. Age classes are based on the age of the entrepreneur or, in the case of team start-ups, on the age of the oldest member of the start-up.  
Legend: 53.7 percent of the entrepreneurs aged at least 65 in the high-tech sector have product or process innovations.  
Source: Special evaluation by the IAB/ZEW Start-up Panel. Own representation.  
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that conduct R&D activities continuously, in each case for different age groups of the entrepreneurs at the time of founding. Continuous R&D is above average if older people founded the business. In the age groups of people aged 60 to 64 and over 64, 7.4 percent and 6.3 percent, respectively, of the businesses have conducted continuous R&D activities since their establishment. The average across all age groups is 4.4 percent. At the same time, the average R&D expenditure of recent start-ups increases for entrepreneurs up to the age of 60 to 64, who have the highest R&D expenditure at an average of €114,800. The R&D expenditure declines again in recent start-ups by those aged 65 and over..

### Patents by Older Inventors Less Disruptive

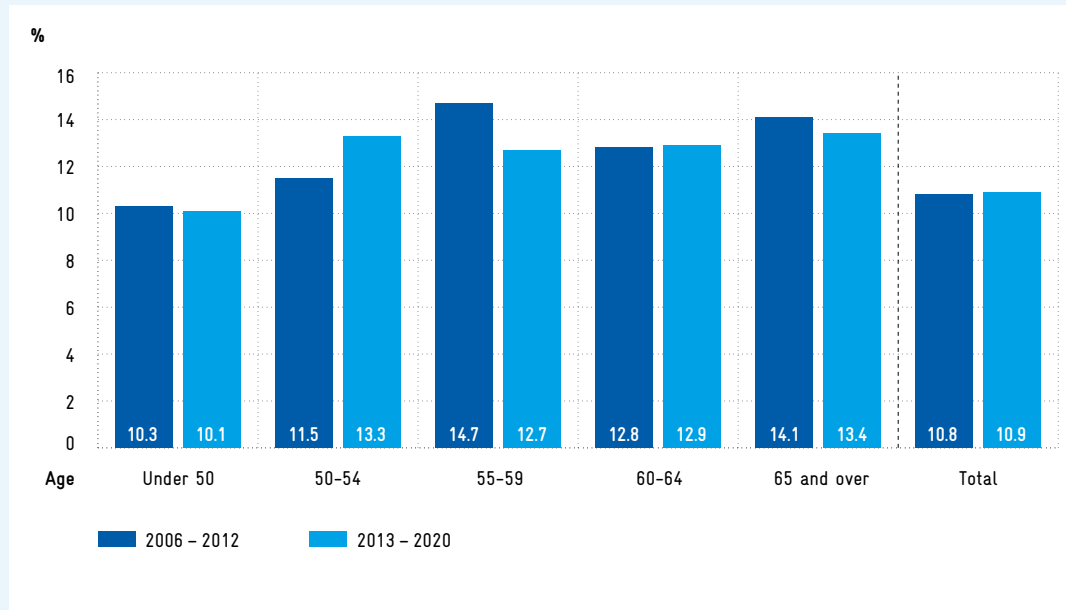
Patent data can be used to assess the genuine contribution of older people to the development of new technological ideas that can be the starting point for innovations. Comprehensive patent data with age classification are available for the USA.<sup>122</sup> Around 1.2 million inventors are recorded for the period from 1976 to 2017. The patenting rate can be determined in relation to the respective age of these inventors. The highest patenting rate is achieved by men in their early 40s with one patent in four years and women in their late 30s with one patent in six years. With increasing age, patenting activities decrease: at the age of 65, the rate is about one patent in eight years for men and one patent in 14 years for women. In addition, patents by older people



**Fig. B 1-6 Percentage of recent start-ups with market novelties by age group of entrepreneurs**



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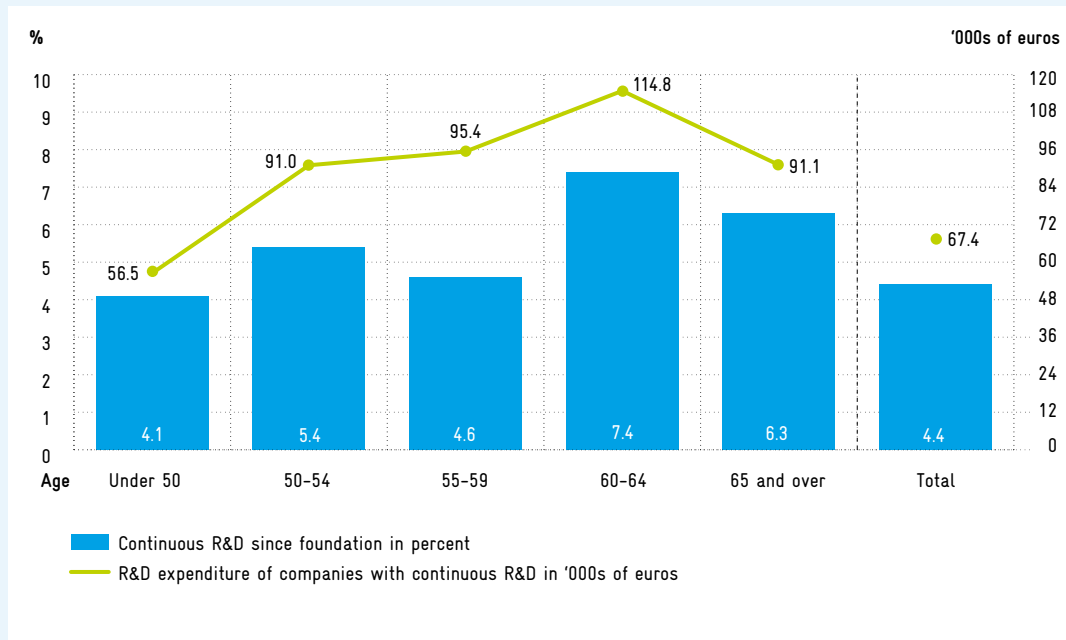
Market novelties (yes/no) of recent start-ups for the periods from 2006 to 2012 and from 2013 to 2020, projection. Recent start-ups are those that were less than four years old at the time of observation. Age classes are based on the age of the entrepreneur or, in the case of team start-ups, on the age of the oldest member of the start-up.  
Legend: 13.4 percent of recent start-ups with at least 65-year-old entrepreneurs introduced market novelties in the period from 2013 to 2020.

