Royal Academy of Engineering

AT2030

UK International Development
Partnership | Progress | Prosperity

AT2030 Frontiers symposium

Inclusive innovation in action: Community-led assistive technology solutions in local contexts

8 to 10 October 2025
Kathmandu, Nepal

Symposium report

Elevate (Unsplash)

UCL

Global Disability Innovation Hub

Design Lab

Royal Academy of Engineering

Introduction to Frontiers

The Royal Academy of Engineering's Frontiers programme connects and empowers researchers, innovators and practitioners from the UK and around the world to work together on new ways to solve complex global challenges. The programme hosts thematic symposia events, bringing together around 70 of the best early- and mid-career researchers and practitioners from industry, academia, non-governmental organisations (NGOs), and the public sector in interdisciplinary workshops that address fundamental development challenges.

The symposium's objectives are to encourage collaborative work that addresses international development challenges and to promote cross-disciplinary thinking among the next generation of engineering leaders. Unlike traditional conferences, the Frontiers format is built for peer learning, group-based problem-solving, and long-term collaboration.

The result is not just knowledge-sharing, but partnership-building. Following each symposium, competitively allocated seed funding is available to small groups to strengthen and facilitate continued collaboration and development of ideas from the symposium.

Contents

Symposium

Delegates met for three sessions over two and a half days, which were interspersed with networking opportunities and visits to the Museum of Nepali Art and Durbar Square.

The symposium took place in Kathmandu, and was a collaboration between the Royal Academy of Engineering and Global Disability Innovation Hub's (GDI Hub) AT 2030 Programme, in partnership with Kathmandu University. AT2030 is funded by UK International Development.

Symposium partner and collaborator

AT2030

The AT2030 programme tests 'what works' to improve access to life-changing assistive technology (AT) for all. Led by Global Disability Innovation Hub (GDI Hub) and funded by UK International Development, we've reached 64 million people across 61 countries, driving a lifetime of potential.

From creating deep community leadership to generating new evidence and insights, AT2030 answers critical research questions and develops foundational methodologies, addressing intersectional challenges and research and evidence gaps.

By incubating future tech inspired solutions and providing venture acceleration, AT2030 brings effective solutions to market – testing new mechanisms and ambitious scaling pathways, while strengthen systems to make inclusion a reality. By embedding disability innovation into national policy landscapes, we stimulate demand, activate country pilots and create enabling market environment in low- and middle-income countries.

AT2030 clusters

Five clusters of activities support the AT2030 programme to test 'what works' to improve access to life-changing AT for all.

- **Include:** create deep community leadership and engagement.
- **Inquire:** generate new evidence and insights. Led by GDI Hub's Academic Research Centre at UCL (University College London), with partners globally.
- **Incubate:** test future tech-inspired solutions and develop vehicles for venture acceleration while building capacity and supporting talent.
- **Invest:** bring effective solutions to market.
- **Integrate:** strengthen systems to make inclusion a reality by building evidence and driving action.

Global Disability Innovation Hub

GDI Hub accelerates ideas into impact for a more just world – for disabled people, and all people. Their vision is for disability inclusion and social justice. They work towards a world without barriers to participation, where everyone has the opportunity to live a joyful life.

Kathmandu University

KU is an autonomous, not-for-profit, self-funding public institution established by an Act of Parliament in December 1991. It is an institution of higher learning dedicated to maintaining the standard of academic excellence in various classical and professional disciplines. The university aspires to serve the nation by fulfilling the needs of the society through the motto of taking knowledge and skills "from the campus to the community."

Symposium chairs

Professor Nerrolyn Ramstrand – Jönköping University, Sweden

Professor Ramstrand's background is in clinical prosthetics and Orthotics. She completed both her undergraduate degree and PhD at La Trobe University, Melbourne. After several years working in Vancouver, Canada, she has moved to Sweden where she has lived and worked for over 20 years. Her research focuses on optimising prosthetic and orthotic devices and services in different country contexts. She uses both qualitative and quantitative methods to better understand client needs and to develop technologies that respond to those needs, while being mindful of cultural and contextual factors that affect access to services, perceptions of disability, and satisfaction with outcomes. Currently, her projects are based in Cambodia, Ukraine, and Sweden.

Professor Pramod Shrestha – Tribhuvan University, Nepal

Over the past 44 years, Dr Shrestha has held several prominent positions, including professor, campus chief, project co-ordinator/chief, and international/national consultant. He has worked with various organisation such as World Bank, Asian Development Bank, UNDP, and numerous bilaterally funded projects aimed at improving engineering and technical education and training systems across Nepal, India, Bhutan, Bangladesh, Sri Lanka, Pakistan, Iran, the Philippines, Cambodia, Thailand, Malaysia, South Korea, Japan, Canada, Norway, Australia, and Thailand. Dr Shrestha became Nepal's first Professor of Mechanical Engineering in 1993 and retired from the Institute of Engineering, Tribhuvan University in 2007 after 34 years of dedicated service.

Alexis Rodriguez (Unsplash)

The Nepal symposium: Community-led assistive technology solutions in local context

The AT2030 Frontiers Symposium on AT brought together global and local experts, practitioners, and advocates of AT to explore sustainable, inclusive, and innovative approaches to its delivery. Chaired by Professor Pramod Shrestha from Nepal and Professor Nerrolyn Ramstrand from Sweden, the event was hosted from 8 to 10 October 2025 in Kathmandu, Nepal and featured participants from over fifteen countries. The symposium was structured around three thematic areas, each highlighting the urgent need for systemic transformation in AT provision, particularly in low-resource settings like Nepal.

