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Current times are challenging both globally and in Europe. Anti-globalisation and protectionism are on the rise in many countries and in various ways; people are increasingly concerned about whether Europe offers prosperity and a fair participation for its citizens. The vote in the United Kingdom to leave the EU as well as the negative outcome of the referendum in Italy are symptoms of these developments.

However, we must not forget the benefits of a strong Europe. The European Union is a unique achievement to bring Europe together and has overall increased the prosperity of its citizens. One of the world’s largest and most integrated markets with around 500 million inhabitants generates a GDP of more than €14 trillion.

But past achievements are no guarantee for future successes. Europe needs to adapt quickly to new developments. New competition is on the rise, global growth expectations are decreasing and growth is taking place mainly outside Europe. Economic competitiveness, i.e. a thriving industrial sector, is a major foundation of success and Europe must offer an attractive environment for investment, growth and innovation. This year’s report shows once again that Europe has work to do as summarised in the Key Messages.

Innovation has been a strong pillar of Europe’s economic success in the past. With emerging markets increasing their efforts on innovation, Europe needs to ensure that it speeds up. Fostering innovation requires support from different angles.

Digitisation is another growth driver. It increases productivity and economic performance, promotes education in new skills and creates new jobs. However, regulatory intervention has shifted market dynamics, resulting in an underinvestment in digital infrastructure in Europe. Some initial movements have been started, but further improvement of the framework is essential in realising a Digital Single Market strategy.

Europe is still the largest exporter of goods and services. A significant proportion of European jobs depends on our success on global markets. It is with great concern that we note a steady increase of potentially trade restrictive measures and a backwards trend in the integration of the European Single Market.

The 2016 edition of the ERT Benchmarking Report presents a comprehensive grading of Europe in the global context in terms of competitiveness, trade and investment, innovation, digital economy, energy and climate, employment and skills. It also provides some encouraging examples of “best practices” for innovation.

We trust you will find this report useful.

Yours sincerely,

Kurt Bock
Chairman of the ERT Competitiveness Working Group
Chairman of the Board of Executive Directors, BASF SE
January 2017
Key messages

1. Industry remains the backbone of the European economy – contributing more than 30% of GDP growth and more than 80% of private R&D spending.

2. Expectations for global growth have decreased. Most economic growth is taking place in countries like China and India, but stagnating in Europe.

3. Trade and unrestricted access to global markets are of utmost importance for Europe as the global #1 exporter of goods and services.
   The European Single Market and international trade remain key for jobs and growth in the EU.
   However, trade restrictive measures are steadily increasing; globally at least around 1,000 new potentially trade restrictive measures were introduced since 2008.

4. Due to a strong decrease of incoming investment, the EU is now at similar levels to other regions, but still #1 in terms of outflowing investment.
   FDI inflow to the EU in 2015 at 50% of its 2007 level.

5. Productivity and innovation challenges exist in most European countries.
   Real labour unit cost/GDP decreasing more in the US and Japan than in the EU.
   Persisting GDP per hour gap between the EU and the US.
   EU lagging behind in terms of key emerging technologies.
Although Europe is under-investing in innovation relative to its key competitors, positive initiatives are emerging. Empirical evidence confirms correlation between R&D spending and productivity.

R&D intensity stagnating at 2%, significantly below the EU-2020 target.
Overall, Europe is in the global top 5 in terms of innovation performance, with China significantly improving.
Innovation Leaders in Europe: Sweden, Denmark, Finland, Germany and the Netherlands.

Digitisation is a growth driver for innovation, productivity and economic performance. Europe is underinvesting in digital infrastructure. However, initiatives and reforms have been launched.
Start-ups struggle to scale up in the EU.
The number of “unicorns” is five times higher in the US than in the EU.

Europe is leading in energy efficiency and low CO₂ emissions per GDP.
In 2015, energy efficiency in Europe was double that of China and 50 % better than the US.
Overall, Europe currently accounts for only 10 % of global CO₂ emissions.

Europe has some of the highest power prices – mostly driven by taxes and levies.
Average industrial electricity prices in the EU were double those in the US and around 10% above China in 2015.

Youth unemployment is a challenge in Europe. Ageing population will put additional pressure on social welfare systems.
Youth unemployment in Southern Europe is twice as high as the EU average (20%).
By 2030, advanced economies will have an average ratio of 4 elderly people for 10 in the working age group, i.e. twice as many as in the 1980s.
Growth expectations deteriorating

Global economic growth remains fragile. Growth expectations have been deteriorating, mainly for emerging countries but also for the US, Japan and even the UK. The outlook for Europe remained stable but on a low level.

