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EDITORIAL

# Editorial: The Real Technology Revolution: Technology Justice

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We are witnessing the dawn of the Fourth Industrial Revolution. Over the last 250 years, humanity benefited (and suffered) from the use of water and steam power to mechanize production in the First Industrial Revolution, then from electric power to create mass production in the Second Industrial Revolution, and most recently from electronics and information technology to automate production in the Third one. The Fourth Industrial Revolution builds on digital advancements that converge with other technologies and blur the lines between physical, digital and biological realms.

As it was in previous industrial revolutions, technologies are touted as solution to the social, economic and environmental challenges of our time, often as framed by those who develop and deploy these technologies. New and emerging technologies such as synthetic biology and gene editing techniques are promoted to deliver food security, health and nutrition, even energy security, while high hopes are pinned on geoengineering as a saviour from the climate crisis. Automation, robotics, drones and remote sensing are expected to address problems in agriculture, health, transportation and infrastructures. Artificial intelligence (AI) machine learning and crypto currencies promise to deliver long-aspired industrialization to developing countries.

As technologies, coupled with policies that promote human welfare, contribute to better health and sanitation, even food security in many parts of the world, as well as to the sharp decrease in extreme poverty globally, studies show that income inequality may be at its highest since the industrial revolution.[1] While new tools and technologies are developed that could potentially address development challenges, they are not necessarily accessible to all nor benefit those who need them most. Furthermore, these technologies actually lock-in and further consolidate the current hegemonic and homogenizing pattern of economic globalization along with its concentration of economic and political power.

The so-called 'digital divide' between the Global North and the Global South remains largely un-addressed, despite apparent policy attention, and continues to mirror the wide gaps between the haves and have-nots within countries and between genders. While the world has more mobile phones today than its total population, over one billion people have no access to electricity, two billion people have no toilets and nearly a billion go hungry every day. Research and investments on neglected diseases like dengue, filariasis and leprosy that remain scourge to almost a billion people in the tropics only received investment amounting to US$3.6 billion in 2017,[2] the highest ever, compared to the estimated US$50 billion investments on cancer research every year.[3] Investments on so-called orphan crops that provide food and nutrition to people living in marginal areas and during environmental stresses are lamentably low while 45% of annual research and development investments on crop seeds are spent on maize, an industrial crop considered as most profitable for seed companies (Fuglie et al. 2011: 39). The disparities on who benefits from new technologies bring to the fore questions on who decides which technologies are developed, which problems should be prioritized, and what solutions are needed to address them.

As serious as these divides, though largely invisible in the dominant narrative of digitalization utopia, are its externalities: electronic waste, the energy requirement of data centres and data networks, mineral resources needed to produce new hardware and more efficient technologies, and the potential

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[1] http://thecorner.eu/world-economy/economic-inequality-may-be-at-its-highest-level-since-the-industrial-revolution/74792/. Accessed 21 October 2019.

[2] https://www.nature.com/articles/d41586-019-00244-4. Accessed 21 October 2019.

[3] https://www.mckinsey.com/industries/pharmaceuticals-and-medical-products/our-insights/pursuing-breakthroughs-in-cancer-drug-development. Accessed 21 October 2019.

spill-over impacts of the new wave of digitalization that is promised with 5G technology.

The Fourth Industrial Revolution is advanced by the private sector; more precisely, it is under the primary control of a handful of increasingly consolidated mega-corporations and their giant technology platforms. As the role of corporations is upscaled, the role of governments is played down and the role of people made invisible. Decades of basic research funded by taxpayers' money, as was in the case of the internet and drones, are drowned and forgotten in the excitement over resulting commercial products that reap profits for corporations. With many of these corporations not even paying direct taxes in countries where they operate,[4] it is no coincidence that the richest people (who are predominantly white males) in the world, many of whom own technology platforms and related businesses, comprise the apex of the 1% of global population that control nearly half of the world's wealth.,[5][6]

After decades of neoliberal policies allowing maximum space for corporations to operate within and across nations, accountability of corporate players for the adverse consequences to society of the technologies that they develop and commercially deploy is virtually inexistent. As governments and public institutions increasingly hedge their bets on private sector investments and public–private partnerships in technology development and deployment, the public should ask if it is fair and just that profits from technology enterprises end up in private pockets while society bears the costs of their impacts on people and planet.