Source: Special evaluation by the IAB/ZEW Start-up Panel. Own representation.  
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**Fig. B 1-7 Percentage of recent start-ups with continuous R&D by age group of entrepreneurs and their R&D expenditures in thousands of euros**



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Continuous research and development (R&D) in percent and average R&D expenditure in thousands of euros of recent start-ups since foundation, projection. Recent start-ups are those that were less than four years old at the time of observation. Age classes are based on the age of the entrepreneur or, in the case of team start-ups, on the age of the oldest member of the start-up.  
Legend: In the age group of entrepreneurs aged at least 65, 6.3 percent of the recent start-ups report that continuous R&D activities have been carried out since foundation. The R&D expenditure of recent start-ups with continuous R&D amounts to an average of €95,700 for entrepreneurs who are at least 65 years old.

Source: Special evaluation of IAB/ZEW Start-up Panel. Own representation.  
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tend to be less disruptive,<sup>123</sup> i.e. the degree of novelty of the ideas they protect is less pronounced. Accordingly, with increasing age, the contribution to technological development not only declines, but is also increasingly limited to incremental further development of already existing technologies. The probability of older people contributing to radically innovative ideas is comparatively low.

Older data for inventors employed in Germany subject to social security contributions also show a declining contribution to technological development with advancing age, measured in terms of patent applications. In 2011, the age group of inventors aged 50 to 59 accounted for 23.5 percent of patent applications, while the age group of those aged 60 or older contributed 4.4 percent. Compared to 2006, however, these percentages have increased, which indicates a growing contribution of older people to the patent volume. At that time, only 16.3 percent of patent applications were filed by inventors aged 50 to 59 and 3.2 percent by inventors aged 60 or older.<sup>124</sup>

When combining data on start-ups with information on patents, it becomes apparent that recent start-ups by older people are more often patent-based than recent start-ups by younger people. While 2.8 percent of recent start-ups in the age group of under 50 have a patent at the time of foundation, the percentage increases with increasing age of the entrepreneurs. Among those aged 55 to 59, it accounts for 5.1 percent of all start-ups, and among those aged at least 65, it is as high as 7.6 percent of all recent start-ups.<sup>125</sup>

### Higher Likelihood of Innovation in Mixed-Age Teams

Older employees or older entrepreneurs often contribute to innovations in inventor teams or in the form of team start-ups. Based on data for dependent employees, it can be seen for Germany that in-house inventor teams with a higher average age have a lower probability of innovation.<sup>126</sup> This correlation is also evident in an analysis of the KfW SME Panel,<sup>127</sup> which includes German companies with a turnover of up to €500 million per year.<sup>128</sup> As the proportion of employees over 55 in the workforce increases, the probability of producing innovations decreases. However, the participation of older people in mixed-age teams<sup>129</sup> can be important for the success of innovation.<sup>130</sup> Data for

dependent employees show that mixed-age teams are more likely to produce innovations. Moreover, the probability of innovation increases with the age difference between the individual team members.<sup>131</sup> Data on US patent applications additionally indicate that mixed-age teams produce higher-quality innovations.<sup>132</sup>

## B1-2 Older people as Skilled Workers

In view of the skilled labour shortage caused by demographic change, the considerable potential innovation contributions of older people, as described in B1-1, suggest the question of whether, in which areas and how older people can be recruited for continued dependent employment for longer, if necessary also beyond retirement. The answer to this question could help to compensate for the negative effects of demographic ageing on economic innovation.

When older employees with many years of professional experience retire, their comprehensive and often highly specific expertise and experience is no longer available to companies. The standard pension age<sup>133</sup> is the determining factor for the retirement of dependent employees. In Germany, it remained unchanged at 65 years for a long time until 2012; since 2012, the standard pension age has been gradually raised to 67 years. However, the actual average pension age is below the statutory standard pension age,<sup>134</sup> and the employment rate<sup>135</sup> decreases sharply with increasing age even before the standard pension age is reached. In the age group of 55 to 59 years, the employment rate in 2021 was 81.1 percent, in the age group of 60 to 64 years only 61.4 percent.<sup>136</sup> The economy and society thus lose considerable innovation potential due to the early retirement of older people.

In its Skilled Labour Strategy (Fachkräftestrategie der Bundesregierung), the German Federal Government has formulated the goal of 'keeping older workers in the labour force as long as possible and individually desired'.<sup>137</sup> To this end, measures are to be taken, for example, to raise awareness of the so-called Flexi-Rente.<sup>138</sup> The Federal Government also plans to enter into a social dialogue with employers and union representatives to discuss framework conditions such as flexible age limits in employment contracts and collective agreements.<sup>139</sup> Already as of January 2023, the Federal Government reformed

the possibilities for earning additional income while drawing a pension. Just like people who have already reached the standard pension age, people who draw their pensions early are now allowed to earn as much additional income as they wish without it being offset against their pension benefits. In the case of reduced earning capacity pensions, the additional earnings limit was raised significantly.<sup>140</sup>

### Higher Percentage of Older Workers in Jobs with Highly Complex Requirements

The contribution older skilled workers can make to innovation depends on the extent to which the job they perform gives them the opportunity to contribute their knowledge and experience. Among employees engaged in research, development or design activities (cf. figure B 1-3), older individuals<sup>141</sup> are employed longer in complex and highly specialized tasks<sup>142</sup> than in less complex tasks.<sup>143</sup> A similar pattern can also be seen in a sample of only employees with PhD degrees.<sup>144</sup>

### Digital Transformation as a Challenge for Older Skilled Workers

The digitalization of the world of work is leading to changes that confront all employees with major challenges if they do not have sufficiently developed digital skills.<sup>145</sup> Their job-related digital skills can be continuously improved through in-house and external training.<sup>146</sup> However, empirical evidence shows that in-house training is more likely to be taken up by younger employees. The share of people who completed in-house continuing education and training (CET) in the respective previous year was only 39 percent for people aged 50 to 64 in 2018, while it was 48 percent for people aged 35 to 49.<sup>147</sup> This percentage has increased steadily in all age groups since 2012. The share of CET that is allotted to information and communication technologies (ICT), which are important for the digital transformation, is only 10 percent and hardly differs between the various age groups.<sup>148</sup>

The Federal Government has recognized the importance of CET for successful transformation processes and has adopted a National Continuing Education Strategy (Nationale Weiterbildungsstrategie).<sup>149</sup> However, this strategy does not specifically address the challenges that arise from the combination of demographic ageing and digital transfor-

mation and that can hinder continued employment after retirement.<sup>150</sup>

### Pension Age the Main Reason for Ending Employment

Across all forms of employment, reaching the pension age is the most frequently cited reason for retirement (cf. figure B 1-8). In 2021, 56.6 percent of the respondents who were retired at the time of the survey<sup>151</sup> stated that they had retired<sup>152</sup> because they had reached the pension age. Compared to 2014 and 2017, the relevance of the pension age for ending employment has increased significantly.