While domestic growth remains on a low level, Europe has to prepare for a slowdown in major export destinations. Easy access to markets for trade in goods and services and a global level playing field become even more important.

GDP (annual % change) - Forecasts for period 2016-2018

Note: GDP (annual % change) in constant prices PPP

SOURCE: IMF
Manufacturing sector competitiveness

China remains the most competitive manufacturing country, followed by the US. In Europe, only Germany and the UK are among the top 10. Advanced economies rely mainly on strong infrastructures, innovation policies and rich talent pools.

The manufacturing sector needs innovative ecosystems as well as competitive production costs. Implementing the EU Single Market and investments in technological infrastructure and education are critical factors for competitiveness.

Global manufacturing competitiveness ranking (top 10)

Manufacturing competitiveness is driven by talent, cost, productivity, networks, legal and regulatory frameworks, education, infrastructures, policies, local market and healthcare systems.

Note: based on Deloitte’s own research and a global survey among CEOs of manufacturing companies.

SOURCE: Deloitte
Increasing labour costs in Euro area

Labour unit costs in the Euro area are increasing but shrinking in the US, Japan and Mexico. Improvement in the EU-28 is driven by Eastern European countries and also by Spain. However, this is not sufficient to close the gap with the US in terms of GDP/hour.

Even if the cheap Euro provides some tailwind, core European countries have to increase their productivity to stay competitive.

Change in real labour unit costs - 2005 | 2015

EU/US gap in GDP per hour worked
Constant $ price 2010 PPP

SOURCE: Ameco, OECD
Industry - cornerstone of EU economy

Industry plays a pivotal role in the EU economy in terms of wealth creation, as a driver for growth, a major contributor to R&D investments and by sustaining millions of direct and indirect jobs.

Key indicators on the role of European industry* - 2015

- 17.3% share of GDP
- 30% share of GDP growth
- 35.3m employed
- 15.4% of total employment
- 80% contribution to private R&D

* Not including construction.

Ensuring the competitiveness of EU industry should remain a top priority for politicians. Further harmonisation and coordination of policy initiatives at EU level and in each Member State is needed to compete in the global economy.

SOURCE: Eurostat, EC
In the EU, government debt in relation to gross domestic product shows a long term increase despite low interest rates.

Increasing government debt shifts a burden to coming generations and limits policy choice. Europe should find a balanced path between growth supportive measures, inclusiveness and sustainability of public finances.

**Gross government debt as a % of GDP 2006 | 2015**

<table>
<thead>
<tr>
<th>Country</th>
<th>2006</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU-28</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>Euro area</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td>Poland</td>
<td>85</td>
<td>120</td>
</tr>
<tr>
<td>Germany</td>
<td>90</td>
<td>125</td>
</tr>
<tr>
<td>UK</td>
<td>95</td>
<td>130</td>
</tr>
<tr>
<td>Ireland</td>
<td>100</td>
<td>140</td>
</tr>
<tr>
<td>France</td>
<td>105</td>
<td>150</td>
</tr>
<tr>
<td>Spain</td>
<td>110</td>
<td>160</td>
</tr>
<tr>
<td>Portugal</td>
<td>115</td>
<td>170</td>
</tr>
<tr>
<td>Italy</td>
<td>120</td>
<td>180</td>
</tr>
<tr>
<td>Greece</td>
<td>125</td>
<td>200</td>
</tr>
</tbody>
</table>

**ECB interest rate**: 2006: 3.76% | 2013: 1.14% | 2015: 0.30%

* Rates refer to marginal lending facility. 2006 and 2013: time-weighted averages.

"Maastricht Criteria": debt-to-GDP ratio must not exceed 60%
The European trade balance has improved, partly thanks to energy price declines, but mostly driven by an increasing surplus in manufacturing and services trade.

Increasing energy prices would reduce the European trade surplus. Higher export competitiveness is needed to achieve sustained positive growth contributions from trade.

