Glimpse of an E-Mitra facility during the Jawabdehi Yatra in 2016.
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Exclusion from Digital Infrastructure and Access

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1. Introduction

Information and Communication Technologies (ICTs) have many different definitions, The World Bank defines it as 'The set of activities which facilitate by electronic means the processing, transmission and display of information' (Rodriguez &Wilson, 2000). Economic and Social Commission for Asia and the Pacific (ESCAP) defines ICTs as '….refer[ring] to technologies people use to share, distribute, gather information and to communicate, through computers and computer networks' (ESCAP, 2001). In this chapter we shall follow the one standardized by the United Nations, 'ICTs are basically information-handling tools—a varied set of goods, applications and services that are used to produce, store, process, distribute and exchange information' (United Nations ICT Taskforce, 2003). They include the 'old' ICTs—radio, television and telephone, and the 'new' ICTs—computers, satellite and wireless technology and the Internet. These ICT tools are invaluable to the modern information society. Their impact on the quality of life with regard to access to information and avenues to better oneself especially in developing countries is unprecedented.

1.2 Tracing the Journey of Digital Exclusion

The term 'Digital Divide' was prevalent in studies and policies during the 1990s and early 2000s. As access to and content in the ICTs have evolved over the years, so has the definition of the digital divide. Now it is regarded: as a) lack of infrastructure; b) lack of access; c) lack of information, and d) inability to leverage information.

There are considerable differences in the definition of the digital exclusion by various researchers. For some, the term refers to the gap between people who have access to the internet and those who don't (Mehra, 2002); the extent of physical access to ICTs and the Internet (Loader & Keeble, 2004).

Azari and Pick (2005 & 2009) consider it the 'uneven distribution of the benefits of ICTs' which can be studied at both the specialized level (broadband or mobile Internet access) and basic ICT access level (availability of basic ICT devices such as phone, TV and radio).

In the mid-2000s, research on the digital divide moved beyond physical access and paid closer attention to concepts that are concerned with issues around culture, empowerment, and social mobility; and differentiated uses of the Internet (Hargittai,

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2002; de Haan, 2004; Newhagen & Bucy, 2004; van Dijk, 2006).

Against a general conception of 'digital inclusion' as access to computers and internet for all, regardless of physical, cognitive or financial ability, Crandall and Fisher (2009) broaden the definition to include technological literacy and the ability to access relevant online content and services. They also see it as the process of democratizing access to ICTs, in order to allow the inclusion of the marginalized in the information society.

Hache and Cullen (2009) further state that digital inclusion should be seen as a wagon to social inclusion that ensures individuals and disadvantaged groups have access to ICTs and the skills to use them and are therefore able to participate in and benefit from an increasingly electronically mediated knowledge economy and information society.

Due to the comprehensive nature of Hache and Cullen's postulation, we will consider their definition of digital inclusion as the theoretical underpinning of this chapter.

1.3 Digital Medium as a Public Good

Dhani Poonia—a small hamlet in the Churu district of Rajasthan, India, has only one upper primary school, no hospital or *eMitraKendra.*[1] While almost every popular Internet network is available in this village, connectivity and quality of the connection is low. This forces villagers to travel to the nearby towns of Rajgarh or Taranagar, at a transportation cost of INR 50, every time they want to access the Internet facility at one of these places. Those offering digital services in these two towns charge INR 5 per printout, and INR 20 per hour for internet usage. A student who needs help to fill a form or apply online for admission has to pay a minimum of INR 70 (INR 50 for travel and INR 20 for using the internet service) (Manzar, 2016a). For a worker availing benefits from the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)[2] and earning about INR 150 a day, the total cost of getting a photocopy of an Aadhaar card[3] comes to INR 225 (opportunity cost of losing his day job INR 150, plus travel cost INR 50, plus Internet cost INR 20, and cost of printout INR 5).

Thus, students are unable to maximize the benefits of higher education due to lack of access to Internet. Daily wagers lose their day's earnings just to get their identity card printed. For them, access to digital media is not a luxury but a necessity. It is important for us to highlight that the digital medium has value not in and by itself but rather acts as a medium that facilitates access to other basic public goods and services, especially in developing countries.

In India, access to public entitlement is hard to get, especially for people living in rural areas; here the poor and illiterate get misguided easily and access to basic necessities like pension, daily wage, food, basic health facilities and education is a challenge. 'Public good' here is defined as goods, services, attainments, capabilities, functioning and freedoms—individual and collective—that is essential for a human being to live with dignity (Mander, 2015).

The following example will elaborate the above point. MGNREGA creates a justifiable 'right to work' by promising up to 100 days of wage employment per year to all rural households whose adult members volunteer to do unskilled manual work. However, a recent study 'Right to Work' (Dutta et al., 2014) has pointed out that there is very little public awareness about what needs to be done to obtain work along with an array of other issues surrounding the MGNREGA programme. Thus, despite the law guaranteeing work and livelihood, people are left unemployed due to lack of proper channels of information. The digital medium can serve to enable access to genuine, cost-effective and

timely information thereby increasing feasibility and efficiency.

1.4 Opportunities Provided by the Digital Medium and Why It Matters?

According to van Dijk (2006), the 'digital divide' is the gap between those who do and do not have access to computers and the internet, i.e., have no access to the digital medium. However, what matters is not really the lack of tools like computer and the internet, but the lack of tangible and non-tangible opportunities that it provides. It also allows communication and exchange of ideas while retaining anonymity and foregoing the need for physical travel.

As Table 1 explains, tangible opportunities that the digital medium provides could be access to information, new ideas and skills.

A few examples of digital media enabling access to not just goods and services but also in many cases, access to their basic rights will serve to demonstrate the advantages of digital inclusion and elucidate the point further.

Mobile Vaani is a mobile-based application initiated in 2012 by Gram Vaani Community Media in Jharkhand and has now spread to Bihar and Madhya Pradesh (MP) as well. The application uses an interactive voice response (IVR) system, thus enabling people to create and share content. The IVR system makes it accessible over basic phones with no internet access, as the entire communication happens over a phone call. People leave a missed call and when the server calls them back they have an option to either leave a message and/or hear a message (Rustagi, 2013).The social sector—non-governmental organizations, and development organizations—use Mobile Vaani to disseminate information about their programmes. Local business owners (small shop owners), coaching centres and self-help groups use it to advertise their services and products.

CGNetSwara, a Bhopal-based project, is a voice portal for citizen journalists to report or listen to news bytes about Chhattisgarh, using their mobile phones in Hindi and Gondi (a language spoken in the central Gondwana region of India, which comprises the central tribal region stretching from the Adivasi areas of Gujarat to West Bengal).

On 8 January 2011, a citizen journalist posted an interview with Pitbasu Bhoi from Ambikapur, who was not paid his wages even after working 100 days under MGNREGA. A week later, another citizen journalist ran into Bhoi and discovered that his son had died due to the non-payment of wages. After two leading national dailies, *Times of India* and *The Hindu,* picked up the story from Swara and followed up, Bhoi was paid his wage on 20 January, 2011 (Shah, 2012).

D B Corp, owner of the largest circulating newspaper in Chhattisgarh, acquired a coal mine in Dharamjaigarh in Chhattisgarh. Despite the rigged public hearing, local media ignored the story. However, following two reports on CGNetSwara about the public hearing, three national newspapers carried elaborate stories, leading to the cancellation

Table 1: Tangible and Non-tangible Opportunities Provided by ICT Devices

Tangible	Social: Communication, Participation, Association	Educational: Information, Ideas, Knowledge/Skill	Material: Resources, Source of Economic Capital Formation
Non-Tangible	Freedom of Anonymity		

Source: Van Dijk, J.A.G.M., 2006

of the allotment of the coal mine. (Srivastava et al., forthcoming)

Swara became a success due to the ease of telecommunication, user friendliness and round the clock availability of the application. Another major factor that aided the success of Swara was its ability to enable communication in the regional language.

Digital interventions like Mobile Vaani and CGNetSwara help break the traditional socio-economic barriers of communication as they provide both non-tangible benefits like information, knowledge and ideas while also enabling the marginalized communities to generate livelihood opportunities and enhance the existing ones.

Thus, the digital medium acts as a vehicle. It is not the end but acts as the means to an end.

2. Mediators of Digital Exclusion

According to Curtis Kularski, '…the digital divide is composed of a skill gap and a gap of physical access to Information Technology (IT) and the two gaps often contribute to each other in circular causation. Without access to technology, it is difficult to develop technical skill and it is obsolete to have access to technology without first having the skill to utilize it' (2012, p.1).

