

SUMMARY REPORT

# #SystemTransformation

HOW DIGITAL SOLUTIONS WILL DRIVE PROGRESS TOWARDS  
THE SUSTAINABLE DEVELOPMENT GOALS



**GeSI**  
GLOBAL e-SUSTAINABILITY  
INITIATIVE

**accenture**strategy



"We welcome this report which shows how ICTs will be vital in achieving each and every one of the 17 Sustainable Development Goals, and highlights the role of ICTs as a key enabler for social, economic and environmentally sustainable growth and development, as set out in ITU's Connect 2020 agenda."

*Houlin Zhao, Secretary-General, International Telecommunication Union (ITU)*



"At Microsoft, our mission is to empower every person and every organization on the planet to achieve more. Through initiatives like GeSI, we believe digital technology can be applied to help solve society's most pressing challenges spanning education, healthcare, environmental sustainability and urban planning."

*Satya Nadella, Chief Executive Officer, Microsoft*



"It is time to understand that the digital revolution can be the answer to our global problems. Therefore it's our #digitalduty at Deutsche Telekom to shape this revolution for the benefit of future generations."

*Timotheus Höttges, Chief Executive Officer, Deutsche Telekom AG*



"Digital is transforming the way we live and work, and humans are driving that revolution. This report shows the potential for digital technologies, powered by human innovation, to solve some of the greatest challenges facing society today, such as achieving gender equality, delivering quality education and equipping the workforce of the future with digital skills."

*Ellyn J. Shook, Chief Leadership & Human Resources Officer, Accenture*

[www.systemtransformation.gesi.org](http://www.systemtransformation.gesi.org)

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## STATUS OF THE WORLD TODAY

**Every country** has achievement gaps in **>50% of SDGs**

- 

**>25% of countries** have achievement gaps in **all 17 SDGs**

- 

**Digital solutions** have up to **23 times higher diffusion speed and reach** than traditional approaches

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## DIGITAL IMPACT HIGHLIGHTS IN 2030

**Digital solutions** indispensable to achieve **all 17 SDGs** and **>50% of the 169 targets**

- 

**1.6 billion people** benefitting from **e-healthcare** (target 3.8)

- 

**720,000 lives saved** and **30 million injuries prevented** on the world's roads (target 3.6)

- 

**US\$ 9 trillion** of enabled revenues and cost savings (target 8.1)

- 

**12% of GDP** protected in developing countries (target 8.1)

- 

**Decoupling growth** from oil consumption, **-70%**, and CO<sub>2</sub> emissions, **-20%** (target 8.4, SDG 13)

## In Brief

### 1.

The UN Sustainable Development Goals (SDGs) envision a world without poverty or hunger, in which high-quality healthcare and education are available to all, where gender inequalities have been abolished, where economic growth does not harm the environment and where peace and freedom reign all over the world. This new research quantifies the scale of the transformation needed: every country has achievement gaps in more than half of the SDGs and over a quarter of countries have achievement gaps in all 17 SDGs. GeSI's research furthermore finds that digital solutions from all areas of life can directly contribute to SDG achievement: to all 17 goals and over 50 per cent of the 169 targets.

### 2.

Digital solutions can close the SDG achievement gaps by transforming how we live and work. Digital solutions diffuse at unprecedented speed and reach while increasing access to goods and services in a more people-centric, affordable and sustainable way. Consider the fact that today only 17 per cent of Sub-Saharan's rural population can connect to an electricity grid, over 130 years after grids were invented. But digital works at a different speed: 70 per cent of the Sub-Saharan population can have access to a digital mobile network, just 23 years after the first digital networks became available. Compared to the electricity grid, this is 23 times higher diffusion speed and reach, which is exactly the transformative power required to achieve the SDGs.

### 3.

GeSI's research finds that digital solutions will have a huge and measurably positive impact on each of the three interrelated dimensions of development covered by the SDGs: improving people's quality of life, fostering equitable growth and protecting the environment. Digital impact highlights in 2030 include:

An estimated 720,000 human lives could be saved from road traffic accidents by connected cars (helping to meet target 3.6). 1.6 billion people could be connected to e-health services in 2030, radically improving access to health and getting the world closer to universal health coverage (target 3.8)

Over \$9 trillion of economic benefits to business, government and individuals could be created in additional revenues and reduced costs, helping to spur investment and innovation to meet SDGs 8 and 9. Additionally, delivering on broadband expansion (target 9.c) could protect 12 per cent of GDP in developing countries (target 8.1)

12.1 gigatons of CO<sub>2</sub>e could be cut from global emissions per year in 2030, holding emissions at today's levels and helping to meet SDG 13. Digital solutions can also help the world to decouple growth from resource consumption and enable sustainable industrialization in least developed countries and developing regions (target 8.4 and 9.4) by saving 330 trillion liters of water and the equivalent of 25 billion barrels of oil per year in 2030, a reduction of 70 per cent from today's levels

### 4.

What's more, investing in digital solutions that contribute to SDG achievement makes good business sense: improving people's lives, fostering the world's growth and protecting the environment provides attractive value creation opportunities for the Information and Communications Technology (ICT) sector. GeSI's analysis shows that \$2.1 trillion in additional revenue can be generated per year in 2030 from digital solutions with positive impact on the SDGs alone, a 60 per cent increase compared to current ICT-sector revenues.

### 5.

But the digital revolution will not happen automatically. GeSI's research for this report has identified several roadblocks to deploying digital solutions. These exist within the "rules of the game", on the supply side and on the demand side – in least developed countries, developing and developed regions alike. This report finds that effort is most urgently needed to overcome regulatory and financial barriers. Furthermore, the digital transformation needs to be steered responsibly, with the ICT sector addressing people's concerns by building trust, ensuring the ethical use of data and tackling cybercrime.

### 6.

The SDGs are the most ambitious set of global development goals ever agreed to, and they set a short timetable of 15 years for the world to deliver. Digital solutions are indispensable: they transform the world quickly, with attractive propositions to people and with a positive impact to achieve all of the SDGs. GeSI and its member ICT companies accept the challenge the SDGs pose. GeSI has made the SDGs its central framework for action up to 2030. But we are also well aware that the ICT sector and digital solutions will not reach SDG achievement alone. This is a call for joint action to harness the full potential of digital solutions in every sector all over the world. Working together with our partners in government, business and civil society, we truly believe we can make the SDGs a reality. Please join us!

# I. The UN Sustainable Development Goals Aspire to Transform Today's World

This chapter introduces the SDGs and reveals how far the world is from achieving them

In September 2015, 193 countries signed up to 17 UN Sustainable Development Goals (SDGs) – the most ambitious global agenda ever formalized for the social, economic and environmental improvement of the world. The 17 SDGs include aspirations to end poverty, abolish hunger, achieve gender equality, boost equitable economic growth (while decoupling it from resource consumption), reduce inequality and tackle climate change – all by 2030 or earlier. The SDGs, for the first time in the global development agenda, apply universally to all countries in the world, and articulate ambitious, 100 per cent eradication targets, like zero hunger by 2030.<sup>1</sup>

But substantial gaps towards meeting the goals exist in all countries as this report's "status of the world analysis" reveals. Exhibit 1 illustrates the results on a global level. Every single country in the world has substantial gaps towards SDG achievement. Every country has achievement gaps in over 50% of the SDGs, and over a quarter of countries have achievement gaps in all 17 SDGs. So every country in the world needs to "walk the talk" if it is to achieve the transformative vision by 2030.

Unsurprisingly, GeSI's new analysis shows that the largest strides need to be made in the least developed countries (LDCs)<sup>2</sup>. These countries need urgent action on poverty (SDG 1), hunger (SDG 2) and health (SDG 3), but they also require major investment in digital infrastructure (SDGs 9 and 17) and to boost their growth rates in as equitable a way as possible (SDG 8). Developing countries also have substantial gaps to fill in achieving the SDGs, but the level of urgency is quite similar across the SDGs.

Developed regions, meanwhile, need to focus hard on decoupling their economic growth from environmental degradation, and on making both their productive capability and their consumption habits more sustainable. They also fall short on several "social" SDGs like education (SDG 4) and gender equality (SDG 5).

The problem is that, taken together, the world is so far from achieving the SDGs that making only incremental gains to "business as usual" will not be anywhere near enough to achieve the SDGs in 15 years. We need urgent, transformational change – and digital solutions will be central to delivering it.

## THE WORLD'S CURRENT TRAJECTORY IS DEEPLY CONCERNING:

**Social progress is too slow for too many people.** Take education for example. Fifty-nine million children do not go to school at all.<sup>3</sup> And in the world's least developed countries, one out of every three boys and girls fails to complete primary school. In developing regions, one in ten people can not read or write, and in developed regions one in six people leave school without secondary qualifications.<sup>4</sup>

**Current growth is unsustainable.** By mid-August each year, humanity has already consumed the amount of resources the Earth's ecosystems can renew in a year.<sup>5</sup> At the same time, global economies will be wasting an estimated \$4.5 trillion worth of material value in 2030 by failing to recycle or recover valuable resources in their supply chains.<sup>6</sup>

**The world is heading towards dangerous average global temperature rises.** Even if all the national commitments in the Paris COP21 agreement were met, the world would still be on course for an average 2.7°C temperature rise,<sup>7</sup> well above the desired limit of 1.5°C and resulting in more natural disasters, forcing hundreds of millions of people to leave their homes.<sup>8</sup>

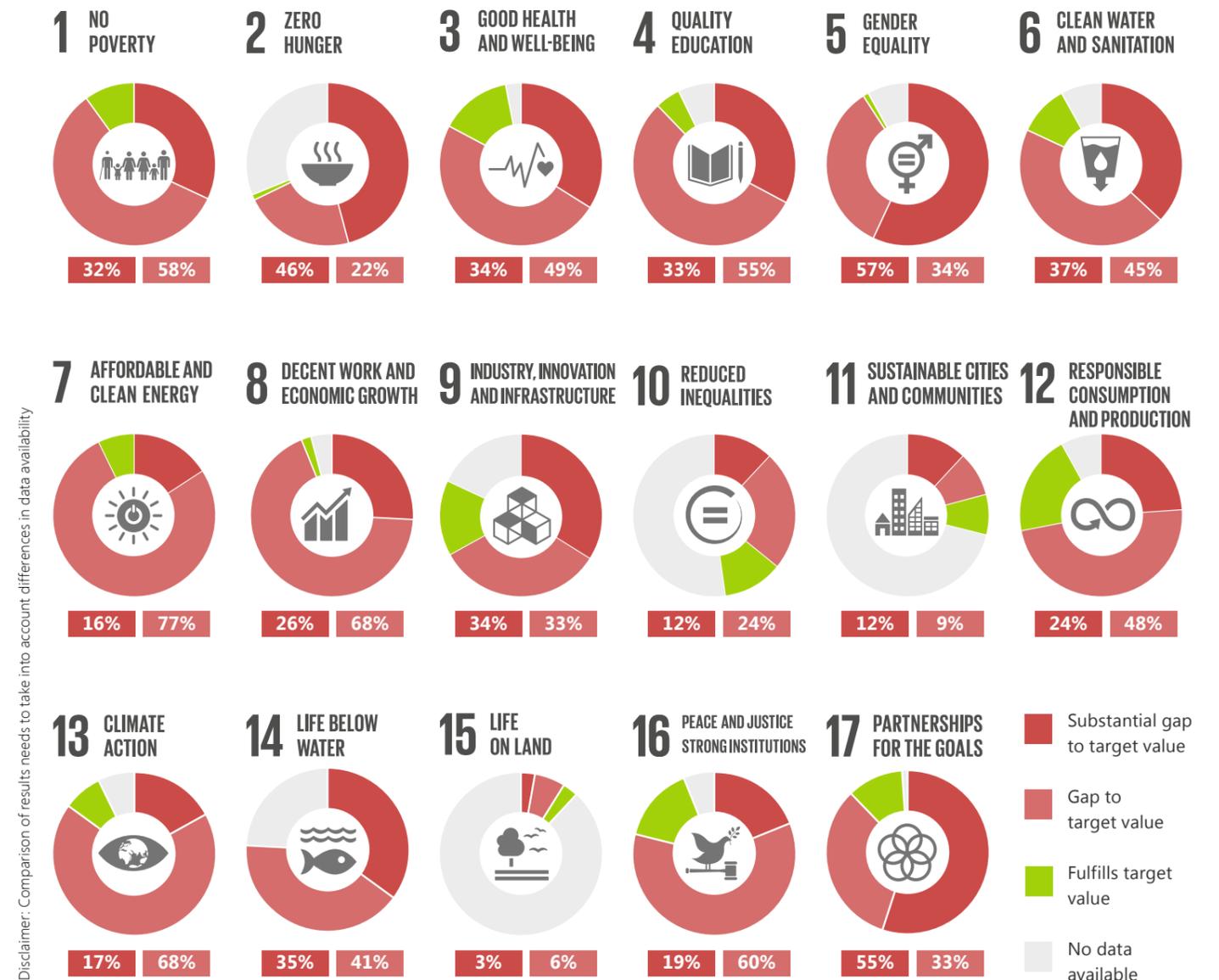
Hence, humanity needs exponential development to meet these challenges – development that puts people at its heart and protects our planet. This is where digital solutions and the Information and Communications Technology (ICT)<sup>9</sup> sector come in.