EU-28 trade balance* by region and sector (€ billion)

<table>
<thead>
<tr>
<th>Year</th>
<th>China</th>
<th>Russia</th>
<th>US</th>
<th>RoW</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>-168</td>
<td>-66</td>
<td>67</td>
<td>98</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>-170</td>
<td>-49</td>
<td>132</td>
<td></td>
<td>215bn</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>China</th>
<th>Russia</th>
<th>US</th>
<th>RoW</th>
<th>Other</th>
<th>Energy</th>
<th>Agriculture</th>
<th>Services</th>
<th>Manufacturing</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>-335</td>
<td>-69bn</td>
<td>-20</td>
<td>108</td>
<td>179</td>
<td>215bn</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>-266</td>
<td>-18</td>
<td>30</td>
<td>151</td>
<td></td>
<td>215bn</td>
<td></td>
<td></td>
<td></td>
<td>318</td>
</tr>
</tbody>
</table>

*Extra EU trade only

SOURCE: Eurostat
More than 35% of jobs in Europe depend on foreign demand. About half of this relies on extra-EU trade.

EU Member States should strive for completion of the Single Market and remain committed to the opening of international markets.

% jobs in the business sector sustained by foreign final demand (2011)

Source: OECD
EU remains leading exporter

While global markets have overall expanded over a ten-year period, the EU remains the most important exporting region (in terms of goods and services combined). However, China has become the main exporter of goods.

Facilitating market access, the elimination of trade and investment barriers and adherence to a rules-based global trading system are crucial to the EU economy, including employment and to remain globally competitive.

Share of global goods exports - 2006 | 2015

<table>
<thead>
<tr>
<th>Region</th>
<th>2006</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU-28</td>
<td>16.4</td>
<td>15.2</td>
</tr>
<tr>
<td>China</td>
<td>10.7</td>
<td>17.4</td>
</tr>
<tr>
<td>US</td>
<td>11.5</td>
<td>11.5</td>
</tr>
</tbody>
</table>

Share of total exports (goods and services) - 2015

- EU-28: 17.4%
- China: 15.4%
- US: 13.2%

Note: Excluding intra-EU trade.

Source: WTO
Since the financial crisis, trade in goods has slowed down and is growing less than GDP. This is due to slower economic growth, lower raw material prices, higher share of services, more production capacities in emerging markets but also more protectionism.

The world economy faces a protectionist trend that should be countered by fostering free trade agreements and raising awareness of the benefits they bring.
Despite a significant contraction the EU remains the biggest foreign investor globally. FDI inflows have reduced significantly and are now on a similar level as other regions. Overall, inward FDI have been concentrated in the services sector.

European companies in outward FDI is important to its economic and technological development.
Uneven investment in R&D

China has passed the EU-28 in terms of R&D spending per GDP. Overall, Europe is significantly behind global key competitors and its own EU-2020 target (3%).

Innovation is the main driver of economic growth in Europe. An innovation-friendly regulatory framework is essential to stimulate more investment in R&D.

**Gross domestic spending on R&D (as % of GDP) 2000 | 2014**

<table>
<thead>
<tr>
<th>Country</th>
<th>2000</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finland</td>
<td>3.1</td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>3.1</td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Austria</td>
<td>2.9</td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>2.8</td>
<td></td>
</tr>
<tr>
<td>EU-28</td>
<td>2.0</td>
<td>2.2</td>
</tr>
</tbody>
</table>

Top 5 EU countries 2014

**Compound annual growth rate of R&D spending (%)**

<table>
<thead>
<tr>
<th>Country</th>
<th>Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Korea</td>
<td>9</td>
</tr>
<tr>
<td>Israel</td>
<td>4</td>
</tr>
<tr>
<td>Japan</td>
<td>2</td>
</tr>
<tr>
<td>US*</td>
<td>2</td>
</tr>
<tr>
<td>China</td>
<td>16</td>
</tr>
<tr>
<td>EU-28</td>
<td>2</td>
</tr>
</tbody>
</table>

*US: based on 2013 data.

Source: OECD, Eurostat.
Innovation

R&D spending linked to productivity

Empirical evidence shows that public and private R&D investments generally increase productivity in the long run. Vice versa: highly productive economies have more resources to invest in R&D.

For many EU countries, higher investment in R&D is a necessary route to higher productivity and welfare – particularly given the multiple challenges of ageing societies.

Average R&D spending vs GDP per hour worked

SOURCE: OECD, BASF
Global innovation performance

Comprehensive analysis shows that the EU stands among leading innovators globally. However, Korea, the US and Japan are still doing better, especially with regards to R&D spending, public-private co-publications, patents and in their share of population with tertiary education. China is catching up fast.