ICTs have become an irreplaceable tool in society. Today, the Internet has become an integral part of many lives and it is difficult to imagine having to function without internet access. The number of people 'going online' to conduct everyday activities, such as business and banking, education, seeking employment, civic engagement and forming and maintaining social relationships, is increasing every day. The World Development Report noted that almost 1.063 billion Indians were offline even though India ranks among the top five nations in terms of the total number of Internet users, along with China, the US, Japan and Brazil. The report further stated that while India has come close to the US in numbers in terms of Internet penetration it remains far behind at 18 per cent as against 87 per cent in the US. India still needs to connect these 'offline people' to the Internet for pushing growth, creating jobs and accessing public services (World Bank, 2016).

This section explores various factors which contribute to digital exclusion like poverty, geography, illiteracy, disability, gender and age, and throws light on the intersection of these independent variables. These variables influence the existence of various groups on a 'continuum of exclusion', due to the inherent intersection that is endemic to exclusion. However, there are members of these groups that may experience complete exclusion.

For the chapter, we have defined 'complete digital exclusion' as a social and economic inequality with regard to personal access to ICTs; the skills to use the devices of and on their own without having any assistance; and ability to leverage the benefits of ICTs. In this particular definition, we have excluded the concept of the sharing of ICT devices and Internet with the family and community members. The World Bank (2012) also highlighted the difference between mobile users and subscribers, stating that 'if a mobile phone exists in a household, then all members could theoretically use it, thereby extending access.' This definitional extension of access can be used to inflate metrics when assessing digital inclusion, therefore, the authors have chosen to disregard it.

2.1 Poverty

Poverty poses a major barrier to Internet access. As per the 68th round of the National Sample Survey Organization (NSSO), conducted in 2011, the percentage of persons below the Poverty Line in India has been estimated as 25.7 per cent in rural areas, 13.7 per cent in urban areas and 21.9 per cent for the country as a whole (Abhay, 2014).

The high cost of ICT devices and data plans, low incomes and affordability are the major challenges for much of the offline population. In India, the ability to purchase or rent the ICT tool for access to digital information is less among the masses. The Ericsson Consumer Lab Report (2015) stated that in India, for the consumers who do not use mobile broadband, affordability was the prime obstacle to the adoption of ICT services as 88 per cent of Indian consumers on 2G felt that mobile broadband is too expensive. Many Indians struggle to meet their basic needs and are unable to afford internet services. The report also stated that even with the low and competitive prices of devices and data plans compared with the rest of the world, internet access in India remains beyond the reach of close to 1.063 billion people as the lower income group does not have discretionary money[4] to spend on cyber cafes or to get Internet connectivity on their own to access digital information.

The most formidable hurdle in digital inclusion is the inability of Indians to afford data plans. The State of Connectivity Report, 2015, by internet.org stated that four of five Indians could afford internet if data costs fell by 66 per cent, but Indian telecom operators already claim to run data services at an 11 per cent loss, making cost-cutting difficult. The statistics show that a data plan, currently priced at INR 100 should not cost more than INR 34, if India has to make internet affordable for 80 per cent of its population. Poverty and socio-economic constraints digitally exclude the people belonging to lower rungs of the economic ladder as they cannot afford new communication technologies and the expenses incurred in upgrading the equipment, software, and training support.

To facilitate digital inclusion among low-income groups, the total cost of ownership including devices, data plans, taxes, and related expenses (such as charging solutions) would need to be at a level that these low-income consumers can afford.

2.2 Geography

Chen and Wellman (2004) found that geographic location is one of the major factors affecting people's access to and use of the internet, with more prosperous regions having higher internet penetration rates than poorer regions.

Lack of sufficient network coverage and insufficient infrastructure are the major obstacles to internet adoption, particularly in rural areas. The Internet and Mobile Association of India (IAMAI) Internet in India Report (2015) found that India had over 317 million users accessing the Internet at least once a month. Of this, urban India accounted for 209 million users out of an overall urban population of 414 million people, while rural India accounted for 108 million users out of an overall population of 922 million people. This is approximately around 25 per cent of the country's population. One of the foremost reasons for rural areas lagging behind urban areas with regard to access to ICTs is that spectrum allocations in the lower-frequency coverage bands, under 1GHz, are inadequate in providing an economically viable network. Besides, existing operators don't generate enough revenue in rural areas and therefore, do not invest in building infrastructure. The Census of India identified 6,40,932 rural settlements and 7933 urban settlements (2011) within the country. Rural settlements are eighty times more numerous than urban settlements. Yet, according to a report by Deloitte (2015), the distribution of towers is skewed towards urban areas, with 61 per cent of towers as opposed to 39 per cent of towers in rural areas.

There are also other reasons like the lack of infrastructure coupled with harsh terrain and often-vast distances between communities, and the low income of rural communities. In addition to this, access to electricity is another hurdle in rural areas, with only 55 per cent of rural households having access to electricity (Census of India, 2011).

The above mentioned barriers are exacerbated by the lack of awareness about benefits of ICTs, in spite of access to ICTs being available. The IAMAI survey (2015) also found that 76 per cent of Indian respondents cited lack of awareness about the internet as the reason they weren't online. Beyond basic awareness, a significant number of individuals have been exposed to the internet but choose not to go online because they don't see the value in its potential uses.

Internet users in rural and urban areas have varying usage and preferences because of differences in devices, network capabilities and underlying consumer behaviour and the patterns can be expected to evolve over time as they gain more experience by browsing more sites. According to the IAMAI(2015), urban users use the Internet for online communication the most (71 per cent), followed by social networking (67 per cent), entertainment (59 per cent) and online shopping and online ticketing (at 23 per cent and 24per cent respectively). Rural users' primary use of the Internet is for entertainment (44 per cent), social networking (33 per cent), and communication (37 per cent). Online ticketing and online shopping account for 14 per cent and 5 per cent respectively.

With the aim of providing stable and affordable connectivity in rural areas; both the government and some major corporations are attempting to resolve this issue with network sharing, National Optical Fibre Network (NOFN) project and other initiatives. With the NOFN project initiated in 2011, the government has aimed to provide broadband connectivity of a minimum of 100 Mbps to over 2,50,000 *Gram Panchayats*[5] (local self-government organizations in India of the Panchayati Raj[6] system at the village or small-town level) with non-discriminatory access to the network for all categories of service providers. This government initiative estimated that the rural internet users would increase from 60 million in June 2014 to 280 million in the year 2018 (Rao, 2015).

In the north-east, most of the people are digitally excluded as these states have been getting internet connectivity through Mumbai and Chennai International Internet Gateway, but the problems of weak signals and drop of linkages were faced because of long distance. To tackle the connectivity issues, an agreement had been signed between Bangladesh Submarine Cable Company Limited (BSCCL) and Bharat Sanchar Nigam Limited (BSNL) in June 2015 to provide unimpeded and high speed internet with large bandwidth. Besides, India's third International Internet Gateway (IIG) after Mumbai and Chennai is being installed at Agartala through Cox Bazar Cable Landing Station of Bangladesh for the north-eastern regions of India—Assam, Meghalaya, Mizoram, Tripura, Manipur, Nagaland and Arunachal Pradesh (Indo-Asian News Service, 2016).

Google has also taken the initiative to bring affordable internet access to rural India with project 'Loon', the infrastructure for which would be big balloons floating at a height of 20 kilometres above the Earth's surface for the transmission of internet services. They have also partnered with telecom companies to share the cellular spectrum enabling people to access internet from their phones and LTE (Long-Term Evolution, commonly marketed as 4G LTE) enabled devices. Though this project is under development, it is expected that its implementation will result in greater access to internet services and reduce digital exclusion (Press Trust of India, 2015).

Thus, there are different initiatives and projects to provide the network backbone for connecting villages, yet grassroots connectivity remains a challenge because of poor implementation and lack of monitoring.

Insufficient infrastructure and network coverage, combined with digital illiteracy and absence of discretionary money contribute to complete digital exclusion of most of the villages. Consider the case of the *Agariya* community, which is a De-notified

Box 1: Including the Agariyas

In this era of real-time communication where mobile phones in many ways define the human experience, there's still a place in our country where people communicate with each other by way of reflecting mirrors. In the Little Rann of Kutch in Gujarat, mirrors are one way to reach out to each other.

The 4,953 sq. km Little Rann, home to about 3,500 families belonging to the Agariya (salt worker) community, is known as India's 'Survey Number Zero' because no land survey has been conducted here since the British left. Several attempts have been made by activists working in the region to get government officials to come and see the living conditions here. Yet, majority of the Agrariyas continue to live a life of virtual non-identity and is [sic] mostly paid poorly by middlemen for their labour. The Agariya community is a denotified tribe scheduled [sic] that has been farming salt for centuries.