In their opening remarks, the symposium chairs set the scene by emphasising the role of continuous learning and collaboration, highlighting that true innovation lies in openness and sharing knowledge rather than in ownership and calling for connections that go beyond the confines of the current event.

At the beginning of the symposium, participants learned about each other, their backgrounds, interests, and expectations from the event. This networking session established the scene for a discursive and proactive two and a half days. Discussions were organised around three thematic sub-themes: **Localising innovation and production** for sustainable provisioning of AT); considering **inclusion and integration** for transformed AT delivery; and **AT solutions for improved access.**

As conversations unfolded, several key themes emerged: the power of local innovation, the necessity of integrating AT into broader health and education systems, and the importance of inclusive, context-sensitive approaches. It became clear that dignity, participation, and systemic transformation are vital to sustainable AT.

Overall, the symposium served as a platform for knowledge exchange, inspiration, and strategic alignment, setting the stage for collaborative action to ensure that AT becomes universally accessible, affordable, and empowering. This report summarises the key discussions with the following overarching insights across concerned themes:

- Adopting and adapting for efficiency and impact. The use of local materials and capacities with digital technology offers new opportunities to improve access and services.
- Research and continuous learning is necessary to improve impact. Reflection and action must go hand in hand.
- Grassroots innovation and economies of scope will enhance affordability and market sustainability
- Change perceptions to influence behaviour. Disability is still seen as a taboo topic in some societies, shaped by socio-cultural contexts. The charity-based model needs to be replaced with rights-based model to champion equity.

Local innovation and production for sustainable AT provisioning

Session chair presentations

1. **From global chains to local workshops: Building responsive AT systems**

   Dr Ben Oldfrey, GDI Hub, UK

2. **The opportunities of scope alongside scale**

   Andrew Lamb, Massive Small Manufacturing, Australia

3. **Local Innovation: The Himalayan engine for sustainable assistive technology provisioning**

   Dr Pratisthit Lal Shrestha, Kathmandu University, Design Lab, Nepal

Key takeaways:

- AT research and development can benefit f rom user knowledge and human-centred design
- Local materials can offset dependencies on import and make AT more accessible
- Stronger collaboration between medical and technical professionals is necessary to achieve an effective AT ecosystem

This session explored local innovation, design thinking, and regulation in AT. Participants emphasised integrating human-centred design, local materials, and collaboration between technical and clinical experts as key contributors. Discussions highlighted challenges in workforce capacity, regulation, and quality assurance, as well as the need for participatory production and adaptable standards – stressing a balance of local production with global supply chains to achieve affordability. Open-source platforms were referenced to create the environment for shared innovation. Examples from Nepal illustrated creative reuse of materials and grassroots repair networks. Overall, the session called for inclusive, context-sensitive, and sustainable approaches to strengthen AT systems through collaboration and localised innovation.

From global chains to local workshops: Building responsive AT systems

Dr Ben Oldfrey

Dr Oldfrey presented insights on why we need to consider both global and local production systems, especially in the context of AT and disability services.

He began by recognising the benefits of globalisation, mass production, efficient global supply chains, and reduced costs, that have driven accessibility and economic progress. Yet, he cautioned that this large-scale model cannot meet every human need, particularly in specialised or individualised cases. Dr Oldfrey argued that global and local models should complement, not compete with, each other.

Local production, he explained, plays a vital role in addressing complex, personalised cases such as those involving children, whose devices must frequently be adjusted, repaired, or replaced as they grow. Local systems also foster sustainability through material recovery and component reuse, citing Norway's strong refurbishment practices as a model. Moreover, local engagement supports customisation and maintenance, ensuring that AT solutions remain relevant and usable.

However, several challenges persist. Ensuring quality at small scales is difficult, business models for local AT production often struggle to remain profitable, and consumer trust in locally made devices is low compared to factory-made imports. Workforce retention is another major barrier due to limited financial stability.

To overcome these, Dr Oldfrey highlighted initiatives like 3D-printed prosthetic sockets, locally produced liners for people living with leprosy, and local spare parts manufacturing for wheelchairs. He concluded by urging the attachment of AT services to existing manufacturing systems rather than isolated workshops and commended Nepal's growing governmental focus on disability inclusion as a strong foundation for future progress.

The opportunities of scope alongside scale

Andrew Lamb

Andrew Lamb traced the evolution of manufacturing from the traditional model of economies of scale to a digital, distributed, and inclusive approach driven by AT.

He explained that traditional mass production, which fuelled industrialisation and globalisation, depended on making large quantities of identical products to reduce costs. In contrast, today's digital manufacturing revolution powered by 3D printing and open-source hardware relies on economies of scope, where producing diverse items at a low marginal cost is possible. Design, he noted, is no longer a creation bottleneck but a distribution challenge.

Lamb highlighted Nepal's own transformation as an example: from having only two 3D printers in 2015 to hundreds today, with even schoolchildren learning to use them. This democratisation of production has supported local innovation and access.