Innovation performance is measured by a set of sub-indicators: quality of human resources and research systems, investment in R&D, availability of intellectual assets, exports of technology products and knowledge intensive services.

More private and public investment in R&D, improved collaboration between academic and private sectors and human capital are needed to close the gap between the EU and top innovators.


Innovation performance is measured by a set of sub-indicators: quality of human resources and research systems, investment in R&D, availability of intellectual assets, exports of technology products and knowledge intensive services.
Uneven innovation performance in the EU

Large differences in terms of innovation performance can be observed within the EU. Scandinavian countries, Germany and the Netherlands are leading with better results for the eight innovation dimensions.

To become and remain successful, excellence in all innovation dimensions, including regulatory framework conditions, is needed. Risk culture and societal attitudes towards innovation are also essential.
Scaling up start-ups

The number of unicorns* is an indicator of a dynamic business environment supportive of technology start-ups. The US dominates with more unicorns and a higher market value. Asia is catching up while Europe is lagging behind.

In order to enable start-ups to scale up, a wide range of initiatives need to be taken such as boosting entrepreneurship, access to funding and cutting red tape.

Unicorns are venture-backed private tech companies (since 2014) valued at $1 billion or more.

SOURCE: Dow Jones VentureSource and The Wall Street Journal
European share in venture capital declining

Easy access to venture capital makes the US the dominant place for start-ups. However, China and India are gaining importance as destinations of venture capital investments. Europe’s share of total venture capital invested is declining.

Venture capital investors are critical for the success of European start-ups - not only with regard to finance but also as management support for young companies. A decreasing share of Europe in global venture capital investments should be taken as a warning sign.
### Connected devices on the rise

By 2021, the number of connected devices in use will have almost doubled since 2015. Non-cellular IoT is showing the biggest increase and is expected to surpass mobile phones.

<table>
<thead>
<tr>
<th>Year</th>
<th>Cellular IoT* (in billions)</th>
<th>Non-Cellular IoT** (in billions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>0.1</td>
<td>0.7</td>
</tr>
<tr>
<td>2015</td>
<td>0.3</td>
<td>3.9</td>
</tr>
<tr>
<td>2021</td>
<td>1.2</td>
<td>13.7</td>
</tr>
</tbody>
</table>

* Cellular IoT are devices connected by 3rd Generation Partnership Project (3GPP) networks

** Non-cellular IoT are devices not using 3GPP standards and licensed frequency bands. The vast majority is not managed by an independent professional operator.

The multitude and variety of connected devices together with a wider range of IoT applications will need to be supported by strong telecom infrastructure, a flexible regulatory framework and cyber-security.

The Internet of Things (IoT) describes the coordination of multiple machines, devices and appliances connected to the Internet through multiple networks. It has grown with the size and number of IoT start-ups providing the technologies needed.

The Internet of Things

SOURCE: Ericsson
Digital platforms: an economic force

With a total market value of $4.3 trillion and an employment base of at least 1.3 million direct employees and millions of others indirectly employed, digital platforms* have become an important economic force. The US is clearly ahead of the other regions.

Expanding sustainable digital platforms in Europe is an opportunity for industry and economy. The EU needs to establish the right regulatory framework to create a level playing field and close the current competitiveness gap.

Numbers, market capitalisation, employees in digital platforms* - 2015

- **Europe**: 27 platforms, $181 billion, 109,000 employees
- **North America**: 64 platforms, $3,123 billion, 820,000 employees
- **Asia**: 82 platforms, $930 billion, 352,000 employees

*Digital platforms provide a growing range of services such as internet search, social media, e-commerce, mobile payment, media, travel, transportation, food delivery, connected health and real estate/accommodations.

**SOURCE:** Center for Global Enterprise
While telecom services’ revenues are growing in the US, they are declining in the EU. Investments per capita are on a higher level in the US and in Asia and even increasing in the US.

Addressing the investment gap in new telecom infrastructure is a priority for Europe. A more investment-friendly framework, in particular reviewing telecom rules, will establish the EU as a digital leader on the global stage.

**DIGITAL ECONOMY**

**Telecom infrastructure - EU needs to get it right**

**Total investments in physical assets per capita**

**Telecom services’ revenue**

**SOURCE:** IDATE, US Census Bureau
Business digitisation drives innovation

Digitisation of businesses is a core driver for innovation and competitiveness. The uptake of digital technologies by business is increasing across the EU, but differs among EU Member States.