This peculiar lifestyle means that their children hardly ever get a chance to go to school. When I visited the Little Rann, I got a chance to see about 17 schools made of rugs and sacks around the area of about 10-20 km from Patadi block headquarters of Surendra Nagar district (Manzar, 2016 b).

Scheduled Tribe[7] that has been farming salt for centuries.

The Agariyas are being socially and digitally excluded as thesy don't have access to better opportunities in terms of education and employment; and don't have access to ICTs (Box 1).

2.3 Illiteracy

Literacy is a prerequisite for being able to participate fully in society—including the act of getting online. A low literacy rate is a major impediment to increasing internet penetration, while digital literacy and skills are important in allowing access to digital information. Literacy, according to the Census of India, 2011, is the ability to read and write with understanding in any language. A person who can merely read but cannot write is not classified as literate. As per the Census (2011), literacy rate in India is 74.04 per cent with a 14 per cent increase from 2001. However, there isn't enough statistical data with regard to the level of digital literacy (the ability to effectively and critically navigate, evaluate, and create information using a range of digital devices and technologies) possessed by people.

Generally, online content and information are designed for an audience that reads at an average or advanced literacy level and has discretionary money to spend. Non-users often lack the digital skills to be able to access mobile internet and discover what is available. This can be compounded by a lack of motivation due to the perception of limited relevant content. People in many disadvantaged groups are often precluded from making use of ICTs because of low levels of computing and technology skills. This is a significant factor in completely excluding certain people from using the internet technologies (Salinas, 2003). Lack of digital literacy is combined with a lack of motivation where people don't associate the benefits of the internet and other digital devices with their personal needs, believing that 'computers are not for them'. As a result, they behave very passively towards the ICTs and become completely digitally excluded.

To close the digital divide, a National Digital Literacy Mission (NDLM) has been initiated by the government with the vision to empower at

least one person per household with digital literacy skills by 2020, and help users to harness the power of technology and develop necessary skills to start using ICTs with confidence.

Another reason for digital exclusion is the language in which content is available on the internet. India is a culturally, religiously and linguistically diverse society. At least 80 per cent of all content on the internet is in one of 10 languages: English, Chinese, Spanish, Japanese, Portuguese, German, Arabic, French, Russian, or Korean (World Bank, 2014). Language fragmentation within India compounds the challenge as it has 22 official languages in 11 scripts and hundreds of unofficial languages. Despite the large number of individuals who speak the country's major languages, none of these languages appear among the top 10 languages on the internet. Lack of relevant (localized) internet content is a hurdle for the people whose primary language is not English and prevents people from familiarizing themselves with benefits of internet-based information.

The number of Wikipedia articles in Indian languages fall woefully short of the top 10 languages on the same platform. To put the sheer scale into perspective, the number of Wikipedia articles in English stand at 5.308 million versus 1,14,399 articles in Hindi; 1,10,856 in Urdu; 89,578 articles in Tamil; and 46,815 in Malayalam (Wikipedia Foundation, 2016).

An IAMAI report (2016) on 'The Proliferation of Indian Languages on the Internet' stated that the increase in online local language content would lead to an increase of 39 per cent in the number of internet users. Further, the report highlighted that rural India will be the primary driver of this growth (75 per cent), while in urban India the growth will be 16 per cent. The report also found that the local language user base is growing at 47 per cent annually, and reached 127 million in June 2015. Thus, it may be postulated that availability of internet content in local languages will increase the number of internet users in India.

2.4 Disability

In the evolving information-based society, providing digital access and digital services to persons living with disabilities has become an issue of major importance. The word disability indicates human limitation of one kind or another, in performing various tasks performed by other human beings in general. Disability may be of one or more kind—motor, mental or sensory, including visual and hearing. Over 26.8 million people in India are suffering from one or the other form of disability, which is equivalent to 2.1 per cent of the total population. Among the total number of disabled people in the country, 14.9 million were males and 11.8 million were females, although the number of disabled was more in rural than in urban areas (Census, 2011). Ghai (2002) noted that extant socio-cultural exclusionary processes compounded disability-related exclusion for women leading them to be doubly excluded.

The lack of access to information is a major problem for people with disabilities. Though no data is available on the ownership of ICT devices and internet usage by people with disabilities, still it can be said that due to different kinds of limitations, persons with disabilities are not able to use ICTs with ease. Disabled users face many difficulties in accessing and using ICTs—motor disabilities may restrict the use of input devices, a visually impaired user may have difficulty in seeing display devices, a hearing impaired user may have difficulty in hearing audio information, and a person with learning/cognitive disability may have problem in understanding system operations.

In order to facilitate equal and unhindered access to electronics and ICTs by PWDs, the Ministry of Electronics and Information Technology (2013) formulated the 'National Policy on Universal

Electronic Accessibility' that recognizes the need to eliminate discrimination on the basis of disabilities and to facilitate equal access to electronics and ICTs. The policy also recognizes the diversity of differently-abled persons and provides for their specific needs, covers accessibility requirements in the area of electronics and ICTs, and also recognizes the need for ensuring that accessibility standards and guidelines, and universal design concepts are adopted and adhered to. India is also plagued with a host of issues including, but not limited to, the lack of institutional funding for educational initiatives for children with disabilities (UNESCO, 2013).

ICTs along with assistive technologies have helped persons with disabilities to access digital information and overcome various obstacles faced in all types of environments. Some of the assistive technologies such as touch screen interface can be beneficial when used in combination with software like on-screen keyboards, or other assistive technology, by making computing facility accessible to people who have difficulty in using computers.

Also, a range of software is available for the visually impaired that makes using a computer an easier, more enjoyable and more productive experience. A screen reader transmits whatever text is displayed on the computer screen into a form that a visually impaired user can process (usually tactile, auditory or a combination of both). But many people cannot afford this as the hardware for screen-reading is usually very expensive, and websites without any accessibility features aren't compatible with screen readers or their new features, making it a major challenge for visually impaired users to comprehend the information. This policy shall be covered in a following section in the chapter.

Overall, the cost of assistive technologies comprising the cost of the technology as well as the cost of assistive technology assessment, training and support services, is still a significant barrier that prevents persons with disabilities from fully accessing digital services (See Shilpi Kapoor's quote below). Even when they are free, assistive technologies or embedded accessibility features in commodity products may still remain unused if there is a lack of experts and rehabilitation professionals trained in the use of these technologies and features.

Shilpi Kapoor, Founder of Barrier Break addressed the nature of the problem saying,

> Many economic factors play a vital role in access to ICT and assistive technology, the foremost being affordability and availability. With an income below average, most persons with disabilities are unable to get access to ICT and assistive technology. Access to Internet in rural or remote areas is also a problem. Many in the rural areas are not aware of funding options if any and do not know where to approach for subsidized rates. Proper training is also an important factor. Just having a technology without knowing how to use it is a waste (2016).

To overcome the barriers of inaccessible web design, Web Accessibility Initiative (WAI, n.d.) guidelines are adopted for promoting the use of ICTs for people with disabilities. These guidelines are published and broadly used for the World Wide Web Consortium (W3C) Web Accessibility Initiative. Web Content Accessibility Guidelines (WCAG) 2.0 give a range of recommendations for making web content more accessible to a wider range of people with disabilities, including blindness and low vision, deafness and hearing loss, learning disabilities, cognitive limitations, limited movement, speech disabilities, photosensitivity, among others. Web applications developed using these guidelines often make web content more accessible to users in general. These standards have been around for a decade but still much of the web remains inaccessible to the disabled population.

According to a survey conducted by the Centre for Internet and Society (CIS) in 2012, almost 25 per cent of 7800 government websites failed to

open and the remaining had accessibility barriers. The web accessibility survey report of Indian government websites, revealed that out of the 200 government websites tested, only two were found to be disabled-friendly (Minhas, 2014). There are around 7800 websites of Government of India and even the few that claim accessibility, don't meet the international standards.

Despite the growing awareness of web accessibility issues, people with disabilities are still facing barriers to digital access and digital services; they need to switch and coordinate with different information-seeking strategies such as browsing, scanning, etc. Individuals using screen readers face navigational problems due to a lack of understanding of the different ways in which users interact with and navigate web-based resources. Thus, assistive technologies provide limited information on web page layout by imposing navigational constraints. Other barriers contributing to digital exclusion of the disabled are interface design and the interpretation of speech synthesis to convey the content on the page. Screen readers are voice synthesizers that can read the text on a screen. However the internet is inaccessible to the blind and visually impaired users because the screen reader is unable to read the graphically based web page (Cullen, 2001).

