



ROUND TABLE

Digital accessibility: Challenges and opportunities



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Received 17 March 2017; revised form 2 April 2018; accepted 14 May 2018; Available online 30 August 2018

KEYWORDS

Digital accessibility;
Inclusion;
Best practices;
Barriers to accessibility;
Disability;
India

Abstract This round table is focussed on outlining barriers to digital accessibility, solutions, and possible next steps to ensuring digital accessibility. In setting the context of the round table discussion, the article first outlines what accessibility involves, accessibility standards and guidelines, and spells out barriers to accessibility, including the limitations posed by the institutional context and the technology context. It also discusses the status of digital accessibility in India. The article then reports on a panel discussion in which diverse stakeholders discussed several of the issues outlined above.

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Introduction

Accessibility refers to the extent to which a product, device, service, or environment is available and navigable for persons with disabilities, or for persons with other special needs or functional limitations. Digital accessibility, the focus of the present round table, centres on access to technology products, resources, and services across hardware and software (Carnegie Mellon University, 2015; Lazar et al., 2015). Web accessibility, a core area of digital accessibility, implies the removal of barriers in accessing the Web. Put alternately, it implies making the perception, comprehension, navigation of, and contributions to the Web easier for persons with disabilities or for those whose abilities may change given the process of bodily ageing (World Wide Web Consortium or W3C, 2005).

Digital accessibility can level the playing field for persons with disability and allow for productivity and inclusion

through participation in educational, economic, and political spheres (Dobransky & Hargittai, 2006; Kent, 2015; Lazar et al., 2015). However, it is important to view such accessibility as beneficial for *everyone*, and not just one sub-group, though accessibility may have originated to facilitate matters for a particular sub-group. For example, the widely used speech technology (e.g., hearing driving directions in cars or search results on smartphones) was birthed from Dr. Raymond Kurzweil's decision to create a reading machine for the blind. E-books that we listen to today were birthed from George Kerscher's frustration that he, as a blind man, could not access information. Captioned video which helps us follow a movie via subtitles in noisy places or helps us learn new languages was created for people who are deaf or hard of hearing. As a final example, speech recognition or voice recognition technology, be it Microsoft's Cortana or Apple's Siri, or interactive voice response systems we use to book hotel rooms or air tickets have been used by persons with disabilities for over thirty years (Lazar et al., 2015).

Below is a brief overview of Web accessibility standards and guidelines, followed by barriers to accessibility, and the

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<https://doi.org/10.1016/j.iimb.2018.05.009>

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state of accessibility in India. This brief will allow for an understanding of the round table discussion that follows, which was focussed on outlining barriers to digital accessibility, solutions, and possible next steps to ensuring digital accessibility.

Accessibility standards and guidelines

The World Wide Web Consortium (known as the W3C: <https://www.w3.org>) issues guidelines for accessing of Web content; referred to as Web Content Accessibility Guidelines (WCAG). Lazar and colleagues (2015) have summarised the WCAG as follows: The latest version, issued in 2008 (WCAG 2.0) remains the preferred accessibility standard across geographies as it was developed through a multi-stakeholder effort and because of the ease with which one can understand it. Of the multiple standards outlined by the World Wide Web Consortium (see for example: <https://www.w3.org/TR/>) here I outline ones most pertinent to the round table.

The Authoring Tool Accessibility Guidelines (ATAG) provide recommendations for the making of accessible authoring tools so that content creators with disabilities can use the tools independently. The ATAG also assists authors with accessible content creation by enabling support and promoting production of content which conforms to the Web Content Accessibility Guidelines. Further, the User Agent Accessibility Guidelines (UAAG) are guidelines for the evaluation of accessibility of user agent technologies like Web browsers, media players, document viewers, and access technology tools which persons with disabilities use to access information. These guidelines can be used by tool developers as well as policy makers and procurement decision makers to enhance accessibility of all content.