## "STATUS OF THE WORLD ANALYSIS" – OVERVIEW OF APPROACH

For GeSI's "status of the world analysis", all 17 SDGs were assessed against 63 key performance indicators<sup>10</sup> for every country in the world, based on the list of 215 economies in the world provided by the World Bank. The results of this analysis at the country-level were allocated to three country clusters, based on each country's development level, as defined by the UN:

Developed regions consisting of 54 countries, developing regions made up of 113 countries, and 48 least developed countries (LDCs). The data for assessing each country against the 63 indicators were obtained from the UN (where available), World Bank, OECD, ITU and other reputable sources.<sup>11</sup>

EXHIBIT 1: Status of the world analysis results - performance towards SDG achievement in per cent of countries



In December 2015, the UN General Assembly highlighted the cross-cutting contribution of information and communications technology to the Sustainable Development Goals noting that ICTs can accelerate progress across all 17 Sustainable Development Goals.<sup>12</sup>

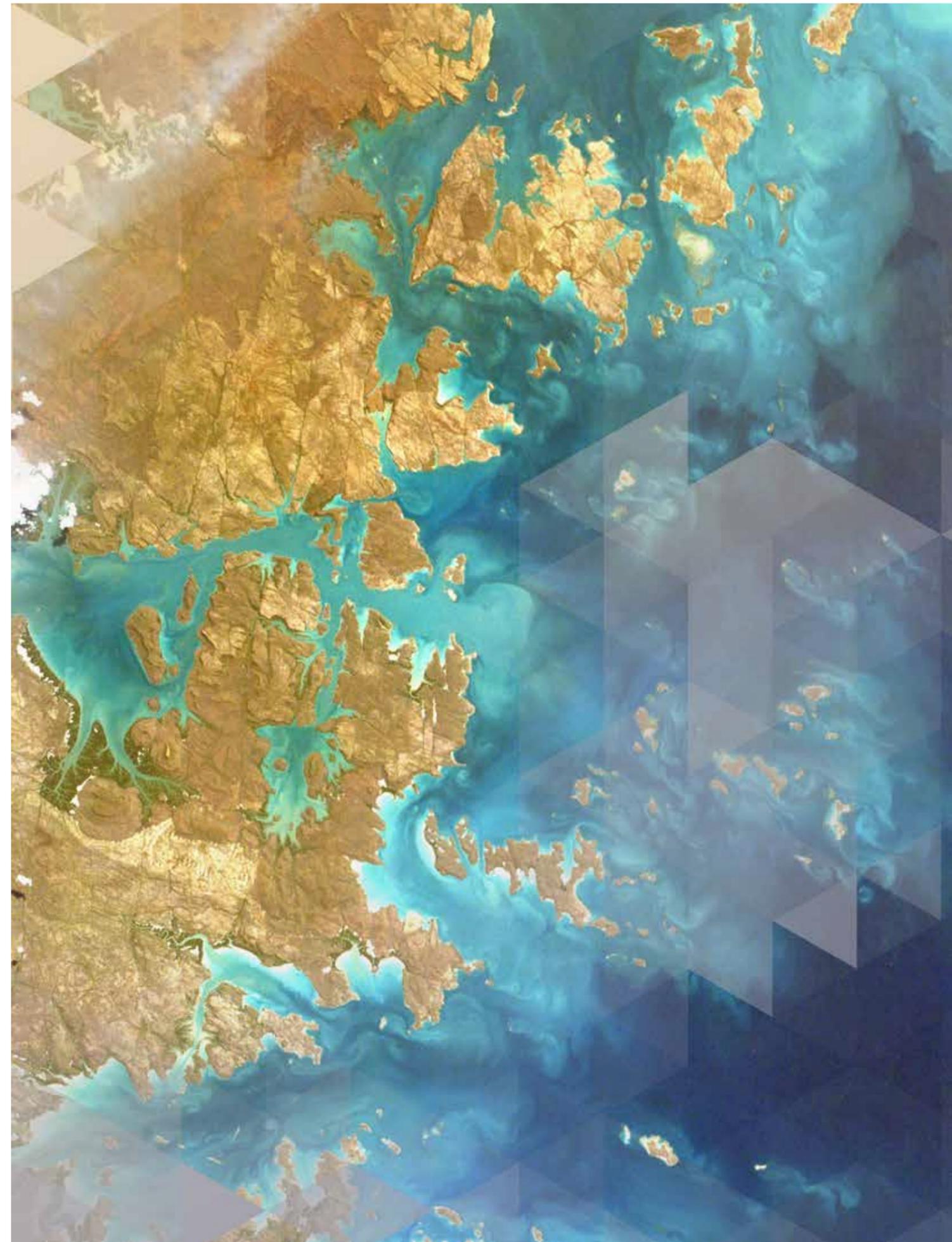
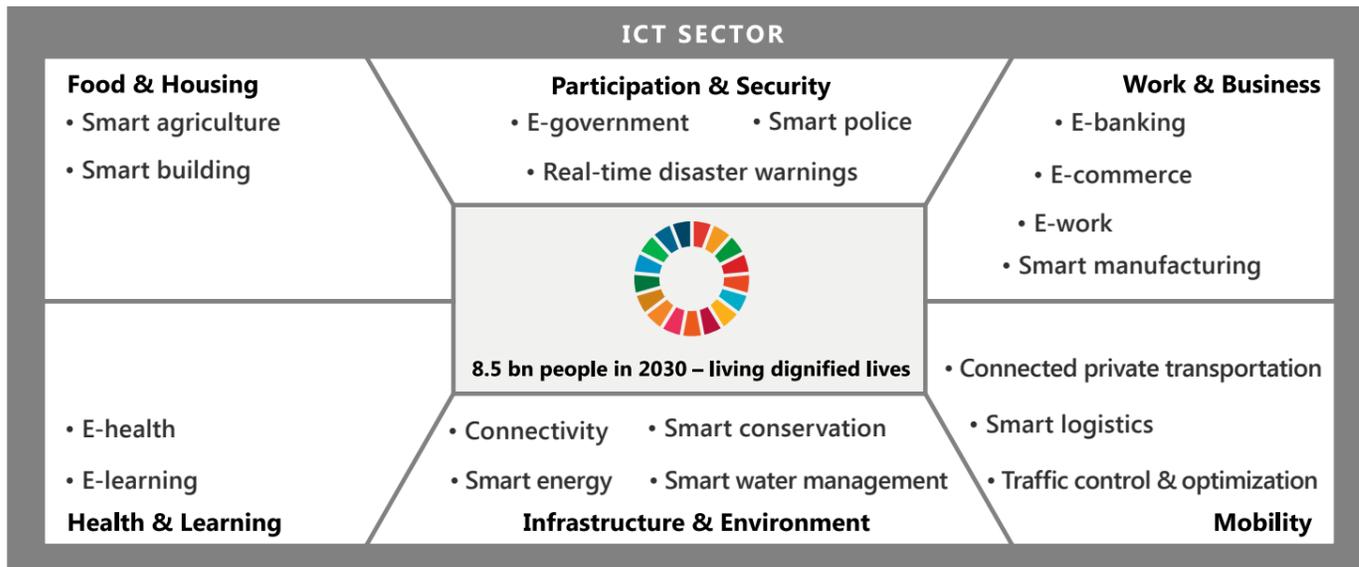
This report sets out to demonstrate the full impact that digital solutions and the ICT sector can have to catalyze SDG target achievement. GeSI has identified digital solutions across all areas of life that have the potential to support SDG target achievement: connectivity and 17 innovative digital solutions, for example, e-health, e-learning and smart building (see Exhibit 2).

This report finds that the identified digital solutions can contribute directly to the achievement of each and every one of the 17 SDGs, and to over half of the 169 targets within them. Some targets can be met directly, like significantly increasing access to ICT and striving to provide universal and affordable access to the internet in least developed countries (target 9.c). Others will be met more indirectly, like target 14.3, which aims to reduce ocean acidification, and will be met in part by the economy-wide CO<sub>2</sub> emissions savings made possible by the digital solutions analyzed (as listed in Exhibit 2).

The digital solutions analyzed in this report will be indispensable to meeting the SDGs on the very tight timetable the UN has set – provided the barriers the report also identifies are overcome.

In the following section, we detail what is unique about digital solutions and how they can help change the world by 2030.

**EXHIBIT 2:** Overview of analyzed digital solutions across all areas of life contributing to SDGs



# II. Digital is Transforming People's Lives

This chapter shows how digital solutions have unique properties to transform the world in the way the SDGs envision

The world has less than 15 years to meet the ambitious Sustainable Development Goals. So there is a need for speed and impact. GeSI is convinced that digital solutions hold the key for three main reasons:

Digital solutions can diffuse extremely quickly across all aspects of economy and society – reaching people in any income bracket, virtually anywhere

Digital solutions genuinely put people at the heart of products and services, allowing for attractive offerings that “deliver it all”: better experience, reduced cost, improved sustainability

Digital solutions make good business sense and are not reliant on aid or charity – a plethora of new business models is springing up, creating markets that previously had not existed and innovating towards tackling some of the world's most pressing issues

The combination of these features yields a mix of benefits that works across almost every sector, in least developed countries, developing and developed regions alike.

### DIFFUSION SPEED AND REACH

There is no historical analogy for the speed at which ICT-enabled solutions have spread globally. Compare access to grid electricity with mobile communication: 130 years after the invention of grid electricity, the rural electrification rate in Sub-Saharan Africa is only at 17 per cent. On the other hand, a mere 23 years after the first digital mobile phone entered the market, digital networks already cover 70 per cent of Sub-Saharan Africa (as Exhibit 3 illustrates).<sup>13</sup> This represents an adoption rate increase that is 23 times higher for mobile networks than for grid electricity, which is precisely the transformation at speed the world needs to achieve many of the SDGs: very rapid deployment of technology to some of the poorest people in the world, on a large scale, thereby improving access and participation opportunities. Recall also that 90 per cent of the world's data that ever has been collected, has been created in the last two years alone, as Exhibit 4 illustrates.<sup>14</sup> That is what the exponential development needed for SDG target achievement looks like.

### PEOPLE-CENTRIC

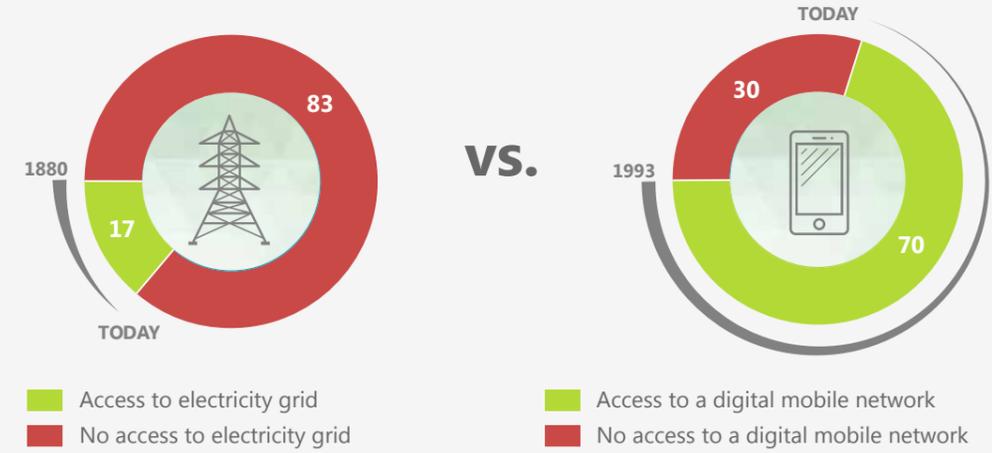
Another reason digital solutions offer such potential to move us to “warp speed” on sustainable development is that people and businesses usually do not need much convincing to use them. People want access to technology for the benefits it can bring to their own lives. And when large numbers of people voluntarily adopt new digital solutions, automatic social, economic and environmental benefits flow from them, many of which have direct and indirect bearing on the SDGs. For example, wearable health monitoring equipment is becoming increasingly popular, and now enjoys three figure growth rates<sup>15</sup>, enabling people to track their health and to respond to problems. Likewise, in least developed and developing regions, some health workers are starting to use mobile-based programs to learn how to administer new treatments – saving them time and money.

### NEW BUSINESS MODELS

The third aspect is commercial. Digital solutions are enabling and sustaining new business models all over the world. These new businesses are acting as catalysts for innovation, quality of life improvements and growth in a wide array of sectors. Spotify is a famous example from the entertainment sector. Founded in 2006, Spotify today delivers access from any device to a huge library of music to over 100 million users, with revenues of over US\$1 billion.<sup>16</sup> Smart watches, to take another example, are only two years old, but have already overtaken Swiss watches for market share with a growth-rate of 326 per cent a year.<sup>17</sup> Or take MKopa, a firm delivering solar-based, off-grid lighting solutions to people in Africa at incredible 100 per cent growth rates and directly contributing to SDG target 7.4 (to improve access to clean energy).<sup>18</sup>

All of these solutions are sustained by business models that were unimaginable 15 years ago. And digital businesses in 2030 will have developed business models we cannot imagine today. Many of these might help us make hunger, poverty and illiteracy things of the past. The next chapter of this report explains how.

## Sub-Saharan Africa is connected – not to electricity, but to digital networks



**ADOPTION RATE INCREASE P.A. (IN %)**

**23x FASTER**

**ELECTRICITY GRID: 0,13% VS. DIGITAL MOBILE NETWORK: 3,04%**

EXHIBIT 3: Yearly adoption rate increase of electricity grid compared to digital mobile networks in Sub-Saharan Africa

## 90% of the data has been collected in the last 2 years – an impressive demonstration of digital's disruptive power.

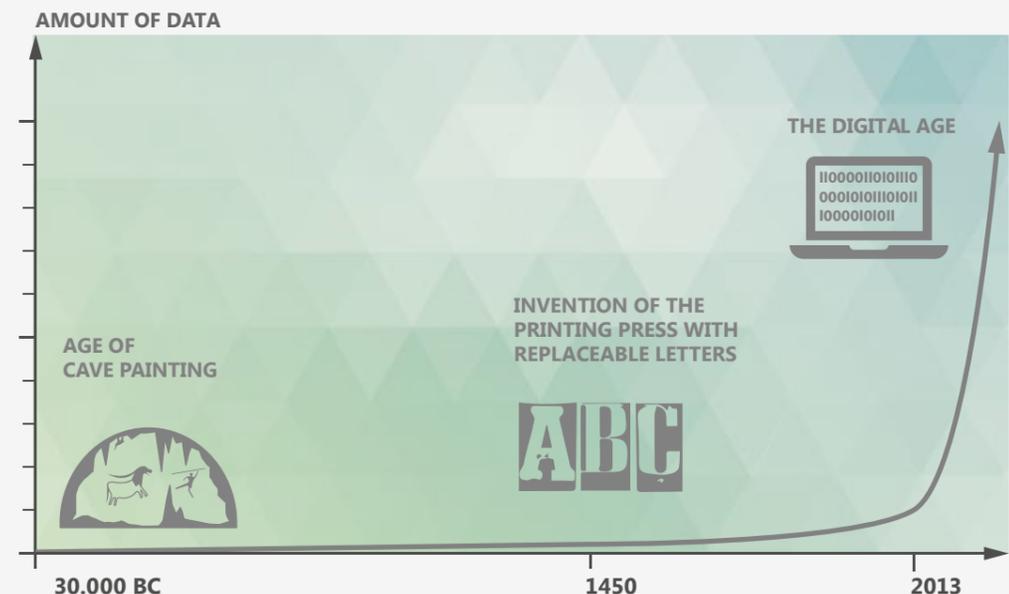


EXHIBIT 4: Amount of data collected by humanity over time - illustrative

# III. Digital Solutions Catalyze the Achievement of all SDGs

This chapter demonstrates the positive impact digital solutions can have on people, growth and environment, the triple development agenda of the SDGs.

The central question is this: how can 8.5 billion people in 2030 live and develop well, within planetary boundaries?

GeSI's research for this report has identified those digital solutions that substantially contribute to reaching all 17 SDGs, as noted above. To explore the impact of these digital solutions, this report groups the SDGs into three positive impact categories, while acknowledging the overlap between them:

## 01. IMPROVING PEOPLE'S QUALITY OF LIFE

This set of goals concerns the basic human need to live one's life in dignity, with enough to eat (SDG 2), in good health (SDG 3), and with an open and trained mind (SDG 4), flourishing in a world without violence (SDG 16).

## 02. FOSTERING EQUITABLE GROWTH

These goals focus on economic growth understood as an essential prerequisite for communities and individuals to prosper. They seek a world in which people have enough individual financial resources (SDG 1), where women are enabled to participate equally (SDG 5), where people are engaged in highly productive employment (SDG 8), facilitated by innovative infrastructure and environmentally-friendly industrialization (SDG 9) – while ensuring no one is left behind (SDG 10).

## 03. PROTECTING THE ENVIRONMENT

These SDGs are about ensuring that the other goals are achieved without exhausting the planet's ability to regenerate for future generations. They refer to the need to ensure fresh water supply (SDG 6), cleaner energy for everyone (SDG 7), better functioning and cleaner cities (SDG 11), resource-efficient consumption and production (SDG 12), combatting and adapting to climate change (SDG 13) as well as the need to protect ecosystems below water and on land (SDG 14 and SDG 15).

