Policy Brief

Digital Equity as an Enabling Platform for Equality and Inclusion

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About the Grand Challenge

Inequality and exclusion are among the most pressing political issues of our age. They are on the rise and the anger felt by citizens towards elites perceived to be out-of-touch constitutes a potent political force. Policymakers and the public are clamouring for a set of policy options that can arrest and reverse this trend. The Grand Challenge on Inequality and Exclusion seeks to identify practical and politically viable solutions to meet the targets on equitable and inclusive societies in the Sustainable Development Goals. Our goal is for national governments, intergovernmental bodies, multilateral organizations, and civil society groups to increase commitments and adopt solutions for equality and inclusion.

The Grand Challenge is an initiative of the Pathfinders, a multi-stakeholder partnership that brings together 36 member states, international organizations, civil society, and the private sector to accelerate delivery of the SDG targets for peace, justice and inclusion. Pathfinders is hosted at New York University's Center on International Cooperation.

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Executive Summary

The global pandemic has laid bare the digital inequities across vertical (income) and horizontal (social, political, and identity) dimensions, while exposing the extent to which pre-pandemic approaches to bridging the digital divide have been dominated by economic considerations even while they are not universally treated as policy priorities. This policy brief reviews key aspects of the digital divide, with special attention to exclusion and inequality, emphasizing that poor connectivity isn't just about wealth—it is also about inequality.

Even in wealthy countries, data on internet use by children under 15 in 39 countries from across the income spectrum shows that national wealth does not always corelate to universal access. It also varies considerably based on factors like rural versus urban, gender, or refugee status. In the United States, for example, only 66 percent of children under the age of 15 have regular access to the internet, compared to 82 percent in Brazil. While mobile phones have contributed greatly to increasing access, they can also lock in various aspects of inequality. An estimated 72 percent of people globally are connecting to the internet through their mobile phones, with about two billion connecting through their phones exclusively, but young girls and women are often disadvantaged with mobile phone access.

Even before the pandemic, many governments invested in internet connectivity but adopted policy stances that implicitly considered it somewhat of a luxury, depending on private sector solutions to bridge the gap. Experience shows that only significant public infrastructure investments can have the necessary transformative impact on internet access. Predictably, the COVID-19 pandemic drew attention to digital tools as part of pandemic response, including economic recovery plans and improving access to critical social services like education and health. However, only a small fraction of digital-enabled or digital-focused pandemic interventions specifically targeted marginalized groups and vulnerable individuals, or included groups that had already been marginalized in previous planning. Most focused instead on broadly increasing reach in rural communities. This does not close the access gap. Indeed, most countries are using a combination of public resources and policy incentives to private operators to address this issue, but only a small fraction of these explicitly center on equality and inclusion. Even so, some emerging practices provide direction for stakeholders who wish to invest in digital initiatives that more directly seek to bolster equality and inclusion:

- There is value in investments that provide ***integrated solutions directly to underserved communities and persons***, such as the "kiosk in a box" approach by World Telecom Labs (WTL) Vivada installations in rural and poor urban communities in Morocco, Tanzania, and Gabon.

- It is important to craft well-rounded initiatives that seek to not only expand digital connectivity for economic opportunity and social services, but also ***support dignified interaction between individuals and communities and their state authorities and functions***. Examples include the Mobile Payments for Safe and Sustainable Water intervention in Uganda's Kyaka II Refugee Camp; the *Solis Mobile* service in Lebanon; and the granting of social telecommunications concessions in Mexico's *Telecomunicaciones Indígenas Comunitarias*.

- Investments in digital access can offer benefits in both administrative efficiency and public acceptability by ***integrating digital access investments with existing social and/or economic programs***, as was done in Ecuador's Social Tariffs Project which links improved and more affordable digital access to their conditional cash transfer program.

- Concerns around digital access during the pandemic offer a chance to examine historical practices of political and social exclusion. Mitigating approaches could include a ***public policy dialogue on preventing recurrence of old patterns of exclusion***, and investments that might reverse that marginalization. In Brazil, for instance, a joint project by *Instituto Socioambiental* and the Brazilian Association of Digital Radio provides access to indigenous knowledge across remote rainforest locations. Another program, the *Casa dos Meninos* investment in São Paulo *favelas*, focuses on social cohesion.

Much of the innovation explored in this brief is still underway, and impact and cost-benefit data are still scarce. There is nevertheless sufficient diversity of experience and qualitative evidence for stakeholders to identify promising avenues for action. Digital equity will be crucial for low-income workers to access economic activities in future, and will help the post-pandemic recovery to be more inclusive. It also has the potential to positively affect other areas of inequality, including access to education, healthcare, and political participation. Inequitable education is particularly concerning: it is a "threat multiplier," disabling access to other individual and community levers that can reduce inequality. The pandemic has worsened educational disparity, with students in marginalized groups losing ground at a faster rate. This in turn puts them farther from economic opportunities and political participation.

Overall, governments have focused their efforts primarily on expanding network infrastructure through supply-side initiatives that incentivize network operators to extend penetration and reach, while making limited use of universal access mechanisms. The understanding of "access gaps" has been based primarily on economics, with most attention given to reaching remote and rural communities. The urban poor and socially marginalized groups (including indigenous or tribal communities) receive much less practical attention. Globally, women, people with disabilities, and historically-disadvantaged ethnic, indigenous, or racial groups have had lower digital access, but supply-driven connectivity is not the full answer. Initiatives to increase access must be accompanied by appropriate policies and rights protections that account for preexisting structural inequalities of access, knowledge, and opportunity.

Experience also demonstrates the danger of deliberate or incidental situations invading the privacy and autonomy of marginalized communities and individuals, and the risks of exploitation. Focus on supply-driven connectivity to address the "access gap" means less attention is paid to building technology policy that considers social context, encouraging trust from citizens and transparency from the state.

Addressing this "trust gap" will require community engagement and participation to ensure coverage meets needs, as well as public support for any physical changes. The state will need to move first, trusting citizens by opening up public data and allowing for community monitoring of high-profile initiatives, before asking these citizens to trust the state with their personal data. Providing the tools and means for internet access for all on an equitable basis—with appropriate protections and rights—will counteract the growing digital divide and help address historical structural inequalities.

With this in mind, policies to address digital inequalities must address both technical and normative dimensions in order to both close gaps and prevent new ones from emerging. Unfortunately, little attention has been paid to quantifying results beyond the high-level metrics of reach, and even less to measuring impact on inequality or exclusion. This means policy options and investments are based more on assembled case studies with partial or tentative results that signal the potential for tangible impact on inequality and exclusion, rather than on actual statistical data. Still, the case studies underscore the arguments of the Pathfinders framework for high-impact policy interventions:

> *"Priority interventions will have impact on both material opportunities (distribution) and also on status, esteem, and perceptions of worth and respect (recognition), and are unifying rather than creating artificial divides between historically marginalized identities."*
>
> —Pathfinders for Peaceful, Just and Inclusive Societies, "Challenge Paper: Inequality & Exclusion," 2019.

Policy recommendations

Access to digital is a product of both material investment and political will. Where there is no conscious effort to include marginalized communities into digitalization plans, these communities can be left behind. In countries where identity-based exclusion is routinely built into political behavior, there can be systematic patterns of exclusion of specific groups (e.g., the indigenous First Peoples of North America, the Roma of Europe, or the Somali of northeast Kenya). Many countries around the world have such communities, and any work to digitalize a country must be founded on politically and socially conscious efforts to include groups that may be left behind by historical marginalization.

Good digitalization policy also affects development goals more broadly. Governments are thus well-served to pursue policies that emphasize investment in digital public infrastructure, sensible regulation, and inclusive use of digital platforms. With the significant caveat that using digital initiatives as a platform for enabling equality and inclusion is a new policy arena, there are promising signs in experimentation across a range of areas which support the policy options presented here. Stakeholders in the Grand Challenge should consider an array of possible focus areas for exploration, rigorous evaluation (for both efficacy and efficiency), and eventual adoption, including:

1. Engage with development partners, especially international financial institutions (IFIs), to reframe digital infrastructure as an essential development enabler like potable water and electricity: a utility, with basic access irrespective of household income, and supported by an enabling policy environment that empowers communities and respects human rights.

2. Increase the use of approaches that explicitly combine material opportunity (affordable and safe access to digital connectivity for economic opportunity and social services) and recognition (digital connectivity that supports dignified interaction with community functions and state authorities regardless of income, while protecting autonomy and privacy).

3. Prioritize state investments in connectivity that are self-targeting to underserved communities and persons:

    - Expand use of “kiosk in a box” approaches to rural and poor urban communities, embedded in larger infrastructure and economic recovery packages with broad appeal. Examples include initiatives described in Section 3 (in Ghana, IntelSat in the Ampain refugee camp, or RuralStar countrywide; and the WTL Vivada “Rural Infrastructure Ecosystem” in three African countries).

    - Include connectivity access as a standard element in public investment projects that build or upgrade schools, clinics, and municipal buildings, rolling out first to the most marginalized and underserved communities, with the eventual goal of universal coverage.

4. Articulate a core policy package that includes social and legal elements around technology to encourage trust from citizens and transparency from the state:

    - Significant investments in digital public infrastructure, targeting the most excluded groups first (replacing default targeting to rural and remote areas).

    - International conventions/agreements on keeping the internet free and equally available.

    - Thresholds and standards of access to precede digital-first initiatives; e.g., if schools are moving to all-digital, what do they need to have in place beforehand?

    - Standardize investment in schools and public libraries as public access nodes for the internet.

5. Use the pandemic recovery process as a catalyst for a candid and open reflection on existing historical practices of political and social exclusion, with the goal of identifying 1) robust efforts that might prevent old patterns of exclusion from recurring, and 2) politically conscious investments that could prevent further consolidation of marginalization.

    - Start with discussion on how the pandemic has revealed realities in the country (of marginalization, or discrimination, or harm and deprivation experienced during the pandemic) that perhaps were not well understood or were ignored.
    - Use data on the differential experiences of communities/groups with regards to digital access to set parameters of policy discussion: where has the most deprivation occurred, and where has opportunity been most limited?
    - Identify politically conscious investments in digital infrastructure that can bridge the “access gap,” reverse marginalization, and protect against digital predations.

1. COVID-19 has shown how poor policymaking around the issues of digital access and use can deepen inequalities and create new ones

The COVID-19 pandemic is the greatest international challenge of the 21st century, testing systems in all spheres of life including healthcare, economics, social policy, and international organization. Governments that have underinvested in public health systems have suffered the consequences of a serious illness affecting large swathes of their populations. The pandemic creates dynamics that interact with existing inequalities along parameters that include socio-economic status, education, age, gender, ethnicity, and geography.[1] Societies with low trust in government have struggled to get buy-in on public health initiatives. And in countries across all income levels, it is clear that systematic underinvestment in quality digital access has made it impossible for people—and children especially—to remain connected with their professional and educational work given the core need to physically distance in order to stem the spread of the pandemic.

The Pathfinders *Grand Challenge on Inequality and Exclusion* is anchored in a framework that seeks to achieve impact on both material opportunities (distribution), and on status, esteem, and perceptions of worth and respect (recognition). This "framework of redistribution and recognition" focuses attention both at the top and at the bottom of society, while noting that horizontal and vertical inequalities may have equally adverse and intensifying mutual impacts.[2] As such, policy action on digital inequalities must address disproportionate access to power and resources and the relative welfare of groups.