The Consortium has also outlined the following checkpoints for gauging accessibility standards - perceivable, operable, understandable, and robust. Perceivable refers to content availability (e.g., captions for deaf users), operable refers to the users' ability to interact with content (e.g., use of keyboard vs. mouse), understandable refers to processing of content by the user (e.g., ease of making changes as needed), and robust refers to the degree to which content can work with present and future technologies.

While the Consortium does not prescribe particular types and degrees of compliance in its documentation, there are three levels which can guide new content creation as well as aid remediation. More specifically, compliance with the Web Content Accessibility Guidelines is divided into three progressive levels from barebones to excellence: A, AA, and AAA. For example, the first level may require captions for pre-recorded video, the next may require captions for live events, and the third may require full descriptions of all visual information, including expressions of actors or non-speech sounds like laughter (W3C, 2008; Lazar et al., 2015).

However, technology and technical documents and standards cannot be expected to create accessible spaces on their own. What also matters is the historical, social, and the regulatory context within which technologies operate - all of which can pose barriers or enable accessibility (Lazar et al., 2015). A few such barriers are noted below.

Barriers to accessibility

Limitations posed by the institutional context

The institutional landscape comprises various key stakeholders who undertake positive steps towards accessibility, but fall short in some ways. For example, positive steps in the form of the United Nations Convention on the Rights of Persons with Disabilities (UNCPRD) lead to discussions and documentation of the need for providing persons with disability access to new information and technologies. However, the implementation of such resolutions has met with uneven success given patchy acknowledgement of regional regulations and laws. Governments may also craft guidelines and regulations but may not specify tangible goals to meet and may fail to fully engage in compliance monitoring (Lazar et al., 2015).

As another example of a key set of institutional actors, organisations may espouse accessibility goals and may undertake genuine efforts to make such goals a reality but the perception of lower profitability of inclusive technologies given a relatively narrow market for such may dampen overall efforts (Goggin & Newell, 2007; Neufeldt et al., 2007). It is also likely that in the absence of unambiguous governmental guidelines or regulations, organisations may not understand legal requirements, categories of individuals to be covered with accessible solutions, and processes to be followed to ensure accessibility (Lazar et al., 2015). Thus, positive intentions of global bodies, governments, or organisations may not lead to appropriate creation or dissemination of accessible technologies.

Further, institutional actors may inadvertently slow down the overall process in the field. For example, those with a disability, those working in advocacy groups, and those who are actually developing accessible technologies may be different groups of actors who do not fully understand each other's work, needs, or constraints, and may thereby hamper final outcomes (Oswal, 2013). To the extent the institutional field comprises multiple stakeholders who do not share common ground with regard to objectives and agendas, digital accessibility efforts can encounter dualisms such as "profit versus human rights, market share versus accessibility, competition versus inclusion" (Stienstra et al., 2007: 149).

Finally, overall dominant institutional attitudes towards those with a disability may inhibit true inclusion. When seen as a marginal group that deserves welfare (Kulkarni et al., 2017) or as those that need care and aid, the idea of dependency is reinforced (Lazar et al., 2015). Such attitudes and our use of language reinforce each other to further inhibit inclusion through technologies. For example, societal understanding of what is normal or otherwise can imply that technology that aids able-bodied people does not create dependency but the same used by persons with disabilities are considered to be "assistive technologies" that imply dependency (Moser, 2006; Stienstra et al., 2007). Such a mind-set can act as a barrier to digital accessibility creation and implementation.

Limitations posed by the technology context

Another prominent challenge comprises constraints and limitations imposed by technology itself, though this can also be

construed as human inability to craft technologies. A major challenge around digital accessibility concerns the present inability of technology to cover the diverse types of disabilities. More specifically, as [Kelly and colleagues \(2010\)](#) and [Lazar and colleagues \(2015\)](#) explain: while perceptual disabilities (i.e., those involving vision and hearing limitations) and physical disabilities (i.e., those involving limitations of use of limbs as well as speech) have been the focus of accessibility solutions, cognitive disabilities have proven difficult to address. For example, screen readers can help persons who have visual limitations and captioning of videos can help persons who have hearing limitations. Similarly, certain types of keyboards and other hardware devices can help persons who have physical limitations. However, in case of cognitive impairments such as Down syndrome or Alzheimer's disease, technology is yet unhelpful and needs to be attended to.

