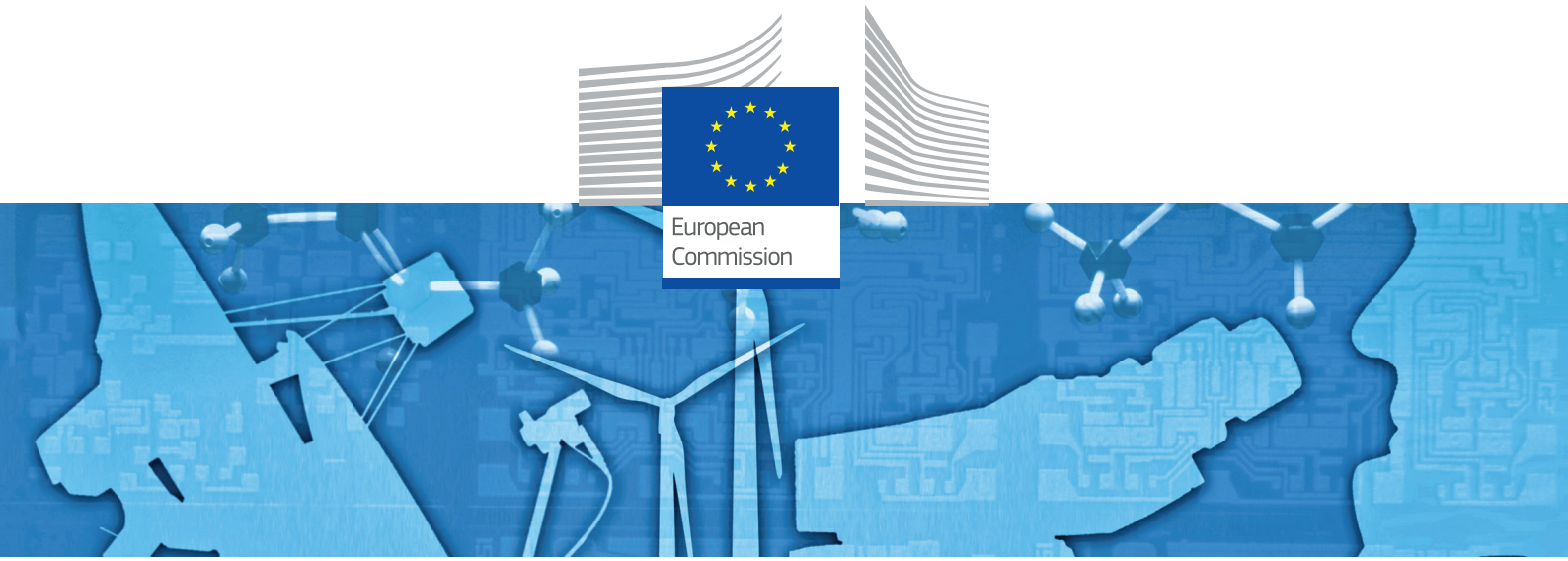

EU R&D SURVEY

The 2014 EU Survey on Industrial R&D Investment Trends

Report EUR 26909 EN

European Commission

Joint Research Centre
Institute for Prospective Technological Studies (IPTS)

Contact information

European Commission
Joint Research Centre
Institute for Prospective Technological Studies
Edificio Expo
C/ Inca Garcilaso 3
E-41092 Seville (Spain)
Tel.: +34 95 448 83 18, Fax: +34 95 448 83 00
e-mail: jrc-ipts-secretariat@ec.europa.eu
https://ec.europa.eu/jrc

Acknowledgements

"The 2014 EU Survey on Industrial R&D Investment Trends" has been published within the context of the Industrial Research and Innovation Monitoring and Analysis (IRIMA) activities that are jointly carried out by the European Commission's Joint Research Centre (JRC) - Institute for Prospective Technological Studies (IPTS) and the Directorate General for Research - Directorate A, Policy Development and Coordination. IRMA activities aim to improve the understanding of industrial R&D and Innovation in the EU and to identify medium and long-term policy implications.
The project was coordinated under the leadership of Xabier Goenaga Beldarraín (Head of JRC-IPTS Knowledge for Growth - KfG Unit) and Román Arjona Gracia (Head of DG RTD.A4 Analysis and monitoring of national research policies). This document was produced by Alexander Tübke, Fernando Hervás, Jörg Zimmermann and Nicola Grassano (KfG Unit) as the main authors. Héctor Hernández, Sara Amoroso, Mafini Dosso, Antonio Vezzani and Iulia Siedschlag from the KfG Unit, Diana Ivanova van Beers from DG RTD.A, Anca Dumitrescu and Daniel Deybe from RTD.F, Sabine Prevost from RTD.D, and Nathalie Pasquier from GROW.H made contributions to the design and review of the survey.

The JRC-IPTS and DG RTD-A would like to express their thanks to everyone who has contributed to this project.

Any comments can be sent by email to: JRC-IPTS-IRI@ec.europa.eu

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JRC92349

EUR 26909 EN

ISBN 978-92-79-43964-3 (pdf), ISBN 978-92-79-43965-0 (print)

ISSN 1831-9424 (online), ISSN 1018-5593 (print)

doi:10.2791/14520

Luxembourg: Publications Office of the European Union, 2014

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The 2014 EU Survey on Industrial R&D Investment Trends

Alexander Tübke, Fernando Hervás,
Jörg Zimmermann and Nicola Grassano

2014

Contents

Executive Summary

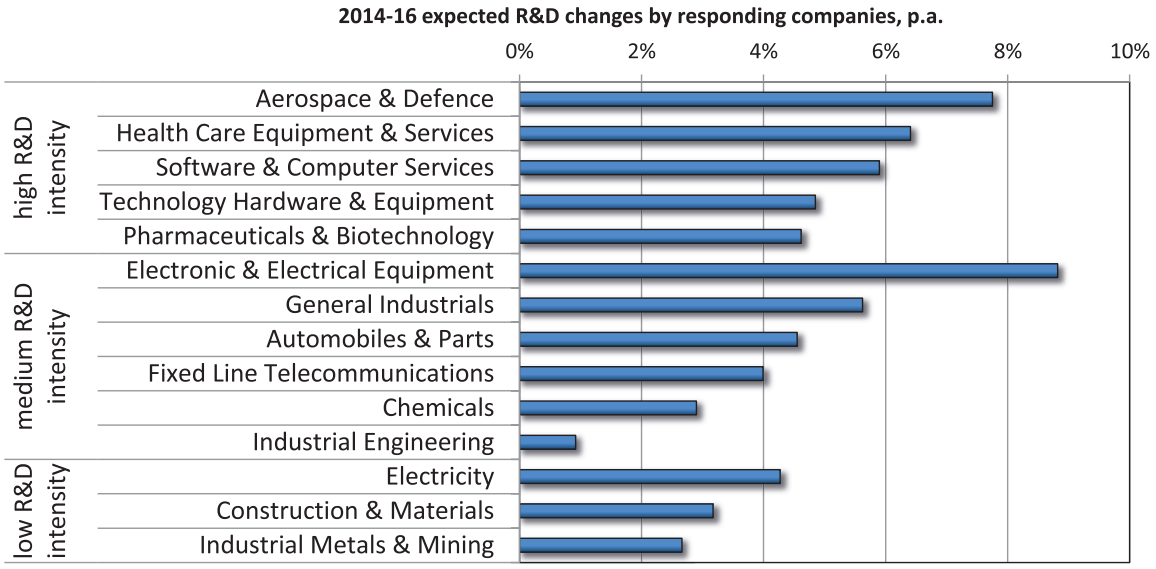
The present document contains the main findings of the ninth European Commission survey on industrial research and development (R&D) investment trends. It analyses the responses of 186 mainly very large enterprises from a subsample of 1 000 EU-based companies in the 2013 EU Industrial R&D Investment Scoreboard[1]. These 186 companies invested almost € 60 billion in R&D from their own resources, which corresponds to 36 % of the total R&D investment by the 1 000 EU Scoreboard companies. The main findings of the survey are as follows.

R&D investment expectations

The responding companies expect R&D investment to increase by on average 4.2 % per year during 2014–16. This is about 50 % higher than the increase anticipated in the previous survey (2.6 %) and mainly reflects the shift in expectations in the automobiles and parts sector, which returns to the level of previous years (4.6 %) after last year's reported stagnation (–0.4 %).

The increase in R&D investment is higher than in the past in the following sectors: aerospace and defence (7.8 % per year over the next three years); healthcare equipment and services (6.4 %); and fixed-line telecommunications (4.0 %). In other sectors, the expected increases in R&D investment are lower than in previous surveys: general industrials (5.6 % per year over the next three years); construction and materials (3.2 %); chemicals (2.9 %); and industrial engineering (0.9 %). The two sectors pharmaceuticals and biotechnology and automobiles and parts, which constitute more than 20 % of the total sample R&D each, expect similar levels of increase in R&D investment (4.4 % and 4.6 %, respectively). For automobiles and parts, the 4.6 % increase represents a significant shift from the expected stagnation declared in the 2013 survey (–0.4 %).

Figure 1: Expected changes of R&D investment of the surveyed companies 2014-16, p.a.



Note: p.a. per annum

European Commission JRC-IPTS (2014)

1 These are 527 EU-based companies of the world top 2 000 companies in the 2013 Scoreboard and 473 additional from the EU with an R&D investment of over € 5.2 million in the accounting period 2012/13.

Key Enabling Technologies (KETs)

Activities related to Key Enabling Technologies (KETs) are highly diverse and often concentrated among few companies, mainly from high and medium R&D-intensity sectors.

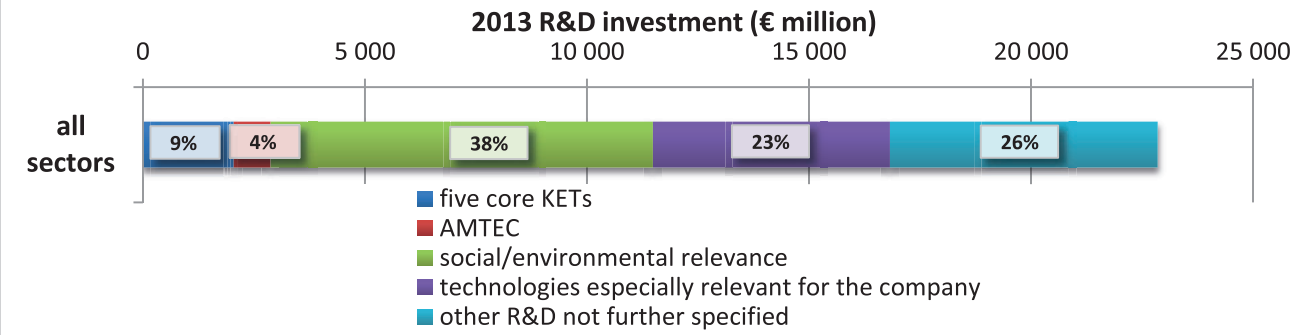
127 responding companies have detailed the technological profile of their R&D investments in KETs and related technological fields. The highest share concerns socially or environmentally relevant technologies (38 %). The five core-KETs (advanced materials, industrial biotechnology, micro- and nanoelectronics, nanotechnology and photonics) constitute 9 % of their R&D, and Advanced Manufacturing Techniques (AMTEC) 4 %. Most of the R&D for the five core-KETs comes from companies in the high R&D-intensity sector, and most of the R&D for AMTEC from the medium R&D intensity ones.

The high and medium R&D-intensity companies also spend the lion's share of R&D in social or environmentally relevant technologies.

The total number of patents filed in KETs increases with the R&D-intensity of the sector group. The highest technological diversity of patents filed can be found in the medium R&D-intensity sectors.

Revenues from and expenses for licences are mainly concentrated in companies from the high R&D-intensity sector and in the field of red and green biotechnology (which constitutes over two thirds of the total for both revenue and expenses). High R&D-intensity firms report investments in all the surveyed KETs, with a focus on red and green biotechnology and key software technologies. For companies from the medium and low R&D-intensity sectors, the majority of investments are concentrated in key software technologies.

Figure 2: R&D investment in KETS and other relevant technologies



Note: *The figure refers to 127 out of the 186 EU companies in the sample*
Source: *European Commission JRC-IPTS (2014)*

Location of R&D investment

The 166 companies which provided information make one-fifth of their R&D outside the EU.

The largest share of R&D investment made outside the EU is in the United States and Canada (8.4 %), followed by China (4.3 %), the rest of the world (3.6 %), India (1.9 %), other European countries (1.6 %) and Japan (1.2 %).

The responding companies' expectations for R&D investment for the next three years show the ongoing participation of European companies in the global economy. While maintaining the focus of their R&D investment in the EU, they reap opportunities for growth in emerging economies.

Examining the distribution of the expected 4.2 % R&D increases by world region, moderate but sustained growth is expected in R&D investment in the EU (3.1 % per year over the next three years). This contrasts with much higher expectations for investment growth in non-EU world regions: India (11.9 %); China (8.7 %); the United States and Canada (8.1 %); and the rest of the world (7.2 %). Expectations for Japan and other European countries lie at around 1 % or below and are combined with a relatively small share of total R&D investment. All in all, the expected nominal R&D investment increases in the EU continue to be of a similar magnitude to those outside the EU (around € 900 million per year for a total of 151 companies which provided information).

Country attractiveness for R&D

Two out of three of the responding EU-based companies consider their home country the most attractive location for R&D. The United States, Germany, China and India are the most attractive locations mentioned outside the home country.

Finland and Denmark were mentioned only by respondents for which they are the home country. The Netherlands, Poland and Romania are EU countries with an especially high attractiveness index for companies for which they are not the home country.

Human resources, knowledge-sharing and proximity to other company sites are the criteria that make countries attractive for R&D activity.

For the countries where companies have the greatest R&D activity, the criteria most influencing attractiveness were said to be R&D personnel in the labour market (quality, quantity and labour costs), knowledge-sharing and collaboration opportunities (with universities and public research organisations) and proximity (to other company sites, technology poles and incubators, and suppliers).

In a separate comparison of attractiveness factors among R&D sites within the EU, quality of R&D personnel and knowledge-sharing opportunities with universities and public organisations are by far the most frequently stated in the top three.

They are followed by proximity to other company sites (for Belgium, Denmark, Germany, France, Italy, Finland and Sweden) and quantity of R&D personnel (for Italy, Austria, Poland and the United Kingdom). The factors that make countries less attractive are related to demand for innovation via market growth (for Denmark, Spain, Italy, the Netherlands, Austria and Sweden) and public procurement (for Belgium, France and the United Kingdom).

Comparing R&D attractiveness factors within the EU with those for the United States, the 38 respondents point to knowledge-sharing opportunities and quality and quantity of R&D personnel as the leading factors for both world regions.

Proximity to technology poles and incubators, other company sites and suppliers is also mentioned as an important factor for the attractiveness of R&D sites in both regions. As in our previous survey, the respondents consider the United States more attractive for R&D than the EU regarding market size and growth, whereas the quality of R&D personnel in the labour market and public support for R&D via grants and direct funding and fiscal incentives stood out in EU countries.

Comparing R&D attractiveness factors within the EU with those for China and India, the 13 respondents reveal significant differences between the two world areas.

For R&D sites in the EU, the quality of R&D personnel, knowledge-sharing opportunities (with universities and public organisations and other firms) and proximity (to other company sites, technology poles and incubators, and suppliers) are the most relevant factors.

For R&D sites in China and India, market size and growth, together with the quantity and labour cost of R&D personnel, are the main determinants of attractiveness. Compared with the EU, China and India are not attractive in terms of either intellectual property rights (IPR), especially enforcement conditions, or public support for R&D via grants and direct funding, public–private partnerships and financing of other (non-R&D) investments.

R&D and innovation

R&D within the company is the most important component of innovation, followed by market research, product demonstration and training to support innovation activities.

As observed in our previous surveys, and not surprisingly for major R&D players, internal R&D is critical for innovation (for more than 97 % of respondents). Market research is the second most relevant component, followed by product demonstration and training. The purchase or licensing of IPR is the least important aspect. However, the importance of these factors varies significantly between firms in sectors with high, medium or low R&D intensity and also depending on whether the R&D is performed within or outside the EU

1 Introduction

Investment in research and innovation is one of the five main targets of Europe 2020, the EU's 10-year growth strategy.[2] Its aim is not only to overcome the crisis that continues in many EU economies but also to address the shortcomings in its growth model and create conditions favourable for a type of growth that is smarter, more sustainable and more inclusive.

Five key targets have been set for the EU to achieve by the end of the decade in the areas of employment, education, research and innovation, social inclusion and poverty reduction, and climate/energy. In practical terms, this includes seven 'flagship initiatives', providing a framework through which the EU and national authorities can mutually reinforce their efforts in areas supporting Europe 2020. One of them is the Innovation Union flagship initiative,[3] which includes a 3 % EU headline target for intensity of research and development (R&D) investment.[4] R&D investment from the private sector, however, plays a key role not only for the Innovation Union flagship initiative but also for other relevant Europe 2020 initiatives, such as the Industrial Policy,[5] Digital Agenda and New Skills for New Jobs flagship initiatives.

The Industrial Research and Innovation Monitoring and Analysis (IRIMA) project[6] supports policymakers in these initiatives and monitors progress towards the 3 % headline target. IRIMA's core activity is the EU Industrial R&D Investment Scoreboard,[7] which analyses private R&D investments based on the audited annual accounts of companies and shows *ex-post* trends. By collecting expectations and qualitative statements from the EU Scoreboard companies, the present survey complements the Scoreboard with *ex-ante* information.

The European Commission has undertaken eight previous surveys since 2005.[8] Similar to its predecessors, the present survey addresses the R&D investment expectations for 2014-16, R&D location strategies and the relationship between R&D and innovation. A new element of the current edition of the survey is the question on the role of certain key enabling technologies (KETs) in the development of new goods and services.[9]

'R&D investment', in our surveys, refers to the total amount of R&D financed by the company, regardless of where or by whom it was performed. This excludes R&D financed by governments or other companies, as well as the company's share of any associated company or joint venture R&D investment. It includes, however, research contracted out to other companies or public research organisations, such as universities. The survey reports what each responding company states as its actual financial commitment to R&D. This is different from the official statistical concept, business expenditure on R&D (BERD), which provides a geographical perspective.[10]

The questionnaire was sent by post to the top operational level (chief executive officer or similar) or previous year's contact person of the 1 000 European companies that appear in the 2013 EU Industrial R&D Investment Scoreboard. A total of 186 responses, equivalent to a response rate of 18.6 %,[11] were received. These 186 companies are responsible for a total global R&D investment of almost € 60 billion, which corresponds to 36 % of the total R&D investment by the 1 000 EU Scoreboard companies.

