Inclusion and Technology Design
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Lecture - 06
Accessibility Fundamentals

Hi, my name is Ankit Rajiv Jindal and I am the founder of friends for inclusion. Our vision is to empower people with disabilities through technology.

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And, we do this by creating and eventualizing technology and accessibility standards for all. I am also a senior marketing manager in a leading multinational IT services organization. So, today we are going to talk about the role of ICT in fostering inclusion for people with disabilities. We are going to understand what disability is, how the understanding of disability has evolved from one generation to another, what is the role of assistive technology in the lives of people with disabilities, what steps has the government taken so far and what steps businesses and service societies can take in the future.

By the end of this session I am hopeful that all of us will be able to appreciate the role or the usefulness of assistive technology in our lives. We are also able to understand how the assistive technology landscape needs to evolve in the country.

"In the context of health experience, a disability is any restriction or lack of ability (resulting from an impairment) to perform an activity in the manner or within the range considered normal for a human being."

So, let us start in our solution in our presentation today, really we let us start from what has been the definition of understanding of disability over the years. Really, if you go back in 1980s the World Health Organization gave us our gave us a definition and it said disability is any restriction or inability on account of an impairment that restricts one to do activities considered normal. So, this was a definition which was well understood and accepted in the 1980s.

Here the onus was on the individual, the definition purely said [FL] if you have an impairment and because of which you are not able to perform certain activities like studying or working at a work you know at a job or travelling to some places then you would be considered disabled. Now, the onus was completely on the person and it was completely attributed to the medical condition of that individual.

So, as a result what happened? Let us see in this particular slide, the onus shifted really the implication was that the person became the center of the problem and the understanding at the larger level was, I am not able to study if I am a person who is blind because of my blindness. I am not able to work at a particular office because, I am a wheelchair user. I cannot wine and dine in a restaurant because I have a condition like a leprosy. So, everything was with a person and not anything with the society.

So, as a result what would happen? The government and the policy makers and every other stakeholder focused more at the individual. The policy were lot more welfare oriented, the idea was to give charity to see how we can help that person and see how we can try to overcome their limitations. The society and the environment outside was completely absorbed of this responsibility of inclusion.

"Disability is not just a health problem. It is a complex phenomenon, reflecting the interaction between features of a person's body and features of the society in which he or she lives."

Come 2000s in the new millennia we change the whole way of looking at disability. Now, this happened after a lot of advocacy and lot of thinking that went behind it and the new definition of disability was something which was a lot more complex. It was just not about my or somebody's own impairment, but it said that it is a complex phenomena when ones impairment.

So, somebody's disability maybe of an eye or having any physical impairment, when it comes in contact with a person's environment and this environment could be physical environment, technology environment and you know when they come in contact is when they experience disability.

So, let me give you an example according earlier the understanding was I cannot study if you are if you are blind you cannot study because you are blind. But, in the newer definition the understanding has changed and it says that today a person who is blind cannot study because he do not have accessible materials. And, now a books and materials can be made accessible for people with disabilities. They need to follow certain accessibility guidelines, but because they do not adhere to those guidelines is when a person with is person with disability experiences the whole phenomena called disability.

So, it is really a it is a phenomena it is just not about much more individualistic in nature, but it is also an interaction between a person's body or persons impairment or the features of one's own body with the features of the environment.

So, let us try to understand what is the implication; the focus really shifts away from the person or correcting the person to the environment. Now, as a result a person who is blind not is not say you know you cannot study because you are blind, you say person who cannot study because he or she does not have materials in accessible format of course, we discuss this. There is a person who is using a wheelchair is not disabled because he uses wheelchair or he cannot walk, but he or she is disabled because the environment or the building does not have accessibility features like ramp or a lift.

Similarly, a person who is affected by like leprosy and wants to wine and dine in the restaurant is not able to do it not because he has a leprosy, but it is because the management in the restaurant is not informed enough perhaps aware enough to accommodate a person who has any such condition in his or her restaurant. So, really the problem is not so, much with an individual. Today if a person is on a wheelchair and is an MBA or an engineer like many of you are it really what really differentiates them or perhaps what really causes a problem to them is not that they are less qualified its just because of the disability.

They need certain physical environment and if the workplace has those kind of an environment like an accessible ramp, accessible wash rooms, having a lift they will be able to perform on par with as anybody else. If you do not provide them is when they experience disability. So, really if you have accessibility incorporated in your

environment a person's experience of disability can be reduced. Now what so, when you really think in that context. So, they really focus or the nuclear really shifts from the person to the society, we then try to make changes in the environment.

So, in case of a built environment we will try to see if we can accommodate accessibility into this, we will audit a building, we will see if it has a ramps of a particular standard. The ramp cannot be extremely steep so, that person is not able to kind of use the ramp on his own. We will also see there is buildings has a elevator or not, does it has accessible washroom and then there are standards. And these you know so, buildings are audited not on just on the basis of certain set of individuals, but then there are well accepted standards both in India and abroad.

In India the harmonized guidelines are the recommended standards for which really lays down in detail what standard that one needs to follow to make the built environment accessible. By following these standards you will be able to make most you will be able to cater to the needs of most disabilities. Similarly, when it comes to the digital work environment or the digital ecosystem there are accessibility standards. The standards for instance are called Web Content Accessibility Guidelines and in short we call it WCAG or WCAG.

Now, WCAGs current version is 2.1 and really like in the physical environment, if you follow these accessibility guidelines you will be able to cater to the needs of most disabilities. And, by following WCAG a range of people including those who use screen readers, those who have seizures, those who magnifying glass, who has difficulty in hearing and many others will be able to access your IT in an equal basis. So, that is where the focus shifts when the thinking evolves from a medical model, where we really blame a person for his or her disability where, we say [FL] you know you are a particular body part is not functioning.

And, thus you are not normal you need to be you know you need to have a subnormal life to something more contemporary today where we say you know it is you know. Diversity is part of the human evolution, we all are different, it is just that some of us need some different accommodation. So, what you have difficulty in seeing or hearing or walking if our environment can cater to your needs we will truly create an empowering and an inclusive environment.
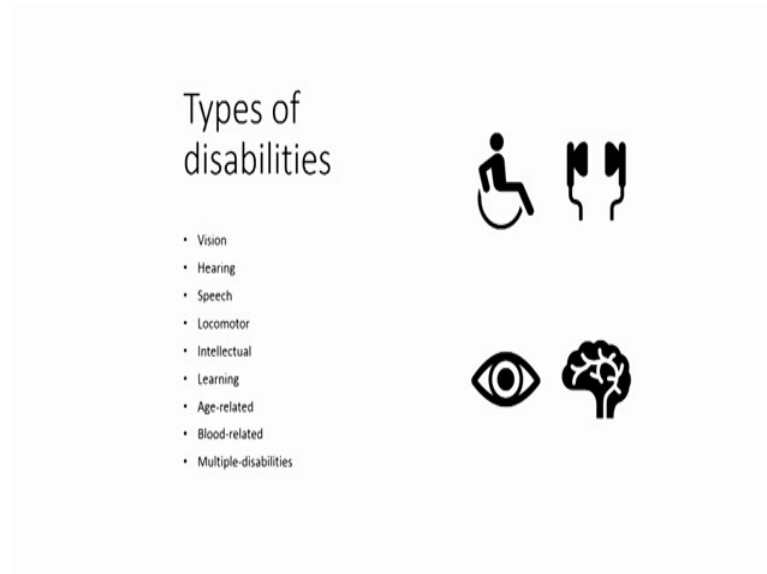
So, that is really the evolution or the understanding of disability and if you really move forward it talks about the types of disability. And, as we also briefly touched upon earlier that difficult you know the disabilities range from difficulty in seeing. So, there are people who cannot see at all they are blind or the people who can see though partially blind or there are people called low vision.

So, they may they are not able to see properly in spite of using glasses. Similarly, people who have difficulty hearing can be classified into two broad categories. The people who are deaf, who cannot hear at all they generally use sign language as the primary need of mode of communication and then there are people who are hard of hearing.

So, they are they can partially hear they often use hearing aid, then there are people with locomotive disabilities they have they have difficultly using either of the limbs the upper limbs in case of your hand or the lower limbs in case of your legs. Now, these difficulty could be in account of many conditions.

