DIGITIZING THE NETHERLANDS
HOW THE NETHERLANDS CAN DRIVE AND BENEFIT FROM AN ACCELERATED DIGITIZED ECONOMY IN EUROPE
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EXECUTIVE SUMMARY

The Netherlands, as one of the leading digital frontrunner nations in Europe, must make further digitization a top priority, improving domestic smart policies and actions enabling faster digitization of the country, as well as pushing targeted cross-country cooperation through political leadership at the highest level, in order to secure growth and jobs in a rapidly changing digital world.

Digitization is significantly influencing our lives and our economies. It represents a transformative shift in technology – influencing governments and businesses as well as individuals. Not only does it enable increased efficiency and globalization, but it also changes how existing businesses operate and how markets are opened up, and it greatly affects our everyday lives. Embracing digitization, and staying abreast of it, is key to keeping up global competitiveness and securing and creating jobs at all levels in society.

The Netherlands currently fares well in many measures related to digitization and the country is considered one of the leading digital nations of the world.

- In the 2016 BCG e-Intensity index, the Netherlands ranks fifth in the world overall, it is fourth in the Global Innovation Index, and fifth in the World Economic Forum’s Global Competitiveness Index.

- The Internet infrastructure is relatively good, as demonstrated by Amsterdam’s Internet Exchange being one of the largest globally, and its Internet speeds meet the DSM goals.

- Several tech MNCs and major startups have selected the Netherlands as a European base for their operations due to factors such as favorable legislation, geography, and high livability, factors which provide tech-related jobs, enabling knowledge transfer and increasing general tech interest.
The Netherlands has in some areas, notably the sharing economy, been agile and adaptive in the handling and regulation of platform business models and is renowned for openness toward, and encouragement of, new technologies.

Being in a good position today does, however, not mean a country can relax its efforts, both because there remain areas of relative weakness and because digitization is a force that continues to drive change at an immense rate. Complacency by any country, including the Netherlands, could mean being quickly overtaken.

- The Netherlands is ranked 31st globally in financial market development, and 17th in labor market efficiency, far from the desired position in the digital age.

- There is a gap between online sales and online purchases at a national level: 17% of SMEs are for instance selling online, 10% cross-border, while 76% of consumers buy goods and services online, according to the EU Digital Economy & Society Index.

- Looking at the Forbes ranking of national business attractiveness; there is significant room for improvement related to investor protection and reduction of red tape.

- There is currently a notable shortage of ICT professionals in the Netherlands, making it increasingly difficult for companies to find enough skilled talent for the digital age. For instance, a recent study showed that more than half of companies in the Netherlands that were trying to recruit ICT specialists found it hard to fill their vacancies.

- Looking at the future ICT supply, it is worth noting that computing graduates constituted just over 3% of the total number of graduates in tertiary education, below comparable benchmarks in other countries. By 2020, the lack of ICT specialists could be as high as 54,000 FTEs.

- Access to venture capital in the Netherlands is well behind leading countries in Europe, with the venture capital investment share of GDP at around 0.026%.

The current digitization trajectory in Europe is furthermore not sufficient. The ongoing initiative of the Digital Single Market (DSM) is not enough to fully capture the digital opportunity for Europe, especially when considering the speed of change outside the continent, notably some rapidly digitizing Asian economies.

- The EU DSM plan is broad which risks a lack of prioritization. As a result, progress on key areas of opportunity, such as the removal of obstacles to small businesses expanding into European markets, is unlikely to be fast enough. In addition, the DSM plan contains many proposals for new legislation and regulation, where the use of a wider set of policy tools, such as self-regulation, might allow for more flexible and quicker solutions to be developed.
• Looking outside of Europe, there are several other nations, particularly in Asia, that are highly digitized or are undergoing rapid digitization, including Hong Kong, China, Taiwan, and South Korea. There is a risk that European countries, including the Netherlands, will be surpassed by these more digitally inclined economies, leaving the EU in a digital backwater on the global scene, with capital, talent, and growth at risk of being focused elsewhere when especially large international digital players shift their focus to more attractive markets.

The value at stake for the Netherlands of the successful creation of a true digital single market in Europe, combined with a rapid adoption of emerging digital technologies at home, is substantial, a doubling of GDP growth rate is within reach.

• A working DSM could increase the Dutch GDP growth rate from an expected 2.2% per year to 3.3% in the period until 2020.

• On top of this, the impact of a full Dutch embrace of a set of emerging high-value digital industries, including big data analytics, the Internet of Things, advanced robotics, and augmented reality, could further increase the Dutch GDP growth rate by almost 50%.

• Combined, this amount to close to a doubling of the GDP growth rate for the Netherlands until 2020, adding €97 billion annually to GDP by 2020, or about €6,000 per person.

• Translating these figures into job opportunities, we find that the total number of jobs related to this digital growth is 650,000 FTEs by 2020, or around 7% of the current working population.

To fully capture this digital opportunity, there is a lot the Netherlands must do at national and international levels to improve domestic smart policies and push targeted cross-country cooperation, prioritizing the right national actions and enabling the successful implementation of those priorities. These actions include:

• Improving access to venture and growth capital for startups and SMEs. This can be done by carefully increasing investments from pension funds in venture capital, selectively matching public funds to venture capital investments, and introducing tax breaks on certain angel investments. The Netherlands should also work to attract international risk capital.

• Simplify business regulation and support the digitization of SMEs. On the European level, non-synchronized regulation across nations, for example regarding freight, payments, terms, and labor laws, often hinders the expansion of small businesses. By making EU online commerce more open and conditions more synchronized across borders, SMEs can be empowered to compete with larger established international players. Regarding digitization, the Netherlands could look into how to incentivize the nation’s SMEs and startups to invest in needed digital resources and skills, for
instance with tax breaks for SMEs and startups for investing in digital resources. By engaging more broadly in digital journeys, smaller businesses will have the right preconditions to succeed in an increasingly competitive digital and globalized world.

- **Ensuring sufficient long-term supply of adequately ICT-educated professionals in the Netherlands.** This can be done with initiatives including updating primary and secondary education to facilitate improved “digital literacy” with earlier and more extensive exposure to digital topics, as well as by introducing measures to attract students to ICT studies in tertiary education, matching expected long-term demand. It is also important to ensure an adequate supply of teachers and to invest in updating the skills of the already existing labor force.

- **Continuing the work to encourage entrepreneurship in general, and the founding of tech businesses in particular.** For instance by maintaining the discussions around changing attitudes toward bankruptcy both legally and culturally, steering public tenders more toward SMEs and startups, and considering changes in the taxation of stock options.