This chapter highlights the contribution potential of digital solutions towards the achievement of all SDGs within each category, and provides a more detailed perspective for two SDGs each.

The six SDGs analyzed as deep-dives have been chosen based on two main criteria: firstly, the expected transformation potential of digital solutions on the sector(s) and area(s) of life that the SDG touches upon, secondly, on the expected positive impact in these sector(s) and area(s) of life.



## SDG 17: ENABLING THE TRANSFORMATION

SDG 17 covers certain means of implementation for achieving the targets within the other 16 SDGs and is, therefore, an overarching SDG, not attributable to one "impact area". It covers multi-stakeholder partnerships, financing, better global market regulation and the establishment of a good monitoring system.

SDG 17 also refers to the enabling role of technology towards SDG achievement in three targets: Enhance cooperation on and access to science, technology and innovation, and enhance knowledge sharing (17.6), Promote development, transfer, dissemination and diffusion of environmentally sound technologies on favorable terms

(17.7) and, operationalize capacity building mechanism for least developed countries (LDCs), and enhance use of enabling technologies, in particular, ICT (17.8).\*

The digital solution: the entire ICT sector and digital solutions play a crucial role in enabling the transformation towards the SDGs. In particular, connectivity helps leverage technology and the use of ICT, which is at the core of this overarching "means of implementation" SDG. In addition, all digital solutions described in this report can help to disseminate more environmentally sound technologies as described in target 17.7.

# 01. Improving People's Quality of Life

Four SDGs primarily focus on improving people's quality of life and their ability to live dignified lives

SDG	SDG FOCUS AREAS AND TARGETS* WHICH BENEFIT MOST FROM DIGITAL SOLUTIONS	MOST POWERFUL DIGITAL SOLUTION(S)	DIGITAL'S POSITIVE IMPACT WITH ILLUSTRATIVE DATA POINT
<p><b>2 ZERO HUNGER</b></p>	<ul style="list-style-type: none"> <li>End hunger (2.1)</li> <li>End malnutrition (2.2)</li> <li>Double agricultural productivity of small-scale farmers (2.3)</li> <li>Ensure sustainable food production (2.4)</li> <li>Ensure functioning of food markets (2.c)</li> </ul>	<p><b>SMART AGRICULTURE</b></p> <p>for example, optimized farm management and automated irrigation systems; precision agriculture, incl. M2M / IoT, soil sensors and satellites and integrated real-time weather information; traceability and tracking systems</p>	<p>» Increases agricultural productivity while reducing the need for scarce inputs such as water</p> <p><b>Crop yield increase of &gt;900 kg/ha in 2030<sup>19</sup></b></p>
<p><b>3 GOOD HEALTH AND WELL-BEING</b></p>	<ul style="list-style-type: none"> <li>Reduce maternal mortality end deaths of children (3.1 and 3.2)</li> <li>Reduce death from non-communicable diseases, e.g. diabetes (3.4)</li> <li>Halve deaths and injuries from road accidents (3.6)</li> <li>Achieve universal health coverage (3.8)</li> <li>Improve training of health workforce (3.c)</li> </ul>	<p><b>E-HEALTH</b></p> <p>for example, remote diagnostics videoconferencing, electronic data storage, augmented reality, wearables, biosensors, personalized medicine, DNA sequencing, etc.</p>	<p>» Makes health more accessible and affordable, and enables better quality</p> <p><b>1.6 billion people with access to e-health services in 2030<sup>20</sup></b></p>
<p><b>4 QUALITY EDUCATION</b></p>	<ul style="list-style-type: none"> <li>Ensure primary and secondary education for all (4.1)</li> <li>Ensure equal access to vocational and tertiary and education (4.3)</li> <li>Increase youth's vocational skill levels (4.4)</li> <li>Achieve literacy and numeracy (4.6)</li> <li>Increase supply of skilled teachers (4.c)</li> </ul>	<p><b>E-LEARNING</b></p> <p>for example, videoconferencing, advanced data analytics, Massive Open Online Courses (MOOC), open community platforms, augmented reality, gamification, voice recognition software</p>	<p>» Makes education more accessible, affordable and higher quality</p> <p><b>450 million e-learning degrees in 2030<sup>21</sup></b></p>
<p><b>16 PEACE AND JUSTICE STRONG INSTITUTIONS</b></p>	<ul style="list-style-type: none"> <li>Reduce violence and deaths everywhere (16.1)</li> <li>Develop effective, accountable and transparent institutions (16.6)</li> <li>Ensure participatory decision-making (16.7)</li> <li>Provide legal identity for all, including birth registration (16.9)</li> </ul>	<p><b>E-GOVERNMENT AND SMART POLICE</b></p> <p>for example, big data analytics, open government (datasets, public apps using open data), e-identity, online voting, predictive analytics and algorithms for crime forecasting, augmented reality, drones and robotics and neuroscience</p>	<p>» Reduces crime and enables better participation and transparency, strengthening people's democratic rights</p> <p><b>In Mozambique, SMS messages allowed citizens to report electoral irregularities and increased voter turnout by 5 percentage points<sup>22</sup></b></p>

\*abbreviated description by Accenture Strategy

**EXHIBIT 5:** Overview of digital solutions' positive impact on SDGs that primarily focus on improving people's quality of life

GeSI's research has shown that digital solutions can have a huge positive impact on each of these goals, but for the purposes of this summary report, the focus is on how digital can transform people's educational opportunities (SDG 4) and health (SDG 3).

# DEEP DIVE Putting Students at the Center of Learning



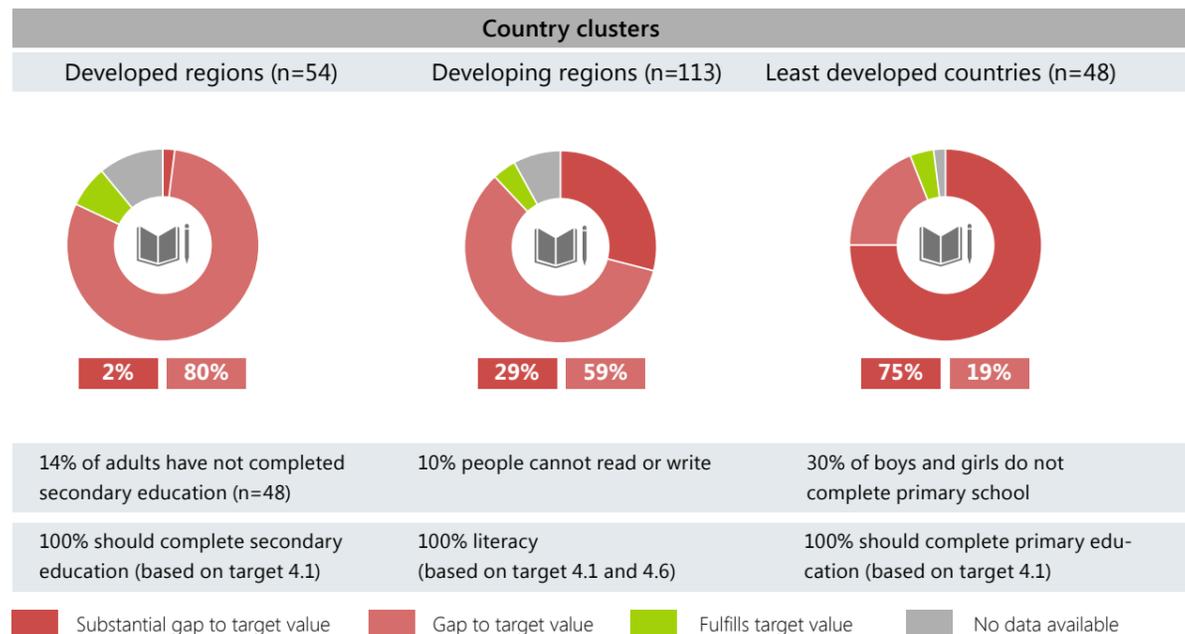
SDG 4 is about equal access to quality education - primary, secondary, tertiary and vocational – as well as about teacher supply and quality

## SDG 4: "ENSURE INCLUSIVE AND EQUITABLE QUALITY EDUCATION AND PROMOTE LIFELONG LEARNING OPPORTUNITIES FOR ALL".

### Targets that benefit most from digital solutions within SDG 4:

- Target 4.1: "By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes"
- Target 4.3: "By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university"
- Target 4.4: "By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship"
- Target 4.5: "By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations"
- Target 4.6: "By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy"
- Target 4.b: "By 2020, substantially expand globally the number of scholarships available to developing countries, in particular least developed countries, small island developing States and African countries, for enrolment in higher education, including vocational training and information and communications technology, technical, engineering and scientific programs, in developed countries and other developing countries"
- Target 4.c: "By 2030, substantially increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and small island developing states"

EXHIBIT 6: SDG 4 – Status of the world per Country Cluster



### THE STATUS OF THE WORLD TODAY<sup>23</sup>

SDG 4 aims at achieving 100 per cent completion rates in primary and secondary education in 2030. But 57 million primary-school children do not go to school at all at the moment.<sup>24</sup> On top of this, least developed countries face a near crisis in school completion rates, with one in three children not completing primary studies. This is only marginally less severe in developing countries, where still today, one in ten people cannot read or write. In developed regions, meanwhile, one in six boys and girls never completes secondary school.<sup>25</sup>

UNESCO estimates that the world will need nearly 30 million extra schoolteachers by 2030 to achieve SDG 4.<sup>26</sup> Teacher training delays and high absentee rates continue to afflict the developing world, making school too unreliable for a large number of students, many of whom need to travel large distances to reach a classroom. This is partly why GeSI's analysis identified such substantial gaps towards the achievement of target 4c. Adding urgency to these challenges is a recent fall in global aid spending on education in least developed and developing countries, which dropped by 16 per cent between 2009 and 2012.<sup>27</sup>

Gender inequality is widespread in education. For example, globally, 14 per cent more girls than boys do not attend primary school.<sup>28</sup> In least developed countries, this percentage worsens to 27 per cent.<sup>29</sup>

Meanwhile, vocational skills and tertiary education are becoming an issue, with 63 per cent of CEOs worrying about their companies' chances of hiring the quality graduates they need in the future, especially in the fastest growing regions of the world.<sup>30</sup> By 2020, 65 per cent of all jobs in some developed regions are expected to require post-secondary education and training beyond high school.<sup>31</sup> The European Commission additionally expects that 90 per cent of jobs in Europe will soon require "some level of digital skills". It also expects around 800,000 vacancies in the ICT sector to go unfilled by 2020 due to a lack of properly trained people.<sup>32</sup>

### DIGITAL IMPACT HIGHLIGHTS:

- 450 MILLION E-LEARNING DEGREES IN 2030
- UP TO A 10 PER CENT AVERAGE INCREASE IN ANNUAL INCOME FOR EACH ADDITIONAL YEAR OF SCHOOLING
- ADDITIONAL REVENUES OF \$413 BILLION FROM LEARNING CENTERS IN 2030
- \$1.2 TRILLION OF COST SAVINGS TO GOVERNMENTS AND STUDENTS IN 2030

### THE DIGITAL SOLUTIONS

E-learning can enable a huge number of people to gain access to affordable and quality education, opening the door for as many as 450 million people to obtain e-learning degrees in 2030 and vastly cutting the costs of education for everyone, everywhere.<sup>33</sup>

E-learning solutions are already heralding a fundamental transformation in learning that could become the norm by 2030. E-learning can be applied to learners at any stage of their lives, from people needing to learn basic skills to remote students and health workers needing technical instruction on how to administer a brand new treatment. E-learning could thereby also improve access for the disabled by reducing physical barriers.

In addition to improved access, people are becoming more empowered. The shift towards e-learning allows students to tailor their own learning: from knowledge being delivered to active and personalized knowledge acquisition. If people want to improve their literacy or pick up numeracy skills, there is an app for that. Likewise, if they need to train up in a new language for a job overseas there is now intuitive, gamified software at their fingertips. Meanwhile, responsive student feedback, personalized syllabuses and lower tuition fees can help to motivate students of all ages, in countries of all income groups.

The e-learning shift can be enabled by technologies such as devices, connectivity and e-learning software and apps with different levels of sophistication, replacing an approach that relies 100 per cent on physical presence. Hence, e-learning can help solve one major problem, particularly in least developed and developing countries: the lack of quality textbooks and trained teachers. This will become less of an issue as downloadable learning portfolios with interactive learning units replace, or at least supplement, teacher and paper textbook-centric approaches. Thereby, education can become more accessible in remote areas, helping to reach target 4.1.

New digital learning formats can also help to train teachers in some of the most remote parts of the least developed and developing regions of the world, and specialized tracking apps are already tackling teacher absenteeism by rewarding the most reliable teachers,<sup>34</sup> helping to reach target 4.c.



## DEEP DIVE Putting a Doctor Within Reach

SDG 3 includes targets to reduce maternal mortality rates, increase access to health care, foster a better-trained health workforce, reduce lifestyle diseases like diabetes and halve deaths from road accidents

### The Digital Transformation towards 2030: from “static classroom” learning and teacher-centric delivery to student-centric and lifelong learning “anytime, anywhere, for everyone”

Importantly, e-learning makes education more affordable, helping to achieve several of SDG 4’s targets. Students and their families, and governments, could save around \$1.2 billion a year in 2030 from e-learning.<sup>35</sup> Tuition fees will fall, while access will improve and become more equitable. This substantially improves people’s future participation opportunities. It is estimated that for every additional year of schooling, a student can look forward to a 10 per cent uptick in their average earnings – an effect that is magnified in developing regions.<sup>36</sup>

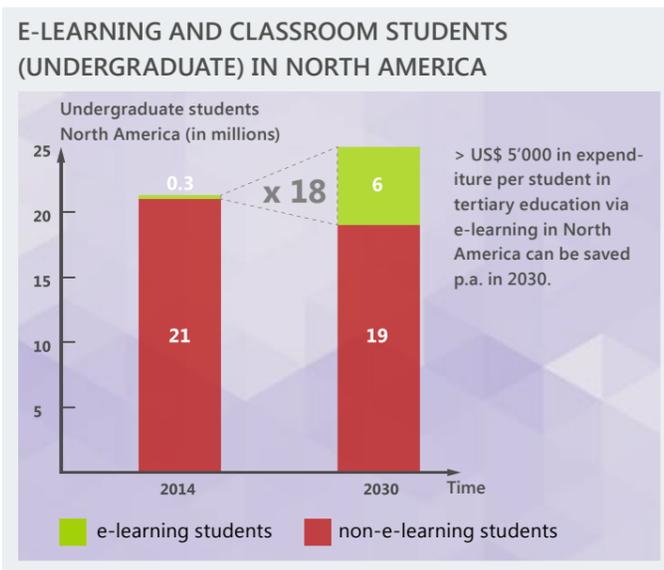
Remote access to education and more affordable learning opportunities can also help to reduce the gender inequalities in education (target 4.5) , for example, via options to study from home where girls are not allowed to leave their homes similarly as boys.