It could be on an account of an accident, it could in an account of a particular disease like leprosy or it could be a in account of a of a paralysis stroke that one encounters or it could be because that you have a any other condition. Similarly, there are difficulties relate related to a person's cognition or in or as we call it intellectual disabilities. And, the range of conditions which gets included including autism which are often considered as intellectual disabilities.

Mind you again not all persons who have cognitive or intellectual disabilities are you know the as in any other disability, they are on a spectrum, they are people. And, there might be here in the room or might have milder instances of autism which often is hard to notice. And, there might be cases which may be at the other end of the spectrum which are far more complex and far more severe. So, yes intellectual disabilities can also be on a on a very wide range and it really varies from people to people.

Similarly, there are difficulties in learning. So, we have all see in the movie Taare Zameen Par and we have all seen the story of Ishaan who had dyslexia. Like dyslexia where people have difficulty in reading characters, there are other disabilities like the dysgraphia and dyscalculia. Dyscalculia is a condition where you have difficulty in reading and processing numbers. Then there are psychosocial disabilities where you have difficulty in social interaction and men you know. So, very acute depression, bipolar disorders, schizophrenia are all kind of considered as psychosocial disabilities.

There are other disabilities which are on account of certain health conditions and these health conditions may vary from a neurological conditions or blood related disorder or organ failure. Similarly, there are conditions related to age, we often age and in India specially we do not really like to say that we are disabled. But, really many of us have our grandfathers and parents this start defect having difficultly seeing or hearing and those really cannot be corrected even with a spectacle or a hearing aid. So, there is no there is no shame in accepting that with age there is an onset of disability.

Estimate says from 1 in every 4 person to 1 in every 2 person after a particular age you know depending upon 60 or 65 they do start experiencing disability of course, as we said the range is wide. And, relate the onset really depends on various factors. So, yes these are various types of disabilities. It really ranges from different types in terms of seeing, hearing, intellectual, psychosocial physical, intellectual.

Now, I know a lot of you must be thinking [FL] you know for many of us disability was just seeing, hearing and somebody who was not able to walk properly. But, yes I think that is the take away that we also want to take away that disability is just not restricted to a few condition. It is a far wider phenomena and it is just not because of a particular medical condition. Really, if a person has difficulty seeing in spite of wearing glasses he

has you know he is he or she is experiencing disability and they may or may not need certain assistance to overcome that.

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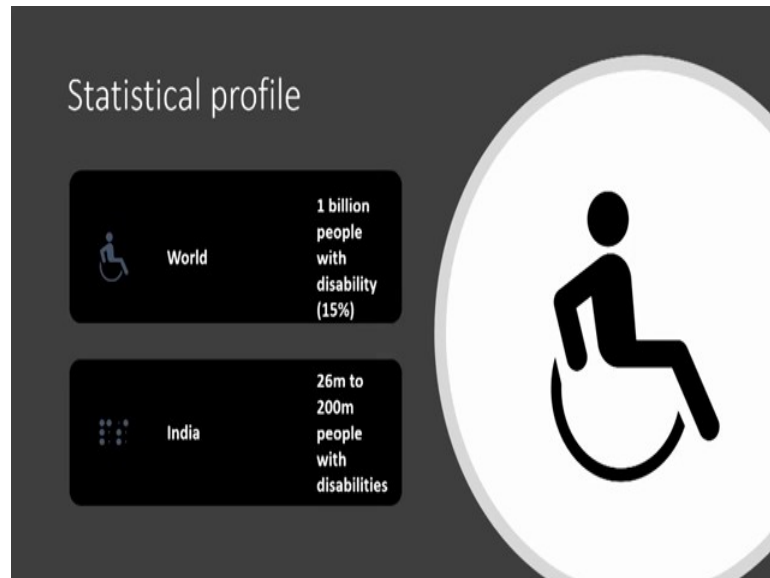
So, if we really look at the numbers and this slide 7 really talks about the statistics around the number of people with disabilities. Now, if I would have to asked you to take a guess how many people in our population would have a disability? In most cases I do get a number which ranges from 1percent to 2 percent.

Now, World Health Organization and United Nations and many other of these international bodies do estimate that 15 percent of your population experience one or the other form of disability. So, really if you look at a global scale the total population size is actually 1 billion people with disabilities. Now, if you look at it from an India point of view again like anything everything else we have a spectrum depending on what source of data that you refer to.

According to the census of 2011 we have about 2.6 crore or 26 million people with disabilities; mind you at that time we had only canvassed for about 7 disabilities and as a country our definition or understanding of disability has also evolved with RPWD Act. So, it is definitely an underrepresented number, if you go by the estimates of the World Health Organization or the United Nation we have about 15 percent. So, for a population which is about 1.35 billion we would have roughly 200 million people with disabilities in the country.

Now, 200 million people with disabilities is a huge number, if you really put all of these people in one place we will form the fifth or the sixth largest country in the world by population, it is a huge number. Even with the most conservative number and if you go by the census which is the 26 million our population will still be of you know will be bigger than 75 percent of the world's country.

75 percent of the world's country has population which is less than 26 million people which is the number for people with disabilities in India. So, clearly it is a huge phenomena; one may wonder that why people have disabilities are not seen. But, it is not because they lacking in number its often because we do not have an environment which is inclusive enough.

Think of it if you are walking on a footpath we find if all a lot of us find it difficult to use a footpath generally, it its full with you know they have not maintained properly, there are hawkers, there are bikes there are trees. There are so, many barriers that we all encounter; for people with disabilities it becomes that much more tougher for you know them to navigate just the footpath. And, really if you extend this the access in busses, metros, any other buildings, the work places, the your malls, the work, the schools or colleges most of them are not designed to cater the needs of people with disabilities.

So, yes I think that is the reason we do not see as many people with disabilities in generally as we should have been seen otherwise. But, make no mistake it is a huge population and certainly must not be ignored.
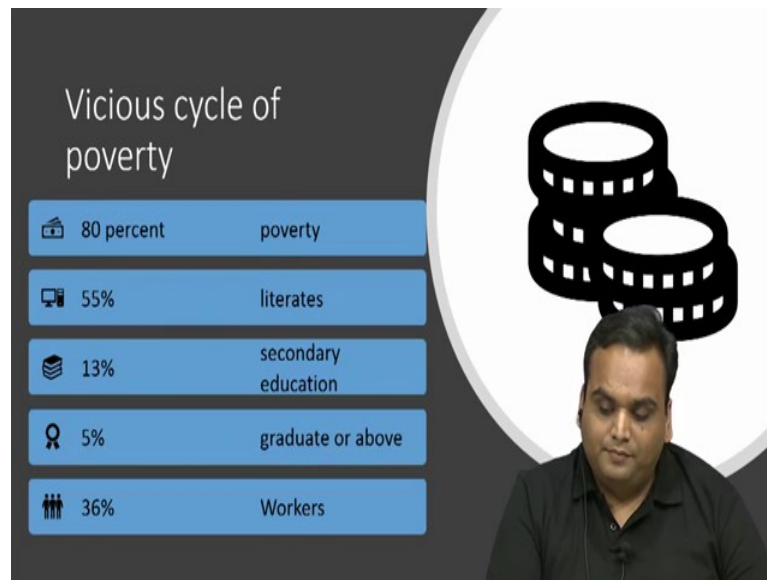
Slide 8 talks about the vicious cycle of poverty and we extensively discussed about the barriers that they that exists. Today there are number of barriers that people with disabilities encounter whether it is to do with physical environment. So, we have discussed that the buildings are not accessible, the roads are not accessible, the transportations are not accessible, they are not inclusive enough.

Similarly, there is an IT ecosystem which is not equally accessible for people with disabilities, they have not catered to it. There is a big attitudinal barrier that exist people have a very patronizing attitude, they we all tend to feel oh people with disabilities are [FL].

Then they need to be protected and they need to be safeguarded, but then truly we do not see them as a worthy citizens or contributing citizen and the numbers are there to talk for themselves. If you really look at this 1 in 3 people are getting are getting worthy employment and these are numbers from census. Really, less than 10 percent of the people are able to complete any decent education which could be there. So, we say in disability we have a vicious cycle of poverty because you do not have access to resources, you do not have you do not get access to education.

