>> GITANJALI SAH: Good afternoon, ladies and gentlemen. Greetings from the ITU headquarters in Geneva and welcome to our 11th WSIS talks on ICTs in education and the role of information and communication technologies in education for visually impaired children during COVID-19. We were just informed also by our speakers, Mr. Dipendra Manocha and Olaf from the DAISY Consortium that today is also appropriate day, because it's Global Accessibility Awareness Day. Olaf, you will be moderating the talk today and I would like to hand over the floor to you. Over to you, Olaf.

>> OLAF MITTELSTAEDT: Over to me. Right. I don't see anybody else joining.

>> GITANJALI SAH: Olaf, the attendees are joining in. Maybe you can start.

>> OLAF MITTELSTAEDT: Okay.

Right, first technical issues. So, if -- you see on your screen there is a Q&A button, and I would ask you to put your questions that you might have even while Dipendra and myself are talking in that Q&A. Please do not use a private message or private chat to Dipendra as he has his screen reader off and so please do put all of those messages privately to me and say it's a question to Dipendra, because I will then read it out so Dipendra can get that message. You can also then later in the Q&A part of this talk use the raise your hand and I will then unmute your microphones so that you can pose your question, which, in fact is the best idea because then Dipendra can understand your question. And if you haven’t understood that by now, Dipendra, doesn't see so well. So that would be kind of nice of you to observe that.

Then as Gitanjali mentioned in her remarks, today is Global Accessibility Awareness Day. We are very happy that we can do this at this day. It's been kind of a fortunate coincidence that this happens.

So, I'm going to start with telling very briefly and very shortly the way it took us to get where we are today. And this talk today will be a fairy tale. It's a tale of three giants. It's actually a tale of giants of change and that started in a dark night sometime in the last century, somewhere in Scandinavia where someone -- (No audio).
It was actually hard to come by.

And that led to a coming together of six countries, Japan, Spain, United Kingdom, the Netherlands, Sweden, and Switzerland. And then ten minutes after that -- okay. I should warn you, when I use size measures like giants and time measures in ten minutes, these are to be understood metaphorically and not because these giants are quite humanly sized.

So, these libraries then said, okay, let's find and define a format that would be digital and therefore much easier, much better to read than the cassette format that we presently have.

Ten minutes after that happened, the DAISY Consortium was formed and then with the inclusion of an American library for the blind, our first giant appeared. That was George Kersha and Nesbitt, his guide dog. So, George followed his guide dog all around the world and brought us on key, on page, to developing the software that the libraries would need to produce these talking books.

And then -- and this is the second giant -- came to the realizing that this is all nice and fine, and we are kind of -- the libraries for the blind from truly developed countries and they found out that 80% of their prospective clients actually live in countries which are dirt poor or developing or in developing countries. And that got the second giant Hirashi Kavimora around and he traveled around countries and identified people that could be on the Vanguard in that country for helping to get the better way to read on the way in those countries and that gets us to today's giant which is Dipendra sitting there.

Dipendra is in India and what makes him a giant is the task he was facing. You have to realize that India has 15 million blind people or I should rather say persons, and on top of everything else, India has over 20 languages. So, if you want to have a book that is available in 20 different languages to all the various speakers of those languages, you can imagine what it is.

So here goes first question, Dipendra. Since the access to accessibility is kind of the biggest part of the problem, because you have this -- you know, what you need for assistive technology is whatever they need, be it the DAISY reader, a screen reader, a braille reader, the refreshable braille line they come at a cost. So, could
you please tell us a little bit more how you tackled with that problem?

>> DIPENDRA MANOCHA: Thank you, Olaf, and very, very good morning, good evening, to all who are there in different parts of the world.

First of all, Olaf, I think I must thank you for your generosity. This is an extreme generosity to put me or even compare me with those two giants, George Kersha and Hiroshi Kawimora who have been a friend, philosopher, guide to me, and learned a lot from them. They are the ones would bring me to this world of digital accessibility and accessible books and accessible information.

So, their shoes are too large to be in, actually, for me. But then coming down to your question, that, yes, when I was introduced to this DAISY world and how we were seeing that how wonderful it is to be able to, you know, read books in a very well, extremely good reading experience of extremely good navigation facilities, books reaching out to us in a much compact method, and with full, you know, control over its navigation, which was completely new to our world.