The large cost savings e-learning can bring have been reflected by its popularity for tertiary education in the aftermath of the global recession, as students looked for more cost-effective ways to develop their talent and skills.<sup>37</sup> The tertiary education market is expected to profoundly change towards 2030. Exhibit 7 illustrates the potential for e-learning to transform the traditional model of learning in North America, for example. The number of students in traditional education is predicted to fall by two million between 2014 and 2030. Yet, the shortfall will be more than compensated by a 18-fold rise in the number of students enrolled in e-learning, which is expected to rise to nearly six million in 2030, taking over nearly a quarter of the whole education market. GeSI’s research suggests that in North America, e-learning will eventually cut over \$5,000 per year from the cost of education for a student by 2030.<sup>38</sup> This illustrates how the e-learning shift can help achieve target 4.3 and 4.4.

E-learning is also applied in vocational training: around 10 per cent of companies use Massive Open Online Courses (MOOCs) to train their staff, and this is projected to rise to around a third by 2030,<sup>39</sup> contributing to target 4.4. These cost-effective tools could help companies increase the digital skills required of their employees. Moreover, people looking for a job could take advantage of affordable online courses to increase their skillset – and improve their chances for employment (target 4.b).

In conclusion, rolling out e-learning solutions will not only transform education and deliver social and economic benefits to people, but also provide substantial benefits for the education sector: learning centers, for example, can look forward to additional revenues of \$413 billion from e-learning in 2030.<sup>40</sup>

**EXHIBIT 7:** Share of e-learning undergraduate students from total undergraduate students in North America, 2014 to 2030



### THE STATUS OF THE WORLD TODAY<sup>41</sup>

In least developed countries, the maternal mortality rate at birth is still high: on average, 437 mothers die because of childbirth for every 100,000 live births. This figure needs to be cut by 83 per cent to meet target 3.1. The situation is better, but still not good, in developing countries, where the mortality rate is 106 for every 100,000 births. A large part of the problem, as with education, is a lack of access to affordable and practical healthcare – in all regions of the world, including some developed countries. Furthermore, the delivery of health services by properly trained professionals remains a challenge, especially in least developed countries and developing regions, but rural areas in developed regions also face this problem. In developed regions, the main challenges are to deliver more responsive and targeted healthcare within the constraints of public finances, and to foster healthier lifestyles to combat rising levels of non-communicable diseases like cardiovascular conditions and diabetes. These are today responsible for around 16 per cent of deaths in the developed world, with target 3.4 aiming to reduce this by a third.

Finally and strikingly, the casualty rate on the world’s roads remains far too high with around 1.25 million people dying each year from traffic accidents, and 50 million suffering injuries, according to the World Health Organization. This figure is expected to stabilize or increase in a business-as-usual scenario (BAU) without dedicated action to achieve target 3.6, which aims at halving this number.

### THE DIGITAL SOLUTIONS

New digital, medical technologies like wearable tech, patient-doctor videoconferencing and biosensors are beginning to enable people to receive diagnosis for medical problems remotely and could easily be applied in developing countries where they could significantly cut the costs of seeing a doctor and – in the process – save lives. GeSI estimates that e-healthcare could be available for as many as 1.6 billion people worldwide by 2030, a truly staggering prospect. Meanwhile, the fascinating field of augmented reality is actually enabling doctors to train remotely, and some health workers are now being trained in part by mobile phone in some of the most remote parts of the developing world, for example, in Kenyan villages.<sup>42</sup> These technologies could make significant inroads into training the number of doctors needed to achieve target 3.1, which aims to cut maternal mortality to fewer than 70 in 100,000 live births. In terms of service delivery and achieving target 3.8 on universal health coverage, the ability to diagnose and prescribe medicine remotely also gives health workers and patients much more freedom to receive the right treatment in a way that is convenient to them, saving them a lot of money and getting them back to work faster after treatment.

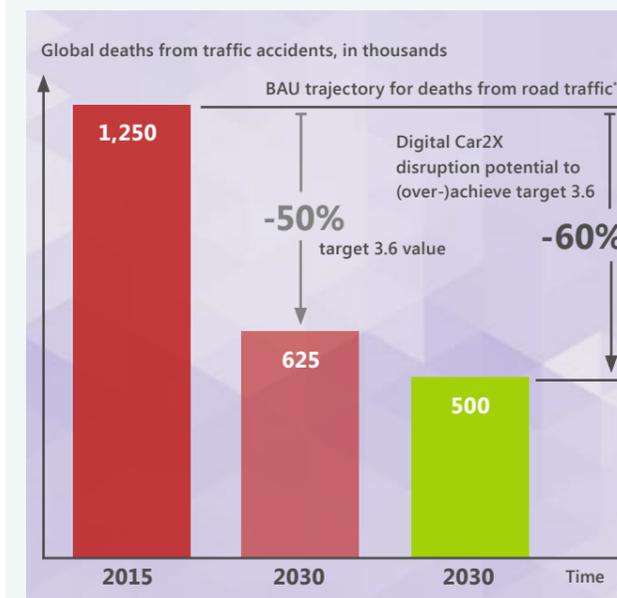
In terms of rising to the challenge of tackling non-communicable diseases in the developed world especially, wearable tech and fitness apps are allowing more people to understand and prevent conditions more easily by closely monitoring their own health statistics and taking the necessary action to avert or treat conditions, adding years to people’s lives and helping to meet target 3.4.

Finally, as Exhibit 8 shows, the introduction of Car2X, which enables cars to communicate with their surroundings, could prevent up to 60 per cent of road traffic accidents and related fatalities and injuries from happening.<sup>43</sup> With a 100 per cent adoption rate, this could save a total of around 720,000 lives and prevent 30 million injuries from road accidents,<sup>44</sup> which would actually overshoot target 3.6.

The WHO estimates that road traffic deaths and injuries in developing countries alone cause economic losses of up to 5 per cent of GDP,<sup>45</sup> so technologies which reduce these will contribute significantly to the next set of SDGs examined in this report, those concerned with fostering equitable growth.

Taken together, GeSI’s estimates that e-healthcare solutions could generate over \$200 billion of additional annual revenues for the health sector by 2030.<sup>46</sup>

### TARGET 3.6 – HALVE DEATHS AND INJURIES FROM ROAD ACCIDENTS\*



\*abbreviated description by Accenture Strategy  
 \*\*based on WHO reports 2013 and 2015

**EXHIBIT 8:** How Car2x could help (over)achieve SDG target 3.6 by enabling 60% reduction of traffic accidents

## 02. Fostering Equitable Growth

Five SDGs primarily focus on fostering equitable growth, understood as an essential prerequisite for communities and individuals to flourish.

SDG	SDG FOCUS AREAS AND TARGETS* WHICH BENEFIT MOST FROM DIGITAL SOLUTIONS	MOST POWERFUL DIGITAL SOLUTION(S)	DIGITAL'S POSITIVE IMPACT WITH ILLUSTRATIVE DATA POINT
<b>1 NO POVERTY</b> 	<ul style="list-style-type: none"> <li>Eradicate extreme poverty (1.1)</li> <li>Reduce poverty in all its dimensions (1.2)</li> <li>Ensure equal rights to economic resources and basic services (1.4)</li> <li>Build resilience of the poor (1.5)</li> </ul>	<b>CONNECTIVITY</b> for example, fixed and/or mobile access to telephony and internet, includes necessity for a device	»» Increases access to opportunities to break free of poverty and improve economic participation  <b>One third fewer people living on less than \$1.25 per day from extended internet access<sup>47</sup></b>
<b>5 GENDER EQUALITY</b> 	<ul style="list-style-type: none"> <li>Eliminate all forms of violence against all women and girls (5.2)</li> <li>Ensure women's full and effective participation and equal opportunities for leadership (5.5)</li> <li>Enhance the use of enabling technology, in particular ICT (5.b)</li> </ul>	<b>CONNECTIVITY</b> for example, fixed and/or mobile access to telephony and internet, includes necessity for a device	»» Empowers women to participate in economic activities and thereby improve their status  <b>US\$13-\$18 billion additional combined annual GDP for 600,000 women in developing countries from an increase in Internet access<sup>48</sup></b>
<b>8 DECENT WORK AND ECONOMIC GROWTH</b> 	<ul style="list-style-type: none"> <li>Sustain per capita economic growth and at least 7 per cent GDP growth in least developed countries (LDCs) (8.1)</li> <li>Improve global resource efficiency and decouple economic growth from environmental degradation (8.4)</li> <li>Achieve full and productive employment and decent work (8.5)</li> <li>Reduce youth unemployment (8.6)</li> <li>Strengthen capacity of domestic financial institutions and expand access to banking (8.10)</li> </ul>	<b>CONNECTIVITY</b> (see explanation in SDG 5)  <b>E-WORK</b> for example, augmented reality, cloud-based platforms (e.g. "platform as a service"), telecommuting, virtual business meetings  <b>ALL DIGITAL SOLUTIONS</b> as they transform production and consumption patterns	»» Boosts growth and helps decoupling it from resource-consumption  <b>Up to 1.38 per cent GDP growth from 10 per cent increase in broadband penetration<sup>49</sup></b>  <b>70 per cent cut in oil consumption in 2030 compared to today from all digital solutions examined<sup>50</sup></b>

\* abbreviated description by Accenture Strategy

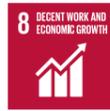
SDG	SDG FOCUS AREAS AND TARGETS* WHICH BENEFIT MOST FROM DIGITAL SOLUTIONS	MOST POWERFUL DIGITAL SOLUTION(S)	DIGITAL'S POSITIVE IMPACT WITH ILLUSTRATIVE DATA POINT
<b>9 INDUSTRY, INNOVATION AND INFRASTRUCTURE</b> 	<ul style="list-style-type: none"> <li>Facilitate sustainable and resilient infrastructure development (9.a)</li> <li>Increase access to ICT and provide universal access to internet (9.c)</li> <li>Develop quality, reliable, sustainable and resilient infrastructure (9.1)</li> <li>Promote inclusive and sustainable industrialization (9.2)</li> <li>Upgrade infrastructure and retrofit industries with clean technology (9.4)</li> <li>Enhance scientific research, upgrade technological capabilities of industrial sectors incl. increasing the number of R&amp;D workers (9.5)</li> </ul>	<b>SMART MANUFACTURING</b> for example, industrial Internet of Things (IoT) and Machine-to-Machine (M2M), 3-D printing, cyber-physical systems (CPS), Data analytics & cloud computing, drones & robotics, embedded system production technology  <b>SMART LOGISTICS</b> for example, IoT/connected vehicles, load units, products and machines; augmented reality and wearable technologies; Commercial Unmanned Aerial Vehicles (UAV); digital warehouses; optimized fleet and route management  <b>CONNECTIVITY</b> (see explanation in SDG 5)	»» Boosts efficient and innovative supply, production and delivery of goods  <b>US\$982 billion economic benefits to industries from smart manufacturing and smart logistics<sup>51</sup></b>
<b>10 REDUCED INEQUALITIES</b> 	<ul style="list-style-type: none"> <li>Achieve and sustain income growth of the bottom 40 per cent (10.1)</li> <li>Empower the social, economic and political inclusion of all (10.2)</li> <li>Reduce to less than 3 per cent the transaction costs of migrant remittances (10.c)</li> </ul>	<b>CONNECTIVITY</b> for example, fixed and/or mobile access to telephony and internet, includes necessity for a device	»» Improves access to more affordable participation  <b>2.5 Billion additional people can be connected in 2030 mainly in developing regions and LDCs<sup>52</sup></b>

EXHIBIT 9: Overview of digital solutions' positive impact on SDGs that primarily focus on fostering equitable growth

GeSI's research has shown that digital solutions can have a huge positive impact on each of these goals, but for the purposes of this summary report, the focus is on how digital can power growth (SDG 8) and infrastructure and innovation (SDG 9).

# DEEP DIVE

## Powering Growth: Connected and Decoupled



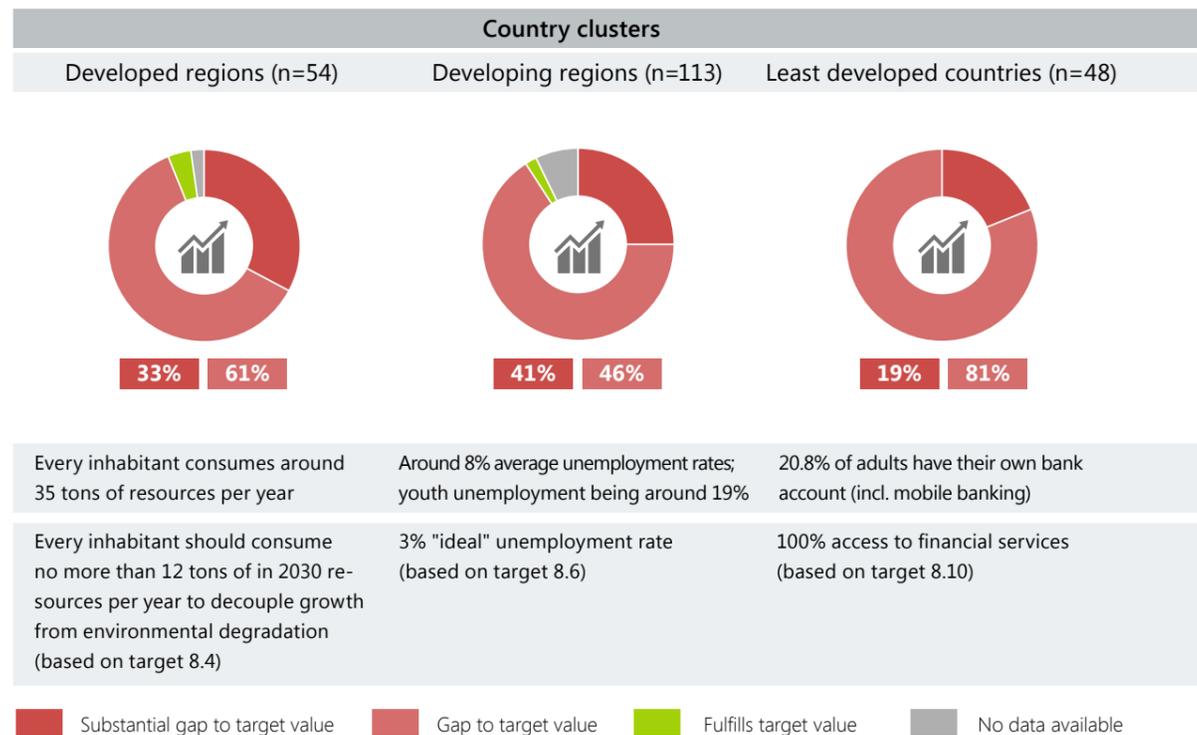
SDG 8 is about economic growth, decoupling economic growth from environmental degradation, and decent employment for all

**SDG 8: "PROMOTE SUSTAINED, INCLUSIVE AND SUSTAINABLE ECONOMIC GROWTH, FULL AND PRODUCTIVE EMPLOYMENT & DECENT WORK FOR ALL".**

**Targets which benefit most from digital solutions within SDG 8:**

- Target 8.1: "Sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries"
- Target 8.4: "Improve progressively, through 2030, global resource efficiency in consumption and production and endeavor to decouple economic growth from environmental degradation, in accordance with the 10-year framework of programs on sustainable consumption and production, with developed countries taking the lead"
- Target 8.5: "By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value"
- Target 8.6: "By 2020, substantially reduce the proportion of youth not in employment, education or training"
- Target 8.10: "Strengthen the capacity of domestic financial institutions to encourage and expand access to banking, insurance and financial services for all"

**EXHIBIT 10:** SDG 8 – Status of the world per country cluster



**THE STATUS OF THE WORLD TODAY<sup>53</sup>**

In the least developed countries especially, there is a pressing need to boost economic growth rates from their current average of 4.9 per cent, to the 7 per cent envisioned by target 8.1. In addition to economic growth, least developed countries also need to work towards target 8.10, access to financial services, because only one in five inhabitants currently has access to a bank account or mobile banking, leaving the vast majority of people in the poorest countries in the world locked out of opportunities to fully participate in the economic system.