- **Engaging more deeply in international collaboration on digitization topics, especially with other digital frontrunner countries.** This would help push for easier and more barrier-free digital market access on equal terms, the development of further smart policies in the EU, and the move toward a truly single digital economy in the European Union. As a single country, the Netherlands has limited power to drive such development, but backed by like-minded nations, an international collaboration could speed up the digitization of the European economy, a development from which the Netherlands as an export-driven and digitally competitive nation would benefit significantly.

Digitization is one of the major growth opportunities in our time, and its well-planned adoption could potentially situate the Netherlands among the fastest-growing economies in the world, securing growth and jobs at all levels.
Digitization constitutes a transformative shift in technology across industry and society in general. It fundamentally changes the way people live, work, and communicate, and how they purchase and pay for goods and services. Existing business models in established industries are also being challenged by digitization, giving rise to new companies that can contribute to society through new jobs and increased tax revenue. The pace of change is rapid. The digital sharing economy, for example, was largely unheard of ten years ago, but in 2015, Airbnb, a platform for listing and renting lodging, was used in 192 countries, and Uber, the app-based ride-request company, logged its billionth ride.

The digitization of a society spans most industries and sectors. Among the many ongoing technological shifts driving digitization, we find the Internet of Things (IoT) enabling the connectivity of a vast array of objects, and remote monitoring and control through online platforms; as well as big data analytics, advanced robotics, and new forms of visualization through augmented and virtual reality (see Exhibit 1).

### Exhibit 1 | Digital Technology Reshaping Industries and Societies

<table>
<thead>
<tr>
<th><strong>INTERNET OF THINGS &amp; SENSORS</strong></th>
<th><strong>BIG DATA / ADVANCED ANALYTICS</strong></th>
<th><strong>NEW DEVICE FORM FACTORS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Intelligent products with sensors and IP addresses to control the environment</td>
<td>Gain customer insights for personalized recommendations</td>
<td>Wearable, flexible, embedded, or implanted digital devices</td>
</tr>
<tr>
<td><strong>AUGMENTED REALITY</strong></td>
<td><strong>3D PRINTING</strong></td>
<td><strong>UNIVERSAL CONNECTIVITY</strong></td>
</tr>
<tr>
<td>View of the real-world augmented with context-relevant information</td>
<td>Manufacture tailored products in smaller quantities, closer to the point-of-sale/use</td>
<td>Always-on, high-speed broadband and mobile connectivity across all devices</td>
</tr>
<tr>
<td><strong>ADVANCED ROBOTICS</strong></td>
<td><strong>COGNITIVE COMPUTERS</strong></td>
<td><strong>SIMULATION</strong></td>
</tr>
<tr>
<td>Smart robots with the ability to react autonomously to unknown situations</td>
<td>System equipped with artificial intelligence to sense, predict, and infer independently</td>
<td>Powerful (3D) simulation software for education, product testing, and R&amp;D</td>
</tr>
<tr>
<td><strong>SOCIAL, LOCAL, MOBILE</strong></td>
<td><strong>CLOUD COMPUTING</strong></td>
<td><strong>SYSTEM INTEGRATION</strong></td>
</tr>
<tr>
<td>Engage with customers in a relevant and continuous way</td>
<td>Scalable processing power combined with shared cloud storage to build SaaS solutions</td>
<td>Linking together individual computing systems and software applications</td>
</tr>
</tbody>
</table>

Source: BCG analysis
Values Created for Citizens, Businesses, and Nations

Digitization creates value for individuals, corporations, and society alike (see Exhibit 2). On the corporate side, it can expand reachable markets for companies both domestically and internationally, thus increasing sales potential. Businesses also benefit from the productivity increase that comes with digitization of corporate processes such as digitized supply chains, automated production lines, and digitized distribution systems for customer deliveries.

Going digital can help governments increase their overall efficiency, for example through more efficient tax collection and data management. E-government initiatives and big data tools make it possible to analyze societal trends as well as combat fraud and misuse of public services. Increasing access to non-sensitive government data through e-government services may also boost innovation in the private sector by encouraging new uses of public data.

Citizens benefit as increased competition gives them access to the best products and services at the lowest price point. More competition would also push European companies to improve their products and service offerings. Companies, citizens, and society as a whole gain from a more open job market with digitized recruitment, where supply and demand are better matched. This could contribute to reduced unemployment, provided that people with the right competencies are available to fill the vacant positions.

Digitization is an important driver of GDP and job growth on a country and regional level.

What this Means for Large Organizations

Digitization brings about rapid shifts that can cause abrupt turns in its path, giving rise to considerable uncertainty. In many cases, the technologies and services are at an early stage, so it’s difficult to foresee their impact. This complicates planning for the long term.
and making informed decisions, but this is not a reason to remain indecisive or passive.

Governments and companies alike should organize themselves in a way that allows for rapid change and quick decisions related to their digitization journeys, in line with the quickly transforming society. The earlier this takes place, the more time there is to adjust, helping the more vulnerable members of the population take part in and profit from the transition. In cases of uncertainty, a certain degree of risk-taking will be necessary when making decisions, but risk should be spread whenever possible. Assessing and trying different options early, continuously, and with an open mind makes for more agile and responsive organizations.
Digitization constitutes a transformative shift in technology that fundamentally influences all industries and society in general. It is not an isolated phenomenon, but an integrated part of the economy as a whole. Not only is digitization transforming existing industries, but it also gives rise to new ones. It represents a great opportunity to boost the economy of the Netherlands through new jobs and overall GDP growth if the country plays its cards right.

However, should the Netherlands fail to adapt to the rapidly evolving world, the consequences could be significant. In combination with globalization, increased digitization gives rise to a race for competitiveness. If existing and new innovative Dutch companies cannot be globally competitive, Dutch GDP growth and jobs are at stake in the long term. In other words, because of globalization and digitization, some jobs will inevitably be lost. To make sure that jobs at all levels are also created and the Netherlands actually benefits from the transition through a net job increase, actions are required.

**Caveats to the Success Story**
The Netherlands fares well in many measures related to business and digitization. For instance, the country ranks fifth in the World Economic Forum’s Global Competitiveness Index and fourth in the 2015 Global Innovation Index published by Cornell University, INSEAD, and WIPO. The capacity to innovate is vital to being competitive in a rapidly changing and increasingly global world. Language skills are also an important factor in international business, and the Dutch are among the best non-native English speakers in Europe – the country ranks second in the 2015 EF English Proficiency index.

The BCG e-Intensity index, measuring to what extent a country is embracing the Internet (see Appendix for details), tells a similar story. In the 2016 ranking, the Netherlands came in fifth in the world overall, and shows especially strong performance across two main components of the index: expenditure and engagement. Expenditure focuses on the share of e-commerce and online ad spending in the economy, and engagement measures to what extent businesses, consumers, and governments are embracing the Internet. In engagement, the Netherlands has ranked number one overall since 2012, mostly due to strong consumer engagement.