2 European Commission, Europe 2020: a strategy for smart, sustainable and inclusive growth (see: http://ec.europa.eu/eu2020/index_en.htm).

3 The Innovation Union flagship initiative aims to strengthen knowledge and innovation as drivers of future growth by refocusing R&D and innovation policies for the main challenges society faces.

4 This target refers to the EU's overall (public and private) R&D investment approaching 3 % of gross domestic product (see: http://ec.europa.eu/europe2020/pdf/targets_en.pdf).

5 The Industrial Policy for the Globalisation Era flagship initiative aims to improve the business environment, notably for small and medium-sized enterprises, and support the development of a strong and sustainable industrial foundation for global competition.

6 See: http://iri.jrc.ec.europa.eu/. The activity is undertaken jointly by the Directorate General for Research (DG RTD C; see: http://ec.europa.eu/research/index.cfm?lg=en) and the Joint Research Centre, Institute for Prospective Technological Studies (JRC-IPTS; see: http://ipts.jrc.ec.europa.eu/activities/research-and-innovation/iri.cfm).

7 The Scoreboard is published annually and provides data and analysis on companies from the EU and abroad investing the largest sums in R&D (see: http://iri.jrc.ec.europa.eu/scoreboard.html).

8 See: http://iri.jrc.ec.europa.eu/survey.html

9 See section 3.

10 BERD includes R&D financed by the company itself, as well as R&D performed by a company but funded from other sources. Official BERD figures comprise R&D carried out by the companies physically located in a given country or region (including foreign-owned subsidiaries), regardless of the source of funding.

11 See Annex A: The Methodology of the 2014 Survey.

The number of responses received by sector group and the corresponding share of R&D compared with the 1 000 EU Scoreboard companies are summarised in Table 1.[12]

intensity was also observed in last year's survey, their share of this year's sample is much higher compared with the R&D investment composition of the 2013 Scoreboard (Figure 3). This is due to an over-representation of companies from the automobiles and parts, chemicals, and fixed-line telecommunications sectors in the sample.

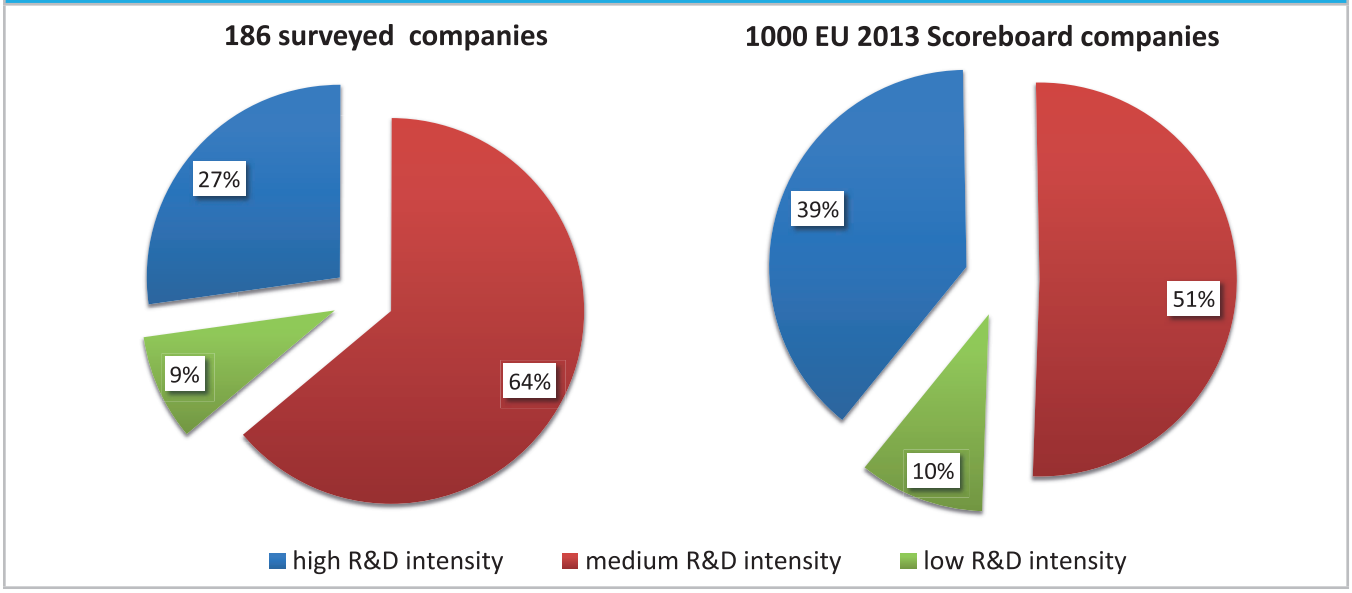
Table 1: Number of responses, by sector group

Sector Group	ICB Sector	Number of responses	R&D share of the sample of the 1000 EU Scoreboard companies
High R&D intensity	Pharmaceuticals & Biotechnology, Software & Computer Services, Aerospace & Defence, Technology Hardware & Equipment and Health Care Equipment & Services	58	26%
Medium R&D intensity	Industrial Engineering, Chemicals, Electronic & Electrical Equipment, Automobiles & Parts, Food Producers, General Industrials, Fixed Line Telecommunications, Household Goods & Home Construction, Support Services, Media and Personal Goods	88	47%
Low R&D intensity	Construction & Materials, Industrial Metals & Mining, Banks, Electricity, Oil & Gas Producers, Gas, Water & Multi-utilities, Forestry & Paper, Mining, and Mobile Telecommunications.	40	32%
		186	36%

Source: European Commission JRC-IPTS (2014)

Companies in the sector group with medium R&D intensity are responsible for the majority of R&D investment and constitute the majority of respondents in the sample. Although an emphasis on the sectors with medium R&D

Figure 3: Distribution of R&D investment in the survey compared to the 2013 Scoreboard



Note: The figure refers to all 172 companies in the sample.
Source: European Commission JRC-IPTS (2014)

12 R&D intensity is the ratio between R&D investment and net sales. An individual company may invest a large overall amount in R&D but have a low R&D intensity if net sales are high (as is the case of many oil & gas producers, for example). For the groupings see: Annex A: The Methodology of the 2014 Survey.

As in our previous surveys, the participating companies are very large, with an average turnover of € 13 billion, 34 000 employees in total and 1 650 employees engaged in R&D. In the sample, there are only seven medium-sized companies and one small company (mainly in the sectors with high R&D intensity). Among the large companies in the sample, 23 had between 251 and 1 000 employees, 71 between 1 001 and 10 000 employees, 42 between 10 001 and 30 000 employees, and 42 more than 30 000 employees.

It follows that the survey differs from the Community Innovation Survey (CIS), which uses a different sampling technique, taking in a much higher number of small and medium-sized firms.[13]

As in our previous surveys, the response rate of previous participants was close to 50 %.[14]

13 The CIS uses stratified sampling for at least three size classes (small, medium and large enterprises) across all EU Member States.

14 Out of the 186 responding companies, 90 had participated in the previous two surveys (in 2012, 91 out of 172), 67 in the previous three, 50 in the previous four, 35 in the previous five, 21 in the previous six, 15 in the previous seven, 10 in the previous eight, and six in all nine surveys.

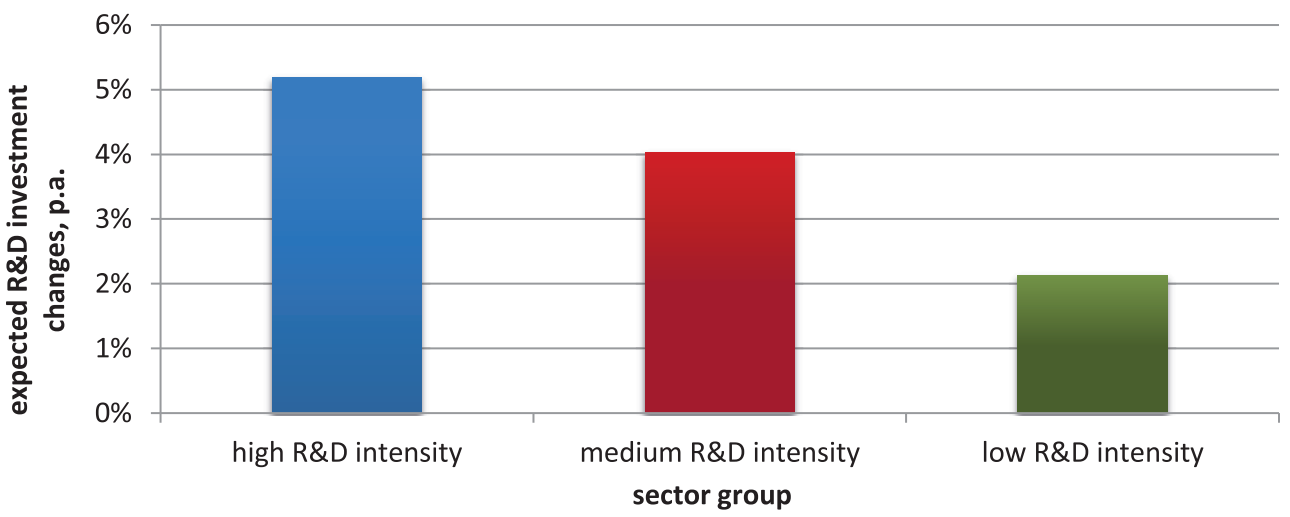
2 R&D Investment Expectations

The responding companies expect to increase their R&D investment by 4.2 % per year during 2014–16.[15] This is similar to the results of our 2013 survey (without the automobiles and parts sector) and the one before.

This 4.2 % annual growth in corporate R&D investment is a positive outlook, above the nominal EU growth estimates for gross domestic product (GDP) of 1.6 % for 2014 and 2.0 % for 2015.[16] However, R&D investment expectations are still far from the levels reported prior to the 2008 economic crisis (7 % in the 2007 survey). The biggest expectations are found in companies with high R&D intensity (5.2 %), followed by those with medium (4.0 %) and low R&D intensity (2.1 %; see Figure 4 below).

Figure 5 compares the respondents' expected changes in R&D investment in 2014–16 with their expectations for 2013–15 and 2012–14 in our two previous surveys.[17]

Figure 4: Expected changes in R&D investment in the next three years, per annum, in real terms



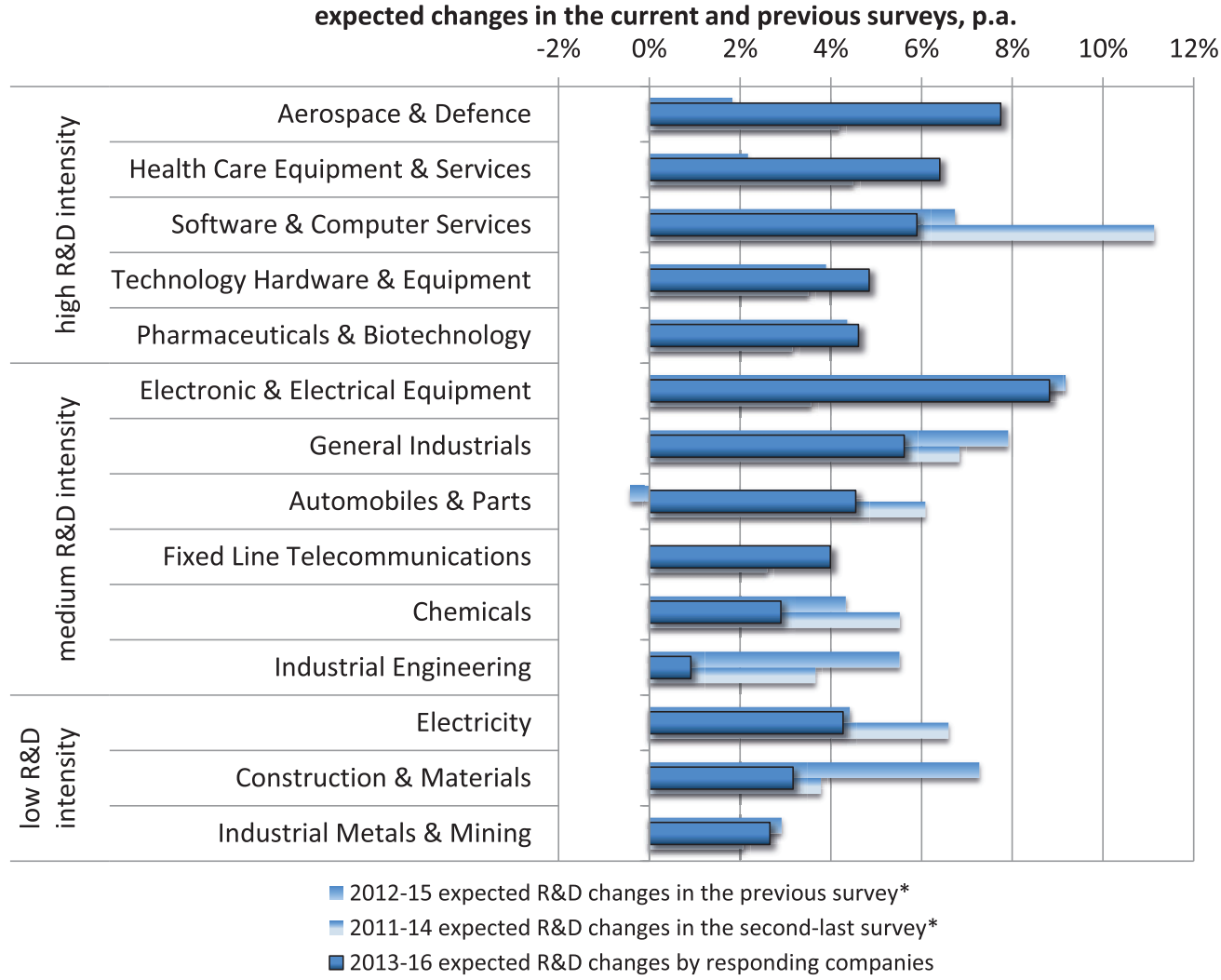
Note: The figure refers to 162 out of the 186 companies in the sample, weighted by R&D investment.
Source: European Commission JRC-IPTS (2014)

15 The expectations are per annum over the next three years, weighted by R&D investment.

16 European Commission, 'Spring 2014 economic forecast: growth becoming broader-based' (see: http://ec.europa.eu/economy_finance/eu/forecasts/2014_spring/overview_en.pdf).

17 The samples in the different surveys have different compositions.

Figure 5: Expected changes in R&D investment in the current and previous two surveys, p.a.



Note: p.a. per annum

** The sample compositions in all three surveys vary from year to year. Growth rates calculated as CAGR over the three years for which expectations were mentioned (see Annex A: The Methodology of the 2014 Survey).*

The figure refers to 140 out of the 186 companies in the sample, weighted by R&D investment. Only for sectors with at least five responses.

Source: European Commission JRC-IPTS (2014)

The expected increase in R&D investment is significantly higher than in our previous surveys in the following sectors: aerospace and defence (7.8 % per year over the next three years); healthcare equipment and services (6.4 %); and fixed-line telecommunications (4.0 %). In the group with high R&D intensity, expected R&D investment increases in pharmaceuticals and biotechnology (4.4 %) and technology hardware and equipment (3.6 %) are slightly above those of last year's survey but below those of two years ago.

In other sectors, the expected increases in R&D investment are lower than in our previous surveys: general industrials (5.6 % per year over the next three years); construction and materials (3.2 %); chemicals (2.9 %); and industrial engineering (0.9 %).

The two sectors pharmaceuticals and biotechnology and automobiles and parts each constitute more than 20 % of the total sample investment in R&D, so their expectations are very important for the whole sample. The expected increase in R&D investment in pharmaceuticals and biotechnology is similar to that reported in our past surveys (4.6 %).

R&D investment expectations in the automobiles & parts sector increased to 4.6 %. The stagnation in investment in R&D in that sector observed in the 2012 survey was not detected in the present exercise. This may be because the drop in passenger vehicle sales forecast in 2012 for 2013 did not materialise,[18] and expectations for 2014 have

18 Center of Automotive Management (CAM), 'PKW Absatzzahlen im Kalenderjahr 2013' (see: http://www.auto-institut.de/index_htm_files/Absatz%20OEM%2012_13.jpg).

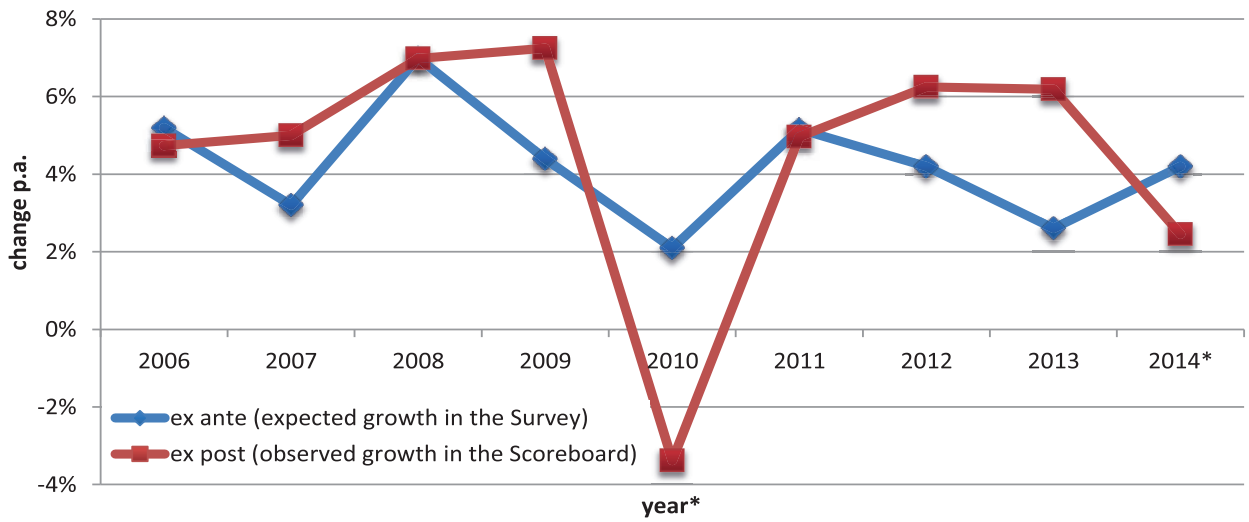
even improved.[19] R&D investment expectations for the automobiles & parts sector are thus back to a level similar to those reported in previous years.