Also, in 2021, 51.7 percent of the respondents were motivated by personal, health or family reasons to end their employment. Across all years, business or labour market-related reasons for leaving employment were cited significantly less frequently and in decreasing order over time.

### Increased Employment in Retirement

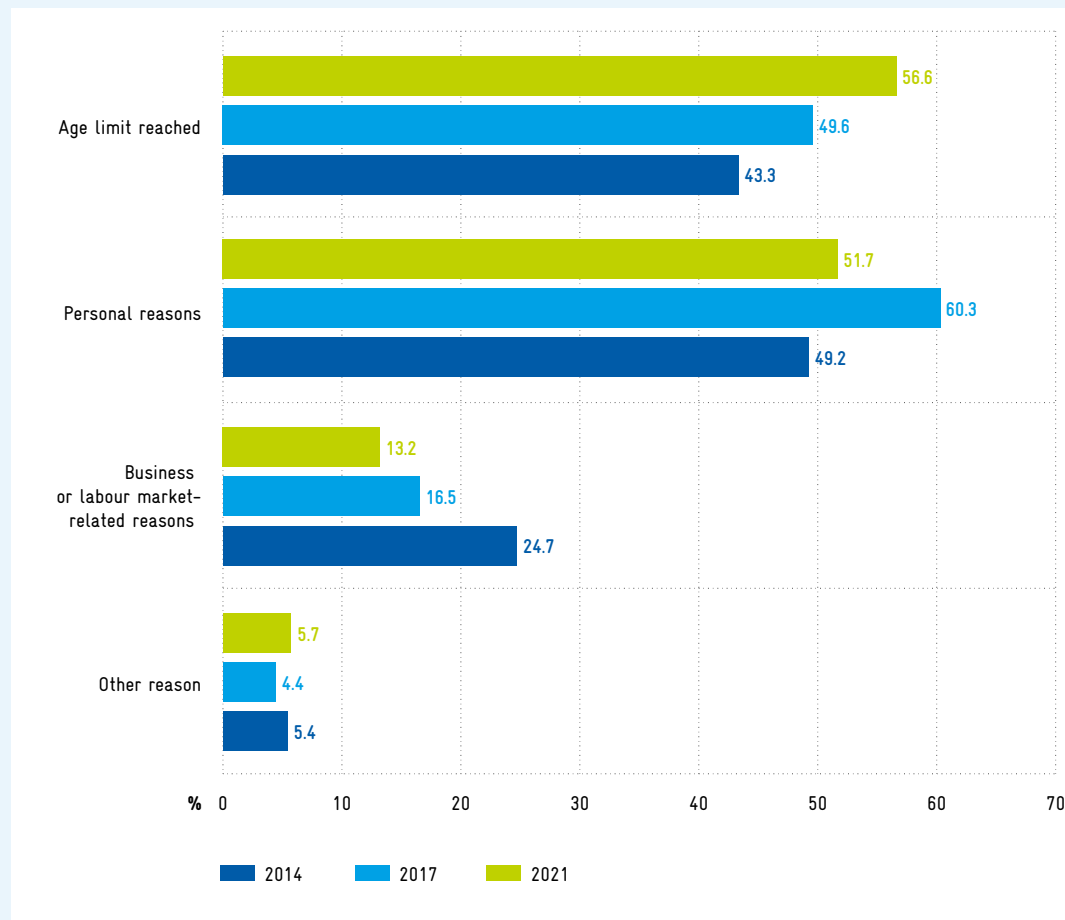
There is a disproportionately high number of people with a high level of education among older dependent employees who are available to businesses as skilled workers beyond retirement.<sup>153</sup> For companies, continued employment beyond reaching pension age creates opportunities to retain their expertise and thus also to promote innovation.

The share of people who are still employed in retirement has increased from 10.7 percent in 2014 to 11.7 percent in 2021. Of these retired workers, 40.1 percent were dependently employed in 2014 and 29.7 percent in 2021, a decrease of 10.4 percentage points (see table B 1-9).<sup>154</sup> Increasingly, companies are retaining their own retirees. In 2021, at 47.8 percent, almost half of those who continued to work in retirement were employed by or otherwise working for the same employer. Compared to 2014, this corresponds to an increase of 10 percentage points.<sup>155</sup> The fact that many companies have recognized the potential of older skilled workers is also reflected in various initiatives to build up pools of skilled workers that can be drawn on when needed (cf. box B 1-12).



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**Fig. B 1-8 Reasons for leaving employment by age group in percent**



Answer to question: Why did you stop working full-time in your primary occupation? What are the main reasons for you? Question was changed in 2021, therefore categories simplified. No distinction between self-employed or employed possible. Personal reasons include: quitting as early as possible, double burden otherwise too high, partner/spouse is retired, enough time for myself, taking care of sick person, family reasons, health reasons, taking care of children, taking care of grandchildren, preparing for retirement. Company and labour market reasons include: became unemployed, internal company reasons, dissatisfied with labour market situation. Multiple answers possible. No differentiation between self-employed and employed persons before retirement. Legend: In 2021, 56.6 percent of retired persons gave reaching the age limit as the reason for retirement. Source: German Ageing Survey 2014, 2017 and 2021. Own calculations. Own representation. © EFI – Commission of Experts for Research and Innovation 2023.