There is also a strong startup scene in the Netherlands, concentrated in Amsterdam and Eindhoven, and major tech companies, including Tesla, Uber, and Netflix, have established European headquarters in the country because of its favorable conditions that enable knowledge transfer as well as its strong interest in tech. The Netherlands has been agile and adaptive in the handling and regulation
of platform business models and is known for its openness to and encouragement of experimenting with new technologies.

Being in a good position is, however, not a reason for the country to relax its efforts. Improvements are still needed in certain areas for the Netherlands to catch up with global leaders and in addition, the forces of digitization and globalization drive change at an immense rate. Complacency will cause any country, including the Netherlands, to be left behind in a short period of time, regardless of how well it is positioned today.

Access to venture capital in the Netherlands is just above the European average and well behind leading countries in Europe.

The more general Global Competitiveness Index measuring a wide range of parameters in the economy and society paints a bright picture at first glance. The Netherlands is ranked fifth in the world with strong performances in education, innovation, and infrastructure. The weak spots, however, raise a few concerns for the future. The Netherlands is ranked 31st in financial market development, 17th in labor market efficiency, and 43rd in sub-indicator flexibility. Digitization requires investments which are dependent on access to capital in financial markets. Secondly, new jobs created through digitization will need to be filled, and a flexible and efficient labor market will help this transition.

There is also a gap in online sales versus purchase at a national level. For example, 17% of SMEs are selling online – 10% cross-border – while a much larger 76% of consumers buy goods and services online, according to the EU Digital Economy & Society Index.

Competing globally is not only about companies competing for customers, but also for talent. To win the race for talent, the Netherlands must provide a fertile business environment and attractive living conditions for skilled professionals and entrepreneurs. This is not only important for attracting talent from abroad, but also for long-term retention of local workers. The Netherlands is ranked ninth in Forbes’ 2015 ranking of best countries for business, with room for improvement in places such as investor protection and reduction of red tape.

The Netherlands should do more to address the shortage of ICT professionals which has been publicized by the trade association Nederland ICT. Companies in the Netherlands are finding it difficult to find IT professionals to fill job vacancies, and it has been calculated that the lack of skilled ICT workers could be 54,000 FTE by 2020. This situation is not unique to the Netherlands. In many European countries, the supply of skilled ICT professionals is not keeping up with increasing demand as digitization evolves. According to the European Commission, the shortage may amount to more than 800,000 skilled ICT professionals by 2020.

For the Netherlands specifically, the most recent OECD statistics show that the share of computing graduates constituted just over 3% of the total number of graduates in tertiary education in 2013. This is less than several other European countries, and the Netherlands should do more to promote computer science education in order to avoid falling behind in the long term. There is a risk that companies will choose to locate their offices in other countries where IT professionals are easier to find and recruit. The current shortage is likely to become even greater in coming years, as demand for ICT skills comes not only from tech companies, but companies in traditional industries which are digitizing their activities.

Access to venture capital to fund innovative startups and allow them to grow in the country is another area that needs attention. In 2014, the venture capital investment share of GDP in the Netherlands was 0.026%, according to the EVCA (European Venture Capital and Private Equity Association). This is only just above the European average of 0.24% and well behind the 0.76% of leading countries (which is almost 200% more than in the Netherlands).
International Picture

The Netherlands is a relatively small country in terms of size and population. This means that for Dutch companies to reach a globally competitive scale, they will need access to markets outside the Netherlands. In 2014, ICT goods and services exports from the Netherlands made up 13% of GDP, which is among the highest rates in Europe. Therefore, it is in the interest of the Netherlands to embrace open-market initiatives so companies can be continuously competitive, ensuring long-term growth and securing Dutch jobs.

From 2014 to 2020, the gap between the Netherlands and China in the Internet’s contribution to GDP will have shrunk by more than 50%.

The European market must become more open. As Europe has grown increasingly digital, certain obstacles to trade have become more prominent. These include distribution costs as well as varied and complex regulations for payments and taxes. Currently the vast majority of European e-commerce is still domestic – only 15% of European consumers buy online from other EU countries.

To address these challenges and to create a large DSM, the EU Commission put forward a Digital Single Market (DSM) plan in 2015. It is a good sign that the EU Commission ranks the DSM as one of its top priorities. The DSM plan itself is, however, very broad, covering a wide scope of regulatory measures, and will take many years to implement. More broadly, Europe’s debate on digital is characterized by widely differing opinions on whether digital represents an opportunity to be grasped or a threat to be contained. This dynamic creates a real opportunity and imperative for the Netherlands to shape Europe’s digital debate in a more open and optimistic way.

Looking at the Internet’s contribution to GDP, the Netherlands is ahead of many countries in Europe, but not in the lead (see Exhibit 2). If we widen the view beyond Europe, we see that China is catching up fast – in 2014 the gap with China was 2.1 percentage points, but by 2020 it will have shrunk by more than 50% to 1.0 percentage point. If the trend continues, the Netherlands may be overtaken by China by 2020. China’s rapid growth shows that a business-as-usual way forward is not enough to maintain a leading position and competitiveness over time.

This picture holds true when we consider the factors covered by the BCG e-Intensity index. While the Netherlands is improving its relative rank among European nations over time, we see that Asian countries such as China, Taiwan, and Singapore are climbing quickly. Should current trajectories be maintained, they will be neck and neck with the Netherlands in just a few years. And if you look to 2025, they will pass the Netherlands (see Exhibit 3).

It is important to note that the Asian nations mentioned are not climbing by chance. These countries are putting considerable effort into stimulating innovation and translating it into tangible results. This threat was also recently mentioned by Günther Oettinger, European Commissioner for Digital Economy and Society, when he stated, “Action is needed if we want to catch up with Japan, the U.S.A., and South Korea,” in the European Commission’s latest digital economy and society index report.

In a scenario where the Netherlands allows itself to be surpassed by Asian nations or others, the country becomes more vulnerable to global competition. This could mean lower GDP growth and lost jobs, with innovation, capital, talent, and companies being concentrated elsewhere, compared with a scenario where the Netherlands remains a digital leader. This is one reason why the country should make digitization an overall national priority (see Exhibit 3).

The Large Value at Stake

Digitization will be a main driver for innovation and economic growth for the near and midterm future. This is another reason the
Netherlands should focus on maximizing its efforts to enable it. If the Netherlands successfully constructs a smart digital policy environment domestically and pushes for one on the EU level – one that promotes rapid digitization and innovation – large economic and societal benefits stand waiting. Below, we describe the magnitude and nature of those benefits.

### A functioning DSM could boost the Dutch GDP growth rate by almost 50% by 2020.

In order to understand the value of an open DSM and increased digitization to the Dutch economy, we also need to understand the value on a European level. On the EU level, the Digital Single Market strategy was presented by the EU commission in 2015. It is also important to note that the DSM strategy is in no way a complete and readymade structure that will achieve a fully functioning European single market. As Günther Oettinger also said, “The EU makes progress, but too slowly. There is no room for complacency.”