The 2014 forecast figure for the increase in R&D funded and performed by US companies is the same as that reported here by the EU companies surveyed (4.2 %).[20] These figures, higher than last year's expectations, correspond to a somewhat improved general economic and business cycle outlook.[21]

The R&D investment growth expectations collected in our surveys are compared with the R&D investment trends observed in the Scoreboard (Figure 6).

The trends of the R&D investment expectations reported in our surveys before 2013 were largely in line with the actual follow-up trends observed in the Scoreboards. The trends anticipated by the Survey in 2013 and 2014 were different from the Scoreboard due to differences in sample composition. The 2013 Survey expectations were especially low due to the weight of the slightly negative expectations for the automobile & parts sector. Without this sector, the expectations were at a similar level than those of 2012 and 2014 and thus much closer to the figures observed in the Scoreboard.

Figure 6: Expected (survey) versus observed (Scoreboard) R&D growth



*Note: * Survey annual growth expectations are for the next three years following the exercise, while the Scoreboards refer to the latest audited accounts. The figure refers to 163 out of the 186 companies in the 2014 survey sample, weighted by R&D investment.*
Source: European Commission JRC-IPTS (2014)

19 Center of Automotive Management (CAM), 'Forecast of global passenger vehicle sales for 2014' (see: http://www.auto-institut.de/index_htm_files/prognoseabs2014.jpg).

20 'The Battelle 2014 Global R&D Funding Forecast', *R&D Magazine*, December 2013 (see: http://battelle.org/media/press-releases/2014-global-funding-forecast). Battelle's estimates refer to R&D funding, which has a definition slightly different from that of R&D investment, as given here.

21 'The Industrial Research Institute's 2014 R&D Trends Forecast', Research-Technology Management, January–February 2014 (see http://www.iriweb.org/Public_Site/RTM/Volume_57_Year_2014/January-February_2014/2014_IRI_Trends_Forecast.aspx). This forecast is based on a survey of 107 US-based companies and indicates a stagnation in R&D in these companies owing to the challenging business landscape. The abovementioned forecast by Battelle and the present survey show more optimistic expectations for R&D, which seem to be the result of an improved economic environment, which is also observed in the official GDP estimates. The responses for the Industrial Research Institute's forecast were collected eight months before ours and a few months before the Battelle study.

3 Key Enabling Technologies (KETs)

The Commission is undertaking initiatives to strengthen KETs for the development of new goods and services.[22] In order to gain a better understanding of companies' perspectives on KETs and their relationship with other important technologies, a typology of technological fields was provided in the questionnaire. It includes the five **core KETs**:[23]

1. **Advanced materials** leading to lower-cost substitutes of existing materials and new higher value-added products & services;

2. **Industrial (white) biotechnology** applied to industrial processing and production of chemicals, materials and fuels;

3. **Micro- and nanoelectronics,** e.g. semiconductor components and highly miniaturised electronics,

4. **Nanotechnology,** i.e. design, production and application of structures, devices and systems by controlling shape & size at nanometric scale; and

5. **Photonics,** i.e. conversion of sunlight into electricity, photodiodes, LEDs and lasers.

A further category was added for a range of advanced manufacturing technologies identified as critical in the 2012 Industrial Policy Communication:[24]

6. **Advanced Manufacturing Technologies (AMTEC)** encompass the use of innovative technology to improve products or processes that drive innovation, including all production equipment that deploys a KET or any other innovative technology.

Another three categories were added in order to consider related and socially or environmentally relevant technologies:

7. **Other (red and green) biotechnology** applied to medical and agricultural processes;

8. **Environmental technologies (incl. alternative energy),** i.e. devices, materials, and techniques for pollution prevention, reduction or containment, and

9. **Key software technologies,** e.g. high performance computing, building data value, social computing, internet-based applications, embedded systems, human-centred computing, enterprise applications and the generation of software-intensive systems.[25]

Free space was provided for the respondents to **name other technologies especially relevant for the company** not covered in the above classification.

The respondents were asked to estimate the approximate numbers of patents filed, the revenue from licences issued, the expenditure on licences used and the amount of R&D for each technological field in the past year (2013, in €).

22 These KETs enable the development of new goods and services and the restructuring of industrial processes needed to modernise EU industry and make the transition to a knowledge-based and resource-efficient economy. While the EU has very good R&D capacities in some KETs, it has not always been successful in translating research results into commercialised manufactured goods and services. The Commission's KET strategy aims to boost the industrial production of innovative KET-based products and applications in the future (see: http://ec.europa.eu/enterprise/sectors/ict/key_technologies/).

23 According to section 2 of the Staff Working Document (see: http://ec.europa.eu/enterprise/sectors/ict/files/staff_working_document_key_enabling_technologies_en.pdf).

24 The European Commission's 2012 Industrial Policy Communication (see: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2012:0582:FIN:EN:PDF) aims to boost the contribution to GDP of industry in Europe from its current level of around 16 % to 20 % by 2020. To achieve this ambitious target, the European Commission has engaged in a partnership with the Member States and industry to step up efforts to boost the market uptake of European AMTECs and give Europe a competitive lead in the new industrial revolution (see: http://ec.europa.eu/enterprise/policies/industrial-competitiveness/industrial-policy/task-forces/amt/index_en.htm).

25 According to the 2012 ISTAG report: http://cordis.europa.eu/fp7/ict/docs/istag-soft-tech-wgreport2012.pdf.

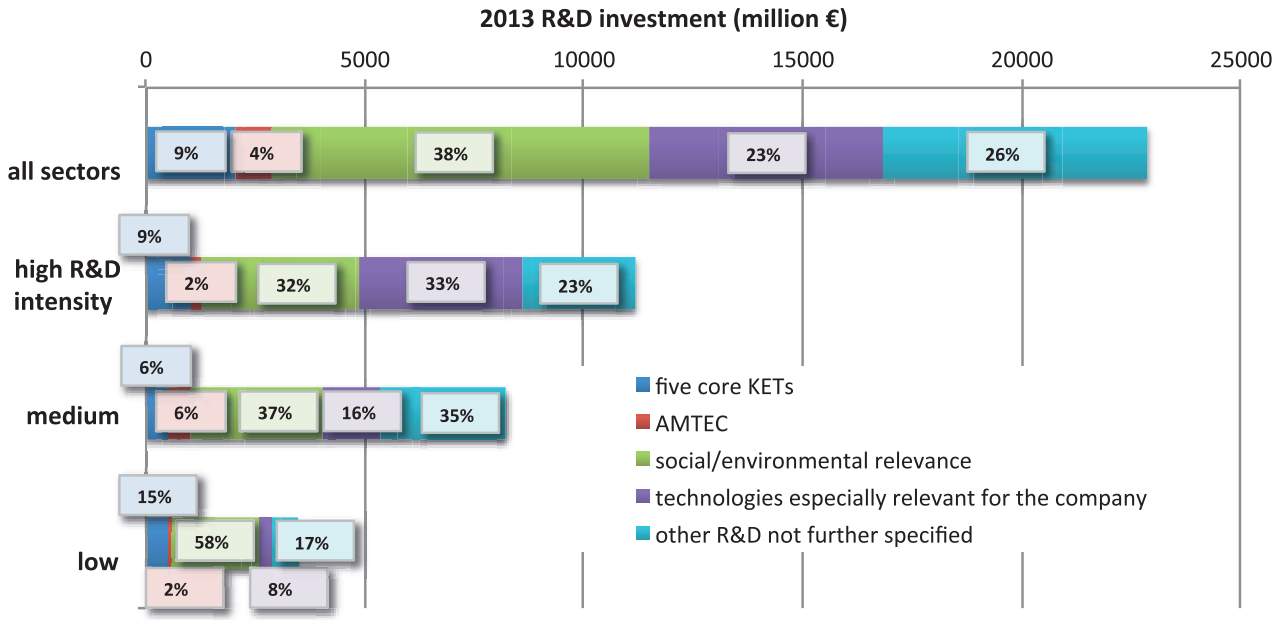
Technological content of R&D by technology group

Out of the 186 respondents, 127 companies provided details about the technological content of their R&D investment according to the above categories. As shown in Figure 7 below by technology group, the highest share concerns socially or environmentally relevant technologies (38 %), followed by other technologies especially relevant for the company (23 %), the five core-KETs (9 %) and AMTEC (4 %). About one quarter corresponds to other R&D not further specified.

Most of the R&D for the five core-KETs comes from companies in the high R&D-intensity sector, and most of the R&D for AMTEC from the medium R&D intensity ones. The high and medium R&D-intensity companies also spend the lion's share of R&D in social or environmentally relevant technologies.

Technologies especially relevant for the company concern sector-specific technological fields and were mentioned mainly for the high R&D intensity sectors (33 %, mainly health and aerospace & defence-related technologies), followed by the medium R&D-intensity sectors (16 %, mainly chemicals and electronic and electrical equipment related) and the low R&D-intensity sectors (8 %, mainly related to oil & gas producers).

Figure 7: R&D investment in KETS and other relevant technologies



Note: The figure refers to 127 out of the 186 EU companies in the sample.
Source: European Commission JRC-IPTS (2014)

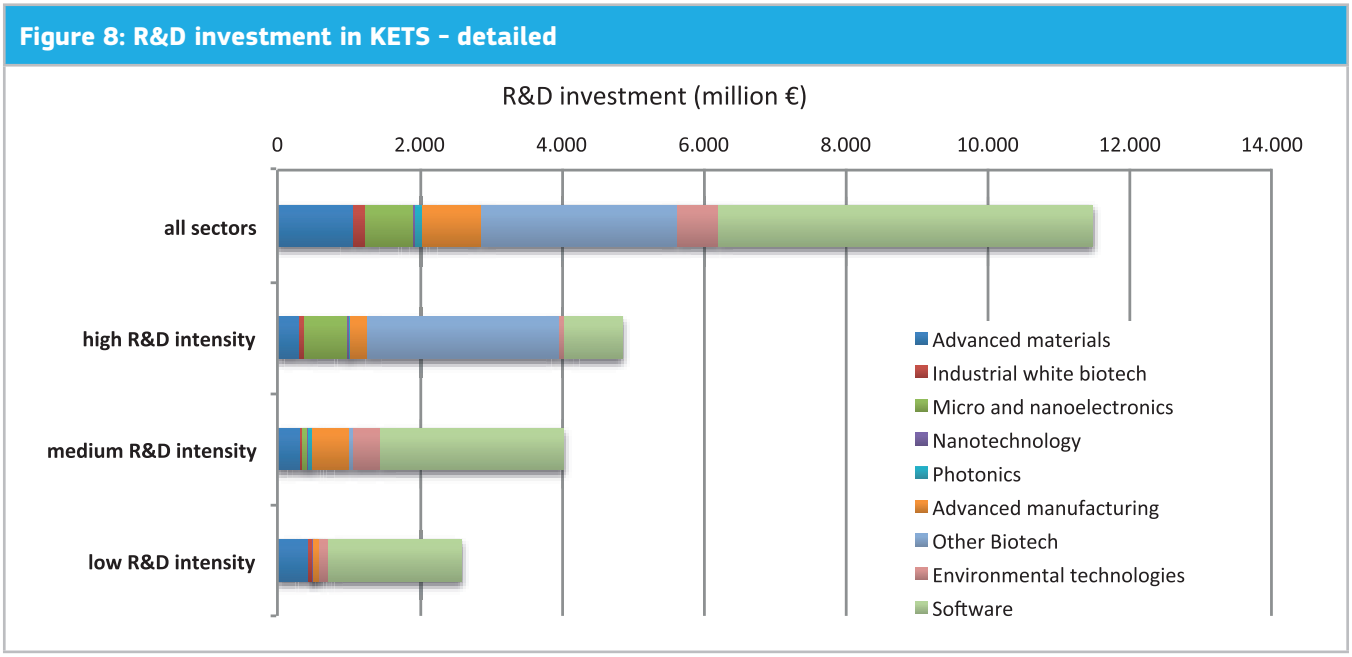
Technological content of R&D by technology field in detail

Figure 8 examines the technological fields in the above groups in more detail. The majority of R&D is invested in key software technologies (46 % of the total reported) and other (red and green) biotechnology (24 %). Very few R&D resources are invested in photonics and nanotechnology (below 1% each).

High R&D-intensity firms report investments in all the surveyed KETs, but mainly in other (red and green) biotechnology (55 % of the total reported R&D investments in KETs) and key software technologies (46 %). For the other two groups, the majority of investments are concentrated in key software technologies. This corresponds to the fact that the three sectors at ICB4 digit level investing more in R&D for KETS are pharmaceuticals, fixed line telecommunications and banks.[26]

Per company, high R&D-intensity firms invest more (€ 131 million per firm on average) in KETs than medium and low R&D-intensity firms (€ 89 and € 77 million, respectively). However, the difference between the three groups is not as marked as it is in the case of revenue from and expenses for KETs license (see Figure 13 and Figure 14 further below).

Figure 8: R&D investment in KETS - detailed



Note: The figure refers to 118 out of the 186 EU companies in the sample.
Source: European Commission JRC-IPTS (2014)

26 Looking at the concentration of the investments in KETs at firm level, overall the value of HHI and C4 are quite low (HHI=0.072, C4=0.464).The situation differs if we look at R&D intensity group level. While among the medium R&D intensity firm the concentration is still fairly low (HHI=0.072, C4=0.464), investments in R&D for KETs are more concentrated in the case of high (HHI=0.258, C4=0.812) and low (HHI=0.272, C4=0.874) R&D intensity firms.

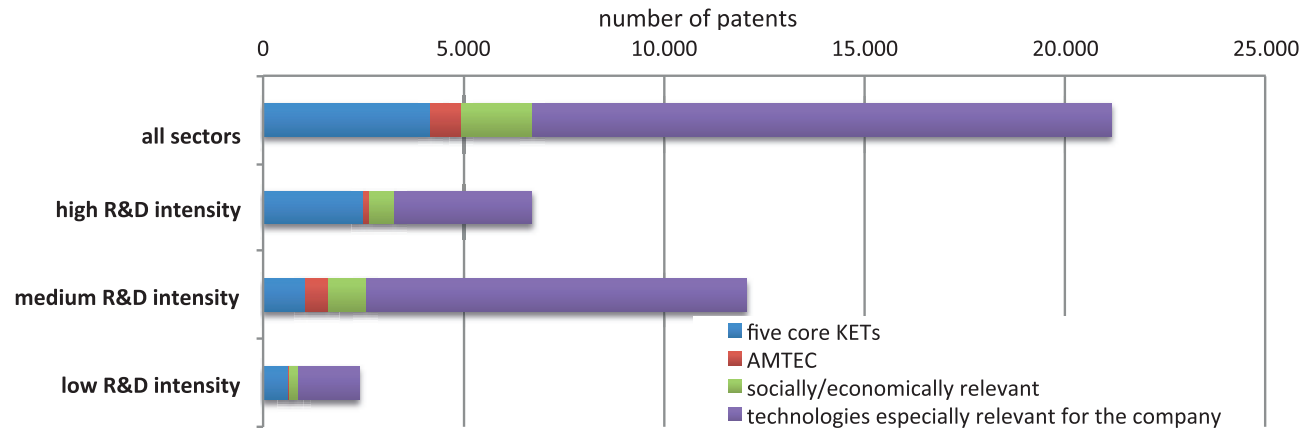
Number of patents

Figure 9 compares the number of patents filed by responding companies in technology group. Patents in the five core-KETs, AMTEC and socially or economically relevant technologies account for almost half the total patents filed by high R&D-intensity firms. For medium and low R&D-intensity firms this percentage is considerably smaller (21 % and 37 %, respectively).

For every technological group, more patents are reported in the five core-KETs than in the socially or economically relevant technologies.

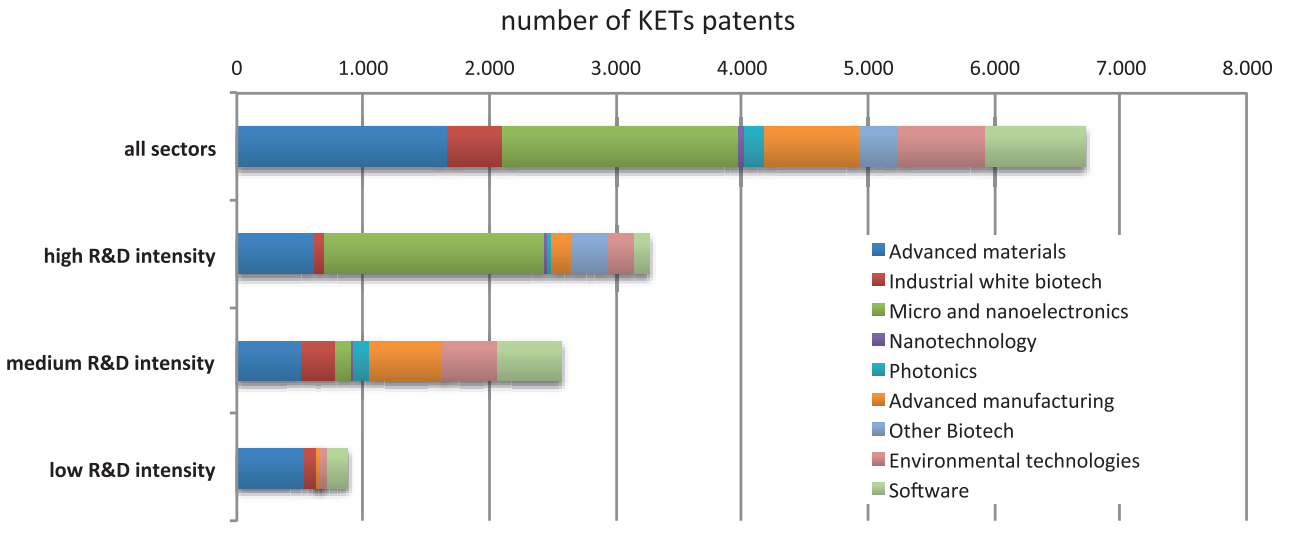
Figure 10 focuses on the patents by technology field in detail within the technological groups.