And so, we were facing two problems in developing countries like in India specifically, and they were the cost of these technologies, in the hands of the users or even for organizations to transform from analog to digital. The kind of technologies that the world was using, those were completely unaffordable for organizations in India.

And most of the times even not usable because the kind of people who were running these libraries in high-income group countries and in developing countries, their profiles were entirely different. So while you would have software engineers who were handling this transition in the Switzerland’s and the Sweden’s of the world, in India, you would have almost, you know, the school pass outs or dropouts volunteering their efforts and running the libraries for the blind in a country like India.

So, there was a complete contrast of the profile of people who were handling these things and then the costs, as I said.

And the third one, a huge problem was related to the language compatibility. So, while we would have software that was working in Europe and languages, we hardly had
even a screen reading software that actually worked in Indian language at that time. So, these three were the huge problems that we were set out to solve. But yes, fortunately, you know, there were enough innovators around and the whole group got together. We were able to, you know -- instead of dealing with single organizations, we went about this task by building networks, getting people together to say that, you know, these problems are for affordability and language compatibility, is something that we can't expect people from the outside of our country to solve for us.

Why would an engineer in Europe try to make everything compatible with Hindi language?

So, it is -- I think we understood our responsibility in a way, saying we have to play the major role and the central role in solving our problems, while keeping it compatible with the global standards, that is where the DAISY standards came into play. All around the world, we created a single standard for digital books being and we said that we will comply to these standards fine, but we will find our own tools to do it, because we have our own methodology. We have human resource in abundance. We don't need to rely on only high-capacity functioning machines to do our jobs. We have human beings -- more number of human beings who can be involved and that may bring in more employment opportunities, even for persons with disabilities.

So our emphasis was even our analog to digital conversion, for example, the small example that is -- that the audio books which are there in analog, and which were converted in digital, where a tool -- a set of tools would cost somewhere like $8,500 or $10,000 for putting a single set of these tools for conversion. We actually were able to adopt a single -- you know, a cassette player in just about $50, $60, which give us four times the speed of, you know, transferring this audio recording of a cassette to a computer.

And although it was not equal to a 16-times speed, but four-times speed and $50 or $60, we could deploy multiple of these machines at different locations to deal with the, you know, decentralized way of dealing with this transition. And we were able to convert our analog libraries into digital libraries at a fraction of the cost.
of what any European country was doing at.

Then, obviously, we went about developing text-to-speech engines for our Indian language. It was the blind community ourselves we were involved in all of this. And we can say in 2018 or so, we -- in India, we were able to summarize our two and a half decades of work into a few sentences, saying that today, proudly we can announce that in at least 16 to 17 most proper Indian languages, we have the technology to read with eyes, ears, or fingers, means that we can read these digital books, read and produce Indian books in 16 Indian languages, either in large print or as an audio or on an official braille display, an affordable official braille display which is one-tenth of the traditional braille displays which are working in all the languages.

>> OLAF MITTELSTAEDT: If I can splice in here for a moment. Normally the cost of a text-to-speech engine is around $20,000 to $30,000 to develop anything like that. I mean, those were the costs when you started out for developing such a tool. How did you bring down the cost of development for all of those 16 Indian languages?

>> DIPENDRA MANOCHA: So, we went -- as I said, we all went into partnerships. There were various methods deployed. So, one thing that we had our favor is the numbers. Now, we had to devise methodologies to turn those numbers into clients. And this is where these negotiated with companies saying that if you try to provide your products at the European cost, you may find, 10, 15, 20 people in the whole year who will be able to purchase it, but if you bring it down to Indian palatable costs, those numbers, 20 can be turned into 20,000.
And then that made business sense for companies. We adopted open source tools, wherever we were not able to get these numbers of clients for languages, and at least had something which was working which may not be as human-sounding as a nuance or even kind of code voices, but we made sure that we could use open source tools such as eSpeak and build all of our Indian languages into it involving developers who were blind themselves and also all the language expertise that existed amongst the persons of blindness and the organizations with blindness, we ourselves actually dedicated a lot of our time and effort and resources to -- to develop these languages and to the text-to-speech at a much, much lower cost which is available, actually to users at a very affordable cost.