The dematerialization of physical and biological resources resulting from digitalization have brought new complexities in grasping the societal impacts of these technologies and their legal implications. Advances in digital sequence information on genetic resources have rendered multilateral agreements on fair and equitable sharing of benefits arising from the use of biological and genetic resources obsolete even before they were even translated into national policies and legislations. Computer assisted genetic sequencing has made gene editing accessible to many scientists and researchers, some of whom ignore ethics and protocols in the race to fame, sometimes leading to profitable start-ups that can grow fast only to be snapped up by tech giants.

Behind the halleluiahs sang to the promises of the Fourth Industrial Revolution, governments and institutions are at a loss on how to deal with the challenges that comes with it. The UN General Assembly invited Sophia-the-robot[7] for an interaction on the SDGs with member States, rather than listen to grassroots representatives. Saudi Arabia was so awed from that interaction that it granted citizenship to genderless Sophia while criminalizing LGBTIQ. Sophia is the first non-human to be given any United Nations title when it was named first-ever Innovation Champion by the United Nations Development Programme in Asia–Pacific in November 2017. At the same time, South Korea imposed a form of taxation on factories employing robots in production to compensate for losses of human jobs.[8] And, in all this unclarity, the United Nations Secretary General has established a high-level panel on digital cooperation co-chaired by tech billionaires Jack Ma and Melinda Gates.[9] The UN has recently inked a partnership framework with the World Economic Forum (WEF),[10] the principal purveyor of the Fourth Industrial Revolution.

More than ever, governance of technologies needs to be at the centre-stage of societal deliberations in an increasingly technology-dominated world. This involves several intertwined challenges. The greatest obstacle comes from the profound and pervasive political economies that dominate the policy turf, which tend to generate a significant policy bias in favour of false solutions that only increase the concentration of technological power in few hands while locking in the current model of technological expansion. The dominance of tech giants was also enabled by a key pillar of neoliberal policies: the conscious retreat of governments from the technology sphere, leaving it wide open to the private sector. The mantra on public–private partnerships further reinforce this dominance of the private sector in the technology sphere: public institutions (including military research) provide the basic research while the private sector invests in development and deployment of promising technologies. Hence the vicious cycle where giant corporations and large technology platforms offer themselves as solutions to the problems which they have themselves generated. Where is the public in those partnerships? Well, it bears the societal impacts and costs of a profoundly unequal partnership. This state of affairs is further cemented by intellectual property regimes that exacerbate current divides and injustices, and

[4] https://www.huffpost.com/entry/60-biggest-companies-paid-no-taxes_n_5cb01f75e4b0ffefe3ae2626.

[5] https://www.forbes.com/billionaires/#5d1ff1e9251c. Accessed 21 October 2019.

[6] https://inequality.org/facts/global-inequality/#global-wealth-inequality. Accessed 21 October 2019.

[7] Sophia is a social humanoid robot developed by Hong Kong based company Hanson Robotics. Sophia was activated on 14 February 2016 and made its first public appearance in mid-March 2016 in Austin, Texas, United States. It is able to display more than 50 facial expressions.

[8] https://www.koreatimes.co.kr/www/news/tech/2017/08/133_234312.html. Accessed 21 October 2019.

[9] https://news.un.org/en/story/2019/06/1040131. Accessed 21 October 2019.

[10] https://weforum.ent.box.com/s/dj7x7z2fjxrox49farw5dfxfa1hfqw3h. Accessed 21 October 2019.

shackle those who need the technologies most from getting them.

There is also another set of challenges. For those on the bright side of the divide, technology is somehow fuelling—and thriving on—the myth of the superhuman. It evokes the idea that we can transcend the biological boundaries of human existence in search for some sort of immortality. Hubris and human-centric nature of new technologies are evident, that humans dominate and subjugate other creations and reduce other living organisms, including physical components of what makes us humans, into genes and genetic sequences that should be conserved in computer databases and considered as commodities that can be exchanged among researchers and traded by corporations. 'Conservation' has been endowed a totally new meaning by advances in synthetic biology and gene drives that promise 'resurrection' of extinct species, in gene editing that claim to create babies immune to diseases, in geoengineering that hypes up conservation of the climate. Who made these decisions on behalf of humanity and the planet? Who ensures that people who are most in need will benefit to make deliver the vision of no one being left behind by 2030? How? Technology is therefore becoming a new religion that gives hope to all those in search for it, obfuscating judgement and rendering any technology assessment very complicated.