Furthermore, changes in technology have been very rapid. The outcome of this speed has meant that, for the most part, the design and development of most assistive technologies is a "reactive process" such that by the time new accommodations are introduced into existing products and services, technology has already moved forward. This situation arises especially because accessibility needs are often not taken into account when designing a product or a service ([Dobransky & Hargittai, 2006](#)). Cost poses yet another barrier to both creation and utilisation of digital accessibility. That is, technology products and services specifically crafted for use by persons with disabilities are expensive to make and difficult to afford by those with limited incomes ([Dobransky & Hargittai, 2006](#); [Stienstra et al., 2007](#)).

Finally, present accessibility guidelines also have certain limitations which act as barriers to widespread utilisation and effectiveness of digital accessibility solutions. For example, we do not yet fully understand - with concrete evidence - the effectiveness of recommendations and standards such as the WCAG. Further, complexity of guidelines may get in the way of designing and developing accessible products and services. For example, while the WCAG provide recommendations for the Web content, the Authoring Tool Accessibility Guidelines guide tools used in the creation of said content, and the User Agent Accessibility Guidelines are more concerned with tools for accessing said content. Thus, when developers have to fulfil criteria of all such guidelines, accessible product and service design and development can be perceived as complicated ([Kelly et al., 2010](#)).

Nevertheless, the very outlining of challenges is a step to overcoming them. For example, when we know that institutional challenges include unaligned or unaware stakeholders and incomprehensibility of extant guidelines, a few of the following suggestions may be helpful.

Diverse stakeholders can work together on not just the crafting of technology but also on the buy-in for how the technology can be deployed. For example, as is already done, persons with disabilities (as well as other sets of users with varying needs or those with functional limitations) can engage in real time and on a continual basis in the design and development of assistive technologies ([Jaeger & Xie, 2009](#); [Kelly et al., 2010](#)). Further, to ensure that all stakeholders understand each other's work, needs, and constraints, spaces must be created for interested parties to congregate and discuss developments in accessibility on a periodic basis. Such periodic and focussed congregation can also examine particular issues. As

an example, there are ongoing concerns about mandatory versus voluntary acceptance of guidelines. That is, while technology developers and manufacturers argue for voluntary guidelines to safeguard creativity, policymakers prefer mandates ([Stienstra et al., 2007](#)).

Digital accessibility in India

India ratified the United Nations Convention on the Rights of the Persons with Disabilities (UNCRPD) in 2007, and pledged a focus on accessibility for societal inclusion of persons with disability. The government has taken positive steps since towards digital accessibility. For example, in 2013, the government approved a National Policy on Universal Electronic Accessibility. This policy is aimed at facilitating equal access to electronic and other information and communication technologies, and at creating awareness about issues pertinent to universal design and universal accessibility guidelines ([National Policy on Universal Electronic Accessibility, 2013](#)). More recently, in 2015, the Department of Empowerment of Persons with Disabilities under the Ministry of Social Justice and Empowerment has outlined the Accessible India Campaign. This campaign is geared towards achieving universal accessibility and comprises the following components: accessibility of the built environment (physical infrastructure accessibility), accessibility of the transportation system (airports, railways stations), and accessibility of information (making public documents and Websites accessible; [Accessible India Campaign, 2015](#)). Industry associations have also begun to heed the importance of digital accessibility. For example, the National Association of Software and Services Companies, a trade association of Indian Information Technology and Business Process Outsourcing industry, organised a round table to increase awareness within the country about digital accessibility ([NASSCOM, 2013](#)).

These actions are certainly laudable. However, according to the Centre for Internet and Society, a non-profit organisation which undertakes research on digital technologies from both policy and academic perspectives, the country has a way to go before we catch up with complete accessibility as is hoped for by the government and industry bodies. Centre reports show that India lags behind other countries in employing clear accessibility criteria for persons with disabilities ([The Centre for Internet & Society, 2011](#)), that most of the government Websites were not fully accessible ([The Centre for Internet & Society, 2012](#)) and that given inaccessibility, little information on government policies, programmes and schemes for persons with disabilities is easily available ([The Centre for Internet & Society, 2016](#)).