So, for example, a Smartphone with the screen read software and text-to-speech in Indian languages, something that costed about, if I may say, something around, you know, $400, we were able to introduce same kind of -- same solution, absolutely the same solution without -- without making any changes. The same software and the same hardware, we were able to bring that cost down to one-third, 33%. So, you can -- you can imagine a 66% drop in cost with no change in hardware and software. We were able to do all of that by deploying these, you know, number crunching and adaptations and taking -- or contributing human resource in development.

>> OLAF MITTELSTAEDT: Oh, great! Now you have all of these tools and they are quite wonderful and you did sort of an incredible thing of convincing companies of the viability to produce them at a cost that is a lot lesser than they would be able to sell it here and still make economic sense for them.

Okay, but how did you tackle the problem? Now you still have -- you have all of these lovely tools but you still have all of these blind persons. What was your idea to tackle that?

>> DIPENDRA MANOCHA: No, this is something which I would not say that we have solved this problem. I think we are working two stages. We are evolving. So, we have had a huge time spent on filling the technology gaps. What we normally say is that a solution has to reach with all of its components, it has to be a holistic solution.
We can't provide part of the solution, which means that the device training, distribution method, and the digital content, all of these four components have to be delivered together, otherwise if you take out even a single of these components, the others are used less.

We also call it kit contain confidence to sound more rhythmic, but essentially what it means is the device in the hands of users, the digital content that can be read on these devices, delivery mechanism of delivering this content right on the devices of the users, and the trainings to be able to use the system, all of these things have to be delivered to the persons.

Now, talking about India, I guess we can't be justified if we talk anything less than a million. So -- so we came up with this idea that if we have to -- the solutions have to reach out to a very large number and a population, which is very diverse in their language, social, you know, geographical reach, economic capacities, all of these things are extremely diverse in India. And if we have to reach out to all of this population, our solutions have to be not just holistic. They have to be multimode delivery. We can't say that a single solution will fit all. So our -- our -- for example, our method for the online library, it can deliver content on one hand on a Smartphone, loaded with this Android Smartphone with a simple reading app and it can deliver it to special hardware’s, but an organization can actually download content and deliver the same content on very low-cost players such as mega wise or other simple-to-use tools or actually printed out in braille using a braille embosser and deliver it as a traditional method of braille books.

Now, of course, till now, the online library registration has reached to about 32,000 or 35,000, in a country like India, these numbers as best can be seen as the beginning of this whole thing. In fact all the organizations have got together and we are saying that we must reach 1 million, and we call it "See a Million" or "can we see to a million" in the next five years so at least some number of some useful number of people can start taking benefit of all of these efforts that have been made.

>> OLAF MITTELSTAEDT: Terrific! Great to hear. Listen -- okay, I have been over to India and you got me an enormous amount of people this February to be interviewed by me.
I have 50 gigabytes of interviews with people that either work with you or as equally important, or maybe even more so, the people who went through your program, and that program that you just said was the four-step program. You enacted that in a school that you started and founded and are running called Saksham. Can you tell us a little bit more about that?

>> DIPENDRA MANOCHA: Yes. So, one of the strategies that we follow is to build models, and this Saksham resource center is one of such models where we went about proving that, you know, this huge change that has happened, that we first in 19th century, we got specialized script. And that opened doors of education, but then this information technology and the digital technology allowed us to use -- to read and write in the script that the whole rest of the world is using.

So, from a specialized script of writing a language, to the mainstream script has been this huge transition that happened the last part of the 20th century, where DAISY also came into being after that, introducing that digital ability.

This opened up so many jobs for us. This resource center introduced it technology at a very, very early age, because this is the basic reading and writing technology for us, which means that this is not just an employability skill. It is something which is of skill that a person must acquire right at the age of education and early education.

And what we did in the school -- this is a resource center that supports students who go into the mainstream schools. They attend mainstream school classes. Their teachers are supported by our special educators and sometimes we also provide remedial classes to these students and there is a very specific reason for providing these remedial classes because most of the children who are studying through our -- who are supported by Saksham Resource Center, they are first generation learners. It means that their parents are actually not educated or very -- or their education stills are very low.

They migrant workers. They are daily wage earners. They belong to the absolute lower part of the pyramid.
And their children, with the close connection between poverty and disability, these children have acquired this disability, blindness and low vision, but what we are doing, we are equipping them with -- with these digital devices.