To date, approaches to digitalization around the world have focused on a top-down approach to improving access, only recently pivoting to a focus on making internet more affordable and inclusive around the world. As a result, gaps in digitalization have continued to grow in many countries, hardening the perspective that technology exists primarily for the rich, with the poor only getting what is left over. This is one aspect of inequality that must be addressed in order to achieve truly inclusive digitalization.

Technology has long been at the center of global development planning. A 2009 World Bank report found that in low and middle-income countries, a 10 percent increase in broadband internet penetration accelerated economic growth by 1.38 percent.[3] Yet strategic investments in public technology infrastructure are not keeping pace with the growing demand for economic and social progress. The pandemic, moreover, has revealed and exacerbated preexisting gaps at a time when digital connectivity is needed most.

Projections yield surprising real-time results

According to the International Telecommunications Union (ITU), by the end of 2020 an estimated 85 percent of the world's population would be covered by a 4G network, even though this number shrinks to 71 percent against 95 percent when data is disaggregated for rural versus urban.[4] Similarly, the ITU estimated that in 2020, 63 percent of the world's urban population would have access to a computer against 25 percent of the world's total population, with Europe having the highest regional computer penetration (82 percent in urban areas and 66 percent in rural areas) and Africa the lowest (17 percent in urban areas and only 2 percent in rural areas).[5] ITU 2020 projections were bullish that global internet connectivity was on the rise; with the notable exception of Africa, they estimated that all regions of the world had more than 60 percent of their populations able to connect to the internet.

The outbreak of COVID-19 has confounded many international projections, not least regarding which countries would be best prepared to handle a pandemic.[6] Technology was expected to mitigate the impact of the pandemic on daily social and educational life, but most of the world's countries are failing. For example, social distancing led to school closures across the globe as schools were viewed as significant

transmission vectors. Most governments then urged students and teachers to shift to online learning, but the shift has demonstrated that global internet access is plagued with inequalities.

A 2020 study from the Pew Research Center found that 15 percent of US households do not have high speed internet access at home, and roughly one third of households with children aged between six and seventeen have no internet access at home.[7] In some parts of Indonesia, more than a third of school children have no internet access and the *New York Times* reported that children study on the side of major highways or climb to the tops of trees because these are the only places in their community where they can get stable internet access.[8] In Kenya, although one mobile provider has made internet access free for school children, the digital gap has widened during the pandemic as many children simply do not have internet access at home.[9]

While exact global measures remain scarce, poor internet access has proven to be a major barrier to protecting poor people from being marginalized and disconnected during the pandemic. The ITU collects data for internet use in children under fifteen in thirty-nine countries. One can infer from these statistics that the issue of poor connectivity isn't just about wealth; it is also about inequality. Thus, in the US, only 66 percent of children under the age of fifteen have regular access to the internet, compared to 82 percent in Brazil. UNICEF suggests three types of inequality that may be influencing access to the internet for school children: adults having preferential access to the internet in households; a lack of infrastructure to ensure steady and constant high-speed internet; and a lack of connectivity altogether. Inequality of access to reliable internet is compounding global inequalities in access to educational opportunities for millions of children.

Internet access as basic right

Given the level of inequality, several international conventions and agreements recognize access to the internet as a fundamental right. The African Union Convention on Cyber Security and Personal Data Protection, for example, satisfies the Pathfinders recognition and redistribution criteria, balancing individual rights to data protection and recognition before the law with a commitment to building an information society.[10] As a result, some governments have attempted to increase internet access, but many remain dependent on private sector solutions when practice has shown that only significant public infrastructure investments can yield the required impact.

An estimated 72 percent of people in the world connect to the internet through their mobile phones, with about two billion connecting through their phones exclusively.[11] The biggest growth in smartphone ownership is expected to come from China, India, Indonesia, Nigeria, and Pakistan, which also happen to be the most populous countries in the developing world.[12] In contrast, only 7.6 of every one hundred people are connecting to the internet through fixed broadband connections.[13] While connecting through a phone is more cost effective in the short term, poor people end up paying more in the long term for internet, locking in horizontal inequalities.

Gender inequality also manifests in various ways. In many societies, gender norms on property ownership and allocation within families affect women's access to technology. Specifically pertaining to mobile phones—acknowledging the reality that the vast majority of people connect to the internet through their phones rather than broadband—the 2019 GSMA report on gender equality highlights that women's ownership of mobile phones has increased significantly, and now almost 80 percent of women globally own them.[14] Still, women are more than 10 percent less likely to own mobile phones than men in low- and middle-income countries, and the overall gender gap in mobile access in developing countries is 23 percent.[15] This gap is widest in South Asia, where women are 28 percent less likely than men to own a mobile phone and 58 percent less likely to use the internet.[16]

The gap also manifests in who is building the digital infrastructure that we use. In Canada, a growing number of women are graduating with degrees in STEM (39 percent of graduates aged 25–35, as opposed to 23 percent of graduates aged 55–64), but they are more likely to be unemployed with a STEM degree than their male counterparts.[17] Women in technology are also more likely to be underpaid than their male counterparts, and less likely to receive professional support in their work, cementing inequalities in how digital technologies are made and for whom.[18]

Roadblocks to greater accessibility

The Broadband Commission for Sustainable Internet has been working with governments around the world to make broadband more accessible. According to their *2020 State of Broadband* report, thanks in part to their advocacy 174 countries around the world now have a broadband plan of some sort, an increase from 101 in 2010.[19]

Monitoring implementation of these plans remains a challenge, but most countries have recognized the need to prioritize broadband connectivity as critical to their development. The challenge remains in convincing governments that it is in their interests to invest in digital infrastructure, rather than outsourcing it to private sector initiatives that often fail because they cannot guarantee profitability.

In Kenya, Google launched Project Loon which was to use hot air balloons to provide internet access in rural parts of the country. The project collapsed, however, because commercial viability remained a long-term goal for the project with an unclear path to get there.[20] Similarly, Facebook's Free Basics program, rolled out in several developing countries, has been plagued with accusations of undermining net neutrality and consolidating inequality because Facebook's priorities remain profitability rather than public service.[21] If access to the internet is a fundamental right, then it is up to the state as the custodian of rights to provide the required internet infrastructure so that everyone who wants to be connected to the internet can be connected consistently and affordably.

A key part of the problem in securing internet access is the framing of the policy challenge. One hundred percent of people connected to the internet 100 percent of the time is an ambitious and expensive target, and one that is instantly negated by individuals or communities which may prefer to remain offline, possibly for religious or other reasons. People should be able to opt out of digital lives if they are doing so of their own free will and in the full knowledge of their rights. Moreover, the global debate on net neutrality affirms that connectivity must not come at the expense of individual rights to privacy, and that private corporations should not be invited to provide connectivity at the expense of privacy, inclusivity, and justice.[22]

Recognizing that digital connectivity is not a right that supersedes all other rights, the Broadband Commission's policy agenda has, for example, shifted over time toward convincing governments to commit to attainable plans that allow connectivity as an option, e.g., by making broadband more affordable, and setting attainable targets for investments in public infrastructure. Where internet is provided, it must as far as possible be provided with the same consistent attention to equity, fairness, and respect for individual and collective rights as any other utility.

2. Understanding digital equity through recent thinking and research about why it matters

The idea of digital connectivity is riddled with both technical and normative considerations, many of which have become more apparent during the pandemic. The Broadband Commission emphasizes that connection must be "meaningful;" i.e., not only addressing gaps in access, but also making sure that the nature of the connectivity does not reinforce patterns of inequality.[23] Gaps in infrastructure, digital skills, safety, and security, as well as gender and age, must all be addressed in order to make connectivity meaningful. And it is crucial to avoid situations where attempts to provide connectivity reinforce the idea that some people deserve lower quality internet access than others because they are poor.

The main normative concern over connectivity is whether or not the internet should be provided as a public good or as a commercial product. In the early days of the internet, when access was mostly confined to large institutions like research organizations or universities, the Internet mostly functioned as a public good. However, growth in use has led to its increased commercialization, with significant public policy implications.[24] Some analysts argue that since the internet was built using public funds primarily channeled through universities and other large, public institutions, it is a public good that should be as widely available as possible and funded primarily through public investments.[25] The emerging approach of digital public infrastructure consolidates this point, with research on the social and political impact of the internet underscoring that it must be administered and approached much like other utilities, e.g. electricity.[26]

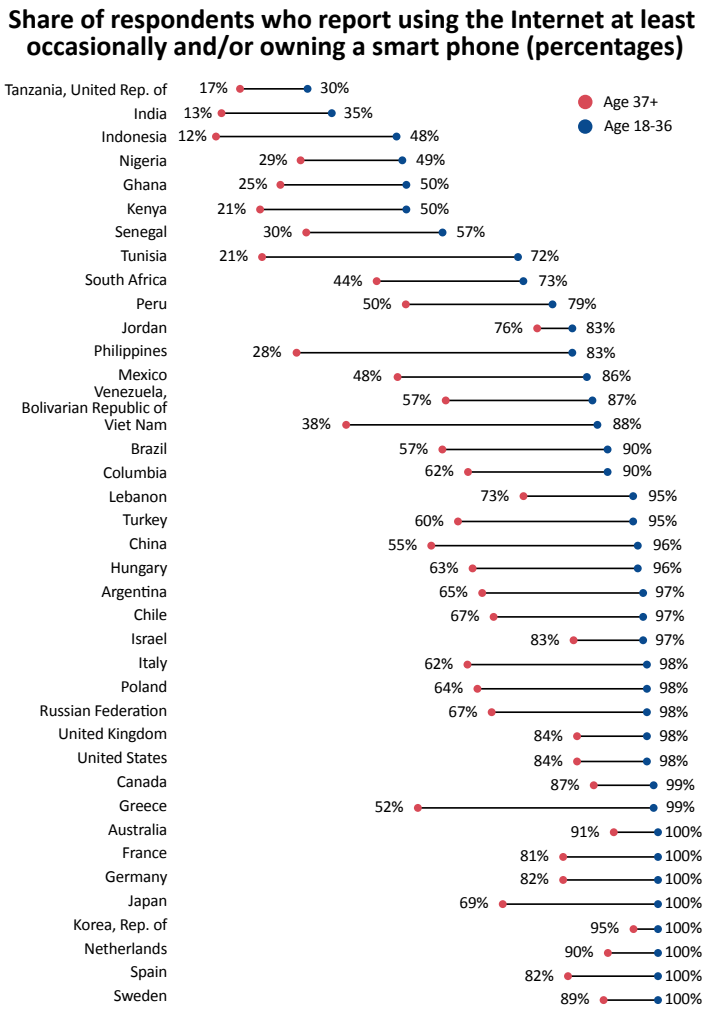
Digital infrastructure can be publicly organized and privately funded much like other large infrastructure projects. A useful example of this is the federal highway program in the US,[27] in which the state leads on setting the policy goals and mobilizing resourcing, with private companies playing a role as they compete to build the towers and lay the cables. The World Bank has also articulated this case regarding the internet, stating:

> Everyone benefits as more people come online. As more essential services and information migrate to the web, anyone without access almost becomes a second-class citizen. And all citizens benefit when everyone else is better informed and when public services are provided electronically at lower cost. The private sector should take the lead in providing internet infrastructure and services because the business case is usually compelling. But public investment or intervention is sometimes justified where the private sector is unable to provide affordable access.[28]

Overall, there is growing consensus that the internet—even if not necessarily including the platforms we use to connect to it—should be administered as a public good given its impact on our public lives.