It is in this context that the round table on accessibility was framed.¹ Participants were chosen to reflect diverse stakeholders noted above. Specifically, we saw participation from the industry (these players were also connected with the governmental and other stakeholders in some manner), those who worked specifically on accessibility solutions noted above (e.g., Web accessibility), those who

¹ The Round Table discussion on "Best Practices in Digital Accessibility" was held on December 19, 2016.

worked on accessibility solutions with persons with a disability through the form of training, placement, and examining accessibility within workspaces, and those who worked on accessibility solutions in the educational sector. The discussion also was framed around issues noted above. For example, we discussed barriers to accessibility, solutions that exist and which can be tweaked to suit diverse contexts, and how we can move forward the conversation in this space in our country.

Best practices in digital accessibility: Round table discussion²

Invited panellists at the Round Table discussion on “Best Practices in Digital Accessibility” included Dr. Meenu Bhambhani, VP and head of CSR at Mphasis; Mr. Ashutosh Chadha, Group Director, Government Affairs and Public Policy, Microsoft India; Mr. Rakesh Paladugula, founder of Maxability, accessibility engineer at Adobe, and a member of the W3C, India accessibility group; and Mr. Srinivasu Chakravarthula, lead for accessibility at Informatica, and an accessibility evangelist.

Special audience invitees who were physically present at the round table event, and who are quoted in this report, included key stakeholders in the spaces of accessibility: Ms. Rama Chari (Founder, Diversity and Equal Opportunity Centre), Mr. Dipesh Sutariya (Cofounder and CEO, EnAble India), Ms. Shanti Raghavan (Cofounder and Managing Trustee, EnAble India), Mr. Mohan Sundaram (CEO ARTILAB; Trustee and Board Member, Association of People with Disability), Ms. Meera Shenoy (Founder, Youth4Jobs), Mr. S Shankar Subbiah (Agate Infotek), Dr. Nirmita Narasimhan (Policy Director, Centre for Internet and Society), Ms. Sucheta Narang (Global Lead-People with Disabilities, Wipro Ltd), and Dr. Vasanthi Srinivasan (Professor, IIMB, Chairperson Fourth Wave Foundation, and Board member of EnAble India). Sections below outline conversations of this group. Christopher Broyles, Chief Accessibility Officer of Mphasis, connected via a video message. While capturing each person’s full contribution is not possible given space limitations, the core of the discussion appears below.

Which barriers hinder digital accessibility?

The discussion on barriers included (a) specific issues such as accessibility in terms of initiatives like demonetisation and (b) the overall mind-set that serves as a roadblock to understanding that accessibility solutions are not for some special group of people, but that such solutions benefit everyone.

With regard to specific issues, Rakesh Paladugula noted:

A burning topic of interest right now in India is demonetisation. Most of us have bank accounts, cheque books, an ATM card, and an online account. But do you think all Indians, especially people with disabilities, also have all these facilities? Many people with disabilities are not provided with

basic bank accounts. This is slowly changing but there is a long way to go. Most of you know that India has ratified the United Nations Convention on the Rights of People with Disabilities (UNCRPD). One of the major criteria of UNCRPD is that states should take necessary measures to provide equal opportunities to everyone regardless of disability. After India ratified UNCRPD in 2007, RBI circulated circulars to all the scheduled commercial banks (except for regional rural banks -RRBs) to ensure that banking facilities are not denied to persons with disabilities. However, my personal attempts to open a bank account in rural Andhra Pradesh in 2008 were unsuccessful. The manager suggested I open a joint bank account, which I did not want to do...I would say that this is where demonetisation is not reaching out to people with disabilities. Further, if people with disabilities have bank accounts, the infrastructure is not accessible. Most ATMs are not accessible for wheelchairs... If you have digital literacy, and a bank account, the next problem we commonly come across is Web accessibility. How many bank Websites are accessible? Can I do my transaction without any dependency? Many of the banks will ask for a captcha (completely automated public Turing test to tell computers and humans apart), which many a time is not accessible if you have to fill a registration form...I am just talking about Web accessibility and not mobile accessibility... wallet applications on mobiles turn out to be inaccessible. It is really difficult to do transactions through the wallets...- Though persons with disability are digitally literate, such problems will still not allow cashless transactions.