Business digitisation in selected EU Member States - 2015

Business digitisation is measured by five indicators (as % of companies using): electronic information sharing, radio-frequency identification, social media, invoices and cloud solutions.

EU policy-makers need to support industry-driven standardisation, an EU harmonised regulatory framework, promote eSkills and digital platforms.

SOURCE: EC
Top players in emerging technologies

Asian countries file the majority of patents in new technologies. Overall, Europe’s performance is similar to North America.

Share of top patents in key technologies 2010 - 2012

Efforts in key technologies are needed to seize the digitisation opportunity and not fall behind in terms of international competition.

SOURCE: OECD
The share of taxes and levies in the average industrial electricity price is high compared to other parts of the world, leading to even higher electricity price differences.

The Energy Union should result in lower and more harmonised regulatory costs (taxes, levies, etc.) and prices in order to increase the EU economy’s competitiveness.

**Structure of industry electricity prices per region ($/MWh)** 2015 | 2020 | 2030 | 2040

- **Capital recovery and fuel costs**
- **CO₂ price**
- **Network, retail and other**
- **Renewables subsidy**
- **Tax**

*Source: IEA, central scenario (New Policies)*
Russia and China consume more energy per unit of GDP than the US and the EU. With comparatively lower CO₂ emissions per GDP, the EU also produces only 10% of global emissions.

The EU should show leadership in globally implementing the Paris Agreement, but also remain vigilant that the competitiveness of its own economy is safeguarded and that carbon leakage is avoided.
Carbon pricing mechanisms are expanding worldwide. At present, more than 13% of CO₂ emissions are under some type of scheme. Global carbon pricing provides an effective route to reducing emissions within and across economies, if embedded in a coherent, holistic and well-designed policy framework and if guaranteeing a level playing field across sectors and geographies.
High youth unemployment

Youth unemployment rates are biased because many young people are still in education or training. NEET rates (not in Employment, Education or Training) give a slightly better picture. Nevertheless, high youth unemployment goes together with high NEET rates. They are very high in several countries, especially in Southern Europe.

Youth unemployment can be addressed by ensuring people’s employability. It requires modernising EU Member States’ education systems by the promotion of ICT, STEM* and entrepreneurship, and creating openness and interactions between schools, business and other parts of society (e.g. the public sector).

NEET Rate** in % of population - 2015***

<table>
<thead>
<tr>
<th>Country</th>
<th>NEET Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT</td>
<td>40.3</td>
</tr>
<tr>
<td>EL</td>
<td>49.8</td>
</tr>
<tr>
<td>ES</td>
<td>48.4</td>
</tr>
<tr>
<td>FR</td>
<td>24.7</td>
</tr>
<tr>
<td>IE</td>
<td>20.9</td>
</tr>
<tr>
<td>SK</td>
<td>26.5</td>
</tr>
<tr>
<td>HU</td>
<td>17.3</td>
</tr>
<tr>
<td>PL</td>
<td>20.8</td>
</tr>
<tr>
<td>FI</td>
<td>22.0</td>
</tr>
<tr>
<td>BE</td>
<td>22.1</td>
</tr>
<tr>
<td>UK</td>
<td>14.6</td>
</tr>
<tr>
<td>SE</td>
<td>20.3</td>
</tr>
<tr>
<td>DE</td>
<td>7.3</td>
</tr>
<tr>
<td>NL</td>
<td>11.3</td>
</tr>
<tr>
<td>EU-28</td>
<td>20.4</td>
</tr>
<tr>
<td>US</td>
<td>11.6</td>
</tr>
<tr>
<td>JP</td>
<td>5.6</td>
</tr>
</tbody>
</table>

* STEM: Science, Technology, Engineering and Mathematics  ** Persons aged 20-24 Not in Education, Employment or Training  *** Or latest year available  **** Persons aged 15-24

SOURCE: OECD
Digital jobs: untapped potential for additional jobs

Predictions show that by 2020, there will be 674,000 new and filled ICT jobs in Europe. The demand for ICT profiles will however continue to increase and by 2020, a shortage of around 756,000 ICT professionals is expected.

To embrace the full potential of the digital economy, ICT skills are needed in Europe. This will support not only the industry, but also growth and innovation in almost all sectors of the EU economy.