Besides, cost of technology and limited awareness create an obstacle in accessing ICTs. Estimates from the 58th round of NSSO, conducted in 2002 showed that only 26.3 per cent of disabled persons were engaged in economic activities. Thus, economic instability makes it difficult for PWDs (Persons with Disability) to afford computer and other digital devices (Somavia, 2009).

It is quite obvious from the above that the degree of ICT usage is limited among persons with disabilities and the situation becomes more challenging with PWDs residing in rural areas and those belonging to low-income groups.

2.5 Gender

The barriers women and girls face in getting online both reflect and reinforce gender norms. The gender digital divide is one of the most significant inequalities amplified by the digital revolution.[8] The IAMAI report (2015) reveals an unsettling gender gap when it comes to accessing the internet—males account for 71 per cent of internet users, while women account for just 29 per cent. The gap is slightly lower in urban India, with men accounting for 62 per cent and women 38 per cent. The gap is quite stark in rural India, where the men to women internet user ratio stands at 88:12. In the Gender Gap Index (World Economic Forum, 2016), India ranked at 87 out of 144 countries on gender-based disparities based on economic, political, education, and health-based criteria. In India, marked disparities in education, income, employment, age, location (urban or rural) and cultural norms restrict women's ownership of phones and access to the internet, thus contributing to digital exclusion.

The prevalence of traditional restrictions has also served to hamper women's access to technology. The most important concern is the bizarre restrictions on women using mobile phones in rural India. Some groups in India inhibit women's access to technology and impose bans on women using and owning mobile phones by saying that mobile phones were 'debasing the social atmosphere' by leading young women to elope (Aljazeera, 2016). In Bihar's Sunderbadi village in Kochadham block of Kishanganj district, the Panchayat imposed a penalty of INR 10,000 if an unmarried girl was found using a mobile phone (Shetty, 2012).

Social barriers prevent women from actively engaging with the digital world as most of the time they are monitored by male members of the family, in addition to the lack of support from other family members. The Women and the Web Report (Intel, 2013) revealed that one in five women in India believe that the internet is not 'appropriate'

for them. Many women are socially conditioned to believe that using the internet would not be useful for them, and if they did, their families would disapprove.

Other important factors determining women's online access are the affordability and awareness about the internet. The cost of internet access intersects with gender norms that discourage female internet use. The Women and the Web Report (2013) revealed that 40 per cent of women cited a lack of familiarity or comfort with technology as a reason for not using the internet and, particularly, women who were uncomfortable with technology lacked the exposure to internet technologies that would make them more aware and allow them to develop their computer and digital literacy skills. According to a report by the World Wide Web Foundation (2015), the two primary barriers keeping women offline were the perceived lack of know-how and high cost of internet. The report also stated that women are 1.6 times more likely than men to report lack of skills as a barrier to internet use. According to a survey conducted by Google, only one-third of the total Indian population with access to the internet were women and 49 per cent of women did not see any reason to access the internet (Indo-Asian News Service, 2015). So, lack of skills eventually affects their motivation and online behaviour.

Apart from all these factors, access to education hinders their participation in the digital space. Census of India (2011) clearly indicated that the female literacy rate (65.46 per cent) in India was lower that the male literacy rate (80 per cent); parents didn't send their daughters to schools and thus, restricted their involvement in many academic spheres. In India, 51 per cent of women can read and write compared to 75 per cent of men, and without this fundamental skill the internet and the benefits of the online world remain out of reach.

The most vulnerable group in terms of complete digital exclusion is women and the condition becomes worse when they belong to the lower rungs of the economic ladder and reside in rural areas. India being a patriarchal society, it is difficult for women to reach for better opportunities and empower themselves not only within the household but also in their community spaces. Women are taught to be specialized in domestic work such as looking after siblings, cooking food, cleaning the house, etc., right from their childhood. The reality in census data clearly shows that the literacy rate among women is lower than men. In addition, women have always been accorded lower status than men and are dominated by male members within the family and society at large. In addition, women have low participation in the labour force in India. According to a report by the International Labour Organization (ILO), 2016, only 26.91 percent of the adult females in India participate in the workforce.

Even technologies are gendered with men's control of technology, information and knowledge limiting women's opportunity to learn, use and benefit from it. Both historical and current data show that women's access to technology lags considerably behind that of men. Melhem, Morrell &Tandon (2009) also claim that,'Women and girls are poorly placed to benefit from the knowledge society because they have less access to scientific and technical education specifically and to education in general.' The skewed nature of women's access to ICTs in India reflects across all age groups. However, highly educated women are a notable exception, as they reportedly use the ICTs as much as men, suggesting that given educational opportunities and the means to do so, the results could have a levelling tendency with respect to the gender divide in digital inclusion.

Undeniably, cultural and societal norms, lack of education, control over finances, lack of access to ICTs, and a lack of comfort with technology make women digitally illiterate and hinder their participation in the digital space.

2.6 Age

Mark Prensky(2001) put across the concept of Digital Natives and Digital Immigrants where he said that today's generation is called N-gen (N for Net) or D-gen (D for digital) where all students are the 'native speakers' of the digital language of computer, video games and the internet, whereas Digital Immigrants refers to those who were not born into the Digital Age but have at some point of time become fascinated with the new technology. Today, these Digital Immigrants are turning to the internet for getting information or building social networks, and are in the process of learning the digital language. Digital Natives, that includes the youth, are acquainted with digital literacy and education; therefore, these people reap the maximum fruits of ICTs.

The Pew Research Centre (2015) found that there are big demographic differences with regard to internet access in the United States. It can be postulated that similar to the findings in the US, younger, more-educated and higher-income Indians are more likely to use the web than older, less-educated and lower-income Indians (relative to the median household income within India). A comScore report (2013) highlighted that men under 35 and women between 35 and 44 are heavier Internet users. According to the Ericsson Consumer Lab report (2015), mobile internet users grow substantially, with four times the number of users over the age of 50, and three times the number of middle-aged users increasing in the past two years.

According to 'Online and upcoming: The Internet's impact on India', young people (those under 35 years) are nearly twice as likely as older people to use internet-related technologies such as smartphones and Voice over Internet Protocol (VoIP), and they show a greater propensity to transact online and use electronic social networking modes that ride on India's expanding 3G/4G telecom networks in urban centres (McKinsey & Company, 2012).

Mukherjee (2011) stated that only the educated and affluent class is proficient in ICT usage in India, and dependence of the elderly limits their access and capacity to reap the benefits of ICT usage. IAMAI and IMRB (2013) also reported that 15 per cent of the senior citizens accessed the internet from cyber cafes, and 81 per cent of them are using the internet for more than five hours a week. In terms of the services accessed on the internet, 62 per cent of them used it for watching news online and 2 per cent read news on their mobile. About 26 per cent of them look for stock quotes and engage in trading, 38 per cent of senior citizens are using the internet for online banking services and 21 per cent for online shopping. Singh's (2004) study also highlighted that persons aged 15 to 24 (45 per cent) used the internet daily. Older respondents, especially in the 45 to 54 year old category (27 per cent), used the internet once a month.

The other factors that influence the elderly's internet use are socio-economic status, psychological capital (e.g., depressive symptoms, general anxiety symptoms, and general self-efficacy) and social capital (e.g., indicators of social integration/ties and social support). Other than these, usability problems (e.g., small fonts, difficulty of navigation) and associated frustration with the systems, partly due to the cognitive, perceptual, and motor skills, are some of the other reasons that contribute to digital exclusion of the elderly.

According to the Central Statistics Office, Government of India (2016), India has 103.9 million people above 60 years of age. The issues of digital inclusivity become more complex with the physical and cognitive limitations associated with ageing. The vulnerability among the older people is not only due to an increased incidence of illness and disability, but also due to their economic dependency upon their spouses, children and other younger family members. It is clear that a digital divide exists between age groups because the youth are more exposed to technology and are willing to

use it, whereas older people are resistant to change and avoid the use of technology.

3. Process of Digital Exclusion

The exclusionary processes surrounding digital tools and services have long been thought of in isolation. However, in recent years, a more comprehensive approach to exclusion and inclusion studies has been on the rise.

There are complex processes and reasons for India's lack of progress in providing equitable digital access to its citizens—they may be attributed to institutional weakness, policy detachment and the lack of context-specific solutions, among others. Exploring the myriad reasons is beyond the scope of this chapter. This section seeks to explore some specific aspects and processes of digital exclusion.

3.1 Ineffective Agencies

The modest liberalization of the economy in India that began in the 1980s aimed to transform the digital economy and digital access. IT initiatives at the national level were started in the year 1981 with the establishment of National Informatics Centres (NIC) at all the district headquarters in our country. Under the aegis of NIC, many projects like computerization of land records, Public Grievance Redress Monitoring System, Distance learning programme, computerization up to the *taluka*[9] level, creation of State Wide Area Network (SWAN), video-conferencing, training programme for creating awareness, etc., have been undertaken.