Sucheta Narang posed a question about the business sense of accessibility, and noted that organisations may be reluctant to focus on accessible solutions for a small set of stakeholders. This question generated a lot of discussion centered on the importance of accessibility as beneficial to all stakeholders, and not just to persons with a disability. For example, Srinivasu Chakravarthula noted:

What is the definition of accessibility? It is making your products accessible to all users. If you look at Web Content Accessibility Guidelines 2.0, 70% of the guidelines do not talk about or do anything special for people who are disabled. If your app is accessible, there are plenty of opportunities for people other than those with disabilities to use it in all ways.

Shanti Raghavan gave a personal example wherein she would benefit from accessibility, even though people do not classify her as someone with a disability or someone who may require accessibility solutions:

I found myself challenged by an ATM machine with a touch screen device, and I am not a Luddite. If it would just say ‘Hello this is touch screen, so please touch it’ it would have been so much better. Digital accessibility is about the audio, the visual, the touch, and the tactile. A business case has to be built on this.

Meenu Bhambhani noted similar points and suggested that disability is not a monolithic identity, but one that can be possessed by various groups. To that extent, when the stakeholder group is pitched as a large one, there is a better business case for accessibility:

² This part of the article carries edited excerpts of the presentations made at the Round Table panel discussion on “Best Practices in Digital Accessibility”. The views expressed by the panellists are personal and academic in nature and not necessarily the views of their organisations. The presentations of the panellists were made in an academic context in an academic institution.

We must understand that people with disabilities cut across various groups. They include women, men, they come from various cultures and ethnic backgrounds. If we sell a proposition for an exclusive category, the numbers shrink. But if you sell it for a larger category, where all people will be a part of everything, then it builds a stronger case.

Mohan Sundaram voiced a similar opinion and explained that products once seen as beneficial for one group were later found to have far reaching use for multiple stakeholders. He noted:

There is enough past evidence to show that innovations for the disabled make for go-to products for the able-bodied people. For example, a certain type of keyboard was built for the visually impaired to write a letter, which used voice. Today Siri, a language user interface on the Apple mobile, has become the most pervasive interface. If a business case is built in such a way that if you build something for the disabled it enhances product motive for the able-bodied population, then products and services can be seen as far more valuable. Then I think you have a far stronger case.

Rakesh Paladugula suggested yet another path to making a business case for accessibility:

There is a lack of data. We all say that Web accessibility is increasing business. But there is no measurable information that says if you make your Website accessible your turnover of Rs.1 crore will increase to Rs.1.2 crores. . . That is where organisations should come forward and make information and the data available.

Overall, the discussion on barriers not only highlighted barriers, but also pointed to solutions. For example, the very questions on demonetisation allow us to craft solutions. Further, the very understanding of digital accessibility features (audio, visual, touch, tactile) and reach (across women, men, cultures) allows for a business case, as does collating of data to showcase the impact of accessibility.

Which digital accessibility solutions can help us?

Srinivasu Chakravarthula and Rakesh Paladugula, who are both accessibility champions and advocates, maintain blogs that can help various stakeholders (e.g., organisations, educators, individuals with a disability). These blogs outline both systemic and ad hoc solutions to issues, and interested readers can refer to their blogs for accessibility solutions. The discussion in the round table was focussed specifically on education, employability, and enablement or inclusion as aided through technology. Such solutions and organisational actions can be replicated by others. For example, Meenu Bhambhani explained the three focus areas of Mphasis:

Mphasis has three focus areas. . . education, livelihood and inclusion. Technology is the theme in all these focus areas, whether it is technology to scale, technology to sustain an initiative, or technology as disruptor. . . We

have been supporting the NCPEDP (National Centre for Promotion of Employment for Disabled People) and its advocacy efforts in the space of accessibility. We have been supporting their universal Design Awards and Make India Accessible campaign. . . EnAble India has been our partner in the livelihood and inclusion space where we have been running training programmes to hire people with disabilities, in Mphasis, and also to skill them so that they are able to get jobs elsewhere.