A working European DSM would bring benefits such as increases in productivity derived from increased competition and a larger initial market for small businesses and startups. It would also enable European consumers to more easily find the right product or service at a better price point.

The value of a fully implemented DSM has been estimated by Cambridge Econometrics to be worth €415 billion in incremental GDP for the EU member states by 2020. More digitized export-driven nations should more easily find the right product or service at a better price point.

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**EXHIBIT 3 | Asian countries are climbing in e-Intensity rankings and set out to overtake Digital frontrunners by 2025**

- **2011:** South Korea, UK, Sweden  
- **2016:** South Korea, UK, Sweden  
- **2020:** South Korea, UK, Sweden  
- **2025:** South Korea, UK, Singapore

**Note:** 2020 and 2025 rankings are based on extrapolating 2011-2016 data. China 2020 figures linear 2016-20 Luxembourg not included in BCG e-Intensity Index.

**Source:** BCG analysis, BCG e-Intensity Index.
would likely increase the Dutch GDP growth rate by around 47% in the period until 2020 (see Exhibit 4).

Fully embracing emerging high-tech digital industries could increase Dutch growth by a further 50%.

The benefits of digital markets and technology are by no means limited to the EU DSM strategy. There are several high-value industries on the rise that can bring significant economic value to those ready to take part. Notable examples include technologies and concepts such as Industry 4.0, big data analytics, the Internet of Things, advanced robotics, and augmented reality. Being able to compete in these areas requires innovative businesses that are highly digitized and that are acting in an innovation-friendly regulatory environment (see Exhibit 5).

When modeling the impact of a full Dutch embrace of these high-value emerging digital industries in terms of increased GDP growth and changes to employment, we find that, on top of the benefits of a working DSM, the Dutch GDP growth rate can increase by another 50% or so. This effect is achieved if the Netherlands is able to capture a share of these high-value industries proportional to its share of the world economy. This means that a working DSM combined with an increased level of digitization would almost double the GDP growth rate for the Netherlands. This is

<table>
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<tr>
<th>Exhibit 4</th>
<th>A Digital Single Market has significant potential to increase growth</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>“EU Big 5”</strong></td>
<td><strong>The Netherlands</strong></td>
</tr>
<tr>
<td>GDP (B EUR)</td>
<td>GDP (B EUR)</td>
</tr>
<tr>
<td>Business as usual</td>
<td>Fully functioning Digital Single Market</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>10,000</td>
<td>10,000</td>
</tr>
<tr>
<td>11,500</td>
<td>11,500</td>
</tr>
<tr>
<td>2014</td>
<td>2014</td>
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<tr>
<td>2016</td>
<td>2016</td>
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<tr>
<td>2018</td>
<td>2018</td>
</tr>
<tr>
<td>2020</td>
<td>2020</td>
</tr>
<tr>
<td>+18% yoy growth, from 1.9 to 2.25% p.a.</td>
<td>+47% yoy growth, from 2.2 to 3.3% p.a.</td>
</tr>
</tbody>
</table>

Source: BCG analysis, Eurostat, OECD, World bank

<table>
<thead>
<tr>
<th>Exhibit 5</th>
<th>Emerging Global Technology Markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Big data analytics</td>
<td>Advanced robotics</td>
</tr>
<tr>
<td>2020 global market value¹: ~€300 billion</td>
<td>2020 global market value¹: ~€80 billion</td>
</tr>
<tr>
<td>Internet of Things</td>
<td>Augmented/virtual reality</td>
</tr>
<tr>
<td>2020 global market value¹: ~€1,900 billion</td>
<td>2020 global market value¹: ~€1.5 billion</td>
</tr>
</tbody>
</table>

¹Estimates based on several sources, IDC, Gartner, Markets & Markets, IBM
Source: BCG analysis, World bank, Eurostat, IDC, Gartner, Markets & Markets, IBM
equal to a GDP increase of more than €97 billion by 2020, and would place the Netherlands among the fastest growing economies in the world (see Exhibit 6).

Translating these figures into job opportunities, we find that the total value at stake for the Netherlands could exceed 650,000 full-time equivalents (FTEs) by 2025, or about 7% of the current working population. Many of these jobs will likely emerge in small and innovative businesses, however, as long as larger, more mature companies keep up in their digitization efforts they will likely see growth as well. This is an opportunity the Netherlands cannot afford to miss.
SHAPING DUTCH POLICY FOR THE DIGITAL ERA

In order to become a long-term leading nation when it comes to leveraging digitization and technology, stimulating economic growth, and creating jobs, the Netherlands must adjust certain policies. In this chapter, we suggest a general blueprint for world-class digitization, and we measure the Netherlands’ current adopted initiatives and status against this. We then point to a couple of areas where we think there is potential to improve.

Blueprint for National Digital Agendas
Countries ultimately must adopt comprehensive nationwide digital agendas to meet the rapid development of digitization. Such an agenda should be made up of a wide set of highly prioritized political policy initiatives and investments for a digitized economy of the future. To make sure a digital agenda can be successfully implemented, the agenda must also be underpinned by an efficient structure and clear leadership.

There are five areas that should be prioritized for a world-class digitized nation:

- Enable digital and technology innovation
- Stimulate entrepreneurship
- Improve access to capital, especially for young businesses
- Create smart policies for the future
- Build the skills and talent of tomorrow

Successful implementation can be facilitated with six main building blocks in place:

- Strong political leadership communicating urgent need for change, with a clear agenda and roadmap to drive transformation
- Cross-departmental cooperation and vision
- Alignment of initiatives, targets, and roadmap
- Long-term political cooperation and policy consistency
- Public-private partnership models
- International peer group cooperation

The priorities and implementation building blocks together form what we see as a blueprint for an ambitious agenda for world-class digitization of a country. We believe that these two parts can be described as the “what” and the “how.” The agenda covers the “what” and concerns prioritizing the right things. The implementation elements to consider make up the “how” and concern how to enable successful implementation of the priorities.
The what – prioritizing the right things

Enable digital and technology innovation. Enabling digital and technology innovation requires strong support in several areas, including supporting the development of innovation clusters by providing a world-class digital infrastructure, connecting startups to leading national companies and universities, and attracting leading technology multinational corporations to establish national operations. We must also steer and incentivize established SMEs to move into digital and mobile-first businesses. Government processes and services should be fully digitized, and it is very important that these services be well utilized to boost actual efficiency. An element of experimentation must be allowed, both on the government level and among businesses. Being a testbed for new technology means being first with implementation when technology reaches maturity. In addition, we must invest in maturing technologies of high impact such as IOT and big data.