Figure 9: Number of patents filed by technological group



Note: The figure refers to 132 out of the 186 EU companies in the sample.
Source: European Commission JRC-IPTS (2014)

Figure 10: Number of KETs patents filed - detailed



Note: The figure refers to 118 out of the 186 EU companies in the sample.
Source:European Commission JRC-IPTS (2014)

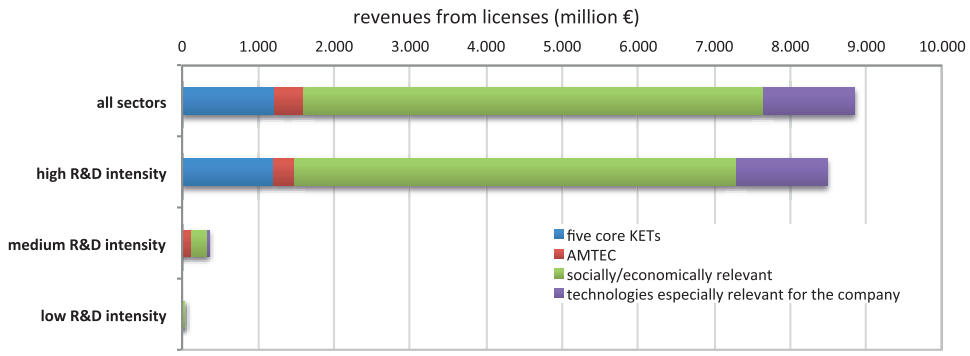
On average, the high R&D-intensity companies filed a higher number of KETs patents (3268) than medium and low R&D-intensity firms (2570 and 879, respectively). Overall, the technology category with the majority of reported filed patents is micro and nanoelectronics (1864), followed by advanced materials (1666). In comparison, only 156 and 53 patents have been reported in photonics and nanotechnology.

A closer look at the three R&D-intensity groups shows a similar behaviour of high and low R&D-intensity firms. Almost three quarters of the filed patents are concentrated within 2 sectors: micro and nanoelectronics and advanced materials for the high R&D-intensity firms (combined share 72 %), and advanced materials and key software technologies for the low R&D-intensity firms (combined share 79 %). Medium R&D-intensity firms show a more diversified behaviour, with more than 10 % each of patents spread over five of the nine technologies surveyed (advanced materials, industrial (white) biotechnology, advanced manufacturing technologies, environmental technologies and software). An analysis of the concentration ratio confirms that the higher concentration of patents in the high and low R&D-intensity groups compared to the medium R&D-intensity one is also found at firm level.[27]

Revenues from licences issued and expenses for licences used

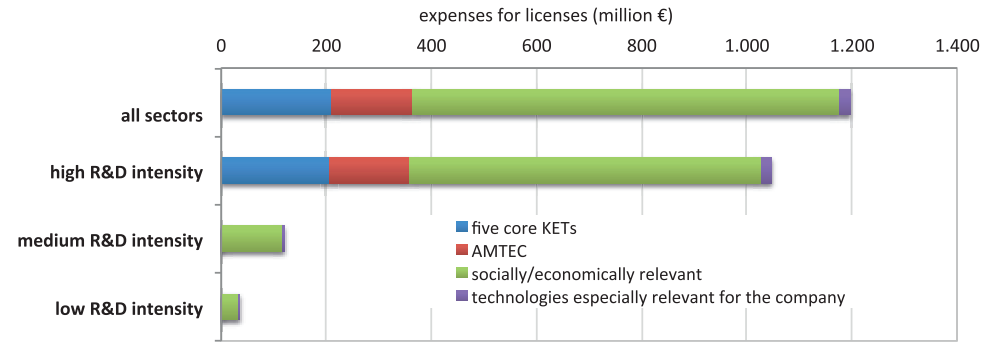
Figure 11 and Figure 12 compare KETS to other technologies in terms of revenue from licences issued and expenses for licences used by technology group. It should be noted that the response rate to this question is only half or less of the sample and thus considerably lower that of the previous sections.

Figure 11: Revenue from licenses



Note: The figure refers to 85 out of the 186 EU companies in the sample.
Source: European Commission JRC-IPTS (2014)

Figure 12: Expenses for licenses



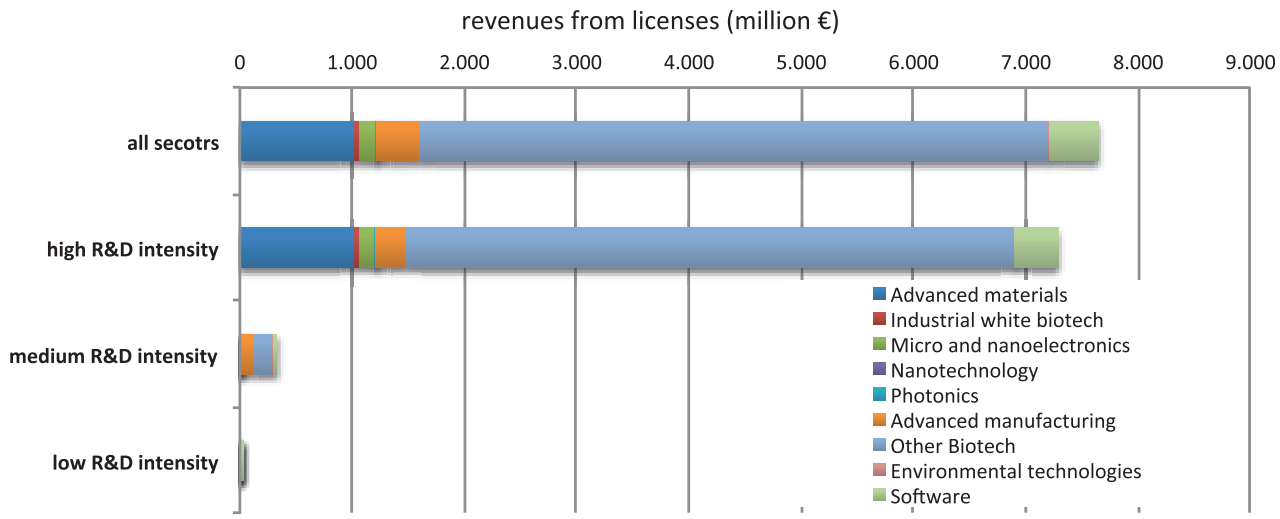
Note: The figure refers to 93 out of the 186 EU companies in the sample.
Source: European Commission JRC-IPTS (2014)

27 The values of the standardised Herfindahl–Hirschman index (HHI) and of the concentration ratio (C4) are higher among high (HHI=0.293, C4=0.852) and low (HHI=0.212, C4=0.805) R&D intensity firms than among medium (HHI=0.068, C4=0.505) R&D intensity firms. If we look at the overall level of concentration, this is quite low when it comes to reported filed KETs patents (HHI: 0.083), although 51.6%of them were filed by only 5 firms.

The picture for licence revenues and expenses is similar to the observations on R&D invested by technological group and opposite to the above observations for patents. For licence revenues and expenses, socially and economically relevant technologies are more important than the others. For both licence revenues and expenses, other technologies represent a very small percentage of the total amounts, especially in the medium and low R&D intensity sectors. Only in the case of revenue from licenses for high R&D-intensity firms they reach a 2 digit figure (14 %).

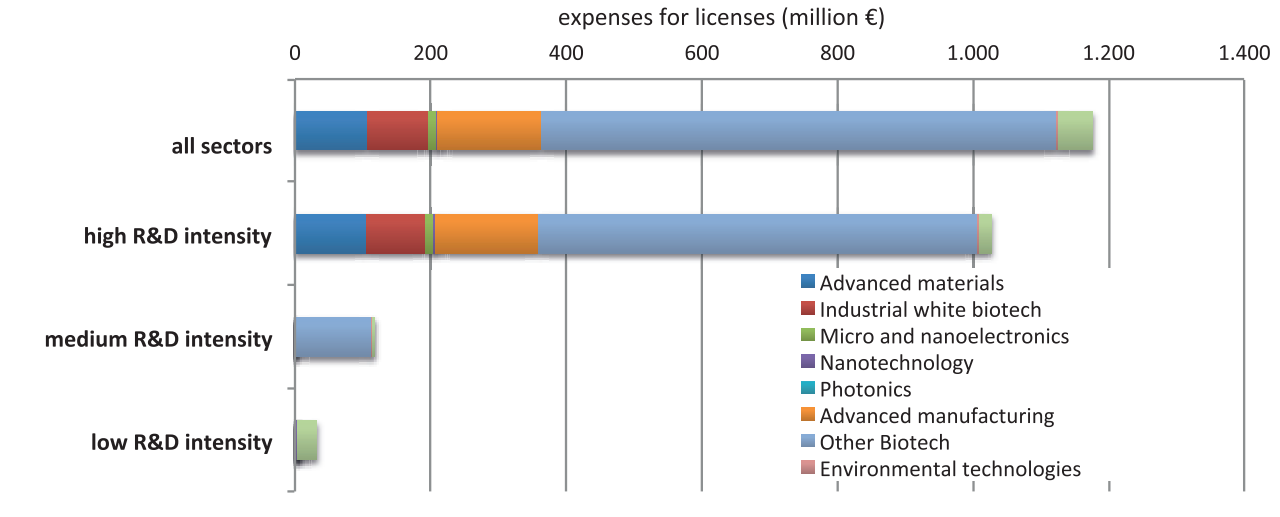
A more detailed look at licence revenues and expenses for each technology field is provided in Figure 13 and Figure 14 below.

Figure 13: Revenue from licenses – detailed



Note: The figure refers to 87 out of the 186 EU companies in the sample.
Source: European Commission JRC-IPTS (2014)

Figure 14: Expenses for licenses – detailed



Note: The figure refers to 81 out of the 186 EU companies in the sample.
Source: European Commission JRC-IPTS (2014)

For both licence revenues and expenses, high R&D-intensity firms have the lion's shares (95 % of reported revenue and 87 % for expenses). Licenses in red and green biotechnology are alone generating almost three quarters (73 %) of the reported revenue among the respondents. Other (red and green) biotechnology is the technology generating the majority of revenue for both high and medium R&D-intensity firms (75 % and 52 %, respectively), compared to key software technologies for the low R&D-intensity firms (78 %).

Licence expenses follow a similar pattern as revenue. Also in this case, other (red and green) biotechnology constitute the majority of expenses (65 % of the total amount reported), both for firms belonging to the high and medium R&D-intensity sectors (63 % and 95 % respectively). Licence expenditures from low R&D-intensity companies are instead concentrated in key software technologies (90 %). Just as in patents, the concentration of licence revenue and expenses is confirmed also at the firm level.[28]

28 We computed the values of the HHI and C4 ratio also for revenue from KETs licences issued and expenses for KETs licences used. Revenue is more concentrated than expenses for companies in the high (HHI=0.66 for revenue against HHI=0.33 for expenses) and low (HHI=0.47 for revenue against HHI=0.39 for expenses) R&D intensity sectors. The opposite is true for companies in the medium R&D intensity sector (HHI=0.35 for revenue against HHI=0.87 for expenses). The overall values of the C4 ratio confirm the high concentration of reported revenue from (0.92) and expenses for (0.95) KETs licenses.

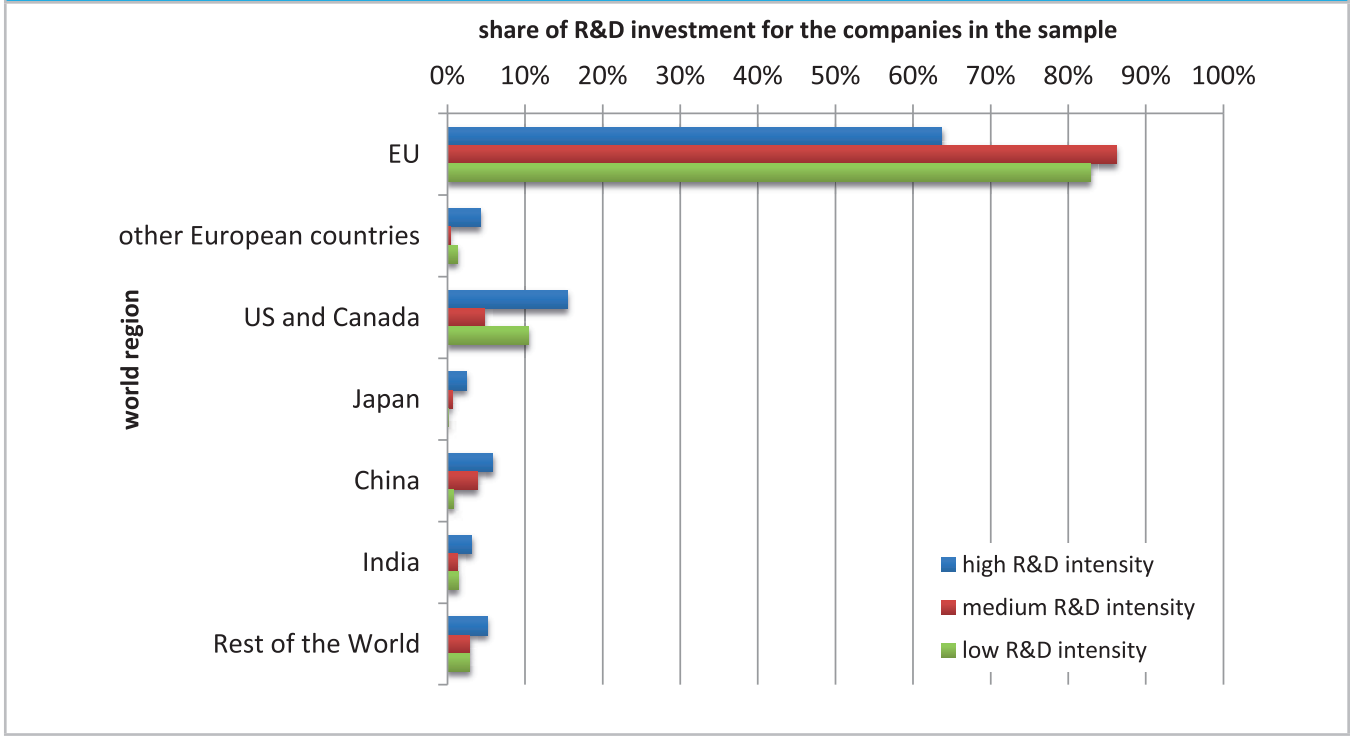
4 R&D Investment Location

This survey collects information about the location of R&D by world region by addressing both the current distribution (stock) of R&D investment and the distribution of the expected changes in R&D investment (dynamics). The current distribution in terms of shares of total R&D investment in each of the seven world regions is displayed in Figure 15 below.

The EU-based companies in the sample carry out one-fifth of their R&D outside the EU (21 %), which is very similar to the findings of our three previous surveys. The largest share of R&D investment outside the EU is in the United States and Canada (8.4 %), followed by China (4.3 %), the rest of the world (3.6 %), India (1.9 %), other European countries (1.6 %) and Japan (1.2 %).

Another finding very similar to those of our previous surveys is the observation that the combined share of R&D investment carried out in China and India is around 6 %. Considering those countries' rising share of global production and GDP, their share of R&D investment by EU companies is steadily increasing, but it remains at a low level overall for the European companies surveyed. For China, a recent study observed a drop in its unusually high rates of growth in R&D expenditure to levels about three to four times that of developed economies such as the United States.[29] The differences can still be explained by growth in GDP and the fact that China is investing strongly in technologies to help it progress beyond cost-based production.

Figure 15: Distribution of R&D investment by world region and sector group



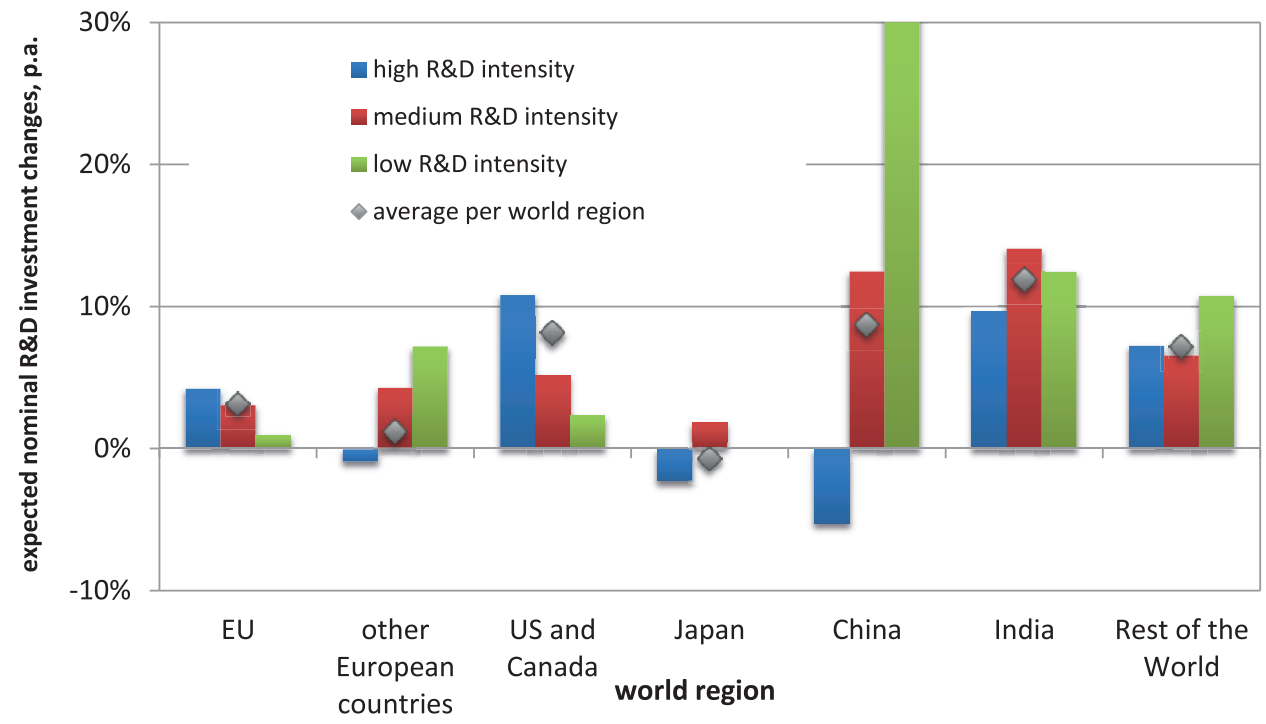
Note: The figure refers to 166 out of the 186 EU companies in the sample, weighted by R&D investment. Other EU countries include Switzerland, Norway and others, while the rest of the world includes a heterogeneous set of countries such as South Korea, Taiwan, and Brazil..
Source: European Commission JRC-IPTS (2014)

29 'The Battelle 2014 Global R&D Funding Forecast', *R&D Magazine*, December 2013 (see: http://battelle.org/media/press-releases/2014-global-funding-forecast).