Because, you do not get access to education, you do not get employment and because you do not have employment; you do not have resources like money to really invest back and upgrade yourself. So, we are trapped in a vicious cycle of poverty and this has been

going on for generations after generation. And, really if you come from a very well off family that is a very different story to somebody who comes from and that is the whole case for most of the of people, we really come from very modest families. In fact, the World Health Organization or the United Nations estimate that 80 percent of people with disabilities live in extreme poor conditions. They are the one who are the marginal of the marginalize community, they live in extreme poverty and they find it extremely difficult to meet make the ends meet.

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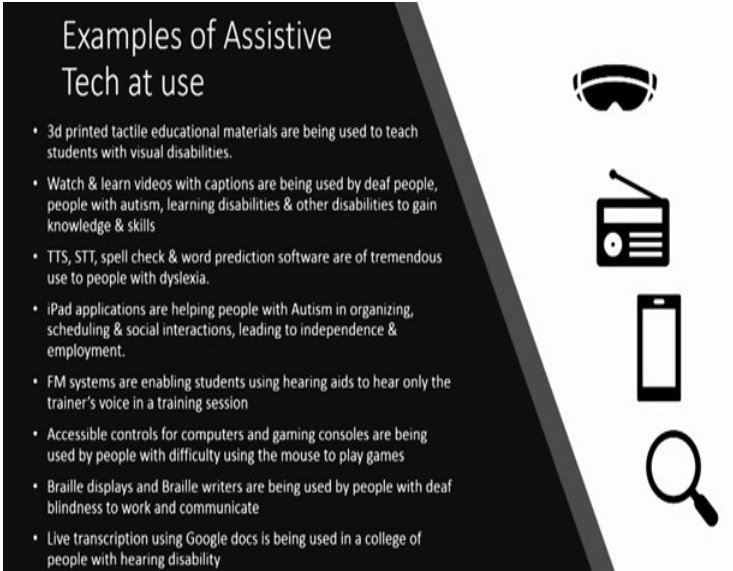
So, let us come to about ICT and you know really we are here to understand the role of technology in the lives of people with disabilities. So, really when you see technology or ICT in context of people with disabilities; I would like to really make start with the making a very simple distinction. You have two types of this technologies: on one hand you have the main stream technologies like the mobile phone, the you know you are your desktop operating systems likely Windows. Smart phones like Apple or Android phones, your television all these are main stream products which are used by most people at large.

On the other hand there are specialized products these are called assistive products. Now, these assistive products help people with disabilities perform a certain task and they are often designed and developed for their specific needs. So, there are whole range of assistive products that exist today right from a wheelchair, a hearing aid, a smart cane to

something which is more sophisticated like a screen readers. The most popular screen readers for instance are JAWS and NVDA, as I am speaking I have my computer being configured with a screen reader called JAWS. And, I am I am hearing a you know my system is actually converting all the text into speech and I am able to kind of read through my notes because, there is a screen reader installed.

Similarly, there are other assistive technologies like speech to text which really converts speech into text. You all are very familiar with it its really now a days a big buzz. There is also a lot of other in terms of captioning, audio description all these are different forms of assistive technologies or systems which are in practice today and they form a very important part of the ecosystem.

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Examples of assistive technology at use and really this is not an exhaustive list, this is a very small list and I just wanted to kind of show how different types of people with disabilities are using technology in different scenarios. So, there are tactile materials which are being now developed using 3D printers and often some adhesive material, that they are dozing with which really is able to kind of create a more tactile experiences for diagrams maps and you know. And, people students who have vision disabilities are actually able to study, thanks to those tactile graphs or diagrams that are being created.

Similarly, the deaf community is using videos with caption; now we all have we all would have seen subtitling on our were when we watch movies. Now captions are very

similar to that, but they also often tend to describe a sound. So, for instance if there is a dog barking us a captioning if it follows the best practices, it will also say that us a dog is barking or a doorbell rang; in addition to the dialogues being transcribed in the case of subtitles. And, captions has been extensively being used by the deaf community to read and view lectures and in really in different environments whether its workplace or education.

Similarly, text to speech word predictions software's today they are a big rage you know we are using text to speech in our smart speakers whether it is the Google assistant or Alexa or we are using it in so, many applications voice activated application. But, many of this was evolved first developed to help people with disabilities; similarly predictive text we many of us have been using this amazing feature while texting or WhatsApping. But, again the routes of predictive text was to help people with certain learning disabilities or certain intellectual disabilities to help them predict words and make spelling corrections and you know they are able to kind of perform on par.

So, yes that is the you know those technologies are been extensively used for people with disabilities. Thus, similarly today there are number of iPad and smart phone based applications which have been developed which help people with you know on autism spectrum to organize their life and be a little more independent in their lifestyle. Similarly, there are schools in the country which use FM systems the which actually are (Refer Time: 30:09) you know which are linked to a person's hearing aid and they are able to kind of listen to the classroom lectures much more effectively. Many schools for the hear hard of hearing use this technology to deliver lectures for them.

Similarly, accessible controls for gamings are used to for people with certain in physical impairment to perform day to day activities. Another way a lot of people are actually using is using assistive technology is using smart speakers or you know assistants like Alexa and Google speaker to manage their home environment; to really saying in Alexa or a Google assistant to turn on or to off my lights or refrigerator or air conditioning. So, really the whole smart home while it is it is good to have for many of us, it is really a source of independence for many people's with disabilities and that really become that really doubles up as an assistive technology for them.
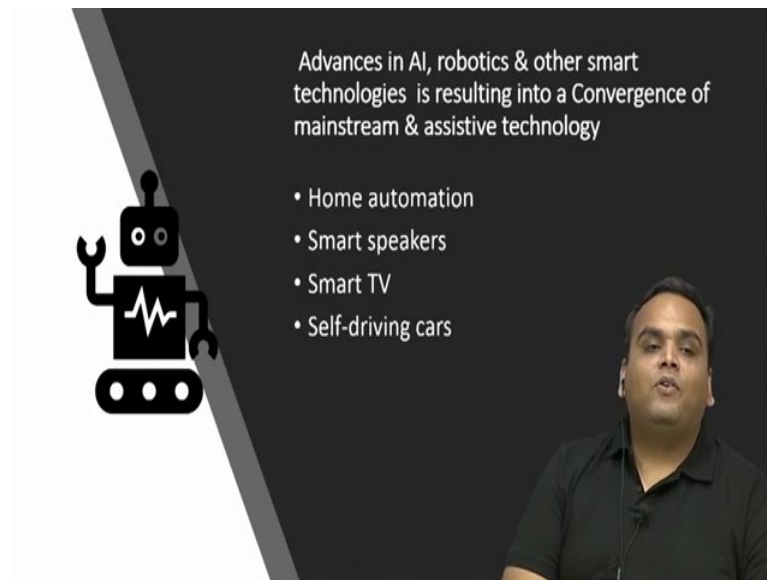
Slide 11 and what I really want to discuss through this particular slide is really today earlier we would consider a main stream technology very different from assistive product which was specially designed for people with disabilities. But, in the last few years thanks to advances in artificial intelligence, machine learning a lot of these things these two worlds are slowly, but surely merging.

We have seen and we have discussed how many of these technologies which first actually began in the realm of supporting people with disabilities to now, which has become a more main stream application. So, really these two worlds are merging and they will continue to merge and I think that is a very interesting thing.

And, it is slowly we are kind of inching towards the phenomena called universal design where you will have products and services, but which can be used by a lot of people without having a need to a have separate design or separate attachment. So, no more you may need to have a separate read books, tomorrow the books for the tomorrow will have will be inclusive we now which can be accessed equally by people with and without disabilities.

Similarly, if you are able to kind of if you have a smart home people with and without disabilities would be able to kind of access the features of it fairly independently. And, this is where we really getting towards you know take for instance self-driving cars you know of course we all are very excited about this amazing technology.

So, much of research being happening; so, much of investments being poured in really biggest companies in the world whether it is the Google, the Tesla's, the Ubers major academic institutions both in India and abroad they all have shown interest in the self-driving car. And, if you really look at it self-driving car does not have to confirm to the design principles of the today's car.

It may come in various shapes and form and that can be a radical improvement for the lives of people with disabilities, I you know if I am a person who is blind I do not you know certainly the need for having assistance or having a driver just vanishes. Because, tomorrow I will have a self-driving car and we will be able to navigate as equally independently may be as anybody else.