Stimulate entrepreneurship. Stimulating entrepreneurship is about incentivizing and removing barriers. Taxes on stock options for small companies and startups should be lowered, public tenders and procurement should not discriminate against SMEs to stimulate demand and growth, and initiatives should be instituted to strengthen the link between universities and startup communities to ensure startups have access to talent. Furthermore, it’s important to encourage a culture in which entrepreneurship is seen as a viable career option for top talent, in order to address societal and cultural barriers to entrepreneurship.

Improve access to capital especially for young businesses. Public funding systems are often complex and funds might be partially misappropriated. There are several complementary initiatives to be leveraged to enable startups to gain access to capital. Public funding structures can be made simpler and the funding primarily used for matching private investments. Pension fund investments could be in some cases carefully steered toward established venture capital funds. Introduction of tax breaks on angel investments would give startups access to early-stage capital. Nations should also aim to attract worldwide leading venture capital funds.

Create smart policies for the future. There must be a pragmatic and proactive approach to regulation if the Netherlands is to maintain competitiveness. Regulation can’t be allowed to hinder or slow down economic and societal development. Removing regulatory barriers includes increasing labor market flexibility, simplifying legal conditions for SMEs, and promoting the sharing economy – for example when it comes to car sharing, accommodations, and music and video streaming. These new business models must not be hindered by existing regulation that is not adapted to the digital era; initially they should be approached on a case-by-case basis. Strong support of the digitized economy means changing legislation where it is cumbersome, but also instituting regulations that are flexible enough to deal with innovation and specific legislation that allows experimentation. The Netherlands has already succeeding in this by welcoming and stimulating experimentation with self-driving cars by providing quick and legal ways of testing them.

Build the skills and talent of tomorrow. A central factor for managing unemployment and driving economic growth will be a nation’s ability to transform human capital in the face of fast technological development, and build the skills and talent needed for the future. To successfully manage the next wave of structural transformations, we must rethink the educational system. We must modernize the curriculum in the primary and secondary schools; and tertiary schools should specialize and introduce cross-disciplinary programs. Moreover, investment in digital skill sets for the workforce is needed – with an eye to future demand both in the private and public sectors.

The How – enabling successful implementation of priorities

Strong political leadership communicating urgent need for change, with a clear agenda and roadmap to drive a transformation. Placing digital among top political priorities promoted by ministers and supported in electoral manifestos is crucial for achieving world-class na-
tionwide digitization. It is also important to make sure there is a clear agenda and implementation plan which can be tracked and communicated to all stakeholders. All ministers should promote digital transformation as a benefit to all parts of society.

Cross-departmental cooperation and vision. To ensure a successful implementation of a new digital agenda, there must be cross-ministerial cooperation and decision-making focusing on digital efforts for both public and private sectors. Ownership and oversight should be anchored at the highest political level in order to drive the agenda and manage cross-departmental activities.

Alignment of initiatives, targets, and roadmap. A well-developed digital agenda that takes into account entrepreneurship and startups should be supported by concise and detailed initiatives, including specific targets and implementation plans.

The digital agenda must have an overall implementation roadmap that is linked to strategic priorities. The initiatives, targets, and plans must be communicated and easily available for all stakeholders to educate them on the digital priorities, available support, and new opportunities that might arise.

Long-term political cooperation and policy consistency over election cycles. To ensure successful long-term implementation, alignment and support on the agenda and governance structure between the sitting government and opposition parties is advised.

Public-private partnership models. Public-private partnership models will act as a catalyst and support the development of digital in the private sector. A nation should create structures for joint investments in tech industries, as well as digital advisory boards which can assist businesses in the digitization effort.

International peer group cooperation. A nation should establish connections and cooperation with other nations in order to learn from best global practices and be able to cooperate with certain initiatives. The digital frontrunners are a suitable group of potential partners for such a cooperative effort.

### Inspirational Global Best Practices

Digital enablement: e-citizenship in Estonia.

Lead by Estonia’s Chief Information Officer and tech-savvy government, e-citizenship has been introduced to boost Estonia’s economy by encouraging foreign entrepreneurs to start businesses remotely in the country. An e-residency does not automatically entitle people to physical residency in Estonia, but it allows them to manage an online business and to base their online financials in Estonia. In 2015, the Estonian government took e-citizenship to the next level by partnering with Bitnation, a decentralized governance project offering e-world citizenship IDs and DIY governance. The e-citizens of Estonia will, via Bitnation, be offered the service of a notary public. This will allow them to notarize things such as contracts, certificates, and marriages using blockchain technology.

Stimulating entrepreneurship by linking education and technology industries via a dedicated body, thus supporting the skills and talent of tomorrow: Promoting semiconductor-related fields in Taiwan. Taiwan’s dominance in the semiconductor industry rests on public sector intervention. Since the 1970’s, the Taiwanese government has invested in growing semiconductor production through the non-profit Industrial Technology Research Institute. The institute is, among other things, helping students to understand and become involved in activities related to the semiconductor industry early on to boost interest in these careers.

Cross-departmental governance structure: Digital minister with digital governing body in Belgium. Belgium launched “Digital Belgium” in 2015, an initiative to put Belgium on the map when it comes to digital development. The initiative covers a concrete national digital action plan. The plan followed the establishment of an advisory board – Digital Minds – on digital for Belgium the same year. The board consists of the nation’s top ICT ex-
perts and is heading the digital agenda. Alexander De Croo, founder of the advisory board as well as deputy prime minister and minister of Development Cooperation, Telecom, and Postal Services, is ultimately responsible for the agenda. Hence, he has also been appointed the minister for the Digital Agenda.

Alignment of initiatives, targets, and roadmap: Digitization in private and public sector run by authority with yearly annual reports and business plans in Singapore. Singapore is often mentioned as a highly digitized nation. The nation is also driving digitization in the private and public sectors through one board, the Infocomm Development Authority, which allows for comprehensive and clear planning and tracking. The authority is tasked with driving ICT development in the private sector, as well as driving e-government initiatives through the nation’s Government Chief Information Office wing. In the private ICT sector, it is formulating policies, related guidelines, and codes of practice.

Enabling digital and technology innovation via public private partnership models: 5G investments in South Korea. South Korea is positioning 5G to become a core driver of its future growth by public-private partnering and SME involvement. The government has pledged to invest $1.5 billion – jointly with the private sector – in R&D, bandwidth, and a business ecosystem. Unlike their earlier investments in 4G, this time the government will intentionally increase support for startups and SMEs, hoping to increase SME participation in 5G research by 40%.

Increasing labor market flexibility: Flexicurity model of Denmark. Denmark stands out when it comes to labor market flexibility, as Denmark’s employment regulation is regarded as one of the most flexible in the world. This is enabled by Denmark’s “Flexicurity” model coupled with an active labor market policy. The Danish model consists of three elements: flexibility, security, and active labor market policy, sometimes referred to as the “golden triangle.” The elements ensure flexibility around hiring and firing, unemployment security via unemployment benefits at a high level, and job guidance or education for the unemployed.

