



# Technology

## Definition

The reach of technology has expanded considerably since the beginning of the 20<sup>th</sup> century and more particularly since the 1990s. The use of technology is ever-growing and in industrialized countries permeates almost every single sector of people lives. Currently, basic technologies are accessible to the majority of the world population. Technologies can include basic and everyday objects such as cars, coffee machines or credit cards while new technologies range from nanotechnology, smartphones, drones and 3D printers to artificial intelligence. Developments in information and communication technology have the most extend.

In 2016 ICT services are becoming increasingly affordable and covering ever larger areas, available to two-thirds of the world's population<sup>1</sup>. This extensive development is advancing progress towards goal 9 of the SDGs which seeks to “Build resilient infrastructure, promote sustainable industrialization and foster innovation”<sup>2</sup>.

## Key Insight

**The use of new technologies and their increasing availability will have major “transformative consequences”<sup>3</sup> for the humanitarian sector.**

Technology allows access to remote areas and communities, for example, “related technologies, including telemedicine, open the way for the provision of care at a level normally not considered possible in poor or inaccessible communities<sup>4</sup>”. It induces changes in all socio-economic aspects of peoples’ lives with often positive impacts on education and social connections between individuals. However, it also provides risks, as social networking can be a relay of “misleading information<sup>5</sup>” sometimes leading to confusion between “different calls for

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<sup>1</sup> International Telecommunication Union, (2016), [ICT facts and figures 2016](#), pg. 8

<sup>2</sup> United Nations, (2016) [Goal 9: Build resilient infrastructure, promote sustainable industrialization and foster innovation](#). Sustainable Development goals, 17 goals to transform our world, retrieved on 7 April 2017

<sup>3</sup> Kent, R, Armstrong, J, Obrecht, A, (2013), [The Future of Non-Governmental Organisations in the Humanitarian Sector. Global Transformations and Their Consequences](#), Humanitarian Futures Programme, King's College London, pg. 42

<sup>4</sup> Kent, R, Armstrong, J, Obrecht, A, (2013), [The Future of Non-Governmental Organisations in the Humanitarian Sector. Global Transformations and Their Consequences](#), Humanitarian Futures Programme, King's College London, pg. 42

<sup>5</sup> Kent, R, Armstrong, J, Obrecht, A, (2013), [The Future of Non-Governmental Organisations in the Humanitarian Sector. Global Transformations and Their Consequences](#), Humanitarian Futures Programme, King's College London, pg. 42



assistance”<sup>6</sup>. Technology is challenging for aid organizations in terms of public perception and media coverage. “The widespread availability of social networking and mobile capability shapes the local and global public arenas in which NGOs must negotiate their credibility and legitimacy”<sup>7</sup>. Technology can be also be a vector of crises as it can be used for nefarious purposes such as cyber-attacks. Moreover, the emergence of “social networking presents a vision of possibilities that are profoundly transformative, and yet their social, socio-economic and political consequences are redolent with uncertainty”<sup>8</sup>.

Humanitarian providers must adapt to this new context and its stakes. “For humanitarian NGOs, the interaction between an ever-increasing range of technologies and natural hazards will pose ever more challenging strategic and operational issues”<sup>9</sup>.

## Changes by 2030

### ➤ Acceleration of technological change

The acceleration of technological developments is a major and continuing trend of the 20th and 21<sup>st</sup> century<sup>10</sup>. This trend is particularly marked since the beginning of the 2000’s and the unprecedented development of information and communication technologies. Ever- growing technologies intersect with an increasing number of objects in various domains, as is illustrated by the increase of patent applications. In 2015, no less than 2.9 million patent applications were submitted. This trend is likely to continue with consistent increases of between 5% and 9% each year, building from the brief decline in 2009-2010 after the economic crisis<sup>11</sup>. This trend, the acceleration of technological change, is being underpinned by other major trends such as a growing youth population in developing and middle income

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<sup>6</sup> Kent, R, Armstrong, J, Obrecht, A, (2013), [The Future of Non-Governmental Organisations in the Humanitarian Sector. Global Transformations and Their Consequences](#), Humanitarian Futures Programme, King’s College London, pg. 42

<sup>7</sup> Kent, R, Armstrong, J, Obrecht, A, (2013), [The Future of Non-Governmental Organisations in the Humanitarian Sector. Global Transformations and Their Consequences](#), Humanitarian Futures Programme, King’s College London, pg. 42