The distribution in location of R&D investment by sector group is also similar to that seen in previous surveys. The sector with medium R&D intensity accounts for the largest share of R&D investment within the EU (86.2 %), mainly due to companies from the automobiles and parts sector. Companies in sectors with high R&D intensity, where Europe is already under-represented in relation to the United States,[30] are the most internationalised companies outside the EU. They invest 15 % of their R&D in the United States and Canada, which, as in most of our previous surveys, is mainly due to companies in two sectors – pharmaceuticals and biotechnology and technology hardware and equipment.

Figure 16 below reveals the expectations for R&D investment growth in the different world regions by sector group for the overall average of 4.2%.

Figure 16: Expected changes in R&D investment in the next three years, per annum, in real terms, by world region and sector group



Note: The figure refers to 151 out of the 186 EU companies in the sample, weighted by R&D investment and after elimination of outliers. Other EU countries include Switzerland, Norway and others, while the rest of the world includes a heterogeneous set of countries such as South Korea, Taiwan, and Brazil.

Source: European Commission JRC-IPTS (2014)

30 In the Scoreboards, the R&D investment share of sectors with high R&D intensity is almost twice that of the EU for US companies, mainly due to pharmaceuticals and biotechnology and information and communications technology-related sectors (see the 2013 EU R&D Investment Scoreboard).

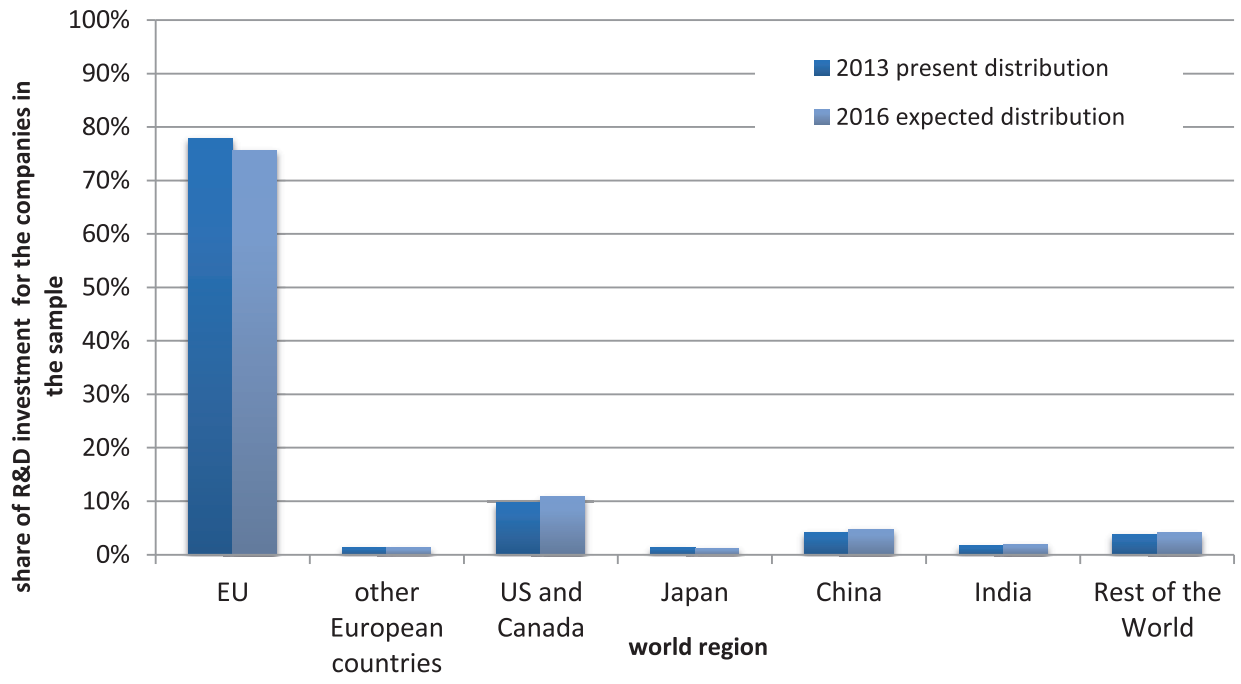
The distribution in expectations for growth is similar to that observed in our previous surveys. Growth in R&D investment is expected to be relatively low in the EU (3.1 % per year over the next three years).

Much higher growth is expected in the non-EU world regions: India (11.9 %); China (8.7 %); the United States and Canada (8.1 %); and the rest of the world (7.2 %). Expectations for Japan and other European countries lie at around 1 % or below and are combined with a relatively small share in total R&D investment, which makes the results for those countries more sensitive to bias from sample composition.

In sectors with high R&D intensity, pharmaceuticals and biotechnology and software and computer services are the drivers of increases in R&D investment in the United States and Canada and India. The declining increases in R&D investment in sectors with high R&D intensity in China are due to a mixed picture, with some pharmaceuticals and biotechnology companies expecting increases and others decreases. For R&D investment in sectors with medium R&D intensity in the EU, slightly positive expectations in the automobiles and parts sector are offset by slightly negative ones in the chemicals and industrial engineering sector.

The realisation of the above expectations would lead to a future reduction in EU countries' share of R&D investment. In parallel, the shares of R&D invested in the United States and Canada, China, India and the rest of the world would increase (Figure 17).

Figure 17: R&D investment shares in 2013 and expected in 2016, by world region



Note: The figure refers to 151 out of the 172 EU companies in the sample, weighted by R&D investment and after elimination of outliers. Other EU countries include Switzerland, Norway and others, while the rest of the world includes a heterogeneous set of countries such as South Korea, Taiwan, and Brazil.

Source: European Commission JRC-IPTS (2014)

Such higher expectations for R&D investment growth outside the EU have been observed in five of our seven previous surveys. As these expectations were within similar dimensions,[31] this can be considered a trend. The patterns were always similar, with the highest growth rates expected for China and India, followed by the United States and Canada, while other world regions remained at more modest levels.

It should be pointed out that the above picture of a decreasing relative share being invested in R&D in the EU occurs within the context of overall increases in the absolute amounts invested in R&D in all world regions. The anticipated nominal increases in investment in R&D in the EU are of a similar magnitude to those outside the EU (around € 900 million per year over the next three years). In other words, R&D investment growth is not expected to continue to follow the present distribution, but in future about half the R&D investment will be inside the EU and the other half outside. This has also been observed in our previous surveys, and it reflects the increasing participation of European companies in the global economy, and in particular in emerging economies, while they retain their R&D focus inside the EU. It also indicates that the gap between R&D invested by the surveyed companies in the EU and in countries such as China and India has not widened significantly.

A few companies from the pharmaceuticals and biotechnology sector provided comments revealing substantial efforts to redistribute their global R&D. These are in line with the results of a study presented at the recent Third IRIMA Workshop on the Internationalisation of Corporate R&D and Innovation, showing that multinational companies in that sector are involved in an ongoing process of restructuring their global R&D value.[32]

31 The only exception was the 2008 survey, where R&D investment was expected to stagnate owing to the impact of the economic and financial crisis in autumn 2008.

32 Ramírez, P., 2014. Outsourcing and Offshoring of R&D in the Pharmaceutical Industry: Evidence and Policy Implications from a Global Value Chain Analysis, Birmingham Business School, Birmingham, UK (see: http://iri.jrc.ec.europa.eu/documents/10180/247186/Ramirez_presenter_session%202).

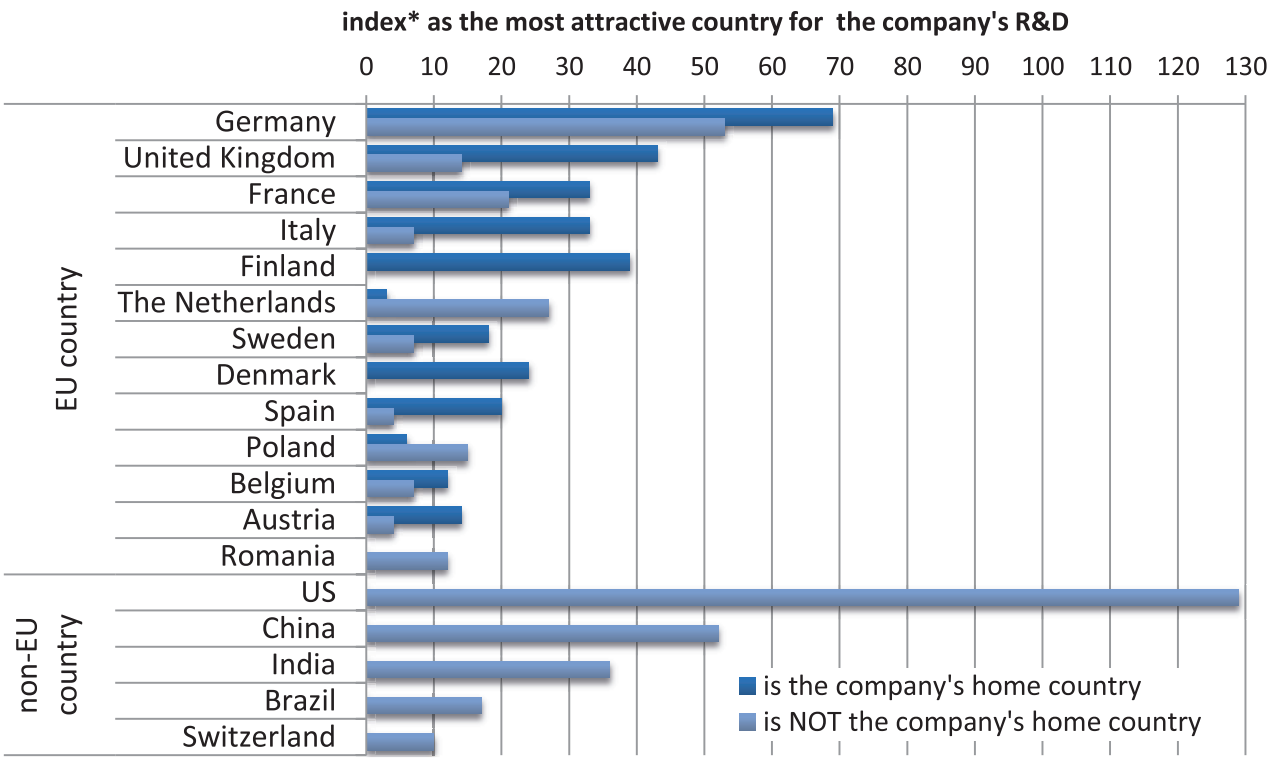
5 Attractiveness of Countries for R&D

The above considerations on the geographical distribution of R&D investment are further addressed by country-specific questions on the most attractive location for R&D and through the potential for a pairwise country comparison of innovation-related factors for attractiveness.

Countries considered the most attractive location for the company's R&D

Respondents were asked to state the three countries currently considered the most attractive location for the company's R&D. The most attractive country could be chosen freely, so these locations did not necessarily need to be actual R&D sites. The result of ranking the most attractive country for the company's R&D is shown in Figure 18 below.

Figure 18: Most attractive countries for the company's R&D



*Note: * Based on an attractiveness index for 161 responses out of the 186 companies in the sample: countries ranked as most attractive with 3 points, as 2nd most attractive with 2 points, and as 3rd most attractive with 1 point.* Based on an attractiveness index for 161 responses out of the 186 companies in the sample: countries ranked as most attractive with 3 points, as 2nd most attractive with 2 points, and as 3rd most attractive with 1 point.*

Source: European Commission JRC-IPTS (2014)

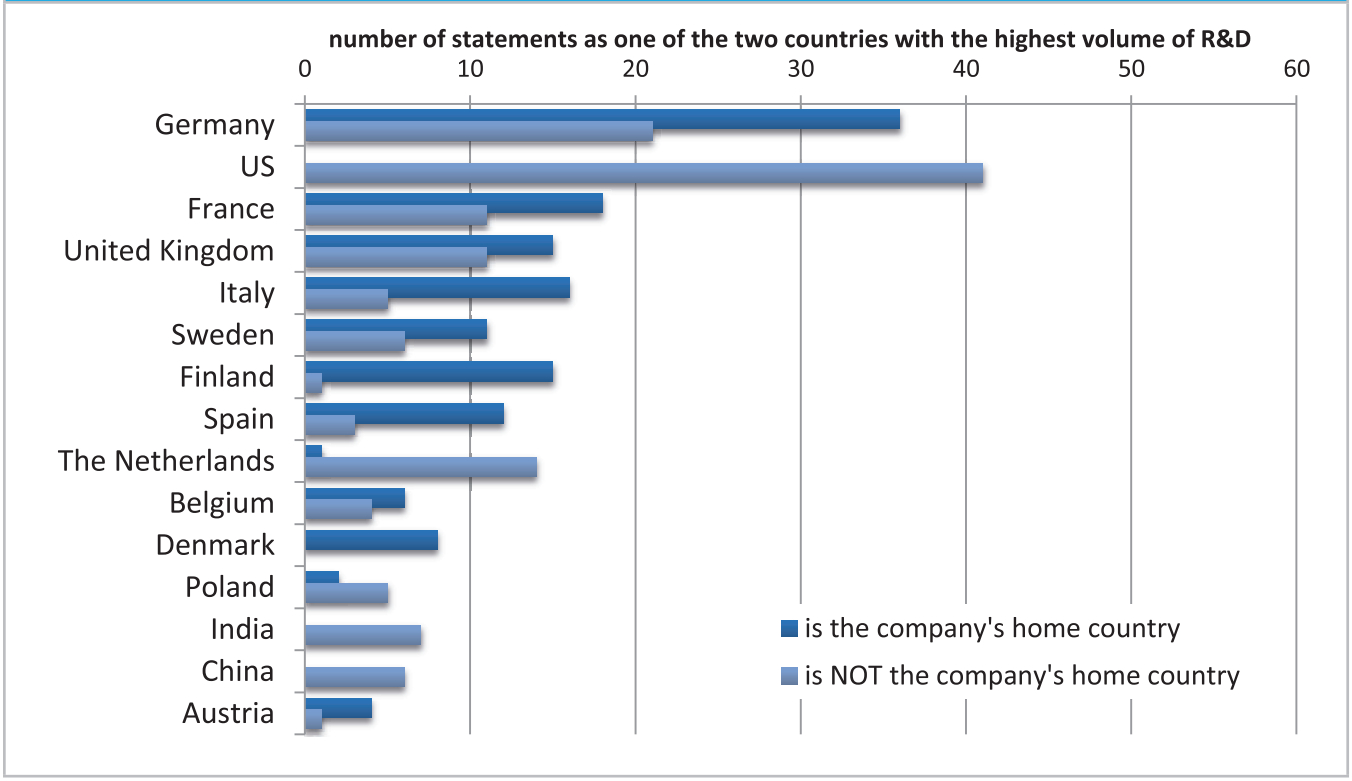
Two-thirds of the respondents considered their home country among the most attractive locations. This is a very similar finding to that of our previous surveys.[33] Finland and Denmark were mentioned only by respondents for which that country is the home country.

The United States, Germany, China and India are seen as the most attractive locations outside the home country. The Netherlands, Poland and Romania are EU countries with an especially high attractiveness index for companies for which they are not the home country. All the above observations were very similar compared with our previous four surveys.

Attractiveness of the two countries where the company has the greatest R&D activity

The respondents were also asked about the level of attractiveness of the two countries where they have the greatest R&D activity. This question allows for a pairwise comparison of the actual R&D locations. As might be expected from the observations above (about the most attractive location for the company's R&D), 9 out of 10 respondents stated their home country to be one of the two with the highest volume of R&D activity (Figure 19).

Figure 19: Countries where the company has the highest volumes of R&D activities



Note: The figure refers to 174 out of the 186 companies in the sample. Numbers of statements refer to one of the two countries where the company has the highest volume of R&D activities.
Source: European Commission JRC-IPTS (2014)

The biggest EU countries and the United States are the countries in which the respondents have the highest volumes of R&D activity. They are followed by Italy, Sweden, Finland, Spain, and Denmark. A large proportion of companies that have their biggest R&D sites in Denmark, Spain, Italy, Austria and Finland are also headquartered in those countries. The opposite is true for the Netherlands, where the biggest R&D sites belong to companies headquartered outside, and for non-EU countries playing an important role in the expansion of R&D investment, such as China and India.

