What works to improve access to AT?

Interim AT2030 findings: October 2018 – July 2022

Acknowledgements

Global Disability Innovation Hub (GDI Hub) would like to thank, first and foremost, every single participant and Assistive Technology (AT) user who shared their story to support this learning and the evidence it presents. AT users and disabled people also make up many of our leaders, researchers and managers. Thank you all.

Secondly, we would like to offer our debt of gratitude to Foreign Commonwealth & Development Office (FCDO), who backed this project with £20m (matched by our partners), leading the donor sector in recognition of the vital role that AT must play in the global development agenda. For your vision, permission, and encouragement to try, to fail (and learn), as well as succeed - we thank you greatly.

Finally, we would like to thank the members of the **AT2030 Advisory Board (see below),** and all of the organisations which have participated in the delivery of AT2030 to date (refer to Annexure B). Particular thanks must go to the initial team of disruptors who conceptualised AT2030 back in 2018, and to those who have since given their time and wisdom to its evolution and development.

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Global Disability Innovation Hub (GDI Hub) is a world leading research and practice centre driving disability innovation for a fairer world. A legacy of the London 2012 Paralympic Games, GDI Hub comprises an Academic Research Centre (ARC) led by UCL and a Community Interest Company (CIC) that supports and delivers disability innovation programmes in more than 41 countries. A disability innovation lens enables GDI Hub to solve complex problems with creative solutions, putting communities at the heart of decision-making processes and promoting participation and autonomy. We work across 5 domains, disrupting practice by bringing together new partnerships to overcome the barriers that exclusion and poverty create in relation to disability, with a focus on 5 themes, reflecting the expertise and priorities of GDI Hub. AT2030 works across all of the domains and themes as depicted below (Figure 1).

Domains

1. **Research:** creating new knowledge
2. **Teaching:** learning and sharing knowledge
3. **Innovation:** growing inclusive ecosystems
4. **Programmes:** testing what works
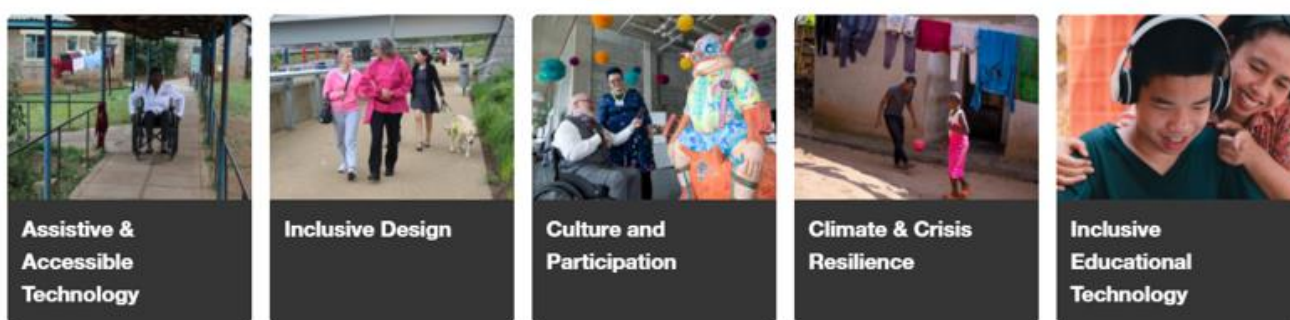5. **Advocacy:** evidence-based outreach

Figure 1: GDI work Domains and Themes (Source: GDI Hub)

This report was written by Associate Professor Diane Bell, Dr Natasha Layton, Professor Cathy Holloway and Dr Victoria Austin. It should be cited as follows:

Bell, D., Layton, N., Holloway, C. and Austin, V.; 2022. What Works to Improve Access to AT? Interim Findings from AT2030. GDI Hub: London

Executive Summary

AT2030 is creating **a step change in global access to assistive technology**. Since 2018, AT2030 has reached 28 million people in more than 35 countries with over 150 initiatives and an investment of nearly 40 million pounds (including match-funding).

A unique approach: AT2030 approached this mission with a disability innovation lens, embracing disruptive technologies and market shaping approaches. Conducted with key global stakeholders including national governments, AT2030 asked: *What works to improve access to life-changing assistive technology for all?*

Impacts and outcomes have been substantial and groundbreaking. Data and evidence has been generated on a bold set of interventions across product and system innovation, capacity building and participation, as well as country implementation.

The 'What Works' Report provides a comprehensive interim snapshot of the AT2030 programme to inform the sector and guide future work. Bringing together the evidence produced by AT2030 over the last 4 years (October 2018 – July 2022) along with the reflections of multiple stakeholders and the AT2030 Advisory Board, the '**What Works'** report includes:

Who we are	**The global need/imperative**
✓ AT2030 programme and partners, and the unique AT2030 mission led approach	✓ Review of assistive technology and the global context
What we did	**The AT2030 Evidence Base**
✓ Methodology used to critically evaluate 'what works': surveying key partner survey and critical review of 98 programme outputs	✓ Comprehensive listing of AT2030 research and knowledge translation outputs

Achievements to date

- ➢ **Reach**
  - → Direct Reach (People) – 6 million people participate at an individual level in the activities and/or outputs of AT2030
  - → Direct Reach (Systemic) – 22 million people were in groups benefitting from the outputs and outcomes of the AT2030 relating to improved provision of AT through policy and system advances, and community- and organisational-led change.

- ➢ **New models of 'what works'**
  - → 10 new innovative assistive technologies scaling up or on track to scale
  - → 27 AT ventures supported towards sustainability
  - → 30 countries or organisations implementing AT2030 funded ideas, research projects, or methods
  - → 9 innovative service delivery models developed.

- ➢ **Innovation ecosystems established via acceleration programme**
  - → 30 new innovative assistive technologies
  - → 4 cohorts of the Innovate Now accelerator programme.

- ➢ **Data and evidence**
  - → 34 peer reviewed journal articles published
  - → 63 influencing papers, designed to answer critical research questions, published
  - → Downloads to date: 43,024.

- ➢ **Capacity and participation**
  - → 85 partnerships supported to increase AT capacity
  - → 50 strategic tools developed to increase AT capacity
  - → 17 case studies produced
  - → 13.9 million pounds in matched funding achieved through partnerships.

- ➢ **Country testing and implementation**
  - → 10 Country Capacity Assessments conducted
  - → 10 Country Capacity Assessment Action Plans
  - → 4 countries with direct investment in AT matched for sustainability
  - → 2 pilots of 'one stop shop' at country level
  - → 13 daily digests of Japan Paralympic Games produced
  - → 49 broadcasts of the Paralympics across African Countries.

In summary – what is working, and what next?

<table>
<tr>
<td colspan="2">AT2030 Principles
(Austin Victoria & Holloway Cathy, 2019)</td>
</tr>
<tr>
<td>What is working…</td>
<td>What may work for next steps…</td>
</tr>
<tr>
<td>1. AT2030 are delivering a global, mission-led approach with measurable outcomes and clarity of how to ensure a return on investment.</td>
<td>AT2030 has delivered a never-before-seen tranche of research entirely targeted at impact and tackling the complex reality of life for AT users. Coordination within the context of global endeavors is recommended (Layton et al., 2020).</td>
</tr>
<tr>
<td>2. Research and better data are demonstrated to be essential to enable countries to understand the ROI for AT and genuine economic choices before them.</td>
<td>A unique output of AT2030 is the valuing of human potential and the realization of humanistic, mission-led principles translated into practical tools applicable for markets. Building on this powerful start, further work is required to refine data collection methods and to implement knowledge translation with key stakeholders.</td>
</tr>
<tr>
<td>3. Testing and piloting market shaping - accepting there is a way to go before this approach can be scaled. There is a need for strong research base.</td>
<td>A strong body of work on market shaping is underway, with the outputs clearly showing iterations of methods and tests in different environments. A research vision to systematically work through market shaping variables, aiming towards an evaluation framework, is recommended, together with innovative procurement models.</td>
</tr>
</table>

4. Determined work on systemic interventions with national governments.	AT2030 is uniquely placed to engage with national governments and the continued open-source documentation of policy change strategies will be invaluable for the sector as a whole. **The use of developed tools such as the CCA and rATA to be radically scaled, and the tackling of the sparse data and data management challenges e.g., using a Disability Management Information System (DMIS).**
5. Harnessing innovation and new market entrants – with a focus on leapfrog technology, looking beyond the traditional understanding of products or services and bringing in new players.	A diverse set of innovations and innovators have been identified and tested (GDI Accelerate): next steps are to consolidate **methods and evaluation strategies to objectively research outcomes and impact, including longitudinally.**
6. Community participation and capacity building – the exclusion of AT users from programme design, policy and decision-making leads to poorer outcomes, continued power imbalances and political exclusion – these things are all part of the problem and solutions must be designed to counter this.	AT2030 has demonstrated creativity and stamina in coupling community values and a recognition of individual worth with the reality of markets and enterprise. AT2030 underpinning philosophies are well articulated and **ripe for translation into research tools.**

Abbreviations

AI	Artificial Intelligence
AIIMS	All India Institute of Medical Science, New Delhi
AP	Assistive Products
ARC	Academic Research Centre (at UCL)
AT	Assistive Technology
ATA-C	Assistive Technology Country Capacity Assessments
ATIF	Assistive Technology Impact Fund
ATscale	Global Partnership for Assistive Technology (hosted by UNOPS)
CHAI	Clinton Health Access Initiative
COSP11	(UN) Conference of States Parties to the CRPD (2018)
CIC	Community Interest Company
CfSC	Communication for Social Change
COVID-19	Coronavirus disease
CRPD	(UN) Convention on the Rights of Persons with Disabilities
DIX	Disability, Design and Interaction
DMIS	Disability Management Information System
DTC-AT	Direct To Consumer approach for Assistive Technology
FCDO	UK Foreign, Commonwealth and Development Office (previously DFID)
FINTECH	Financial Technology
GDI HUB	Global Disability Innovation Hub
IIT	Indian Institute of Technology Delhi
IPC	International Paralympic Committee
ISO	International Standards Organization
ISPO	International Society for Prosthetics and Orthotics
LMIC	Low- and middle-income countries
LSHTM	The London School of Hygiene & Tropical Medicine

OPD	Organisations for Persons with Disabilities
rATA	Rapid Assistive Technology Assessment tool
SDGs	Sustainable Development Goals
UCL	University College London
UCL (CS)	University College London – Computer Science
UCL (DPU)	University College London – Development Planning Unit (Bartlett)
UCL (IIPP)	University College London – Institute for Innovation and Public Purpose
USAID	United States Agency for International Development
WHO	World Health Organization
WHO DATA	World Health Organization Digital AT for Ageing
WHO GATE	World Health Organization Global Access to Assistive Technology (now the Access to Assistive Technology (ATA) team)
WHO GReAT CONSULTATION	World Health Organization Global Report on Assistive Technology Consultation
UK	United Kingdom
UNICEF	United Nations International Children's Emergency Fund

List of figures, boxes and cases

BOXES

CASES

Table of Contents

1. Introduction

In early 2018 two teams from Research and Evidence (RED) and Global Health divisions inside the United Kingdom's former Department for International Development (DfID), now the Foreign, Commonwealth and Development Office (FCDO), issued requests for proposals for two separate consultancies on the topic of assistive technology. The intent was to outline a coherent picture to inform these two divisions. The resulting Scoping Research Report on AT access (Holloway et al., 2018) was published in June, after the team co-hosted a session at the UN Conference of States Parties (COSP11) in May 2018 to test thinking and raise awareness of AT as a specific area of disability inclusion.

Alongside the scoping research, Global Disability Innovation Hub (GDI Hub) led a conversation to develop a partnership which would be able to deliver new research necessary to test 'what works' in getting AT to people globally. The emerging partnership included University College London (UCL), Global Access to Assistive Technology team of World Health Organization (WHO GATE), Maynooth University, Clinton Health Access Initiative (CHAI); and later, Motivation in the UK and Kenya. The intent of this partnering was to develop the thinking for a roadmap to enable global movement towards more equitable access to Assistive Technology (AT).

At this time, just before the UK and Kenya held the first Global Disability Summit at GDI Hub's home close to the Queen Elizabeth Olympic Park in July 2018, the Scoping Report set out consensus-based evidence, calling for a new approach to AT access. This approach proposed six principles of intervention as outlined below and as depicted in Figure 2:

1. A Social Development approach and political leadership
2. A global, mission-led partnership
3. Testing and piloting market shaping as a methodology
4. Backing market shaping with work on systemic interventions
5. Harnessing innovation

6. Community participation and capacity building

In addition to these key principles, the authors argued that "any intervention that is to be successful must go hand in hand with policies and practices to remove stigma and discrimination and empower AT users to take part at all levels of society" (Holloway et al., 2018, p 6).
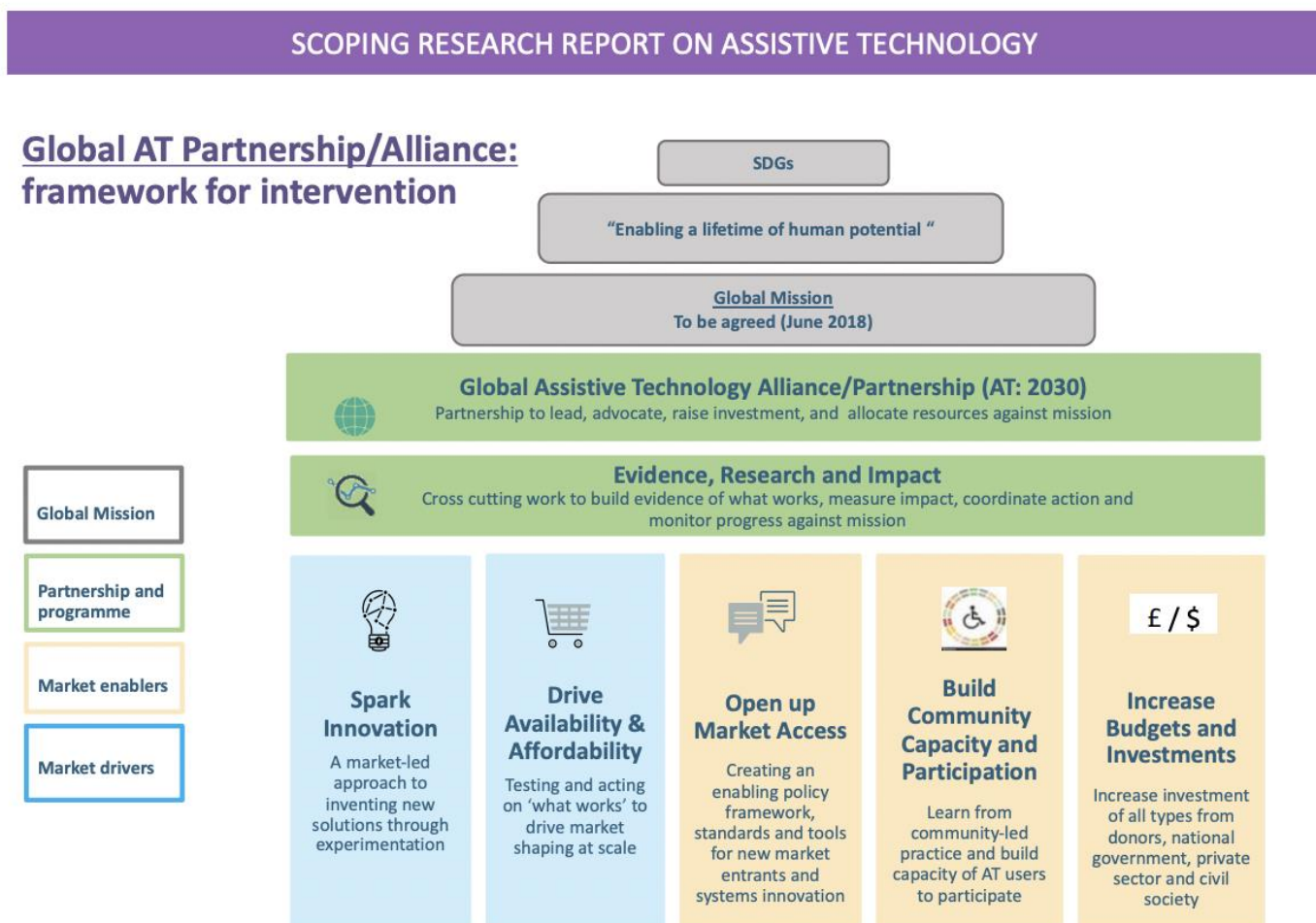
Figure 2: Global AT Partnership/Alliance: Framework for intervention (original version)

AT2030 is the programme designed to trial and test 'what works' against this framework, and ATscale is the Global AT Partnership designed to lead the global agenda. Both were announced at the Global Disability Summit in London in July 2018. GDI Hub were a founding partner of ATscale as well as the lead for AT2030, and both initiatives have worked closely together from the start, including on key influencing papers to help test what works and then develop and scale initiatives. In March 2019 FCDO doubled the initial £10m investment into AT2030 to total £19.8m, with this funding matched 100% through the partnerships work (to date £13.5m) (July 2022).