Ashutosh Chadha elaborated on how Microsoft focusses on inclusiveness across education, employability and enablement:

Education must ensure that each and every person on this planet has access and the ability to acquire knowledge which is useful to him or her. Every person, irrespective of his/her situation, should have the ability to become gainfully employed. Enablement would mean being one with society and being able to become independent so that there is no exclusion. . . We find that technology has a role to play in these three areas. I would like to play a short video to show how technology, when looked at from a universal design perspective, can drive inclusion. This is a video about a research project between Microsoft Research and a few professors in the University of China. We are looking at using a technology of ours, which is a games console, called Xbox Kinect. The technology, interestingly, is being used to help the hearing impaired connect. Fundamentally, as we speak different languages, sign language users also have different languages globally. The first challenge was: is there a way by which a person who knows a particular sign language can communicate with a person in a different sign language; the second challenge was: is there an opportunity to use technology so that a person who is communicating through a sign language can communicate with a person who does not know sign language; and vice-versa. That will open up a whole avenue of opportunities from education to employability and enablement.

As explained by Ashutosh Chadha, and as we saw in the video presentation, the research project on the Xbox Kinect is about sign language translation. It translates from one sign language to another and helps the hearing and the deaf communicate. The Kinect captures the sign language and then recognises the meaning of the sign language including the posture and the trajectory and there is automatic translation into spoken language. The basic modes are a translator mode and a communication mode. The translator mode shows how single words can be translated from a sign into a writing form or how to translate a written form into a sign. In communication mode you can actually use a translation of full sentences. The avatar is used in the system to represent the hearing person doing signing. It is a proxy for the hearing person.

As Ashutosh Chadha concluded, the possibilities of this sign language solution are a big leap towards inclusion as this idea could be used in a hospital, a hotel, or an airlines desk. Being a technology leader across the globe, Microsoft has worked on technology driven accessibility in various domains. Ashutosh Chadha cited a few examples:

Microsoft has invested a lot in the potential for innovation in the area of accessibility. Seeing AI program uses Microsoft Cognitive Services to empower a visually impaired person to experience their physical environment in new ways. Ability Eye Gaze is a project that started as a partnership with former NFL player, Steve Gleason, who is living with amyotrophic lateral sclerosis (ALS) and uses eye-tracking technology to communicate and interact with his devices.

Finally, Christopher Broyles, Chief Accessibility Officer of Mphasis, connected with round table participants via video and explained that to increase accessibility, Mphasis has “baked in Web Content Accessibility Guidelines 2.0 level A and AA, which are the recognised international standards for digital accessibility, into a majority of our digital products and programs.”

Overall, participants noted how solutions such as a focus on education or livelihood can be enhanced through the use of technology and how research on and extensions of extant technologies can have a far-reaching impact.

What else can we do to further digital accessibility?

The panel and audience members contributed diverse ideas to ensure that accessibility becomes a reality. Ideas included concrete ways of engaging in external and internal awareness generation, working alongside stakeholders towards accessibility solutions, and looking for relatively simple ways of ensuring that accessibility is part of various stakeholders’ vocabulary and action repertoire.

With regard to regulations, Ashutosh Chadha stressed that “we should not allow regulations to come in the way of innovation,” a view he noted was just recently mentioned by Amitabh Kant, the CEO of Niti Aayog. Alongside, he also noted Microsoft’s focus across the four vectors of ABCD at Microsoft for 2017.