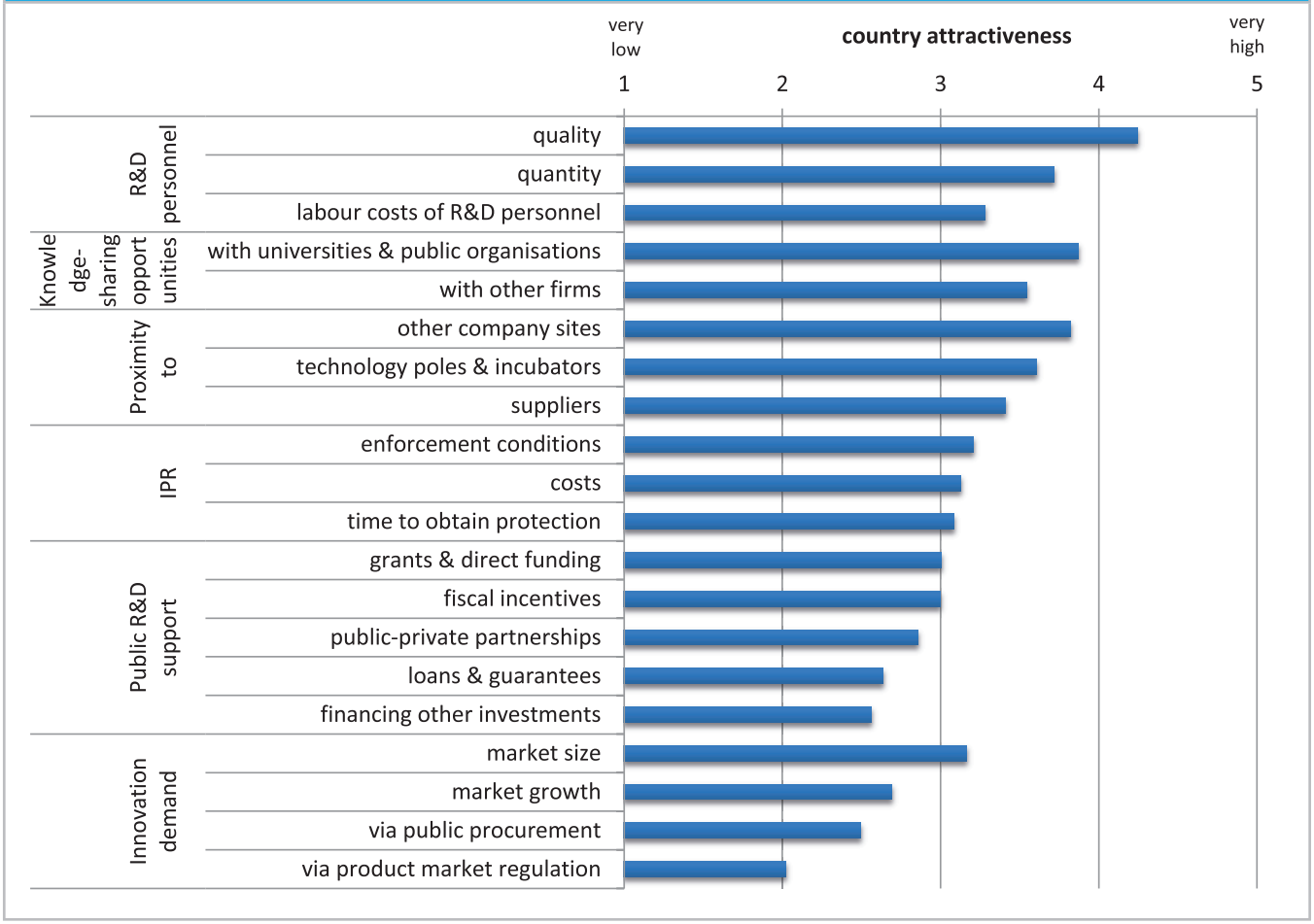
33 As observed in the 2010 and 2008 surveys, more than two-thirds of the respondents considered their home country the most attractive location for R&D, whereas in the 2013 survey the proportion was exactly two-thirds.

As a follow-up, respondents were asked to rate a number of attractiveness factors for the countries where companies have the highest volumes of R&D activity (Figure 20).[34]

As in our previous survey, above average attractiveness was attributed to R&D personnel in the labour market (quality, quantity and labour costs), knowledge-sharing and collaboration opportunities (with universities and public research organisations), proximity (to other company sites, technology poles and incubators, and suppliers), intellectual property rights (IPR) (in terms of enforcement conditions, costs of protection and the time taken to obtain it), and demand for innovation in terms of market size.

The quality and quantity of R&D personnel in the labour market clearly ranked ahead of labour costs. For the other factors that were not so influential for R&D attractiveness, public procurement and product market regulation were not deemed to make a country attractive for R&D. While public support for R&D was not particularly relevant on average, it seemed more relevant to the sector with low R&D intensity, whereas IPR issues were more relevant for the sectors with medium and high R&D intensity.

Figure 20: Attractiveness factors of the two countries with the highest volume of R&D activities



Note: The factors are grouped by the average relevance of the major items in the survey.
The figure refers to 157 out of the 186 companies in the sample.
Source: European Commission JRC-IPTS (2014)

34 Innovation is the introduction of new or significantly improved products, services or processes.

Attractiveness of EU countries

For the two countries where the company currently has the greatest R&D activity, this section addresses the attractiveness of 12 EU countries for which at least five statements were received.[35] The non-EU countries for which more than five responses were obtained are analysed in the next section.[36] below shows the top three and the least attractive factor for each of the EU countries.

Table 2 below shows the top three and the least attractive factor for each of the EU countries.

Table 2: Top three and lowest attractiveness factor for EU countries with at least five statements

country (number of statements)	average rating	most attractive	second most attractive	third most attractive	least attractive
United Kingdom (20)	3,37	quality of R&D personnel	knowledge-sharing opportunities with universities & public organisations	quantity of R&D personnel	innovation demand via public procurement
Germany (54)	3,26	quality of R&D personnel	proximity to other company sites	knowledge-sharing opportunities with universities & public organisations	public R&D support via fiscal incentives
Finland (16)	3,26	quality of R&D personnel	knowledge-sharing opportunities with universities & public organisations	proximity to other company sites	time to obtain Intellectual Property Rights protection
Spain (15)	3,24	quality of R&D personnel	public R&D support via fiscal incentives	knowledge-sharing opportunities with universities & public organisations	innovation demand via market growth
Belgium (10)	3,20	proximity to other company sites	public R&D support via grants & direct funding	knowledge-sharing opportunities with universities & public organisations	innovation demand via public procurement
France (25)	3,18	public R&D support via fiscal incentives	quality of R&D personnel	proximity to other company sites	innovation demand via public procurement
Austria (7)	3,14	knowledge-sharing opportunities with universities & public organisations	quality of R&D personnel	quantity of R&D personnel	innovation demand via market growth
Sweden (16)	3,13	quality of R&D personnel	knowledge-sharing opportunities with universities & public organisations	proximity to other company sites and technology poles & incubators	innovation demand via market growth
Italy (19)	3,02	quality of R&D personnel	quantity of R&D personnel	proximity to other company sites	innovation demand via market growth
The Netherlands (10)	3,00	quality of R&D personnel	proximity to technology poles & incubators	knowledge-sharing opportunities with other firms	innovation demand via market growth
Denmark (7)	3,00	proximity to other company sites	knowledge-sharing opportunities with universities & public organisations	knowledge-sharing opportunities with other firms	innovation demand via market size & growth
Poland (6)	2,89	labour costs of R&D personnel	quality of R&D personnel	quantity of R&D personnel	public R&D support via public-private partnerships

Note: Refers to 103 out of the 186 companies in the sample, numbers of statements per country in brackets (). Countries are sorted by average attractiveness.
Source: European Commission JRC-IPTS (2014)

35 Sorted by average attractiveness, these are the United Kingdom (20 statements were obtained), Germany (54), Finland (16), Spain (15), Belgium (10), France (25), Austria (7), Sweden (16), Italy (19), the Netherlands (10), Denmark (7) and Poland (6).

36 The United States, China and India.

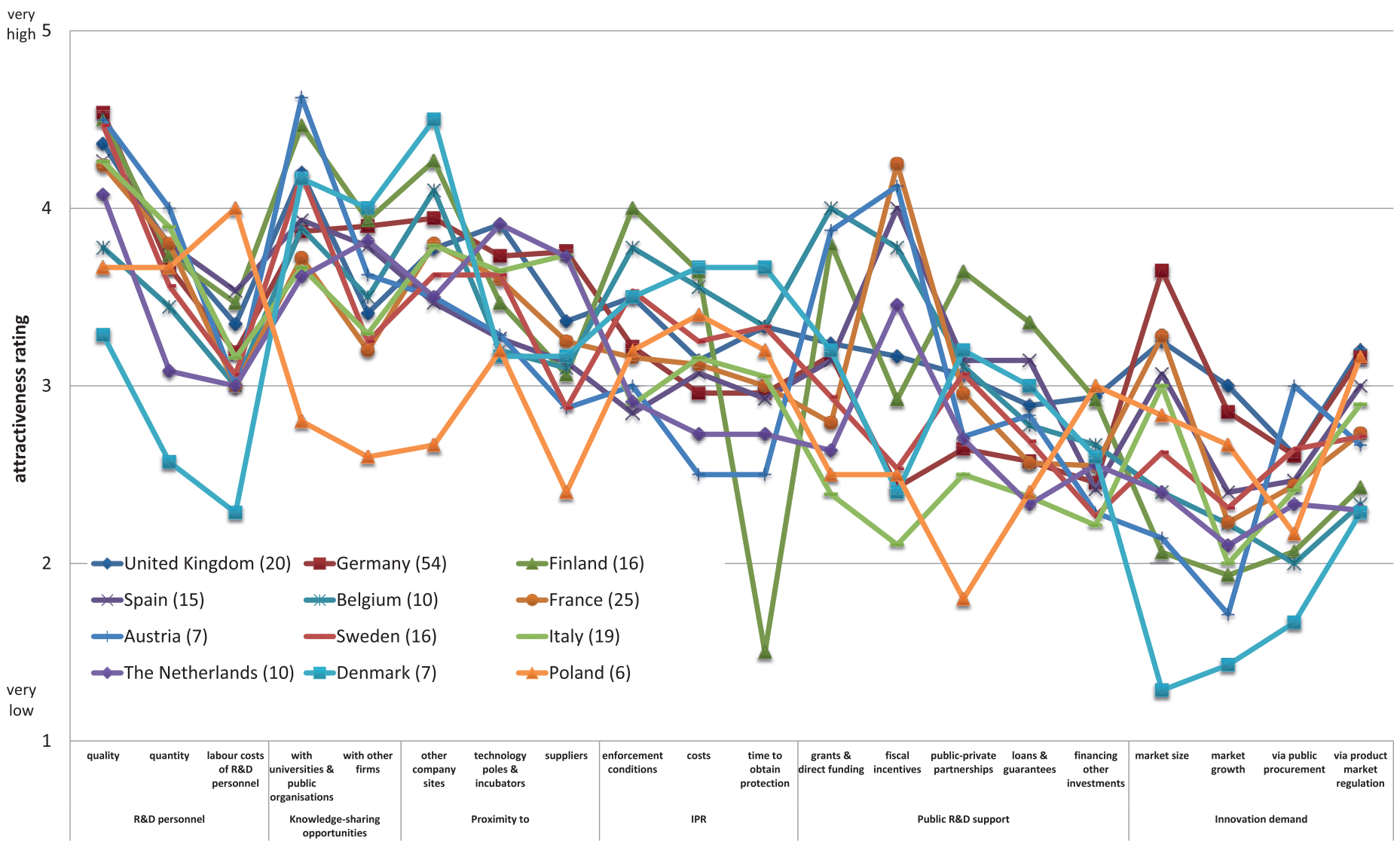
For these countries, the quality of R&D personnel (10 statements) and knowledge-sharing opportunities with universities and public organisations (eight statements) were by far the most frequently found to be among the top three factors for attractiveness in these countries. They are followed by proximity to other company sites (Belgium, Denmark, Germany, France, Italy, Finland and Sweden) and quantity of R&D personnel (Italy, Austria, Poland and the United Kingdom).

Public support for R&D was stated as being important for Spain (via fiscal incentives) and Belgium (via grants and direct funding) and knowledge-sharing opportunities with other firms for Denmark and the Netherlands. For Poland, all three human resources-related aspects (labour costs and quality and quantity of R&D personnel) are attractiveness factors.

The factors that are the least attractive centre on demand for innovation via market growth (Denmark, Spain, Italy, the Netherlands, Austria and Sweden) and public procurement (Belgium, France and the United Kingdom). The lack of market growth for most of these 12 countries is not compensated for by the creation of demand via public procurement or product market regulation.

Figure 21 on the next page shows the country ratings for the individual factors in more detail.

Figure 21: Attractiveness of EU countries



Note: The figure refers to 103 out of the 186 companies in the sample, numbers of statements per country in brackets (). Countries are sorted by average attractiveness.
Source: European Commission JRC-IPTS (2014)

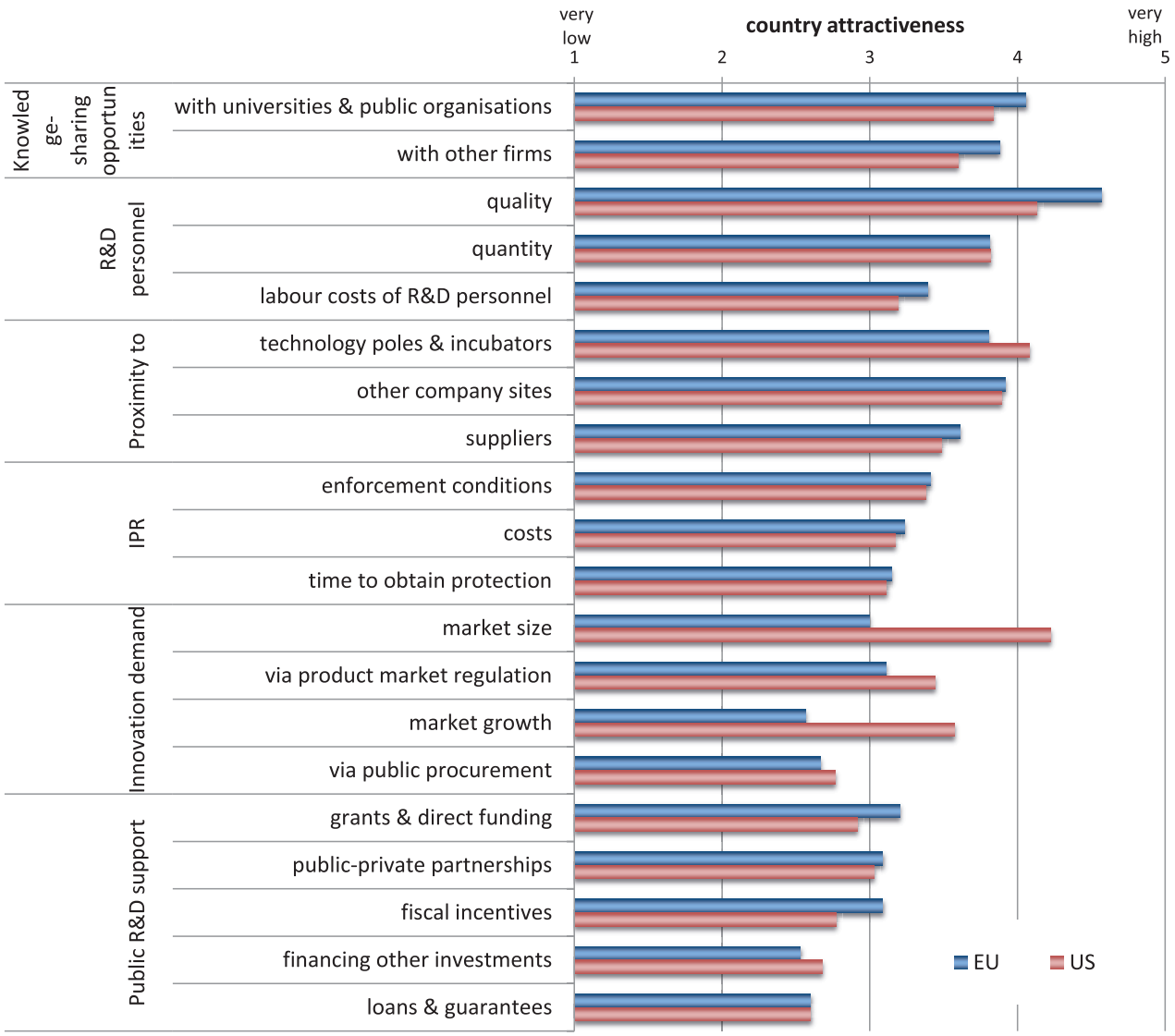
Attractiveness of EU countries versus the US

Considering the possibility for a pairwise comparison, Figure 22 compares the attractiveness of the EU and the United States as either of the sites where the company has the highest volume of R&D activity.

Knowledge-sharing opportunities and quality and quantity of R&D personnel are the leading attractiveness factors for the EU and the United States, before proximity factors.

As in our previous survey, respondents considered the United States more attractive for R&D than the EU regarding market size and growth, whereas the quality of R&D personnel in the labour market and public R&D support, via grants and direct funding and fiscal incentives, stood out in EU countries.

Figure 22: Attractiveness of EU countries compared to the US for 38 cases



Note: The figure refers to 38 out of the 186 companies in the sample.
Source: European Commission JRC-IPTS (2014)

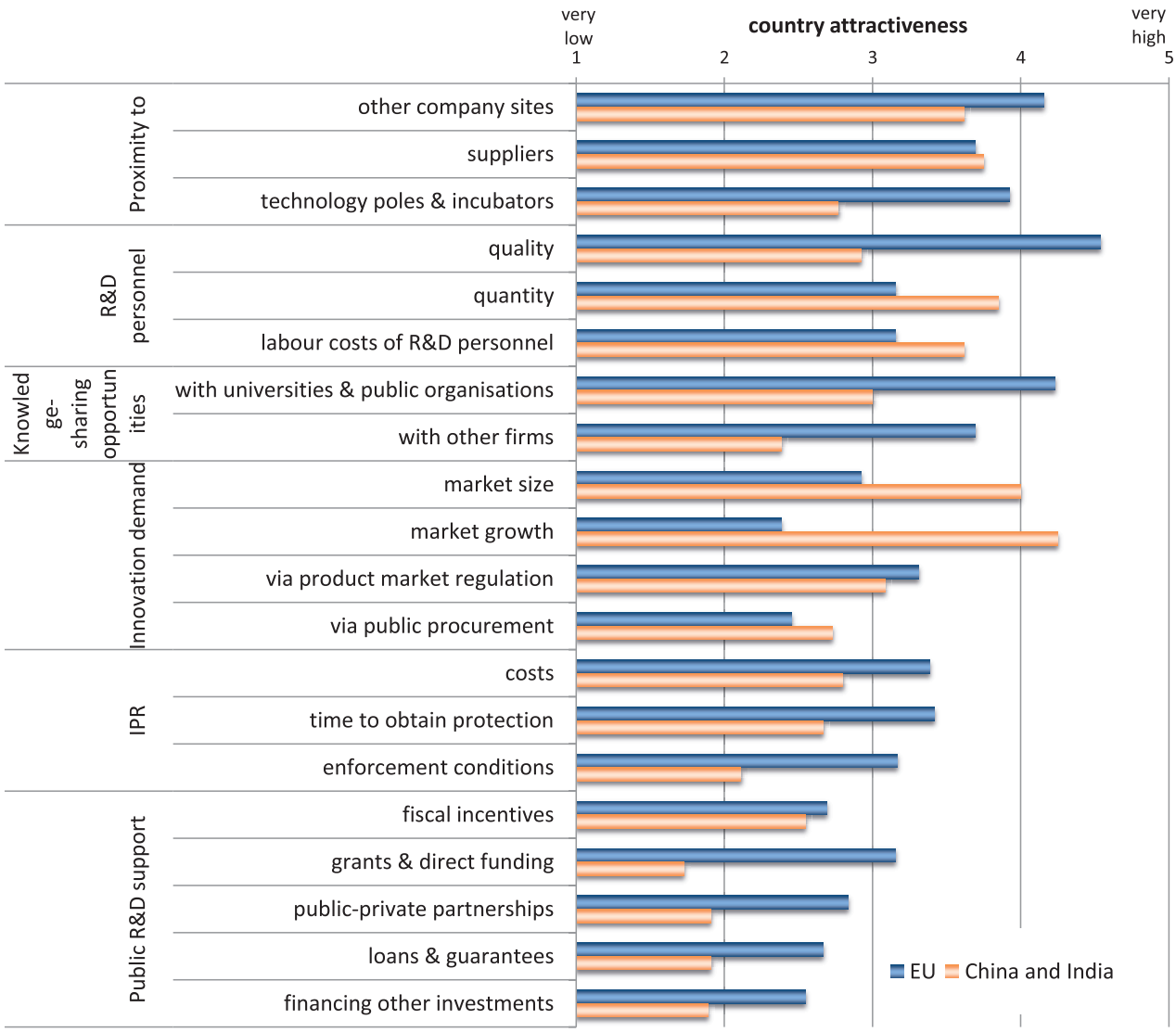
Attractiveness of EU countries versus China and India

For 13 actual cases, Figure 23 compares the attractiveness of sites in EU countries with the greatest R&D activity with those in China and India with the second highest volume.