ICT professional jobs and demand in Europe 2014-2020

SOURCE: Empirica
Europe’s population is ageing

Core countries of Europe are ageing strongly. The financial burden of providing pensions payments and health care is rapidly increasing. Consumption patterns change and supply of qualified labour could become tight. Population growth and overall growth dynamics are slowing down.

Further increases in labour productivity need to compensate for an ageing population while social security systems need to be adapted. Qualified labour migration could help to reduce the demographic challenge.
EU income inequality lower than in the US

The Gini coefficient* shows that inequality in the EU as whole declined in 1994-2008, after which it remained broadly stable. Today, inequality is much lower among EU citizens than in other parts of the world.

One of the benefits of the EU has been to deliver growth and prosperity while at the same time keeping income inequality at a relative lower level.

Gini coefficient of disposable income inequality - 1989 - 2015

* A Gini index of zero represents perfect equality (incomes are perfectly evenly distributed) and a Gini index of 100 indicates perfect inequality (all incomes are owned by one person).
Located in the Eindhoven area in the Netherlands, Brainport is one of the most innovative high-tech regions in Europe. It aims at developing the regional economy based on its assets: high-tech manufacturing, an outstanding design sector and a long history of private/public collaboration.

Brainport implements a more inventive and inclusive model (“Multi Helix”) involving citizens, customers, consumers, investors, designers, artists, universities, governments and corporations. It emphasises connections between technology, applications design and social innovation and also builds bridges to other international knowledge regions that can help strengthen Brainport’s position.

Brainport seeks to find solutions to the biggest challenges facing society in the areas of health, mobility, energy, food and safety. Different specialised clusters of niche markets are developed. They tackle these challenges with a combination of technology, design and open innovation.

When designing solutions and converting them into products and services, Brainport seeks to test them in large-scale ‘living labs’, for example with the participation of thousands of local residents or motorists. The High Tech Campus Eindhoven also plays a key role in close collaboration with private firms and other organisations to accelerate innovation by offering easy access to high tech facilities and international networks.
Siemens has been working on an open industrial cloud platform (called “MindSphere”) to adjust its offering to the increasing process of digitalisation in the manufacturing industry.

MindSphere’s cloud system is open to industry manufacturers that can use the platform as the basis for their own digital services, with particular reference to the fields of preventive maintenance, energy data management and resource optimisation. Unlike other industry platforms, MindSphere is conceived for companies with the aim of providing them a “turnkey”, easy-to-access and ready-to-use solution to connect their machines and equipment. This enables them to retrieve and exchange data and eventually optimise the performance of this equipment and build new services on top thanks to the application layer provided by Siemens and integrated to the platform.
To have a complete picture of the different entrepreneurial ecosystems around Europe and a better understanding of the different initiatives and best practices, Telefónica set out to map accelerators, incubators and company builders in leading European countries. This creates a first-of-its-kind portrait of the relative density and scope of accelerators and incubators in 10 key European economies.

**Key findings:**
- Europe has a healthy and thriving early stage start-up scene.
- Europe and the US have a comparable number of start-up programmes per capita.
- The number of European accelerators and incubators has increased dramatically since the start of the financial crisis.
- The accelerator and incubator landscape in Europe is diverse, with different geographical models running on different principles.
- Information or benchmarks of the different programmes is not easily available.
- European accelerator programmes vary widely in terms of the amount of equity they ask in return for funding or for accepting a company into their mentoring programmes. The cost of capital to attend start-ups programmes also varies greatly across and within countries.
- Good, sound policy initiatives at the European level could do much to boost the potential of European entrepreneurs.

Accumulated number of incubators and accelerators in the 10 survey countries since 2001

*Incubators, accelerators and so-called company builders are innovative investment vehicles and business service providers that have made a novel contribution to advancing entrepreneurship around the globe, helping an entire generation of young companies, and particularly high-tech start-ups, to grow, prosper and thrive.*

**CAGR: Compound annual growth rate**

**SOURCE:** Telefónica
The overarching conditions impacting Finland’s innovation capacity are altogether positive. The country benefits from an equitable and fair societal model, a high-quality educational system, effective infrastructure, and a solid financial sector. A sound regulatory framework and the relative predictability and continuity of government approaches are other key aspects. In addition, this small country has developed agility in finding solutions to the external challenges it is exposed to.

Industrial policy has also become synonymous with national innovation strategy.