The four vectors were *awareness*, *business intersect*, *culture*, and *deepened engagement*; in short ABCD. *Awareness* is, simply put, driving awareness of the issue both externally and internally. Externally we focus on accessible technology evangelism, advocacy, socialisation, creating white papers and best practices. As part of driving a *business intersect*, we are looking at education...and how technology can benefit that. We are looking to drive innovation around Microsoft technology and focus on ensuring that the developer ecosystem focusses on accessibility at the design stage itself. Today we do not have developers who learn how to develop around accessible technology. That is the big gap...we need to fix it. Under *culture* within the organisation, our focus is to bring about behavioural change. We need sensitisation training for employees to work along people with disabilities, in hiring and so on. *Deepened engagement* on policy would include Web accessibility guidelines, and engaging with local language and public procurement. In this context, the Ministry of Finance is coming up with its Global Finance Regulation, the Ministry of Information Technology is coming out with its RFP (request for proposal) process to standardise processes, and the Government of India has mandated the Directorate General of Supplies

and Disposals (DSG&D) to come up with its government e-market place. Our recent request to the Director General of DGS&D was to make the Web portal accessible and to make sure that when products are being put on the e-market place, those products have to be accessible.

Our *policy focus* crosses four areas: *procurement* - making accessibility an award criterion for the Government of India; *driving global standards* - promoting globally the harmonised standards of accessibility; *inclusiveness* - encouraging innovativeness and empowering teachers; and *E-government* - making e-government services more accessible...Under procurement, governments can take some practical steps to integrate accessibility into their procurement policies and processes. The government could make accessibility a mandatory award criterion in procurement decisions...and if they start putting this in place, it will spawn a lot of things such as universal design, intersect in the education space, and an encouragement to entrepreneurship in this area... In driving globally harmonised standards of accessibility, the government should adopt public procurement and other ICT policies based on existing internationally recognised standards (EN 301 549), promote the use of WCAG 2.0 AA (ISO/IEC 40500) for Web content and services, include a clear reference to standards in RFPs for products and services and encourage this to be a part of compliance processes for organisations. Organisations can take the requisite practical steps to promote globally harmonised standards... To drive inclusiveness, we should future-proof technology policies by focussing on functional outcomes for accessibility, and collaborate with industry, civil society entrepreneurs, and students to develop innovative, accessible products. We have a few important campaigns in India such as Start Up India, Digital India, and Accessible India. Is there a way we can straddle all three and Make in India? Can we come together and roll out an Accessible India campaign where we actually outsource ideas? Our students today are extremely innovative...We can commit technology inputs, the government can commit seeding, and academic institutions can help drive the entrepreneurs’ training. We should work towards not only creating a Make in India ecosystem but an ecosystem of which accessible technology becomes a part.

Srinivasu Chakravarthula echoed points noted above, referred to how he has addressed similar concerns on his blog, and reiterated a point raised earlier, about starting with working on stakeholders’ mind-sets to solve for accessibility problems:

The first and foremost thing needed here is the mind-set. Corporates must have accessibility as part of the product plan. At every company, anybody who develops a solution, device, application, or software must have a mind-set that the software must be used by everybody and not just a section of people. I think we have to stop talking in terms of a target audience. Once we fix the mind-set, the product manager must own accessibility...We need to have a strategy for the legacy, current, and future products. Companies that have been there for 20-25 years

must have built a lot of products. A lot of the products are inaccessible but they cannot go back and start from scratch and make the applications accessible, as it would be time consuming. We need to have a separate strategy to address the legacy products. . . For current products, companies must sit down with their developers, quality assurance teams, product managers, user experience teams, and others and come to a consensus saying that starting today all the products we build will be inclusive. There is no rocket science to build accessible and inclusive products. While writing code, if developers read every single line of the standard and use every element they are supposed to, almost 50 to 60% of the accessibility problems would be solved. With future products we need to agree that whatever code goes in has to be accessible and it must be reviewed. It has to be taken seriously and implemented. Companies must have their own policy of implementation rather than waiting for acts such as the RPD. Why should we wait for a policy to come and tell us we have to build an accessible product? . . . In our blog posts, we write about our experiences, appreciating the good things first and then we mention what can be improved, and what are the possible solutions available. These may not be the only solutions but they could be the starting point for vendors. . . The education system should teach students the fundamental concepts, and develop the ability to think from perspectives across users. They should be taught the basics of standards, usability and accessibility. . . So collectively if corporates, non-profits, and the education system together can think of accessibility, we can build a more inclusive world for sure.