Every student who goes to the mainstream school actually goes with a laptop sitting on their desk in their mainstream class so that the teacher does not know change in how these mainstream school teachers are teaching the class.

>> OLAF MITTELSTAEDT: All right. Let me jump in here and tell our listeners a little story. So, I was with Dipendra at that school, at the Saksham school, and interviewed this girl. She was about 11 years old and I talked to her. She was in her school dress and in the afternoon, they sometimes come back to the school, but I think this was just -- she was just specifically asked to come back to be interviewed by me.

So, I asked her how, you know, her progress was. And the progress is, in fact, they get even preschool kids and the first thing is they teach them mobility and the second thing is they teach them how to read and write via braille and then they get introduced to a laptop and then that laptop is filled with the class material in a digital format.

I asked her, so when you go home from school, you have somebody at home who helps you with your homework and whatever? And she said no.

And then Dipendra opened my eyes what that means. And she said, no, of course, because everybody at home was illiterate. And this, in turn, means that -- and this might sound cynical to some of you, the fact that this girl was born blind is -- was actually and constitutes now her biggest chance in life, because she will be the first one in her family who will get an education. And there's no telling how far she can go because she a very bright young girl.

And we all know that in order to get an education, it's the easiest way to get one is to come from a household that puts value and has had an education. A value in and has had an education.
So what Dipendra was saying, she jumps a generation and that generational jump will get her in some places and I can give you all sorts of other examples from where that jump will lead you, because I had a chance to interview all sorts of blind persons who had great success in their life.

So, this is a four-step program. It's first of all, mobility, and then it's the acquisition of knowledge on how to operate a tool and then finally, the production of the classroom material that can then be used and utilized with that tool.

Back to you, Dipendra.

>> DIPENDRA MANOCHA: Well, so I think the -- the best part is that once we have this infrastructure, the digital inclusive infrastructure in place, the cost of empowering the student and make them go through a good education, actually, comes down. In fact, they are using the traditional methodology, we may spend more money, and the more resources to provide that education and quality education to childhood blindness, but if we have this digital infrastructure in place which is inclusive, I think that cost actually comes down drastically.

And we actually end up providing much better, you know, skills and employability skills and lifestyles to these students who we expect to touch new heights which we actually in our lives could not have even imagined.

And the level of confidence and the level of, you know -- the way they look at life is amazing. I mean, it's inspiring for us. It's surprising for us. They keep throwing surprises at us every day, because we can only, you know, plant those seeds in them. What kind of fruits they will bear is completely unimaginable for us. How they use these technologies for opening up new avenues, they are becoming engineers. They are becoming, you know -- certainly, they will have their aspirations raise to test the skies. I mean, there are several administrative officers, bank officers, there are software developers. You can these are the kind of areas that I have got opened not because we opened it, but just because we provided that basic digital literacy, which resulted in them exploring new venues and opening up completely new areas of employment for persons with blindness and low vision.
>> OLAF MITTELSTAEDT: Right. Yes, to the effect -- I also interviewed the -- some of the mothers of those kids. And to them, they talk about the burden when they realized they had a kid with special needs and what this meant to their familiarly. And they were just beaming with joy and happiness that now their kids could have a chance to become a full-fledged member of Indian society and partake and contribute in much the same way.

Maybe we should mention at least for a passing moment what Saksham School is doing now that India is in the grips of the coronavirus.

>> DIPENDRA MANOCHA: Right. So, I think this is the -- this is where the investment really paid very, very well. Huge dividends to us. Certainly, all the institutions are closed and the students can't go to the regular classrooms. But a lot of these mainstream schools where kids are actually going, then turned to online classes. And unlike the other students, our Saksham students were actually equipped, digitally equipped, they had the tools, the requires tools and the training to be on these online classes.

So, they were attending all the mainstream school classes. The teachers -- the special educators who have been providing remedial support to the students and the teachers were in touch with them. Our whole team is communicating with them over Zoom or WhatsApp or all of these digital tools and are able to help them out. Even our therapists who are working with multi-disability children are communicating well parents of these children to guide them so all that has been gained through the years through those therapies should not get lost because now the therapist can't be in physical touch or physical vicinity of these young ones. So, this is a big success story that has come up, that digitally empowered students of Saksham are the ones that are not missing out on the classes.