<sup>8</sup> Kent, R, Armstrong, J, Obrecht, A, (2013), [The Future of Non-Governmental Organisations in the Humanitarian Sector. Global Transformations and Their Consequences](#), Humanitarian Futures Programme, King’s College London, pg. 42

<sup>9</sup> Kent, R, Armstrong, J, Obrecht, A, (2013), [The Future of Non-Governmental Organisations in the Humanitarian Sector. Global Transformations and Their Consequences](#), Humanitarian Futures Programme, King’s College London, pg. 42

<sup>10</sup> European Environment Agency (2010), [assessment of global megatrends - an update, global megatrend 4: Accelerating technological change](#), State and outlook 2010, 70. pg

<sup>11</sup> World Intellectual Property Organization (2016), [World Intellectual Property Indicators 2016](#), pg. 173



countries who are more inclined to integrate technology in their work and personal life, and economic globalisation ensuring a global growing demand.



### ➤ High global acceptance for new technologies

This acceleration trend is sustained by high global acceptance of technologies by civil societies. Mass adoption of new technologies is quickening since the 1990's. Illustrating this, it took 7 years and 13 years respectively, for the internet (World Wide Web) and mobile phones to be adopted and used by a quarter of the United-States population whereas it took 35 years for the telephone and 46 years for electricity<sup>12</sup>. This adoption is varying according to the local culture and available infrastructures.

ITC technology such as mobile-cellular phones and the internet have a higher penetration rate than any other technology. Between 2000 and 2015, global Internet penetration grew 7-fold from 6.5% to 53%<sup>13</sup> of the world population. Mobile cellular penetration rate grew 97% from 738 million units to 7 billion units during the 2000-2015 period<sup>14</sup>. In 2019,

<sup>12</sup> European Environment Agency (2016) [Safeguarding people from environmental risks to health](#)

<sup>13</sup> International Telecommunication Union, (2019), [Measuring digital development. Facts and Figures 2019](#), pg. 1

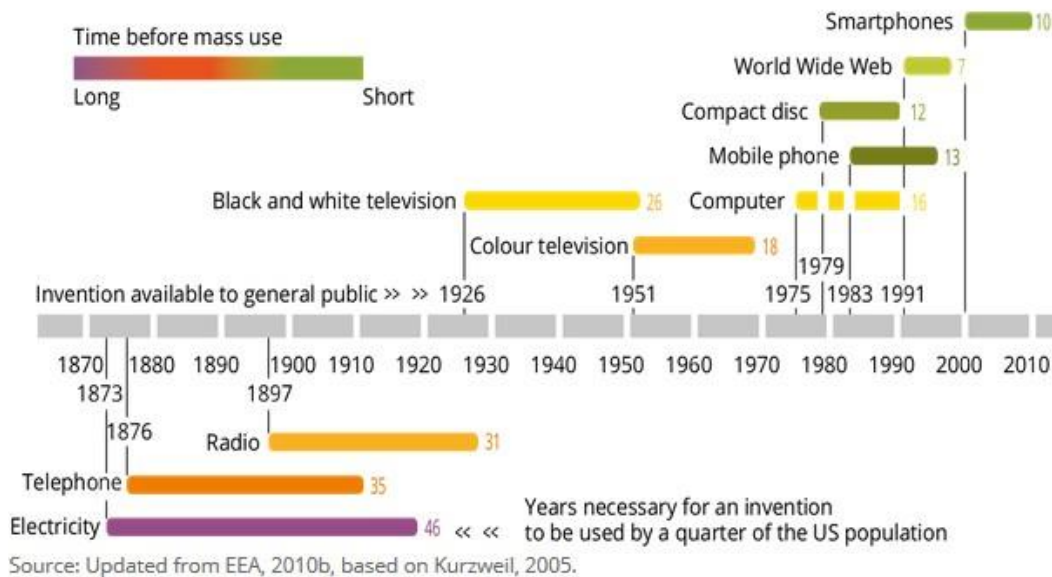
<sup>14</sup> International Telecommunication Union, (2015), [ICT facts and figure. The world in 2015](#), pg. 6



57% of global households had internet access<sup>15</sup> an increase from 52.3%<sup>16</sup> in 2016 and 46%<sup>17</sup> in 2014.