Similarly, smart TV's today now I have just purchased an Android TV which is completely accessible. So, I am able to now navigate set my own preference start audio you know watch audio described movies on Netflix; thanks to the merging of these two worlds of the main stream and the assistive technology um. So, yes these two worlds are merging and these are exciting times and it will continue to build be more exciting with lot of features being integrated and coming these in time.

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So, yes we have understood what disability is, we have also understood the role of technology and how it is so, beneficial for people with disabilities. We have also understood how the two worlds of main stream technologies and assistive products are

slowly, but surely merging. But, really what is then stopping the full main stream adoption? Really there is a huge barrier that exist and let us discuss some of the barriers that exist today as we speak in terms of creating more and enabling environment for inclusive ICT.

First really starts from you know the lack of willingness of and the understanding of the policy makers. Really a policy makers of do not understand the need of assistive products, we need to educate them, we need to create an intent that yes assistive technologies or products are very important; they require research and investment. And, they really not about people with disabilities if you really look at it is about functionalities it is about you know the activity limitation that one encounters. And, thanks to assistive products we can overcome it whether disabled or not disabled as understood in the classical terms.

So, we really need more policies that encourages promotion development, research around assistive products and more willing policy makers around it. Really, there is very little awareness beyond policy makers also even if you have a certain functional limitation or you are a person with a disability in India we do not we still do not have enough awareness around it.

I often say the blind and the low vision community has been the biggest adopter of technology, but really if you go beyond it and specially if you go even in this community if you go beyond the cities of major cities or Delhi, Bombay, Bengaluru, Hyderabad, Chennai, Ahmedabad it really starts dipping. The awareness of IT or the importance of IT all assistive products in the lives of people with disability is just not there. We need to build more awareness around it even with the stakeholders or the or the uses of such disabilities or even with the family supporter.

So, that is another big reason why we are not seeing ICT being adopted by people with disabilities at large. The third biggest barrier that I personally see is the affordability, many of the technology today that we are talking about are extremely expensive. We need to have more indigenous solutions, we need to have more affordable solutions. So, take for instance the there is a you know our screen readers now, the most popular screen reader is called JAWS and a license of JAWS can cost you around a thousand dollar

which is about 70,000 rupees in India. Even if you go with the subsidized version it for students it is still very expensive.

And, you it is just not about the software we also need to own your own laptop. So, all put together you are nearing about a lakh rupees of investment, now a lakh rupees of investment is not a small thing. We need we need to understand in a country where you know which is you know which is which really is a finding it difficult to make the ends meet, it is difficult to invest in such technology and in such expensive technology. So, we need to create more affordable indigenous solutions of course, similarly it is just not about ICT, but it is also about other products.

Take for instance wheelchairs, they also very expensive while for most of us we may see you know wheelchair is a wheelchair and it is not very different, but it varies. There are so, many different types of wheelchair and those wheelchair needs to be accommodated to different needs because one may have a paralysis, somebody may have a spinal cord injury, somebody may develops bedsores; all those have different conditions and have different implications on one's body.

So, really a good wheelchair needs to be more personalized, they need to follow standards and yes there are standards for wheelchair, but really we do not have that kind of an approach in India and we need to invest a lot more on these. So, affordability and really that bring me to the next point which is the unavailability of ICT and assistive products; many of the products that we really think and see about you know independent living are often not available in India. So, take for instance there is a talking OTG available in the western and developed countries, but the same products are not available.

Another classic example that I often talk about is that many of the service provider OTP, video service providers for instance Amazon Prime they have content available in audio description in their western part of the world. But, for some strange reason they have not they have not enabled the option of audio description. So, really availability of such products and services is another big challenge and we need and which is really a kind of creating a barrier for adoption of ICT. Of course, lack of acquaintance of course, if even if you have products and services we do not have an ecosystem which trains people on assistive products and you know making the best use of it.

Even there are many NGO's lately which has come up and been training people with low vision and blindness on screen readers like NVDA or JAWS. But, even with the best of effort those NGO's of fairly small and they really cannot suffice the need of the huge population that exist. And, as we discussed earlier at least there are many other disabilities who do not consider IT very important.

And, as a result of which they have not invested enough either to understand technology or even train people that come in contact of them to understand technology. So, yes lack of acquaintances and ecosystem or a willing ecosystem is another big challenge which causes a barrier.

There are no scientific assessment criterias in many cases there are there is no way of recommending what product what solution works for you. So, as a result you know we do not really know if I you know if I can use certain product or not or if this is going to be helpful to me at all or not in my environment. There is no point of kind of recommending a very sophisticated computer programming program to a person who is who does not have basic computer skills or is not even willing to understand computers or have an aptitude towards that.

So, you need to create more solutions which is more apt for that time and environment. So, yes all these factors and they are enough in more factors this is definitely a not a very comprehensive list but, definitely major points that exist today and are definitely the major points which are causing barriers today.
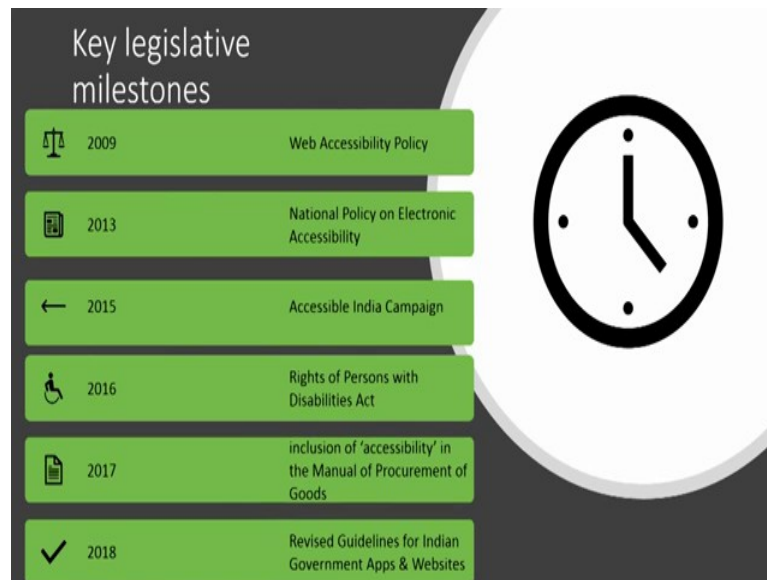
So, let us come to the key legislative milestones that as in India how we are enabling or what exists really currently today in the ecosystem as far as assistive products or accessibility is concerned. So, really India for large part of the time you know 1947 is when we got independence, 1995 you know nearly after 50 years is when we got the first disability legislation which was the Person's with Disabilities Act of 1995. Half a dec half a century gone and really people with disabilities had no identity. Even then really when it comes to accessibility or inclusive assistive products and technology there was very little movement take the millennial new millennium.

And, in the first policy came in 2009 there was a web accessibility policy which was kind of introduced by the Government of India. 2013 is when we created the national policy for electronics and universal goods, it really talks about adopting universal goods, universal design principles and creating more inclusive products.

But, again this has been largely a piece of paper which has not been really brought into affect much. 2015 is when we had the accessible India campaign, ministry of social justice and empowerment they have a department of dedicated for people with disabilities. So, they lodged an accessible India campaign under the and this was flagged by our prime minister Modi and they took aggressive targets as far as making websites, accessible, making buildings more intrusive, transportation, airport a lot of big targets
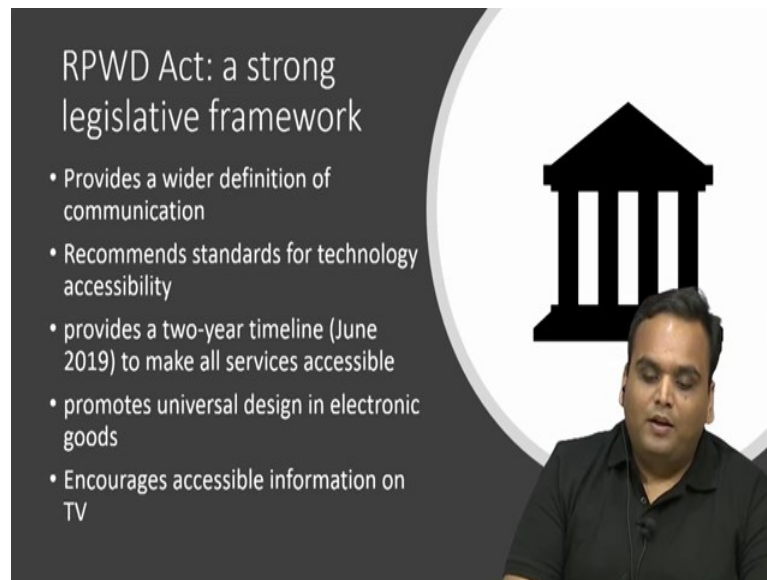
were kind of laid down. Yes, there were certain progress made and of course, in many cases we were not able to achieve those.