Some of the technical aspects of digital inequality include network infrastructure and cost, while normative aspects include lack of digital knowledge and lack of coordinated efforts to foster uptake. Network infrastructure refers to the physical assets required to enable connectivity, including fiberoptic cables and cellphone towers. It also includes end-user objects like computers and smartphones.

Figure 1: Digital Divides Across the World



Source: Pew Research Center, 2018.

The wealth gap

In their 2020 report on the future of jobs,[29] the International Labour Organisation (ILO) found significant disparities in the uptake of technologies around the world (see Figure 1). For example, young people (18-35) are more likely than older people (over thirty-six) to use the internet or own a smartphone.[30] Similarly, younger people in developing countries are less likely to have access to such digital technologies than those in developed countries, where only 30 percent of those aged 18-35 in Tanzania owned a smartphone compared to 100 percent in several rich countries.[31]

But these disparities persist in rich countries too. The Broadband Commission notes significant rural-urban gaps in the US stemming from inequalities in network infrastructure: students in rural areas are more or less completely offline because there has been no investment in rural network infrastructure.[32] However, even in large cities like Los Angeles, poor children have been unable to access the internet during the pandemic due to the prohibitive cost of smartphones and computers.[33] Public investments in network infrastructure, including tax subsidies and investment in local assembly capacity, are the most effective way to reduce the overall cost of getting people online.

Cost is also a barrier once network infrastructure exists (primarily the actual cost of getting and using a connection). A 2014 ITU report found that broadband is still prohibitively expensive in developing countries, costing upwards of 100 percent of average monthly income (compared to 1.5 per cent in developed countries).[34] In 2017, a survey by UK-based cable.co.uk found that the cheapest internet in the world is in Iran at $5.37 per month, rising to $34.07 in Western Europe and $66.17 in the US. But in developing countries the cost skyrockets to $440.67 in Namibia, and an eye-watering $961.22 in Burkina Faso.[35]

A primary culprit of this cost is the monopolies that run telecommunications infrastructure in poor countries, including large multinational corporations like Orange and Vodaphone.[36] In the US, differences in rural connectivity remain problematic: some estimates, including from the US Federal Communications Commission (FCC), point to tens of millions of Americans without access to high-speed Internet. Recent data from Pew Research Center from 34 different countries around the world show markedly different Internet user adoption rates within each country based on age, education levels, and income.

Educational aspects also play a major role in digital inequality. The UN's Sustainable Development Goal (SDG) 4.4 identifies "relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship" as key to global development and growth. Digital literacy is one such skill. UNESCO defines it as follows:

> Digital literacy is the ability to access, manage, understand, integrate, communicate, evaluate, and create information safely and appropriately through digital devices and networked technologies for participation in economic and social life. It includes competences that are variously referred to as computer literacy, ICT literacy, information literacy, and media literacy.[37]

SDG 4.4 calls on countries to track digital literacy in youth and adults. It is possible that SDGs pertaining to health have been more disrupted by the pandemic than those pertaining to education and knowledge. UNESCO emphasizes that failing to invest in digital literacy skills compounds inequality particularly within countries, where wealthier segments of society are able to stay abreast of important developments, but poorer segments fall behind. Basic digital literacy is a function of access to digital infrastructure; without investment in access, this normative aspect also falls behind.

Investments in addressing misinformation and disinformation online are also part of the bundle of efforts required to improve digital literacy. UNESCO identifies the importance of managing misinformation and identifies misinformation and disinformation as risks to functional democracy.[38] Given that trust in institutions is diminishing across the board, and not just in journalism, private solutions alone cannot address the resulting trust deficit that fuels misinformation and disinformation.[39] Rather, public investments in education and a conducive media environment are also crucial to ensure that digital literacy initiatives succeed.

Similarly, private corporations on which misinformation and disinformation thrive continue to decline any responsibility for these practices. This reinforces the need for public oversight over some of their policymaking, particularly where it affects democratic outcomes. While private initiatives to address misinformation and disinformation are welcome, improving digital literacy is another aspect of the digital rights bundle that requires public infrastructure and oversight.

Digital normalcy hurdles

The last normative aspect relates to efforts to foster digital uptake; i.e., normalizing the use of digital platforms in day-to-day life. Digitization of public services like registration, legislative, and judicial processes and other aspects cannot occur without normalizing the use of digital technology by both the service providers and those who use them. It is not enough to train those who will be using this technology: it is equally important to keep the public informed about how these developments will affect the services they receive.

As mentioned, there is a significant generational divide between those who use the internet. Fundamentally, governments must invest in engendering trust in digital platforms through transparent, accountable, and inclusive measures sustained throughout technology roll-out, as when Singapore launched its Coronavirus tracking app with a promise that the information would not be made available to the police. The Singaporean government, however, reneged on this promise, announcing in January 2021 that the information would indeed be made available to the police, undermining public trust and participation in government COVID surveillance.[40] Such reversals damage the relationship between citizens and their state, and using civic tech as a “Trojan horse” to expand surveillance undermines public confidence in the use of technology in general.

By contrast, privacy and anonymization in Taiwan is built into the DNA of all technology used in COVID surveillance, leading to widespread public participation. In India, failed consultations around the Aadhar digital ID system not only alienated large swathes of the population,[41] but also compounded existing inequalities by building them into a more efficient but no less unjust system. Box 1 provides a deeper look at the complexities of Aadhar.[42]

Box 1: India's *Aadhaar* Digital ID System

Perhaps no digital infrastructure initiative in the developing world has captured as much global attention as Aadhaar, India's unique digital identification system created in 2016. The government promised that Aadhaar would streamline service provision across the most populous country in the world, particularly by preventing waste and fraud within these systems. Preventing duplicate and fake identities, as well as providing verification methods, was a core promise of the new system. But critics argue that Aadhaar has only intensified exclusion and inequality, particularly within rural and poor communities.

The failure of the authentication system has been blamed for a spate of suicides within farming communities that could not access their social benefits as a result of failed authentication. The system requires prior familiarity and exposure to email or mobile technology in order to register, which millions of Indians—especially women—do not possess. Fingerprint authentication is a challenge because farmers routinely lose their fingerprints during the course of hard labor. Broader concerns over privacy and compulsion also arise, with critics arguing that meaningful public participation did not happen prior to roll-out. More importantly, even though over 700 languages are spoken in India, only twelve were used in the roll-out, contradicting the government's position that most people were satisfied. Overall, Aadhaar is a reminder that building and deploying digital infrastructure is as much a social and political process as a technical one; meaningful public participation, comprehension, and consent is a crucial part of creating successful digital infrastructure.

It is worth pointing out that a purely digital-first approach to public services can have a deleterious effect on inequality, particularly against older members of society, persons with disabilities, incarcerated populations, and refugee and migrant populations. Significant investments are required in order to make such services inclusive, and these investments must be integrated into the digital platform from the onset rather than as an afterthought. A recent study of the impact of COVID-19 pandemic on inequalities in the UK found that a "digital by default" policy excluded vulnerable populations including the sick, elderly, and homeless.[43]

In order to avoid a "walled garden" approach to technology—i.e., one in which marginalized communities simply watch others enjoy a digital life that they themselves cannot participate in—it is important that social service providers continue to provide analogue alternatives for those who might be left behind. The UK's House of Lord's Public Inquiry into COVID-19 found that "advances in digital technology … should be applied intelligently. Online services should never replace face-to-face services if to do so would only disadvantage the service user."[44]

Cost concerns

For the first few years of the Internet, due to the high cost of connectivity, regulation, and oversight were either completely abandoned or primarily left to large, well-resourced institutions like universities. The entry of mobile phones into the internet space has not only democratized access, but also compounded many of the challenges that arise in terms of providing quality, inclusive, and meaningful connectivity. Smartphones were for many years prohibitively expensive, and only the entry of Chinese mobile giant Huawei and Oppo truly made mass connectivity an attainable goal. Yet the challenge remains: how to prevent mobile connectivity from compounding inequality created by the cost of owning a phone and the cost of using it to connect to the internet. The mobile industry, through their umbrella organization the GSMA, has attempted to address some of these issues, emphasizing the economic rationale but also invoking moral reasons:

> The mobile industry is keen to demonstrate how mobile solutions and apps can enable digital inclusion, especially those expected to generate the greatest economic return (e.g., Internet of Things and smart environments). As consumer groups and an untapped workforce, underserved and marginalized groups present important opportunities for the telecommunications sector in general. Addressing the needs of underserved groups through mobile technology is both an opportunity and a responsibility.[45]

The industry increasingly articulates the need to take deliberate action in order to make mobile phones a tool of inclusion rather than another opportunity to exclude.

A sensitive aspect is the idea that some exclusion of marginalized communities from digital access may be deliberate, rather than just a function of neglect. Two specific dynamics warrant attention: a) situations where digital access is considered a security risk that is not balanced out by potential benefits; and b) societal structures with a built-in neglect of poorest communities (racial, ethnic, or religious minorities, or migrants) who are not considered to have the same social value or political priority as core, middle class, racial or ethnic majority communities.

In summary, policies to address digital inequalities must address both technical and normative dimensions in order to both close gaps and prevent new ones from emerging. Countries with the most success in digitalization are those that approach it as a public good rather than a corporate service, and the best policy choices are those that depend on large-scale public investments in infrastructure that are not based on profitability. As an example, Taiwan's DIGI+ initiative aims to " … enhance digital infrastructure, re-construct a service-based digital government, and realize a fair and active internet society with equal digital rights."[46] The Taiwanese government partners with private sector players like Microsoft, but also boasts significant public investment in research and development, public awareness, and digital infrastructure.[47]

Because the returns on good digitalization policy affect development goals more broadly, governments should pursue policies that emphasize investment in digital public infrastructure, sensible regulation, and inclusive use of digital platforms. The following case studies are examples of where public utility approaches to technology have impacted inequality and exclusion in various societies.

Refugee protection: Digitization of refugee protection offers an excellent case study of how significant promise can be undermined by a failure to adequately consider inequalities of impact. In a 2016 paper, Antonio Diaz Andrade and Bill Doolin argue that social inclusion of refugees is primarily an informational problem, and information and communications technology (ICT) can thus help address inequality and exclusion of refugee populations by bringing information closer to them.[48] This belief is reflected in the approach of organizations like UNHCR, which have focused their ICT initiatives on collecting and processing refugee information, especially digital identity systems. UNHCR's *Digital Access, Inclusion and Participation* program focuses on providing digital identities (ID) to refugees, including building ID systems or insisting that refugees are included in national ID programs.

At the same time, a study conducted across eight countries found that refugees were 60 percent more likely than host populations to be working in highly impacted sectors, compounding the inequality they experience.[49] Some critics have argued that digital identity projects targeting refugees can exacerbate inequalities by operating parallel ID systems outside legal protections, making refugee populations prime targets for exclusion or even systemic violence like genocide.[50] Even so, a 2018 report from a high-level conference on refugees and technology hosted by the Centre for International Governance Innovation concluded that technology offers opportunities in education, training, and technical support in family reunifications.[51] Apps like *Natakallam* also offer opportunities for refugees and migrants to give back and earn a steady income, in this case by providing language training online.[52]

Digital identification: There is a great deal of information about the potential advantages of digital ID, but practitioners assert that in order to prevent digital ID from exacerbating inequality, it is important to pay attention to its drawbacks. Although digital ID systems have become more popular globally, there is growing concern that where they are implemented without sufficient oversight and consultation with the population, or where they lack a robust legal framework, they will actually intensify exclusion and inequality.