Dipesh Sutariya recalled EnAble India's work to stress the importance not only of accessibility but also of usability. Often both these notions did not go hand-in-hand, but it is critical that they be seen as two sides of the inclusivity coin. He noted:

To make a user interface accessible, for instance, you may just need to have a layer over that which exists to make the device accessible for everybody. . . Many times, the usability can be more important than the accessibility. One example is that in our company we tried to put people with visual impairment in call centres. We spent over six months trying to make the software accessible. But we found out that there were four different applications for a person to navigate. The person who is sighted is able to navigate from one screen to another easily; when we made it accessible for a person with visual impairment it was not a level playing ground now because the average handling time becomes much higher and the salary will not be commensurate. So, we have to look at how to make things usable, affordable, and practical as well.

Finally, digital literacy, in its various forms - knowledge of accessible products, education for crafting accessibility, and a focus on research on accessibility - was noted as being a key future focus area. For example, Meera Shenoy noted that accessibility was directly contingent on literacy of that accessibility:

. . . Digital accessibility and digital literacy must go hand in hand. . . Digital literacy is necessary for job portability,

access to information, and to consumer choices. . . I think there is a huge divide in the country between research and development and what is actually going on. We need an organisation which could be a clearing house of products which are already there, so that we do not keep reinventing the wheel.

Srinivasu Chakravarthula and Rakesh Paladugula both suggested that education for accessibility is key if inclusion is a goal in the future. Srinivasu focussed on the importance of increasing "the number of accessibility specialists in our country" to find the "right candidates" for positions of accessibility tester or a consultant. Rakesh took the argument further to suggest that:

I feel there is a strong requirement for having a university specifically for the study of disability and accessibility. More specifically for universal design or accessibility. This does not seem to be part of the course curriculum in any university or institute in India.

Shankar Subbiah seconded the suggestions about education for accessibility and mentioned his experience wherein he was able to bring a paper on web accessibility and mobile accessibility into a Master's level curriculum which was helpful in furthering accessibility knowledge. Shankar remarked, "Why can't we talk to educational institutions so they can also bring in papers on accessibility?" Finally, Rama Chari and Nirmita Narasimhan pointed to the Rights of Persons with Disability Bill (which is now an Act) and suggested the importance of clauses such as ones that help standardise processes of accessibility (e.g., that service providers would have to make their services accessible in a certain time limit of two years).

Vasanthi Srinivasan concluded the session by noting that the disability sector has reached an "inflection point." To move the disability agenda, she noted that there is an urgent need for concerted action across the various stakeholders through the creation of a multi-stakeholder think tank. Such a think tank can serve four key purposes: (a) To bridge the gap between global research and local realities on the state of accessibility for persons with disability (b) To ensure that the macro structural responses (disability bills and acts) that are occurring at the national level are supplemented with appropriate contextualised solutions (e.g., specific solutions for specific disabilities) (c) To do documentation and dissemination of best practices to support scaling up efforts, and (d) To ensure that periodic audit on the compliance to regulations and other global and national standards is done and the data is used to do advocacy. She urged for action noting, "If you want things to happen there are people to make things happen" and suggested that participants in the room could make an impact through enhanced collaboration.

Author note

I thank Professor Rejie George, the Chairperson; Mr. Manoj Chakravarti, the Chief Operations Officer; and Ms. Prabeetha Bolari of The Centre for Corporate Governance and Citizenship at the Indian Institute Management Bangalore for logistical support for this round table. Professor K.V. Gopakumar contributed to the literature which formed the backdrop of this

round table. I also thank Professor Rajluxmi Murthy, Chairperson of the Committee on Inclusion at the Indian Institute Management Bangalore for supporting the round table.

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