AT, he emphasised, are the "killer app" for this paradigm because human needs are distributed everywhere, while industrial supply chains are not. Local maker spaces and fab labs can fill this gap by customising devices such as prosthetics or adaptive tools to meet specific community needs. Illustrative global cases reinforced his argument: clinicians in Kenya using 3D printing for rapid, local assembly; people with disabilities in Jordan producing assistive tools for peers; and Ghana's multi-country maker network collaboratively manufacturing 900 writing aids.

Concluding, Lamb urged a shift from "scaling up" to scaling out, investing in local infrastructure, open design sharing, and distributed production to make technology accessible for all.

Local innovation: the Himalayan engine for sustainable assistive technology provisioning

Dr Pratisthit Lal Shrestha

Dr Pratishit Lal Shrestha addressed what he called a “silent crisis”, the failure of the global model for AT provision in developing contexts like Nepal.

He outlined four core pillars of unsustainability that characterise this global failure:

- prohibitively high costs and fragile supply chains,
- dependence on imported and often unsuitable designs,
- a lack of local technical capacity, and weak repair and maintenance systems.

These interlinked challenges, he noted, have left thousands of Nepalis without access to essential assistive devices, an issue that became especially evident during the 2015 earthquake and the COVID-19 pandemic.

Dr Shrestha then showcased Nepal’s growing movement of local innovation that is redefining what sustainable AT can look like. Through 3D printing, digital fabrication, and cross-disciplinary collaboration, local engineers and makers are creating context-specific solutions such as paediatric polycentric knee joints, custom prosthetic limbs, and electrical muscle stimulation devices for rehabilitation.

He emphasised that sustainable AT must be grounded in dignity, independence, and local ownership, not dependency or charity. Initiatives like Make-a-thons and community co-design sessions illustrate how Nepal is transforming constraint into creativity, building systems of inclusion and resilience.

Dr. Shrestha concluded with a forward-looking message: “the future of assistive technology lies in empowering local ecosystems to design, produce, and maintain technologies with users, ensuring accessibility, affordability, and adaptability for all.”

“The future of assistive technology lies in empowering local ecosystems to design, produce, and maintain technologies with users, ensuring accessibility, affordability, and adaptability for all.”
Dr Shrestha

Group Activity

The session examined how local innovation and production can support sustainable AT provisioning, with participants engaging in structured table discussions on manufacturing models, quality and sustainability, and system adaptation. Key discussion outcomes highlighted the below:

1. Human-centred and participatory approaches

- Engaging users and local stakeholders is critical.
- Iterative design adapts devices to local needs.
- Collaboration with clinical experts ensures safety and usability.

2. Local production and supply chains

- True local production requires locally sourced materials.
- Examples: recycled PET, wheelchair repairs using local materials.
- Mass customisation and modular designs enhance affordability and adaptability.

3. Digital fabrication and training

- Design thinking and digital workflows support innovation and scalability.
- Integrating training into curricula improves adoption and quality.

4. Quality, regulation and standardisation

- Balance flexibility, standardisation, and open-source sharing.
- Testing, validation, and simplified designs ensure quality.
- AI may aid future quality assurance.

5. Scaling and sustainability

- Open-source sharing reduces cost and improves accessibility.
- Sustainable AT is about participation, empowerment, and systemic change.
- Partnerships, mutual respect, and cultural context are essential.

Integration and inclusion for transformed AT delivery

Session chair presentations

1. **Global perspective: building sustainable communities to support integrated and inclusive assistive technology provision**

   Dr Rosie Gowran, University of Limerick, Ireland

2. **Understanding the Nepalese context to transform assistive technology delivery**

   Nistha Shrestha, Ministry of Health and Population, Nepal

3. **Integration and inclusion: assistive technology for women's health and wellbeing**

   Anjana KC, Independent Living Centre - Pokhara, Nepal

Key takeaways:

- Sustainable AT systems need aligned policy, community ownership, and context-aware design. Global frameworks guide progress, but real impact relies on locally rooted practice.
- Nepal is advancing AT integration, yet gaps in data, workforce, financing, and follow-up limit coverage. Stronger coordination and investment remain essential.
- Inclusion requires intentional design that tackles intersecting barriers for women and girls with disabilities, including gender, caste, stigma, and limited AT access.
- Cross-sector collaboration between government, professionals, communities, and people with disabilities, is vital to build equitable, affordable, and resilient AT ecosystems.

The session emphasised that to make AT truly transformative we need systems that are inclusive and grounded in local contexts. Speakers highlighted the importance of building communities of practice to sustainably guide development, the need to streamline state mechanisms and take a data-driven approach to decision-making around resourcing to assure efficiency and effectiveness. They underscored that lived experience, particularly of women and girls with disabilities, is vital to shaping responsive, stigma-free AT services. Collectively, the discussion stressed that sustainable AT must be locally owned, equity-driven, and embedded within broader health and social structures

Global perspective: building sustainable communities to support integrated and inclusive assistive technology provision

Dr Rosie Gowran

Dr Gowran presented on the vital importance of sustainable health and social care infrastructures in achieving inclusive futures. Her discussion emphasised the need to align these systems with the mandates of the UN Convention on the Rights of Persons with Disabilities (UNCRPD) and the Sustainable Development Goals (SDGs), specifically Goal 3: ensuring healthy lives and well-being for all.