But, yes accessible India was a very important milestone where accessibility kind of broke in someways the glass ceiling. And, it entered it entered the it kind of got some mind shared in the bureaucracy that was extensive awareness campaigns which was built and that kind of mainstream at least started to mainstream accessibility in some ways or the other. And, in 2016 is when we got a new law the Rights of Persons with Disabilities Act. It is the new legislation which was formed on the basis of the United Nations convention for the rights of people with disabilities.

2016 is when this act got passed to an RPWD act has several provisions on accessibility where is you know, I will just come to the provisions in RPWD act in a while. 2017 is we had two major life kind of landmark coming in we were we got inclusion of accessibility in the manual for procurement. Now, the government if they need to procure certain goods from anybody, they have a certain manual which really lays down the details of the features or the requirement that they have accessibility was included in that manual which details such requirements accessibility was incorporated in that.

2018 is revised guidelines for Indian we the government kind of they had something called GIGW the government of the Guidelines for Indian Government Website. This was reviewed and updated to form guidelines for the Indian governments apps and website, it is it incorporates the latest WCAG standards and incorporates the principles around their latest accessibility guidelines.
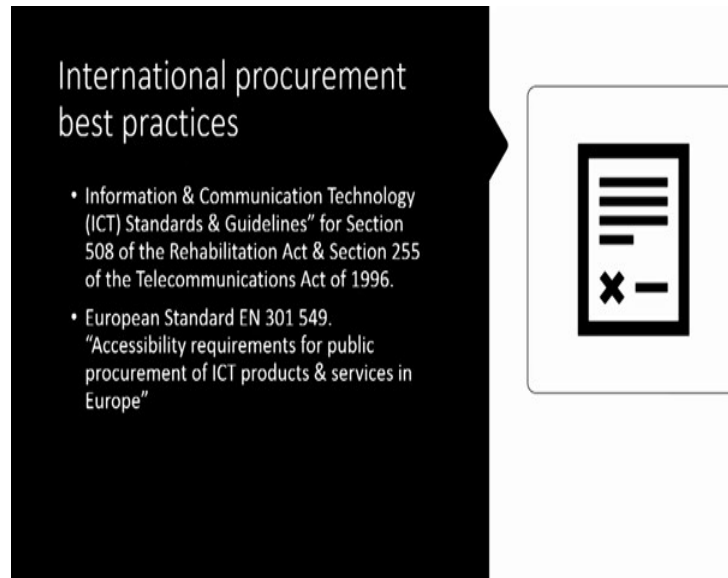
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And so, these were the legislative framework; slide 14 RPWD Act a you know and this is the landmark act that we talked about. And, it has a huge focus on accessibility, it really provides it includes it includes ICT in its ambit, it has a wider definition of communication, it has recommended standards for technology accessibility. So, GIGAW is the recommended standard for making apps and website accessible.

Two years timeline is been provided by the government in the RPWD act for making the services accessible. Now, a services also has a huge definition and it covers everything from health care to banks to telecom to website or web based application all of them in some form or the other are included in this definition of services. And, services have been given two years from June of 2017 is when they have notified the rules. So, from then to now June 2019 is they the is that they have to make their services accessible. If they do not make their services accessible they are liable for punishments for the breach of the for of RPWD act.

It does RPWD act also has a mandate on promoting universal designs as far as products and services is concerned. It does talk about creating more accessible accountant or information on television and the Government of India under the aegis of Ministry of Information and Broadcasting has set up a special task committee who was actually examining how content could be made more accessible or inclusive for people with disabilities. So, really these are some of the major highlights on RPWD act which talks

about accessibility and which are more relevant in context of information technology in assistive products.

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Moving ahead we are talking about international best practices for procurement, now we often say if you have to really make or encourage accessibility you have to you have to make accessibility a mandatory requirement. And, what better way of a enforcing it than really having the biggest buyer of these products and services mandated. So, many countries which like the United States and the European Union they have standards for making a for procuring goods and services which are accessible. In the case of United States there is a section 508 of the Rehabilitation Act which has strong mandates.

And, if you are a if you are a company and you want to do business with the government you have to make sure your products are accessible and they follow the guidelines and the standards as recommended in section 508. If you do not you are not eligible to work in do any kind of a business with the government of USA. Similarly, the European Union they have a guideline for procurement and the countries and the businesses when they want to work with the with the government they need to ensure that the accessibility is given due prominence. And, without which they cannot work with the respective governments in the EU.

Now, you would say [FL] how does it really make a difference. Now, let me give you an example many of the IT companies like Microsoft, Google, Apple, Amazon many of

them have you know they known for the inclusion and they have thought leadership as far as creating more inclusive designs and products for people with disabilities. And, yes it is true they have made significant effort and their leadership has been far more empathetic towards the need of people with disabilities. But, it is also true that one of the very important reason that they continue to invest in accessibility in making it better is because they are supposed to do business with the government.

And, if they need their products to be used or be purchased by the government of the USA, they need to be sure that these work for people with disabilities also. So, as a result they have kind of invested a lot in terms of making their products and apps or websites very inclusive and more accessible.

And, as a result of it many of us in different countries have also benefited now. So, Microsoft for instance if I take example the Office 365 their current version of office productivity suits which contain win, Word, Excel, Power point. They all have extensive accessibility features and they have been kind of researching and adding more accessibility features.

Of course, it is not only to do not only driven by the fact that the business of the government is at stake but, without that provision I think that will not have happened in the way or manner that they are doing it now. And, really it is just not the us government or the citizens of the United States who are benefiting. Thanks to this strong legislation consumers of these products across the world like you know we at India are able to enjoy the same product, same accessibility features in India because there was a very strong mandate there.

So, it just does not help you or just does not help the government or its employees or their governments direct stakeholders, but it really helps the community at large and sooner then we realize it really creates a ripple effect all over the world. It is you know this is a classic case where strong legislation mandate can really foster inclusion and clearly something which is where very much missing out in India; we still although accessibility has been included as a feature in the manual for procurement of goods and services in 2017.

It is still is not a very mandatory or a non-negotiable item and still the government continues to procure a large number of products, services, websites build new buildings

without having any consideration for accessibility in them and really if government does not do it, who else will. So, I think we all need to reflect upon that, we need to be very cognizant of that and we need to encourage government for the on that.

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Slide 16 talks about the technical standards that exist today as far as accessibility is concerned. I have restricted my findings to a technology related standards, we have discussed Web Content Accessibility Guidelines: WCAG. These were released by the worldwide web consortium and the current version is 2.1. There is an authoring tool accessibility guidelines, this guidelines are more useful for authoring tools such as at captivate or any other web tool like a Adobe word press, the word press website builder.