The pairwise comparison between these actual sites in the EU and in China and India reveals that the attractiveness factors are rather different between the two world regions. For actual R&D sites in the EU, quality of R&D personnel, knowledge-sharing opportunities (with universities and public organisations and other firms) and proximity (to other company sites, technology poles and incubators, and suppliers) are the most relevant factors.

For actual R&D sites in China and India, market size and growth, together with the quantity and labour costs of R&D personnel, are determinants of attractiveness. Compared with the EU, China and India also lack attractiveness in terms of IPR factors (especially enforcement conditions) and public support for R&D in terms of grants and direct funding, public–private partnerships and financing other (non-R&D) investments.

Figure 23: Attractiveness of EU countries versus China and India for 13 cases

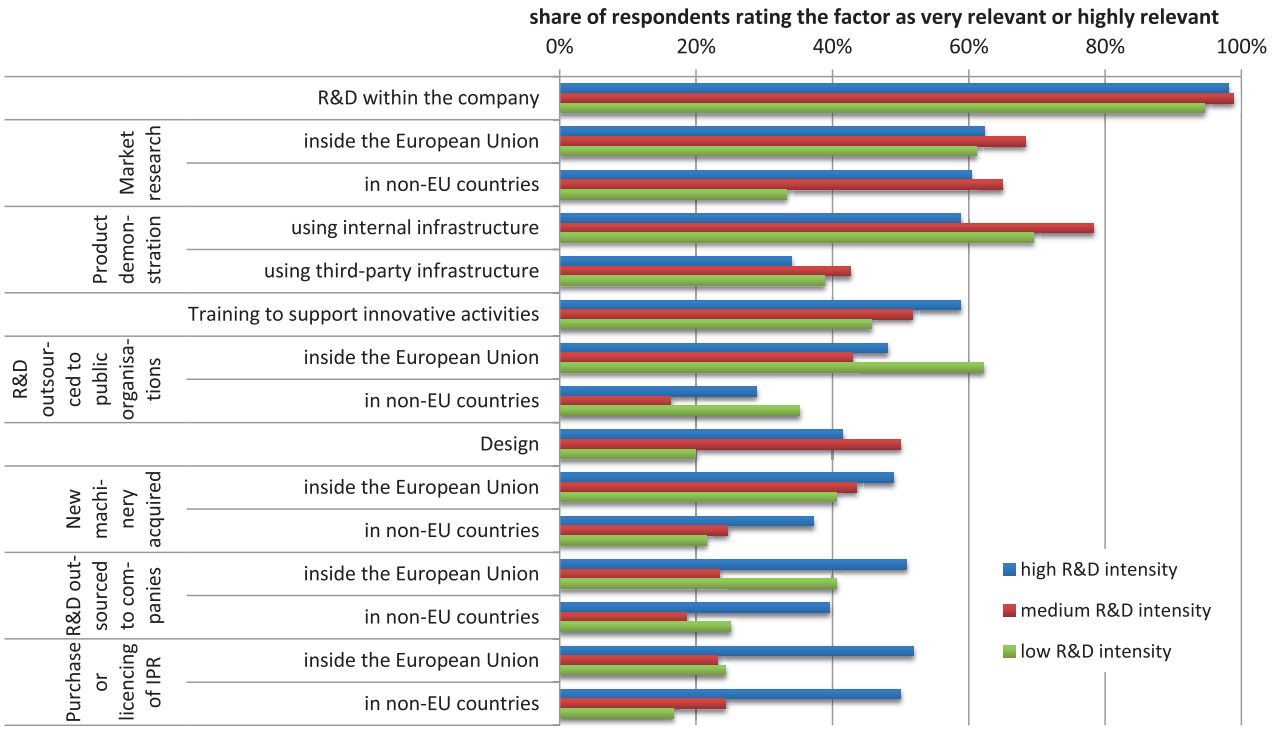


Note:The figure refers to 13 out of the 186 companies in the sample.
Source: European Commission JRC-IPTS (2014)

6 R&D and Innovation

Survey participants were asked to state which R&D efforts are important for innovation in their company.[37] Given a selection of specific R&D activities, respondents could rank them from 1 (irrelevant) to 5 (highly relevant). In order to compare the results, we report the proportion of respondents that rate these activities as relevant (4) or highly relevant (5) in relation to all respondents for each activity (Figure 24).

Figure 24: Relevance of activities for the company's innovations



Note: The activities are listed by average relevance of the major items in the survey.
The figure refers to 169 out of the 186 companies in the sample.
Source: European Commission JRC-IPTS (2014)

37 Innovation is the introduction of new or significantly improved products, services or processes.

Internal R&D activities are by far the most important factor for company innovation. On average, 97.2 % of the responding companies rate internal R&D as relevant or highly relevant. For companies from sectors with medium R&D intensity, this is the case for 98.8 % of the respondents, compared with those from sectors with high (98.0 %) and low R&D intensity (94.6 %).

The second most relevant factor for innovation is market research, advertising and other marketing activities related to the introduction of a new product (average of 58.8 % for all three R&D intensity groups). This effort is more important for companies from sectors with medium R&D intensity (68.3 %) than those from sectors with high (63.5 %) or low R&D intensity (61.1 %).

Product demonstration follows in third position. On average, 54.0 % of all respondents (combined for activities inside and outside the EU) state that this activity is relevant or highly relevant for their company's innovation. Product demonstrations such as pilot lines and demonstrators are more important for firms in sectors with medium and low R&D intensity than for those from high-intensity sectors. However, firms in all sectors value utilising internal infrastructure (69.3 %) significant more highly than using third-party infrastructure (38.8 %).

Training to support innovation activities (average of 52.5 % for all three R&D intensity groups) is more important for companies from sectors with high R&D intensity (60.0 %) than for those from sectors with medium (51.8 %) or low R&D intensity (45.7 %).

R&D outsourced to public organisations is rated highest by firms in sectors with low R&D intensity, followed by the high-intensity sectors in second place and medium-intensity sectors last. Furthermore, those activities are significantly more important within the EU (51.4 %) than in non-EU countries (26.9 %).

Design is rated significantly higher by firms in sectors with medium R&D intensity than in high- and low-intensity sectors (50.0 % vs 42.3 % and 20.0 %, respectively).

Firms across all sector groups value the acquisition of new or significantly improved machinery, equipment and software within the EU more highly than acquiring the same goods from outside (non-EU) countries. This preference for internal acquisition is stronger for companies from sectors with high R&D intensity.

Although firms in sectors with low R&D intensity report the highest level of relevance for outsourcing to public organisations in non-EU countries, followed by those in high- and medium-intensity sectors, the picture changes when considering outsourcing to companies. Such outsourcing is very important for companies from sectors with high R&D intensity (45.3 %) but less relevant for those from low- (32.8 %) and medium-intensity sectors (21.1 %).

Purchasing or licensing IPR and know-how is indicated as the least relevant factor for company innovation. It is, however, more important for innovation in firms in sectors with high R&D intensity (both from within and outside the EU, with a slight preference for intra-EU transactions). Companies from sectors with low and medium-high R&D intensity rate this factor as having lower relevance. Whereas firms with low R&D intensity prefer intra-EU activities, those with medium R&D intensity show a slight preference for activities in non-EU countries.

7 Annex A: The Methodology of the 2014 Survey

Background and Approach

In order to improve the understanding of industrial R&D and innovation in the EU and to identify medium and long-term policy implications, the European Commission established the Industrial Research and Innovation Monitoring and Analysis (IRIMA)[38] initiative. IRIMA is carried out by the European Commission's Joint Research Centre (JRC) - Institute for Prospective Technological Studies (IPTS) and the Directorate General for Research - Directorate A, Policy Development and Coordination. The project monitors and analyses industrial R&D and innovation activities in order to support the implementation and monitoring of the European research and innovation agenda (the Innovation Union flagship, set in the context of the Europe 2020 strategy aiming at a smarter, greener and more inclusive economy). The evidence gathered also contributes to policy-making in other relevant Europe 2020 flagship initiatives such as the "Industrial Policy", the "Digital Agenda" and the "New Skills for New Jobs" ones.

The IRIMA surveys tackles the lack of comparable information on business R&D investment trends at the European level by gathering qualitative information on factors and issues surrounding and influencing companies' current and prospective R&D investment strategies. The survey complements other R&D investment related surveys and data collection exercises (e.g. Innobarometer, Eurostat data collection and other on-going surveys).

Link to the R&D Investment Scoreboards

As part of the Industrial Research and Innovation Monitoring and Analysis (IRIMA) initiative, the EU R&D surveys and complement the *EU Industrial R&D Investment Scoreboard*.[39] The Scoreboard is the main IRIMA product and serves as a tool for the European Commission to monitor and analyse company R&D investment trends, and to benchmark, inform and communicate developments in R&D investment patterns.

While the Scoreboard is based on the audited annual accounts of companies and therefore looks at trends ex-post, the Survey improves the understanding of the Scoreboard companies by collecting (ex-ante) information. In addition to forward-looking issues, the survey addresses location strategies, drivers and barriers to research and innovation activities, or perception of policy support measures with a questionnaire agreed between JRC-IPTS and DG-RTD. This questionnaire is printed and mailed by post together with the Scoreboard analysis report and the previous Survey analysis report to the 1000 European companies. Also a web-interface and email contacts are made available in order to allow for paperless participation. The Survey makes efficient use of the direct contacts established with the European Scoreboard companies by adding-on to the Scoreboard mailing when the reports are officially released.

For the 2014 Survey, the response period ran for three and a half months from 19th March (mailing of the questionnaires) to 8th July 2014 (reception of the last response).

38 See: http://iri.jrc.ec.europa.eu/. The rationale for the IRIMA activities emerged in the context of the European Commission's "3% Action Plan" established to implement and monitor the 3% R&D investment intensity target of the Lisbon strategy ("Investing in research: an action plan for Europe" (COM, 2003)) and in further Communications of the Commission ("More Research and Innovation – Investing for Growth and Employment – A common approach", COM (2005) 488 final, "Implementing the Community Lisbon Programme: A policy framework to strengthen EU manufacturing – Towards a more integrated approach for industrial policy", COM (2005) 474 final). The activity is undertaken jointly by the Directorate General for Research (DG RTD A, see: http://ec.europa.eu/research/index.cfm) and the Joint Research Centre, Institute of Prospective Technological Studies (JRC-IPTS, see: http://ipts.jrc.ec.europa.eu/activities/research-and-innovation/iri.cfm).

39 The Scoreboard is published annually and provides data and analysis on the largest R&D investing companies in the EU and abroad (see: http://iri.jrc.ec.europa.eu/research/scoreboard.htm).

Methodology

To improve response rates, the following measures were taken in the course of the survey cycle:

(1) The questionnaire was revised and streamlined with a view towards keeping it as short and concise as possible and minimise the burden for the respondent. The 2014 questionnaire had a smaller number of items compared to its predecessors due to the streamlined country comparisons in questions 7 and 8.

(2) The questionnaire was sent together with the Scoreboard report to take advantage of this occasion as a door-opener.

(3) The cover-letter presented a figure and table with a benchmarking analysis of the company addressed compared to its peers in the same sector.

(4) As well as physically sending the questionnaire to each company, an online site was provided to facilitate data entry via the European Commission's Interactive Policy-Making (IPM) tool,[40] where a Word version of the questionnaire was downloadable for offline information input.

(5) The questionnaire was emailed to the respondents of previous surveys, together with a link to the electronic copy of the latest analysis.

(6) The contact database was continuously improved. Respondents who had already participated in previous surveys, or their substitutes in cases where they had left their position, were priority contacts. Returned questionnaires and reminder mailings were resent using the latest contact information on the internet or by contacting the company directly via email or phone.

(7) The response rate is closely followed on a regular basis during the implementation. If necessary, measures for improving the response rate are applied, e.g. by adjusting the number of reminders, allowing more time for questionnaire reception, following up selected candidates by e-mail and phone or searching support from former survey participants

(8) Personal contact by phone or email was made with several dozen companies when the deadlines were close, especially for those which had participated in the past.

The response rate has been steadily high over the past five years, taking full advantage of the familiarity of the EU Scoreboard companies with the exercise and their mature approach[41].

Outliers were detected by analysing the distribution of the dataset in scatter and boxplots and defining upper and lower quartiles ranges around the median, according to the variable(s) analysed. To maintain the maximum information in the data, outliers were eliminated only in extreme cases and after assessing the impact on the result.[42]

One-year growth is simple growth over the previous year, expressed as a percentage: 1yr growth = 100*((C/B)-1); where C = current year amount and B = previous year amount. 1yr growth is calculated only if data exist for both the current and previous year. At the aggregate level, 1yr growth is calculated only by aggregating those companies for which data exist for both the current and previous year.

Three-year growth is the compound annual growth over the previous three years, expressed as a percentage: 3yr growth = 100*(((C/B)^(1/t))-1); where C = current year amount, B = base year amount (where base year = current year - 3), and t = number of time periods (= 3). 3yr growth is calculated only if data exist for the current and base years. At the aggregate level, 3yr growth is calculated only by aggregating those companies for which data exist for the current and base years.

Unless otherwise stated, the **weighted figures** presented in this report are weighted by R&D investment.

40 See: http://ec.europa.eu/yourvoice/ipm/index_en.htm

41 The response rate of the present survey is 18.5%. This is slightly higher compared to the 17.2% of last year and similar to the previous three surveys (18.7% (2012), 20.5% (2010) and 18.5% (2009)). The reason for the lower response rate in the last survey was in the shorter response period.

42 For the systematic detection of outliers, an adjusted methodology from the NIST/SEMATECH e-Handbook of Statistical Methods was applied, see: http://www.itl.nist.gov/div898/handbook/prc/section1/prc16.htm

R&D Investment Definition

The objective of the survey is to address R&D investment, and not R&D expenditure, due to its direct link to the Innovation Union headline target of 3% R&D-intensity for overall R&D investment of a country as a share of GDP. To make the survey as easy to complete as possible and to maximise the response rate, only a short definition of R&D investment, which is as close as possible to accounting standards, is provided in the survey.[43] The definition refers mainly to R&D as reported in the company's most recent accounts. The definition used in the survey is thus closely related to the International Accounting Standard (IAS) 38 "Intangible Assets",[44] based on the OECD "Frascati" manual,[45] and the definition used in the EU Industrial R&D Investment Scoreboards.

Composition of the Responses

The 186 responses were classified according to the ICB[46] described in the questionnaire. Sector classifications of individual companies were cross-checked with the Scoreboards. In two cases, two respondents from the same company but different business units were received. It was decided to retain them in the sample as separate entities because they correspond to very large business units in different sub-sectors. In this sense, they could be considered to have similar decision-making authority within their business segment as if they were individual companies. The sectors were grouped according to their average R&D intensities in the Scoreboard as follows:

- High (more than 5%) R&D-intensity (58 companies): Pharmaceuticals & Biotechnology, Software & Computer Services, Aerospace & Defence, Technology Hardware & Equipment and Health Care Equipment & Services.
- Medium (between 2 and 5%) R&D-intensity (88 companies): Industrial Engineering, Chemicals, Electronic & Electrical Equipment, Automobiles & Parts, Food Producers, General Industrials, Fixed Line Telecommunications, Household Goods & Home Construction, Support Services, Media and Personal Goods.
- Low (less than 1%) R&D-intensity (40 companies): Construction & Materials, Industrial Metals & Mining, Banks, Electricity, Oil & Gas Producers, Gas, Water & Multi-utilities, Forestry & Paper, Mining, and Mobile Telecommunications.

Table 3 shows the distribution of the responses among the sectors with their respective R&D investment shares.