In 1999, the Ministry of Information and Communication Technology (MCIT) was formed. The Ministry adopted ICT for promoting literacy, improving quality of education, which resulted in qualified professionals and IT-enabled jobs for Indians. It is also employing IT for good governance, for empowerment of people and their participation in shaping policies of governments, and overseeing it.

The National IT Task Force was constituted in 2003 to provide guidelines for development with the aim to make India an IT superpower. It focused on a number of programmes and policies designed to build the capacities of Indian institutions in IT and IT enabled Services (ITeS). The IT Task Force focused exclusively on increasing institutional access to technology, without any focus on last-mile connectivity, which would provide ICT access to the individuals at the bottom of the pyramid.

India's focus until the mid-2000s was exclusively to improve this institutional access to allow for a top-down model of development that ultimately fell short of its intended goals, and individual access to digital tools remained abysmally low. This is reflected in the limited penetration of computers which stood at 1.4 per cent in 2005 (Times News Network, 2005).

Access to ICTs was mediated by their relatively high price and unavailability at grassroots levels and to a large extent, still continues to be.

3.2 Exclusion by the State

Miliband (2006) spoke about the multi-dimensionality of exclusion and highlighted certain key ideal government approaches to exclusion, saying:

- It is relative and relational—exclusion has multiple factors of causation and is determinant on a continuum of exclusion for different individuals in the spectrum.
- It is multi-dimensional—based on a denial of resources, rights, goods and services and the inability to participate in normal relationships and activities.
- It is embedded in power relations that constrain and define the capabilities and choices of individuals.

Government policies/projects may be designed with the intention of promoting greater inclusion. However, there is a considerable gap between the intention of such policies/projects and the actual implementation on ground. This is caused due to ineffective and detached policy/project design. The approach cited by Miliband is frequently overlooked.

Additionally, the multidimensional nature of ICT inclusion projects means that, while the Ministry of Electronics and Information Technology (MeitY), formerly a department under the Ministry of Communications and Information Technology (Sharma, 2016), is the nodal ministry for ICT, interventions in education, health, rural governance, etc., are anchored by different ministries.

The core policies that deal with IT across the country is the Information Technology (IT) Act, 2000 (Ministry of Law, Justice and Company Affairs (Legislative Department), 2000) and the IT (Amendment) Act, 2008 (Ministry of Law and Justice (Legislative Department), 2009). These laws only deal with the techno-legal aspects of IT in the country and define violations and penalties. They have no direct impact on digital exclusion.

When examined through the lens of human rights, it can be said that the imposition of criminal penalties on legitimate expression online is creating a chilling effect that may impact new internet users unfairly. There is evidence to show that this avenue of exploration is, unfortunately, beyond the purview of this chapter but it nonetheless highlights the nuanced challenges towards achieving holistic digital inclusion in India.

At the 32nd session of the United Nations Human Rights Council, a non-binding resolution titled 'The promotion, protection and enjoyment of human rights on the Internet' (United Nations General Assembly, 2016) was adopted which seeks to promote greater access to the internet and a rights-based approach to maintaining the tenets of the Universal Declaration of Human Rights (UDHR) and the International Covenant on Civil and Political Rights (ICCPR). A set of amendments was led by China and Russia, which aimed at reducing the protections of the tenets of the UDHR and ICCPR within the resolution. India, surprisingly voted in favour of the amendments (Article 19, 2016).We note this in particular because the Digital India Plan, which is explored in detail further in this chapter, aims at providing universal internet access. At the same time, the government seems reluctant to sign a non-binding resolution to incorporate a rights-based approach to ensuring this access. This is perhaps, the most telling form of state-led digital exclusion.

3.2.1 National Policy on Universal Electronic Accessibility, 2013

The National Policy on Universal Electronic Accessibility, referenced in the earlier section, is the only policy document available on the MeitY website that deals with increasing digital inclusion. However, a review of this policy reveals gaps in the cognizance of the inter-sectionality inherent in the goal of providing universal access to persons with disabilities. As noted in the earlier section, PWDs are more likely to have reduced income and employment opportunities. This, in turn would also decrease their opportunities to access digital tools and services. The policy, while recognizing 'the diversity of differently abled persons', only specifies differently-abled women and children as a specific target group. It does not account for PWDs from the poorer and marginalized sections.

3.2.2 National Broadband Policy, 2004 and National Telecom Policy, 2012

The National Broadband Policy, 2004 (Ministry of Communications and Information Technology, 2004), was created with the intention of increasing the proliferation of broadband connectivity in the country, which at the time of drafting stood at

0.02 per cent. This policy only took cognizance of provisioning broadband access in rural areas, with no mention on how to increase access for women, PWDs or the elderly.

The National Telecom Policy (NTP), 2012 (Ministry of Communications and Information Technology, 2012), was adopted with the intention of addressing issues in telecom proliferation and regulation, that have arisen with the increasing penetration of telecommunication and internet in the country. The NTP recognizes the need for increasing telecom penetration in the rural and remote geographical regions of the country. It does not focus on the intersections of exclusion either.

Reassuringly, the NTP, 2012 did mention creating a 'Right to Broadband' that would focus on rural and remote areas, but no work has been done in that regard yet.

The state, in its policy formulation does not explore the myriad of extant exclusionary processes that plague the intended beneficiaries of these policies. This leads to widening traditional exclusions in addition to digital exclusion.

We posit that exclusionary processes exist on the ground during the implementation of government projects, with little or no empirical evidence available about the discrimination and exclusion involved. However, there exists anecdotal evidence (See Box 2) which echoes the discrimination found in the implementation of the public distribution system in India, particularly the Mid-Day Meal Scheme (MDMS) and public health delivery systems. Studies have found that these programmes are fraught with issues surrounding physical access, participation and community-level access for individuals from Scheduled Castes and Tribes.

Thus, it may be postulated that since state actors/functionaries are the real on-ground implementers of government programmes and policies, the motivations of these actors may leads to the reinforcement of differential access on social, economic and cultural grounds. While they may genuinely believe in the programme, they are still susceptible to personal biases.

3.3 Poor Implementation of Programmes

3.3.1 Common Service Centres under the National e-Governance Plan

In 2005, the government launched the National e-governance Plan (NeGP, 2016) that placed a major focus on the development of technology-enabled governance services to 'improve the delivery of public services and simplify the process of accessing them.' The NeGP introduced the Common Service Centre (CSC), which was conceptualized as 'front end service delivery outlets enabling smooth and transparent governance at the village level.' They were envisioned as change agents that would 'promote rural entrepreneurship, build rural capacities and livelihoods, enable community participation and affect collective action for social change—through a bottom-up model that focuses

Box 2: Discrimination in Access to Digital Services

In a village outside Coimbatore, the Common Service Centre is run by a dominant caste man. While he may allow men from lower castes to access the CSC, he is strictly against women from lower castes accessing the CSC. His argument is that women, especially lower caste women, do not have any need of accessing digital tools and services. CSC operators are an integral part of the implementation of the digital inclusion agenda of the Government of India.

Anonymous quote received by Research Team, 2016

on the rural citizen.' CSCs are essentially telecentres or telecottages that provide public internet access points in rural areas. While noble in aim, challenges in implementation lead to scepticism about such telecentres. Dagron (2001) observed that, globally, only one out of a hundred telecentres is actually useful for the community.