Then there is user agent accessibility guidelines, these are useful for something like a media player, how to ensure accessibility of them. Accessible rich internet application these also known as ARIA today, the web has evolved there are lot of rich application. So, these standards provide recommended guidelines on making rich internet app applications more accessible. There is also independent user interface accessibility guidelines, there is ePub guidelines for making Electronic Publication documents ePub's more accessible.
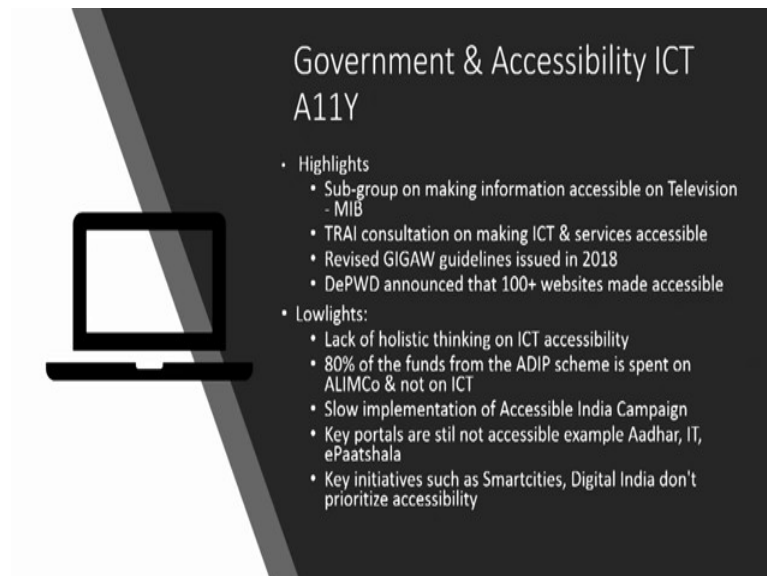
There is also the a PDF UA guidelines which talks about how to make the most ubiquitous document format PDF more accessible. So, a number of standards today already exists globally some of them have also been incorporated in India in GIGAW.

So, really you could look up on the internet and find these resources, I would encourage you to you know go through them. This would help you get an understanding for the needs of how to make your technology more accessible and inclusive for people with disabilities.

And mind you many of them are not rocket science in fact, it is very simple. In most cases you would find that these are common sense, these are best practices, but often common sense is also not very common. So, we often tend to kind of miss out on best practices and we like to kind of take the shorter root and just get our work done. But, just take that a little extra time, go through these guidelines this will help save you a lot of ordeal because now even in India we do have a mandate for accessibility. And, it is pretty much applicable for all sort of companies including the private sector.

So, sooner or later you would if you are a if you are someone who is developing any kind of an a technology whether it is on though on the desktop or for the mobile phones or on any other interface you may be require to kind of adhere to these guidelines. And, now that you have kind of experience this particular session, I would strongly encourage you to read these guidelines, this will help you to become more accessible.

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So, really the slide 17 I am we really go trying to understand how different stakeholders like the government, business and civil society what they have done so far. And, what I have really try to un do here is try to do a kind of a some little of analysis and would be

saying [FL] what are the good things or the highlights or the low lights that the government or these stakeholders have done in this place. We start with the government and really if I have to say the of course, the government has been taking a lot of effort.

And, if I have to really see the highlights passing of the RPWD Act was definitely one such things which did provide a big mandate for in for accessibility which covered a private sector. So, definitely that is one big highlight. The government has been setting up various task committees including most recently they have kind of set up a task committee within the in the Ministry of Information and Broadcasting and TRAI to understand in the case of information broadcasting they want to see how television can be made more accessible.

So, they exploring the use of sign language and audio description then tri TRAI had a more wider mandate and they actually completed their round of consultation last year. And, we will be kind of seeing through some of their recommendation very soon.

But, yes government has taking steps towards that, they have revised the GIGAW guidelines the department of empowerment for people with disabilities have announced that there more than 100 websites that they have been able to make accessible.

I think that is our landmark achievement and we need to applause the government for the effort; clearly a lot more needs to be done by some estimate they are roughly about 8 to 10,000 websites under different departments and ministries and PSU's. So, of course, 100 is the first step and we still need to go a long way before accessibility is incorporated in all those websites government apps and website.

Low lights we still do not have a very you know holistic view of it, we still have a very patchy thinking as far as accessibility, it is often very reactive and not very proactive in nature. So, do you the government needs to be pushed and they would react or take certain action. We still do not have a holistic policy or a guideline on assistive product at a larger scale which really cuts across different stages from research to encouraging manufacturing to distribution or making things more available in the country. We do not have that kind of a thinking yet evolved in the country.

ADIP there is a scheme called ADIP with the government and that has been carried out by the department of people with disabilities. They distribute a lot of products under
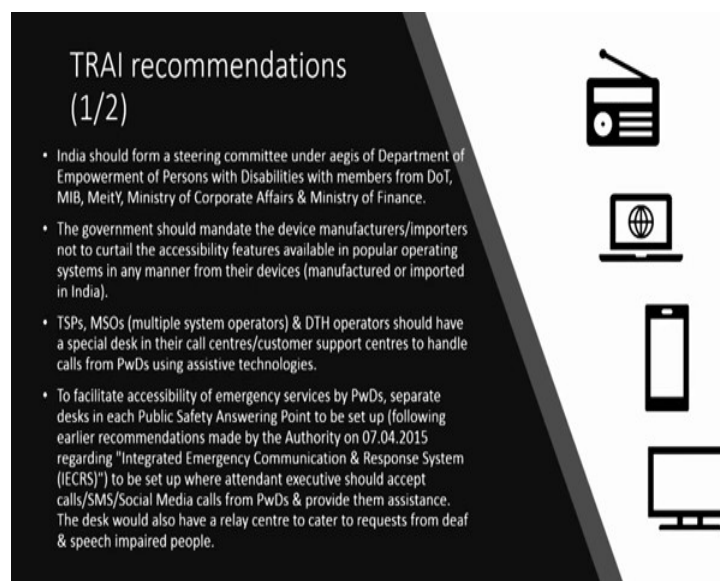
ADIP scheme, but 80 percent of those products are largely a largely for the products which are procured by ALIMCo. And, these ALIMCo products are like wheelchairs and crutches and many of them, they are not so, much on IT.

And, the and the and the list of products is also not often updated, it is it is the last I think the revision happened in 2013. Clearly when technology is evolving so, fast ADIP schemes like ADIP should also need to be updated a far more frequently. It largely caters to few disabilities and many other disabilities needs are not taken care into accessible India campaign while it was a wonderful campaign, but really the implementation left a lot more wanting.

It has not yet been fully you know the objectives have not yet been fully actualized; I mean need to you know we need to still go travel a long way when these objectives could be materializes, huge number of building. Many places they have not given them access ordered, a huge number of places where they have con completed access ordered, there was no action kind of executed on it.

So, many websites were suppose to become accessible, but just about 100 odd so, have become accessible. There is so, much of emphasis today in the government on digital India, e governance, but accessibility really is very low in the priority. So, definitely a lot more desired as far as government and ICT implementation is concerned.

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As we discussed just a while ago of the government or the telecom regulatory authority of India which is the regulator for telecom services in India they conducted an extensive consultation in 2017 and 2018. They invited representation or opinion from a variety of organizations including telecom service providers like Airtel and Vodafone. They have also invited up the direct to home service providers like the TataSky or Dish TV and internet service provider. So, a lot of these people kind of provided the inputs and so, the so, was the disability sector you know invited to given their recommendations to TRAI.

Now, they have kind of released a recommendation in July and some of the recommendations that they have kind of kind of given here are: it recommends that India should have a steering committee under the aegis of departments of electro empowerment for people with disabilities. And, which should be more cross departmental, cross ministerial in nature and should have representation from Ministry of Electronics and IT, corporate affairs, Ministry of Consumer Affair, the Bureau of Indian Standards.

So, all these ministry needs to be kind of should be participating in that particular committee and should have a more holistic thinking in this subject. This should the government should mandate device manufactures to create at least to one of the product SKU's which have universal design principles and they have accessible for all.
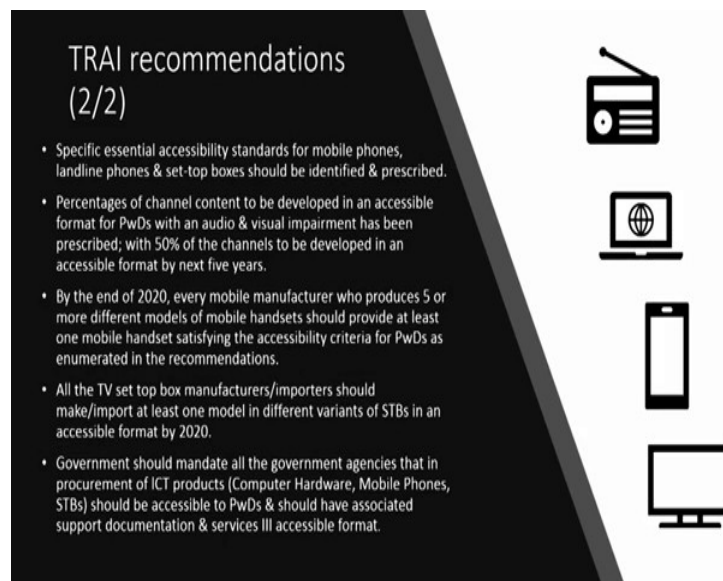
If you are a telecom services provider or internet service provider or even a cable operator you should have a specialized desk or a call center where or provide training to the staff to cater to the needs of people with disabilities. We often seen when people with disabilities go all the call center and they ask about they give their concern, the staff is just not able to understand those queries.