The AT2030 consortium brought together partners who have not traditionally focused on AT, enabling experts, innovators, and AT users to experiment with new ideas and thinking and answer the question: **what can be done to enable a step change in access to life-changing AT?** Innovation is enabled across three sub-domains: community-led, systems-focused, and market-driven interventions. AT2030 has engaged more than 70 partners across more than 40 countries, reaching more than 28m people to date. Enacting a mission led approach and following a transformative model of change, AT2030 has purposefully engaged with the major humanitarian and political challenges of current times. Projects have embraced the complexity of life for the majority world, for example working in informal settlements, tackling stigma, and pivoting in response to the Coronavirus disease (COVID-19) pandemic.

COVID-19 had three principal impacts on AT2030. Firstly, the impact on public finances meant a select reduction to delivery during pandemic years with workstreams such as the Innovation Hub in India halting until later years of the programme. Secondly, much of the in-country work either halted or pivoted to remote working, especially where research and data collection was required. In several cases, this led to new partnerships and deeper local capacity strengthening, as perceivable in the Inclusive Infrastructure Sub-Programme and the new local partners delivering that work. Finally, AT2030 responded to early indications that disabled people were being impacted most severely by the crisis, by conducting both research and impact story

collation to highlight this injustice and identify how increased access to AT could be better aimed to respond in a crisis.

Aside from the impact of COVID-19 the AT2030 programme has evolved since its inception with the natural completion and attrition of some early projects and the maturing of others. For example, the programme has now completed much of the initial market shaping pilots and country capacity assessment work and commenced on the next steps in AT access based on the progress and recommendations from this early work. Some areas of research, such as the role of AT in humanitarian crises, have taken on new meaning since the programme began and in response to shifting world events. In other areas where the programme began specific pilots on venture innovations, the programme has now matured its approach to form a holistic innovation vehicle in GDI Accelerate. Having delivered on the legacy of London 2012 Paralympic Games at the 2022 Tokyo Games, the programme now looks towards Paris in 2024 and beyond to build on these lessons. Fially, AT2030 having enabled ATscale to launch in 2019,

and co-supported the WHO/UNICEF World Report on AT in 2022, we now continue to work alongside ATscale as drivers of the AT sector globally.

Ultimately, the AT2030 programme will deliver on four key performance areas: people reached (currently exceeding 29 million); countries reached (over 35); pounds invested (19.8 million) and innovations seeded (see Figure 3).

AT2030 programme will deliver

AT2030 tests 'what works' to improve access to life–changing Assistive Technology (AT) for all. More than 2.5 billion people need one or more forms of AT, such as wheelchairs, prosthetics, hearing aids, or digital tools supporting cognition. Yet in LMICs, access can be as low as 3% of need, while this need continues to grow.

29m
People reached

35
Countries

£19.8m
investment by UK Aid; will be matched 100% by GDI Hub and partners

Innovation
- New Tech
- New Ventures
- New Ideas
- New Models

Figure 3: AT2030 Programme Deliverables

The body of evidence delivered since project inception is large in number and diverse in type. An interim report (Austin and Holloway, 2019) presented to the World Health Organizations' Global Report on Assistive Technology **(GReAT) Consultation** in Geneva, 2019, reported on the first 10 months of work and the doubling of investment due to early positive results, along with a 'slightly tightened impact framework (theory of change)' (refer to Figure 5).

Over 150 research outputs and knowledge translation pieces were available as open source at time of writing, including the co-sponsored WHO/ UNICEF World Report on AT in 2022 (WHO & UNICEF, 2022). AT2030 outputs

continue to grow and will be included in future reports.

The 'AT2030 What Works Interim Findings Report' explores outputs, outcomes and impacts, critically appraising what worked and what didn't. This is what we have learned on our journey to date, also providing a proposed 'blueprint' (defined approach) of where to from here. The intention is for this document to be distilled into accessible micro-documents, such as Evidence-to-Action Insights, for ease of learning and implementation by sector stakeholders.

"WE ARE BUILDING A MOVEMENT WHICH CAN CHANGE THE WORLD" (Holloway et al., 2018) (p. 3)

2. Project background

AT2030 was designed to find out 'what works' to get AT to the people that need it around the world. A global overarching strategy of six pillars aims to achieve the Sustainable Development Goals (SDGs) on behalf of up to 500 million people, enabling the realisation of potential through life changing assistive technology (refer to Figure 4).

Figure 4: Global Overarching Strategic Priorities on AT (6 Pillars)

The Strategy is enacted through a Theory of Change which was revised following the 2020/21 Annual Review to better articulate Intermediate and Long-term Outcomes. The version depicted in Figure 5 will be used for this report as its structure aligns with the clusters analysed during the reporting period. Within this, inputs (funding) are used to drive the programmes of work across:

- **data and evidence** (delivering research evidence and impact as well as applied research);
- **Innovation** (sparking innovation and innovation scale up fund);
- **country testing and implementation** (drive availability and affordability; open up market access; country capacity and rapid implementation fund); and

- **capacity and participation** (building capacity and participation; inclusive infrastructure, sport against discrimination, and grow the global partnership).

These programmes are realised through multiple activities producing related outputs which are measured. Downstream outcomes, and longer-term impacts, are then measured. Monitoring and evaluation are crosscutting activities to assess programme impact and to iterate learning from the body of work underway, across time and influencing the way forward.
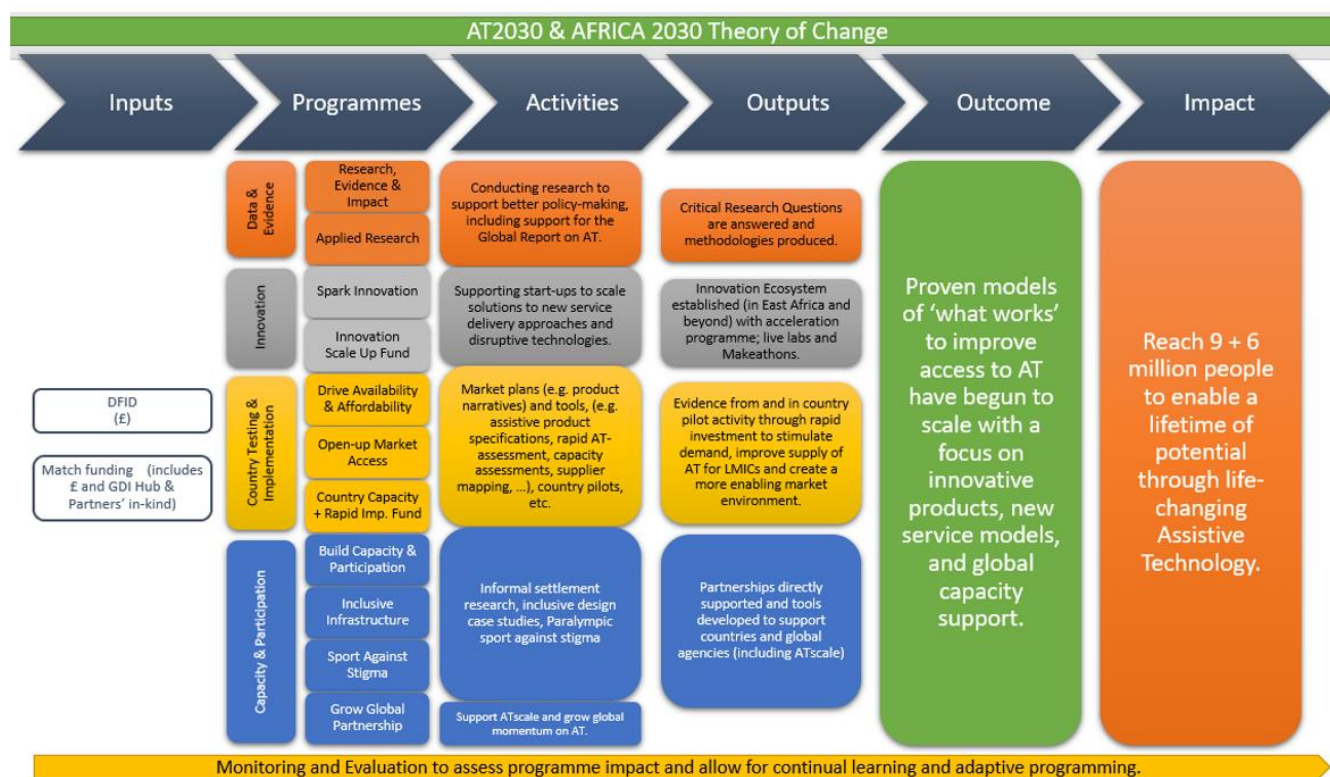
Figure 5: AT2030 & AFRICA 2030 Theory of Change (2020/2021)

GDI Hub has led the AT2030 body of work for almost four years and momentum has grown considerably; with more than 150 outputs published under the programme, including 38 peer-reviewed journal articles, 15 reports and 8 conference papers (as of 31 July 2022). This tranche of evidence is disseminated through knowledge translation strategies including blogs, videos and media as reflected in Figure 9.

The 'AT2030 What Works Interim Findings Report' includes all work funded by AT2030 as well as the projects delivered under the 'match funding' arrangements administered by the AT2030 project team, as reported, and recorded within the Programme Management System (Airtable). These interim findings will be of significant interest to funders, partners, and many other AT stakeholders globally.

"The aim of AT2030 is to test "what works… What we uncovered was a series of systemic failures which cut across governmental departments of: Health, Education, Labor, and Social Welfare, and ICT" IN (Holloway & Barbareschi, 2021) (Chapter 3, p. 28)

3. Key Objectives and Research Questions

Our main objective is to provide interim findings to answer the key question:

*"**What Works to improve access to life-changing Assistive Technology (AT) for all?**"*

Reviewing the extensive body of evidence produced in answer to this question yielded a revised set of overarching research questions, aligned with the four AT2030 Programme Clusters as depicted in Figure 6:

Programme Clusters

Data & Evidence

Improving data and evidence to enable better decision making and unlock investment into AT, including in Humanitarian Contexts

Innovation

Sparking innovation and supporting new products and service delivery models to scale access to AT.

Country implementation

Laying the foundations for market shaping and systems-level change. Driving availability & affordability, opening-up market access and building country capacity.

Capacity & Participation

Building partnerships, capacity, and community solutions; maximising the power of the Paralympics to overcome stigma and promoting inclusive design.

Figure 6: AT2030 Programme Clusters

Here the original research question from AT2030 is reported with the revised overarching research question resulting from the analysis in this 'What Works' Report. These re-worked questions are offered for consideration going forward in the AT2030 workplan:

Programme Cluster 1: Data & Evidence

Improving data and evidence to unlock investment into AT.

- What works to develop conceptual foundations, build research evidence, and evaluate impact across AT ecosystem elements, to deliver on AT2030 mission? *- 9 research sub questions*

Programme Cluster 2: Innovation

Supporting new products and service delivery models to scale.

- What works to spark innovation and new solutions to get access to AT for the people that need it, with particular focus on the innovations which support new products and service delivery models to scale? - *6 research sub questions*

Programme Cluster 3: Country Implementation

Laying the foundations for market shaping and systems-level change.

- What works to develop conceptual foundations, build evidence and evaluate impact across AT ecosystem elements, to deliver on AT2030's mission? - *6 research sub questions*

Programme Cluster 4: Capacity & Participation

Building community solutions and maximising the power of the Paralympics to overcome stigma and promoting Inclusive Design

- What works to build capacity and participation to mediate access and participation in activities of citizenship? - *4 research sub questions*

(Note: key findings across and between clusters and sub-programmes are brought together for the purpose of reporting 'what works' on key topics resulting in an overlap, at times, of research sub questions.)

Some of the key delivery achievements to date include the following, per cluster:

BOX 1A: DATA & EVIDENCE

- Published **>150 papers and studies** supporting 'what works', incl. humanitarian context
- (Including) **25 peer-reviewed journal articles** on access to AT
- Launch of **a global online portal of AT research**, for policymakers, researchers, and practitioners
- Co-authored the WHO/UNICEF **World Report on Assistive Technology**
- So far, **31 organisations implementing AT2030 funded ideas** (findings, research or new methodologies)

BOX 1B: INNOVATION

- Launch of the world's **first AT Investment Fund (ATIF)** and Africa's first **Assistive Technology Accelerator (Innovate Now)**
- **30 innovative assistive technology products have been supported** to scale-up development and production, incl. AT for remote settings
- **27 AT-focused entrepreneurs** have received a mix of investment and technical support to develop and scale their businesses.
- **8 innovative service delivery models** have been piloted and scaled across six African countries.

BOX 1C: COUNTRY IMPLEMENTATION

- **10 AT country capacity assessments** (incl. in humanitarian and informal contexts) conducted in FCDO priority countries, with further investment to embed recommendation and **$4.8million** in public sector funding unlocked to support access to AT.
- Publishing of **5 landmark AT Product Narratives** which inform global investment and scoping market-shaping opportunities for key AT products (wheelchairs, eyeglasses, hearing-aids, prosthetics, and digital-AT)
- Development (with the WHO) of a **new global AT training course** for policymakers and practitioners, building capacity to access, provide and support AT by non-experts.

BOX 1D: CAPACITY & PARTICIPATION

- **Free-to-air broadcast of the 2022 Tokyo Paralympics across 49 African** territories, reaching an estimated **>57million viewers**, as part of a wider Para Sport against stigma programme changing attitudes to AT use.
- Cities in India and Mongolia (with Kenya, Sierra Leone, and Indonesia to follow) developed inclusive infrastructure case studies, informing the **inclusive design and development of urban environments**.
- **£13m of match-funding mobilised** from delivery partners and partners.
- In-depth research investigating **community and informal provision of AT** conducted in Sierra Leone and Indonesia.

AT2030 UKaid from the British people Global Disability Innovation Hub

The body of the Report is organised in answer to both the overarching research questions per sub-programme (per cluster), as well as the research sub questions, and the recommendations which emanate from them. Firstly, however, we describe assistive technology and the global context, as well as the methodological approach followed in the development of this report.

Refer to www.at2030.org for detailed information concerning Partners, Projects and Publications, as well as the Annexures within this report.

4. Assistive Technology and the global context

The last half decade has seen a paradigm shift in the global policy and rights landscape, as awareness grows regarding the potential of AT to realise achievement of the United Nations Sustainable Development Goals (Tebbutt et al., 2016; United Nations, 2016). Bookended by the World Health Assembly Resolution on Access to Assistive Technology (World Health Assembly, 2018) and the publication of the WHO UNICEF Global Report on Assistive Technology (WHO & UNICEF, 2022), AT2030 and its partners have been instrumental in driving the much-needed global change. GDI Hub was an active contributor to the WHO GReAT Summit (WHO, 2017) and GReAT Consultations (WHO, 2019), becoming the world's first WHO Collaborating Centre for Assistive Technology in 2021 (UCL, 2021). In just one example, uptake of the person-first 5 P conceptual model of the AT ecosystem (WHO, 2021) by the AT2030 partners is evidence of the iterative and responsive collaborations fostered through the WHO Collaborating Centre and the close working relationships the partnerships have built.

A foundation stone was the Scoping Research Report on AT (Holloway et al., 2018) which stepped out the case for overcoming systematic global barriers to AT and informed the novel methodology and quick-start testing approaches initially used within the AT2030 programme.