The case of the *Aadhar* system presented earlier is a prime example of how a poorly-implemented system creates unique vulnerabilities for populations already at the social and economic margins.[53] Aside from governance concerns around informed consent (unchecked data collection initiatives shift the balance of power toward those who already have it and those who can commercialize the data fastest), civil society also raised important concerns about major lapses in the legislative process used to pass the law, and the private sector interests that shaped its development and implementation at the expense of the public system. In fact, a number of suicides by farmers excluded from the final database—and thus ineligible for social benefits and farm subsidies—were directly attributed to the roll-out. The lesson here (and in other cases like the *Huduma Number*[54] in Kenya) is that digital infrastructure is important, but so too is creating a positive social environment through effective public participation and consultation.

Mobile money and financial inclusion: Mobile money systems are rightly hailed as bringing in unbanked populations, but concerns are growing over predatory lending practices that exploit poor and marginalized populations. In Kenya for example, where mobile money transactions have reached the equivalent of one third of GDP, mobile lending has grown exponentially to a peak of forty-nine providers in 2019.[55] In 2020, the government of Kenya was forced to intervene when research revealed that digital borrowing was contributing to " … suicides, divorce, family breakup and increased listing of loan defaulters" as 40 percent of all borrowers on the platforms reported borrowing from six to ten platforms at once.[56] Individuals borrowing on these platforms also pay a premium to access them, meaning that poor people pay more to access financial services than wealthy people. Without sufficient regulation to protect citizens from predatory practices, digital financial systems can compound inequality by creating and hardening debt traps, with grim social consequences.

Education: Aside from health, perhaps no other sector of public life has been as gravely affected by the COVID-19 pandemic, revealing gaps in inequality of access, opportunity, and protection. Indeed, this pandemic is a reminder that addressing inequalities in digitalization must be intentional and built into the logic of the programs. Otherwise, the assumption of "trickle down" can inadvertently consolidate inequalities.

Global school closures have disproportionately affected students from poor communities who are unable to access e-learning due to lack of digital infrastructure and hardware.[57] Even in wealthy countries like Denmark, research found that the COVID-19 pandemic enhanced inequalities in the learning environment; for instance, children were less likely to make use of extracurricular facilities or partake in educational activities available online.[58] The same study found that the major difference between immigrant families of the same socioeconomic class was that children of immigrant families were less likely to make use of facilities like public libraries, perhaps reflecting cultural differences shaped by parents who come from societies where such facilities are uncommon.[59]

The pandemic has underlined that much of the conversation on digitalization of education is based on myths around "leap-frogging" that ignore the fundamentals of inequality: without significant public investments in infrastructure and freely available access points like school libraries, students from poor families will be left behind, even in rich countries. Countries must invest in digital infrastructure—particularly central digital infrastructure through schools and libraries—as service distribution points for children who may not have access to digital infrastructures at home. Indeed, outside the pandemic, well-resourced libraries with digital collections are an example of multi-use infrastructure that can alleviate some educational inequalities while serving multiple social functions in communities.

3. Experience with digital equity initiatives, before and during the pandemic

Pre-pandemic policy context: initiatives to bridge the digital divide

Up to 2019, the global narrative on digital access was slowly shifting from one that treated investments and policy initiatives related to connectivity as a luxury good to one that sought to accelerate digital access as an enabling sector for economic growth & innovation (and to a lesser extent an enabler of government-citizen interface). While the World Bank's flagship 2016 report on Digital Dividends centered the challenge of the digital divide, justification for subsequent investments continued to be largely based on expected impact on economic growth and innovation, with little attention to addressing inadequate incentives to serve poor and marginalized groups.

The economic dynamic is as follows: the private ITC sector underinvests in certain areas or populations because the private return (i.e., the financial return they gain from their operations in those areas) may be less than the social return (the broader benefit to society for having those people and communities connected). Low-density remote areas like small island developing states, or unattractive markets such as fragile and conflict-affected situations, can lead a private company to consider investing there to be "uneconomic" or unprofitable; lack of scale, poor governance, or security challenges discourage sources of private capital from supporting businesses entering such areas. These communities may have high mobile phone penetration, but more advanced infrastructure for data services is loss-making for network operators.

The enduring stance of governments is to treat digital as a sector that needs a strategy for physical infrastructure, with analog complements such as regulation, institutions to develop and enforce rules, and skills/workforce development. However, an emerging strand in the public narrative—increasingly common as the pandemic's effects mount—is to see digital not as a sector that can enable or accelerate economic growth, but as a theme that cuts across the entire social contract. This positions countries actively seeking to combat inequality and exclusion to use digital as an enabling platform for service delivery and equality, and in doing so, to reject the notion that digital investments are a "luxury" that merit attention only in middle- and higher-income communities and countries.

As digital infrastructure becomes a more common element in infrastructure strategies, governments have begun to recognize the social costs of being unconnected are causing widening gaps in livelihoods, educational outcomes, and health outcomes. A common response (at first in high income countries, but gradually, across the income spectrum) has been to develop universal service policies. The most recent comprehensive assessment[60] of universal access and services funds (UASFs) describes how governments have adapted them:

- Repurposing telephony UASFs to focus on broadband data
- Sharing of infrastructure/assets (masts, towers, cable ducts) or mutualization
- Technological innovations (physical, like drones, and virtual, like spectrum and white space)

Beyond universal access funds, the dominant framing in public policy discussions has been "last mile connectivity," where investments and policies are based on characteristics of underserved/underconnected communities or persons. The most common parameters are geographic, with a focus on rural or sparsely populated, and remote or distant. Other parameters are less common, and in the case of socioeconomic categories, have sometimes been invoked but rarely actually used to allocate resources:

- Socio-economic:
  - Poor
  - Identity group experiencing discrimination, or tribal or indigenous group

- Involuntary or unplanned mobility (i.e., people who are unhoused or have informal tenancy, displaced people, youth moving between multiple caregivers)
- Densely populated urban[61] neighborhoods lacking enabling infrastructure (e.g., electricity)

• Critical function (schools, health centers, municipal buildings)

Open, fair, and accessible internet

The arguments for government interventions to move beyond supply-side policies and ensure accessible, affordable, open, and safe internet have sharpened during the pandemic, since vital services are increasingly (and sometimes only) available online. Workers or children who do not have internet access (through no fault of their own) are penalized or experience hardship as digital becomes a new vector for exclusion.

Understanding the potential positive impact of expanded digital access as a multiplier of equality and inclusion starts with thinking of it as a utility, like potable water or electricity. The goal is for it to be universally accessible, affordable, open, and safe. It need not be necessarily free to everyone, but it should certainly be supported by public policy and investments anchored in two principles: that price should not be a barrier to poor and marginalized groups or individuals, and that social benefits within previously unconnected groups or individuals may not always be quantified in monetary terms but must still be accounted for.

Framed in this way, the policy perspective opens up far beyond the idea of connectivity measured by the share of a geographic area's population within physical reach of ITC infrastructure. This perspective encompasses dimensions of affordability, nondiscrimination, safety, and privacy, but also elements of agency and respect. In doing so, government policies can send a powerful signal to communities and individuals: your value to society is not merely as an economic actor, and the opportunity to be connected matters because we value your voice and want you to have control over important aspects of your life. This speaks to the recognition element of the Pathfinders approach.

A startling observation that emerges from reviewing digital stances of countries both before and during the pandemic is that very few have constructed digital policy environments that are comprehensive, inclusive, and deliberately seek to use open and safe digital access to address historical inequalities. Less surprising is that the countries making the most robust strides in that direction are in East Asia, where uptake and innovation of technology as a cross-cutting policy tool has been robust.

Perhaps nowhere in the world has a government's use of technology and policy stance on public access as a driving force for inclusion been more effective—both before and during the pandemic—than in Taiwan. Coverage tends to focus on Taiwan's digital minister, Audrey Tang, whose people-centered emphasis on the "Internet of Beings" has been central and whose life story as a member of a socially vulnerable group models empathy and dignity. There are certain institutional elements of the Taiwanese approach that have enough relevance across income levels to be considered universal, and therefore replicable. The policy goal is clear: digital tools must engender trust, so they can be effectively used to build a stronger, more open, more accountable society, and deliver services fairly to everyone.[62] A central tenet is that government should demonstrate trust in citizens first, by opening data and facilitating access, before asking citizens to trust government with their personal data or involvement in partnership.[63] Taiwan activates this by empowering civic hackers with transparency and flexibility around rules, so open spaces can be created that allow for building trust through social innovation.[64]

In a region distinguished by fertile innovation ecosystems and a willingness to embrace digital innovation in both the public and private spheres, South Korea shares many of the same enabling pre-pandemic characteristics of Taiwan: quick adaptation to changing circumstances, and nimble communication with its population. The recent New Digital Deal further supports the use of digitalization with projects exploiting synergies between the government and the business sector.[65] However, South Korea also illustrates the challenges even a tech-forward policy stance may suffer: a persistent digital age divide and a bias toward large tech companies rather than fostering growth of SMEs.[66]

Approaches to "last mile, last community" connectivity

The most recent and comprehensive description of efforts to create sustainable connectivity options for unconnected sites comes from the ITU 2020 review of "last mile" solutions. Table 1 is an excellent snapshot of the state of play before the pandemic hit.

Table 1: Range of 'Last Mile' Approaches

Type of intervention	Description/services	Revenue model (access network)	Level of subsidy	Commonly used access technologies	Commonly used backhaul technologies	Regulatory concerns	Examples from the Case Studies Database (submissions)	Advantages	Challenges
Commercial MNO	Traditional voice and data services; operates through a national licensing regime (e.g. telecommunication licences) using licensed spectrum	Mix of usage-based services for voice and data, and other paid services	Little to none, except universal service funds to support deployment in marginalized areas	Licensed spectrum technologies: 2G, 3G, 4G, 5G; in some cases, Wi-Fi		Licensed spectrum; radio certifications; franchise; right-of-way and pole attachment agreements; national, regional and local business licences	Ruralstar Ghana; WTL Morocco; WTL Tanzania	Extensive geographic coverage (sometimes owing to coverage obligations); QoS standards to fulfil	Significant capital resources required; reluctant to serve geographic areas that afford low return on investment
Commercial ISP	Can be regional or national, operating under licences or authorization (less stringent), in both fixed-line (fibre, cable, etc.) or wireless networks, and including satellite networks	Mix of usage-based services for voice (fixed line) and data, and other paid services (even though VoIP is regulated in some countries)	Little to none, except universal service funds to support deployment in marginalized areas	Fixed wired (fibre, cable, coax, copper); fixed wireless access (including Wi-Fi); satellite	Fibre; microwave; satellite	Radio certifications; franchise; right-of-way and pole attachment agreements; national, regional and local business licences; satellite landing rights	AirJaldi India; Mawingu Kenya; Bluetown Ghana and India; Brightwave South Africa; Viasat Mexico	Increases competition for data services, particularly by differentiating offers from cellular service	Geographic coverage may be limited by backhaul access and coverage limitations
Not-for-profit local mobile network	Small cellular network, usually community operated	Mix of paid services and free access	Partial (one- time and recurring) to full recurring; sometimes includes pooled resources	Licensed spectrum technologies: 2G, 3G, 4G		Licensed spectrum; radio certifications; franchise; right-of-way and pole attachment agreements; local business licences	CELCOM Brazil; Tecnologías Indígenas Comunitarias	Demonstrates the viability of cellular service where traditional MNOs do not provide coverage	Very small deployments so limited scale; requires local capacity to negotiate interconnection with traditional MNOs and maintain the network
Not-for-profit local ISP networks	Small data-only networks, usually community operated	Predominantly free access or low-cost services	Partial recurring to full recurring; sometimes includes pooled resources	Fixed wired (fibre, cable, coax, copper); fixed wireless access (including Wi-Fi); satellite		Radio certifications; franchise; right-of-way and pole attachment agreements; local business licences	Zenzeleni Networks, Altermundi, Pamoja Net and BOSCO Uganda	Demonstrates viability of providing data services to communities without access (or where other services are cost-prohibitive)	Sustainability of service without continued subsidy; scale of networks and service

Source: excerpted from Table 12 in ITU 2020 Last Mile report

While the document is structured as a detailed step-by-step guide to diagnosing and addressing the constraints to connecting "the last mile," it provides an overview of current and recent policies and investment choices employed by countries in order to expand digital access (and, in some cases, to bridge the digital divide).