Dr Gowran then traced the evolution of AT over the past three decades, noting that sustainability once referred only to environmental concerns but now encompasses sustainable communities of practice in AT provision. She highlighted the World Health Organization's (WHO) 2015 global cooperation initiative that produced the 5P Framework – Policy, Products, Personnel, Provision, and People – to promote sustainable AT systems. The 2018 World Health Assembly resolution further reinforced global commitment to improving AT access, followed by the Global Report on Assistive Technology, which provided the first globalsnapshot of countries' preparedness and needs in this area.

Dr Gowran underscored that sustainable AT provision requires context-sensitive approaches. Drawing on her comparative work in Romania and the Philippines, she demonstrated how differing geographies, advocacy histories, and infrastructures shape service delivery. Romania's central location and stability contrast sharply with the Philippines' archipelagic geography and frequent natural disasters. These contexts affect each nations' AT systems and capacities.

To guide inclusive AT development, Dr Gowran has developed a Sustainable Community of Practice Model, informed by soft systems methodology and Maslow's Hierarchy of Needs. The model comprises four pillars: **valued management of place**, **vital meaning to people**, **vital maintenance affecting pace**, and **visible mindfulness for effective policy**. Together, these promote integrated, contextually grounded, and solution-focused systems.

She concluded that sustainable AT systems must be actionable, inclusive, and locally owned, which can then empower people of all ages and abilities to thrive, not just survive.

Understanding the Nepalese context to transform assistive technology delivery

Nistha Shrestha

Nistha Shrestha presented state initiatives that are integrating AT in the national health system. Her presentation underscored the view that AT and rehabilitation are necessary to achieving universal coverage while still highlighting Nepal's complex governance structure. This can be difficult to navigate at times, with seven provinces, 77 districts, and 753 municipalities. She suggested the need for decentralised, inclusive approaches, to ensure equitable access across diverse and often very remote geographies.

Globally, over 2.4 billion people require rehabilitation services, many due to non-communicable and neglected tropical diseases. In Nepal, a rapid assessment revealed that only 27.7% of people who need assistive products currently use them, revealing a massive unmet need. Integration efforts have focused on embedding AT into existing national systems such as the Health Management Information System (HMIS) and the National Demographic Health Survey to strengthen data collection and policy coordination.

Nepal has taken policy strides, including developing a 10-year national action plan and multiple cross-sectoral strategies. However, Shrestha noted persistent gaps in monitoring, evaluation, and local production. Financing mechanisms exist such as tax exemptions on wheelchairs and targeted grants, but resources remain fragmented across ministries, so it is challenging to ensure that they benefit those that need them. There is a critical lack of support for maintenance and follow-up services as well.

Another key challenge is human resources: Nepal currently has only eight occupational therapists, eight prosthetics and orthotics professionals, and three physiatrists nationwide. Task-shifting and training initiatives are being explored to bridge this gap.

Shrestha concluded that Nepal must adopt an integrated, data-driven, and context-sensitive approach, building workforce capacity, improving financing coordination, and raising public awareness – to ensure equitable and sustainable AT access for all citizens.

Integration and inclusion: assistive technology for women's health and wellbeing

Anjana KC

Drawing from her lived experience with osteogenesis imperfecta, Anjana KC discussed how access to appropriate assistive devices (such as electric wheelchairs, hearing aids, and mobility tools) enables participation, education, and leadership development. She poignantly focused on the critical role of AT in improving the health, dignity, and independence of women and girls with disabilities in Nepal.

Women and girls with disabilities face additional barriers. Marginalisation is driven by discrimination, based on gender, disability, caste, and social stigma, and compounded by high costs, limited infrastructure, and a lack of awareness. Many are discouraged from using AT due to societal perceptions in a patriarchal society that has always provided limited policy headway for their inclusion.

Anjana stressed the urgent need to co-design and promote community engagement in developing and distributing AT. She suggested local leaders, doctors, engineers, and people with disabilities are important actors who can contribute to better adoption. She also called for an inclusive national data system that can adequately identify needs, so as to better integrate AT into health insurance and rehabilitation services, as well as in targeted awareness campaigns on women's health and stigma.

Her personal account of struggling with inaccessible schools and menstruation-related barriers concisely illustrated the intersection of gender, disability, and mental health. She concluded by urging policymakers, NGOs, and communities to collaborate in building affordable, accessible, and inclusive systems that uphold dignity, independence, and universal health coverage for women and girls with disabilities in Nepal.