BOX 2: PRINCIPLES FROM THE SCOPING REPORT ON AT

1. A global, mission-led approach with measurable outcomes and clarity of how to ensure a return on investment.
2. Research and better data are essential to enable countries to understand the ROI for AT and genuine economic choices before them.
3. Testing and piloting market shaping – accepting there is a way to go before this approach can be scaled. Need a strong research base.
4. Determined work on systemic interventions with national governments.
5. Harnessing innovation and new market entrants – with a focus on leapfrog technology, looking beyond the traditional understanding of products or
6. services and bringing in new players.
7. Community participation and capacity building – the exclusion of AT users from programme design, policy and decision-making leads to poorer outcomes, continued

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AT2030   UKaid from the British people   Global Disability Innovation Hub

> power imbalances and political exclusion – these things are all part of the problem and solutions must be designed to counter this (Holloway et al., 2018).

4.1   The scale of the issue

The need for assistive technology is rapidly growing in response to factors such as population growth and an ageing population. By 2050 an estimated two billion people would benefit from life-changing assistive technology but an estimated 90% will not have access (WHO, 2017). Lack of AT access denies outcomes across education, work, family and community life. Humanitarian disasters such as the COVID-19 pandemic compound these issues.

In response, AT2030 seeks to transform access – testing innovative approaches and backing 'what works' to get AT to those who need it the most. AT2030 Targets include:

> ➢ Double the initial investment through partner backing
> ➢ Reach 9 million people directly and 6 million indirectly through increased access to AT
> ➢ Conduct 10 country capacity assessments with 5 action plans in delivery
> ➢ Support 52 new start-up benefiting up to a million users over time
> ➢ Answer 20 key research questions
> ➢ Develop 10 innovative service delivery models
> ➢ Generate at least 40 new technologies with potential for life-changing impact

4.2   Scope of this report

The What Works Interim Findings Report curates the body of work of AT2030 in its first 45 months, from October 2018 – July 2022. It represents a deep dive within and across pillars and sub-programmes, deconstructing data and synthesising evidence-based findings to point to what does, and doesn't work, as of September 2022. As multiple work streams and projects are ongoing, this Interim Report represents an important staging post in the ongoing delivery of the AT2030 programme, not only reflecting retrospectively on the key learnings but also to position areas of focus going forward.

4.2.1 Definitions and assumptions

Assistive Technology and Assistive Products

Assistive technology is the application of organized knowledge and skills related to assistive products, including systems and services (WHO, 2021). Assistive technology enables and promotes the inclusion, participation and engagement of persons with disabilities, ageing populations and people living with chronic conditions in the family, community and all areas of society, including the political, economic and social spheres.

An assistive product optimizes a person's functioning and reduces disability. Assistive products can be specially produced or generally available (ISO, 2022). Assistive products can enhance performance in all key functional domains such as cognition, communication, hearing, mobility, self-care and vision. Examples include wheelchairs, spectacles, hearing aids, prostheses, orthoses, walking devices or continence pads; or they may be digital and come in the form of software and apps that support communication, time management, monitoring, etc. They may also be adaptations to the physical environment, for example portable ramps or grab-rails.

Assistive technology users

All persons have a human right to assistive technology as a precondition for equal opportunities and participation. The WHO/UNICEF Global Report on AT identifies those who need assistive technology as including people with disability; older people; people with communicable and noncommunicable diseases including neglected tropical diseases; people with mental health conditions; and people with gradual functional decline or loss of intrinsic capacity. The need for assistive technology also rises in most humanitarian crises (WHO & UNICEF, 2022).

Across the lifespan, assistive technology plays a critical role and lack of access can limit childhood development for children with disabilities, educational achievement, participation in sports and civic life, and employment readiness. Assistive technology plays an important role in slowing functional decline as people with disabilities get older (WHO & UNICEF, 2022).

5. Methodology

A systematic approach: Establishing a robust method to establish 'what works' is an important step in drawing together the AT2030 evidence base. A systematic data collation and analysis process was established. Data gathering drew on principles to ensure rigor in the reporting of reviews (Moher et al., 2009). Steps such as dual (two reviewer) independent coding and data analysis increased validity and reliability, and triangulation with key stakeholders increased trustworthiness (Figure 7).
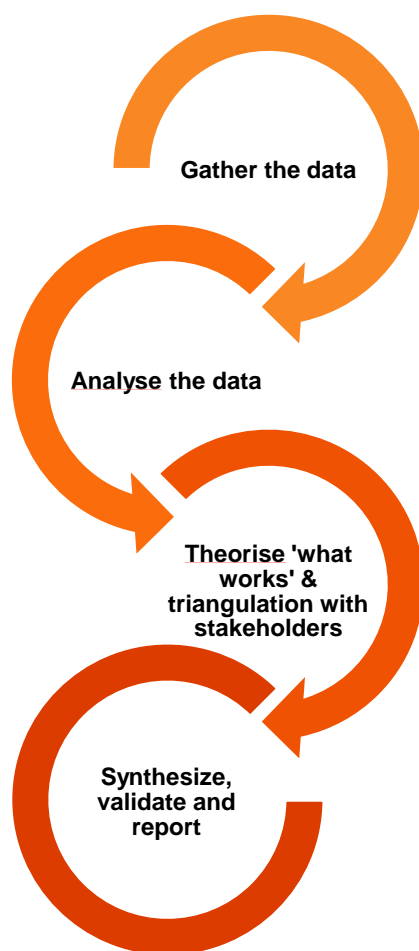
Figure 7: A systematic approach (Liamputtong, 2019)

Conceptual foundations: Consideration was given to the best ways to conduct both the data analysis and evidence synthesis. Evaluation methods (Proctor et al., 2011) offer various criteria to establish impact of studies, however, are not applicable across the broad array of AT2030 outputs. The approach we selected entailed a) thematic analysis of content and b) mapping the primary topic to the 5P Framework (people, products, personnel, policy, provision) (WHO, 2021).

Once outputs were analysed, the IMPACT 2 model (Smith, 2002) was utilised to map the array of AT2030 research across the AT intervention cycle. This is further explained in Section 8.

Data collection and analysis process: Figure 8 (PRISMA Flow diagram) (Moher et al., 2009) reports on the data outputs and final yield
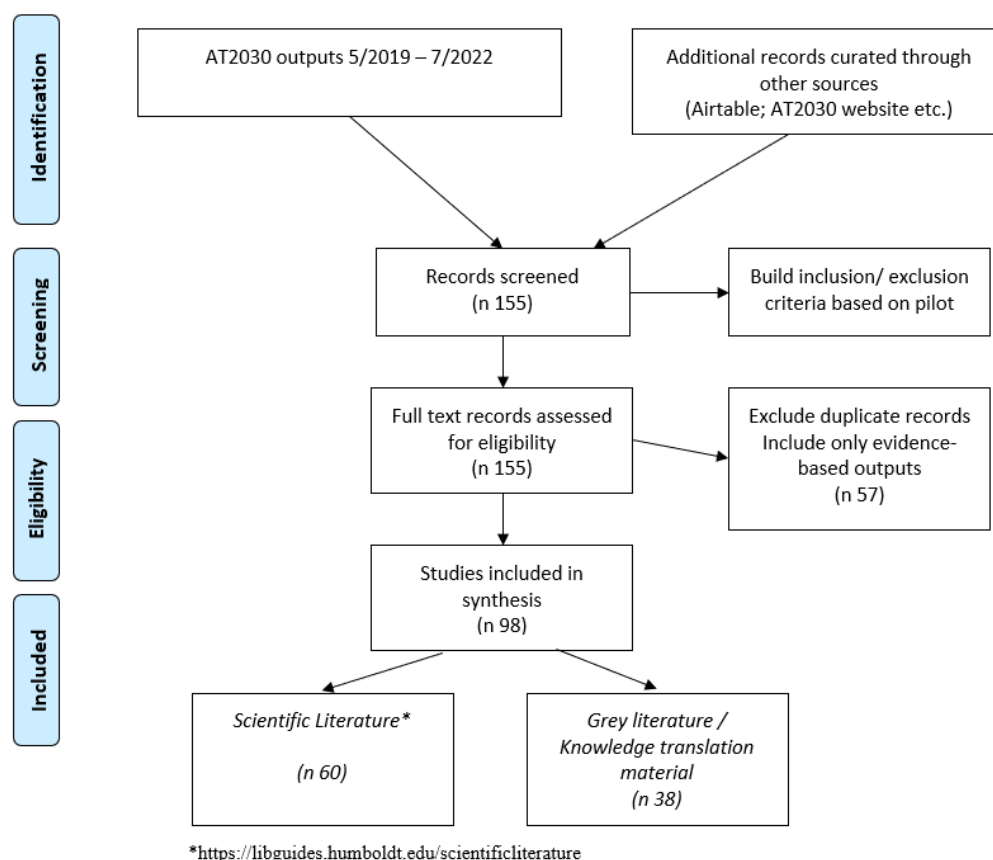
Figure 8: PRISMA Flow diagram (Moher et al., 2009)

Firstly, the AT2030 outputs in scope for this Report were identified. The key criteria was inclusion of work items within the AT2030 programme. Outputs were ranked for quality of evidence but not excluded on this basis. Where initiatives (projects) had multiple outputs, the highest quality published output for that work item was selected. This ensured the best available evidence was included, and that the work item was considered only once. For example, a peer reviewed journal article would be included in the analysis, rather than multiple related blogs or presentations. Figure 9 below illustrates the range of outputs with exclusion filters applied.
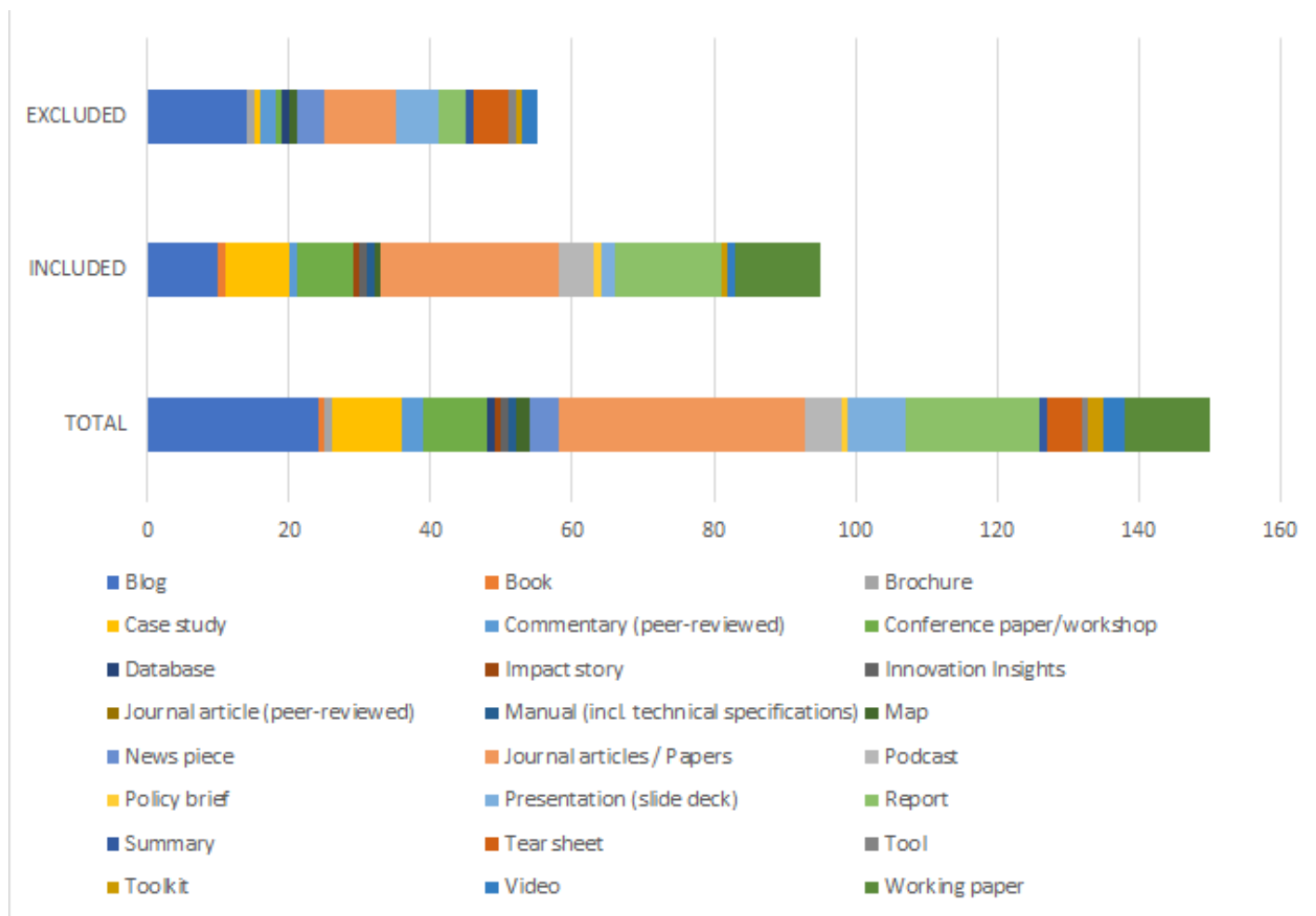
Figure 9: Publication Types (granular level)

Following collation, a range of coding and analysis steps were undertaken to uncover 'what works' across multiple outputs within their various pillars, and sub programmes (see Figure 10).

1   **Collate AT2030 outputs (n155) (May 2019 – July 2022)**
- Apply inclusion / exclusion criteria
- Discussion with 2nd researcher to reach consensus
- Data extraction (13 fields per output)

2   **Coding AT2030 outputs (n98)**
- Included outputs coded by 1 researcher using a Coding Frame (Pilot: Innovation Cluster)
- Reviewed internally – decision to proceed
- Balance of outputs (additional 3 clusters) coded by lead researcher
- Discussion and consensus (2 researchers) to resolves any coding queries

3   **Analysis of AT2030 outputs (n98)**
- 2 researchers independently coded subsets of outputs (sub-programme level)
- 2 researchers collaborated to iteratively refine the analysis framework

4   **Synthesis of Results regarding AT2030 outputs (n98)**
- Iterative review (2 researchers x 6 meetings) of each research sub-question to build results
- Iterative review of overarching research questions per Sub-Programme, ensuring alignment with the overarching research question per Cluster
- Lead researcher developed draft report structure for review; changes implemented
- Preparation of "What Works" draft report for validation & review by key stakeholders – late November 2022

Figure 10: Data collection and analysis process

In **Step 1**, a team of four researchers undertook the initial coding of 155 outputs, applying the inclusion/ exclusion criteria and resulting

in 57 exclusions. In **Step 2**, researchers coded each output with the following coding frame included:

A) Identifying the primary P (people, products, personnel, policy, provision, place) of each output.
B) Summarising 'what works' from the output, based upon content, recommendations and /or summary, depending upon the type of output.
C) Reviewing the research objectives (where stated) for each output, in light of the sub programme and pillar objectives.

The lead researcher then reviewed the coding results, utilizing dual coding techniques and discussion to resolve any coding conflicts.

In **Step 3,** two researchers independently analysed a subset (n-5) of the remaining 98 inclusions, to review the coding frame and to align our coding strategy. **Step 4** involved 2 researchers, across 6 meetings, iteratively reviewing and refining the sub question categories to map the 98 outputs into a network view of 'what works' across the sub programmes and pillars.

This 'What Works' Report takes an evidence synthesis approach to reporting. That is, key findings across and between pillars are brought together for the purposes of reporting 'what works' on key topics. Therefore, outputs delivered in one sub-programme for example innovation or research and evidence, are reported together and draw together 'what works' for topics such as stigma.

Figure 11 below depicts the 60 peer reviewed publications and the 38 grey literature or knowledge translation documents which were included in the analysis of 'What Works'.