### Quality of Life Decisive Motivation for Employment in Retirement

Employment in retirement is primarily motivated by reasons that create quality of life.<sup>156</sup> In 2021, 81.2 percent of respondents cited enjoyment of work, 72.5 percent contact with other people and 66.8 percent having a purpose as motives for continued employment (cf. figure B 1-10). These intrinsic reasons have gained in importance over the past eight years. The financial situation is of comparatively lesser importance for employment in retirement, but at 31.0 percent still not to be neglected. How-

ever, its importance has decreased since 2014. If age and level of education are also taken into account in these correlations, it becomes apparent that quality of life as a motivation for employment becomes more important with increasing age and higher education, while the financial situation becomes less important.<sup>157</sup>

### Similar Occupational Activities Before and After Retirement

The opportunities for contributing to the creation of innovations in retirement are greater the more

Tab. B 1-9 Employment in retirement in percent

	2014	2017	2021
Share of employed in retirement	10.7	10.8	11.7
Of which			
Dependently employed	40.1	30.1	29.7
Working for same employer as before retirement (including dependent employees)	37.0	39.2	47.8

Answer to question: Sometimes pensioners and retirees keep working after retirement. What about you: Are you working at the moment? Are you employed as a worker or employee or are you self-employed? And: Are you employed at the same employer like before your retirement? Do you work for your former employer?

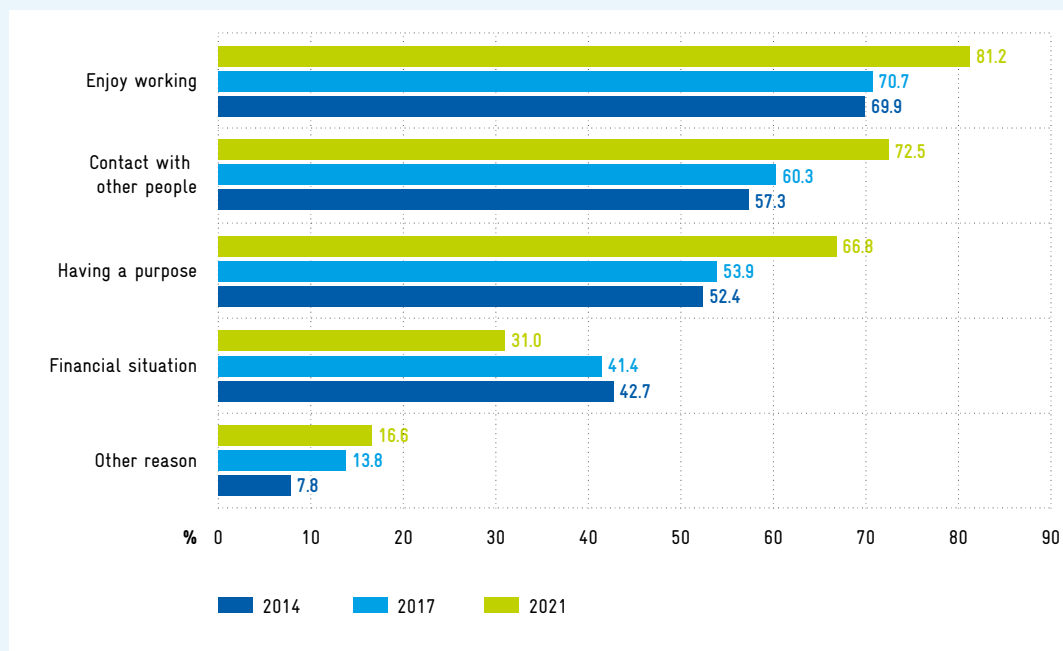
Legend: In 2021, 11.7 percent of people reported being employed in retirement. Of these, 29.7 percent are dependently employed. Of the 11.7 percent who are employed in retirement, 47.8 percent work for the same employer as before retirement (including dependent employees).

Source: German Ageing Survey 2014, 2017 and 2021. Own calculations. Own representation.

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Fig. B 1-10 Reasons for working in retirement in percent



Answer to question: What motivated you to take up work during retirement?

Only dependent employees are taken into account. Multiple answers possible.

Legend: In 2021, 61.2 percent of retirees gave enjoy working as the reason for employment.

Source: German Ageing Survey 2014, 2017 and 2021. Own calculations. Own representation.

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the knowledge and experience acquired during working life can continue to be used. Figure B 1-11 shows the percentage of dependent employees in retirement who are active in the same scope of activities as before retirement. The results indicate that retired workers continue using their expertise

and experience mainly in the jobs they held before retirement. Of those retired workers whose previous occupations were associated with a high level of education,<sup>158</sup> 91.8 percent continue to perform similarly demanding activities in retirement.

## Different Labour Law Regulations for Employment in Retirement

After retirement, older people are certainly motivated to continue contributing their experience to the workplace. From the employer's point of view, the continued employment of retirees has the advantage of retaining employees who have already been trained and their expertise, including their organization-specific knowledge, and gaining more time for the transfer of knowledge to junior staff.

For economic reasons, it is often attractive for companies to employ retirees only on a fixed-term basis. The legal conditions for such fixed-term employment depend on the nature of the employment contract. If a retiree decides to enter into an employment contract with a new employer, then an initial fixed-term contract without an objective reason is unproblematic.<sup>159</sup> However, if a new employment contract is established with the same employer, then an initial fixed-term contract without an objective reason is excluded under the Part-Time and Fixed-Term Employment Act (Teilzeit- und Befristungsgesetz, TzBfG)<sup>160</sup> because of the prohibition of so-called 'prior employment'.<sup>161</sup> Reaching the pension age is not in itself a permissible objective reason for an effective fixed-term.<sup>162</sup> If it is already agreed before retirement to continue an existing employment contract beyond the pension age, a repeated postponement of retirement is unproblematic.<sup>163</sup>

In Germany there are various company programmes that organize the project-related deployment of retirees in order to continue to use their expertise and to improve the supply of skilled workers. In these so-called senior expert programmes (cf. box B 1-12), databases are kept detailing the competences of retired former employees and, if necessary, suitable retirees are requested for mostly shorter projects. For example, senior expert programmes have been established by the industrial group Thyssenkrupp,<sup>164</sup> the car manufacturer BMW<sup>165</sup> and the conglomerate Bosch.<sup>166</sup> However, access to senior experts is more difficult for SMEs, as they can hardly manage the balance of supply and demand for experts with the required competence profile internally. Only a few service providers exist that offer a placement service for retired experts, such as ASE Automotive within the automotive industry.<sup>167</sup>

## B 1-3 Older People as Entrepreneurs

Section B 1-1 made it clear that older people play a relevant role in innovative new businesses, especially in the high-tech sector.<sup>168</sup> However, the general propensity to start a business decreases significantly with increasing age.<sup>169</sup> Therefore, the motives of older people to start a business and the difficulties they face in the start-up process are examined in more detail below.