This is further complicated by the generational divide: digital natives are hard-wired into modern communication technologies to the point that their virtual identities are somehow disconnected from their physical realities. How then can we deal with the technology justice question—and the complex assessments that it requires—in the context of such an emotional dimension and profound generational divides?

The fact remains that the rapid pace of technological advancement and the massive reach of corporate tentacles need to be checked and balanced by an involved and proactive civil society. Dominant narratives tend to promote 'silver bullet' approaches which exaggerate technology's potential to solve problems, underplaying the real extent of the necessary productive and behavioural transformations and shifting attention away from other policy and practical options. The reality is, while technology can play an important role in addressing environmental and social challenges, the pace of technological change is far beyond the grasp of most policymakers and peoples. And it is precisely the confluence of this fast pace and blind faith in technology that may create many dangers. Useful technologies may be overlooked, badly managed, or poorly regulated leading to their loss or abandonment, while problematic technologies may be promoted or imposed without adequate assessment. Furthermore, not all technologies may be accessible to all (particularly in the Global South), or technologies may be introduced (or packaged) in such a way that they are unacceptable or not useful at all to those who most affected by development challenges. Technological enthusiasm may obscure cheaper, more accessible and socially acceptable solutions.

An emphasis on the positive potential of new technologies requires, at least, a concomitant precautionary emphasis on a strengthened global, regional and national capacities to monitor and assess technologies and their real and potential impacts. Confronted by an overwhelming set of new and emerging technologies with potentially profound implications for our societies, our economies and our environment, most governments recognize that the need for assessment is urgent. The UN has recognized this need for decades and has enshrined the urgency of technology assessment based on the Precautionary Principle in the path-breaking Agenda 21 in 1992.[11] Two decades later, the Rio + 20 outcome document[12] reaffirmed the need to develop the capacity of developing countries to evaluate the potential adverse impacts of new and emerging technologies. However, while some industrialized countries, particularly in Europe, have technology assessment mechanisms and processes in place, governments in the Global South have little or no capacity in this respect.

Given the importance given to new technologies to achieve the Sustainable Development Goals (SDGs), multiple assessment mechanisms are necessary to look into their potential impacts at multiple levels, before these can be promoted as solutions. UN bodies that are mandated to help ensure that science, technology and innovations support the achievement of the 2030 Agenda for Sustainable Development, specifically the Technology Facilitation Mechanism (TFM) and the Commission on Science and Technology for Development (CSTD), should put in place adequate mechanisms for global horizon scanning to inform countries on emerging technologies and their potential impacts on society, health, livelihood, biodiversity and the environment. Such mechanisms should also include effective participatory assessments at national and regional levels, and help build capacities in evaluating the potential impacts of new and emerging technologies, as agreed by UN member-states at Rio + 20.[13] An intergovernmental assessment system must be supplemented by a civil society mechanism that can offer independent and alternative perspectives.

[11] United Nations Conference on Environment & Development, Agenda 21, 1992, https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf. Accessed on 10 October 2019.

[12] The Future We Want, Outcome document of the United Nations Conference on Sustainable Development, 2012, https://sustainabledevelopment.un.org/content/documents/733FutureWeWant.pdf. Accessed on 10 October 2019.

[13] Para. 275, 'The Future We Want'.

Technology justice is built on the recognition of the role of peoples as users of technologies, not just as passive consumers but as active participants in decision-making on what is needed to address actual needs and realities. Participatory and democratic mechanisms for communities and peoples to actively engage in evaluation of new and emerging technologies should be established; results and outcomes of such participatory assessments should then shape decisions on research, development and deployment of technologies that are presented as solutions to development challenges.

A key pillar of technology justice is the recognition and promotion of diverse sources of knowledge, far beyond the lip service that is often paid by the general discourse. Already enshrined in a number of UN documents,[14] traditional knowledge of indigenous peoples and local communities need to be promoted, supported and scaled up as it offers invaluable solutions to environmental and climate crises. Many of these local solutions, endogenous technologies and innovations have actually helped communities endure centuries of shocks and crises, adapted to local conditions, tested across generations and helped build collective resilience. Grassroots efforts to develop and deploy local innovations and endogenous technologies that respond to actual needs and are based on existing capacities should be incentivized, enabled and protected from misappropriation.

The real technological revolution will only start when technology justice is placed at the core of the technology agenda.

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[14] UN Convention on Biological Diversity, Art. 8(j), 1992; UN Declaration on the Rights of Indigenous Peoples, 2007.