Against the backdrop of recent declines in economic growth rates among developing countries, there is a need to maintain or raise growth rates. In developed countries, economic growth is still quite fragile and uneven.

The added complexity to the growth challenge is to ensure that growth remains within safe planetary limits and does not jeopardize the achievement of target 8.4, to decouple economic growth from environmental degradation. In developed regions especially, current consumption levels are unsustainable, with the average citizen consuming around 35 tons of natural resources per year, three times the "recommended" sustainable limit.<sup>54</sup>

At the same time, unemployment remains a major problem all over the world, but in the developing regions particularly, where unemployment rates currently average nearly 10 per cent, with one in five young people looking for a job. So achieving target 8.5 is going to be difficult without the huge innovation and job creation potential of digital solutions.

**DIGITAL IMPACT HIGHLIGHTS:**

- \$9 TRILLION IN ECONOMIC BENEFITS IN 2030 FROM DIGITAL SOLUTIONS THAT CONTRIBUTE TO THE SDGS
- UP TO 1.38 PER CENT GDP GROWTH GENERATED FROM A 10 PER CENT INCREASE IN BROADBAND PENETRATION IN DEVELOPING REGIONS
- THE EQUIVALENT OF 25 BILLION OIL BARRELS SAVED IN 2030, A REDUCTION OF 70 PER CENT COMPARED TO TODAY'S OIL CONSUMPTION
- 300 KM<sup>3</sup> WATER SAVED IN 2030

**THE DIGITAL SOLUTIONS**

GeSI and Accenture Strategy's research found that the digital solutions analyzed could unlock over \$9 trillion in economic benefits globally in 2030, saving consumers, businesses and governments around the world over \$4.6 trillion while generating \$4.5 trillion of new income in industries like agriculture, retail, education, renewable energy and mobility.<sup>55</sup>

Deploying broadband infrastructure acts as a booster growth rates (see target 8.1) with a recent ITU/Broadband Commission study finding that a 10 per cent increase in broadband penetration alone can lead to rises in GDP of between 0.25 and 1.38 per cent, with the highest positive impacts occurring in developing countries.<sup>56</sup>

This report also finds that not increasing broadband<sup>57</sup> to universal coverage worldwide (as SDG target 9.c intends) would mean missing an opportunity to raise GDP by 12 per cent in developing regions in 2030,<sup>58</sup> as Exhibit 11 illustrates.

Accenture analysis meanwhile shows that "digital density" also matters. This comprises, among other things, a country's adoption rate of digital solutions, as well as the skills, ways of working and regulatory frameworks needed to realize digital's economic potential. A ten-point increase in a country's digital density would help certain developed economies gain an extra 0.25 per cent of GDP growth between 2015 and 2020 and certain developing regions gain a 0.5 per cent higher than average annual GDP growth rate over the same period.<sup>59</sup>

E-work will fundamentally change the ways people work in the knowledge economy: from anywhere, at any time. Cloud-based workplace solutions are increasingly important, with positive effects on SDG 8. These can help reduce material footprints thanks to more efficient devices and ICT infrastructure, can lead to double digit reductions in CO2e emissions, thanks to reduced commuting and business travel, and generally benefit employees in terms of time and monetary savings.<sup>60</sup>

Online banking and banking through smart devices, meanwhile, will mean the inclusion of millions of additional people in the financial system, providing previously unbanked citizens with the benefits of modern consumer finance. The increased customer density and professionalization of the banking sector through digital solutions can also help reduce the currently very high interest rates in some developing regions and least developed countries.

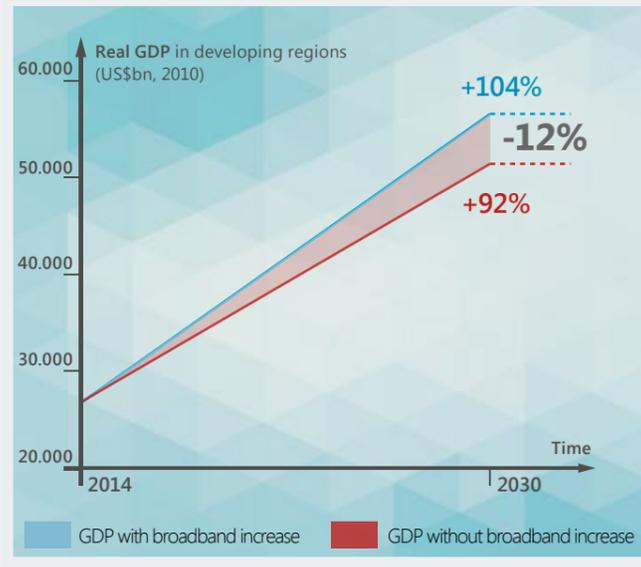
The Digital Transformation towards 2030: from “physically bound” industries, products and workplaces to “connected everything, anytime, anywhere”

**EXHIBIT 11:** Cost of inaction on broadband expansion in developing regions (target 9.c) in per cent of missed GDP (target 8.1)

**COST OF INACTION – BROADBAND EXPANSION IN DEVELOPING REGIONS**

**Assumptions**

- 10% increase in broadband penetration to yield +1.38% average GDP growth in developing regions (ITU, World Bank)
- In line with universal access target 9.1 we assume 80% broadband penetration in 2030, up from 44.5% broadband penetration in 2014 (80% increase)
- GDP growth forecast by World Bank assumed to have taken into account expansion of mobile broadband penetration to 80% in 2030

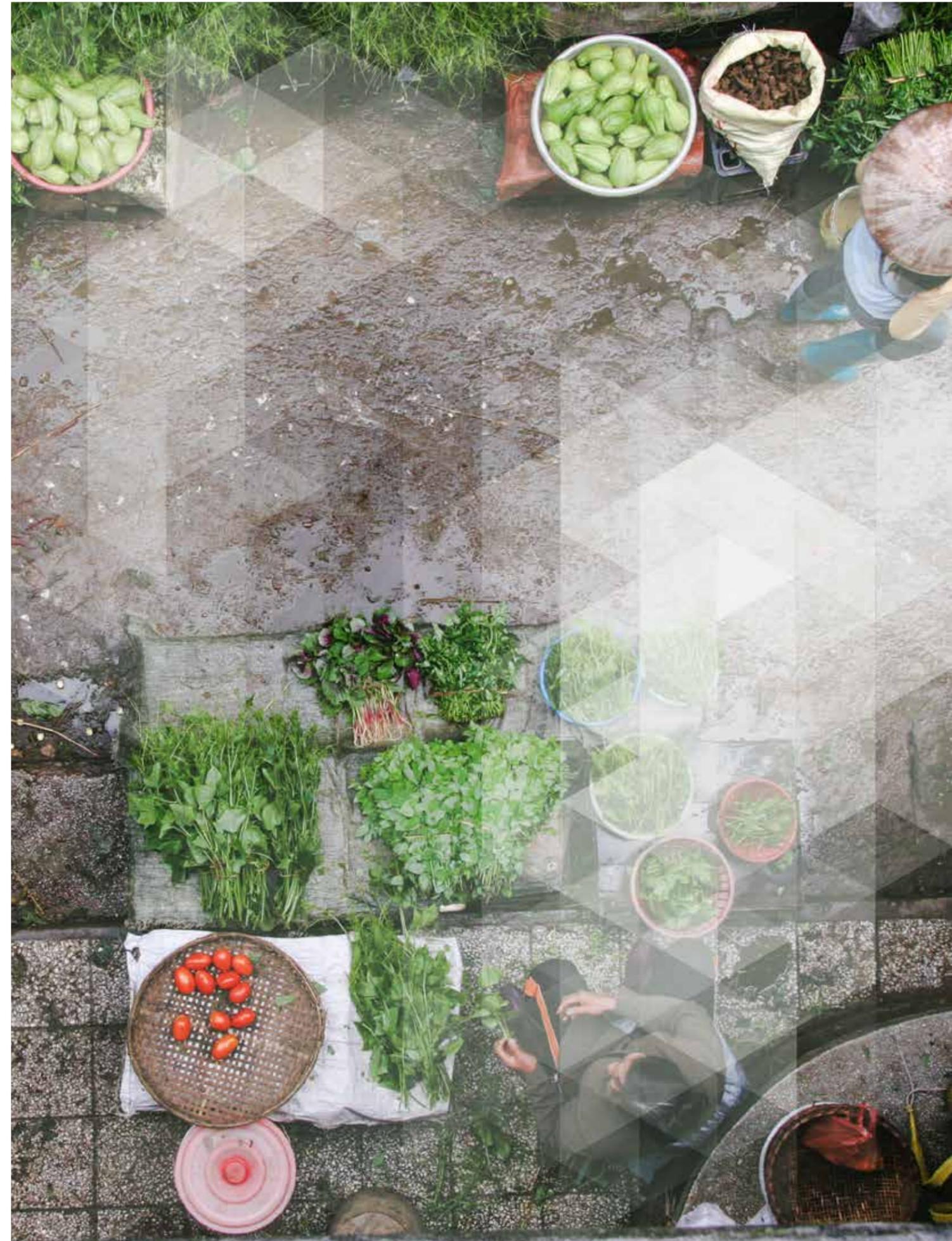


On top of this, improved access to digital solutions in general can help, for example, farmers and fishermen in some of the poorest regions of the world get access to real-time price information, enabling them to sell into regional, and even global markets at the best price for them.<sup>61</sup>

Finally, digital technologies can bring productivity gains. According to the World Bank, companies using e-commerce are now, on average, 11 per cent more productive, twice as large and twice as likely to export as those that do not.<sup>62</sup>

The excellent news for sustainable development is that these digital solutions can help us decouple growth from automatically increasing resource consumption and environmental degradation (see target 8.4). Digital solutions can cut the equivalent of 25 billion barrels of oil in 2030, a reduction of 70 per cent compared to today’s oil consumption. Smart-mobility solutions alone could take 135 million cars off the world’s roads and over 330 trillion liters of water could be saved in 2030 from smart agriculture, smart buildings and smart manufacturing. E-work, moreover, could save 0.4 gigatons of greenhouse gas emissions.<sup>63</sup>

Forecasts for ICT’s positive impact on employment are mixed. Analyzing the past, some studies have seen positive impacts. For example, the World Bank has observed that for every high-tech job created in the United States, nearly five additional jobs could be created in other sectors. Another study estimates that extending internet access in the developing world to levels seen in the developed world could create around 140 million net jobs.<sup>64</sup> Nonetheless, debate among economists continues over possible adverse side-effects on employment created by digital.<sup>65</sup>



# DEEP DIVE Catalyzing Access, Growth and Innovation



SDG 9 is about improved infrastructure, sustainable industrialization and innovation for sustainable development. Target 9.c explicitly mentions that increasing access to the internet is to be achieved within the SDG framework

## THE STATUS OF THE WORLD TODAY<sup>66</sup>

To deliver on SDG 9, the world needs to improve and vastly expand its infrastructure and get better at innovating and promoting sustainable innovation across least developed countries, developing and developed regions.

From the perspective of the ICT-sector, the infrastructure need is crystal clear: globally more people are offline than online and only a tenth of the population in the least developed countries can get online. Differences in access also exist within countries, between rural and urban areas and between men and women.<sup>67</sup>

Least developed countries and developing regions need to increase their share of industry to meet SDG 9. In terms of R&D, huge gaps exist in developing countries, with only around 900 R&D workers per million people, four times less than the recommended amount and less than a third of the share of developed regions, who themselves partly lag behind the proportion envisioned by the SDGs. Developed regions, are not investing enough in environment-related R&D, and this could become a significant problem in the achievement both of target 8.4 and of all the environmental SDGs.

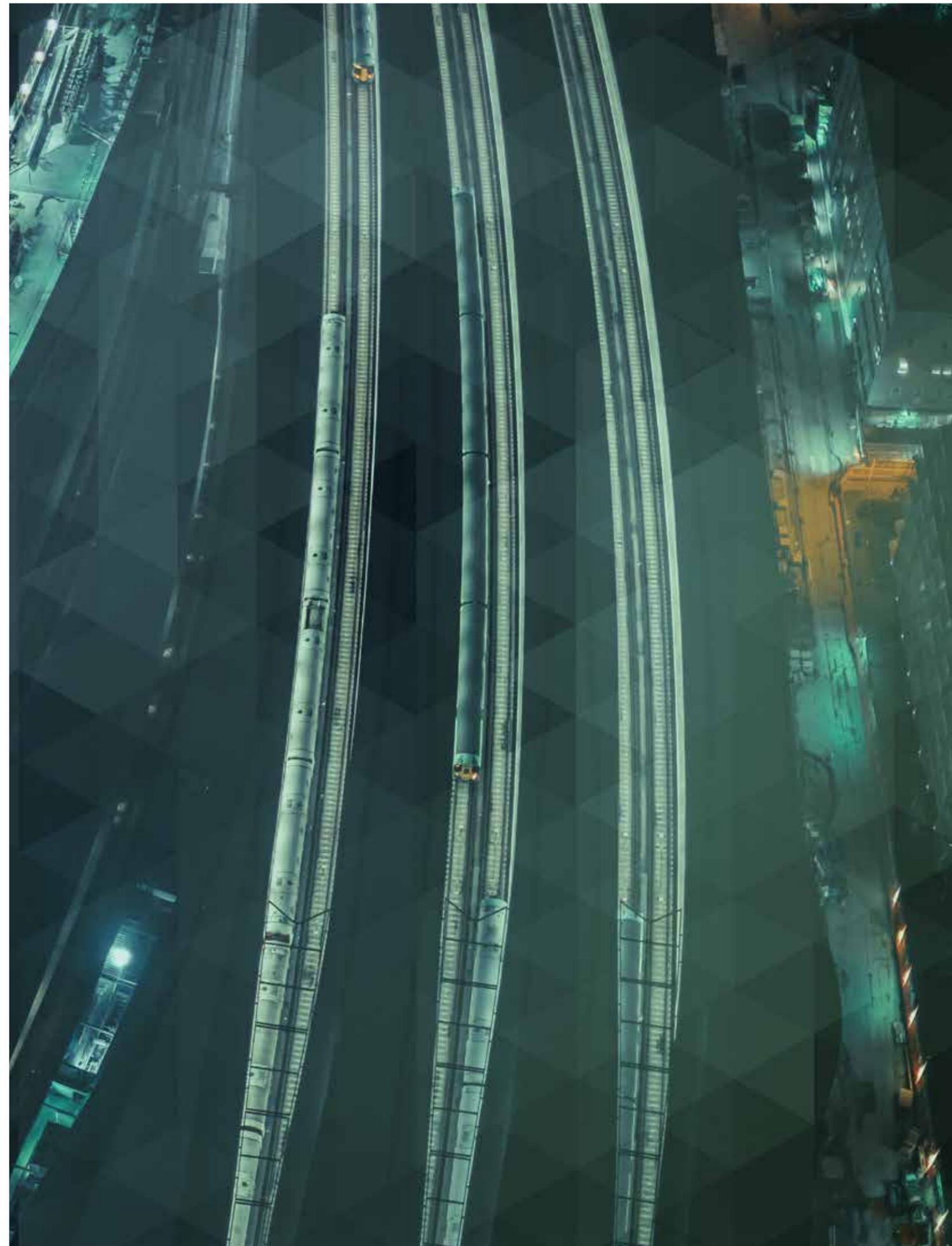
## THE DIGITAL SOLUTIONS

Increasing connectivity is at the heart of SDG 9. And GeSI's research shows that 2.5 billion more people can be connected to the knowledge economy in 2030. But timing matters: broadband coverage needs to increase fast so that the "digital critical mass" required to spur economy-wide innovation is reached as soon as possible. Installed broadband capability needs to be fast as well as reliable. Other SDGs depend on this too, as this report has showed above that failing to deploy broadband would mean foregoing the equivalent of 12 per cent of the GDP of developing countries in 2030. Moreover, there is the challenge challenge of raising the financing needed, with the ITU / Broadband Commission estimating that connecting the next 1.5 billion people to the internet requires around \$450 billion of investment in total.<sup>68</sup>