This increase in the use of ICT is almost certain to continue to grow. By 2020, 57% of the world population is expected to be equipped with mobile broadband connections from 24% in 2015<sup>18</sup>. More than half of the world population, 54%, is projected to be online by 2020<sup>19</sup>. Concurrently, other technology such as robotic or “internet of things” objects are beginning to gain momentum. Currently, 1,8 million robots are active, 80% of them being used in industry. Between 2008 and 2017, the sale of robots increased by 500% and is continuing to increase, sustained primarily by Asian demand. The number of internet of thing objects is expected to be reach between 18 and 50 billion by 2020 compared to 6 to 14 billion in 2014<sup>20</sup>.

**Figure 5.4 Shortening the time lapse before mass adoption of new technologies**



<sup>15</sup> International Telecommunication Union, (2019), [Measuring digital development. Facts and Figures 2019](#), pg. 7

<sup>16</sup> International Telecommunication Union (2015) [ICT facts and figures, the world in 2015](#), pg. 4

<sup>17</sup> International Telecommunication Union (2014) [ICT facts and figures, the world in 2014](#), pg. 3

<sup>18</sup> GSM Association (2015), [The mobile economy, sub-Saharan Africa](#), pg. 62

<sup>19</sup> International Telecommunication Union (2017), [connecting the unconnected, Working together to achieve, Connect 2020 Agenda Targets](#), background paper to the special session of the Broadband Commission and the World Economic Forum at Davos Annual Meeting 2017, pg. 30

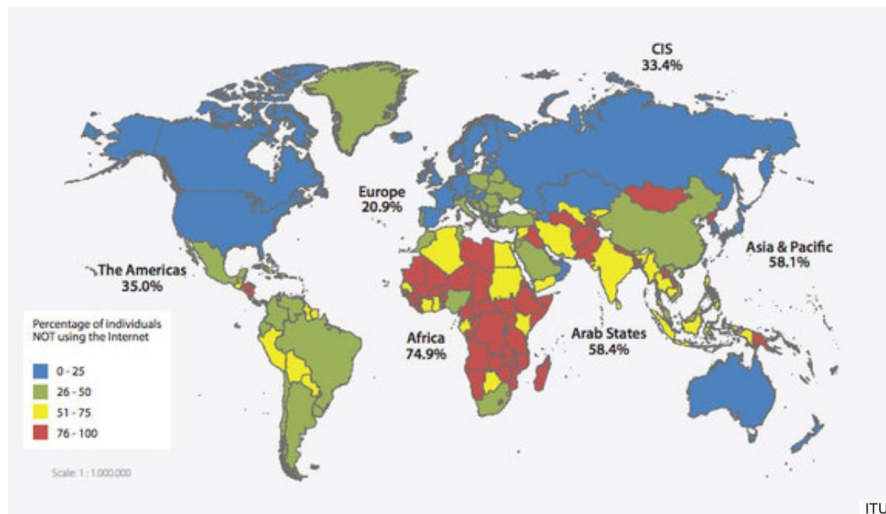
<sup>20</sup>Knud, L.L, (2014), [Iot Market — Forecasts at a glance](#), Iot Analytics

➤ **Remaining significant inequalities for technology access**

Despite the formidable development of technology, significant global disparities in access and adoption remain. These inequalities of access and use of technologies are particularly marked; to describe it, the ICT coined the “digital divide”<sup>21</sup>. The global digital divide highlights inequalities of access to new technologies as lack of access to the internet and mobile technologies can be an inhibitor to the use of other technological advancements and basic goods and services.

The divide in access is particularly marked between developed and emerging and least developing countries. The majority of the population not using the internet live in Africa and Asia. On average, 86.6% of the population of developed countries are connected to the internet compared to 19.1% for the least developed countries.<sup>22</sup> Connectivity is a particular challenge in Africa where the offline population is 75% of the total<sup>23</sup>.

Proportion of regional population using the internet



Source: ITU

<sup>21</sup> International Telecommunication Union, (2015), [ICT facts and figure, The world in 2015](#), pg. 6

<sup>22</sup> International Telecommunication Union, (2019), [Measuring digital development. Facts and Figures 2019](#), pg. 2

<sup>23</sup> International Telecommunication Union (2017), [connecting the unconnected, Working together to achieve, Connect 2020 Agenda Targets](#), background paper to the special session of the Broadband Commission and the World Economic Forum at Davos Annual Meeting 2017, pg. 30