Table 2 gives the status of the CSC rollouts

Table 2: CSC Rollout as on September 2012

States	Total CSCs to be set up	Roll Out as on 30th Sept 2012	Roll Out as on 30th Sept 2012 (per cent of target)	CSCs Connected	CSCs Connected (per cent of rolled out centres)
Andaman & Nicobar Islands	45	10	22.2%	10	100.0%
Andhra Pradesh	4687	3105	66.2%	3110	100.2%
Arunachal Pradesh	200	200	100.0%	141	70.5%
Assam	4375	3881	88.7%	3136	80.8%
Bihar	8463	6608	78.1%	5063	76.6%
Chandigarh	13	25	192.3%	30	120.0%
Chhattisgarh	3385	2460	72.7%	1248	50.7%
Delhi	520	0	0.0%	0	0.0%
Goa	160	29	18.1%	29	100.0%
Gujarat	13,685	13,685	100.0%	13,685	100.0%
Haryana	1159	0	0.0%	0	0.0%
Himachal Pradesh	3366	2803	83.3%	2048	73.1%
Jammu & Kashmir	1109	717	64.7%	544	75.9%
Jharkhand	4562	3292	72.2%	2538	77.1%
Karnataka	5713	800	14.0%	800	100.0%
Kerala	2200	2235	101.6%	1899	85.0%
Lakshadweep	18	12	66.7%	12	100.0%
Madhya Pradesh	9232	9270	100.4%	8549	92.2%
Maharashtra	10,846	10,428	96.1%	8116	77.8%
Manipur	399	399	100.0%	127	31.8%
Meghalaya	225	225	100.0%	115	51.1%
Mizoram	136	136	100.0%	107	78.7%
Nagaland	220	0	0.0%	0	0.0%
Orissa	8558	5302	62.0%	3632	68.5%
Puducherry	66	65	98.5%	65	100.0%
Punjab	2112	1588	75.2%	1588	100.0%
Rajasthan	6626	4224	63.7%	4178	98.9%
Sikkim	45	45	100.0%	43	95.6%
Tamil Nadu	5440	2683	49.3%	2683	100.0%
Tripura	145	145	100.0%	197	135.9%
Uttar Pradesh	18,745	12,828	68.4%	10,025	78.1%
Uttarakhand	2804	2329	83.1%	1406	60.4%
West Bengal	6797	6120	90.0%	5609	91.7%
TOTAL	1,26,056	95,649	75.9%	80,733	84.4%

Source: Open Government Data (OGD) Platform India

across various states in 2012 from data.gov.in. The table shows that most of the states had not been able to meet the rollout deadline. At the start of this project it was stipulated that the project should achieve the 100 per cent rollout status within 18–24 months after signing the Service Agreement with the respective state governments.

However, when we see the information presented in Table 2, as of 2012, only 10 states have been able to achieve full rollout of CSCs across the state. The Andaman & Nicobar Islands, Delhi, Goa, Haryana, Karnataka and Nagaland have zero per cent rollout of the CSC. It is particularly distressing to see the lack of CSC connectivity in Haryana and Nagaland, which suffer from issues of literacy and geographical connectivity. On an all-India scale, only 75.9 per cent of the total allocated CSCs have been created. However, over 80 per cent of constructed CSCs are connected.

One important reason for the poor rollout of these centres was the poor IT infrastructure, lack of adequate institutional frameworks and governance mechanisms for ensuring the successful rollout of the CSC programme.

The state governments were expected to provide premises for the setting up of these centres in their Panchayat buildings or block offices. But there seemed to be a scarcity of space for the same across states (Dass and Bhattacherjee, 2011). In states like Jharkhand some of the Panchayat blocks did not have space. Tripura on the other hand had assigned premises in which the ceiling of the room was missing. Another problem, particularly in the north-eastern states as well as states like Jharkhand and Chhattisgarh, was the uneven and rough geographical terrain. Some of the villages are located in remote and inaccessible locations making it impossible to set up a centre in those areas. This was indeed unfortunate considering it is the people living in such areas who have a greater need of easy access to government services.

Dass and Bhattacherjee also identified issues in the proper implementation of the CSC project, citing lack of Government to Citizen (G2C)[10] services, poor connectivity, lack of Village Level Entrepreneur (VLE) recruitment with the right skill sets (due to low literacy rates in the concerned areas) and lack of cooperation from government officials, especially at lower levels. In addition to these issues, lack of proper infrastructure and lack of connectivity is a key factor in the failure of the CSC project.

Due to the involvement of the central government, state governments and private players through a unique PPP model, a comprehensive budgetary analysis is not possible.

3.3.2 Digital India Plan

In 2014, a newly elected government, led by Prime Minister NarendraModi, launched the Digital India (DI) Plan (Ministry of Electronics and Information Technology, Government of India, 2015) that aimed at building on the NeGP and working towards improving individual access to technology across the country. The DI Mission centred on three key aims: Digital Infrastructure as a Utility to Every Citizen, Governance and Services on Demand, and Digital Empowerment of Citizens. Its approach to achieve these aims was through nine unique pillars:

1. Broadband Highways
2. Universal Access to Mobile Connectivity
3. Public Internet Access Programme
4. e-Governance—Reforming Government through Technology
5. eKranti—Electronic delivery of services
6. Information for All
7. Electronics Manufacturing
8. IT for Jobs
9. Early Harvest Programmes

The DI Plan is, at the time of writing, exactly two years old and while new initiatives like DigiLocker, eSign and the MyGov App have been launched, the efficacy of these projects is still debatable. A review of 18 apps launched under the DI Plan, conducted in August 2016, showed that almost all of them are inaccessible or partially inaccessible to individuals using screen readers (Narasimhan, 2016).

National Optical Fibre Network/BharatNet

One of the initiatives under Pillar 1 of the DI Plan was the revamping of the National Optical Fibre Network (NOFN) into the newly envisioned BharatNet (Rathee, 2016) The NOFN has its roots in the NeGP, which aimed to provide ICT enabled delivery of Government services. Public IT platforms such as State Wide Area Networks (SWANs), State Data Centres (SDCs) and Common Service Centres (CSCs) facilitate this delivery.

It aims to provide broadband connectivity through optical fibre to 2,50,000 Gram Panchayats in an effort to provide last mile connectivity as critical infrastructure. The aim was to provide all necessary government services to citizens in an effort to allow them access to information, which would lead to their empowerment and development. It was a result of the coming together of policy and a vision of managing a high quality network with a link to services to provide on-demand access to citizens.

The initial timeline of the NOFN was to cover 1,00,000 gram panchayats by 31 March 2014 in the first phase; to cover another 1,00,000 by March 2015 in the second phase and an additional 50,000 by September 2015 in the final phase. This timeline was extended once in 2014 to March 2015, March 2016 and December 2016 for the three phases. The second extension to the timeline came with the change of the first 1,00,000 panchayats to be covered by March 2017. While no deadlines for the other phases have been specified, the intention is to complete the coverage of 2,50,000 panchayats by December 2018. The implementing partners of the NOFN—Bharat Sanchar Nigam Limited (BSNL), RailTel Corporation of India Limited (RailTel) and Power Grid Corporation of India Limited (PGCIL) have also been called up by the Government for dragging their feet on the implementation of the project (Singh, 2016). According to the Department of Telecommunications (DoT), only 37 per cent of the total optical fibre planned has been laid (Table 3).

As of April 2016, only 48,199 panchayats of the 1,00,200 were targeted under Phase 1, indicating a 48 per cent success rate. Of the panchayats connected to the NOFN, only 6727 panchayats

Table 3: Implementation Status of NOFN by Partner

Implementing Partner	Districts	Blocks	Gram Panchayats	Optical Fibre to be laid (Km)	Optical fibre laid (Km)
BSNL	410	2146	84,366	1,85,742	70,298 (37.85%)
RailTel	44	225	8676	19,331	4967 (25.69%)
PGCIL	28	356	7156	17,198	7236 (42.07%)
Total	**482**	**2727**	**1,00,200**	**2,22,271**	**82,501 (37.12%)**

Source: Department of Telecommunications Outcome Budget 2016–17

Table 4: State-wise Plan of Gram Panchayats (GPs) to be covered under NOFN/Bharat Net Project Phase-I as on May 2016				
S. No.	States/ UTs	No. of Gram Panchayats (GPs)- Phase I	No. of GPs where optical fibre cable (OFC) laid	No. of GPs lit (with broadband connectivity)
1	Jammu & Kashmir	624	91	0
2	Himachal Pradesh	283	28	0
3	Punjab	6128	3051	0
4	Haryana	6090	3147	160
5	Rajasthan	6967	3757	308
6	Chandigarh	12	12	12
7	Uttarakhand	1767	711	183
8	UP (West)	8040	2721	131
9	UP (East)	14,474	5910	70
10	Bihar	5202	2423	215
11	West Bengal	2713	723	0
12	Sikkim	0	0	0
13	Assam	1013	682	128
14	Jharkhand	1388	985	135
15	Odisha	3388	1633	104
16	Andaman & Nicobar	69	0	0
17	Arunachal Pradesh	256	22	0
18	Nagaland	743	154	0
19	Manipur	24	24	0
20	Meghalaya	638	52	0
21	Tripura	1021	492	75
22	Mizoram	163	0	0
23	Madhya Pradesh	10,516	5170	150
24	Chhattisgarh	2110	1550	514
25	Gujarat	5735	2203	116
26	Maharashtra	12,055	4865	201
27	Daman & Diu	0	0	0
28	Dadra & Nagar Haveli	0	0	0
29	Karnataka	5599	5008	2889
30	Andhra Pradesh	0	0	0
31	Telangana	2097	1558	106
32	Tamil Nadu	0	0	0
33	Kerala	977	1129	1129
34	Puducherry	98	98	101
35	Lakshadweep	10	0	0

S. No.	States/ UTs	No. of Gram Panchayats (GPs)- Phase I	No. of GPs where optical fibre cable (OFC) laid	No. of GPs lit (with broadband connectivity)
36	Goa* (All have been connected)	NA	NA	NA
	Grand Total	1,00,200	48,199	6727
		GPs where OFC is available as a percentage of Phase 1 target	48.10%	
			Connected GPs as a percentage of GPs where OFC available	13.9%
			Connected GPs as a percentage of Phase 1 target	6.71%

Source: RajyaSabha, Analysis by DEF Research Team.

have internet access, which is only 13 per cent of the connected panchayats or 6 per cent of the total scheduled for Phase 1 (See Table 4).