Smart manufacturing and smart logistics can foster sustainable industrialization, including economic as well as environmental benefits. In 2030, they can collectively enable \$982 billion of cost savings from improved efficiencies while delivering significant resource efficiency: energy savings of 5.3 billion MWh and fuel savings of 267 billion liters. This digitized industry can also save 4 gigatons of CO<sub>2</sub>e in 2030, equating to nearly 7 per cent of global emissions in 2030.<sup>69</sup>

Underpinning the dividend from digital infrastructure is a simple fact: bringing more people into the global marketplace is not only great for their employment prospects; it also creates new markets and greater scope for innovation across borders. In terms of really boosting world-changing innovation and R&D, though, the core challenge is to raise the number of researchers and the amount of research spending going into solving social and environmental challenges.

As everyone in the ICT sectors knows, when it gets going, innovation can move very fast. It is not beyond the realm of possibility that the world of 2030 sees the most innovative internet access in a country with very little infrastructure today. Just think of the possibilities that white space might allow, when unused broadcasting frequencies in the wireless spectrum could provide access to fast internet without the necessity of traditional broadband infrastructure. This is still in early stages, but ICT companies have already begun to invest in the opportunity.<sup>70</sup>



### 03. Protecting the Environment

Seven SDGs primarily focus on protecting the environment, ensuring that the other goals are achieved without breaching the planet’s ability to regenerate for future generations

SDG	SDG FOCUS AREAS AND TARGETS* WHICH BENEFIT MOST FROM DIGITAL SOLUTIONS	MOST POWERFUL DIGITAL SOLUTION(S)	DIGITAL'S POSITIVE IMPACT WITH ILLUSTRATIVE DATA POINT
<b>6</b> CLEAN WATER AND SANITATION	<ul style="list-style-type: none"> <li>Achieve universal and equitable access to drinking water (6.1)</li> <li>Improve water quality (6.3)</li> <li>Increase water-use efficiency (6.4)</li> <li>Implement integrated water resources management at all levels (6.5)</li> <li>By 2020, protect and restore water-related ecosystems (6.6)</li> </ul>	<b>SMART WATER MANAGEMENT</b> for example, smart pipes, smart levees, smart meters, soil sensors, remote irrigation management systems, rain water harvesting systems, consumption control apps, e-billing	» Improves water use efficiency and helps increasing access to water  <b>Up to 15 per cent water consumption reduction<sup>71</sup></b>
<b>7</b> AFFORDABLE AND CLEAN ENERGY	<ul style="list-style-type: none"> <li>7.1: Ensure universal access to energy services (7.1)</li> <li>Increase share of renewable energy in the global energy mix (7.2)</li> <li>Double the global rate of improvement in energy efficiency (7.3)</li> <li>Expand infrastructure and upgrade technology for supplying modern and sustainable energy (7.b)</li> </ul>	<b>SMART ENERGY</b> for example, smart grid, smart appliances, energy storage, predictive analytics, sensors, demand response technology	» Improves energy efficiency and access to more affordable energy and supports to increase share of renewable energies in energy mix  <b>&gt;1.3 billion MWh savings in 2030<sup>72</sup></b>
<b>11</b> SUSTAINABLE CITIES AND COMMUNITIES	<ul style="list-style-type: none"> <li>Provide access to safe, affordable, accessible and sustainable transport systems (11.2)</li> <li>Reduce adverse per capita environmental impact of cities, incl. air quality and waste management (11.6)</li> <li>Increase the no. of cities with policies towards, resource efficiency, mitigation and adaptation to climate change, resilience to disasters (11.b)</li> </ul>	<b>SMART CITY MOBILITY</b> for example, mobile ride sharing, e-mobility, driverless transportation, intermodality, connected infrastructure/IoT  <b>SMART BUILDING</b> for example, alarm management and automation, big data analytics and energy management, smart metering, IoT/sensors, monitoring, detection and diagnosis technologies	» Reduces resource consumption, improves energy efficiency and reduces air pollution  <b>Around a 5 per cent CO<sub>2</sub>e emissions savings in 2030 from smart building and smart city mobility alone<sup>73</sup></b>
<b>12</b> RESPONSIBLE CONSUMPTION AND PRODUCTION	<ul style="list-style-type: none"> <li>Achieve sustainable management and efficient use of natural resources (12.2)</li> <li>Halve per capita global food waste (12.3)</li> <li>Reduce waste generation (12.5)</li> <li>Ensure that people have awareness for sustainable development and lifestyles (12.8)</li> </ul>	<b>SMART MANUFACTURING</b> for example, industrial Internet of Things (IoT) and Machine-to-Machine (M2M), 3-D printing, cyber-physical systems (CPS), data analytics & cloud computing, drones & robotics, embedded system production technology  <b>SMART AGRICULTURE</b> for example, optimized farm management and automated irrigation systems; precision agriculture, incl. M2M / IoT, soil sensors and satellites and integrated real-time weather information, traceability and tracking systems	» Improves production and consumption patterns, enabling the transformation to the circular economy  <b>20 per cent food waste savings in 2030 from smart agriculture<sup>74</sup></b>

\* abbreviated description by Accenture Strategy

SDG	SDG FOCUS AREAS AND TARGETS* WHICH BENEFIT MOST FROM DIGITAL SOLUTIONS	MOST POWERFUL DIGITAL SOLUTION(S)	DIGITAL'S POSITIVE IMPACT WITH ILLUSTRATIVE DATA POINT
<b>13</b> CLIMATE ACTION	<ul style="list-style-type: none"> <li>Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters (13.1)</li> <li>Improve education capacity on climate change management (13.3)</li> </ul>	<b>ALL DIGITAL SOLUTIONS</b> with sustainability benefits, including smart agriculture, smart building, smart energy, smart manufacturing, smart mobility, etc.	» Enables greenhouse gas emissions reduction and drives market transformation for renewables  <b>Around 20 per cent of global CO<sub>2</sub>e emissions can be saved in 2030<sup>75</sup></b>
<b>14</b> LIFE BELOW WATER	<ul style="list-style-type: none"> <li>Reduce marine pollution from land-based activities (14.1)</li> <li>Minimize and address the impacts of ocean acidification (14.3)</li> <li>Provide access of small-scale fishers to markets (14.b)</li> </ul>	<b>SMART CONSERVATION</b> for example, advanced mapping and data analytics, sub-marine, coastal and inland smart sensors, drones, real-time satellite imaging, smart monitoring, real-time weather forecasting	» Improves protection of oceans and water quality  <b>32 per cent of the world's coastal areas could already benefit from smart conservation solutions<sup>76</sup></b>
<b>15</b> LIFE ON LAND	<ul style="list-style-type: none"> <li>Ensure the conservation and sustainable use of freshwater ecosystems (15.1)</li> <li>Combat desertification and land degradation (15.3)</li> <li>Promote the implementation of sustainable management of all types of forests (15.2)</li> <li>Ensure the conservation of mountain ecosystems, including their biodiversity (15.4)</li> </ul>	<b>SMART AGRICULTURE</b> (see explanation in SDG 12)  <b>SMART CONSERVATION</b> (see explanation in SDG 14)	» Improves protection of nature reserves on land and resource-use efficiency  <b>251 trillion liters of water saved in 2030, from smart agriculture<sup>77</sup></b>

EXHIBIT 12: Overview of digital solutions' positive impact on SDGs that primarily focus on protecting the environment

GeSI's research has shown that digital solutions can have a huge positive impact on each of these goals, but for the purposes of this summary report we will examine closely SDG 13, on climate change and SDG 11, on sustainable cities.

# DEEP DIVE Decarbonizing How We Live and Work



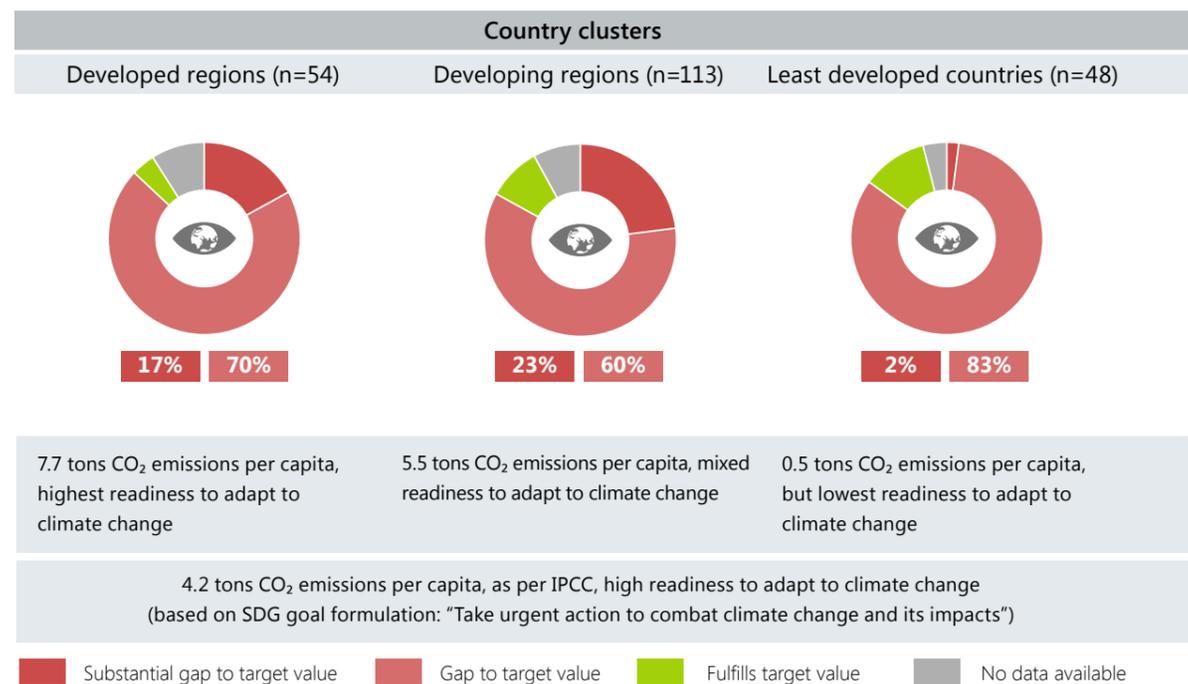
SDG 13 is about climate change mitigation, i.e. reducing greenhouse gas emissions, and adaptation, i.e. ensuring that countries and people are resilient against the effects of climate change like extreme weather

## SDG 13: "TAKE URGENT ACTION TO COMBAT CLIMATE CHANGE AND ITS IMPACTS"

### Targets which benefit most from digital solutions within SDG 13:

- Target 13.1: "Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries"
- Target 13.2: "Integrate climate change measures into national policies, strategies and planning"
- Target 13.3: "Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning"

EXHIBIT 13: SDG 13 – Status of the world per country cluster



The Digital Transformation towards 2030: from humanity causing climate change to climate-friendly work & life everywhere

### DIGITAL IMPACT HIGHLIGHT:

- 12.1 GIGATONS CO<sub>2</sub> EMISSIONS SAVINGS FROM ALL DIGITAL SOLUTIONS WITH SUSTAINABILITY BENEFITS IN 2030, EQUALING 20 PER CENT OF GLOBAL EMISSIONS

## THE STATUS OF THE WORLD TODAY<sup>78</sup>

The challenge is twofold. Countries of all income levels need to mitigate the adverse effects their unsustainable practices are having on global climate while preparing for the effects of climate change that are expected in the coming decades.

In terms of mitigation, the world is not on track to hold global average temperature rises to under 1.5°C above pre-industrial levels, the aspiration agreed at the COP21 conference in December 2015. Total global emissions of carbon dioxide equivalent (CO<sub>2</sub>e) have increased by almost 50 per cent since 1990 according to the Intergovernmental Panel on Climate Change (IPCC), and even the political progress made at the Paris COP21 conference in 2015 will not be enough. Analysis suggests that adding up all the emissions cutting commitments made by the 160 national parties to the conference would still lead to global average temperature rises of 2.7°C by the end of the century.<sup>79</sup>

As a consequence, major infrastructure and lifestyle changes are required to align the UN's desire to raise people's quality of life all over the world. This includes the need both to decouple economic growth from emissions growth and – at the same time – to prepare for the effects of climate change (often described as adaptation or resilience, and referred to in target 13.1). The target per capita emissions level to keep the world on a below 2°C trajectory is estimated to be around 4.2 gigatons of CO<sub>2</sub>e by 2030. The current per capita average emissions in least developed countries are well below this level at 0.5 gigatons per head. But the average for developing countries is 5.5 gigatons, while the average for developed regions is nearly 8 gigatons per person. The striking fact here is that – to stay on target – global average emissions of CO<sub>2</sub>e per person need to be lower than they are currently in the developing regions.

Those who contribute least are also the least prepared for resilience and adaptation (target 13.1): the task is particularly urgent in least developed countries, where despite being the lowest emitters, national structures have the lowest "readiness to leverage investment and convert it into adaptation actions to prepare for climate change". This is according to a major study by Notre Dame University which scores countries by their readiness for adaptation (least developed countries score an average of 33 out of 100, while developing countries score 46, and developed countries 69, suggesting that all countries have large strides to make to prepare for climate change).<sup>80</sup>

## THE DIGITAL SOLUTIONS

Luckily, digital solutions have an enormous potential to reduce greenhouse gas emissions. GeSI has calculated digital solutions, including smart manufacturing, smart agriculture, smart buildings, smart mobility, and smart energy, can cut over 12 gigatons of CO<sub>2</sub>e across the global economy by 2030. That would be around a fifth of total global emissions in 2030,<sup>81</sup> a substantial inroad. Importantly, GeSI's modeling also shows that these digital solutions can help us hold emissions at current levels while enabling the huge strides in equitable growth and quality of life described in the sections above.