Because what is going to happen is that the mainstream schools are going to hold these classes online, and when -- God willing -- the schools reopen, no matter how much time, two, three months, I don't know, whenever they classes of schools reopen, all the teaching that has happened digitally is not going to be repeated. So, the people who miss out on these actually miss out. And then the kind of catchup game that is going to happen for them is going to be enormous.
These students who are digitally empowered are better placed if not at the same level, but they are actually better placed than the rest of their classmates to deal with this crisis situation. So that's been -- hats off to our section faculties and teachers and -- and the students themselves who have really taken on this challenge of being completely at par with the people, with the digitally empowered people sections of the society.

>> OLAF MITTELSTAEDT: All right. I think we pretty much covered everything, and I now would like to get our participants -- I already have one question, which wasn't typed. So, I would like to ask Jenna unmute yourself and pose the question in the audio.

>> PARTICIPANT: Hi, hello. Hello, this is Jenny Arana. Thank you, first of all. I'm from the development bureau of ITU and I work in the digital inclusion. I would like to congratulate Mr. Dipendra, Manocha for the impressive work you have done to support -- to support learning continuity for children with blindness and low vision in your region.

It is truly inspiring also to hear how the work you have done has improved the employability possibilities for persons with visual impairment. One question I have is what is next on your plans? Perhaps in terms of empowering the groups you work with, with the technology and the skills necessary for their livelihoods, perhaps, to succeed and entrepreneurship efforts.

And also, I would like to make a comment, just to tell you a little bit about what we are doing in the development Bureau of ITU, our work is in ensuring that everyone, including children, and youth with disabilities are included in the digital world. To achieve this goal, BDT, the Development Bureau has guidelines, resources and training which can be consulted on our website and I will share the link on the chat.

We also work directly with ITU members, for example, among other Study Groups on questions, which is a -- it refers to access to telecommunications and ICT services by persons with disabilities and other persons with specific needs, providing specialized advice to governments and implementing the appropriate policies, the regulatory measures and strategies to enable digital accessibility for children and youth, among others.
Also, I wanted to share that we have developed guidelines for all relevant target groups on child online protection, including digital skills and education. The new 2020 code guidelines dedicate specific attention to the special situation of children living with disabilities, that despite feeling similar about the risk and the harms they face online, may face difficulties in using or even expression from online environments to inaccessible design, denial of request accommodations or need for appropriate support.

These guidelines are aimed to address all risk and harms for all children online, including children in -- with disabilities. Thank you very much. And I will leave the web link on the chat.

>> DIPENDRA MANOCHA: Great. So, I think what you asked is some immediate steps and I think there are two or three immediate next steps which are there, which are challenges which are there. One is that how -- we obviously have directed all of our energies as we said to reach out to 1 million people in the next five years, which means that every person amongst that million needs to be empowered with the device training and the relevant digital content for them.

Yes, per individual, I think this kind of empowerment investment that we need to make is much less than what we would face if we didn't do that empowerment, because the implications are huge and long-term. If they are not digitally empowered then they cannot become a productive part of the society and productive workforce, which means the overall economic burden on a country really increases a lot. So, this is an investment that we really need to make per person to deliver this device training and content for them.

The second part is about the mainstream infrastructure accessibility. So the digital infrastructure, the digital, you know -- all of our -- our main stream digital libraries, the mainstream websites, the apps and the various applications, the Windows applications or mobile phone apps, their accessibility and the digital content being put out by -- for the mainstream, they need to adhere to all of those guidelines that you were mentioning, but obviously, there are well-established guidelines like the WCAG 2.0 or the epub standards or the Unicode standards.
These are three such critical standards that need to be followed. And if these are followed, then our -- our whole assistive technology infrastructure turns into an opportunity. Otherwise, if these are not followed, then this whole infrastructure, digital infrastructure which is getting created for mainstream will create unsurmountable hurdles.

So, an opportunity can turn into a hurdle if these basic accessibility guidelines are not followed in the mainstream infrastructure. We definitely cannot recreate the whole infrastructure again for persons with disables. So that is one thing that really needs to be understood. The legal infrastructure is in place but people have not gotten into the habit of, you know, using these or adhering to these guidelines as of now. I don't know whether it will take litigations or awareness or education, or the mix of everything to bring about that change and getting this thing to people that it's the mainstream infrastructure that needs to be made accessible and we can't just rely on recreating the whole infrastructure.