INCLUDED SCIENTIFIC AND GREY LITERATURE

■ Scientific Literature ■ Grey Literature

38

60
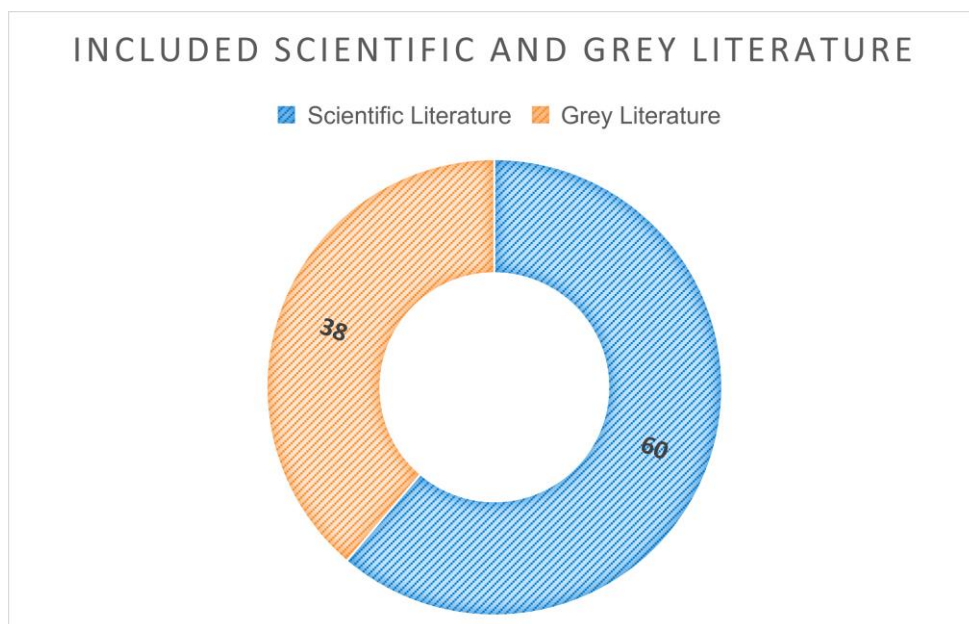
Figure 11: Outputs included (n 98)

In addition, all project leaders were surveyed to gather supplementary insights concerning 'what works' and 'what doesn't work' which was thematically analysed. Only those insights that did not surface through the analysis of the outputs were included per cluster.

6. Data & Evidence

1

Data & Evidence

The data and evidence cluster pulls together learnings of "what works" across the AT2030 programme and develops systematic mappings of data to create an evidence base for policymakers and funders. Data represents 'what we know', and evidence represents 'how well we know it'. Whilst Data and evidence arguably underpin every pillar and sub-programme.

We analysed 43 outputs across two sub-programmes to provide evidence across a wide range of topics. The data and evidence is a cluster in its own right, but also draws from and offers insights from across the other clusters.

GALVANIZE INVESTMENT & POLITICAL SUPPORT

STRENTHEN POLICY, SYSTEMS & IMPLEMENTATION

AT2030

UKaid
from the British people

Global
Disability
Innovation
Hub
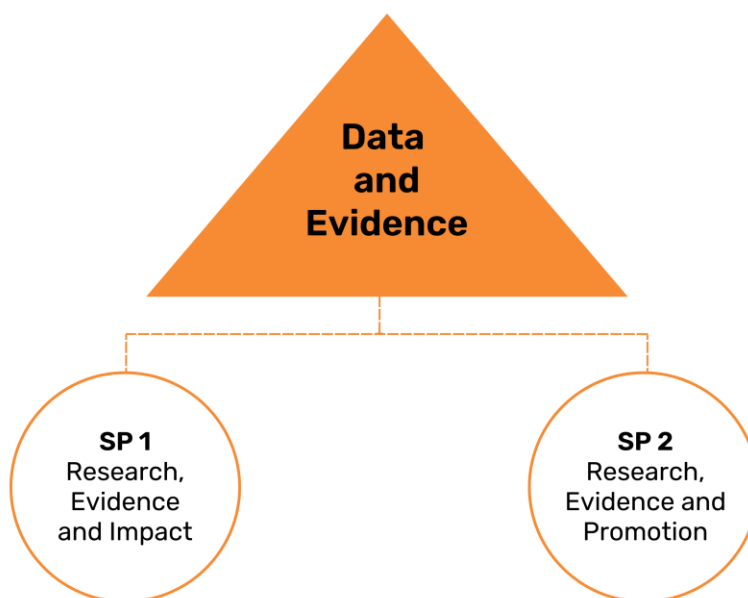
Figure 12: Sub-programmes within the Data and Evidence Cluster

The key objective of this cluster is to **improve data and evidence to unlock investment into Assistive Technology.** This Cluster consists of **two Sub-Programmes**, namely:

(i)   **SP 1: Research, Evidence and Impact**, with a focus on framing the economics of AT around a mission-led approach; developing a return-on-investment framework and researching what works to overcome stigma, and

(ii) **SP 2: Research, Evidence and Promotion** which focuses on enhancing the use and usefulness of data for decision-makers through enhancing: user empowerment through storytelling, data availability through sparse data improvements and mobile data collection tools, and data visibility through AI-powered data portal development.

SP1 was complete at the time of this review, whilst SP2 was only a few months old when the review took place.

A review of the outputs across sub-programme 1 and 2 suggests, for the future, the overarching research question is: **What works to develop conceptual foundations, build evidence and evaluate impact across AT ecosystem elements, to deliver on AT2030 mission?**

Figure 13 shows the number of outputs analysed per project, depicting a clear emphasis on the following:

- Digital transformation of Prosthetics and Orthotic (P&O) Services (n-6)
- Systematic Reviews & Influencing Papers (n-11)
- GReAT Reports and Support to the GReAT Report (n-12)

(Note: key findings across and between clusters and sub-programmes are brought together for the purposes of reporting 'what works' on key topics.)

NO. DATA & EVIDENCE OUTPUTS ANALYSED PER PROJECT

Project	No.
Strengthening Data Systems and Data Visibility for Global Policy Makers	1
Frame the economics of AT around a mission-led approach and develop a return on investment framework	1
Assistive Technology in Humanitarian Settings	1
Disability Interactions	1
Develop market shaping framework and methodology	2
Environmental Scan of Assistive Technology Products and Service Delivery in Kenya	2
Researching What Works to Overcome Stigma	2
Strengthening Data Systems for AT	4
Digital Transformation of Prosthetic & Orthotic Services	6
Systematic Reviews & Influencing Papers	11
GReAT Reports (including Support to the GReAT Report)	12

Figure 133: Outputs analysed per project (data and evidence) (n-43)

What Works to improve access to AT?

What is AT need and coverage as estimated through specified tools in identified localities or defined assistive products? (SRQ 14 x 6 outputs)

✓ **Strengthening data systems for measuring AT need and coverage is essential to inform supply and demand, ultimately informing investments and innovations for AP market-shapers:** Scoping [AT2030.41] and systematic reviews [AT2030.83] recommend use of WHO assistive product domains, and standardized definitions in order to further develop comparable population level research [AT2030.41]. Five recommendations are made:

  o Standardized definitions for AP indicators should be used to enable the comparison of results across settings. Some measurements are only appropriate for data-poor settings, like potential need. When possible, the most relevant and comprehensive measurements should be reported.

  o For AP assessment approaches, agreed methods for measuring common indicators should be used, when possible, to collect more systematic and comparable data on impairment, functioning, and AP indicators across the six functional domains. Specifically, rapid assessment tools should be reviewed to ensure AP indicators are well-integrated as viable timely options for improving AP data collection.

  o Use AP study design and analysis methods in contexts where they will be most effective and be aware of study design limitations when interpreting research.

  o An indicator of essential AP services should also be included in research generating AP indicators, as the absence of these services will impact AP use, demand, and ultimately influence supply decisions. AP indicators will be more comprehensive where the need and coverage of their associated services are also evaluated.

  o Data generated in the AP supply process should be well-defined and collected at each stage to standardize supply chain evaluation and facilitate the identification of bottlenecks that limit AP accessibility on the supply-side.

- ✓ **Designing and selecting fit-for-purpose data collection tools is essential:**
    - ○ Combining self-report and standardised tools promises to provide a more wholistic picture of need [AT2030.29] [AT2030.140].
    - ○ Methodological shortcomings highlight the need for improved survey methods compatible with the ICF, disability and health to estimate population-level need for AP and related services to inform advocacy and planning [AT2030.29]
- ✓ **Population need and coverage has been established for some assistive products and countries:**
    - ○ The rATA for assistive products in Pakistan [AT2030.143]
    - ○ Need is estimated for glasses and hearing aids in The Gambia. A further research agenda is explored and set out to strengthen methods to measure need [AT2030.43]
    - ○ There is high need and low coverage of glasses, hearing aids and wheelchairs in India and Cameroon [AT2030.29] [AT2030.140]

How can the potential of mobile technology be leveraged to support digital inclusion and increase access to AT? (SRQ 7 x 2 outputs)

- ✓ **There are gaps and opportunities in the use of mobile phones as AT which can guide future research.** The penetration rate of mobile technology is almost three times higher than for desktop computers and broadband lines, even in low and middle-income countries, but data on access, use and barriers for people with disability is scarce [AT2030.144]
    - ○ Understanding digital AT use in informal settlements illuminates ways to meet need, for example 'supportive interactions' [AT2030.31]

What ecosystem best mitigates the impact of humanitarian crises upon AT access and facilitates societal inclusion?
(SRQ 13 x 5 outputs)

- ✓ **Building blocks are identified to strengthen elements of ecosystems related to pandemics:**
  - o A baseline of functioning for AT users during the novel Coronavirus pandemic has been established with which to forecast ecosystem adjustments [AT2030.32]
  - o Five factors protect against crises such as COVID-19: sustainable infrastructure; best practice service delivery models; accessible and affordable communication tools; AT users central to planning [AT2030.33]; and social empathy [AT2030.34]
  - o An AT provision and co-ordination framework including interagency responsibilities and minimum standards is proposed for future use [AT2030.131]
- ✓ **Projects exploring needs and gaps in humanitarian contexts (Bangladesh and Jordan) have generated helpful baseline data, but also demonstrated the complexity of establishing need.** The project findings suggest ways to improve data collection about needs and gaps [AT2030.121]
  - o Devices alone cannot ensure wider inclusion – for that, there still needs to be attitudinal change; environmental adaptations, better provision of resources (including rehabilitation) and much wider awareness about the policies and legislation that support the rights of persons with disabilities, including those who have crossed an international border to seek safety and security.
  - o Turning inclusion into action requires more connected thinking on joining up social assistance.
  - o There needs to be increased investment in, and focus on, strengthening healthcare systems to respond to the growing need for AT. There has been a lack of focus on AT and allied services such as rehabilitation, and resource-constrained countries have often prioritised other aspects with the healthcare systems.
  - o There is still limited evidence on what works for effective AT, how to deliver it and how much it costs.

How can inclusive design and accessible, enabling environments drive disability inclusion? (SRQ 6 x 2 outputs)

- ✓ **Inclusion can be championed through leadership**
  - o A disability inclusion model is conceptualised and tested based on learnings from the Paralympic Games 2012, and published for iterating, sharing and scaling [AT2030.79]
- ✓ **Innovative (fearless) research engagement with real world contexts provides us with blueprints for driving disability inclusion**
  - o Evidence from four studies of human computer interaction in 3 low resourced settings (Uganda, Jordan and Kenya) demonstrate key learnings in the areas of 1) scoping and engagement; 2) inclusion of the end user voice and 3) understanding different expectations; 4) communication and relationships; 5) ethics; 6) funding; 7) remote data collection and analysis [AT2030.37]

What works to reduce stigma related to disability and to AT, and promotes social inclusion? (SRQ 18 x 1 output)

- ✓ **AT interventions will not be effective unless stigma is addressed** [AT2030.39]
  - o Disability stigma and discrimination is multifactorial and needs actions at national as well as local levels
  - o Perceptions about perceived availability of resources as well as disability status will influence the experience of stigma, which has implications for AT provision
- ✓ **Evidence suggests a range of stigma-reduction strategies**:
  - o Champions, myth busters and role models are promising strategies

Should functioning be measured when evaluating outcomes of rehabilitation and AT?
(SRQ 8 x 3 outputs)

- ✓ In a foundational call to arms to researchers, **functioning is identified as a key lens through which to conduct research** [AT2030.42]
  - o Shifting the focus to functioning will ensure actions address achievement of Sustainable Development Goal 3, inclusive Universal Health Coverage and supporting COVID-19 survivors
- ✓ **Identifying people who need assistive products and services: what questions to ask?**
  - o The Washington Group question set was examined across five population-based surveys, demonstrating moderate sensitivity and specificity as a first-stage screening option to identify people with impairment and referral needs [AT2030.154]
  - o Unmet need for assistive products and services can be uncovered with epidemiological data. In a study of musculoskeletal impairment among Syrian refugees in Turkey, common reasons for not seeking services and APs were 'need not felt', lack of service availability, lack of awareness of services, and financial barriers [AT2030.153]

What are the systemic factors which support entrepreneurial activities and sustainable business models within emerging AT ecosystems? (SRQ 12 x 9)

- ✓ **A mission-oriented approach supports a research and policy agenda that, by addressing entrepreneurship, and sustainability, will bolster emerging AT ecosystems** [AT2030.88] [AT2030.64]
  - o The original vision of AT2030 echoes through nearly one hundred outputs: the foundations are firm beneath progressive iterations leading to authorship around the mission led approach [AT2030.74] [AT2030.145] [AT2030.146]
  - o The foundation body of work by AT2030 is synthesised in a key peer reviewed paper well received by the sector (citation index: 36):

the SMART (System-Market for Assistive and Related Technologies) Thinking Matrix [AT2030.64]

- ✓ **Universal health coverage is a foundation factor in supporting AT ecosystems**
  - o Scoping research identifies barriers to access and levers of change by DFID and others [AT2030.87]
- ✓ **Applied systems thinking has generated a proposed SMART approach to effecting change in AT ecosystems** [AT2030:75]
- ✓ **The unique product narrative method developed by AT2030 captures the systemic factors that matter in AT ecosystems**
  - o A Kenyan case study of AT innovation ecosystem design provides a blueprint for action [AT2030.147] [AT2030.72]

What market shaping interventions promote effective and sustainable AT access?
(SRQ 16 x 2 outputs)

- ✓ **Applying the USAID Market Shaping Pathway framework to four AT markets provides a set of key guiding activities**
  - o Support LMIC governments; Build and strengthen procurement mechanisms; support assessment of products quality; develop market reports; build enabling environments for AT delivery [AT2030.139]
- ✓ **Product narrative approaches to researching AT ecosystems are effective in distilling 'what is happening' in the supply network and uncovering 'what to do' about it.** Product narratives tabulate strategic objectives and concrete actions that focussed on innovative and appropriate products, innovative service delivery models and harnessing local capacity. The product narratives (further described under 'country implementation' for digital AT, prosthetics, eyeglasses) were foundational in informing ATscale's activities and investments pertaining to overcoming supply and demand-side barriers for priority AT.
  - o The Wheelchair Product Narrative identifies how to leverage the capabilities and resources of the public, private, and non-profit sectors to harness innovation; enhance market

efficiencies, coordinate and incentivize the number of stakeholders involved in demand and supply-side activities [AT2030.148]

What novel approaches and thinking is needed to enable AT innovation, service provision and disability inclusion? (SRQ 17 x 10)

- ✓ **New conceptualizations of disability, design and interaction (DIX)** [AT2030.66]
  - o Synthesize learnings from GDI Hub projects in 35 countries with 70 partners, across a portfolio of £50m into evidence for
    - DIX principles (ABC: Basic and Applied; radically different interactions; co-created solutions; value and usefulness; open and scalable)
    - DIX Dimensions (systems; participation; wellbeing; power; innovation)
- ✓ **Application of a human rights-based lens**
  - o Identifying the focus of state parties in reporting for the United Nations Convention on the Rights of Persons with Disabilities and calling for the development of a General Comment on Assistive Technology reporting for the CRPD [AT2030.142]
- ✓ **New conceptualizations of digital and assistive technologies for ageing** [AT2030.70]
  - o WHO DATA initiative sets out a challenge to innovate and to move beyond expensive prototyping, to affordable quality products and functionalities provided at scale. Further, to establish open and accessible platforms that integrate technologies as well as human systems, ecologies, neighborhoods', and values.
- ✓ **Innovation ecosystems** [AT2030.80]
  - o Stepping out the strategies and processes needed to improve access to AT: mission-led innovation for AT; explaining AT; open innovation; systems strengthening; finance and expertise
- ✓ **Manufacturing innovations and initiatives:** podcast series with innovators exploring the strengths and potential scalability of 3D printing and other digital manufacturing methods as well as the impact of the pandemic context [AT2030.44]
  - o Materials [AT2030.48] and digital fabrication [AT2030.26]

- o Haptic / tactile interactions: drawing with a reconfigurable tactile pixel array at Braille resolution [AT2030.82] [AT2030.86]
- ✓ **Agile responses to the unexpected: innovation in response to COVID-19** [AT2030.45]
  - o Solutions which can be scaled quickly are essential, and the pandemic has created a spirit of virtual collaboration which can be leveraged for this.
  - o 'Importance of choosing an approach that helps to provide clarity and select the right tools for each context, rather than constantly adding new possible solution that might create more confusion for decision makers'
  - o Good quality and reliable data have become one of the most important tools that we can use to contain the impact of COVID-19 and minimise the negative impact that the pandemic has on people's lives.