Exhibit 14 sets this out as a graph. GeSI has taken the Intergovernmental Panel on Climate Change's (IPCC) "business as usual" (BAU) scenario as a basis and plugged digital solutions into it, showing how digital can strip away emissions growth from the economic growth modeled by the IPCC BAU scenario.<sup>82</sup>

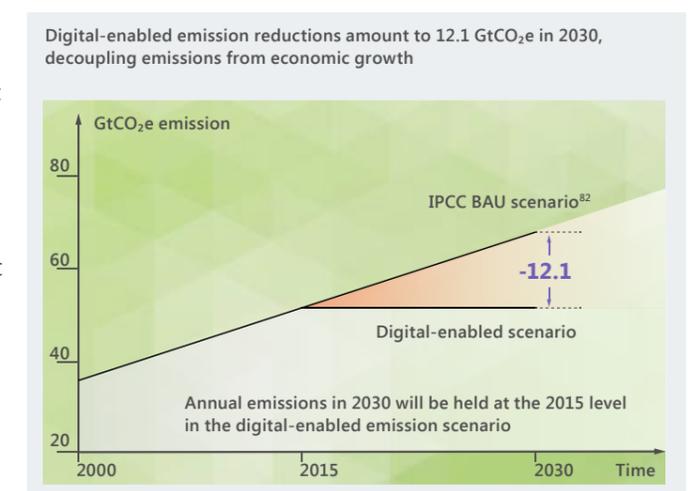


EXHIBIT 14: Digital-enabled CO<sub>2</sub>e emissions trajectory towards 2030, compared to IPCC BAU scenario

All this will lead to vastly improved lifestyles for people around the world, with a much-reduced risk of resource warfare and the displacement of peoples. At the very least, digital solutions can help us stabilize global climatic conditions that are recognizable today – while enabling economic growth to do its work in lifting people out of poverty.

Of course, other measures need to play their part, but GeSI is clear that digital solutions are critical and often-overlooked tools to achieve the aspiration of a 1.5°C trajectory.

SDG 11 is about making cities and all human settlements more resilient and environmentally friendly while enabling a better environment for the people living in them, including boosting access to sustainable transport systems and safe and affordable housing

**THE STATUS OF THE WORLD TODAY<sup>83</sup>**

On SDG 11, as for SDG 13, we have a twin challenge: cut emissions and pollution from transport and buildings while preparing for increased urbanization and improve road safety and provision for vulnerable people, women, children and people with disabilities (target 11.2).

The task is made more urgent by the fact that, in 2016, more than half of the world’s seven billion people live in cities, and this is projected to rise to nearly two thirds by 2030 – two thirds of a then larger population, of course.<sup>84</sup> So both mobility and housing, necessary to achieve targets 11.2 and 11.3, will be vastly important, as will confronting the connected problems of air pollution and waste management, as the population of cities continues to become more affluent.

Today, nearly 90 per cent of the world’s urbanites live in over-polluted cities, according to the World Health Organization<sup>85</sup> and much of this pollution is caused by dirty transportation and poor logistical planning. Well over 10 per cent of people actually live in cities in which airborne particulates are at levels dangerous to human health, again according to the WHO.<sup>86</sup> Not only does this severely impact people’s quality of life, but it also has serious health implications, with an estimated seven million premature deaths per year being linked to poor air quality.<sup>87</sup>

Around a third of global emissions are attributable to buildings, and this is on an upward trajectory.<sup>88</sup> Coupled to this are the problems of securing electricity supply and avoiding water stress, as clean water becomes an ever more precious resource.

**THE DIGITAL SOLUTIONS**

Digital solutions will play an important role in sustainable urbanization in making cities smarter and more sustainable. For example, enabling new forms of mobility and housing.

In terms of mobility, there are two main ways in which digital solutions can transform urban lives. These are, firstly, by connected private transportation and, secondly, by helping city authorities design and operate better traffic flow with traffic control and optimization.

In terms of the former, car-sharing and car-pooling platforms can be made much more accessible through smart technology which will improve people’s access to transport and also help take cars off the roads. Strides in GPS location-based services are also making an electric vehicle network a genuine prospect in the future, and better-designed social media and apps are helping people book rides, organize logistics and generally plan their lives more easily.

As far as city-wide traffic control and optimization is concerned, both driverless cars and connected smart sensors will have a substantial impact in aiding flow, shortening journeys and saving fuel. Coupled to intelligent infrastructure and real-time big data analytics, a seamless and automatic traffic grid is not beyond our reach. Forty-two billion hours could be saved globally in 2030.<sup>89</sup> Car-to-car technology is also predicted to reduce the number of deaths and injuries from road-traffic accidents by 60% (as already mentioned in the section on health above), saving both lives and money for emergency services and transport networks.

GeSI can see a future for the world’s cities in least developed, developing and developed countries, where many more items are connected to and analyzed by the Internet of Things, where self-driving cars and automated traffic systems vastly improve traffic flow, speed up journeys for people, and significantly reduce pollution, positively impacting people’s quality of life. An estimated 456 billion liters of fuel can be saved from connected private transportation and optimized traffic control.

GeSI’s analysis for this report also suggests that the cost savings from rolling out smart mobility solutions alone, by 2030, would total nearly \$100 billion.

And the timeline could be realistic. On a low-growth assumption, there could be nearly 12 million self-driving cars on global roads by 2035.<sup>90</sup>

The second major way in which digital can support the transition to sustainable cities as envisioned by SDG 11 is through smart buildings solutions. These include data analytics, automated alert systems, optimized load management, smart sensors and smart metering, making the house an example of the Internet of Things. These technologies can seriously reduce the electricity consumption of buildings and help tailor them to the time of day/year and the specific needs of their occupants.

On top of this, there is a substantial water saving potential with GeSI’s figures suggesting that around 261 billion liters of water could be saved via a switch to smart buildings, contributing to achieving target 11.6. In total, smart buildings could net total revenues of nearly \$184 billion by 2030 and save \$361 billion in wasted energy and other building maintenance expenses. The energy savings alone are estimated as being around 5 billion MWh.<sup>91</sup>

Imagine a city with virtually no road-traffic accidents, no air pollution and smart buildings that adapt perfectly to each person’s needs and reduce their environmental footprint. We would also, of course, need fewer power stations to power them, helping to meet SDG 13.

# IV. Sustainable Development Makes Good Business Sense

This chapter demonstrates how solving social, economic and environmental challenges towards SDG achievement represents a huge growth opportunity for the ICT private sector

As set out in the previous chapter, the digital solutions that catalyze SDG achievement could create over \$9 trillion of new economic benefits for industries in all sectors, governments and consumers per year in 2030.<sup>92</sup>

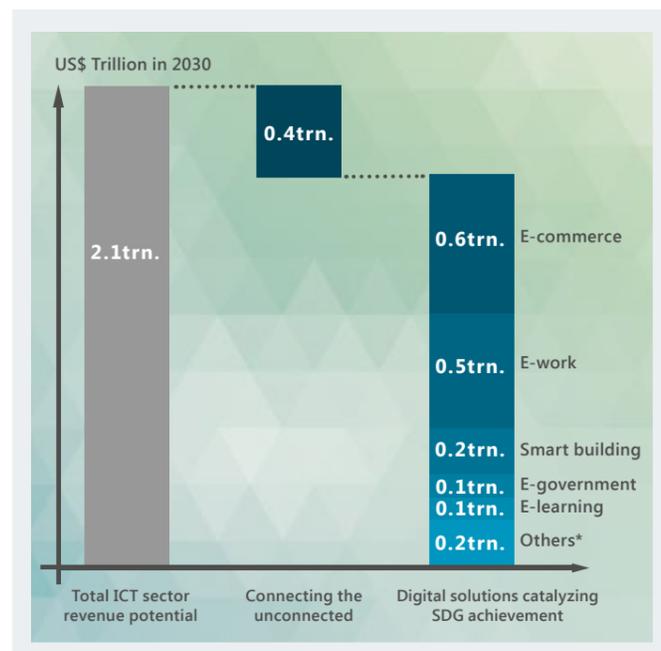
The encouraging additional news, from the perspective of investors in the ICT sector, is that deploying these digital solutions also makes good business sense for the ICT sector. GeSI's research for this report has modeled \$2.1 trillion of additional annual revenues to the sector<sup>93</sup>, from rolling out a range of established and emerging technologies across all markets. Given that the ICT sector's current global revenues per year are around \$3.5 trillion<sup>94</sup>, including revenues from other solutions than the ones analyzed in this report, this would represent a huge growth boost of 60 per cent – only from solutions that help achieve the SDGs. This is something no investor or chief executive can ignore.

GeSI's findings show that connecting 2.5 billion currently unconnected people can deliver \$400 billion per year in 2030. Of the remaining \$1.7 trillion, five digital solutions alone represent approximately \$1.5 trillion of the potential additional income. These are e-commerce, which could bring in an additional \$580 billion per year to the sector and e-work, which represents a possible extra \$537 billion. Smart buildings, meanwhile, could generate nearly \$200 billion, e-government \$86 billion and e-learning could bring in an extra \$75 billion.<sup>95</sup> Other revenues come from, among other things, wearable tech and e-health solutions, precision agriculture and solutions for connected fleet management. Taken together, this is an exciting prospect.

On top of these revenues, GeSI has identified several intangible benefits to the ICT sector which could add further revenues. According to a recent survey, more than two thirds of businesses are already planning how they will engage with the SDGs.<sup>96</sup> Likewise, 79 per cent of the world's large companies have publically committed to emissions-reduction targets, and a number of large financial organizations are taking the risks posed by climate change and potential resource-shocks to their portfolios and business models very seriously. Taken together, the opportunities in front of ICT companies for brand enhancement by becoming the go-to partners for corporate risk-reduction and collaboration are vast.

On the personal scale, as lifestyles are transformed by the ICT sector's digital solutions, new demands are created. When this is married to equitable growth, there is a greater market for data-driven goods and services in all sectors, from a growing pool of networked consumers, businesses and governments. The world gets simultaneously smaller as markets get bigger. This is great news for businesses in practically all sectors, but ICT will be the common link.

**EXHIBIT 15:** ICT sector revenues from digital solutions that catalyze SDG achievement, per year in 2030



\* Others include: Connected private transportation, e-banking, e-government, e-health, real-time disaster warnings, smart agriculture, smart conservation, smart energy, smart logistics, smart manufacturing, smart police, smart water management, traffic control & optimization

# V. Roadblocks and Concerns Need to be Overcome to Harness Digital's Potential

This chapter describes barriers hindering ICT deployment and addresses the concerns people have over some aspects of digital technology

We now turn to the hurdles the world needs to clear in order to deploy the digital solutions needed to meet the UN's ambitious timeline for achieving the SDGs. These hurdles are twofold: firstly, barriers to ICT deployment hold up the scaling of digital solutions on a global basis. Secondly, people's concerns about some aspects of digital solutions limit the diffusion of some innovative digital solutions.

Any large-scale transformation in the way we live our lives will also, inevitably, throw up several concerns. For digital, these include concerns over trust and cyber-security, as well as the potential for the displacement of jobs in a fully digitally-enabled world.

In the second section of this chapter, each of these concerns is considered. First, though, the specific barriers to the deployment of digital solutions on a global basis are examined.

## ROADBLOCKS TO ICT DEPLOYMENT<sup>97</sup>

In essence, this report has identified three types of barriers facing large-scale ICT deployment to boost digital impact towards SDG achievement (also refer to exhibit 16):

Barriers to the efficient operation of the ICT sector, or the "rules of game", such as political and regulatory blockages

Constraints to ICT rollout, or supply-side barriers, such as a lack of capital for infrastructure projects or for testing innovative digital solutions

Impediments to ICT uptake, or demand-side barriers, such as a lack of suitable digital skills among would-be users or entrepreneurs

Needless to say, some of these barriers are more prevalent or serious in developing regions, some are confined to the least developed countries, and others are universal, persisting across all country clusters. The most fundamental barriers within the "rules of the game" category apply to all regions. This includes limited awareness of ICT's potential among stakeholders, such as policy makers, aid organizations and NGOs that could otherwise harness digital's potential for development work.

Equally, supply-side barriers, such as the lack of available capital for financing hinders the scaling of digital solutions all over the world, especially of costly infrastructure projects in rural areas.

Demand-side barriers, meanwhile, such as the low affordability of ICT solutions and lack of digital skills, are more prevalent in developing and least developed regions. Within these country clusters, the effects are magnified for vulnerable people, people living in rural areas and women, all of whom could benefit the most from access to the knowledge society.

GeSI's research has also identified that regulatory and financing barriers are the most important roadblocks to ICT deployment, hindering the full-scale positive impact of digital on SDG target achievement.

## FOCUS ON REGULATORY BARRIERS

Regulatory barriers take several forms, but problems around the inadequate regulation of the ICT sector generally, as well as insufficient or uncoordinated protections around intellectual property and data security affect least developed countries, developing and developed regions alike.

In developing regions especially, the prevalence of infrastructure and connectivity monopolies, as well as poor and insufficient regulation, prevent digital roll-out at scale. These two impediments combined are particularly arduous when it comes to driving infrastructure and connectivity investment.

In developed regions, on the other hand, over-regulation of the ICT sector can also block the deployment of digital solutions, especially software, apps and connectivity. The root of this barrier often lies in regulation that was created without the positive impact of new digital solutions in mind.

Across all country clusters, poor, insufficient or uncoordinated regulation of the ICT sector, especially data privacy and security, as well as intellectual property rights, holds up the deployment of sensors and smart-technology by increasing the complexity of development and deployment due to regional differences in regulatory requirements. This creates additional costs to the ICT sector. Moreover, the convergence between the ICT sector and other industries, for example the health industry, challenges the assumptions that underlie regulation defined before the digital revolution. This impediment to digital deployment calls for an updating of regulation to facilitate new, more sustainable, digitally enabled lifestyles.

Additionally, “winner-takes-all” market structures without an adequate regulatory environment contribute to the formation of monopolies and oligopolies in highly scalable platform solutions across all country clusters, hindering healthy market rivalry to drive down prices and hence scale deployment. More generally, these barriers highlight the lack of a level playing field for competition and innovation – a prerequisite for digital solutions to flourish. On top of these barriers, ICT investors in the least developed countries and developing regions also face the challenge of unreliable applications of the rule of law and a lack of regulatory certainty in general. This hinders the deployment of every type of digital technology and is clearly a challenge that the ICT sector, in conjunction with governmental partners, needs to help least developed and developing countries address, and to which SDG 16 (on promoting just, peaceful and inclusive societies) explicitly refers.

**FOCUS ON FINANCIAL BARRIERS**

The financial barriers impeding full digital deployment fall into three categories: a lack of regulatory and policy incentives for investment within the rules of the game, a lack of available capital on the supply-side and low affordability of digital solutions on the demand-side. All three, but especially the last one, apply much more in least developed countries and developing regions than in developed regions. Limited public support for financing most seriously affects investment in digital infrastructure in these regions, while a general lack of incentives can affect each ICT sub-sector in developing and developed regions, for example by failing to provide financial support for testing and rolling out innovative digital solutions. Both are areas requiring significant focus in the coming years by the private sector and policy makers alike to create a financial environment that fosters the digital innovations that further sustainable development.