Stimulating innovation in digital by combining stakeholders from multiple sectors: The Catapult program, UK. Catapult creates a digital center where businesses can come together with academic and research communities regardless of sector. In the digital age, it is not always possible to predict where innovation will come from next. Cross-collaboration among sectors can spawn unexpected results to boost innovation.

Assessment of Current Ambitions and Policies

Using the previously described blueprint consisting of the elements making up the “what” and the “how,” we have analyzed how current political initiatives in the Netherlands compare. Looking at each component in the 11 elements, we determined where the Netherlands stands globally in terms of facilitating digitization. The blueprint summarizes our views on what should be the aspiration of a world-class digitized nation, and our analysis shows that while the Netherlands is doing well in certain areas, improvement opportunities still do exist (see Exhibit 7).

Limited access to venture funding and seed capital relative to the high demand from startups could lead to a lack of innovative ideas.

The Netherlands is a global leader when it comes to enabling digital and technology innovation. We believe that going forward it will be important to focus efforts on next-generation technologies, further increasing investments in the digitization of that industry, and establishing and adopting global standards, for example when it comes to 5G technologies. It is important to catch the next-generation wave in time to ride it. What is also crucial is to not only enable, but ensure that both public and private sectors and the general community, are widely adopting these new technologies. We must be innovative and open to solutions using new technologies, with Esto-
The Netherlands needs to improve the digital skills of the workforce in order to tackle the national shortage of ICT professionals. This includes updating the skills of already existing workers, as well as attracting more students to ICT studies. Examples of how this challenge is being addressed include the recent Dutch initiatives “Onderwijs2032” and “Techniekpact”. The nation has kicked off initiatives aimed at looking over the curricula and improving the connection between education and the labor market in the technology sector. This is a good example of a joint effort involving the central government, the regions, the organized business community, the trade unions, and the education community. We believe that this sort of inclusive solution is crucial to meet the skills demand, not only when it comes to students, but also for teachers. Efforts must focus not only on providing digital talent and skilled labor for the ICT industry, but for all industries, as they are all becoming highly dependent on digital.

When it comes to stimulating entrepreneurship, the recently launched innovation hub StartupDelta, and the passionate promoting of startups and digital by Neelie Kroes, former European Commissioner for Digital Agenda, has pushed the Netherlands in the right direction, but further action is needed to boost tech startups. Two such levers to look into would be the taxation of stock options, and considering steering public tenders toward SMEs and startups. Worth mentioning also is that we should follow up on the StartupDelta program so as not to lose traction after the first phase ends mid-2016. It is essential to continue with a clear agenda and plans for the coming years. The attitude toward bankruptcy should also be changed, from both a legal and cultural perspective, to increase entrepreneurship and encourage risk-taking.

In the area of regulation, the Netherlands is doing some things well, but it could improve in the handling of platform business models and being open to and encouraging experimentation with new technologies. Other improvements could be made to labor market flexibility and IP and data protection legislation. Given the Dutch dual system of fixed and temporary contracts, more could probably be done in terms of making temporary – and from an employer point of view flexible – contracts attractive as well to talented workers in the market.
Last but not least, venture funding and seed capital is in short supply relative to the high demand from startups. This risks the loss of innovative ideas, as entrepreneurs look to establish their businesses outside of the Netherlands, in places where they have better access to capital (see Exhibits 8 and 9).

EXHIBIT 8 | The What: Prioritizing the right things – The Netherlands assessed against blueprint

<table>
<thead>
<tr>
<th>Leadership</th>
<th>Cross-departmental cooperation and vision</th>
<th>Alignment of initiatives, targets, and roadmap</th>
<th>Long-term political cooperation and policy consistency</th>
<th>Public-private partnership models</th>
<th>International peer group cooperation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong political leadership communicating urgent need for change and with clear agenda and roadmap to drive a transformation</td>
<td>Central and cross-departmental decisions regarding the digitization efforts</td>
<td>A detailed digital agenda</td>
<td>Alignment and support on the agenda and governance structure between sitting government and opposition parties to assure successful long-term implementation</td>
<td>Establishing digital advisory boards that can aid businesses in the digitization effort</td>
<td>Establishing connections and cooperation with other nations in order to learn from best global practices and be able to cooperate with certain initiatives</td>
</tr>
<tr>
<td>Ownership and oversight at highest political level that will drive the agenda and manage cross-departmental activities</td>
<td>Ownership and oversight at highest political level that will drive the agenda and manage cross-departmental activities</td>
<td>Supported by well-defined initiatives, targets, and implementation plans</td>
<td>Support for the digitization effort</td>
<td>Establish structures for joint investments in high tech industries</td>
<td>Establish structures for joint investments in high tech industries</td>
</tr>
<tr>
<td>Clear communication and information about agenda in user-friendly format</td>
<td>Forum to track and evaluate progress to allow adaptation of initiatives if needed to reach targets</td>
<td>Clear communication and information about agenda in user-friendly format</td>
<td>Establishing and supporting policies to drive the agenda and governance structure between sitting government and opposition parties to assure successful long-term implementation</td>
<td>Regularly conduct benchmarks against other nations</td>
<td>Regularly conduct benchmarks against other nations</td>
</tr>
</tbody>
</table>

Note: SME = small & midsize enterprise. MNC = multinational corporation. IP = Intellectual property. Source: BCG analysis

EXHIBIT 9 | The How: Enabling successful implementation of priorities – The Netherlands assessed against blueprint

<table>
<thead>
<tr>
<th>Leadership</th>
<th>Cross-departmental cooperation and vision</th>
<th>Alignment of initiatives, targets, and roadmap</th>
<th>Long-term political cooperation and policy consistency</th>
<th>Public-private partnership models</th>
<th>International peer group cooperation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enable digital and technology innovation</td>
<td>Enable digital and technology innovation</td>
<td>Tax stock options as capital gains</td>
<td>Attract world-leading and regional venture capital funds (startup and growth capital)</td>
<td>Review IP and data protection legislation to reflect the needs of the innovative digital age</td>
<td>Rethink primary and secondary education curriculum</td>
</tr>
<tr>
<td>Stimulate entrepreneurship</td>
<td>Stimulate entrepreneurship</td>
<td>Steer public tenders &amp; procurement toward SMEs and startups</td>
<td>Attract world-leading and regional venture capital funds (startup and growth capital)</td>
<td>Push for a European digital single market</td>
<td>Promote equality and integration throughout the educational system</td>
</tr>
<tr>
<td>Improve access to capital</td>
<td>Improve access to capital</td>
<td>Link tertiary education and startup communities</td>
<td>Attract world-leading and regional venture capital funds (startup and growth capital)</td>
<td>Promote and regulate the sharing economy</td>
<td>Differentiate tertiary education and launch cross-discipline programs</td>
</tr>
<tr>
<td>Create smart policies for the future</td>
<td>Create smart policies for the future</td>
<td>Introduce digitization and technology vouchers for SMEs</td>
<td>Shift major part of pension funds’ investment mix to established venture capital funds</td>
<td>Increase labor market flexibility</td>
<td>Launch visa programs aimed at entrepreneurs and top talent</td>
</tr>
<tr>
<td>Build the skills and talent of tomorrow</td>
<td>Build the skills and talent of tomorrow</td>
<td>Recognize and promote major entrepreneurial activity at the national level</td>
<td>Simplify legal conditions for SMEs and startups</td>
<td>Simplify legal conditions for SMEs and startups</td>
<td>Perform strategic workforce planning for digital at national level</td>
</tr>
</tbody>
</table>