### Economic Motives Less Pronounced in Start-ups by Older People

Businesses are established for a variety of reasons. The importance of the various motives can change over the course of a lifetime. Figure B 1-13 shows how pronounced individual start-up motives are depending on the age group. Across all age groups, independence is the most frequently mentioned motive for establishing a business. Turning the business idea into reality is mentioned more frequently as a motive for starting a business in the three age groups of those over 49 than among those under 50.<sup>172</sup> In contrast, the motive of earning a higher income is significantly more important for those aged 18 to 49, at 24.4 percent, than for the older age groups, where the frequency of mention ranges between 11.3 and 18.5 percent.

### Difficulties in Business Establishment Less Frequently Perceived by Older People

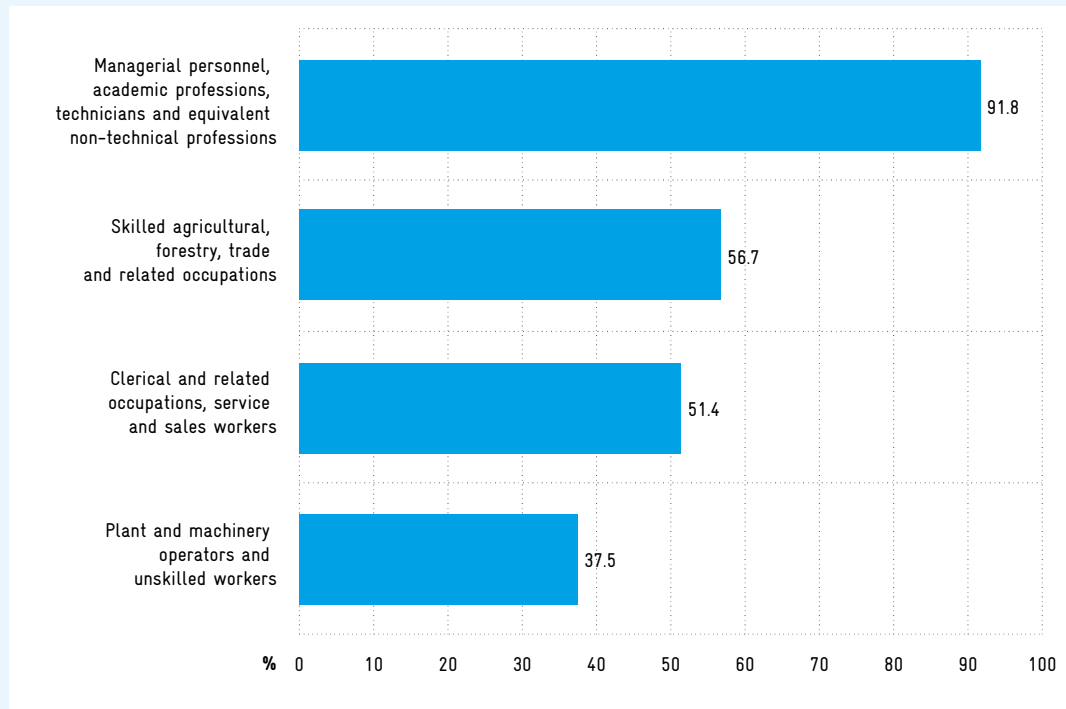
During their start-up project, entrepreneurs are confronted with various difficulties that can delay the start-up project and jeopardize its success. As part of the KfW Entrepreneurship Monitor, entrepreneurs were asked about perceived difficulties during the start-up process. Table B 1-14 shows the percentage of entrepreneurs who experienced the respective difficulty, broken down by age group.<sup>173</sup>

Across all age groups, bureaucratic hurdles and delays are considered the greatest difficulty for start-up projects. While the burden on the family is, unsurprisingly, less of a problem for older people, 16.3 percent in the age group 55 to 59 already perceive their age as a difficulty, compared to 3.2 percent in the age group 18 to 49. Financial risks and financing difficulties do not seem to be disproportionately pronounced for older entrepreneurs. Only 3.7 percent of those aged 60 to 67 have financing difficulties and 14.0 percent have concerns about the high

**Fig. B 1-11 Similar occupational activities before and after retirement**



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Answer to question: Pre-retirement occupational activity according to ISCO88 and occupational activity in retirement according to ISCO88.

Only dependent employees are taken into account. Multiple answers possible.

Legend: 91.8 percent of the dependent employees in retirement in the job roles of managerial personnel, academic occupations, technicians and equivalent non-technical occupations were also employed in the job roles of managerial personnel, academic occupations, technicians and equivalent non-technical occupations in their last job before retirement.

Source: German Ageing Survey 2014, 2017 and 2021. Own calculations. Own representation.

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### Box B 1-12 Senior Experts: The Example of Bosch Management Support GmbH

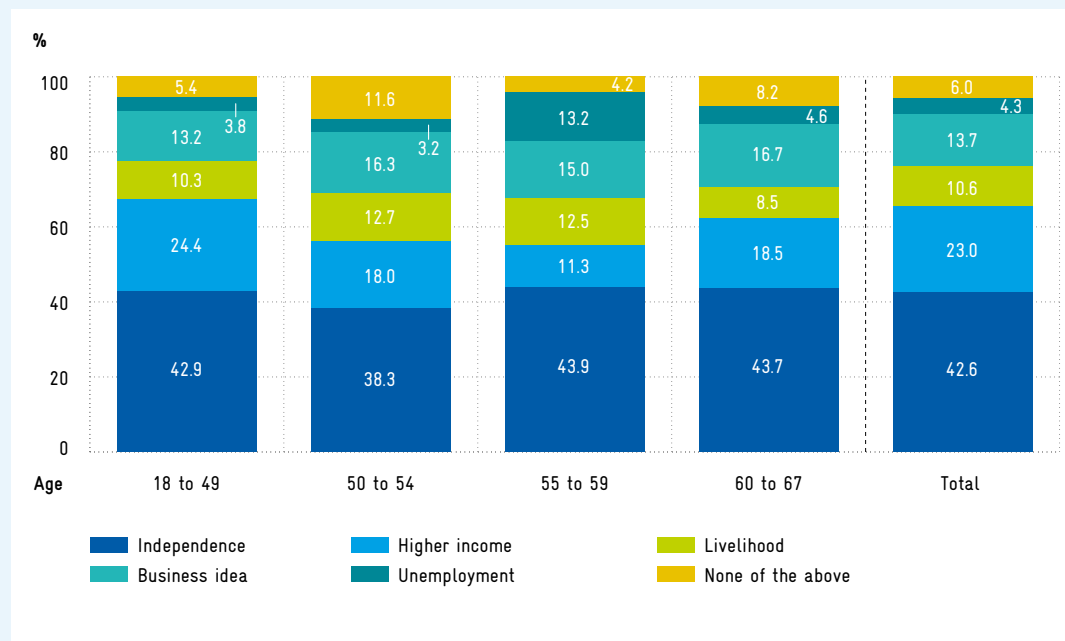
Bosch Management Support GmbH (BMS) was established in 1999 to coordinate the deployment of retired specialists known as senior experts within Robert Bosch GmbH.<sup>170</sup> From the company's point of view, the deployment of senior experts within the context of short-term projects contributes to innovative capacity. The aim is to deploy them in a specialist and problem-oriented manner in accordance with the existing expertise and to transfer knowledge across generations by working together in mixed-age project teams. Only former Bosch employees are deployed as senior experts. As they are familiar with internal work processes, this minimizes the induction period.