In addition to the approaches detailed in the report, which was issued in 2020 based on mostly pre-pandemic data, the ITU team compiled a database of case studies and examples. The "last mile" focus is geographic, reaching remote and rural locations, but the collection of 125-plus examples of interventions provide data on parameters beyond density and remoteness. The following paragraphs lay out the scope of these interventions, followed by selected examples.

Coverage

- Africa: 41 interventions from 21 countries (Kenya and South Africa most numerous and diverse)
- Asia (Central, East, South, and Southeast): 25 interventions from 10 countries
- Australia/New Zealand/Pacific: 4 countries, one example each
- Europe: 13 interventions from 11 countries
- Latin America & Caribbean: 12 interventions from 11 countries
- North America: 31 interventions from USA and Canada

Geographic & demographic targeting

Density is by far the most common primary targeting parameter

- 62 interventions were focused on low-density rural and/or remote areas
- 11 interventions were focused on combined low- and medium-density areas
- 11 interventions were focused on medium-density areas, including towns
- 17 interventions were focused on high-density urban areas, including two refugee facilities

Social category or identity is an important targeting parameter in a notable minority of interventions

- 7 interventions were focused on schools and/or students
- 4 interventions were focused on agricultural activities or assets
- 17 interventions were focused on tribal areas and/or indigenous/tribal groups* (in Brazil, Honduras, Indonesia, India, Nepal, Nigeria, Pakistan, Peru, South Africa, and the US)
- 6 interventions were focused on refugee facilities and/or populations (in Germany, Ghana, Kenya, Netherlands, and Uganda)

* There are zero cases of marginalized ethnicities other than designated tribal groups being recognized as a targeting parameter in efforts to expand connectivity in service of inclusion.

Infrastructure gaps, in particular lack of access to electricity, are cited in more than 50 percent of the interventions as a primary motive for the design innovation; frequent "bundling" of digital access plus solar power.

Table 2: Examples of "Last Mile Connectivity" Interventions with Relevance for Inclusion

Country	Interventions
Brazil	In Brazil, community networks—"bottom-up" networks built by individuals or community groups for the common good—have been instrumental in empowering peripheral communities. These networks are especially relevant to Brazil's many indigenous populations and *quilombos* (communities established by the descendants of escaped Afro-Brazilian slaves), as community networking allows greater participation in structuring and guiding the mission of these networks. In Northeastern Brazil, there are two community network projects led by Afro-Brazilian and indigenous women, working to democratize access and elevate women's participation in public spaces. Community networks also expand opportunities in Brazil's low-income urban communities. For example, the Casa dos Meninos Association installed an intranet system in a São Paulo neighborhood where the majority of residents live in *favelas* (informal settlements), and which has a homicide rate almost double that of the city's average. The community network was created to facilitate community cohesion and increase access to educational materials and economic resources.
China	China has concentrated its efforts largely on one-time subsidies and concessional loans to deploy broadband in underdeveloped western regions and other target areas. China has also empowered municipal authorities to require property developers to lay fiber-optic cable in newly-built residential buildings, treating digital connectivity infrastructure in a similar fashion to other essential utilities like water and electricity. The approach is anchored in the 2013 Broadband China plan, which formally recognized the broadband network as a strategic public facility (i.e., a necessity rather than an optional value-added telecommunications service).
Costa Rica	*CR Digital* is a national initiative to connect the whole country to the Internet. Currently, nine private operators participate. Phase one, *Comunidades Conectadas,* connected remote communities through schools and community centers. The second phase, *Hogares Conectados*, focused on providing every Costa Rican household with fixed-line internet access and devices needed to get online and use the internet. Eligible families are poor, indigenous, disabled, elderly, or low-income entrepreneurs. 95 percent of participating families are female-headed households; more women than before—especially rural—have access.
Ecuador	The Social Tariffs Project (*tarifas preferenciales*) introduced in 2018 linked the 900,000 beneficiaries of the Human Development Grant (HDG) conditional cash transfer with operators to provide lower-cost data services for those earning the lowest incomes. Beneficiaries of the program now make three times the number of calls and access nine times the amount of internet data for the same price as before. The social tariffs empower this sector of the population through the use of technology. They also promote market competition, with approximately 644,000 prospective new users wielding increased collective buying power, market participation, and voice.
Ghana	Ghana's success story in expanding national access is a mixture of high-level regulatory transformation and locally-targeted innovation in technology. A 2008 decision to eliminate the monopoly on submarine cable entrants into its territory, and the collaboration with Nigeria on subsequent cable investments, opened up possibilities not only for Ghana but for all of West Africa. However, Ghana's success in poverty reduction has largely been confined to southern and urban areas; universal mobile broadband connectivity remains a challenge, partly due to the high prevalence of poverty in northern and rural areas with low population densities, low incomes, and weak/missing infrastructure like roads or electricity. Government chose to invest in new technology, partnering with network operators to deploy RuralStar in remote areas where macro-sites would not be profitable. This lightweight solution supports 2G, 3G, and 4G; consumes less power and thus can rely on solar panels instead of grid or diesel generators; and uses non-line-of-sight (NLOS) wireless backhaul technology to fit into remote mountainous, desert, or island terrain.

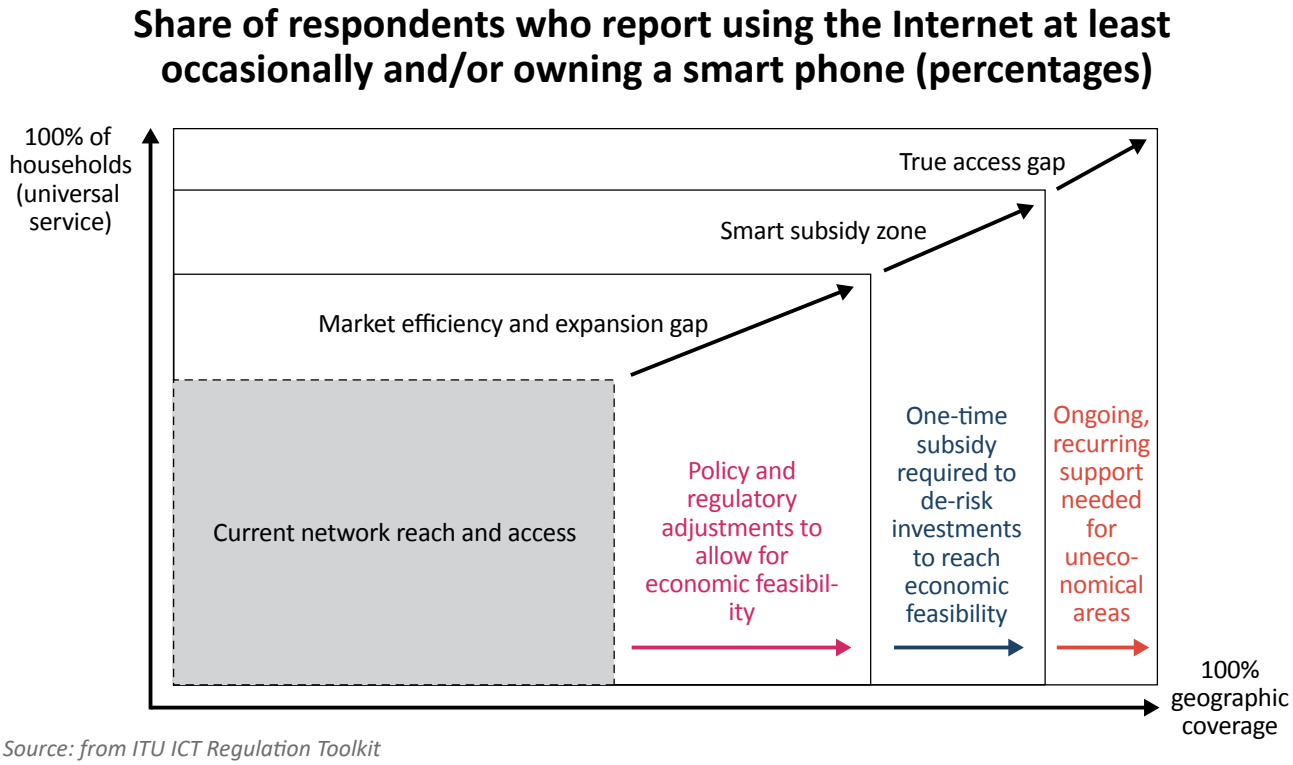
Country	Interventions
Mexico	The national telecoms authority granted an experimental concession of spectrum for social use in 2014 to community organization Rhizomatica, which had lobbied the government for such use and worked with communities to deploy open source technology. The success of this trial led to Indigenous Communities Telecommunications (TIC) first to be issued a permanent license linked to previously unassigned portions of spectrum in 2016. The NGO, which is also a social cooperative, started by serving over 350 municipalities in five states among Mexico's poorest. Immediately, consumer prices fell substantially: one woman shared her experience of paying 80 cents (USD) a minute to make calls to the US, where her husband is based. After TIC's arrival, she paid the equivalent of 1 cent per minute. Calls to other subscribers in TIC's network are free of charge. The cellular sites that serve these communities are owned and operated by them. (See Box 3 for the most recent news on TIC's efforts to create a financially sustainable model for access.)
Morocco, Tanzania, Gabon	In partnership with World Telecom Labs (WTL), resources from the universal service fund were deployed in a one-time subsidy from the Moroccan national telecommunication regulatory authority to establish and service remote locations beyond the reach of terrestrial networks (initially 8,000 locations), using satellite, in a prepaid business model that is commercially viable (in recurring cost terms). The WTL Vivada system was also used in 4,000 villages in Tanzania, and 2,700 equatorial rainforest communities in Gabon (a project which was designated the Best Connectivity Solution for Africa at AfricaCom 2016). Both were financed through their respective countries' universal service funds. By 2018, these experiences had allowed WTL to expand Vivada into a "Rural Infrastructure Ecosystem" where the base infrastructure providing voice and data in rural and semi-urban areas also generates solar power, in turn allowing for the provision of metered water through eWATERpay.
Pakistan	Pakistan uses its UASF to invest in geographically and socially prioritized expansion of digital access, cofinancing or subsidizing infrastructure development in rural and remote tribal areas and integrating social inclusion drivers into its programs. The ICT for Girls Programme provides labs to train 10,000 girls each year at Women Empowerment Centres; in poor rural areas where there is low household device ownership, Telecentres provide public access points and digital literacy programs to support employment and economic benefits, and special projects fund ICT services for people with vision impairments (Pakistan's UASF requires all contracted operators to make services accessible for persons with disabilities.)
Peru	Launched in June 2019, *Internet para Todos Peru* (IpT) addresses the connectivity divide through a public-private partnership model. IpT works in partnership with local communities and uses open technologies to reduce deployment costs. A key element of IpT is the existence of rural mobile infrastructure operators, local companies that own mobile infrastructure but use spectrum allocated to other operators. This has made it possible to connect remote high Andean communities and provide reasonable financial returns at the same time. IpT is providing new internet connectivity for around 1.5 million people.
Rwanda	Through their UASF, Rwanda invested in a number of projects to support connectivity in rural areas. Schools within 200 meters of the country's national fiber optic backbone received a fixed connection to that backbone, while more remote schools were connected to the 4G LTE network. The UASF subsidized internet bandwidth for 190 community institutions in underserved communities, and digitally-enhanced training for teachers.[67] Mobile broadband has become more affordable: in 2015, 1GB cost 20 percent of the average Rwandan's monthly income, while today that cost is 3.4 percent, a critical success given that affordability is one of the most stubborn barriers for marginalized groups. A rising wave of connectivity and internet use among rural households has occurred, with internet penetration among rural households nearly tripling between 2014-2017. However, this number still lies far behind urban connectivity, at 38.1 percent. Mobile internet has been a key driver in this dynamic, now representing over 98 percent of rural connections.