Note: SME = small & midsize enterprise. MNC = multinational corporation. IP = Intellectual property. Source: BCG analysis
PRIORITIZED DOMESTIC INITIATIVES TO SPEED UP DIGITIZATION

Based on the Netherlands’ starting point in the assessment of the nation’s initiatives for digitization, in this chapter we suggest five areas to prioritize in order to further advance the digitization of the country:

**Improving access to venture and growth capital for startups and SMEs.** This can be done by carefully increasing investments from pension funds in venture capital, selectively matching public funds to venture capital investments, and introducing tax breaks on certain angel investments. The Netherlands should also work to attract international risk capital.

**Simplify business regulation and support the digitization of SMEs.** On the European level, non-synchronized regulation across nations, for example regarding freight, payments, terms, and labor laws, often hinders the expansion of small businesses. By making EU online commerce more open and conditions more synchronized across borders, SMEs can be empowered to compete with larger established international players. Regarding digitization, the Netherlands could look into how to incentivize the nation’s SMEs and startups to invest in needed digital resources and skills, for instance with tax breaks for SMEs and startups for investing in digital resources. By engaging more broadly in digital journeys, smaller businesses will have the right preconditions to succeed in an increasingly competitive digital and globalized world.

**Ensuring sufficient long-term supply of adequately ICT-educated professionals in the Netherlands.** This can be done with initiatives including updating primary and secondary education to facilitate improved “digital literacy” with earlier and more extensive exposure to digital topics, as well as by introducing measures to attract students to ICT studies in tertiary education, matching expected long-term demand. It is also important to ensure an adequate supply of teachers and to invest in updating the skills of the already existing labor force.

**Continuing the work of encouraging entrepreneurship in general, and the founding of tech businesses in particular.** For instance by maintaining the discussions around changing the attitude toward bankruptcy both legally and culturally, steering public tenders more toward SMEs and startups, and considering changes in the taxation of stock options.

**Engaging more deeply in international collaboration on digitization topics.** Collaboration is vital, especially with other digital frontrunner countries, to push for easier and more barrier-free digital market access on equal terms, the development of further smart policies in the EU, and the move...
toward a truly single digital economy in the European Union. As a single country, the Netherlands has limited power to drive such development, but backed by like-minded nations, an international collaboration could speed up the digitization of the European economy, a development from which the Netherlands as an export-driven and digitally competitive nation would benefit significantly.

These proposed actions will require targeted work and resources, but action for further digitization is required if the Netherlands is to keep up with global development, and investments in this area will pay for themselves in a relatively short time. Digitization is one of the major growth opportunities for the Netherlands going forward and succeeding with digital is worth the attention and effort we can give it.
THE NATIONAL DIGITAL AGENDA IN A EUROPEAN CONTEXT

As important as the national digital agenda of the Netherlands may be, not everything can be achieved by the country alone. The Netherlands must work with other countries with similar goals if it is to ensure easy access to a larger digital market.

International Collaboration
Digitization will benefit all European countries, but not to an equal degree. This leads to diverging priorities among countries. The Netherlands needs to find partners with whom it can drive an ambitious digitization and digital single market agenda on the EU level.

By assessing how European countries perform in a number of digitization and market openness related parameters, a group of high-performing nations similar to the Netherlands emerges (see Exhibit 10). We refer to these countries as European digital frontrunners.

The group as we define it consists of Denmark, Belgium, the Netherlands, Sweden, Estonia, Ireland, Finland, Norway, and Luxembourg. These countries are characterized by being relatively small in terms of population size in an international context, dependent on ICT exports, and highly digitized and innovative. The digital frontrunner group constitutes a likely set of partners for an meaningful digital push in the EU.

The Digital frontrunners would gain more than most from a DSM and are more vulnerable should a DSM not be fully realized.

The digital frontrunner countries have a limited domestic market compared with bigger European countries such as the EU Big 5 (Germany, France, the UK, Spain, and Italy). This means that the digital frontrunners – as is the case for the Netherlands – can benefit considerably from easier access to the vast European market. The average ICT goods and services exports as a share of GDP for the digital frontrunners is 8%, compared with 2% for the EU Big 5, indicating that their economies are indeed more dependent on exports than their bigger neighbors. The Netherlands’ ICT exports as a share of GDP at 13%, is significantly higher than the EU Big 5 average. But the digital frontrunners are also more vulnerable should the digitization of the European economy not be realized to its full potential, and are at greater risk of slower growth and job losses as a likely consequence of a less digitized EU.

Being highly digitized and innovative, the Netherlands is in a good position to benefit from EU digitization and other efforts to remove regulatory and administrative barriers. These efforts would create a more accessible market with healthy competition where countries with competitive companies would thrive. Given that a high degree of digitization
and innovation increases a country’s readiness for and ability to access and offer competitive products and services in an open digital market, the Netherlands would have an advantage.

Although all the digital frontrunners are in good positions when it comes to their own digitization and the potential to gain from EU digitization, individually they still have limited influence on policy changes at an EU level, given their relatively small size. By working together toward common goals, their influence can be strengthened considerably.

Given the similarities among the digital frontrunners, it will be relatively easy to agree on a joint course of action, promote a DSM, and pursue other efforts that would open up the common market. This would benefit the Netherlands, the other digital frontrunners, and in the long term, the whole of Europe.

Turning the Digital Tide in Europe
To boost the nation’s move to digital, the Netherlands should engage in an international collaborative forum with the European digital frontrunners. This collaboration would aim to speed up the digitization of the European economy, a development from which the Netherlands as an export-driven and digitally competitive nation would benefit.

The Netherlands should join a collaborative forum with other digital frontrunners to drive their digital agenda and share best practices.

The initiative should include ministers responsible for digital in each frontrunner na-
tion. The ministers would work closely together and also ensure close collaboration among permanent representatives in Brussels. This forum should be used to shape the European policy debate by closely cooperating with the European institutions.