Section Summary and Recommendations

What works to develop conceptual foundations, build research evidence and evaluate impact across AT ecosystem elements to deliver on the AT2030 mission?

What works is applied research engagement based on sound conceptual foundations.

There is good evidence that inclusive design and accessible, enabling environments can drive disability inclusion. Mobile technology is a ubiquitous and rapidly developing technology which can be leveraged to this end. In measuring the outcomes of rehabilitation and AT, functioning is a key measure and is a foundation concept to guide current and future measurement of AT need and coverage. AT2030 is identifying the systemic success factors which support entrepreneurial activities and sustainable business models within emerging AT ecosystems. The systems which best mitigate the impact of humanitarian crises upon AT access and facilitate societal inclusion are comprehensively identified. Emergent market shaping interventions have been identified across 15 outputs. Product manufacturing and innovation is explored, and the product narrative approach has proven to be a valuable integrative framework with which to step out the multiple dynamic factors which influence outcomes and impacts, and to tackle them.

The wide array of research undertaken is unique in relation to the broader assistive technology evidence base due to its focus on the pragmatics of context. That is, engaging with complex issues across the 5 P ecosystem, including markets and financing, culture, geographic and political settings. Maturation of the data and evidence pillar is evident in the iteration of methods and enquiries in certain settings and with certain products.

Additionally, emanating from Clusters 1 and 2, we have learnt that the following works:

- Developing mobile and other new data collection tools
- Developing robust data collection methods
- Online portals open up access to data
- Good collaborations across disciplines
- In-country capacity training

For future AT2030 workplans, data and evidence may be best integrated as a cross-cutting strategy to support the overarching programme aims, rather than being an aim in itself.

Methodological commitment to co-design and systems thinking works. It is timely to:

- Consider a preferred set of mixed methods to answer research questions
- Further develop and commit to an evaluation approach which meets benchmarks
- Lay out longer term stepped research programmes as supported by the scoping work represented above
- Balance iterative projects with a planned stepwise development approach
- Regularly and explicitly review and focus on priority areas

CASES 1A and 1B

This Is the Story of Community Leadership with Political Backing [AT2030.113]

Learnings from the London Paralympics generated a unique, 12 step model for disability inclusion. Telling the story of the lessons learned, and 'what works' when political backing, a strengths-based view of human diversity and sporting engagement come together.

The London 2012 Disability Inclusion Model sets out 12 steps that will lead communities to:
(**Get ready**) community-led mission setting
(**Get set**) essential building blocks
(**Go**) enabling a culture of success

The London 2012 Disability Inclusion approach is designed to be replicated to other major programmes, as a public good.
Read more in the full article, published in the Journal of Sustainability.

1 Community leaders' articulation of needs and priorities	2 P/political leadership	3 Clear mission and joint objective setting	4 Time limited action
12 Reflection and recognition of success			5 Governance by disabled people and community leaders
11 Culture of excellence (beyond contractual compliance) & consequences of failure (to try)			6 Diverse partnerships where everyone can drive change
10 Good enough data, scrutiny and progress management	9 Inclusive innovation encouraged	8 Resources, resourcefulness and tools	7 Expert technical assistance and mainstreamed training

Figure 2. The resulting 12 Step Disability Inclusion Model of London 2012.
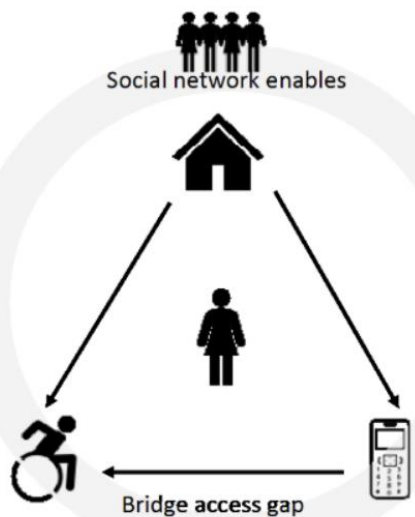
Social network enables

Bridge access gap

Bridging the Divide: Exploring the use of digital and physical technology to aid mobility impaired people living in an informal settlement. [AT2030:31]

How might wheelchair users use their traditional assistive technology (their wheelchair) and their digital link to the world (their mobile phone) in the context of an informal settlement? In-depth qualitative research in Kibera, Nairobi, illuminates a range of physical and economic factors which restrict the use of wheelchairs and of mobile phones. However, the support of the Kibera social network unlocks the potential for mobile to bridge the physical accessibility gaps in Kibera for wheelchair users. have a mobility impairment. This study demonstrates mobile phones act as an accessibility bridge when physical accessibility becomes too challenging. The social fabric that characterizes informal settlements enables the technology to be useable. Understanding the social fabric enables us to design for context.

7. Innovation

2
Innovation

Innovation by definition is a new and untested way of doing things, with the potential to drive transformational change. Innovations are likely to undergo many iterations as they develop and are tested in, and refined by, different contexts (Rogers, 2003).

The key objective of this cluster is to: **support new products and service delivery models to scale where spark innovation already exists.**

This Section reports upon 19 outputs within the innovation sub-programme.

A review of the outputs across sub programmes 3 and 5, within cluster 2 suggests, for the future, the overarching research questions may address "**What works to spark innovation and new solutions to get access to AT for the people that need it, with particular focus on the innovations which support new products and service delivery models to scale?**"

SPARK INNOVATION & NEW SOLUTIONS	DRIVE AFFORDABILITY & AVAILABILITY
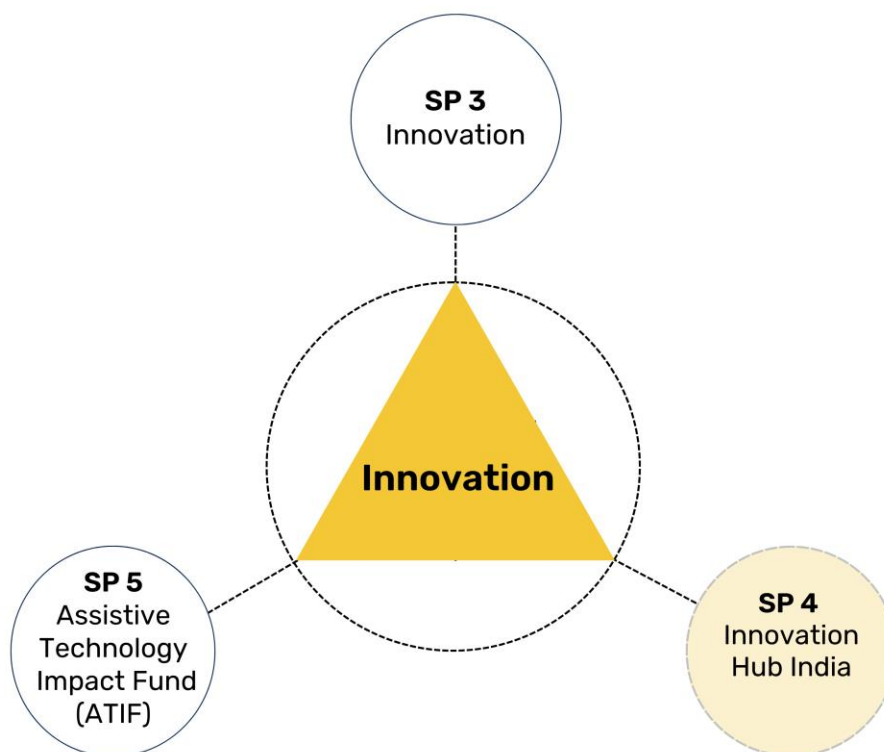
Figure 144: programmes within the Innovation Cluster (SP 3 and SP5)

This Cluster consists of these three **Sub-Programmes:**

(i) **SP 3: Innovation**, with a focus on delivering AT innovations in East Africa through inclusive innovation ecosystems, AT accelerator, service delivery and wheelchair provision. Horizon scanning to scope the disability mobile gap and programmes to address stigma, as well as 3D printing for humanitarian response and an AT Makeathon.

(ii) *SP 4: Innovation Hub India, led by the WHO, UCL and the Indian Council for Medical Research, explores a new partnership to deliver an Innovation Hub in India with regional reach.   This project is still in its inception phase and has not yet produced any evidence-based deliverables to be reported on.*

(iii)   **SP 5: Assistive Technology Impact Fund (ATIF)** was established to better enable frontier technology solutions to reach people with disabilities in Africa, and to test business models that are most likely to succeed.

Through the delivery of 14 projects across the two sub-programmes, with 32 outputs, including 7 peer-reviewed journal articles, 5 reports and 2 case studies, we endeavored to answer the key research question, as well as the associated 6 sub research questions.

Figure 15 shows the number of outputs analysed per project, depicting a clear emphasis on the following:

- ➢ Harnessing the power of mobile (n-7)
- ➢ Horizon 2: Research and Insights (n-10)

NO. INNOVATION OUTPUTS ANALYSED PER PROJECT

Project	Value
AI & Assistive Technology—powering inclusion	1
Understanding AI's role in AT information	1
Local Solution - Local Production	1
Stigma in youth	1
H1: Operations	1
H2: Research (Miracle Feet and 60 Decibels)	1
H3: Future (Briter Bridges)	1
A revolution in wheelchair manufacture applying 3D printing technologies	2
Strengthening the Kenyan AT innovation ecosystem	2
Innovate Now - an AT accelerator programme connected to live labs	2
Confidence Socket Research Project	2
Harnessing the power of mobile	7
H2: Research and Insights	10

Figure 155: Outputs analysed per project (32 across SP 3 and SP 5) (n 32)

(Note: key findings across and between clusters and sub-programmes are brought together for the purposes of reporting 'what works' on key topics.)
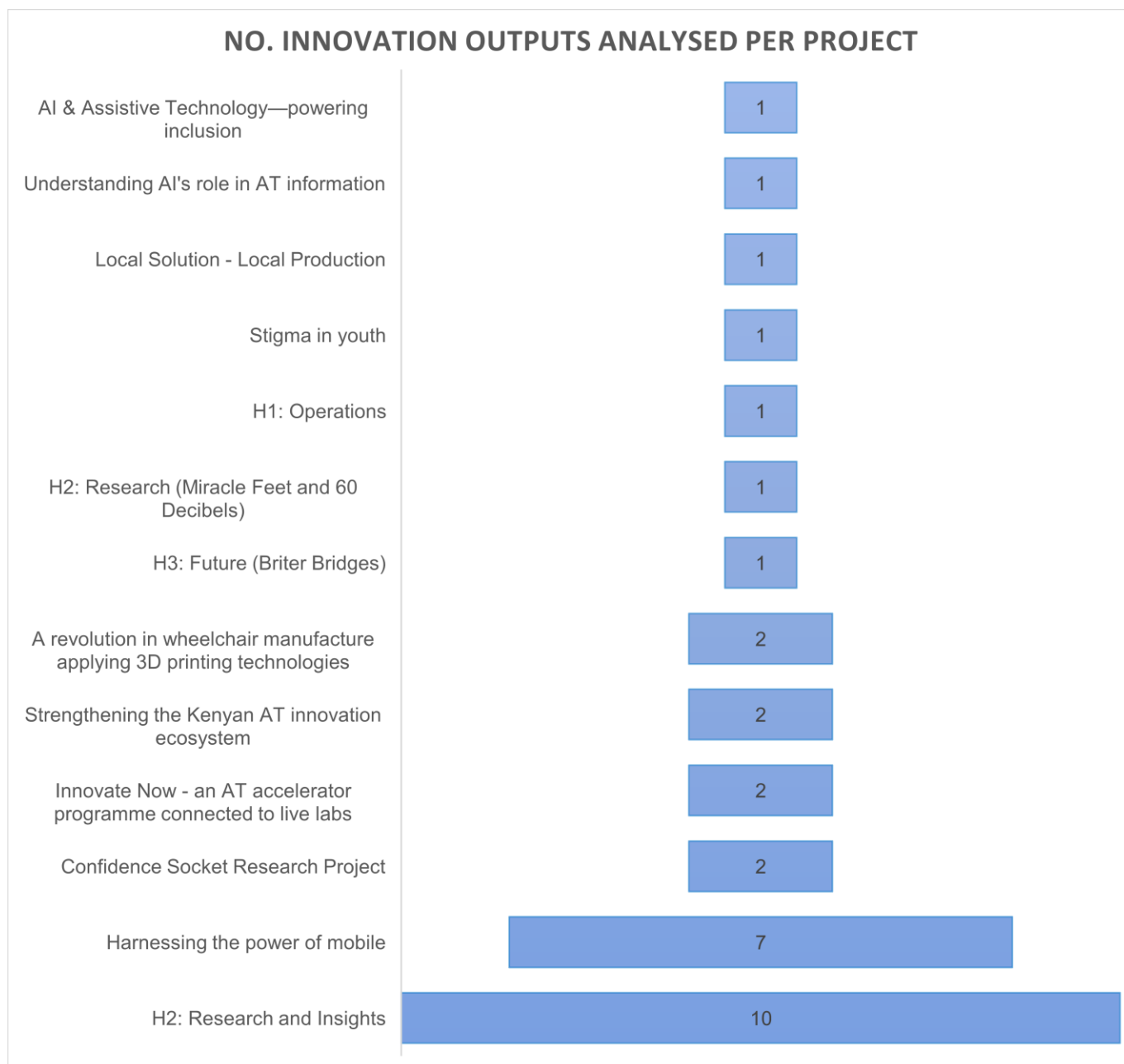
What Works to improve access to AT?

What novel approaches and thinking is needed to enable AT innovation, service provision and disability inclusion?
(SRQ 17 x 11 outputs)

Evidence to date suggests that:

- ✓ **AT innovations that leverage novel technologies, such as 3D printing, must focus not only on the assistive device themselves, but also bring innovation into the service delivery models** that accompany them (for example, using the Emotional Design Model.) This is particularly relevant in LMICs where the systemic failure of these systems is often what prevents people from accessing the devices that they need [AT2030.35].

  - o Advances in design using shape changing materials such as a single sheet of Nitinol which is transformed into a reconfigurable tactile pixel array at Braille resolution (known as Tacilia), creates unique opportunities for new haptic interactions [AT2030.82], optimizing speed and accuracy for persons with visual impairments [AT2030.86]. (Note: Outputs AT2030:82 and AT2030:86 are cross-referenced in SP2)

- ✓ **Novel manufacturing methods** such as the use of **additive techniques** (building small numbers of products for example via 3D printing) **is a promising technology** for the creation of smart prosthetic liners, provides a low-cost digital method which addresses the need for customisation and efficient one-off production [AT2030.30].

- ✓ The use of **innovative product design** (for example, Amparo Confidence Socket – easier and faster to fit, designed for field use) has **the potential to bridge economic barriers and achieve scale** through improving access [AT2030.25].

  - o Access to an appropriate lower limb prosthesis can help restore mobility and confidence; reaching the functionality that allows them to resume their role in work, family and community life [AT2030.25].

- ✓ **Entrepreneurs in Nepal and Uganda have been able to harness the power of digital technologies** (such as 3D printing and the use of recycled materials) and human creativity to create fair and resilient manufacturing systems that bring value to their communities [AT2030.44].

    - o Incorporating Afro centric design into product ranges accommodates the needs and the wants of local consumers.

    - o The business operations at businesses such as Zener and Wazi Vision (which uses recycled plastics) show that innovative manufacturing approaches can address challenges encountered both on the supply and the demand side of production.