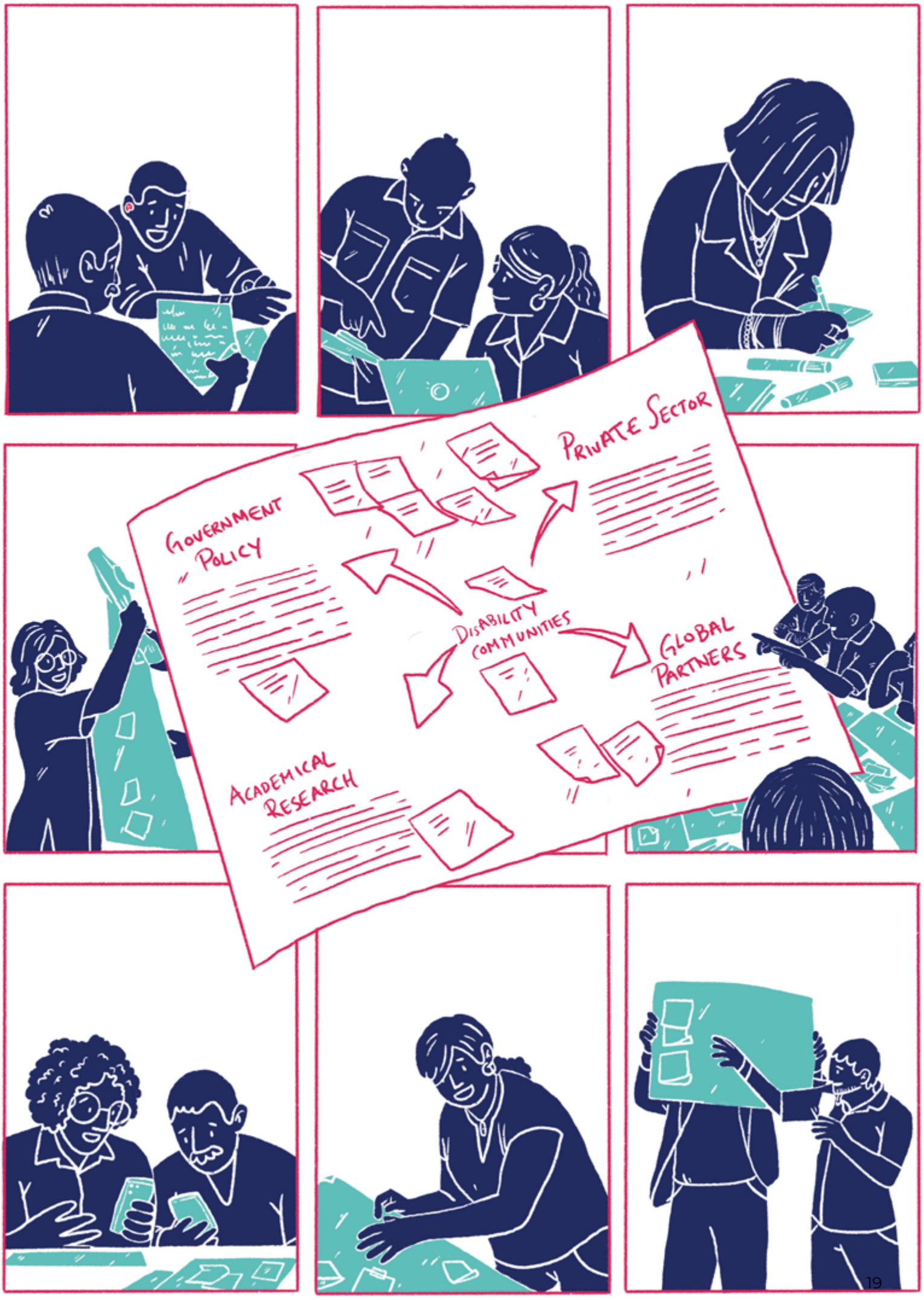
Group Activity

The session explored community-led AT solutions rooted in local contexts, using a Sustainable Community of Practice model alongside the WHO 5P framework. Four groups applied the model to understand local contexts and stakeholders, identify opportunities for sustainable infrastructure, and co-create practical AT delivery solutions. Each group used a visual image to represent the envisioned AT ecosystem in their assigned context.

The discussions demonstrated that AT solutions are most effective when they are:

- Grounded in local contexts rather than applied as one-size-fits-all models
- Designed for systemic sustainability, including governance, maintenance, and accountability
- Framed as a human security issue, addressing freedom from fear, want, and indignity particularly in low-resource and crisis-affected settings.

Country-specific discussions illustrated these challenges in practice: Nepal highlighted geographic barriers, stigma, and fragmented data systems; Ireland demonstrated that funding alone is insufficient without strong accountability and repair systems; Argentina faced coordination failures and procurement delays that frame AT as a luxury; and Ukraine showcased innovative crisis responses through mobile fabrication units and AI-supported knowledge transfer. Overall, participants agreed that sustainable AT ecosystems require integrated governance, co-design with persons with disabilities, strong political will, localisation of global knowledge, and long-term, collaborative investment beyond technical solutions alone.


PRIVATE SECTOR
GOVERNMENT POLICY
DISABILITY COMMUNITIES
GLOBAL PARTNERS
ACADEMICAL RESEARCH

Session three

AT solutions for improved access

Session chair presentations

1. **Bridging local solution to standard service provision to strengthen accessibility**

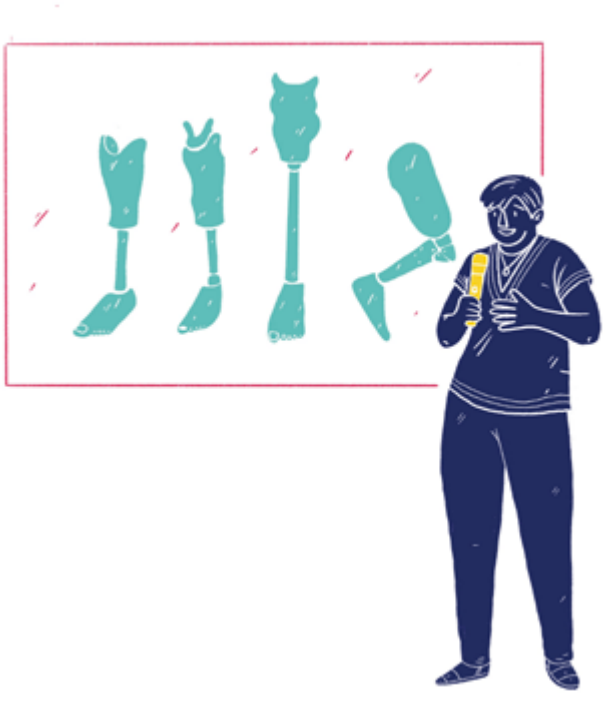
   Amit Ratna Bajracharya,
   Limb Care Nepal Pvt Ltd, Nepal