An alliance such as this is also an opportunity to understand common concerns and how the nations could work together when it comes to national policy solutions to ease the implementation of the DSM and encourage digitization.

The frontrunner nations have an opportunity to become a global trendsetter and idea generator when it comes to digitization, similar in influence to the International Energy Agency. This might include inviting international scholars, business leaders, and politicians from other countries which are leveraging digitization to drive economic and societal development, in order to encourage a nuanced discussion on digitization.

This is also a chance to conduct – and learn from – digitization benchmarking. Yearly benchmarks could be set up to compare European nations and learn from global world-class initiatives. The international perspective will serve as an inspiration for updates in the Dutch digital agenda, thus helping to keep up global competitiveness.

Concluding Words

We hope this report will contribute to the public debate on the digitization of the Netherlands – and its role in Europe’s digital development – with senior politicians and business leaders. The Netherlands, as well as the entire Union, has many benefits to gain from digitization and a single market in Europe when it comes to digital.

In light of the quickly digitizing nations outside of Europe, the pace of development we are seeing is not enough to ensure the Netherlands a top global position when it comes to digital. Dutch political leadership must look into adopting a comprehensive national digital agenda with well-targeted initiatives. To facilitate growth of domestic businesses and promote competitive strength, the Netherlands must also engage in an urgent push for a true single digital market in Europe, together with the European frontrunners.
APPENDIX: METHODOLOGY

The methods and assumptions used throughout the report are outlined in this chapter.

e-GDP

e-GDP is a measure that quantifies the monetary value of the Internet on a country level. Comparing it with the GDP of a country yields the economic share of Internet-related activities in the country.

There are several ways in which the GDP can be calculated. The figures in this report have been calculated using the expenditure method. This method measures total spending on finished goods and services in an economy.

The underlying principle is that all finished goods and services are bought by someone and that, consequently, the value of production (of which GDP is a measure) equals total expenditure.

Our choice of the expenditure method is based on two things. First, expenditure data is more readily available and makes cross-country comparisons easier and more reliable. Secondly, the expenditure method makes it possible to distinguish among spending of households, companies, and the government for additional insight.

The expenditure method is computed as the sum of four components:

- **Consumption**: This covers the goods and services bought online by households in a country. It also includes consumer spending on Internet access and the relevant cost of devices used to access the Internet.

- **Investment**: Capital expenditures of telecom companies and Internet-related private investment in information and communications technology (ICT).

- **Government spending**: Public spending on ICT infrastructure and software along with supporting services.

- **Net exports**: The difference between exports and imports of ICT equipment and services.

Trusted sources for spending have been used to allow for cross-country comparability. Such sources include Gartner, Ovum, IDC, Euro- monitor, WTO, UN, OECD, and the World Bank. In addition to this, country-specific sources, mainly statistics services, have been used for greater granularity in consumption and import and export data. When computing aggregated figures for groups of countries, the included countries have been considered as a single economy.

As most global sources are presented in US dollars, this currency has been used as currency of reference throughout. In order to re-
duce the possibility of exchange rate fluctuations over time influencing some countries more than others, an average exchange rate for 2010-2015 has been used for currency conversions over the entire studied period (2010-2020).

**BCG e-Intensity index**

The BCG e-Intensity index is a measure of how strongly a country has embraced the Internet. It is updated on a yearly basis to track performance over time. The e-Intensity score is computed based on a weighted average of three sub-indices:

- **Enablement**: Measures the presence of Internet infrastructure and how available Internet access is
- **Expenditure**: Measures the share of consumer spending which is online and how big the online share of advertising is
- **Engagement**: Measures the extent to which consumers, businesses, and governments embrace the Internet

The weights of individual metrics can be seen in the Exhibit below.

When it comes to the future projections of e-GDP scores, extrapolation of historic data has been used. The results have been adjusted for outliers.

**Impact of digitization and DSM on GDP and jobs.** When projecting GDP impact from policy shifts, new markets, and other types of changes, one needs to handle a large number of unknown factors.

The best and most reliable way of doing this is with a computer model that uses as many relevant input variables as possible. The E3ME model from Cambridge Econometrics is such a model. It is often used to simulate outcomes of changes to societies and economies.

In our analysis for this report we have used the output from the E3ME model simulation of the DSM. This output has then been allocated to the EU member states based on a set of assumptions.

a. Economies that are more dependent on exports will see larger shifts in GDP from regulatory changes that affect trade.

b. Nations with economies that are more digital will see larger effect from changes that affect digital trade and standards.

c. A country will see an effect on its GDP that is in proportion to the comparable size of that country’s GDP size.

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**EXHIBIT 11 | BCG E-Intensity Index Composition**

<table>
<thead>
<tr>
<th>Enablement</th>
<th>Expenditure</th>
<th>Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td>33%</td>
<td>33%</td>
<td>33%</td>
</tr>
</tbody>
</table>

**Overall Bandwidth**

- Fixed broadband subscriptions % pop (ITU)
- Fibre-to-home connections % population (ITU)
- Internet bandwidth per person (ITU)

**Business internet use**

- B2B Internet use (WEF)
- B2C Internet use (WEF)

**ICT impact**

- Impact of ICT on new services & products (WEF)

**Internet use**

- % of population who use the Internet (ITU)
- Internet access in schools (WEF)

**Online ad**

- % of advertising spending which is online (Magna Global)

**Online media and social activity**

- Metrics covering social media, online gaming, personal finance, etc. (ComScore)
- U.N. e-Government Development Index (UN)

**e-Government**

- U.N. e-participation index (UN)
- Government online service index (WEF)
- Quality of math & science education (WEF)

**e-Education**

- U.N. e-Government Development Index (UN)
- U.N. e-participation index (UN)

**Source:** BCG analysis, Magna Global, UN, WEF, ComScore, ITU, Euromonitor, Ovum
These assumptions have been built into a model and then been equally weighted. This has in turn rendered our presented results.

When modeling the potential impact of increased level of digitization we have adopted a market-driven approach. A few emerging high-value markets were identified. Estimates for these markets were then established by multiple sources.

The impact on the different countries were then calculated based on an assumption that a world-class level of digitization would enable a country to control a share of these markets that is proportional to its share of the Gross World Product.

The net impact on jobs is calculated by using a productivity metric called Gross Value Added Per Hour Worked. We have assumed that an increased level of digitization will increase labor productivity and thus require fewer employees to produce the same amount of value. When using this new level of productivity we can calculate an approximate number of new jobs that will be needed to create a specific level of GDP-impact. While future job creation is difficult to predict, this approach gives the reader a good approximation for the magnitude of the benefits of digitization.

Overall we have used trusted sources for general data on GDP, exports, and workforce statistics. These sources include; the World Bank, OECD, Eurostat, CIA World Fact Book, IDC, Gartner, and more.
NOTE TO THE READER

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