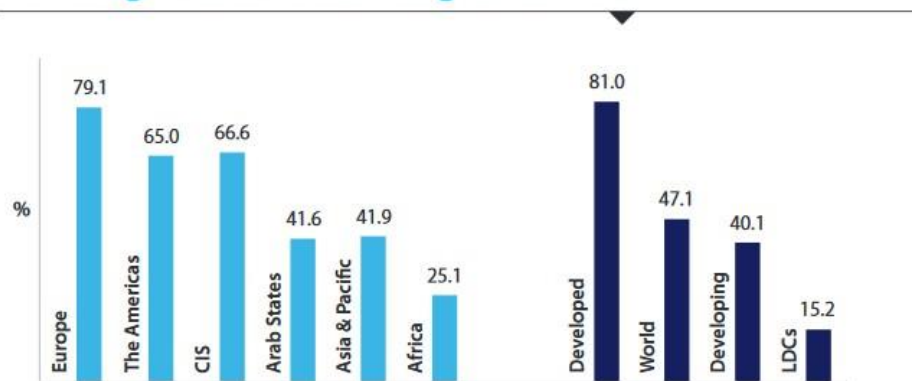


Inequalities of access are not restricted to ICT technologies as it also concerns other types of technology. Robotics constitutes one example of these disparities with 70% of robots, particularly those used in industry, being bought by just five countries: China, Japan, Korea, the United States and Germany. 3D printing technologies are similarly concentrated, with nearly 40% of the products currently located in the United States. Japan, Germany, China, United Kingdom, Italy and France have 39% of the world's 3D printers, while the rest of the world shares the remaining 21%<sup>24</sup>.

Added to this is a geographical and gender divide even at a national level. Despite investments in extending technologies to remote areas, the access and quality disparities between urban and rural

areas are persistent--60% of the unconnected population lives in rural areas<sup>25</sup>. There is also a gender divide with women composing the larger share of unconnected people worldwide, 58%<sup>26</sup>. This gender gap is most pronounced in the least developed countries with the largest gap for the African countries and smallest for the American countries<sup>27</sup>.

**Percentage of individuals using the Internet**



Source: ITU

These inequalities are mainly due to the lack of locally adapted infrastructures and longer delay to get the latest advanced technologies. When the technology is available,

<sup>24</sup> Conseil Économique Social et Environnemental (2015) [Innovations technologiques et performance industrielle globale : l'exemple de l'impression 3D](#), pg. 62

<sup>25</sup> International Telecommunication Union (2017), [connecting the unconnected. Working together to achieve. Connect 2020 Agenda Targets](#), background paper to the special session of the Broadband Commission and the World Economic Forum at Davos Annual Meeting 2017, pg. 30

<sup>26</sup> International Telecommunication Union (2017), [connecting the unconnected. Working together to achieve. Connect 2020 Agenda Targets](#), background paper to the special session of the Broadband Commission and the World Economic Forum at Davos Annual Meeting 2017, pg. 30

<sup>27</sup> International Telecommunication Union, (2016), [ICT facts and figures 2016](#), pg. 8



including in urban areas, it can be unaffordable or inaccessible given the level of skills<sup>28</sup> or language<sup>29</sup> needed to use it effectively. Consequently, “the offline population is disproportionately female, rural, poor, illiterate and elderly”<sup>30</sup>.

Inequalities are likely to remain an ongoing challenge, with projections showing that by 2020, the percentage of the population who are online in the least developed and developing countries will only represent 17% and 46% respectively<sup>31</sup>.

Nevertheless, lack of access to the most recent technologies can be bypassed by other means. The least-connected populations often use adaptation mechanisms to meet these inequalities by relying on more broadly available technologies. One example is the widespread availability of mobile phone. In 2016, “seven billion people (95% of the global population) live in an area covered by a mobile-cellular network”<sup>32</sup>, this has allowed the unexpected expansion of mobile money transfer applications such as M-Pesa in Kenya.

## Uncertainties

### ➤ Use of nanotechnology

Nanotechnologies are often spoken of as revolutionary tools which could eventually transform many socio-economic logistics and dynamics. “Nanoscale materials have been used for decades in applications ranging from window glass and sunglasses to car bumpers and paints. Currently, the convergence of scientific disciplines (chemistry, biology, electronics, physics, engineering etc.) is leading to a multiplication of applications in many domains such as industry, health care, energy, biotechnology, space exploration and, security. Nanotechnology is expected to have a significant impact on our economy and society”<sup>33</sup>. Nanotechnologies are expected to impact numerous sectors, including drug delivery,

<sup>28</sup> International Telecommunication Union, (2016), [Working together to connect the world by 2020, reinforcing connectivity, initiatives for universal and affordable access](#), Davos forum, pg. 22