Financial subsidies

Information on financing is provided on 75 of the 126 interventions in the ITU last mile database. Private investors and concessional loans from IFIs accounted for 11 percent. Of the remaining interventions, partial subsidies were more common than full (55 percent versus 45 percent). One-quarter of interventions employed both one-time and recurring subsidies, and the remaining majority of interventions were equally divided between those using one-time subsidies and recurring support.

One-time subsidies lower investment costs and thus help networks overcome financial barriers to entry, allowing them to deploy in areas where investment capital may be unwilling to take the risk. Recurring subsidies have a longer-term impact on the operations of a network, allowing them to operate in communities where they would otherwise be unsustainable: full recurring subsidies cover the full cost for the lifetime of the network or for a significant period of time, while partial recurring subsidies cover only part. But both represent indefinite commitments of fiscal resources by governments, whether through routine budget allocations or from UASFs. Figure 2 is taken from ITU's *ICT Regulation Toolkit*, and illustrates the "access terrain" measured both by geographic range and households.

Figure 2: Range of Interventions to Bridge Access Gaps



Source: from ITU ICT Regulation Toolkit

Universal access policy approaches

Universal access (UA) policies seek to not only expand connectivity (measured by the share of the population or geographic territory reached by networks of either broadband or mobile network), but also ensure affordability and inclusion. Much of the history of efforts to bridge the digital divide has focused on incentivizing private sector network operators to contribute toward "last mile" connectivity—typically through universal access and services funds (UASFs). The most recent comprehensive assessment of these funds dates back to 2013,[68] but the patterns reported by the ITU in 2020 are similar: most of the activity and innovation in UASFs is in high- and middle-income countries. Current estimates are that close to one-third of all low- and middle-income countries either have no UASF or theirs is inactive. The remaining countries have no mechanism in place at all, or use other policy levers including license conditions, subsidies, and public-private partnerships (PPPs) to promote universal access.

Overall, digital inclusion (in dimensions other than geographic reach) has been overlooked by the majority of UASFs monitored by the ITU. In many cases, this has derived from an oversight in the crafting of the initial legal and legislative framework, meaning that digital inclusion cannot be taken up as a policy objective of the fund without changes to this underlying legislation and/or framework. However, even when the authorizing environment of the UASF allows and a fund has set out a digital-specific policy, many of those funds do not translate the policy into targets, nor do they prioritize funding those actions.

A paradox identified by the 2013 ITU "deep dive" into UASFs was that many funds focusing on inclusion did so by supporting the creation of tele-centers, dedicated physical locations to encourage digital access and use. However, those interventions did not explicitly take into consideration the different design elements and operational requirements for accessibility or assistance for persons with disabilities. Certainly, some funds have sought to address the requirements of specific vulnerable populations such as people with disabilities; however, targeting greater inclusion of the elderly, indigenous peoples, or women and girls has remained quite rare. Box 2 illustrates targeted examples of UASFs that emphasize inclusion.

Box 2: How have Universal Access and Services Funds Fostered Digital Inclusion?

Periodic assessments by the global industry entity ITU show that most UASFs focus on extending digital services to rural and remote areas, but some developed programs seeking to build inclusion:

- Bulgaria provided fixed voice telephone services and/or terminals for persons with disabilities, and for the 'underprivileged.'
- Ghana established hybrid centers that combined for-profit tele-centers and nonprofit community resource centers targeting general community members, school children, youth out of school, women, and women's groups. It also established 'Easy Business Centres' for persons living with disabilities.
- Jamaica created an island-wide broadband network with public access (schools, libraries, post offices) and extended broadband connectivity for hospitals and health centers.
- Malaysia used UASF funds for programs supporting socially vulnerable persons (disabled, children and women under protection) and extending access to low-income urban areas.
- Mauritania introduced an ICT Centre (training and services) for people living with disabilities.
- Sudan improved connectivity of schools, universities, and health centers.
- Thailand financed new services for persons with disabilities, seniors, and underprivileged people, as well as discounted telecommunication services for persons living with disabilities.

Analysis of the most recent ITU data—their 2020 "last mile" database—shows new interventions in seven countries that made explicit use of their preexisting UASF to expand access and inclusion: Costa Rica, China, Gabon, India, Malaysia, Morocco, Pakistan, Peru, Rwanda, South Africa, and Tanzania (several of these country examples are shown in Table 2).

Additional strategies to achieve universal access goals have included supply-side measures targeting ICT network operators, enabling tax, tariff, import, and business regulation policies designed to reduce risks and financial burdens, and provide incentives to ICT investors and financiers. Similar measures on the demand side target users and communities, including direct device and tariff subsidies to vulnerable user groups; reduction or elimination of value-added tax (VAT) and import duties; Wi-Fi hotspots; Internet-enabled community centers/anchor facilities; online content; apps and services including public awareness campaigns; and ICT skills training.

Examples of funding options have typically included the following:

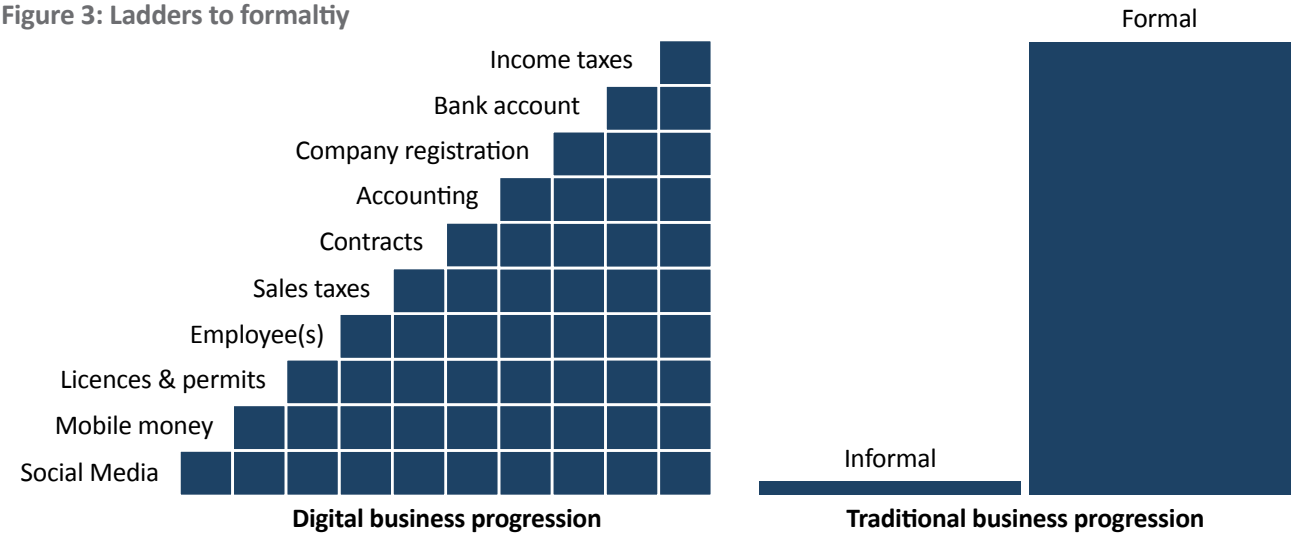
- Governments may choose to ***utilize public funding, development aid, and regulatory incentives*** to bring affordable broadband to underserved areas and population groups. For instance, the statutory regulator in France in 2018 required frequency licensees to improve reception quality nationwide and particularly in rural areas, achieve ubiquitous 4G coverage, and offer Voice over Wi-Fi solutions.
- ***Reducing tax and import duties*** on equipment and services makes telecommunications products more affordable to more people, and may promote demand and adoption of digital activities.
- When private capital does not see an economic incentive to invest in network infrastructure in lower-income, less-densely-populated areas, national governments may provide ***supplementary direct government funding, or joint public and private funding***. This might be directly funding national connectivity infrastructure, such as the Indonesian government's roll-out of a national submarine fiber optic cable network through a public-private partnership, or other national governments using satellites and/or balloons to extend broadband to rural or remote areas.
- Some governments aim to adjust and improve ***regulatory policies*** to attract private sector investment in broadband infrastructure.

"Pay or play" policies offer operators the choice to either pay their financial contributions to the UASF or implement projects of commensurate value approved by the regulator. The USF in Morocco, for example, offers operators three options to fulfil their USF obligations: pay 2 percent of gross revenues each year; respond to tenders issued by the government telecommunications services committee; or develop and propose their own universal service projects. Togo also employs a "pay or play" regime: the regulatory agency runs an annual survey in order to determine underserved areas, and projects are awarded following a proposal by eligible operators and evaluation by the regulator. In general, operators who choose to "play" report that they have the advantage of more directly linking their financial investment to the communities who benefit, and everyone is aware of the projects to which UASF funds are directed, creating a more visible relationship between the state, the operator, and the community.

Even as evidence mounts of the economic benefits of expanded digital innovation made possible by deeper and broader access, it is easy to observe the complex tangle of contradictions concerning effects on economic equality. For example, digital tools made available through pay-as-you-go arrangements are the positive mirror of older analog financial tools that allow poor households to diversify their options beyond savings (like microcredit and ROSCAs). One deconstructs lumpy large costs into manageably small payments, the other enables accumulation of usefully large sums for life milestones.

Similar to the enhanced control made possible by pay-as-you-go, digital tools and mobile connectivity have been instrumental in dismantling the huge barriers between the informal and formal sector (Figure 3), a structural shift that empowers individuals and levels the playing field.

Figure 3: Ladders to formaltiy



Source: Center for Global Development, 2018. "Let's Be Real: the Informal Sector and the Gig Economy.

Those same tools are a primary enabler of the gig economy, where platforms were hoped to disproportionately help low-income households. There is little evidence, however, they have done so. The gig economy has generated controversy for its effects on labor conditions, wages, and the distribution of income and wealth. Concerns include increased income inequality among the bottom sections of the distribution; transferring risk from employers to workers; and reinforcement of gender biases and wage gaps. Indeed, as income inequality has grown since 1980 in the developed countries of Western Europe and North America, a two-tier economy has emerged, characterized by a surplus of basic "gigs" at the bottom, fewer opportunities in the middle to offer upward mobility, and a resulting polarization of labor markets. As Pathfinders' analysis elsewhere has noted, " … this wedge often overlaps with identity-based group divides; in addition to income and wealth, a form of cultural inequality has developed in many high-income countries, where the poor are disparaged."[69]

Digital tools have played a particular role in the relationship between workers, employers, and the state as a regulator of labor rights. The pandemic intensified an existing dynamic where self-employed or informal workers, or micro-entrepreneurs, from minority or marginalized groups with historically inadequate protections serve in roles that are critical for other economic sectors to function. When pandemic restrictions were issued in response to the COVID-19 outbreak, workers' rights advocates across countries were forced to find new ways of supporting, advocating for, and connecting with the workers they serve, many of whom were designated as "essential."