Work assignments of BMS senior experts last 40 days on average. In a representative survey, the senior experts name several motives for their work at BMS.<sup>171</sup> The appreciation of one's own person associated with passing on experience and the opportunity to contribute to value creation are just as much a motivation for the senior experts as the maintenance of personal performance through challenging activities during retirement. Identification with the company and interesting work locations are also mentioned as motives for working in retirement. For most of the senior experts surveyed, the flexibility resulting from their own decision-making authority regarding the acceptance of assignments and the possibility of working in a home office are also of key importance.



[Download Data](#)

**Fig. B 1-13 Motives for establishing a start-up by age group of the entrepreneurs in percent**



Averages of the start-up cohort 2016 to 2021 are given. Age categories are based on the age of the interviewee, regardless of whether the new business is an individual or a team start-up.

Legend: Independence is a motive for 43.7 percent of 60- to 67-year-old entrepreneurs.

Source: Special evaluation of KfW Entrepreneurship Monitor by KfW Research. Own representation.

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financial risk, while in the age group 18 to 49 the respective percentages are significantly higher at 14.7 percent and 23.6 percent.

Comparable results are seen for respondents who have discarded the plan to establish a business. Here too, bureaucratic hurdles and delays are perceived as the most frequent difficulties. Conversely, financial risks and financing difficulties are perceived more frequently among older people who have abandoned their start-up plan, in contrast to those who have established a business, but not disproportionately frequently compared to younger people.<sup>174</sup> Overall, the data also show that difficulties are perceived less frequently with increasing age.

### Start-ups by Older People More Likely to Survive

From a societal perspective, the success of start-ups is even more relevant than their frequency. A general and frequently used measure of success for start-ups is their long-term survival on the market.

Based on actual start-ups, figure B 1-15 shows the likelihood of survival of start-ups in the first five years after establishment for different age groups of entrepreneurs.<sup>175</sup> Start-ups of the under 50s consistently show a lower likelihood of survival than start-ups in other age groups. One year after establishment, 86.7 percent of the start-ups still exist, compared to over 90 percent of the start-ups of people over 50 years of age. After five years, 75.3 percent of the start-ups of those aged 50 to 54 still exist, 71.2 percent of the start-ups of those aged 54 to 59, 62.0 percent of the start-ups of those aged 60 to 67<sup>176</sup> and 57.2 percent of the start-ups of those under 50.

### B 1-4 Innovations for an Ageing Society

The demographic ageing of society is not only leading to changes in the labour markets and in the associated innovation activities. It is also changing the markets for goods and services. Older people's de-



[Download Data](#)**Tab. B 1-14 Perceived difficulties by age group of entrepreneurs in percent**

	18 to 49 years	50 to 54 years	55 to 59 years	60 to 67 years
Bureaucratic hurdles and delays	39,9	31,2	38,1	28,7
Difficulty in acquisition of orders/customer contacts	27,7	24,0	19,1	19,5
Concerns about age	3,2	6,4	16,3	16,6
Other difficulties	14,7	13,4	17,3	15,7
Concerns about high financial risk	23,6	15,6	14,8	14,0
Concerns about lack of professional qualifications	16,9	8,3	9,2	13,9
Concerns about immature idea	15,3	12,0	6,7	13,1
Concerns about lack of commercial knowledge	20,9	11,9	13,0	12,9
Concerns about economic situation	16,3	16,4	10,6	11,7
Strain on family	30,6	17,2	15,5	10,4
No suitable employees	15,6	11,0	11,6	8,6
Fear of social decline in case of failure	17,0	15,4	15,7	7,9
Concerns about advantages of dependent employment	20,7	10,0	13,8	3,7
Financing difficulties	14,7	14,1	7,5	3,7
Poor infrastructure	12,4	11,8	7,4	3,6
Lack of suppliers	7,3	4,6	2,5	3,4
Lack of co-founders	10,6	4,4	3,1	2,0
Poor image	6,6	7,2	4,2	1,7
Not receiving public funding	9,9	6,3	4,2	0,7

Often Rarely

Perceived difficulties of entrepreneurs. The evaluations are averages of the start-up cohorts from 2016 to 2021. Age categories are based on the age of the interviewee, regardless of whether the start-up is an individual or a team start-up. Abandonment of plans not taken into account here.

Legend: Bureaucracy is a difficulty in the start-up process for 28.7 percent of 60- to 67-year-old entrepreneurs.

Source: Special evaluation of KfW Entrepreneurship Monitor by KfW Research. Own representation.

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mand for goods and services tailored to their needs and preferences will continue to grow in the future. Age-related changes in consumption behaviour, willingness and ability to pay, and preferences for goods and services are causing companies to adapt their market and innovation strategies.<sup>177</sup> In principle, however, these changes do not give rise to any particular need for action in terms of research and innovation policy.

That said, the interaction of demographic ageing and the digital transformation of society creates two fields of action that are relevant for research and innovation policy. These cannot be categorized within the usual pattern of market and system fail-

ure, but they can be justified in socio-political terms. On the one hand, it is important to maintain the social participation of older people in an increasingly digitized environment. On the other hand, digitalization unlocks innovation potential to mitigate the demographically induced rising cost and financial pressures in the health and care system..