The NOFN was funded by the Universal Service Obligation Fund (USOF), with an initial corpus of INR 20,000 crores. However, according to a report (Committee on the National Optical Fibre Network, 2015), the actual total budget needed to achieve the vision of the NOFN is INR 72,778 crores. This represents a budget increase of 363.9 per cent.

3.3.3. Demonetization and the Push towards Digital Financial Payments

On 8 November 2016, the Government of India withdrew the status of all INR 500 and 1000 (high-value) notes as legal tender with immediate effect, citing the intention to curb tax evasion and counterfeit money (Reserve Bank of India, 2016). Overnight, about 86 per cent of the liquidity within the Indian economy was rendered invalid. Most of the Indian economy is based entirely on cash, with an estimated 85 to 90 per cent of all transactions taking place in cash (Reuters, 2016). The impacts of this action have been criticized by various quarters—Kaushik Basu, Amartya Sen, Stephen Forbes and Prabhat Patnaik, apart from the opposition parties in the country (Roychoudhury, 2016; PTI, 2016; Forbes, 2016; Patnaik, 2016; PTI, 2016; ANI, 2016; PTI, 2016).

The currency demonetization drive and the frequent changes of rules regarding transactions (*Economic Times*, 2016; *Indian Express*, 2016) further led to significant human costs. The agricultural sector, due to undergo the *rabi*[11] crop planting season was hit especially hard with the withdrawal restrictions, despite measures taken by the government to ease stress on the farmers. This was compounded given the fact that a majority of farmers are not part of the formal banking system, due, in part to the lack of adequate infrastructure and bank branch penetration, with one report citing that 'Four banks cater to 200 villages of about 2,000 people each' (Firstpost, 2016). The CRISIL Inclusix, 2015, found that of the 35 administrative regions studied, 10 ranked low or below average on overall financial inclusion. The key crop belt of Uttar Pradesh, Bihar and Jharkhand all fall below average (CRISIL, 2015); which would lead to significant impacts on the ability of farmers in these belts to access cash and credit, leading to further

hardship and farmer suicides(La Via Campesina, 2017). Further, many of the farmers had just sold the produce from the earlier crop season and were left with the demonetized high-value notes that were not accepted anywhere else.

Despite all the intentions of the state in pushing digital financial payments, it is our contention that this too, represents how detached from reality state policies and programmes are. There are multiple considerations that policy makers did not take into account when making a decision to abruptly invalidate 86 per cent of the liquidity in the Indian economy and pushing digital payments.

- **Mobile connections in India—**According to figures released by the Telecom Regulatory Authority of India (Telecom Regulatory Authority of India, 2017) in October 2016, the total tele-density[12] stood at 86.25 per cent. This figure is often misleading as it accounts for the total of wireline and wireless subscribers. Exploring wireless tele-density paints a different picture; with a stark urban-rural disparity with urban tele-density standing at 155.35 and rural at 51.98. The penetration of mobiles, the key enabler of digital finance, is woefully lacking in the regions which account for 67.25 per cent of India's population (World Bank, 2015).
- **Smartphone penetration—**Smartphone penetration in India has been estimated at 29.8 per cent of the total mobile users in the country (Statista, 2015). Smartphones, as opposed to feature phones have the capability to access the internet and use third-party applications to enhance their functionality and flexibility of use. Given that most of the digital payments options, including the government's own BHIM application, run only on smartphones, it automatically excludes a significant per cent of the mobile phone users, in addition to those that do not have a mobile altogether.

The central government has also taken steps to incentivize the use of cashless digital payment systems, going so far as to state that 'An incentive of INR 10 will be given to the district administration for every individual who has shifted to digital payment mode and has made at least two digital transactions for day-to-day activities' (*Business Standard*, 2016). This incentive is, in the opinion of the authors, positively delusional as it still doesn't address the underlying gap; only incentivizing an activity that cannot be achieved.

- **Extant socio-economic and cultural exclusions—**The key mediators of traditional exclusionary process, already stated earlier in the chapter, would create 'double-trouble' for the effective implementation of the programme as financial exclusion is also mediated by these extant processes, similar to the case of the access to ICTs for women with disabilities.
  - A comprehensive assessment of the challenges faced by women in accessing digital financial services conducted by Klapper and Dutt (2015) showed that inequalities exist at different stages.
  - Demand-side inequalities like lack of identification, lower financial literacy; lack of financial independence and autonomy of agency, and socio-economic sanctions create a barrier-filled environment for women to demand access to digital finance.
  - Supply-side issues like patriarchal digital finance application design and marketing and the poor mechanisms for recourse can limit financial literacy.
  - Infrastructural and policy issues relating to legal and regulatory environments, Know-Your-Customer (KYC) rules, lack of adequate network access and

taxation limit the quality and depth of interventions.

- Finally, women's access to technology is a key barrier to accessing digital finance.

4. Consequences of Digital Exclusion

Digital divide between high, medium, low and non-users means disadvantaged users always have to play catch-up in obtaining access to ICTs because of weak digital infrastructure and lower levels of digital skills. Little research has been done on the impact of digital exclusion on the above-mentioned disadvantaged or socially excluded groups. Despite the lack of information, the following section provides an understanding of the consequences of digital exclusion on education, livelihood, social participation and citizenship.

4.1 Education

Internet access serves as a gateway to empowerment by building self-confidence, self-determination and the capacity to alter the structure that governs people's citizenship. ICTs are changing ways of doing things and increasing the overall efficiency of human activity. The Internet is enabling one to have access to almost any kind of information on one's fingertips. The use of ICTs in education not only enhances the knowledge and skills but also improves the educational content of both the learner and the educator.

Kulik (2003) conducted a meta-analysis of studies to identify the impact of e-learning on student outcomes. He identified the following trends:

- Students who used computer tutorials in mathematics, natural science, and social science score significantly higher in tests in these subjects compared to students who did not use computers. Similarly, students who used simulation software in science also scored higher. However, the use of computer-based laboratories alone did not result in higher scores.
- Primary school students who used tutorial software in reading scored significantly higher on reading scores. Very young students who used computers to write their own stories scored significantly higher on measures of reading skills
- Students who used word processor or otherwise used the computer for writing scored higher on measures of writing skill.

4.2 Livelihood

India comprises 67.25 per cent of rural population (World Bank, 2015). NREGA, initiated in 2005, aimed at securing livelihood by providing at least one hundred days of guaranteed wage employment to rural households in India. Under this programme, ICT-based interventions were added to enable the rural population to access information on their work history, demand jobs against a dated receipt, and also receive wages on a biometric registration. This would require proper establishment and operationalization of a computer-based Management Information System (MIS) interconnecting all the gram panchayats, blocks, districts, states and the Ministry of Rural Development (MoRD).

The Unique Identification Authority of India (UIDAI) and MoRD signed a Memorandum of Understanding to integrate MGNREGA processes with Aadhaar. It was expected that Aadhaar would soon facilitate a range of MGNREGA, banking, insurance and other services for rural citizens. However, in spite of much hype by the government it was reported (Mathur&Bolia, 2016) that compensation paid on time drastically declined from 50.1 per cent in 2013–14 to 26.90 per cent in 2014–15. In 2008, the central government directed that all

Box 3: Wages of Delay

In Surguja district (Chhattisgarh), the administration relies on post offices as there are hardly any rural banks. In one block, the post office had only one employee who was responsible for opening and operating thousands of NREGA accounts. All the work is done manually as there are no computers. In addition, the postmaster complained that the formalities of opening accounts remained incomplete because he did not have enough passbooks. (The supply of passbooks in the district was delayed for months.) Similar problems have been reported wherever NREGA payments are made through post offices, in states like Rajasthan and Jharkhand.

Source: Kheera (2010).