Digital platforms and tools have been used to connect workers and magnify their voices, share information about the problems workers are confronting, mobilize different forms of support and mutual aid, and make demands of employers and policy makers. These uses of digital tools, while intensified by the demands of the pandemic, are not new.[70] But the heightened attention to "essential" functions performed by workers from groups who have not enjoyed prior protection has accelerated innovation. Useful strategies include training workers to conduct virtual lobby visits, participate in hearings virtually, and hold virtual press conferences with legislators. Using digital tools to support workers also draws attention to the importance of protecting privacy when mobilizing user and member data to push for legislative and public policy changes, whether sharing data with other advocacy organizations or with governmental agencies.[71]

Moving beyond universal access

Populations living in areas likely to be considered commercially unviable—remote, sparsely populated areas, poor urban communities, marginalized ethnicities or regions—are almost always subject to other vectors of inequality and exclusion. They suffer from a "true access gap," where the case for extending connectivity is made on the basis of the public good as opposed to commercial gain. To truly bridge the digital divide, such cases call for ongoing, recurring economic support (full or partial recurring subsidy), and for creative efforts to reach those populations with solutions that take into account their sociopolitical and cultural context and are anchored to trusted local institutions.

Global experience in this regard (up to early 2020) falls into these two areas:

- Collect Universal Access and Service Fund contributions from network operators and prioritize use to lower cost of broadband in rural and urban poor communities, and provide connectivity to essential services
    - Network expansion to rural and remote areas
    - Physical connectivity to schools and clinics, sometimes also hosting free Wi-Fi hotspots
    - Free Wi-Fi hotspots in public spaces in rural and urban poor communities
    - Free-of-charge digital access to critical information and services, including through allocation of free short message service (SMS) quotas
    - Provision of devices (usually tablets or laptops) to low-income families, almost exclusively targeting schoolchildren, often bundled with free Wi-Fi hotspots

- Modify regulatory framework to allow and encourage innovations
  - Community networks and micro mobile network operators (Tanzania, India, Brazil, Mexico)
  - Experimental use of spectrum and white space and 250 MHz band (Brazil, Peru, Kenya)
  - New or expanded use of satellite (Burkina Faso, Brazil)
  - Require developers to treat internet connectivity as a utility in new construction (authorities in China requiring fiber-optic cable in new residential buildings in underserved cities)

A critical aspect of historical and current universal access initiatives is that very few explicitly seek to redress patterns of exclusion and inequality driven by factors other than physical geography. It is clear that economic geography, social marginalization, discrimination, and the inequality that results from these exclusions are all necessary to consider in order to move beyond universal access. Indeed, while there are a few examples of state efforts to reach groups or regions that have been marginalized or discriminated against, much of the digital innovation in this regard has come from civil society and communities themselves, as in the examples shown in Box 3.

Box 3: Civil Society-Driven Digital Innovation in Support of Marginalized Groups

A diverse wealth of approaches anchored in civil society organizations and networks of community-based organizations focus on using ICTs as tools of empowerment and social change. This diversity encompasses global networks that combine focused advocacy and program interventions to address a specific gap in the landscape of digital access and use, as illustrated by these two examples.

The Association for Progressive Communication seeks to ensure that the internet is "developed and governed as a global public good" in service of a world in which "all people have easy, equal and affordable access to the creative potential of ICTs to improve their lives and create more democratic and egalitarian societies." In addition to networking and advocacy, they provide financial and technical support for community-identified innovations such as the project jointly carried out by Instituto Socioambiental (ISA) and the Brazilian Association of Digital Radio (ABRADIG). Both entities worked together with local and indigenous communities to cocreate a digital two-way communication system using high frequency radio adapted to the terrain challenges of forest communities and responsive to indigenous priorities for access to knowledge.

Rising Voices is an outreach initiative that "aims to help bring new voices from new communities and speaking endangered or indigenous languages to the global conversation by providing training, resources, microgrant funding, and mentoring to local underrepresented communities that want to tell their own digital story using participatory media tools." The initiative provides support through: microgrant funding and mentoring; network-building with a special focus on indigenous language digital activism; sharing of citizen media-related resources; and specific training projects in underrepresented and marginalized communities. It focuses on the gaps created by a "one size fits all" policy framework and a private ITC sector that focuses on large and profitable markets.

Another route, less common but still important for expanding attention to marginalized groups, is that of legal innovation. The example presented below in Box 4 explains the context for a 2021 court case in Mexico which set a legal precedent for local communities to operate their own telecommunications services for free under social use concession licenses, drawing a line between commercial and community providers.

Box 4: A Model for Expanding Access and Enhancing Agency for Indigenous Communities

Indigenous communities in Mexico represent nearly 10 percent of the country's population according to the 2010 census, but the Indigenous Peoples Mobile Service Coverage Diagnosis report shows only sixteen out of sixty-six indigenous groups had 100 percent mobile service coverage as of 2018. Telecomunicaciones Indígenas Comunitarias (TIC, or Indigenous Community Telecommunications), a non-profit organization started in 2013 and made up of 16 indigenous communities from Oaxaca, has grown to be the fourth-largest mobile operator in Mexico. In 2016, TIC was granted the first indigenous social telecommunication concession to manage and operate their own cell phone networks; in late 2019, they received a second concession for the 10 GHz band to change their current 2G network to 4G. The First Chamber of Mexico's Supreme Court ruling in favor of TIC exempts them from paying for a concession license to use radio spectrum, setting a precedent and (possibly) establishing a model for other policy initiatives that seek to expand both digital access and control to indigenous communities.

Digital access during the pandemic: a life-supporting source of critical social services, voice and accountability, and economic survival

The global pandemic has "revealed the critical importance of digital infrastructure, technologies, and services in enabling government, businesses, and society to continue to function during times of crisis and to create more resilient economies."[72] Heightened attention to digital's critical role has resulted in both ***investments*** and ***policy choices***; these primarily seek to assist in the immediate pandemic response and recovery efforts, but some also enhance opportunities for more inclusive and equitable economic growth.

Given the important role of private sector operators and networks in determining global digital access, any understanding of the policy responses taken up during the pandemic should seek to understand their actions as well as those taken by governments. The World Bank maintains the *Global Digital Development Policy Response Database*,[73] which offers a publicly accessible dashboard:

# of Measures by Income Group

# of Measures by Intervention

		Region							
Category	**Area of Intervention**	**EAP**	**ECA**	**LAC**	**MENA**	**NA**	**SA**	**SSA**	**Grand Total**
Digital Infrastructure	Affordability	54%	37%	62%	68%	71%	78%	43%	57%
	Internet Speed Regulation			3%					1%
	Network Expansion	31%	26%	14%	12%	21%	9%	28%	21%
	Reduction or Suspension	3%		3%					1%
	Spectrum Policy	3%	6%	9%	16%	7%	4%	22%	11%
	Support for operators or I...	3%						3%	1%
	Tax Relief	3%		2%			4%	3%	2%
	Traffic Management	3%	31%	8%	4%		4%		7%
	Total	100%	100%	100%	100%	100%	100%	100%	100%
Digital Services	Business Continuity	13%	6%	5%	18%			17%	12%
	COVID-19 Tracking	15%	31%	8%	11%	7%	25%	5%	13%
	Digital Payments			3%	11%		17%	34%	15%
	E-learning	15%	24%	44%	48%	60%	17%	21%	28%
	Healthcare Connectivity	11%	6%		9%	33%		7%	8%
	Public Health Information	30%	19%	36%	2%		42%	15%	19%
	Telemedicine	17%	13%	5%				2%	6%
	Total	100%	100%	100%	100%	100%	100%	100%	100%

The dashboard provides data on policy responses to the COVID-19 pandemic from both the public and private sector, with a particular focus on "policies and interventions implemented at the country level to facilitate digital connectivity and usage of digital platforms to help citizens, businesses, and governments cope during the pandemic." Data can be sorted by country income, geographical region, and focus of policy measure: ***digital infrastructure*** (including measures targeting affordability, internet speed regulation, network expansion, reduction or suspension of regulatory fees, spectrum policy, support for operators or ISPs, tax relief, traffic management); or ***digital services*** (including business continuity, COVID-19 tracking, digital payments, E-learning, healthcare connectivity, public health information, and telemedicine).

As the database illustrates, attention to outreach and digital access for poor and marginalized communities has been an important part of the public narrative in many countries across the income spectrum. It has been supported by a range of actions focused on ***affordability***, both during the initial months of the pandemic and persisting into 2021. These actions have been taken by private sector operators as much as by governments, and cluster around raising (or removing) data ceilings, reducing or holding prices steady, pausing suspension of accounts for non-payment, and establishing or expanding public Wi-Fi access.

Turning to investment choices, most countries' stimulus packages are focused on addressing the immediate health, economic, and social impacts of the pandemic. Those whose pandemic response has included large public sector investment have been high- or middle-high-income countries (see Box 5):

- A select number of countries included digital infrastructure and technology innovation as centerpieces of national COVID-19 stimulus packages (EU, South Korea, and China).
- Medium-term recovery plans supporting digitalization of small-medium enterprises (SMEs) and investing in innovation to build a digital-driven ecosystem were adopted in Singapore, EU, Israel, Malaysia, Spain, Lithuania, and India.
- Other countries (China, US, UK) adopted digital measures that indirectly support recovery from COVID-19 (digital health platforms, strengthening internet connectivity and data security).

Box 5: Digital Components in Recovery Plans (as reported by the World Bank):

Connectivity and communications (wireless and wired technologies to enable digital connectivity): Examples range from Australia's commitment of government financing to expand internet access particularly in rural regions, China's "seven new infrastructure" public investment in 5G, and South Korea's support of nationwide rollout of 5G networks through tax/fee incentives.

Data infrastructure and cloud storage (solutions to collect, store, and safeguard large datasets): The EU proposed a temporary recovery instrument to bolster investments in cross-border cloud infrastructure and sustainable supercomputing capabilities, while South Korea's "Korean New Deal" takes a multi-faceted approach with large-scale public investments in digital infrastructure, grants/ subsidies to expand adoption of artificial intelligence, and strengthening of cybersecurity (e.g., developing AI security businesses and supporting SMEs in guarding against cyberthreats).

Accelerating digitalization of the economy (advanced data analytics, including artificial intelligence, machine learning, and new digital businesses): Digitalization of SMEs and government services, green jobs, and/or investing in innovation and R&D, such as Germany's recovery package addressing climate change, innovation, and digital technology through e-charging infrastructure, AI projects, and e-government services, or a number of countries including Singapore, Malaysia, and Israel that expanded financial support for businesses to adopt digital technologies and processes.