So, yes the TRAI recommends that the contact center staff needs to be better oriented and equipped to take to the needs of people with disabilities. It also talks about emergency services and how they should become more accessible and inclusive. India has created their own 911 number it is called 112; it is at early stages of roll out and of course, it is going to become very essential.

So, how can we make this very important services more inclusive, how does how do we make it multimodal in natural. So, that say somebody who is deaf can also reach out to them may be through SMS or chat and somebody who is whose who can actually reach

out to them through call or even any other things. So, yes it needs to be a far more robust multimodal in nature and should be able to cut off cater to the needs. Because, emergency services we will be taking you know it they will be dealing with lives, they will be responding to situation of disaster. And, if we are not able to kind of make them exclusively talking inclusive enough we will be actually causing huge problems for them; continuing with second part of the recommendation.

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It also recommends that there should be accessibility standards for other products like phones and other types of electronics. A certain percentage of all channels content should be developed with order description and sign language included. In five years any mobile manufacturer who has who produces five or more product mobiles and the country must have at least one phone or device which meets the accessibility criteria's.

All TV set top box service provider should have at least one a set top box version which is more accessible and has accessibility features incorporated in it. And of course, lastly we talk it also mentioned about government when they procure any product ICTs, they should ensure that they are accessible right from at the procurement state. So, they should be encouraging this.

The next stakeholder that I would want to talk about is the business, really we discussed earlier that now thanks to RPWD Act and the wider definition that it has taken clearly the private sector has come to the fold of it. And, thus all the accessibility features are also equally applicable for people you know for the private sectors. And, private sector really includes anything from a sole proprietorship to a partnership or a factory or an NGO or an association of people or a private limited company or a public limited company all these kind of are included in the definition. So, clearly nobody is out of the definition.

And of course, if you really look at some of the highlights and the lowlights there has been some effort and by the specially in by industry bodies like such as NASSCOM and FICCI in terms of creating more awareness on RPWD Act and the provisions. And, what it means for those sector companies we have also seen a lot of these startups and tech bees companies who have invested in AI. And, have tried to create early stage products like seeing AI, it was a software application developed by Microsoft using artificial intelligence for the low vision and the blind community.

Similarly, there are other applications such as Eye-D by GT mind technologies or 6 by 6 by Barrier break which again use technology for and things like AI to overcome barriers for people with disabilities. Lowlights is limited awareness of RPWD Act in spite of lot of effort a lot of awareness needs to be built more around RPWD Act. And, it is a way

you know and its applicability on the private sector. There is no sense of urgency we discuss June of 2019 is the deadline by which you know services are ought to become accessible as far as RPWD Act is concerned. But, really the needle has not moved fast enough and there is very little sense of urgency as far as creating more inclusive or making their services more inclusive for people with disabilities is concerned.

Corporate CSR now, India CSR is a very powerful tool it you know it can provide resources for huge number of initiatives. But, still CSR has not got on to the band wagon of accessibility maybe the schedules you know it will be good to have some more clarity in the schedule 7 which really lists down the kind of activities that the companies can support. So, may be an emphasis of accessibility schedule 7 can be very useful and, but providing CSR can support accessibility in a major way. For instance they can support a search related activities, they can support an auditing, they can support in procuring certain goods and services. So, it is there is a huge potential an untapped potential where CSR can make a big impact.

And, mind you some organization for instance Mphasis they have been doing taking some amazing efforts in this space and now Mphasis through their CSR program has collaborated with Uber, Uber technologies. And, they have actually launched Uber assist and Uber access cabs in Bengaluru, Uber assist provides drivers training on you know how to help people with disabilities; when they take a ride with them and when they have taken a option of Uber assist. And, then there is Uber access, they are specially designed cars which has features like ambulift and wheelchair locks. So, people who are on a wheelchair and they find it difficult to transfer, they can actually use those cars and find you know they can actually mobilize within the city.

A huge untapped potential

- A wider talent pool
    - Potential 1 billion people
    - Example: Wipro
- New market segments
    - USD 8 trillion disposable income
    - Example: Skype, Uber
- New product offerings
    - 26 billion opportunity
    - Example: Smart-cane

So, yes these are some of the highlights and the lowlights, as I mentioned for the corporates or the business there is a huge untapped potential. And, they can leverage people with disabilities or focus in many areas. One some of these are kind of mentioned here, they can be a very active workforce. We talked about 15 percent of population being disabled, 1 billion globally, nearly 200 million in India. So, they can be source of employees, for you they bring diverse thinking in your organization. So, definitely that is an area of opportunity for the business. Second is seeing a people with disabilities as a consumer base and there was a study done.

And, they said [FL] people with disabilities and the immediate social circle influence a total disposable income of about 8 trillion dollars that is far higher than the total GDP of India. Now, if I give you an example now in my home we so, if you know we often use Amazon over Flipkart because, we find Amazon a little more accessible. So, because I use Amazon we you know my family in my family we have all kind of pivoted around this. So, my wife, my parents everybody else have started using that application. Not because of the better deals that we get here, but it is also actually because Amazon is more accessible and, because I find it more comfortable to use with my assistive technology.

We have all kind of graduated or pivoted towards the use of Amazon and this is one such example there are many others. And, it holds true in many other services including

transportation or food tech or banking. Accessibility really forms an important criteria as far as when we select a particular service provider. And, it just does not impact me or my brother who are user of assistive tech, but it also impacts the purchase decision for the whole family. So, clearly this number is not a misnomer, it is not an exaggeration by making your products more inclusive and accessible, you actually tend to get access to their immediate friends and family members.

And, really from an assistive tech market the estimate says that the market is as big as 26 billion dollar. It is a huge market and the when we need a lot of innovation and specially in India where, we do not have enough technology available coming in from the west. It is important that we invest in this space and we try to find out solutions assistive tech, ICT products which really helps us overcome these barriers. And, one of the ways of doing it you know you may want to of course, the you know you may want to take up specific problems and build solutions around it.

But, the other way of doing it is also that if you are engaged in building a particular product or a service you make sure that that is accessible, that is inclusive for people with disabilities. By doing so, you anyways kind of travelled certain distance as far as making your products and ICT more inclusive for people with disabilities and really breaking a big wall as far as exclusion is concerned. So, huge potential it is definitely an untapped opportunity really, if you look at it from a market point of view or even from an a talent resource point of view.

Slide 22 civil society and I think this is where all our responsibility comes in and a as individuals as civil society groups, NGO's what can be done, what have been happening. an We have seen a lot of academia like IIT Delhi, IIIT Bangalore who have actually taken up accessibility as a important stream, they have they are working on create setting up a center of excellence. trip IIT Delhi has created something called a smart cane, they have created a Braille book, a kind of a Braille laptop which actually can create content and consume content in Braille. They have also they also trying to work something to do with you know making bus transport more accessible for the blind community.

Similarly, IIIT Bangalore has been incubating non-profits like friends for inclusion and vision empower who are working in the area of technology. And, they have been trying to a support them in terms of building more accessible solutions. So, yes there are some efforts happening as far as academia is concerned.

There are there is some effort as far as to bring together an ecosystem. So, organizations like Enable India and Samarthanam have announced that they will be setting up an ecosystem. They are bringing different stakeholders together on a common platform and see how assistive products can be more you know more researched upon, made widely available, made more affordable.

Of course, there are newer NGO's like Friends For Inclusion, Vision Empower, XRCV many others who are trying to actually take a take technology much more seriously. And,

see how it can be leveraged for making people you know or leverage to enable people with disabilities or overcome certain barriers. Lowlights definitely I think we ourselves have not really put for advocacy or you know the importance of assistive products.