    - o What is key is that although manufacturing locally, there is a need to connect globally and to share not only the digital designs but also the experiential knowledge of the processes (pre and post processing) to create a successful assistive product.

    - o Mapping local production systems is important as it is about being able to see what other locations around the world have very similar challenges and very similar production capacities; and seeing what peer-to-peer learning can occur across these locations (not having to 'reinvent the wheel').

- ✓ A **user-led approach** to **designing new technologies** (approaches, techniques, service delivery models etc.) is **critical to good outcomes** [AT2030.49]

- ✓ When implementing such novel interventions, **researchers are encouraged to make use of flexible approaches and outcomes measures or tools**, that enable them to capture the wider impact of the innovation (product or service-related) on stakeholders, beyond the explicitly stated outcomes of the project at hand) [AT2030.38].

- ✓ **Users and providers valued involvement in the 3D digital manufacturing of wheelchairs in Kenya).** Some functional limitations of both the product and the service delivery model need to be addressed before practical implementation [AT2030.38]

- ✓ Using a **user centric approach**
  e.g., to build customized

wheelchairs with user input and **co-design, leads to users feeling empowered** and proud [AT2030.35]

✓ **Researchers and innovators need to collaborate to develop open-source solutions to address contemporary challenges** such as responding to the COVID-19 pandemic [AT2030.45]: (included in SP2)

  o Enable more direct pathways for rapid innovation.

  o Choose approaches that provide clarity with appropriate tools for each context, noting that constantly adding new possible solutions that might create more confusion for decision-makers.

  o Good quality and reliable data are a critical tool to respond to global events and minimize the negative impact on people's lives.

✓ **Materials can play a central role in the creation of new health-care products that address pressing global needs, are environmentally sustainable and able to be produced locally** [AT2030.48]

  o Many-local challenges can be solved locally e.g., manufacture of sanitary pads in Africa using materials such as banana fibre, which is biodegradable and decomposes, this practical solution can be scaled up and used in other countries and avoids import and taxes.

✓ **Evidence supports a new agenda for developing technology for people with disabilities – Disability Interactions (DIX) Principles model and related dimensions (DIX Framework) is a new approach to co-create new technologies, experiences and ways of working with disabled people** [AT2030.66].

  o DIX embraces complexity better translate the work of accessibility and AT research into the real world, with a strong focus on user-centred and participatory systems across the whole value chain of technology.

  o As technologies and interactions are context-reliant DIX offers nuanced guidance to designing within the disability space; also embracing agentive technologies which could possibly equalize and enhance

differences between individual human abilities, working collaboratively with robots and AI, sharing tasks and control; all within the context of mixed realities.

✓ **COVID-19 has revealed that the true frontline of healthcare is at home** – in particular, rehabilitative and AT care have the potential to decrease costs and make effective interventions more accessible for all, regardless of age or functional capacity [AT2030.70].

- o An important response is to learn from the pandemic and to reform the interaction between healthcare, society and technology, at the population level.

- o Embracing the normalization of technology as part of everyday life, WHO has launched the Digital and Assistive Technologies for Ageing (DATA) initiative, seeking to encourage the development, synthesis and use of solutions that promote access to AT, particularly for older people.

- o Challenging, continue stimulate creativity and innovation and move beyond expensive prototyping, to affordable quality digital products provided at scale, on open and accessible platforms that integrate technologies with human systems, ecologies, and values.

✓ **To improve access to AT through innovative strategies and processes an open innovation ecosystem approach is required** with the following **key recommendations as prerequisites** for ensuring healthy AT innovation ecosystems which drive disability inclusion [AT2030.80]:

- o **Mission-led innovation for AT:** Bold missions are proven mechanisms to increase innovation within countries. AT must be embedded into Government missions and resulting grand challenges. Deliberate and strategic approaches to scaling also need to be developed and adapted to market and local circumstances.

- o **Explaining AT:** For missions to incorporate AT and for investors to invest in new APs, people need to understand what AT is. Only when Governments and investors understand the

sector and the value of the sector will significant change be possible.

- o **Open innovation:** Established companies should begin to better engage with start-ups, universities, and other actors in the innovation ecosystem to drive innovation and growth. Governments can also incentivize these collaborations for the greater good of the sector.

- o **Systems strengthening:** The link between market characteristics and systems level of AT provision demonstrates the need for strengthening at each level. Understanding the market characteristics of a sector is key to being able to diagnose what type of support is most needed and to do this better data is needed on product availability, provision options and supply chains.

- o **Finance and expertise:** There is a need for investment to help scale viable solutions. To address this, a combination of financial support and expertise to scale is needed. This goes beyond the remit of an accelerator and would help bridge the gap between accelerators and traditional impact or venture capital funding.
  (Note: Outputs AT2030.48, AT2030.66, AT2030.70, AT2030.80, AT2030.82 and AT2030.86 are cross-referenced in SP2)

- ✓ **The Assistive Technology (AT) map is a visualization tool which depicts key innovators and stakeholders in the AT and disability innovation ecosystem across emerging markets with the potential to increase access to AT** [AT2030.93]:

  - o Provides an AT taxonomy which is open source (to be used and co-designed by others) and accessible and is also downloadable.

  - o Represents a first critical step to exploring the AT landscape, to show business viability, to attract funding and resources.

- ✓ Despite the UNCRPD laying out specific reporting guidelines for State Parties which describes progress made towards their commitments, **most reviewed UNCRPD reports demonstrate evidence of a systematic approach to AT, without evidence of evaluation or engagement of persons with disabilities in**

either policy development or the evaluation thereof. Several **key recommendations** are provided, such as [AT2030.142]:

- o A more inclusive and systematic approach to how State Parties report on AT in their country is required.

- o Different approaches to the provision of AT are apparent (in these reports), but without evidence of evaluation, it is difficult to determine policy implementation.

✓ **Future reporting should focus on specific policies and activities undertaken to promote access to AT** for all citizens.

✓ **Localisation of production** – Design AT right from the start with its maintenance and end of life in mind to create a **sustainable circular ecosystem** (for example, biodegradable hygiene product), also ensuring that local production must support the local economy i.e., using a **localized circular model of production** (for example, complex connectors for wheelchairs are 3D printed locally and are recyclable locally).

✓ **Enables service providers more control over quality aspects of the final product** and also ensuring that their clients had access to devices that meet their needs [AT2030.93]

✓ **Aligning AT provision with sustainability interventions.** Evidence that there are distinct parallels between what AT provision models require to improve equitable, reliable access and those strategies that could be more beneficial to local communities [AT2030.81]

- o People with disabilities are particularly vulnerable to the negative effects of climate change, which will also likely exacerbate the difficulties of AT provision globally.

- o Thus, localised models of AT production could increase user and context specific AT innovations, whilst concurrently enabling

circular approaches that reduce their environmental impact, as well as bringing economic benefit to local communities.

o A circular AT provision model (refer to Figure below) is founded on a systems-thinking approach to reducing the impact of climate change whilst increasing AT provision. AT needs to be designed right from the start with its maintenance and end of life in mind, with local production helping the local economy. Products need to be re-designed using this type of thinking i.e. designing for resilience through circular economics [AT2030.92].
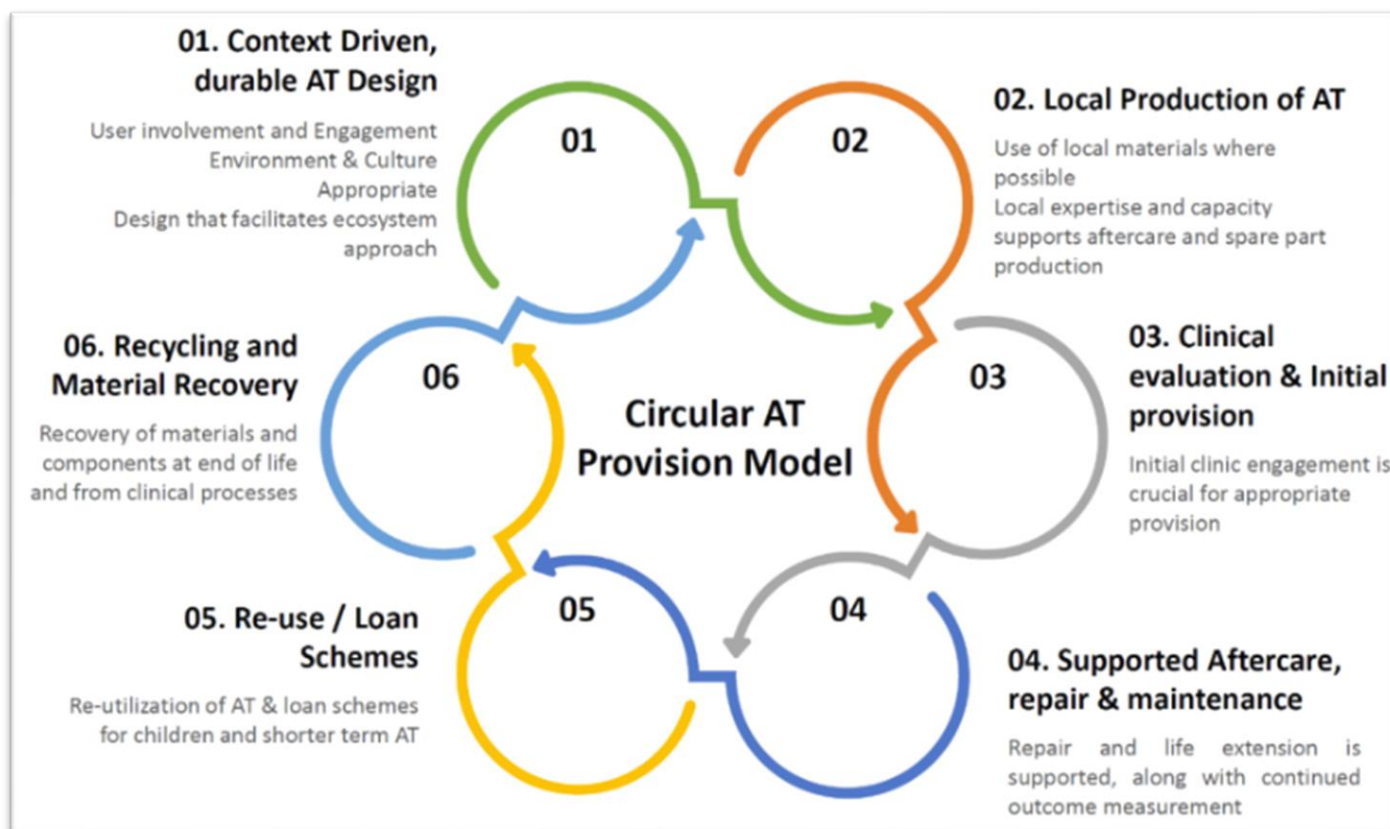

Figure 16: Circular AT Provision Model (Oldfrey et al., 2021)

BOX 3: AT2030 INNOVATE NOW (KENYA)

Innovate Now is Africa's first Assistive Technology Innovation Ecosystem and Start-up Accelerator and is implemented by Amref Enterprises Limited (AEL) and led by the Global Disability Innovation Hub. The Accelerator aims to support 60 start-ups, 15 of which will be scaled up over the next 3 years.

This AT accelerator programme is connected to live labs which shows that instead of a single, physical AT hub, what is needed is a thriving **AT Innovation Ecosystem** and needs to be built on the following **6 key principles** [AT2030.106]:

1. Inclusive AT Innovation is more than a product, a service or a policy. It is a way of thinking

2. Inclusive AT Innovation is driven by Human-Centred Design

3. Inclusive AT Innovation is about creating disruptive partnerships, finding new solutions, a positive attitude and imaginative, non-binary answers to intractable problems.

4. Inclusive AT Innovation harnesses the creativity and dynamism of community-led solutions.

5. Inclusive AT Innovation is primarily about better outcomes for its users and the ability to unleash visionary solutions that work better for everyone.

6. Inclusive AT Innovation requires an Ecosystem of Innovation spaces, all able to give specific domain expertise to the greater problem of AT Innovation.

Through embracing the 6 principles and harnessing the power of access to information, the **AT2030-IN can spur the East Africa region into becoming a global leader in AT innovation**, creating a self-sustaining ecosystem which will outlive the lifetime of the project, but this vision can only be realized through partners working collaboratively and pooling shared expertise.

✓ **Advances in Artificial Intelligence offers the potential to develop and enhance AT**, and to gain new insights into the scale and nature of AT needs, to improve access. An online expert roundtable was held to establish a list of 'grand challenges' for research to drive forward innovation in the sector [AT2030.73].

  o Although the group identified **nine 'grand**

challenges', a call for action, special attention and investment must be channeled into the **following priority areas:**

(i) AI & Communication (e.g., speech to text, image recognition),

(ii) AI & Mobility,

(iii) AI & Improving Information, and other considerations such as: personalization, co-design, AI facilitating human-centred solutions based on feedback loops and multisensory experiences.

o **AI will impact education greatly but needs to be correctly designed and deployed in order for AI tools to truly deliver in the long run on their potential** of i) providing at scale empowering access to education beyond any political, cultural, language, geographical and learning ability barriers; ii) helping us create fulfilling, equitable and inclusive lifelong learning schools of the future; and iii) leveraging the so-called Renaissance of new ways of teaching and learning. However, like with any other technologies, they need to be designed to be a driver of equity and inclusion and not a source of greater inequality of opportunity.

By designing with accessibility (and inclusion) in mind, we can ALL benefit from the creation of more intuitive, feature-rich and impactful products. INNOVATION FOR DISABILITY IS INNOVATION FOR EVERYONE.

IN (Holloway et al., 2020) (p. 4)

How can the potential of mobile technology be leveraged to support digital inclusion and increase access to AT? (SRQ 7 x 6 outputs)

Evidence to date suggests that:

✓ The **ubiquity, affordability and innovation of mobile technology has the potential to improve the lives of persons with disabilities.** By providing

access to communication and information, mobile phones and related services could facilitate more inclusive participation in society and tackle some of the barriers that people with disabilities face daily. In this way, digital innovations can bridge the access gap to ATs and promote the inclusion of persons with disabilities [AT2030.125].

- o The findings of a participatory photovoice study which looked at the role that mobile phones play in the daily lives of persons with disabilities in Kenya and Bangladesh **clearly indicated benefits** such as (i) improved social connection, (ii) increased independence, (iii) access to opportunities, (iv) financial security, (v) mobile devices also promote local knowledge, (vi) empowerment, and (vii) opportunities, with the requisite support being provided, to include persons with disabilities into mainstream activities. Additionally, mobile phone ownership among persons with disabilities is high in Kenya and Bangladesh; with those not owning one, often accessing through borrowing [AT2030.36].

- o A number of **barriers also exis**t: (i) the high cost of handsets and services, low digital literacy and the person's disability itself preventing access and ownership, (ii) in both countries access to basic services is limited and the main barriers experienced is that of stigma and discrimination, as well as a lack of inclusive design of infrastructure, (iii) mobile phone access (in Kenya) was sporadic and ownership amongst people with cognitive and self-care impairments (or multiple impairments) was much less common, and (iv) access was mostly to basic phones rather than smart phones with apps [AT2030.55].

- o **A key recommendation** to address the above is for stakeholders and the mobile and disability ecosystems needing to **work together** to improve the accessibility, affordability and relevance of mobile products and services or PWD's, but together with digital skills training, which is absolutely essential.

- o Findings from a survey conducted with 1000

participants with disabilities in [AT2030.76] are in line with the above, but also suggest the following **additional recommendations:**

- It is key that Governments and OPDs know the number of persons with disabilities in their countries and they are encouraged to make use of the rATA tool developed by WHO.

- PWDs should be empowered to make the decision re a mobile phone in an informed manner to ensure that they understand the potential impact that it could have on their everyday lives.

- Increase access to smartphones - this is highly relevant for researchers, developers and mobile phone operators as they continue to develop new products and services for PWDs.

- There is a need to develop cross-cutting strategies between governments, CPOs, open-source developers and mobile operators that aim to reduce the various costs associated with mobile phones ownership and usage.

- Mobile phones as an AT cannot be simply considered as standalone devices but needs to be incorporated into a wider ecosystem that encompasses the various elements from cost to education i.e., a complex system to be considered in its entirety.