MGNREGA wages be paid through banks and post offices. However, the banks and post offices were unable to cope with the volume of payments (Kheera, 2010). Similar arguments against linking Aadhaar to the Public Distribution System (PDS) have been made in a recent article in *The Hindu* (February 2017), wherein activist Kavita Srivastava observes that linking Aadhaar to social security systems, in this case for food entitlements, is not just unconstitutional, but works systematically against the poorest who are most often at the receiving end of subpar technology infrastructure required for a biometric identification system such as Aadhaar to function.

In the wake of falling market prices of food products, weather challenges, outdated methods of farming, high cost of production and often low yields and poor income, the central government started Kisan Call Centres. Live assistance is provided to farmers in their regional language. It is a combination of ICT and Agriculture technology. It enables farmers to have direct discussions with subject matter experts who provide instant solutions. Despite advertisements on TV and print, a survey reported in *Firstpost* (2014) showed that 70 per cent of the farmers surveyed never contacted a Kisan Call Centre, and 62 per cent had no idea that they are eligible for a minimum price. Lack of awareness about ICTs was a major hurdle in making both Kisan Call Centres and MGNREGA a success.

The push to digital payments along with the effects of demonetization have also had a strong negative impact on the informal sector in the country, with workers in the construction, industrial and service industry being disproportionately impacted. Many vegetable vendors have reported losses of over 50 per cent on a daily basis (Mitul, 2016; DNA, 2016). The lack of a choice of payment channels has also led to a massive reverse-migration of people from urban areas back to villages. This reverse trend has also broken the migrant-dependent nature of certain areas of the country (Naik, Kundri, & Parulkar, 2017; Mahaprashasta, 2016).

4.3 Social Participation

Digital exclusion leads to social exclusion by restricting people's accessibility to the internet, thereby narrowing down the social network where people can express their viewpoints, share their experiences and communicate.

Internet usage has positive benefits for the older people as these people perhaps face high rates of loneliness and depression. This occurs for a variety of reasons, including dearth of social ties, relocation to different types of living and care communities, and limitations of physical and mental health (Jylha, 2004). Social network sites such as Facebook not only provide a platform to reconnect with the people from one's past but also

bridge the generational gap.With ICTs increasingly integrated into every aspect of the modern world, access to ICTs is vital for a person's participation in the society.

The relationship of disabilities and digital inclusion and empowerment has been explored in depth by UNESCO, which states that digital exclusion of PWDs leads to increased inequalities in the ability of these persons to allow their social, political and economic integration. It also leads to a reduced scope of information, knowledge and activities available to them. The New Delhi Declaration of 2015 was the first document in 20 years issued by UNESCO on the issue of disability that was endorsed by its governing bodies (UNESCO, 2015). The Declaration recognized that for persons with disabilities, the issue of universal access to information and knowledge using ICTs is an inalienable human right and precondition to live independently and participate fully and equally in society. It also reasserted the commitment to the World Summit on the Information Society (WSIS, 2005), Marrakesh Treaty to Facilitate Access to Published Works for Persons Who Are Blind or Visually Impaired (WIPO, 2013) and other internationally ratified development goals.

5. Recommendations

The previous sections have demonstrated how access to ICTs is a public good, explored some of the exclusionary processes and laid out impacts of digital exclusion on certain groups. The success of our recommendations depends on an understanding that digital exclusion has a predominantly socio-economic basis and is reinforced by entrenched hierarchical structures in the society.

As Pippa Norris (2001) noted, absolute social inequalities will continue to exist in internet access just as they exist in other dimensions of life,'… it would be naive to expect that the internet will magically transcend information poverty overnight.'

This section aims to propose a set of recommendations that, if properly implemented can make significant strides towards bridging the digital exclusion gap.

1. There is a need for the government to realize that due to low per capita disposable income in India not everybody can have easy access to digital media and the internet. Since access to digital media ensures access to other basic entitlements like education, health, provident fund, food, etc., public provisioning of digital media becomes extremely important. It is recommended that it be provided at a subsidized rate in order to avoid the free rider problem.[13] This will reduce misuse of resources and allow access to those who are actually in need and cannot pay the rate generated by the market.
2. Though there are different programmes initiated by the government to bridge the gender divide, still proper implementation is required to address the issues of literacy and poverty. To digitally empower women, digital ICT programmes must address socio-cultural barriers to women's access to internet and ICT devices.
3. The government should ensure that ICTs are fully integrated in education and training at all levels to bridge the digital divide. Also, existing programmes should be integrated with digital and information literacy targeting individuals with lower literacy levels.
4. The government should provide relevant support in assistive technologies and should organize ICT training for people with disabilities. In addition, all government websites should be made compatible with the W3C Guidelines and a process should

be put in place to ensure these standards are maintained to further guarantee successful implementation, and to make portals accessible to persons with disabilities and the elderly.

5. Awareness should be created among persons with disabilities about the availability of existing and emerging assistive technologies and independent living aids, as well as schemes for the same. Such information should be made available in the public domain including in local languages.
6. There needs to be more comprehensive research about internet usage patterns, challenges faced in accessing internet and the influence of digital exclusion on PWDs and older people. Due to the fractured nature of digital inclusion activities and budgets, further research needs to be conducted to comprehensively analyse digital exclusion.
7. The government should incentivize private and non-governmental actors in bringing technology to rural as well as other geographically inaccessible and remote areas.

Conclusion

We previously established the digital medium as a public good and highlighted how digital exclusion deprives citizens' access to other public goods and widens extant social, economic and cultural stratification in society. Digital inequality leads to deprivation from access to basic necessities like—pension, daily wage, food, safe drinking water, basic health facilities and education, which dilutes the level of agency that a citizen can effectively exercise. On the one hand, the government aims at making India a superpower, and on the other, deeply rooted exclusionary processes lead to digital exclusion that further leads to the deprivation of often basic rights and needs, affecting the overall growth and dignity of an individual.

Cultural norms play an important role in limiting women's access to internet. Weak infrastructure, ineffective implementation, bureaucratic hurdles and weak monitoring have failed to bridge the digital divide between rural and urban areas.

To improve social welfare, it is important that the government provide public goods such as digital access, as it helps to avoid the problem of under-provisioning and under-consumption of information. It is important because it helps people living below poverty line to avail equal opportunities thereby reducing inequality.

In this chapter, we highlighted certain factors that reinforce digital exclusion—income, gender, age and disability. Individuals, who embody any one of these, lie on a continuum of exclusion. When one of the other factors also comes into play, the risk of exclusion increases manifold. It is especially important that the government should try to advocate equal rights, organize vernacular ICT trainings and provide relevant support to such individuals so that they are not excluded from accessing the internet and its related benefits.

Endnotes

1. E-MitraKendras are telecentres that enable villagers to get various entitlement-related services.
2. National Rural Employment Guarantee Act (or MGNREGA) is an Indian labour law and social security measure that aims to guarantee the 'Right to Work'. It aims to enhance livelihood security in rural areas by providing at least 100 days of wage employment in a financial year to every household whose adult members volunteer to do unskilled manual work.

3. Aadhaar is a 12-digit unique identification number issued by the Indian government to every individual resident of India. The Unique Identification Authority of India (UDAI), which functions under the Planning Commission of India, is responsible for managing Aadhaar numbers and Aadhaar identification cards.
4. Discretionary income is the amount of an individual's income that is left for spending, investing or saving after paying taxes and paying for personal necessities, such as food, shelter and clothing. Discretionary income includes money spent on luxury items, vacations, and non-essential goods and services.
5. A gram panchayat is the cornerstone of the Panchayati Raj system (local self-government organization) in India. It operates at the village or small town level and has a Sarpanch (head of village) as its elected head.
6. The Panchayati Raj system is a decentralized system of governance prevalent in rural areas in India. While the Panchayati Raj system is based on the traditional panchayat system, it was formalized through the 73rd Constitutional Amendment, 1992.
7. Denotified Tribes (DNTs), also known as VimuktaJati, are the tribes that were originally listed under the Criminal Tribes Act of 1871, as 'Criminal Tribes' and 'addicted to the systematic commission of non-bailable offences.'
8. The Digital Revolution refers to the advancement of technology from analogue electronic and mechanical devices to the digital technology available today. The era started during the 1980s and is ongoing. The Digital Revolution also marks the beginning of the Information Era.
9. A taluka or tehsil is an administrative division in India that includes a town or city that serves as the administrative centre with a few villages or other towns under its jurisdiction.
10. Government to Citizen Services are a set of certain services that the government provides to the citizen. In India, G2C services in India include Aadhaar Card, Voter ID Application, MNREGA job application, PAN Card application, etc.
11. The Rabi season is from October to February.
12. Teledensity is the number of telephone connections for every hundred individuals living within an area.
13. Free rider problem occurs when those who benefit from resources, goods, or services do not pay for them, which results in an under-provision of those goods or services.

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