A general lack of investment security undermines efforts to find capital for large infrastructure projects in developing and least developed regions. But the high volume of capital needed for such projects poses problems in developed regions too. Across all regions, projects that connect the unconnected, especially, are impeded by inadequate (risk)-return profiles for private sector suppliers, for example projects to install costly infrastructure that reaches remote settlements in rural areas with low or decreasing population density.

Coupled to this, in developing regions, the low affordability of certain devices, sensors and software partly inhibits the uptake of digital solutions. Therefore, limited demand renders these markets unattractive for businesses, while businesses partly lack adequate business models to serve low-income market segments (like unattractive tariff options). Low availability of financing for devices for the unconnected (for example, the lack of government substitutes) excludes potential users in least developed and developing regions from enjoying the social, economic and environmental dividends of digital solutions.

**CONCERNS AROUND SCALING DIGITAL SOLUTIONS**

As noted earlier, any large-scale transformation will throw up challenges alongside opportunities. This is in the nature of novelty. Some of the challenges are societal, others political. Digital solutions are no different, and the scale of the transformation referred to in this report means that the potential downsides are amplified. To our minds, the most serious of these concerns are as follows:

**Ensuring digital trust:** there are two stands to this. The first is guaranteeing moral governance in the collection and accessing of data without infringing people’s privacy. The second, digital ethics, is how data generated from a variety of sources, including sensors, should be used ethically

**Avoiding cyber-crime:** as digital technologies become more widespread and complex, the need to keep people’s data secure and to protect them from attack becomes greater

**Addressing any negative impacts on employment:**

digital technologies affect employment significantly, in a variety of ways. It is imperative that societies adequately prepare people to anticipate changing requirements in the labor market and enable them to pick up the rights skills to maximize their employment potential

**Reducing ICT’s footprint:** ICT equipment needs to be designed and distributed with a view to minimizing the sector’s footprint and recovering the value from used devices

To harness ICT’s full potential to achieve the SDGs, these barriers and concerns need to be overcome and addressed. The next chapter outlines a roadmap GeSI has developed on how private-sector ICT companies can work with their partners to do this.

**EXHIBIT 16:** Overview of barriers to ICT deployment, with most important barriers marked bold

BARRIER PERSPECTIVE	BARRIER FOR ICT DEPLOYMENT
<b>"Rules of the game"</b> (political perspective)	<ul style="list-style-type: none"> <li>• <b>Inadequate regulatory environment</b></li> <li>• <b>Unreliable application of regulation and the rule of law</b></li> <li>• <b>Lack of investment and financing incentives</b></li> <li>• Limited awareness of ICT’s potential among stakeholders, for example, policy makers, aid organizations, NGOs, etc.</li> <li>• Excess taxation on ICT services</li> </ul>
<b>Supply</b> (industry perspective)	<ul style="list-style-type: none"> <li>• <b>Lack of available capital for financing</b></li> <li>• Lack of cross-sector collaboration / partnerships</li> <li>• Lack of integrated standards across technologies</li> <li>• Lack of relevant physical infrastructure, e.g. electricity, wireless spectrum</li> </ul>
<b>Demand</b> (customer perspective)	<ul style="list-style-type: none"> <li>• <b>Low affordability of ICT solutions</b></li> <li>• Lack of ICT skills</li> <li>• Lack of suitable applications, e.g. regarding content</li> <li>• Lack of acceptance of digital solutions</li> <li>• Gender-specific barriers, e.g., lower purchasing power, lower literacy rates, mismatch with cultural role expectations</li> <li>• Lack of applications in local language</li> </ul>

# VI. GeSI's Commitment and Call for Action to Make the SDGs a Reality

This chapter calls for joint effort to harness digital solution's full potential, identifies the roles of relevant partners, explores the ICT private sector role, and outlines GeSI's roadmap to 2030

The transformation envisioned by the UN SDGs is nothing short of a revolution in the way we live our lives. Not a single person will be unaffected if the goals are all achieved, and life will be unbelievably better for everyone.

GeSI, as a leading source of information and best-practice on achieving sustainable development through ICT, has made the SDGs its central framework for action, putting people at the heart of our agenda. We have defined a roadmap and will continue to refine it to inform our priorities up to 2030. GeSI is committed to act as a proactive player in the debate over how the world should use our industry's solutions to step up to the challenge of the SDGs. We will support our member companies – some of the most innovative private sector organizations in the world – in working with their own stakeholders to make the exciting vision this report has set out a reality. And we will monitor our sector's contribution to SDG achievement to celebrate successes and to understand where further efforts are required.

GeSI is firm in its view that robust data, setting out the business case as well as the social, macroeconomic and environmental case for the SDGs will aid decision-makers as they aim to raise investment and scale the projects needed to meet the SDGs, in least developed countries, developing and developed regions alike.

But what makes GeSI so excited about harnessing digital solutions to achieve the SDGs is not just that they provide practical and transferrable solutions but also that they reach so many people, and place them – literally – at the controls. Many ICT companies have been built on innovation and what unites them is the desire for collaboration, communication and bringing people together. And that is one reason why we emphasize this point: rolling out the digital solutions to achieve the SDGs will happen only by joint effort.

## GESI INVITES THE FOLLOWING PARTNERS TO TAKE JOINT ACTION:

**Policymakers**  need to be fully aware of the practical potential of ICT and to do their part in shaping policy and legal frameworks to improve the "rules of the game". For sure, liberalizing some markets, improving the ease of doing business, bearing down on restrictive practices and improving business climates is important. But so is taking steps to ensure that ICT is not taxed as a luxury, as is the case in some countries, but as a necessity. Brazil, for example, exempted computers from VAT, foregoing \$3.5 billion in tax receipts in 2015, but believes that tax break was "more than compensated for by an increase in output, sales and employment in the sector"<sup>98</sup>. On the demand side, it is crucial that we raise digital literacy rates, for example by updating learning curricula, both among young and old, to ensure that no one gets left behind by the rising technological tide. There is already a "digital divide" emerging between "haves" and "have-nots", and also between men and women, and we must overcome it.

**Multilateral organizations**  like the UN and the World Bank, along with international standards-developing organizations, need to play their part in spreading norms, standards and good practices on how to harness the power of digital solutions to development ends as quickly as possible. We have already noted that upfront capital cost and access to financing are often barriers to ICT roll-out. Multilateral organizations are crucial partners in de-risking large investments, especially in digital infrastructure, where the use of Public-Private Partnerships is likely to be important. GeSI is also clear that – in the ICT sector – multi-stakeholder engagement platforms are often the keys to enabling dialogue with policy makers, unlocking financing and creating a problem-solving environment to jointly envision and implement solutions. For this purpose, the UN General Assembly called for close alignment between the World Summit on the Information Society and the 2030 Agenda for Sustainable Development.

**Businesses from outside the ICT sector**  need to raise their voices with the ICT sector's, to demonstrate that they are just as committed to meeting the SDGs, and to insist that other businesses in their own sector are part of the solution, not the problem. This has often been overlooked in the past. Today, the world needs to work on developing international standards, on building joint ventures and on jointly speaking up on regulation that does not work – as well as on the regulation that will reduce the risks for investors.

Finally  **NGOs and donor organizations**  in the third sector need to continue to work with businesses and governments to improve the "rules of the game" and to develop and help implement new and innovative projects for improving people's lives. NGOs also perform a very important role in communicating not just the scale of the challenge to the wider public – in developed regions especially – but they are also excellent partners for adapting development models to different places and ensuring content is tailored both linguistically and culturally to make the greatest impact.

And what is the specific role for  **private sector ICT companies**  in making all this happen? First, it is critical to recognize the opportunity to simultaneously transform the world and grow our businesses. Second, the ICT sector needs to ensure that its solutions are implemented responsibly. This means tackling the concerns over aspects of the digital transformation – some of which are outlined in the previous chapter. In order to guide the sector in this, GeSI will continue to support its members to align our activities on the principles of stewardship, transparency, empowerment, equity and inclusion.<sup>99</sup>

## NEXT STEPS:

GeSI has defined a roadmap for the next 15 years, and we will continuously refine it to guide our priorities up to 2030. The roadmap contains our commitment to support our members in making the SDGs a reality. Major action items include the need to:

Raise stakeholders' awareness of the potential of digital solutions towards SDG achievement and supporting stakeholders to engage

Engage with policy makers and other relevant stakeholders to create a market environment that works towards realizing the SDGs

Foster cross-industry collaboration and partnerships to boost the positive private sector impact across all sectors

Improve the relevance of our industry's services towards SDG achievement, for example by providing services in local languages, offering flexible payment solutions to improve affordability and adapting business models to low income countries to improve access

Monitor and report the ICT sector's contribution to SDG achievement, for example by:

- Tracking the implementation of initiatives aimed at leveraging digital solutions to achieve the SDGs
- Tracking access to those services our industry provides which are relevant to SDG achievement

The ICT sector has already had a good start. GeSI is proud but not satisfied with the progress to date and is convinced that if the next transition is steered responsibly, then we truly can achieve the vision set out by 193 countries in 2015 to transform every person's life for the better. GeSI hopes this report provides the starting point to define a practical roadmap for the beneficial use of digital solutions in achieving that vision.

**Please join us!**

## About

### ABOUT GESI

The Global e-Sustainability Initiative (GeSI) is a strategic partnership of the Information and Communication Technology (ICT) sector and organizations committed to creating and promoting technologies and practices that foster economic, environmental and social sustainability. Formed in 2001, GeSI’s vision is a sustainable world through responsible, ICT-enabled transformation. GeSI fosters global and open cooperation, informs the public of its members’ voluntary actions to improve their sustainability performance, and promotes technologies that foster sustainable development.

GeSI enjoys a diverse and global membership, representing around 40 of the world’s leading ICT companies and partners with over 12 global business and international organizations such as the International Telecommunications Union (ITU), the United Nations Framework Convention on Climate Change (UNFCCC), the United Nations Environment Program (UNEP), the World Business Council for Sustainable Development (WBCSD), the World Resources Forum Association (WRFA) - as well as a range of international stakeholders committed to ICT sustainability objectives to share and develop ideas, launch joint initiatives, and collaborate on a broad range of sustainability projects. These partnerships help shape GeSI’s global vision regarding the evolution of the ICT sector, and how it can best meet the challenges of sustainable development.

For more information, see [www.gesi.org](http://www.gesi.org).

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## Endnotes

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- The United Nations define least developed countries based on three criteria: Income, Human Assets Index (HAI) and Economic Vulnerability Index (EVI). United Nations Development Policy and Analysis Division, “LDC criteria”, 2014
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- This report uses the term „digital“ to describe innovative digital solutions, e.g., e-health or e-learning, and the term “ICT” to describe the ICT industry, i.e. infrastructure and connectivity providers, devices and sensors producers and retailers and software and apps producers and providers.
- Indicator selection for “status of the world analysis” based on the four requirements (in order of importance). Indicators should: (1) cover areas of the SDGs where digital solutions can have a direct or indirect impact (2) Focus on the central topics within each SDG. Where topics where covered within several SDGs, e.g., violence covered in SDG 5 and 16, indicators were defined for the SDG which has its main focus on that topic, e.g., in case of violence, indicators about violence were included in SDG 16 but not in SDG 5. (3) Align as closely as possible with the indicators selected by the UN Economic and Social Council (status: 47th session, 8-11 March 2016), depending on data availability, (4) Have data readily available at country level in publicly accessible databases published by a reputable source in Excel/cvs format (status: March 2016)
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57. The definition of broadband in this report is based on the definition of broadband used by the ITU, “Measuring the Information Society Report 2015”, 2015; According to this report, “Fixed-broadband subscriptions refers to fixed subscriptions for high-speed access to the public Internet [...] at downstream speeds equal to or greater than 256 kbit/s[...]” and “[...] [M]obile-broadband subscriptions refers to active mobile-cellular subscriptions with advertised data speeds of 256 kbit/s or greater that allow access to the greater Internet [...]. Standard SMS and MMS messaging do not count as active Internet data connection, even if messages are delivered via IP”. However, ITU collects this data from various national sources, which may lead to variations in interpreting and applying these definitions.

58. This is based on the following assumptions: (1) 10% increase in broadband penetration to yield +1.38% average GDP growth in developing regions (ITU, “Working Together to Connect the World by 2020: Reinforcing Connectivity Initiatives for Universal and Affordable Access”, 2016); (2) In line with the universal access target 9.c we assume 80% broadband penetration (GSMA, “The Mobile Economy 2014”, 2014) in 2030, up from 44,5% broadband penetration in 2014 (80% increase); (3) GDP growth forecast assumed to have taken into account expansion of mobile broadband penetration to 80% (World Bank, “Projected Real Gross Domestic Product (GDP) and Growth Rates of GDP for Baseline Countries/Regions (in billions of 2010 dollars) 2010-2030”, 2015)

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99. Accenture’s five principles of digital responsibility: Stewardship: Businesses should take all reasonable measures to ensure the environmental and social responsibilities for its digital products and services; Transparency: Businesses should be as transparent as possible in their use of digital technology, building trust with their stakeholders across their operations and ensuring that individuals understand clearly the value that they receive for interacting with digital services; Empowerment: Businesses should ensure that safeguards and systems are in place to give individuals appropriate controls over technological development; Equity: Businesses should ensure that customers are equal partners in a ‘fair value exchange’ when collecting and using personal data and that producers of devices are fairly treated; Inclusion: Businesses should use their digital assets to help reduce existing societal inequalities and achieve positive societal outcomes, not only whilst using digital solutions, but also in production. (Accenture, “Guarding and growing personal data value”, 2015)



"The story is clear: digital puts achieving the Global Goals within reach, and the Global Goals boost our business opportunities. At BT, we are already demonstrating how ICT can support the transition to the low carbon economy. And much more is possible by 2030."

*Gavin Patterson, Chief Executive, BT Group*



"Connectivity is at the core of Telenor's business and fundamental for supporting the UN Sustainable Development Goals. We believe communication and mobile technologies can be successfully applied to ensure better health, education, reduced inequalities and combat climate change. The ICT industry plays an important role together with Governments and civil society to achieve the UN Sustainable Development Goals."

*Sigve Brekke, President and Chief Executive Officer, Telenor Group*



"Verizon is excited about the impact our digital technology can have in helping our customers implement sustainable practices and in improving educational programs to create brighter futures for marginalized youth. By tapping into the power of digital technology, we can address two of society's biggest needs."

*Rose Stuckey Kirk, Chief Corporate Responsibility Officer & President, Verizon Foundation*



"GeSI is committed to act as a proactive player in the debate over how the world should use our digital solutions to address the SDG's challenges. The SDG's will be GeSI's central framework for action. We have defined an implementation roadmap and will continue to refine it to guide our priorities up to 2030. We commit to support our member companies to make the exciting vision this report has set out a reality. And we will monitor and report on our sector's contribution to SDG achievement to celebrate successes and to understand where further efforts are required."

*Luis Neves, Chairman, Global e-Sustainability Initiative (GeSI)*

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