2. **Balancing local innovation and global imports: A local company's perspective on AT access in Nepal**

   Ganga Gurung,
   Bloom Park Store Pvt Ltd, Nepal

3. **Accessible Digital Textbooks (ADTs) for All Initiative. Inclusive education for every learner, everywhere**

   Tania González Veiga,
   United Nations Children's Fund, Panama



Key takeaways:

- Local innovation drives affordable AT access. Low-cost, context-specific solutions from prosthetic parts to sensory tools, significantly expand accessibility and sustainability.
- Global standards plus local production strengthens systems. Combining international designs with local skills creates culturally relevant, scalable, and less import-dependent AT services.
- Inclusive design must start at the outset. Building accessibility into every stage ensures solutions that work for diverse users, from mobility needs to inclusive learning.

This session presented examples of innovations that have helped expand access to AT in Nepal. Speakers highlighted locally driven prosthetics and orthotics solutions, emphasising cost-effective materials, designs suited to Nepal's geography, and community-centred scaling. The session also showcased a "global design, local production" model that blends imported components with locally crafted adaptive tools, strengthening sustainability and cultural relevance. Additionally, the Accessible Digital Textbooks (ADT) initiative demonstrated how born-accessible content and AI-enabled translation can support inclusive education, underscoring the need to integrate accessibility from the outset in Nepal's digital learning strategies.

Bridging local solution to standard service provision to strengthen accessibility

Amit Ratna Bajracharya

Amit's presentation highlighted the urgent need to strengthen prosthetics and orthotics services in Nepal through context-driven innovation, affordability, and sustainability.

He started by framing the global challenge: over 65 million people live with amputations worldwide, with 1.5 million new amputations occurring each year, a number projected to double by 2050. Yet, only 5 to 15% of people in low- and middle-income countries have access to prosthetic services. Nepal, he noted, lacks national data on amputees or prosthetic users, underscoring the invisibility of the issue.

Amit drew attention to the acute human resource gap: while the International Society for prosthetics and orthotics (ISPO) recommends at least five prosthetist-orthotist clinicians per million people (about 150 for Nepal), only eight are currently practicing. He described prosthetics as a "blend of art and science," requiring imagination, technical skill, and interdisciplinary knowledge across biomechanics, engineering, and medicine.

Illustrating practical innovation, Amit shared how his team replaced imported $40 to $50 prosthetic suction valves with a locally sourced aquarium valve costing just nine cents, offering identical performance. Such examples show how appropriate technology and creative problem-solving can enhance accessibility and reduce dependency on imports.

He addressed the need for prosthetic designs to adapt to Nepal's varied terrain (mountains, hills, and plains) and shared two inspiring case studies of clients whose lives significantly improved with custom solutions.

Concluding, Amit emphasised the importance of scaling local innovation through global collaboration, skill transfer, and local ownership. True sustainability, he argued, depends on embedding innovation into Nepal's standard care pathways and empowering communities to lead their own progress.

Balancing local innovation and global imports: A local company's perspective on AT access in Nepal

Ganga Gurung

Ganga Gurung delivered a compelling presentation describing Nepal's unique position between global imports of high-end assistive devices and locally developed, affordable innovations, underscoring the need to bridge this divide to ensure inclusive access for all.

While imported AT offers precision and quality, Gurung noted that they remain financially and geographically inaccessible to most Nepali families, particularly in rural areas. Bloom Park Store addresses this challenge by focusing on low-tech, contextually relevant assistive and adaptive devices that cater to sensory, motor, and cognitive needs of children with disabilities. Locally produced tools such as weighted vests, cuffs, and Augmentative and Alternative Communication (AAC) boards are complemented by selectively imported components like Velcro, oral sensory tools, and pencil grips.

Her model, *"Global design, local production"*, integrates international best practices with local craftsmanship, ensuring sustainability, affordability, and cultural fit. Bloom Park operates alongside Bloom Park Clinic, Nepal's first paediatric occupational therapy centre, which hosts the country's largest multidisciplinary rehabilitation team. This integration facilitates innovation, training, and direct service delivery under one ecosystem.

Through a SWOT analysis, Gurung highlighted strengths in skilled human resources and community trust, while noting ongoing challenges in capital, scalability, and supply–demand balance. She concluded that assistive technology transcends devices, embodying empathy, inclusion, and creative problem-solving. Bridging global expertise with local ingenuity, she emphasised, is key to enabling every child to participate meaningfully in life and learning.

Accessible Digital Textbooks (ADTs) for All Initiative. Inclusive education for every learner, everywhere

Tania González Veiga

González Veiga reviewed the importance of inclusive education through the lens of technology and systemic transformation. She highlighted the global challenge – over 240 million children worldwide live with disabilities, and nearly half of them who are out of school. Even those who do attend often still face barriers due to inaccessible learning materials.