Or, in assistive policy assistive products policy at a larger level; countries like the US have has a board called an access board which really influence accessibility in lot of activities, but in India we do not have something like this. So, we need to really drive that a lot more with a lot more vigor and excitement. We have very limited exposure to understand new technologies assess, you know in what scenarios it is best useful. There is very little awareness, very little information available for in on the internet also.

The NGO's do not have that kind of a capacity, they are not trained enough, they do not have the skills. So, yes there is a big problem, a lot of our efforts is very fragmented it is not very in cast and it is not very consistent in nature. So, as a result again you know not much gets achieved, a lot of things are actually they get started but then they remain in limbo because we do not have a larger view of things, we do not have a consistent view of things.

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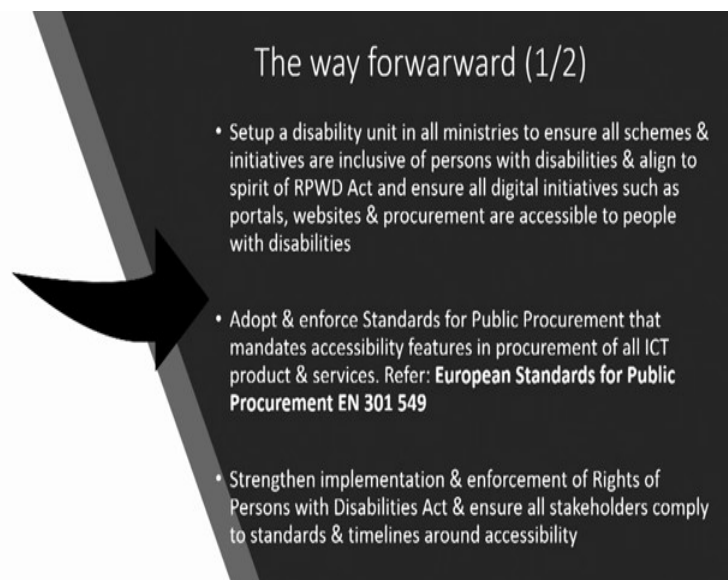
So, yes from civil society these are certain analysis; slide 23 and we come with this we are coming closer to the end of our presentation. And, here is where I have kind of jotted down certain points on the way forward on what could be the possible focus areas for the government, for the business, for the civil society. So, some of the points that we have

kind of listed out here are at the government really we really strongly recommend that all ministries should start seeing disability as a core activity people; with disabilities exist everywhere and their needs are also equal as anybody else. So, people with disabilities also need health, people with disabilities also need education, people with disabilities also need employment.

So, Ministry of Health, Ministry of HRDA, Ministry of Labor, Ministry of Corporate Affairs they all need to have a disability included. They need to have a disability unit established and they should be able to kind of take care of the need of people with disabilities. In according to an analysis, that I did a while ago about 26 such ministries can have a dedicated person or a dedicated unit for disability.

Of course, the next important step is that we should adopt a very strong procurement standard, for procurement I think we discussed enough about the importance of procurement. And, how it can actually create a positive ripple effect by having a accessibility as a mandatory requirement in procurement of government service products and services.

So, a European standards are very good bench mark perhaps we should look at emulating them adapt it to suit our requirement. But, definitely accessibility should become a non negotiable part of the procurement practice at the government. We definitely need a both as the government business and the civil society, we need to focus on being more aware on the RPWD act and strengthen its implementation around each at each stage, at each level. So, it is very crucial that we have been more awareness and we strengthen the implementation of it.
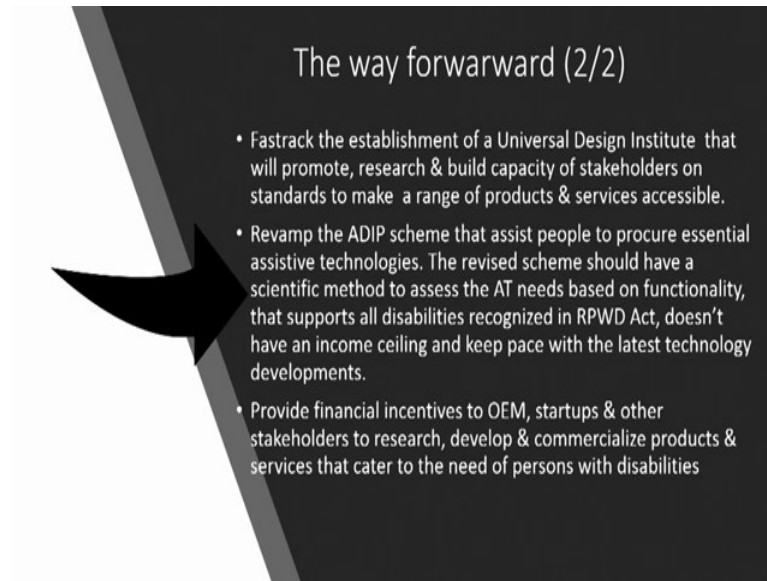
The government was suppose to set up a universal design institute. So, and this was committed in the 12th 5 year plan, but it not much has been achieved on in that front. So, it is important that we kind of fast drive the implementation of it and as you know we really encourage more research on building more standards or building more access products which are more inclusive and more accessible in nature. ADIP scheme we have extensively discussed, ADIP needs to be revamped, it needs to be made more robust.

It needs to take into the need of a wider range of disabilities, it need to you know it need to update products more regularly you know. You just cannot have a you know a certain list being created and do not being updated from many years, technology is improving at a break neck speed. So, we need to make sure that the ADIP scheme is also able to keep pace to it and able to accommodate the needs of people basis the advances and technology. We need of course, ADIP needs also not needs to be rewamped as far as making it more functional in nature, the way it happens today is that there is a one size fits all.

So, there is a very similar wheelchair that has been given to everybody without having to understand what is really what kind of a solution do they need, what type of wheelchairs do they need, do they need do they need an extra cushion. Or do they need a light weight wheelchair, do they need more agile or they do they need something more sturdy; I think that needs to be understood. So, ADIP scheme needs to be made more objective and

instead of taking a very mass base approach, we need to look at making it more personalize. We should have more financial incentive. So, the government should be actually looking at create providing tax incentives or GST through maybe through GST, maybe through income tax, but really more incentives on creating more inclusive products.

So, this would really encourage OEM's or any other you know startups, if you are a if they are in an access accessibility or assistive products (Refer Time: 80:01) then if they can be incentivize that can be very important and very critical. Even from a consumer point of view I think it is a good idea to see if we can subsidize not only through ADIP scheme, but also for those who are buying.

So, somebody whose who has a certain and you know who is able to afford, but if through income tax if they we can provide a set two subsidy or a rebate; if you have a procured certain assistive products I think that could be very useful. Financial incentives is another important area that can be looked into for encouraging more assistive products and solutions for people with disabilities.

With that we I really come to the come to an end of my presentation. Clearly people with disabilities are a important part of our society, they form a huge base 15 percent is not small. It really translates into 1 in 7 person who has a disability, the they may range from something very milder to something more severe. And so, we need to really start accepting that people with disabilities are part of our life.

And, we all need to understand that the problem really does not lie with them. It really is a lot more outside, it is because of the barriers that we have created because of poor design that we have incorporated. So, a building is not accessible not because of person who is not able to walk, but because we do not have ramps and lifts or accessible washrooms.

Similarly, a product or an application is not is not usable by a person with disability not because they are blind or they have a certain disability, but because you know the developers have failed to incorporate accessibility standards in them. So, one needs to focus a lot more on accessibility, one needs to take care of the needs of people with disabilities. As developers I would encourage you to look up on the web on accessibility standards in the area that you are working in; whether you are a civil engineer who is

trying to work with the buildings or you are a computer science graduate or somebody who is going to work in the field of AI or internet of things.

There are accessibility standards in most cases, look up and see how you can incorporate certain best practices really and it is you know it is really not rocket science. It is fairly doable, all that to one needs to do is be more aware and once you are more aware I am sure you will be able to take care or understand the needs of people with disabilities and it is just that one small effort can actually make a huge difference. So, with this I would like to take a pause and I know it may sound of cliché, but remember you can make a difference. You can make a difference in the life of 15 percent of the population who have been marginalized for a very long time.

So, please take care, have you know wonderful time and do remember people with disabilities do exist. And, we need to come together and together we will be able to create a more inclusive and an accessible environment. With this I am Ankit Rajiv Jindal signing off.

Thank you.