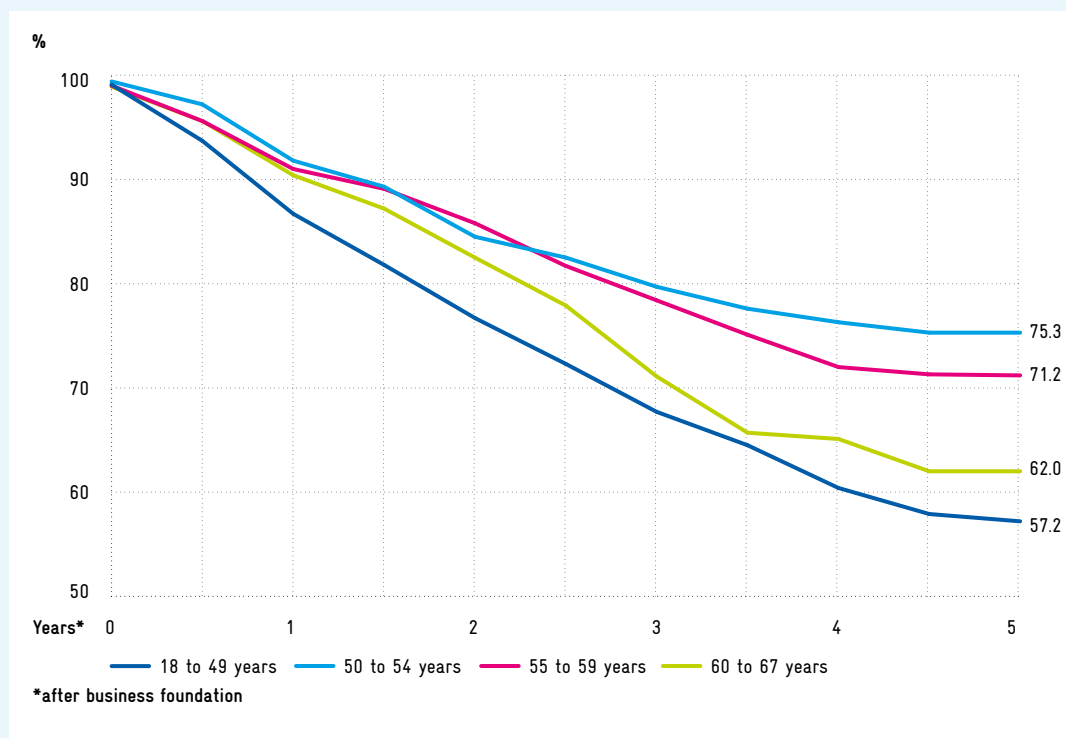
### Digital Skills of Older People Significantly Poorer

The advancing digital transformation generates special challenges for the social participation of older people. Digitalization does unlock great potential for innovations that meet the special needs of older

**Fig. B 1-15 Probability of survival of start-up projects by age group of entrepreneurs in percent**



[Download Data](#)



Kaplan-Meier estimate of the probability of survival of start-up projects in the first five years after founding, by age categories of the interviewed entrepreneurs. Age categories are based on the age of the interviewee regardless of whether it is an individual or team start-up. The analysis is based on start-ups from the surveys from 2016 to 2021 that were no older than five years at the time of the survey.

Legend: 82.5 percent of the start-up projects of 60- to 67-year-olds still exist two years after the founding of the business.

Source: KfW Entrepreneurship Monitor: KfW Special evaluation. Own representation.

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people, for example with regard to their health.<sup>178</sup> Similarly, voice recognition and smart home technologies, digital media and telemedicine allow older people to remain socially integrated in their familiar environment for longer.<sup>179</sup> However, using these innovative services requires nationwide access to digital infrastructures such as broadband and 5G networks, as well as sufficient digital skills among users.

Digital participation describes easy and secure access to digital infrastructures, technologies and developments, which in turn enables access to information, communication and exchange. A prerequisite for digital participation, and consequently for trust in digital technologies and openness towards digital innovations, are basic digital skills.<sup>180</sup> Without these skills, even simple applications with everyday relevance, such as online banking or shopping,

can be challenging. The expansion of digital applications in public administration (e-government) likewise presents serious problems for people without sufficient basic digital skills. A lack of digital skills or skills that are no longer up to date not only have a negative impact on the demand for these services, but also impair participation in social life.<sup>181</sup>

Especially in parts of the older population, it cannot be assumed that the skills required for digital participation are fully available. Currently, digital literacy is significantly lower among the older population than among younger people. It already decreases significantly in the age group of people aged 56 to 64. After retirement, digital skills acquired during working life are quickly made obsolete by the dynamics of new products and services. In terms of digital literacy, the over 76s are particularly out of touch.<sup>182</sup>

Older people often do not see much benefit for themselves in the use of digital technologies. Only about 50 percent of people aged 56 to 75 agree with the statement that they benefit from digitalization; in the age group of 76 and over, the figure is as low as 24 percent.<sup>183</sup> However, once digital innovations are experienced as helpful by older people, openness and acceptance increase immediately.<sup>184</sup>

In an international comparison, the share of people aged 65 to 74 with at least basic digital skills is only 28 percent in Germany, significantly lower than for example in the Netherlands (61 percent), Switzerland (56 percent) and Norway (55 percent).<sup>185</sup> At the same time, non-European countries with special funding programmes also demonstrate that digital skills can be improved across the board with sufficient funding. One example is the Canadian Digital Literacy Exchange Program (DLEP) (see box B 1-16).

In Germany, the promotion of digital skills among older people is still in its infancy. The Federal Ministry for Family Affairs, Senior Citizens, Women and Youth (Bundesministerium für Familie, Senioren, Frauen und Jugend, BMFSFJ) and the German National Association of Senior Citizens' Organisations (Bundesarbeitsgemeinschaft der Seniorenorganisationen, BAGSO) therefore initiated the Digital Pact for Older People (DigitalPakt Alter). The focus is on personal advice and individual assistance with specific questions about digital applications and devices. The two-year budget for 2021 and 2022 was just

under €1.4 million.<sup>186</sup> A total of about 10,000 older people were contacted in the first year.<sup>187</sup>

### Digitalization Potential in Healthcare Not Fully Leveraged

The demand for medical goods and services<sup>190</sup> will increase with the demographic ageing of society. Specifically, an increasing demand for care services is to be expected. 4.6 million people in Germany were already dependent on care in 2021. Assuming a constant care rate and the currently forecast population development, the number of people in need of care will rise to 6.5 million by 2050.<sup>191</sup> Consequently, the need for skilled workers in care professions will increase.<sup>192</sup> This development, as well as the rising demand for healthcare goods overall, will trigger increased financial pressure on the statutory health and care insurance funds. However, the expected cost increases in the health and care system are not matched to the same extent by increasing contribution payments.