>> OLAF MITTELSAEDT: All right. We have another question, Professor, can you please unmute your microphone and please pose your question? Professor?
   Oh, he did not hear me.
>> GITANJALI SAH: Professor Goyal, you have the floor.
   >> Yes, now you are.
>> PARTICIPANT: Am I audible?
>> DIPENDRA MANOCHA: Yes, you are.
>> OLAF MITTELSAEDT: Yes, you are.
>> PARTICIPANT: Yes, this is Professor NX Goyal, I am very much thankful to ITU for this program, and to Dipendra Manocha. I think what he's doing is a wonderful thing, and my background, I came to know this today only through this conference. I wanted to inform Mr. Manocha, we are doing a lot of CSR activities with the blind and we also run the blind teams, et cetera. Wanted to connect to Mr. Manocha to talk to them, if possible, and how to use the libraries they had made for the students and people.
   Thank you.
DIPENDRA MANOCHA: So, yes, thanks for your intervention. I mean, this is what we are -- what we have actually done is there is a platform that has been created called DAISY form of India and if you are talking about the company that runs the Cricket for the blind,, and they are connected to the online library. So, the beauty of this library is that every organization that is involved runs this program in their own name because we know that there are several organizations in the country, who would need to, you know, build their systems in their own language, in their own regions are.

So, what -- the way we have done the architecture of this whole ecosystem is that every organization is able to -- to -- you know, they don't have to surrender their identity. So, they would run their program, most likely we hear about this, and you hear about them doing library services but in the background, it will be just Sunathram to deliver services to their members.

OLAF MITTELSTAEDT: All right. We don't seem to have a -- another question coming up. So, I would just like to run a short video. Is that visible now?

For persons with print disabilities to be able to read with -

OLAF MITTELSTAEDT: Can anybody hear anything?

DIPENDRA MANOCHA: Yes. Yes, Olaf.

In their Indian languages and with affordable cost. When there's sight loss or low vision or blindness, the biggest problem that comes is that we are not able to read normal print. This now becomes possible to read all the books when we have digital technology or the accessible books in digital format.

For example, what do we mean by reading with eyes, ears and fingers on a digital book? If there is a person with low vision and if I have a Smartphone or a laptop, I can actually increase the size of the text on the screen to any level that is suitable for me.

I can also change the color contrast, I can change the line spacing, word spacing, and that would make it suitable for any kind of eye condition and I will be able to read that book very easily with my eyes.
Reading with ears means that the same digital text can actually be read out to me, using the text-to-speech technology, the computer's voice or the mobile phones own voice will read the whole text out to me, and I can listen to it.

Reading with fingers means that this is a refreshable braille display which is connected to either my mobile phone or a computer and I can start reading the same digital text, which is shown on the screen of this computer or a mobile phone with my fingers on this refreshable braille display.

>> OLAF MITTELSTAEDT: Right.

So, I think we have come to sort of an end. Dipendra, any closing words do you have right now for this podcast?

>> DIPENDRA MANOCHA: So, I think the closing words can simply be that this is an exciting time. I mean, if I say exciting times it may sound very rude, actually today, but -- because of the kind of pandemic the whole world is facing. It's -- it's -- it's extremely challenging, but the -- but the exciting part is the -- is the new normal of the digital infrastructure, which is getting created gives us a huge opportunity. We need to get together, I would say that invite as many people as possible to join us to -- to join hands together in our mission of taking these very, very extremely enabling technologies to persons with disabilities, so that they can, you know, be extremely contributing part of the society and not -- as we say it, let's make them taxpayers instead of tax consumers.

So welcome to join the mission and welcome to join the party where we can convert taxpayers' -- tax consumers into taxpayers.

>> OLAF MITTELSTAEDT: Thank you, Dipendra. Yes, and as outcome, or the purpose for my journey to India to work together with you was that I started a charity in the United States in order to tap on to some opinion because all of these things don't pay for -- money because all of these things don't pay for themselves. And in the throes of starting a charity here in Geneva. That charity this is a little bit behind -- the charity is a little bit hindered by this function. It will be operating hopefully sometime next month. The one in America is.
You need money for that dream for a lot of people to come true.