43 See Annex B

44 See http://www.iasplus.com/standard/ias38.htm

45 See "Proposed Standard Practice for Surveys on Research and Experimental Development: Frascati Manual", OECD, Paris, 2002, http://www1.oecd.org/publications/e-book/9202081E.PDF

46 ICB Industry Classification Benchmark (see: http://www.icbenchmark.com/docs/ICB_StructureSheet_120104.pdf)

Table 3: Distribution of the responses by sectors

ICB Sector	Number of responses	Number of Scoreboard companies	Response rate by sector	Total R&D investment share compared to the Scoreboard*	R&D intensity sector group**
Pharmaceuticals & Biotechnology	23	111	20.7%	between 20 and 40 %	High
Software & Computer Services	15	110	13.6%	below 20 %	High
Aerospace & Defence	8	23	34.8%	below 20 %	High
Technology Hardware & Equipment	8	46	17.4%	between 20 and 40 %	High
other high R&D-intensity sectors	4	44	9.1%		High
Subtotal high R&D intensity	**58**	**334**	**17.4%**	**26.0%**	
Industrial Engineering	23	112	20.5%	between 20 and 40 %	Medium
Chemicals	15	42	35.7%	above 40 %	Medium
Electronic & Electrical Equipment	11	76	14.5%	below 20 %	Medium
Automobiles & Parts	10	50	20.0%	above 40 %	Medium
Food Producers	7	27	25.9%	between 20 and 40 %	Medium
General Industrials	7	33	21.2%	between 20 and 40 %	Medium
Fixed Line Telecommunications	6	12	50.0%	above 40 %	Medium
Household Goods & Home Construction	5	19	26.3%	between 20 and 40 %	Medium
Other medium R&D intensity sectors	4	129	3.1%		Medium
Subtotal medium R&D intensity	**88**	**500**	**17.6%**	**45.3%**	
Construction & Materials	9	42	21.4%	below 20 %	Low
Industrial Metals & Mining	7	15	46.7%	below 40 %	Low
Banks	6	9	66.7%	below 20 %	Low
Electricity	5	28	35.3%	below 20 %	Low
Other low R&D intensity sectors	12	69	17.4%		Low
Subtotal low R&D intensity	**45**	**180**	**24.1%**	**31.9%**	
Total	**172**	**1000**	**18.6%**	**36.4%**	

*Note: * For confidentiality reasons, R&D investment shares of individual sectors are shown in ranges and only shown for sectors with at least four responses.*

*** Sector group according to the average Scoreboard R&D-intensity of each sector.*

Source: European Commission JRC-IPTS (2014)

Most of the responses, both in terms of numbers of participants and share of R&D investment in the sample, were from the medium R&D-intensity sectors (see also Figure 3 of the section 2 R&D Investment Expectations).

The number of responses by home country is shown in Table 4 below. According to the Scoreboard methodology, the home country is the country of registered office of the company. Similar to our previous surveys, most participants were from companies located in the three biggest Member States.

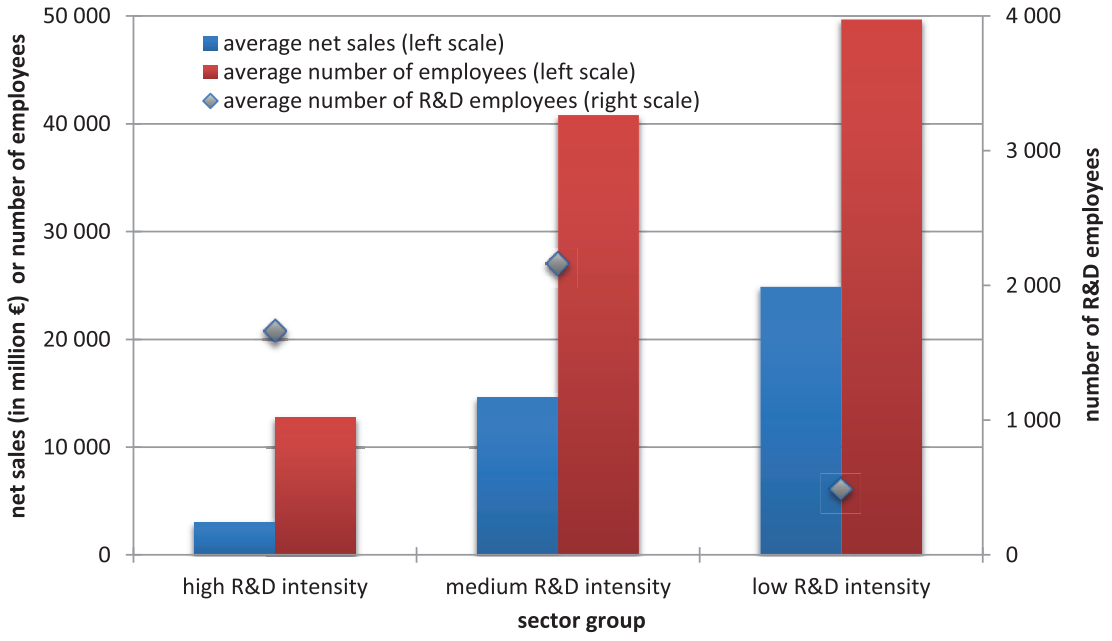
Table 4: Distribution of the responses by home country of the company

country	number of responses	share of responses
Germany	39	21.0%
France	21	11.3%
UK	20	10.8%
Finland	17	9.1%
Italy	17	9.1%
Spain	14	7.5%
Sweden	13	7.0%
Belgium	9	4.8%
The Netherlands	9	4.8%
Denmark	8	4.3%
Austria	5	2.7%
Portugal	5	2.7%
other European countries*	9	4.8%
total	**186**	**100%**

Note: For confidentiality reasons, only information for countries with at least four responses is shown.
** including one company headquartered in a European non-EU country.Source: European Commission JRC-IPTS (2013)*
Source: European Commission JRC-IPTS (2014)

Figure 25 reveals that the average survey respondent is a very large company.[47] However, there are differences in company size between the sector groups.

Figure 25: Average turnover and employee numbers for the responding companies, by sector group



Note: The activities are listed by average relevance of the major items in the survey.
The figure refers to 169 out of the 186 companies in the sample.
Source: European Commission JRC-IPTS (2014)

47 The average turnover of the responding companies was €13 billion, 34,000 employees, and 1,650 employees in R&D. Among the 186 respondents there were 7 medium-sized and one small company mainly in the high R&D intensity sectors (according to the European Commission's SME definition, see: http://ec.europa.eu/enterprise/enterprise_policy/sme_definition/index_en.htm). Among the large companies in the sample, 23 had between 251 and 1,000 employees, 70 between 1,001 and 10,000 employees, 42 between 10,001 and 30,000 employees, and 42 more than 30,000 employees.

The numbers of average net sales and employees are inversely proportional to the R&D-intensity of the sector group. In other words, the higher the R&D-intensity of the sector group the smaller the average size of the companies in the sample. The average number of R&D employees of the companies surveyed is considerably larger in high and medium than in the low R&D-intensity sector. This is the result of the high share of R&D employees in large companies that responded from technology, hardware & equipment, pharmaceuticals & biotechnology and aerospace & defence (high R&D intensity), automobiles & parts, industrial engineering, and chemicals (medium R&D intensity) sectors.

8 Annex B: The R&D Investment Questionnaire

Questionnaire on Business R&D Investment

We would appreciate your response by **(deadline)**, **preferably by using the questionnaire** at: **(http://goo.gl/HWKdrm)**. Alternatively, you may return this completed form by e-mail (**Alexander.Tuebke@ec.europa.eu**), fax (+34.95.448.83.26), or post[48].

The information in your response will be treated as **confidential**. It will only be used within this study and in an aggregated form. The European Commission is committed to the protection and privacy of data[49].

It will take about **35 minutes** to complete the questionnaire.

We will automatically inform you of the results of the survey when they are available (for that, please ensure that you have provided your e-mail address below).

Name of the company you are responding for: _____

Its primary sectors of activity: _____

Your name: _____

Job title: _____

E-mail: _____

Phone number: _____

The European Commission may follow up this survey by short-interviews to clarify major trends revealed in the analysis. Please tick here ❑ if you do not wish to be approached for this purpose.

Definition of R&D investment

For the purposes of this questionnaire, **'R&D investment' is the total amount of R&D financed by your company** (as typically reported in its accounts). It does not include R&D financed from public sources.

48 European Commission, Institute for Prospective Technological Studies (IPTS), Attn.: Alexander Tübke, Edificio Expo, Calle Inca Garcilaso 3, E-41092 Seville, Spain, Tel.: +34.95.448.83.80

49 See the Privacy Statement on the last page

A. Corporate background

1. How many employees in total have worked in your company in the past year (2013)?

   Around _____ (FTE[50]).

2. How many employees have worked on R&D in the company in the past year (2013)?

   About _____ (FTE[3]).

B. R&D investment levels and trends

3. What was your R&D investment in the past year (2013)?

   About € _____ million.

4. At what average rate do you expect the company to change its overall R&D investment over the next three years (2014, 2015, 2016), in real terms?

   About _____ % per annum.

50 Please indicate the number of employees on either permanent or fixed-term contracts in Full-Time Equivalents (FTE), with part-time employees included on a pro-rated basis in line with their contractual working hours.

C. Key Enabling Technologies

5. The Commission is undertaking initiatives to strengthen certain Key Enabling Technologies (KETs) for the development of new goods and services.[51] *In the table below, please estimate the approximate numbers of patents filed, revenue from licences issued, expenses for licences used and amount of R&D for each technological field in the past year (2013).*

	number of patents filed	**revenue from licences issued (million €)**	**expenses for licences used (million €)**	**amount of R&D investment (million €)**
Key software technologies, e.g. high performance computing, building data value, social computing, internet-based applications, embedded systems, human-centred computing, enterprise applications and the generation of software-intensive systems				
Micro- and nanoelectronics, e.g. semiconductor components and highly miniaturised electronics				
Advanced materials leading to lower-cost substitutes of existing materials and new higher value-added products & services				
Industrial (white) biotechnology applied to industrial processing and production of chemicals, materials and fuels				
Other (red and green) biotechnology applied to medical and agricultural processes				
Nanotechnology, i.e. design, production and application of structures, devices and systems by controllling shape & size at nanometric scale				
Photonics, i.e. conversion of sunlight into electricity, photodiodes, LEDs and lasers				
Advanced manufacturing technologies encompass the use of innovative technology to improve products or processes that drive innovation, including all production equipment that deploys a KET or any other innovative technology				
Environmental technologies (incl. alternative energy), i.e. devices, materials, and techniques for pollution prevention, reduction or containment				
Other technologies especially relevant for your company (please specify):				

51 These Key Enabling Technologies (KETs) enable the development of new goods and services and the restructuring of industrial processes needed to modernise EU industry and make the transition to a knowledge-based and resource-efficient economy. Whilst the EU has very good R&D capacities in some KETs, it has not been as successful at translating research results into commercialised manufactured goods and services. The Commission's KETs strategy aims to boost the industrial production of innovative of KETs-based products and applications of the future, see: http://ec.europa.eu/enterprise/sectors/ict/key_technologies/

D. R&D location strategy

6. Please estimate the distribution of your company's in-house R&D activity among the following world areas in the past year (2013) and three years later (2016)?

Distribution in 2013	R&D carried out:	Expected distribution in 2016
%	in the European Union[52]	%
%	in other European countries[53]	%
%	in the US and Canada	%
%	in Japan	%
%	in China	%
%	in India	%
%	in the Rest of the World	%

7. Which countries do you currently consider the most attractive location for *your company's R&D***?** *Please state the countries regardless whether your company has R&D activity there and rank by attractiveness***.**

1. _____ 2. _____ 3. _____

52 There are currently 28 EU Member States: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta,
The Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and The United Kingdom.

53 Examples of other (non-EU) European countries are: Switzerland, Norway, Iceland, Albania, Moldova, Turkey, Russia, Belarus and the Ukraine (for further examples see the recognised states in: http://en.wikipedia.org/wiki/List_of_sovereign_states_and_dependent_territories_in_Europe#Recognised_states).

8. Please state the two countries where your company currently has the *highest volume of R&D activities*:

A. _____ B. _____

How attractive are these two countries in terms of the following factors? *Please rate on a scale from 1 (very low attractiveness) to 5 (very high attractiveness) and leave not-applicable factors blank.*

	attractiveness of:									
	country A					**country B**				
	very low				very high	very low				very high
	1	2	3	4	5	1	2	3	4	5
(a) Demand for innovative goods & services:										
(a1) market size	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
(a2) market growth	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
(a3) through public procurement	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
(a4) via product market regulation, norms & standards	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
(b) Human resources:										
(b1) quality of R&D personnel in the labour market	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
(b2) quantity of R&D personnel in the labour market	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
(b3) labour costs of R&D personnel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
(c) Proximity to:										
(c1) technology poles[54] and incubators[55]	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
(c2) other company sites, e.g. production or sales	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
(c3) suppliers	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
(d) Collaboration & knowledge-sharing opportunities:										
(d1) with other firms	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
(d2) with universities and public research organisations	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
(e) Public financial support for R&D via:										
(e1) fiscal incentives	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
(e2) grants and direct funding	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
(e3) loans and guarantees	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
(e4) public-private partnerships	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
(e5) financing other (non-R&D) investments	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
(f) Intellectual Property Rights in terms of:										
(f1) costs of protection	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
(f2) time to obtain protection	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
(f3) conditions for putting them into force	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Other (please specify):

⇨ _____

_____

54 "Technology poles" are areas where R&D active companies, institutions and universitites are concentrated.

55 "Incubators" are structures that support innovative startup companies in order to increase their survival rates.

E. R&D and innovation

How relevant are the following activities for your company's innovations[56]? *Please rate on a scale from 1 (irrelevant) to 5 (highly relevant).*

	Irrelevant 1	2	3	4	Highly relevant 5
(a) R&D within the company	☐	☐	☐	☐	☐
(b) R&D outsourced to other companies:	☐	☐	☐	☐	☐
(b1) Inside the European Union	☐	☐	☐	☐	☐
(b2) In non-EU countries					
(c) R&D outsourced to higher education institutions or public research organisations:	☐	☐	☐	☐	☐
(c1) Inside the European Union	☐	☐	☐	☐	☐
(c2) In non-EU countries					
(d) Acquisition of new or highly improved machinery, equipment and software:	☐	☐	☐	☐	☐
(d1) Inside the European Union	☐	☐	☐	☐	☐
(d2) In non-EU countries					
(e) Purchase or licensing of Intellectual Property Rights (patents, copyrights and designs) as well as know-how:	☐	☐	☐	☐	☐
(e1) Inside the European Union	☐	☐	☐	☐	☐
(e2) In non-EU countries					
(f) Training to support innovative activities	☐	☐	☐	☐	☐
(g) Design (graphic, packaging, process, product, service or industrial)	☐	☐	☐	☐	☐
(h) Market research, launch advertising, and related marketing activities for new product introduction:	☐	☐	☐	☐	☐
(h1) Inside the European Union	☐	☐	☐	☐	☐
(h2) In non-EU countries					
(i) Product demonstration (pilot lines/demonstrators):	☐	☐	☐	☐	☐
(i1) Using internal infrastructure	☐	☐	☐	☐	☐
(i2) Using third-party infrastructure					

Other (please specify):

⇨ _____

F. Final comments or suggestions

⇨ _____

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Thank you very much for your contribution!

56 Innovation is the introduction of new or significantly improved products, services, or processes.

Privacy Statement

The *2014 EU Survey on R&D Investment Business Trends* is carried out by the Industrial Research and Innovation (IRI) action of the European Commission's Joint Research Centre (JRC), Institute for Prospective Technological Studies (IPTS). The survey is directed at the 1000 European companies in the *2013 EU Industrial R&D Investment Scoreboard*.

The European Union is committed to data protection and privacy as defined in Regulation (EC) nº 45/2001. This survey is under the responsibility of the IRI action leader, Fernando Hervás Soriano, acting as the Controller as defined in the above regulation. The Controller commits himself dealing with the data collected with the necessary confidentiality and security as defined in the regulation on data protection and processes it only for the explicit and legitimate purposes declared and will not further process it in a way incompatible with these purposes. These processing operations are subject to a Notification to the Data Protection Officer (DPO) in accordance with Regulation (EC) 45/2001.

Purpose and data treatment

The purpose of data collection is to establish the analysis of the *2014 EU Survey of R&D Investment Business Trends*. This survey has a direct mandate from the Commission's 2003 Action Plan "Investing in Research" (COM 2003 (226) final, see http://ec.europa.eu/invest-in-research/action/2003_actionplan_en.htm). The personal data collected and further processed are:

- Company: name, primary sectors of activity, company size

- Contact Person: name, job title, phone number, e-mail

The collected personal data and all information related to the above mentioned survey is stored on servers of the JRC-IPTS, the operations of which underlie the Commission's security decisions and provisions established by the Directorate of Security for these kind of servers and services. **The information you provide will be treated as confidential and aggregated for the analysis.**

Data verification and modification

In case you want to verify the personal data or to have it modified respectively corrected, or deleted, please write an e-mail message to the address mentioned under "Contact information", by specifying your request. Special attention is drawn to the consequences of a delete request, in which case any trace to be able to contact you will be lost. Your personal data is stored as long as follow-up actions to the above mentioned survey are necessary with regard to the processing of personal data.

Contact information

In case you have questions related to this survey, or concerning any information processed in this context, or on your rights, feel free to contact the IRI Team, operating under the responsibility of the Controller at the following email address: **jrc-ipts-iri@ec.europa.eu**.

Recourse

Complaints, in case of conflict, can be addressed to the European Data Protection Supervisor (EDPS) at www.edps.europa.eu.

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EUR 26909 EN - Joint Research Centre - Institute for Prospective Technological Studies - DG Research

Title: EU R&D SURVEY. The 2014 EU Survey on Industrial R&D Investment Trends

Author(s): Alexander Tübke, Fernando Hervás, Jörg Zimmermann and Nicola Grassano

Luxembourg: Publications Office of the European Union

2014 - 52 pp. - 21.0 x 29.7 cm

EUR – Scientific and Technical Research series – ISSN 1831-9424 (online), ISSN 1018-5593 (print)

ISBN 978-92-79-43964-3 (pdf), ISBN 978-92-79-43965-0 (print)

doi:10.2791/14520

Abstract
This report presents the findings of the ninth survey on trends in industrial R&D investment. It analyses the 186 responses of mainly large firms from a subsample of 1000 EU-based companies in the 2013 EU Industrial R&D Investment Scoreboard. These 186 companies are responsible for R&D investment worth almost €60 billion, constituting around 36% of the total R&D investment by the 1000 EU Scoreboard companies.

The main conclusion is that the responding companies expect R&D investment to increase by on average 4.2 % per year during 2014–16. This is about 50 % higher than the increase anticipated in the previous survey (2.6 %) and mainly reflects the shift in expectations in the automobiles and parts sector, which returns to the level of previous years (4.6 %) after last year's reported stagnation (–0.4 %).

The responding companies carry out one fifth of their R&D outside the EU. The responding companies' expectations for R&D investment for the next three years show the ongoing participation of European companies in the global economy. While maintaining the focus of their R&D investment in the EU, they reap opportunities for growth in emerging economies. Two out of three of the responding EU-based companies consider their home country the most attractive location for R&D. The United States, Germany, China and India are the most attractive locations mentioned outside the home country.

LF-NA-26909-EN-N

JRC Mission

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Serving society
Stimulating innovation
Supporting legislation

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ISBN 978-92-79-43964-3