The Accessible Digital Textbooks (ADT) initiative, implemented in various countries including Nepal, aims to close this gap by ensuring equitable access to education. Veiga explained that ADTs go beyond digitising print textbooks; they are designed to be *born accessible,* incorporating audio narration, sign language, image descriptions, subtitles, and interactive exercises. This approach allows children with diverse learning needs and preferences to learn side-by-side using the same content.

She illustrated how AI-driven technology enables rapid adaptation and translation of ADTs into multiple languages, including local and indigenous ones, within days, making inclusive learning scalable and sustainable. González Veiga emphasised that accessibility should be integrated from the start, not added later, requiring collaboration among governments, teachers, publishers, and technology providers.

Drawing on the UNICEF Jamaica pilot, she shared evidence that accessible digital textbooks enhance student engagement, confidence, and peer inclusion, benefiting both learners with and without disabilities. To date, the initiative has reached over 2 million children and trained more than 175,000 teachers globally.

González Veiga concluded by encouraging Nepal to adopt a similar approach, embedding accessibility and inclusivity at the heart of its digital education journey.

Group activity

In this session, participants shared findings on barriers, enablers, and solutions for remote disability services and inclusive education, exploring systemic, technological, and human-centred perspectives.

Key Barriers

- Curriculum and education: Curricula often overlook diverse needs; teachers lack capacity.
- Infrastructure and geography: Limited electricity, internet, and access in remote areas.
- Social and cultural: Stigma and low community awareness.

Key Enablers

- Advocacy and policy: Inclusive policies and political will.
- Co-Design: Engagement of users, communities, and local developers.
- Technology and tools: Low-/appropriate-tech solutions; hybrid models.

Proposed Solutions

- Localisation and validation: Adapt tools to local languages, culture, and curricula.
- Hybrid AT Ecosystems: Central fabrication plus local training and distribution.
- Collaboration and capacity building: Partnerships and practical training for communities.

Takeaways

- Co-design and inclusion at all levels are essential.
- Balance global standards with local context.
- Culturally appropriate, usable designs drive acceptance.
- Inclusive AT and education support equity, dignity, and resilience.

Dr Raju Dhakal

Spinal Injury Rehabilitation Center, Nepal

Dr Raju Dhakal's keynote address opened with a personal story of patience and perseverance, recalling early childhood memories of an illness that led to limited activities, his search for inspiration at a children's home where he finally had access to the medical attention he required. But more importantly, he discussed how he was able to get an education and commit to uplifting others in similar situations. Despite the barriers he faced as a person with a disability, Dr Dhakal went on to become a doctor. In his first year of practice, he was confronted with a glaring gap in Nepal's medical field. Rehabilitation was severely undervalued and therefore not accessible in Nepal. This inspired him to make it his cause to bring such critical service to those in need.

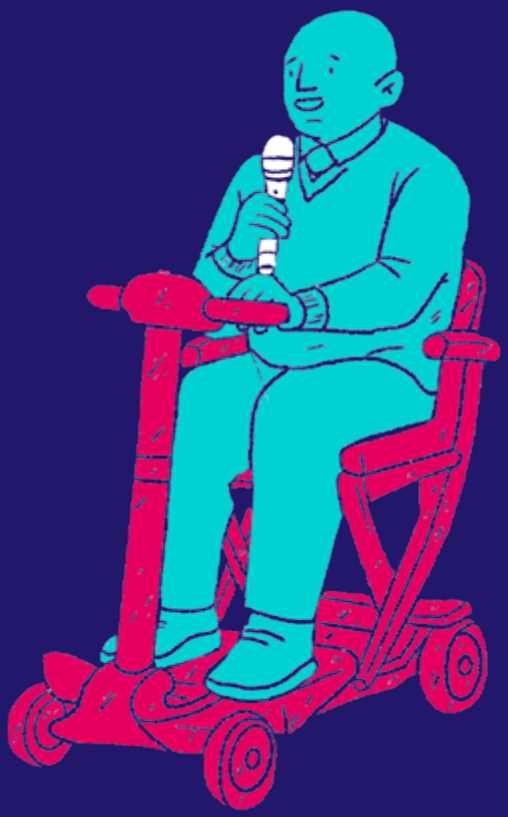
Through both his professional and academic roles, Dr Dhakal continues to champion rehabilitation medicine in Nepal and through the Spinal Cord Injury Centre.

Drawing from his own experiences, Dr Dhakal acknowledged how instrumental assistive devices were to him. Recalling that an ankle-foot orthosis he received from a colleague was still working for him 22 years later, he considers availability, accessibility, and affordability to be the biggest challenges facing assistive technology in Nepal. Additionally, he brought up how despite some positive developments in policymaking, state efforts were restrictive and fragmented allowing for limited progress. Yet, he is hopeful that in a digitally connected world, through collaboration, innovation, and integration more people can be benefitted.