Of these actions (taken most frequently by high-income countries), the majority seek to harness the potential of digital as a force multiplier to accelerate and expand economic activity. They often focus on SMEs, green economy, or digital economy, vectors which do have some potential for combatting inequality. The few middle-income countries that have prioritized attention to digital in their pandemic response programs have focused on support for SMEs to adapt to digital business models (India and Malaysia). Examples of actions explicitly focused on poor and unconnected communities (e.g., increased internet connectivity to rural areas in Australia and the US, gigabit connections for social services and free local wireless connectivity in the EU, and high-speed internet in remote villages and wireless connectivity in public buildings in Korea) are more limited.

Digital solutions have been the signature of Southeast Asia's response to COVID-19. This is described in detail in a recent World Bank policy brief illustrating how proactive and creative adoption of digital elements in pandemic response often echoes the extent to which regions or subregions were "early adopters and investors" in digitalization before the pandemic struck.[74] Technologies used during the crisis were designed to support public health efforts, public communication, and economic and social policies. Digital technologies leveraged to fight COVID-19 involved governments, local technology ecosystems, and citizens in deploying such solutions, while also highlighting the persistent digital divide and the challenges in ensuring technological changes rolled out across the region.

As is true globally, the use of digital solutions and the collection of highly granular or personal data have raised concerns over privacy and ethics, especially in the case of testing, contact tracing, and digital check-in systems. In Southeast Asia, as in the rest of the world, less attention has been given to the potential benefits of pandemic investment in digitalization as a means of addressing social inequalities or bringing digital services to the poor and vulnerable. And as of late 2020, there have been no significant policy announcements or public investment schemes that seek to leverage the increased focus on digitalization in pandemic response to create momentum for addressing inequality and exclusion in the medium term.

The development and humanitarian communities have also pivoted in their use of digital tools. Examples from the GSMA Mobile for Humanitarian (M4H) Innovation Fund illustrate how innovation in the use of mobile technology helped address humanitarian needs. When the pandemic hit, new financial support from the UK government allowed additional targeted funding to adapt existing projects. The initiatives shown in Table 3 illustrate an important element in the use of digital in pandemic response: the ability of mobile technology to respond to a deficit in human contact and adapt in agile ways to unexpected shocks.

Table 3: Adapting Digital Innovation Interventions in Humanitarian Response to Pandemic Needs

Organization	Project name	Location	Original project	Adaptation
Danish Refugee Council	Mobile Payments for Safe and Sustainable Water	Kyaka II Refugee Camp, Uganda	Provide "water ATMs" to camp inhabitants: installation of water ATMs, solar panels, and access sites. Users access clean drinking water by making small payments via mobile money.	Provide 500 households with access to a mobile phone, including one-time cash transfer and SIM registration (UNHCR, Airtel & MTN Uganda). Build trust in mobile money ecosystem with digital literacy trainings.
United Healthcare Distributors	Empowering Women in Camps	West Nile, Uganda	Provide energy security through community solar hubs & battery exchange. Portable smart batteries are rented to households at affordable fee through a lessee network.	Increase number of distribution points. Adapt the Mobile Power App (MOPO) used to manage battery rental, to introduce more flexible hire periods and payment processes.
Naya Jeevan	My Beautiful Thar	Pakistan	Enhance resilience of the Thari indigenous people by providing female frontline health worker-assisted telemedicine and tele-veterinary care for animal livestock, and reduce forced displacement.	Address reported increase in mental health disorders in Thar with cohort of frontline health workers trained on screening for mental health issues like Post Traumatic Stress Disorder. Additional psychosocial support via mobile to 250 households in eight villages (including twelve private video sessions with licensed professional for those requiring mental health treatment).
International Rescue Committee	Protecting Vulnerable Populations	El Salvador, Honduras, & Guatemala	CuéntaNos platform to provide users with independent access to information and support, enabling service providers to coordinate delivery, and allowing vulnerable populations to access vital information.	Expand service to women, girls, survivors of GBV, LGBTQ+: service providers map and develop content for GBV prevention, with virtual psychosocial support and information made available via two-way messaging platform.
Solidarités International	Solis Mobile WhatsApp Service	Lebanon	Using bot technology for an automated free-of-charge platform for Syrian refugees to 'take back' ownership of refugee service delivery. On this platform they request services, ask for information, send complaints, and receive follow-up via mobile.	Incorporate machine learning into WhatsApp bot to improve the efficiency of conversations, provide more accurate answers, and reduce need for mass group trainings. Smarter bot strengthens understanding of refugee needs and allows delivery of more appropriate and targeted aid.
OmniVis	Cholera Detection through a Mobile Platform	Haiti, Bangladesh, & Kenya	Handheld cholera detection system to determine pathogen presence in water in under thirty minutes in the field with 98 percent accuracy. Information uploaded to centralized dashboard to track cholera outbreaks.	Expand water testing sites. Create connections with mobile network operators so cloud-based portal can be used to send alert notifications to local communities about cholera outbreaks, addressing compounding effects of cholera and pandemic.

As this section illustrates, initiatives to expand connectivity to date—both before and during the pandemic—have largely focused on reaching rural and remote areas and populations where economic characteristics make investment unattractive to private investors. Globally, there is significant experience in using a combination of public resources and policy incentives to private operators to close the "access gap," but only a small fraction of that portfolio of experience explicitly centers on goals of equality and inclusion.

The emerging body of experience is distinguished by four characteristics: it is distributed across geographic regions and country income levels; a significant share of the innovative approaches are small-scale and not state-sponsored; there is no consistent practice of reporting and sharing results publicly; and there is little evaluative evidence available.

However, emerging patterns provide direction for stakeholders who wish to invest in digital initiatives that more directly seek to bolster equality and inclusion. These patterns highlight lessons such as:

- There is value in the coherence found in investments that provide ***integrated solutions directly to underserved communities and persons***, such as the "kiosk in a box" approach to rural and poor urban communities taken by the WTL Vivada installations mentioned earlier across Morocco, Tanzania, and Gabon.
- Well-rounded initiatives will be crucial to not only expand digital connectivity for the purposes of economic opportunity and social services, but also to ***support dignified interaction between individuals and communities and their state authorities and functions***. Examples cited earlier range from the "Mobile Payments for Safe and Sustainable Water" intervention in Uganda's Kyaka II Refugee Camp and the *Solis Mobile* service in Lebanon, to the granting of social telecommunications concessions in Mexico's *Telecomunicaciones Indígenas Comunitarias*.
- Investments in digital access can offer benefits in both administrative efficiency and public acceptability by ***integrating digital access investments with existing social and/or economic programs***, as was done in Ecuador's Social Tariffs Project which links improved and more affordable digital access to a conditional cash transfer program.
- The rising profile of digital access during the pandemic offers a chance to examine historical practices of political and social exclusion. This in turn would support a ***public policy dialogue about how to prevent old patterns of exclusion from recurring***, and how to construct investments that might reverse that marginalization. Positive examples in Brazil range from the joint project by *Instituto Socioambiental* and the Brazilian Association of Digital Radio providing access to indigenous knowledge across remote rainforest locations, to the *Casa dos Meninos* investment in São Paulo *favelas* focused on social cohesion.

4. Conclusion and Recommendations: Potential digital policies and interventions to advance equality and inclusion

While much of the innovation explored in this paper is still underway, with impact and cost-benefit data still scarce, there is enough diversity of experience and qualitative evidence for stakeholders to identify promising avenues for action. Digital equity will be crucial for low-income workers to access economic activities in future, and will thus help the post-pandemic recovery be more inclusive. It also has the potential to positively affect other areas of inequality, including the ability to access education, healthcare, and political participation.

We have seen how the impact of digital disparities on education is particularly concerning because it acts as a "threat multiplier," disabling access to other individual and community levers that can reduce inequality. Pandemic experience has shown that students in marginalized groups are losing ground at a faster rate than average, which in turn puts economic opportunities and political participation further out of reach.

Globally, women, people with disabilities, and historically disadvantaged ethnic or racial groups have had lower digital access, but supply-driven connectivity is not the full answer. Initiatives to increase access must be accompanied by appropriate policies and rights protections that account for preexisting structural inequalities of access, knowledge, and opportunity. Experience dictates that without these, there is increased danger of deliberate or incidental situations that invade the privacy and autonomy of marginalized communities and individuals, risking their exploitation.

Nevertheless, attention to digital policy and investment has been characterized largely by supply-driven connectivity to address the "access gap," with less attention to building a policy and social context around technology that encourages trust from the citizens and transparency from the state. Addressing the "trust gap" will require community engagement and participation to ensure coverage meets needs, and public support for any physical changes. The state will need to move first, opening up public data and allowing for community monitoring of high-profile initiatives, before asking citizens to trust the state with their personal data. Providing the tools and means for everyone who wishes to access the internet to do so on an equitable basis, with appropriate protections and rights, will counteract the growing digital divide and help address historically derived structural inequalities.

Because this field is so new, the stakeholders in the Grand Challenge should consider a range of possible focus areas for exploration, rigorous evaluation for both efficacy and efficiency, and eventual adoption. Here are the most compelling options that Pathfinder governments might consider:

1. Engage with development partners, especially IFIs, at 2021 meetings to reframe digital infrastructure as an essential development enabler like potable water and electricity: a utility, with basic access irrespective of household income, and supported by an enabling policy environment that empowers communities and respects human rights.

2. Increase use of approaches tried previously that did (or could) explicitly combine material opportunity (i.e., affordable and safe access to digital connectivity for economic opportunity and social services) and recognition (i.e., digital connectivity that supports dignified interaction with community functions and state authorities regardless of income, while protecting autonomy and privacy).

3. Prioritize state investments in connectivity that are self-targeting to underserved communities and persons:
    - Expand use of "kiosk in a box" approach to rural and poor urban communities, embedded in larger infrastructure and economic recovery packages with broad appeal. Examples include initiatives described in Section 3 (in Ghana, IntelSat in the Ampain refugee camp, or RuralStar across the country; and the WTL Vivada "Rural Infrastructure Ecosystem" in three African countries).
    - Include connectivity access as a standard element in public investment projects that build or upgrade schools, clinics, and municipal buildings, rolling out first to the most marginalized and underserved communities, with the eventual goal of universal coverage.
4. Articulate a core policy package that includes social and legal elements around technology to encourage trust from the citizens and transparency from the state.
    - Significant investments in digital public infrastructure, targeting the most excluded groups first (replacing default targeting to rural and remote areas)
    - International conventions/agreements on keeping the internet free and equally available
    - Thresholds and standards of access to precede digital-first initiatives. For example, when moving schools to all digital, what needs be in place beforehand?
    - Standardize investment in schools and public libraries as public access nodes for the internet
5. Use the pandemic recovery process as a catalyst for a candid and open reflection on what historical practices of political and social exclusion exist. Digital access is a product of both material investment and political will, and where there is no conscious effort to include marginalized communities into digitalization plans, these communities can be left behind. In countries where identity-based exclusion is routinely built into political behavior, there can be systematic patterns of exclusion of specific groups, e.g. the indigenous First Peoples of North America, the Roma of Europe, or the Somali of North East Kenya. The ultimate goal should be identifying 1) what robust efforts might prevent old patterns of exclusion from recurring, and 2) what politically conscious investments can prevent further consolidation of marginalization.
    - Start with recognition of how the pandemic has revealed realities in the country (e.g., of marginalization, or discrimination, or harm and deprivation experienced during the pandemic) that perhaps were not well understood or were ignored.
    - Use data on the differential experience of different communities/groups with regards to digital access to set the parameters of policy discussion: where has the most deprivation occurred, and for whom has opportunity been most undermined?
    - Identify politically conscious investments in digital infrastructure that can bridge the "access gap," reverse marginalization, and protect against digital predations.

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