The bottlenecks in funding and skilled labour can be counteracted through digitalization by using digital innovations in medical and nursing services and goods in the form of assistance and support systems as well as stand-alone applications.<sup>193, 194</sup> For example, the Digital Care Act (Digitale-Versorgung-Gesetz, DVG)<sup>195</sup> passed in 2019 provides for the use of various digital technologies. These include digital health applications, connection to telematics infrastructure, boosting telemedicine and digitization of

#### Box B 1-16 Promoting Digital Participation: The Canadian Digital Literacy Exchange Program (DLEP)

The DLEP was initiated by the Canadian government in 2018 to improve the digital skills and therefore the digital participation of selected population groups, including older people, members of the Indigenous population and non-native speakers. The DLEP focuses on free public services to promote basic digital literacy. In a first funding period from 2019 to 2022, 36 projects were funded with a total of more than CAD\*26

million (approx. €17.9 million).<sup>188</sup> Of the 36 projects funded, 31 were aimed at the target group of people over 65, among others.

In total, the DLEP supported over 400,000 people in their basic digital skills over the three-year period from 2019 to 2022, reaching more than 1 percent of the total population.<sup>189</sup> People over the age of 65 accounted for approximately two-thirds of all participants.

In 2022, the project entered another funding period (2022 to 2025) with a volume of CAD\*17.6 million (approximately €12.1 million).

administrative processes, as well as improved usability of health data and opportunities for the promotion of digital innovations by statutory health insurance funds.<sup>196</sup>

To exploit the potential of innovations of this kind, innovations must benefit those in need of care. An important prerequisite for the use of innovations is that both recipients and providers of services have the necessary digital skills. This makes the previously mentioned problem of older people's basic digital skills relevant in this context as well. In the provision of services in care, the demands for basic and job-specific digital skills will also increase, which will exacerbate the quantitative bottleneck among care professionals. The Commission of Experts already highlighted this problem for the healthcare system in its 2022 report.

In 2017, the Nursing Professions Act (Pflegeberufegesetz) was introduced, which merged the previous vocational education and training programmes for geriatric nursing, healthcare and nursing, as well as healthcare and paediatric nursing into a single training profession. The aim of this generalization is to make the nursing profession more attractive by providing greater flexibility and later specialization. The coalition parties have recognized that the teaching of digital competences must be integrated into this vocational education and training programme.<sup>197</sup>

### Regulation of Cost Transfer in the Health and Care System Inhibits Innovation

As a result of the separation of payers of costs and beneficiaries in the health and care system, cost transfer regulations are indispensable to keep costs controllable. The Joint Federal Committee (Gemeinsamer Bundesausschuss, G-BA) decides which medical and nursing services the statutorily insured in Germany can make use of.<sup>198</sup> It is thus incumbent on the G-BA to decide on the introduction of technological innovations in the health and care system. In the G-BA, in addition to the chair and two neutral members, the payers and the service providers are represented by five members each. Nursing professions as well as non-medical healthcare professions are not represented in the G-BA and consequently have no say.<sup>199</sup> Likewise, the beneficiaries have no voice in the G-BA. To promote innovation in the health and care system, the coalition parties have included a reform of the G-BA in their coalition

agreement. This is intended to speed up decisions in self-administration, increase patient representation and expand the opportunities for nursing and other healthcare professions to have a say in relevant decisions.<sup>200</sup> Further barriers to the adoption of innovations can be reduced by regulatory changes at the interfaces of the social security systems, for example by improving coordination between outpatient and inpatient care.<sup>201</sup>

## B 1-5 Recommendations for Action

### Use the Potential of Older Skilled Workers

Longer labour participation can make a significant contribution to reducing the skilled labour shortage threatening the innovative capacity of the German economy in the medium to long term in the wake of demographic ageing. Older employees should therefore be offered attractive conditions to make their expertise and experience available to the labour market for as long as possible and to contribute to innovation. The labour participation of older workers plays only a subordinate role in the Federal Government's Skilled Labour Strategy. The Commission of Experts recommends developing concrete policy measures that go beyond the social dialogue with the employers and union representatives. These include:

- To make the best use of the innovation potential of older people, the general conditions for them to be employed in retirement should be made as administratively and financially attractive as possible.
- The Commission of Experts does not see any particular need for protection when retirees enter into a new employment relationship. For this reason, a fixed-term contract without an objective reason should always be an option, even multiple times.
- The initiation and start-up funding of regional and sector-related platforms should be considered to support SMEs in the recruitment of senior experts.

### Systematically Integrate Older People in Start-up Support Formats

Older people also make substantial contributions to the performance of the German innovation system as founders of new companies. The available data do not indicate any special funding needs for older entrepreneurs. The Commission of Experts recommends:

- Access to existing funding formats should be made easier for older potential entrepreneurs. For example, the opening of university start-up funding formats and access to public infrastructure such as incubators should be considered. Stereotypes of ‘young’ entrepreneurs should be eliminated when addressing those interested in establishing a business.

### Improving Digital Participation of Older People

The participation of older people in a digital economy and society is enabled by the broadest possible access to new digital products and services. Digital participation requires not only access to digital infrastructure but also the skills to use digital services. Digitalization in the public sector adds to the importance and urgency of this. The Commission of Experts recommends:

- Complementary to the broadband expansion, which the Commission of Experts has already repeatedly called for, systematic support measures are needed to improve the digital skills of older people. The Digital Pact for Older People should serve as a starting point for broader initiatives.
- The overdue digitalization of public administration (cf. chapter A 3) should be directly linked to comprehensive support measures for older people in the use of digital services. This support should also focus on the acquisition of digital skills to counteract the increasing exclusion of older people.

### Leverage the Potential of Digital Innovations in the Health and Care System

Demographic ageing is challenging the health and care system due to increasing demand and a simultaneous shortage of skilled workers. Digital innovations can provide relief here. The Commission of Experts recommends:

- To optimally leverage digital innovations in the health and care system, professionals working in health and care need basic and job-specific digital competences. Therefore, developments in medical technology should be systematically integrated into the curricula of nursing training.
- The steps adopted in the coalition agreement on innovation-promoting reforms such as those of the Joint Federal Committee (G-BA) should be implemented without delay.