The most pressing problems facing the use of assistive technologies are another three As:

- Availability: even if products are available, trained personnel are missing who are needed for provision of related services.
- Accessibility is also impacted by policy and regulatory frameworks. Although the government of Nepal has taken steps to improve access, efforts are fragmented and therefore ineffective. Additionally, AT are still part of charity, struggles to change views
- Affordability is a key concern for a country like Nepal. High costs mean people with disabilities must often compromise on quality

It is widely accepted that universal health coverage remains incomplete without accessible assistive technology (AT), and closing this gap requires innovation, collaboration, and better integration supported by stronger data and research. Digital connectivity has enabled service innovations such as small-scale 3D printing during COVID-19 and the introduction of telerehabilitation to overcome travel burdens and ensure continuity of care, all of which are being systematically documented through research. AT has the potential to transform lives by promoting independence and social participation, making equitable access a matter of human rights and social justice. However, Dr Dhakal noted that progress in Nepal is constrained by a shortage of specialists in physiatry and limited recognition of physical medicine and rehabilitation, which is not yet part of the medical curriculum and is often overlooked due to its time-intensive nature and lack of immediate returns.



Credit: Sonia Litvin

Panel discussion

Inclusive education, accessibility, and post-discharge support in Nepal

Panellists

Dr Rabindra Baskota,
Leprosy Control and Disability Management Section, Ministry of Health and Population

Kanak Mani Dixit,
Founding Chairperson, Spinal Injury Rehabilitation Center

Dr Birendra Raj Sharma Pokhare,
Abilis Country Coordinator for Nepal

The panel, moderated by Professor Pramod Shrestha addressed major systemic gaps in Nepal's disability and inclusive education landscape. Speakers highlighted that despite progressive policies such as the Inclusive Education Policy (2017) and the National Education Policy, implementation remains weak due to political instability, fragmented responsibilities, and a continued reliance on segregated education models. Additionally, technology integration in education is limited, with poor coordination between ministries leading to underutilised resources even when provisions exist.

Government representatives on the panel noted ongoing efforts, including accessibility audits in major hospitals and inclusive design in new health infrastructures but acknowledged that inclusive health and education services remain insufficient. Local governance challenges were also brought up in the context of local government autonomy and prioritisation within Nepal's decentralised school system where 80% of students attend public schools.

The panel stressed the potential of universal design for learning and accessible digital materials to bring children with visual and hearing impairments into mainstream classrooms. Audience questions expanded the conversation to mobility aids, the need for better public transport design, and bridging gaps between IT professionals and people with disabilities to improve assistive technology development.

Long-term rehabilitation after discharge was also discussed, highlighting the importance of community-based rehabilitation, vocational training, psychosocial support, and accessible home modifications to sustain progress. Panellists also hoped that data on long-term rehabilitation needs is improved in the coming years to inform implementation and improvements.

The discussions closed with reflections on transitioning from donor dependency to locally driven solutions – calling for the need to ensure sustained investment and policy guidance through the well-resourced but perhaps less concerned local tier of the government.

Frontiers Insights

Across the three thematic sessions, participants took part in structured group discussions designed to synthesise key learning and prioritise opportunities for action. Each group identified gaps in Nepal's current AT ecosystem, proposed future directions, and "scored" their ideas using three criteria: feasibility, sustainability, and potential for systemic impact. These quick scoring exercises helped move discussions from broad reflection toward clearer, practical next steps.

Participants highlighted four main priorities. First, Nepal should adapt global best practices to its own cultural and geographic context. This means producing more assistive technology locally, even though there are gaps in regulations and skilled workers. Second, research and continuous learning need to be strengthened. Strong evidence is important, but weak data systems make quick progress difficult. Third, low-cost and locally appropriate innovations should be expanded. Community makerspaces and distributed fabrication can help reach more people. Fourth, stigma must be addressed. Assistive technology should be seen as a right. Social attitudes, especially those affecting women and girls, can be improved through awareness and community advocacy. These actions can start immediately.

Recognising that attitudes, skills, and knowledge still need to grow for Nepal to advance innovative and context-relevant assistive technology, symposium participants worked together to identify and prioritise these needs. The process ensured that everyone's voice was included in shaping shared priorities for future action. Several common themes emerged: management and project management skills, research abilities, fundraising capacity, and strong understanding of Nepal's social, cultural, and political contexts. These reflect the competencies participants see as essential for the future of AT development.

Closing the symposium, Professor Ramstrand reflected on the symposium by referencing a quote from Neil deGrasse Tyson: **"Knowing that you don't know is the dawn of real understanding."** She noted that over the past few days there has been, both collectively and personally, a growing awareness of what is not yet known, and of the knowledge still needed to acquire. Whether through learning individually, seeking new information, or connecting with others who possess that expertise, this awareness is key to progress.

Professor Shrestha described the symposium as one of the most engaging he has attended, noting balanced participation despite occasional dominant voices and elements of group think: He outlined a framework of "3As":

- **Adopt –** You do not always need to reinvent the wheel, learn from what works and build upon successful practices.
- **Adapt** – This is where context matters, understanding the local setting, culture, and needs.
- **Act** – meaning to **implement** and move into **action**. It is a **continuous learning loop**. You learn, act, reflect, and learn again. It is cyclical. Like in life, there is no absolute beginning or end, it is a process.

Royal Academy of Engineering

All images used with permission from participants unless otherwise stated.

For more information, including eligibility, please visit raeng.org.uk/frontiers, AT2030 programme and follow @the-royal-academy-of-engineering and @Global Disability Innovation Hub

Royal Academy of Engineering
Prince Philip House, 3 Carlton House Terrace, London SW1Y 5DG

Giuseppe Mondì (Unsplash)