<sup>29</sup>International Telecommunication Union and UNESCO (2015), [The state of broadband 2015: broadband as a foundation for sustainable development](#), the Broadband Commission for digital development, pg. 100

<sup>30</sup> International Telecommunication Union (2017), [connecting the unconnected, Working together to achieve, Connect 2020 Agenda Targets](#), background paper to the special session of the Broadband Commission and the World Economic Forum at Davos Annual Meeting 2017, pg. 30

<sup>31</sup> International Telecommunication Union (2017), [connecting the unconnected, Working together to achieve, Connect 2020 Agenda Targets](#), background paper to the special session of the Broadband Commission and the World Economic Forum at Davos Annual Meeting 2017, pg. 30

<sup>32</sup> International Telecommunication Union, (2016), [ICT facts and figures 2016](#), pg. 8

<sup>33</sup> OECD, [Opportunities and Risks of Nanotechnologies](#), pg. 3



agriculture (through nanoseeds for instance), energy or even textiles and so are expected to change the way humanitarian assistance is provided and the way humanitarian actors interact with populations in need.

➤ **Citizen-driven humanitarian response facilitate by technologies**

The emergence and global spread of technologies, particularly digital technologies, allows greater involvement of citizens in humanitarian response. Using emerging technologies (platforms, social networks, mobile technology...) citizens could gather, mostly virtually, to respond to humanitarian demand directly in anticipatory, emergency and even post-crisis support. A citizen-driven humanitarian response was illustrated following the 2010 Haiti earthquake exhibited by the tremendous financial support through donations or technical support with the online-crowdsourcing platform Ushahidi<sup>34</sup>. The emerging trend of citizen-driven response via digital technologies is often referred as digital humanitarianism describing “the people who participate or volunteer to deploy technology for the humanitarian aid”<sup>35</sup>. Despite its potential advantages, the impact of this new form of humanitarian assistance remain unclear due to lack of cooperation between actors and uncoordinated individual initiatives<sup>36</sup>. Concurrently, the sustainability of such movements is uncertain with the risk of concentration of the support on being focused crises attracting media and public attention while some others might be neglected. NGOs will be forced to update their marketing strategies and techniques to compete for funding in this new era of social media-based donations.

➤ **Populations increasingly using technologies to face humanitarian distress situation**

Broader usage of social networks and the greater availability of mobile technology is “increasing information supply and demand”<sup>37</sup> in situations of humanitarian distress. As illustrated in several recent crises, mostly as result of natural hazards, affected populations are increasingly using digital technologies to respond more rapidly to the emergency. During the 2011 Japanese tsunami or the 2012 Hurricane Sandy, the twitter network was intensively used

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<sup>34</sup> Qadir, J, Anwaar, A, Rasool, R, Zwitter, A, Sathiaseelan, A and Crowcroft, J (2016) [Crisis analytics: big data-driven crisis response](#), Journal of International Humanitarian Action, 17 August 2016

<sup>35</sup> Qadir, J, Anwaar, A, Rasool, R, Zwitter, A, Sathiaseelan, A and Crowcroft, J (2016) [Crisis analytics: big data-driven crisis response](#), Journal of International Humanitarian Action, 17 August 2016

<sup>36</sup> Qadir, J, Anwaar, A, Rasool, R, Zwitter, A, Sathiaseelan, A and Crowcroft, J, [crisis analytics: big data-driven crisis response](#), Journal of International Humanitarian Action, 17 August 2016, retrieved on 7 April 2017

<sup>37</sup> Phillips, J, [Can a citizen-driven response improve humanitarian action?](#) ICRC blog, 4 January 2017, retrieved on November, 6, 2019





to ask for help or propose assistance<sup>38</sup>. Even if the positive impacts and contribution of these systems are well-recognized, the long-term consequences remain highly uncertain<sup>39</sup>. How the humanitarian community will meet the challenge of a “new set of expectations from affected communities for the provision of response”<sup>40</sup> is unclear.

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<sup>38</sup> Phillips, J, [Can a citizen-driven response improve humanitarian action?](#) ICRC blog, 4 January 2017, retrieved on 6 November, 2019

<sup>39</sup> Kent, R, Armstrong, J, Obrecht, A, (2013), [The Future of Non-Governmental Organisations in the Humanitarian Sector. Global Transformations and Their Consequences.](#) Humanitarian Futures Programme, King’s College London, pg. 42

<sup>40</sup> Phillips, J, [Can a citizen-driven response improve humanitarian action?](#) ICRC blog, 4 January 2017, retrieved on November 6, 2019