The Research and Innovation Council, set up in 1986, developed a concept of innovation system and a first holistic approach to innovation policy. Reporting to the Prime Minister, the Council was able to turn this concept into a national strategy.

The Academy of Finland and Tekes are the R&D funding agencies, the first allocating funds to basic research, the latter with competitive grants to industry, universities and public research institutes. Tekes also provides a top-down strategic approach and helps to position Finnish companies well in global R&D, innovation and competition.

The Finnish Innovation Fund (Sitra) is an independent forerunner for new institutional or organisational innovations, involved in policy experimentation, often redefining its role from supporting business development/venture capital investments to promoting social innovations. Sitra is considered to add diversity to the system, helping to avoid the risk of overly one-sided or conservative ideas, policies and funding opportunities.

Close collaboration between all key actors is an essential part of the Finnish innovation system.
KPIs from ERT companies

The total revenue of ERT companies has followed a downward trend since 2012. The sharp decrease in 2015 is mostly due to lower energy prices. EBIT followed a similar trend and decreased by 14% per year on average. R&D growth is just enough to cover inflation.

Total revenue of ERT companies

<table>
<thead>
<tr>
<th>Year</th>
<th>€ trillion</th>
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</thead>
<tbody>
<tr>
<td>2011</td>
<td>2.46</td>
</tr>
<tr>
<td>2012</td>
<td>2.56</td>
</tr>
<tr>
<td>2013</td>
<td>2.41</td>
</tr>
<tr>
<td>2014</td>
<td>2.42</td>
</tr>
<tr>
<td>2015</td>
<td>2.25</td>
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</table>

Annual compounded rate: \(-2\%\)

Total EBIT ERT companies

<table>
<thead>
<tr>
<th>Year</th>
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<tbody>
<tr>
<td>2011</td>
<td>140</td>
</tr>
<tr>
<td>2012</td>
<td>120</td>
</tr>
<tr>
<td>2013</td>
<td>140</td>
</tr>
<tr>
<td>2014</td>
<td>160</td>
</tr>
<tr>
<td>2015</td>
<td>180</td>
</tr>
</tbody>
</table>

Annual compounded rate: \(-14\%\)

Total R&D investments of ERT companies

<table>
<thead>
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<th>Year</th>
<th>€ billion</th>
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<tbody>
<tr>
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<td>40</td>
</tr>
<tr>
<td>2012</td>
<td>48</td>
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<tr>
<td>2013</td>
<td>46</td>
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<tr>
<td>2014</td>
<td>44</td>
</tr>
<tr>
<td>2015</td>
<td>50</td>
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</tbody>
</table>

Annual compounded rate: \(3\%\)

SOURCE: ERT companies based on Oct. 2016 Membership, ECB (exchange rates)
Bibliography

REPORTS
Deloitte, Global Manufacturing Competitiveness Index, 2016
EC, Member States’ Competitiveness Report, 2014
EC, EU Structural Change Report, 2015
EC, EU exports to the world - effects on employment and income, 2015
EC, European Union Innovation Scoreboard, 2016
EC, Cumulative Cost Assessment for the EU Chemical Industry - Final Report, 2016
EC (DG Trade), 11th report on potentially trade-restrictive measures, 1 June 2013 - 30 June 2014
Evans Peter, Gawer Anabelle, The Emerging Platform Economy Series, Center for Global Enterprise, January 2016
EY, Venture Capital Insights®–4Q14 Global VC investment landscape, January 2015
IDATE DigiWorld, World Telecom CapEx, October 2016
IEA, World Energy Outlook, November 2016
IMF, World Economic Outlook Database, October 2016
NOKIA, A comparative analysis of leading global Innovation strategies – What is there for the EU to learn?, March 2014
OECD, PISA 2015 Results in focus, 2016
UNCTAD, World Investment Reports, 2012 and 2016
World Bank/ECOFYS, State and Trends of Carbon Pricing, October 2016

WEBSITES
Ameco (Macro Database of EU)
BP
Ericsson
European Central Bank
European Commission Joint Research Centre (EDGAR Database)
Eurostat
OECD
OECD Stats
Siemens
Telefónica
The Wall Street Journal
United Nations, Department of Economic and Social Affairs
US Census Bureau
World Bank Data
### SHORT FORM ISO COUNTRY IDENTIFIERS

<table>
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<th>European Union Member States</th>
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<td>UK United Kingdom</td>
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