- ✓ **Mobile technology supports and shapes the creation of social infrastructure** which is mediated through four types of interaction: direct, supported, dependent and restricted [AT2030.85].

  - Supported interactions (in Kibera) were possible due to the close proximity and open living conditions

  - Limited choices of technology and lack of knowledge of current phone features lead to an increase in dependent interactions e.g., when using M-Pesa financial system

- o Although participants showed a desire to adopt new technologies which they believed would improve the quality of their lives, they assumed it would be out of their reach e.g., smart phones (text to speech capabilities)

✓ **Digital inclusion can be supported by embracing diversity and engaging with customers with disabilities to reduce the mobile ownership gap,** improve customer loyalty and to find new opportunities for mobile technology (as AT) innovation [AT2030.127]. More specifically, it is important to:

- o Raise the awareness of mobile phones as AT; being considered a Human Right, as mobile phones act as an accessibility bridge when physical accessibility becomes too challenging [AT2030.31].

  - ▪ The physical and economic characteristics of Kibera in Kenya, restricts the use and impact of both the wheelchair and the mobile phone. However, the support of the Kibera "social network" unlocks and enables the potential for mobile to bridge the physical accessibility gaps for wheelchair users. *(Note: Output AT2030.31 is cross-referenced in SP1)*

- o Improve access to mobile phones (especially smart phones) by reducing the cost

- o Improve the accessibility of the smartphones e.g., improved speech-to-text functionality and ensure that the services are suitable for their needs

- o Increase usage of mobile phones (through training) and mobile-enabled services, and ensure that there is access for all to basic services

- o Be aware that people with disabilities, as users of mobile products and services, have different experiences to non-disabled users and therefore mobile operators need to map and understand their unique customer journey's to better serve their needs

✓ **Mobile operators (and other companies) are also encouraged to embrace strategies to actively promote the participation of persons with disabilities**. Strategies could include: to engage and sensitize other employees, create opportunities to innovate specifically for customers with disabilities which

deliver business value, co-design or tailor products and services WITH customers with disabilities (and other key stakeholders e.g., OPD's), and champion and lead wider strategies to promote disability inclusion e.g., provision of AT and reasonable accommodations [AT2030.126].

✓ **Creating and raising awareness of the need for mobile (smart) phones as AT is critical** to creating the space and obtaining the investments needed for innovation [AT2030.126].

Independent use of technology is often a driving factor for the design of technology for people with disabilities, BUT it is not what you can do for yourself, but what you can also do for others, and how you are then viewed as being CAPABLE

IN (Barbareschi et al., 2020) (p. 10)

What works to reduce stigma related to disability and to AT, and promotes social inclusion? (SRQ 18 x 2 outputs)

Evidence to date suggests that:

✓ **There is value in exploring how disability is experienced (understood, perceived and acted on) with youth as a target audience.** In a project run by a media company (the GroundTruth study, conducted by Shujaaz Inc), persons with disabilities were embedded into ongoing media content, depicting young persons with disabilities making their way in modern Kenyan society, and providing persons with disabilities within their fanbase with exposure to appropriate and accessible resources for AT solutions [AT2030.51]. Findings included:

  o There is a high level of knowledge among young people about disabilities, although, in many cases,

true knowledge is mixed with myths and stereotypes.

- o Young people's attitudes towards persons with disabilities depends on their visibility in their community, and that

- o Frequent and positive engagements with persons with disabilities goes a long way to changing attitudes

- o **Other key aspects that work to raise awareness and reduce the stigma of disability include**:

  - Continuing to feature 'disability' in all of their media campaigns moving forward

  - Learning 'the language of disability' is key when talking/engaging about disability-related matters

  - The affordability of AT is key to access; thus, the need to leverage opportunities to strengthen the 'last mile' experience for persons with disabilities who are seeking support, products and services, as currently this process takes too long and is onerous, delaying access to much needed AT.

✓ Research into how young Kenyans without disability understand and conceptualize disability and AT as separate but connected concepts [AT2030.77] demonstrated that **access to appropriate technology alongside societal interventions tackling incorrect beliefs about disability can help to overcome the stigma faced by people with disabilities**, recommending:

- o Accessibility research and practice in the Global South should focus on approaches that highlight the capabilities of individuals with disabilities, both in relation to AT, but also beyond the AT they use. This could be a way for targeted stigma interventions focusing on conveying a more realistic portrait of how people with disabilities develop and leverage their own skills to tackle everyday challenges, both with and without ATs.

- o Future accessibility research (globally) should aim to deconstruct many of the barriers facing people with disabilities by examining both (i) how these barriers are created, and (ii) who has the powers, and the responsibility, to overcome them or to break them down

- o The research agenda must be cognizant of these power dynamics and see inclusion as a shared effort – this will be far more effective in promoting accessibility as a form of social justice, rather than from a stance of benevolence.

- ✓ **It is possible for disability stigma to be shaped through factors endemic to social interactions, including how the use of AT itself may precipitate or alleviate disability stigma** [AT2030.39]. The following needs to be considered:

  - o Effective interventions to ameliorate disability stigma and discrimination warrant urgent consideration by policy makers, including within initiatives scaling up the provision of assistive technology

  - o Considering the importance that young people, and people with disabilities attribute to the ability to work, be productive and provide for oneself and their family, it is essential for future initiatives to focus more on providing better opportunities for people with disabilities to enter and be part of the workforce.

  - o Campaigns are needed to showcase the professional success of local people with disabilities who can serve both as a role model and myth buster.

  - o Disability stigma is shaped by factors ranging from the conceptualization of the causes of disability, to societal and religious beliefs of the community, misconceptions regarding the ability of people with disabilities to work and be productive, inaccessible environments and lack of opportunities for positive intergroup exchanges.

  - o AT is generally viewed as important enabling tools; however, they also work as a constant visible mark of disability that can attract unwanted attention and occasionally be seen as more important than the person with disability who is using them.

(Note: Output AT2030.39 is cross-referenced in SP1)

SP 5: Assistive Technology Impact Fund

Overarching research question:

How can the growth of the AT sector best be facilitated to better enable the development and scaling of frontier technology solutions to reach people with disabilities in Africa?

The **AT Impact Fund** is operationalised as a collaboration between GDI Hub, Brink, and the Catalyst Fund as venture partner, providing custom venture building support to AT innovators that are ready to build responsive and flexible local solution models to scale. The aim is to better enable frontier technology solutions to reach people with disabilities in Africa, and to test business models that are most likely to succeed. This programme is continuing to uncover **how AT entrepreneurs in emerging markets can overcome the 'valley of death' and go on to scale and be successful** (*AT Impact Fund | AT2030 Programme*, n.d.).

Activities include:

- Growing AT companies in Africa
- Facilitating growth of the AT ecosystem
- Building and sharing evidence
- Providing grant funding

What Works to improve access to AT?

What are the systemic success factors which support entrepreneurial activities and sustainable business models within emerging AT ecosystems? (SRQ 12 x 11 outputs)

Evidence to date suggests that:

- ✓ **Although starting an AT business in Africa is challenging, these ecosystem obstacles can be overcome, reduced and managed.** By doing so, we can open the door to success in the AT

industry, and over time create the conditions that will support everyone having access to high-quality AT at a fair price [AT2030.115]

- o AT entrepreneurs must create businesses that do more across the entire value chain while constantly battling the prospect of unanticipated risks since emerging entrepreneurial ecosystems like those in Nairobi and Lagos, are immature and potentially volatile. It is important for AT entrepreneurs to anticipate the potential volatility and to set up a safety net for their business, to overcome the challenges and manage the risks.

- o For AT entrepreneurs in Africa, partners can be the difference between blockbuster success and failure, as although they may not be able to provide the neat 'plug and play' solutions available in mature markets e.g., the use of Onfido for customer identity verification, they do provide invaluable human connections.

✓ As an AT sector, one of the most beneficial tools the community could create would be to **map legislation and regulations across countries and for particular types of AT and explaining how best to manage the process in a specific country context** [AT2030.117].

- o By providing AT business owners with simple access to information, rules and regulations become easier to understand, which in turn increases the AT sector's accessibility to interested ecosystem parties.

- o AT companies need to be realistic on timescales and the resources required to meet regulations, in their own contexts and across countries, as regulations can vary substantially. They need clear plans and groundwork to begin selling in new locations.

- o Early-stage AT companies can be proactive by creating their AT with an evidence-based approach prior to starting the regulatory approval process. This entails testing and refining your product while accumulating data that demonstrates how it functions and that it is reliable, secure, efficient, and significant in order to streamline the regulatory

procedure and foster confidence in your AT in the absence of regulatory permission.

✓ **The reliable and scalable impact that improves the lives of individuals with disabilities can only come from financially stable businesses that are able to create, provision and support AT** [AT2030.114].

- o To be viable, AT organizations must adopt a "selling" mindset throughout the business in order to become sustainable. This could entail retraining current staff members or perhaps employing new personnel with business credentials and experience.

- o The risk of grant and philanthropic capital instability must be successfully managed for AT firms to be financially sustainable.

- o Although a profit-driven attitude may seem paradoxical to the mission of getting AT to everyone, it is of critical importance.

✓ **It is important to celebrate the sector's current state of readiness for disruption and promote the growth opportunity** [AT2030.9].

- o Despite the AT sector being large and valuable, and ripe for disruption, awareness of AT is low outside of the AT space. Two ways to address this are:

  - ▪ To support newcomers to the AT space through the creation and curation of easy-to-understand content which introduces and explains the sector, and

  - ▪ To support, on a continuous basis, these newcomers, as they personally navigate the sector.

✓ **To make a real difference in AT access for millions of disabled people across Africa and over a billion around the world, ATIF and the AT ventures need**: [AT2030.123]

- o Continued investment by private and government donors.

- o Increased partnerships to help with knowledge-sharing and to open doors into national networks.

- o The disability movement to challenge stigma around disability and the use of assistive technology to increase demand.

- o Governments that understand the unmet need for AT and the return on investment– for every $1 USD invested into AT, $9 is returned into the economy (Simpson et al., 2021).

- o Policymakers that create and implement policies to drive AT innovation.

- o The inclusion of disability in on-going impact investments.

- ✓ **Ventures in the global south need to leverage technology, partnerships and creativity in order to bring value to their environment and their communities.** Key **success factors** include: [AT2030.46]:

  - o Embracing a collaborative approach to pivoting to what the community sees as need.

  - o Working together with different ventures along the value chain to be able to rapidly respond to situations such as COVID-19.

  - o Leverage expertise of strategic partners to develop new products that really address the core needs of communities in a sustainable way, and to boost capability.

- ✓ **Network analysis of assistive technology stakeholder is a key strategy to strengthen ecosystems**

  - o A Kenyan start-up has been developing new devices that support independent mobility for blind users and how a group of researchers is using data analysis methods normally applied to social media to create more resilient assistive technology delivery systems in Kenya and Malawi [AT2030.47]

- ✓ **Scoping research report on Assistive Technology**: On the road for universal assistive technology coverage [AT2030:87]

  - o **Foundation document** laying out the evidence base underpinning the AT2030 method and approach.

- ✓ **Overcoming systematic global barriers to AT:** a new methodology and quick- start testing through a £20m programme [AT2030.74] [AT2030.146]

    - o Key interim report describing the first 10 months of implementation of AT2030 and **its rapid early results, leading to increased investment**.

- ✓ **ATscale: Establishing a cross-sector partnership to increase access to assistive technology** [AT2030.145]

    - o **Foundation document** laying out the stakeholder engagement utilized to implement AT2030.

- ✓ **Assistive technology innovation ecosystem design**: A Kenyan case study [AT2030.147]

    - o Illustrates the **Innovate Now ecosystem elements** and how these were implemented.
    (Note: Outputs [AT2030.74]; [AT2030.136]; [AT2030.87];[AT2030.145] and [AT2030.117 are cross-referenced in SP2)

- ✓ **Business related strategies include a B2B (business to business) entrepreneurial approach and a DTC (direct to consumer) approach for AT** [AT2030.111]

    - o DTC-AT model is challenging due to limited finances of customers with disabilities, stigma, limits to cost reductions for AT producers, and unintended consequences of 'free' AT.

    - o **Facilitators to DTC-AT include**:

        - ▪ **Innovative subsidized revenue models:** e.g., MiracleFeet cross-subsidy models where sales to middle-class customers or customers from high-income countries subsidise AT for people with extremely limited incomes.

        - ▪ **Lean-in to Lifetime Value:** An AT subscription model sees the product appropriately prescribed, used, maintained, and replaced, acting as an end-to-end service.

        - ▪ **Community Customers:** AT

companies consider customers as 'family units'. If these companies take a household approach where they demonstrate the value of AT to the end-user and everyone else in the house, the family unit will pull together to pay for it. Considering the potential stigma towards AT, a degree of education and normalisation of AT is required before AT companies can get 'into' households.

- **Value from First Use:** For example, HearX uses its hearing aids to 'diagnose' hearing impairments, rather than traditional diagnostic equipment. From the first moment a customer comes into contact with the hearing aid, they experience what life with this AT can be like, showing the value immediately, which makes the sales process easier.

✓ **Strategies to locate customers and build AT businesses in LMICs** [AT2030.112] [AT2030.113]:

   o Targeted marketing and sales techniques (referrals, introductions, outreach).

   o Stakeholder mapping from end-user across the full supply chain.

   o ATIF Scale Studio demonstrates revenue generation is possible for the selected portfolio companies following a financial injection and venture building support [AT2030.123].

✓ **Key insights for distributing affordable AT include**: [AT2030.98]:

   o Using the developed matrix criteria on an on-going basis to evaluate potential partner opportunities.

   o Ensure affordability and distribution models for reaching low-income users are fit for purpose for different AT e.g., glasses required personalized product and distribution and hearing aids require diagnostics and calibration but can be off-the-shelf.

   o For early clusters, the focus should be on using adjacent to AT companies as partners, rather than portfolio companies. This is because those that understand AT would have a clear

appetite for innovating in affordability and distribution models for AT, but for those who don't yet understand, AT needs to fit into existing, profitable business models and require a more tailored, active approach to the partnership.

✓ For AT entrepreneurs, raising funding is a barrier that must be overcome to continue growing. AT companies in emerging entrepreneurial ecosystems are competing against e.g., Fintech "unicorns" which due to their success automatically attract investors. **The following are some of the most important factors mentioned by investors that can sway their investment decisions**: [AT2030.118]:

  o Get to know investors early; build and maintain relationships.

  o Outstanding (full-time) founders, with previous entrepreneurial experience, supported by a well-balanced team with skill sets that complement the founders.

  o Establish co-founding team then audit the team's skills and capabilities, ensuring that there is a good balance between sector, business, operations, as well as sales and marketing experience.

  o The team needs a deep understanding of the sector and the geographies that they work in; being able to demonstrate to investors what the business has already proven and understood about the market, and what the investment capital will facilitate e.g., testing, additional learning etc.

  o Be acutely aware of and manage regulatory conditions in the environment.

  o Impact matters, but money rules – investors will not treat an AT company any differently than other investment opportunities – they want a financial return.

✓ To **ensure the success of investor/entrepreneur partnerships, investors need:** [AT2030.123]:

  o The support of ATIF to provide the technical aspects of tailored venture building targeted to AT-specific challenges.

  o An investment committee who is familiar with all aspects of AT.

- The evidence generated by ATIF to assess a potential AT portfolio company, especially when analysing commitment.

- Access high-quality and specific market sizing data, that covers specific countries and types of disabilities to demonstrate the scale of the sector, whilst also supporting investor due diligence.

- To provide additional value-added services networking and facilitating partnerships to grow trust in the AT ecosystem that can lead to financial growth.

✓ **All stakeholders in the AT community have a role to play in helping to change the investment landscape,** helping to attract capital into the sector [AT2030.116]. To do this, we need to:

- Improve our awareness raising efforts of AT and disability innovation outside of our existing networks

- Learn how to gradually inform people about the sector without being too technical; else we risk unintentionally excluding people that can accelerate the progress of AT companies.

- Be transparent and openly share the challenges in AT entrepreneurship, but more importantly, the lessons learnt to overcome these challenges and be successful.

- Promote widely about 'AT hero companies' that are highly successful, that are a point of pride for the whole AT sector, proving that entrepreneurial success in AT is possible.

What is the impact of an evidenced intervention (for example, clubfoot initiative) upon quality of life, social participation, and inclusion? (SRQ 15 x 2 outputs)

Evidence to date suggests that:

✓ **Investment in existing successful start-up businesses developing innovative solutions** such as the MiracleFeet brace which

addresses clubfoot in children in LMICs, have a positive impact on their quality of life, social participation and inclusion [AT2030.94].

- o A commissioned study by ATIF to validate the **MiracleFeet brace in terms of its impact on children with clubfoot in LMICs found that it is impactful**:

  - The majority of children receiving MiracleFeet treatment experience improvements in quality of life which is attributed to improvements in the child's ability to move, stand, play and forge positive relationships.

  - The treatment can help children to avoid stigma and enable full social participation and inclusion for the vast majority of the users of the intervention.

  - Based on the evidence, MiracleFeet are having an overwhelmingly positive impact on the lives of children in Liberia and Nigeria.

- o **Clubfoot interventions are also well evidenced**. This particular study investigated the impact of rollout on evidenced treatments on outcomes over a lifetime:

  - Success (of treatment) primarily depends on availability of quality treatment and adherence to a long-term treatment process. When this is not the case, relapse after initial or incomplete rehabilitation may still occur

  - With timely access to appropriate, safe, and effective treatment, clubfoot can be corrected.

  - Increasing access to clubfoot treatment in LMICs will require a multi-faceted approach that combines interventions that address global barriers to access, encourage government and donor prioritisation, and accelerate the scale-up of models and tools that increase capacity and improve adherence [AT2030.54].

How can a co-designed, open-source visual tool enable access to information to support AT innovation? (SRQ 4 x 1 output)

Evidence to date suggests that it is important to:

- ✓ I**nvest in tools to make markets more visible and investible [**AT2030.90]
  - o The Assistive Technology (AT) Map, through a public-private partnership, provides accessible visual access to information, developed using open-source code and co-designed as part of the Innovate Now project.
  - o This visualization tool provides information about key innovators and stakeholders in the AT and disability innovation ecosystem across emerging markets.
  - o It showcases the various types of digital tech-driven and inclusivity-focused startups and other organizations that are creating state-of-the-art solutions for people with disabilities.
  - o This tool serves to drive innovation and access to AT, through demonstrating business viability and attracting investment and other resources to increase access to AT for all.

Section summary and recommendations

Significant potential across multiple countries is demonstrated for novel technologies including shape changing materials and additive techniques. The contexts of deployment are critical, and principles for engagement are emerging from the body of Innovation work. These include user-centric and context-centric service design, sustainability through a circular economy, and the integration of outcome measures.

During the AT2030 work program, a confluence of COVID-19 and related humanitarian events occurred. Projects continued, based in the AT2030 philosophy of mission-led engagement within complex systems, and therefore generated unexpected learnings about civil society interconnection and interdependence. Key among these were the understandings of the power of digital engagement, and the imperative for digital inclusion and related tools (such as access to mobile phones and data). A call to arms in the form of the WHO DATA

(Digital AT for Ageing) publication has been published, alongside multilevel recommendations for scaling digital access. The ingredients of ecosystems in which to build AT innovation are broadly identified and moving into a) testing and evaluation phases within country-settings (x 2) and b) top-down systems strengthening strategies.

A substantial range of strategies show promising outcomes in addressing stigma as a barrier to social inclusion. These include and developing deep understandings of the precursors to attitudes to disability, nesting AT interventions within socio-cultural contexts, utilizing media-based change campaigns and using sport and related cultural highlight as opportunities to change the dialogue on disability and inclusion.

The 'deep dive' represented by the AT Impact Fund has generated substantial in-country implementation data on actions to grow AT companies and facilitate the AT ecosystem in Africa. Multiple business-related strategies have been documented and tested and are ready for iteration and testing across different contexts.

Three significant agenda-setting publications are informed by these projects and include:

1. A Disability Interactions (DIX) Principles model and related dimensions (DIX Framework), providing the sector with an underpinning philosophy and operational framework

2. Nine grand challenges in Artificial Intelligence, highlighting the need to prioritise development of AI

3. Could Assistive Technology Provision Models help pave the way for more environmentally sustainable Models of Product Design, Manufacture and Service in a Post-COVID World?
    o The key learning is that sustainable approaches to AT production could lead to:
        ▪ Improved and quicker AT provision for all, simultaneously reducing unnecessary waste and harm to the environment.
    o The connections between disability inclusion, the

climate crisis and AT production are made clear, thus proposing a Circular Model of Production to address AT need in LMICs over a linear provision system (materials = product = dispose).

- o A circular economy of AT would utilise local materials, expertise and repair systems which would enable the re-use and loaning of AT, as well as recycling materials at the end of a products life.
- o To enable this more environmentally and sustainable model of AT production the authors call for a need to build local capacities and ecosystems.

CASES 2A and 2B

AT2030 – Innovate Now [AT2030:106]
 	
This project, informed by an analysis of the regional context and potential for AT innovation in East Africa, was created to develop and support a thriving AT Innovation Ecosystem in Kenya. The target number of ventures for 2019 was 20, reaching 1.5 million people and for 2021, 100 ventures, reaching 15 million people.
 	
The project commits to:
    4. Changing the world for the better by creating a core of 50-100 AT2030-IN ventures. All with an African base, all with a global reach.
    5. Making a positive difference to 3m disabled people by 2021.
    6. Taking the initial seed investment of £1.5m and turn this into £15m of investment in this sector.
    7. Create a self-sustaining ecosystem which will outlive the lifetime of the project.
	MiracleFeet: the human impact of foot braces in Nigeria and Liberia [AT2030:94]
	
	✓ As a portfolio company of the ATIF, they are being supported to diversify distribution and to explore the brace as a revenue stream via a social enterprise model.
	✓ 200 parents and guardians of children receiving MiracleFeet treatment were surveyed using the AT Impact Measurement survey.
	✓ 98% of children using the brace experienced improved quality of life.
	✓ Parents and guardians attributed the improvement to their child's ability to move, stand, play, and forge positive relationships.
	✓ Parents and guardians of children undergoing MiracleFeet brace treatment are highly satisfied and loyal towards the company with a Net Promoter Score ® of 88.

AT2030

UKaid
from the British people

Global
Disability
Innovation
Hub

AT2030-IN Ecosystem

Mobile Cluster   Medical Cluster

AT2030 Innovate Now Hub

Accelerator Programme   Accelerator Programme

Live Lab   Live Lab   Live Lab   Live Lab

AT2030 Innovate Now Fund

✓ The braces are made freely available to those in need.

8. Country Implementation

Country implementation focuses on driving the availability and affordability of AT through opening up market access and building in-country capacity. The key objective of this cluster is to: **lay the foundations for market shaping and systems-level change**

This Section reports upon 13 outputs within the country implementation cluster.

A review of the outputs across sub-programmes 6, 7 and 8 within cluster 3 demonstrates a range of findings regarding factors that build capacity and participation through market-shaping strategies and community-led interventions; strategies to translate benchmarks and standards into useable tools to open up market access for AT, and ways to build capacity and participation to mediate access and participation in activities of citizenship.

For the future, the overarching research question is: **"What works to develop conceptual foundations, build evidence and evaluate impact across AT ecosystem elements, to deliver on AT2030's mission?"**

DRIVE AFFORDABILITY & AVAILABILITY	BUILD CAPACITY & PARTICIPATION
	STRENGTHEN POLICY, SYSTEMS, IMPLEMENTATION
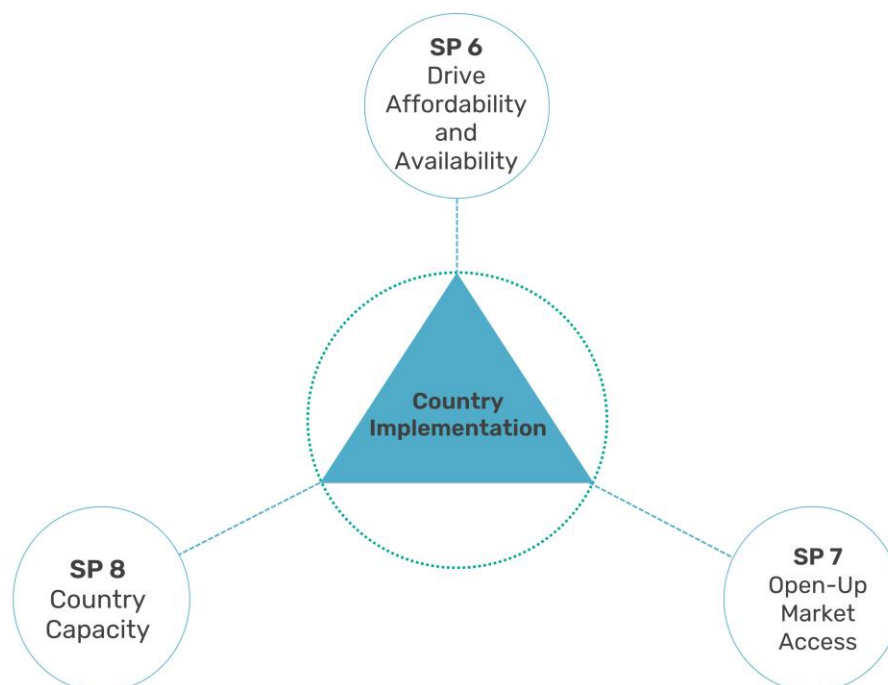
Figure 177: Sub-programmes within the Country Implementation Cluster

This Cluster consists of three Sub-Programmes, namely:

(i) **SP 6: Drive Affordability and Availability:** Led by The Clinton Health Access Initiative (CHAI), this sub-programme is developing AT Product Narratives to inform global investment and scoping market-shaping opportunities.

(ii) **SP 7: Open-Up Market Access**: To align and consolidate global AT efforts, as well as to lay the foundations for systems-level change, this sub-programme provides a set of global benchmarks and standards for AT. This programme is being co-led by WHO, UNICEF, and the London School of Hygiene and Tropical Medicine.

(iii) **SP 8: Country Capacity:** This sub-programme has three elements. Firstly, it brings together the WHO, GDI Hub and Clinton Health Access Initiative (CHAI) to develop, test and learn from Country Capacity Assessments. Secondly it supports countries to develop national action plans.

Thirdly it funds investment to support national AT priorities in these countries.

Through the delivery of 4 projects across the 3 sub programmes, with 13 outputs, including 7 reports, 3 case studies and technical specifications, we endeavored to answer the key research question, as well as the associated 6 secondary research questions.

Figure 18 shows the number of outputs analysed per project, depicting a clear emphasis on the following:

➢ Pilot testing of market interventions with specific countries/opportunities (n-8)
➢ Country Capacity Assessment (n-3)

NO. COUNTRY IMPLEMENTATION OUTPUTS ANALYSED PER PROJECT

Category	Value
Assistive Product Specifications (AT Procurement Manual and Technical Specifications)	1
Product Narrative: Wheelchair	1
Country Capacity Assessment in x10 FDCO Priority Countries	3
Pilot Testing of Market Interventions with Specific Countries/Opportunities	8
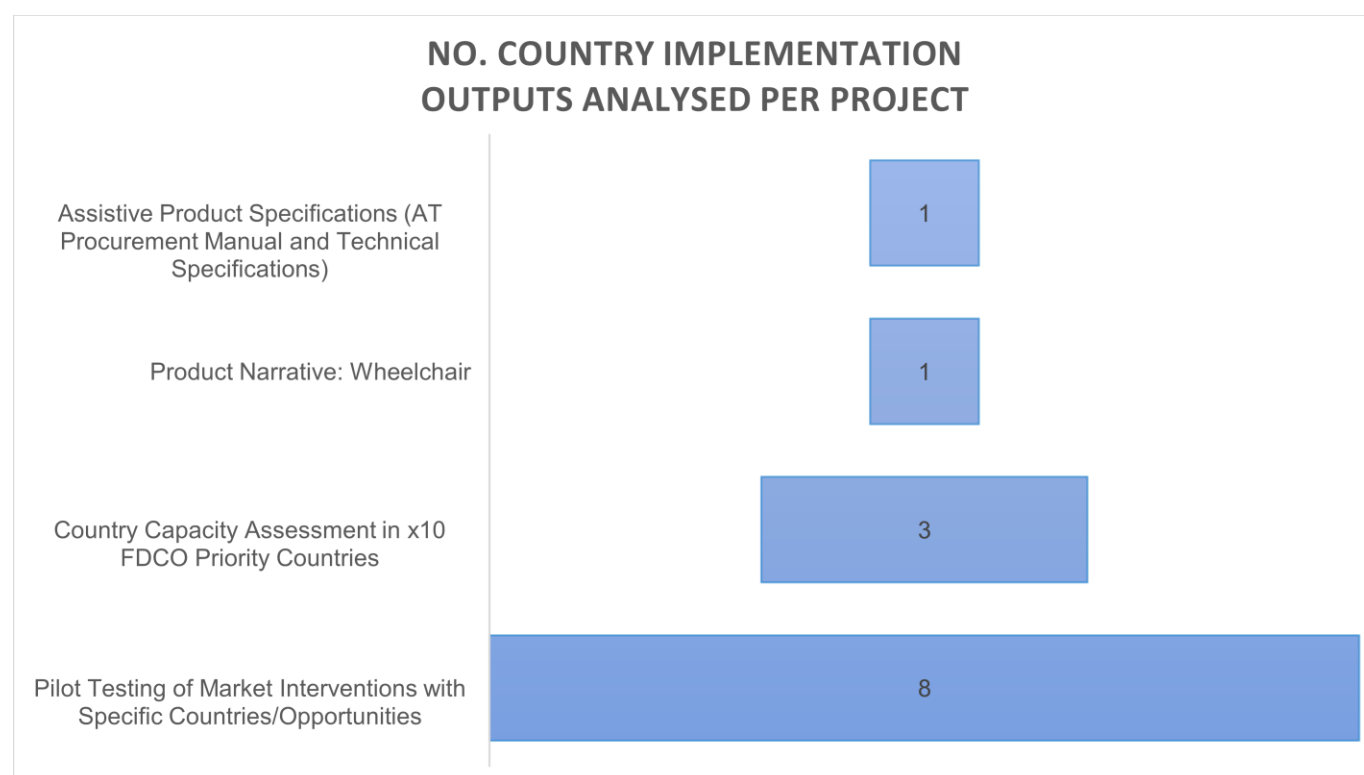
Figure 18: Outputs analysed per project (country implementation) (n 13)

SP 6: Drive affordability and availability

Overarching research question: **What strategies and tools are needed to inform global investment and scoping market-shaping to drive the availability and affordability of AT?**

- **What Works to improve access to AT?**

What pathways and strategies expand access to rehabilitation and AT services utilizing national scale-up tactics? (SRQ 11 x 1 output)

Evidence to date suggests that:

- ✓ **Strengthened coordination is key to increasing access to AT – and a comprehensive strategy is needed** [AT2030.21]
  - o Through supporting the Government of Kenya with the focus on understanding the rehabilitative space and developing a plan for the country, the **key learnings are**:
    1. Strengthened government coordination and leadership on AT work in Kenya as a result of continuous and comprehensive engagements with key stakeholders.
    2. As a result of the comprehensive assessment in one service area i.e., wheelchair provision, it served as an entry point to a wider discussion around rehabilitation and AT policy work aimed at unlocking resources for improving AT service delivery and increasing access.
    3. The current piece of (entry) work i.e., the situational analysis, is serving to inform the development of two key policy documents: (1) the National Strategy for Scaling Rehabilitative Services and Increase Access to Assistive Technology, and (2) the Disability Medical Assessment and Categorization Guidelines. Both aim to streamline rehabilitative services in Kenya.
  - o **Next Steps:** following the validation of the draft

documents, strategies will be implemented to ensure sustainable scaling of rehabilitation services and to increase access to AT.

What market shaping interventions promote effective and sustainable AT access?
(SRQ 16 x 6 outputs)

Evidence to date suggests that:

- ✓ **Viewing AT provision and access through the lens of market shaping has the potential to transform the AT sector** [AT2030.28]**:**

  - o Targeting the root-causes of market shortcomings at the demand- and/or supply-side can improve market's outcomes

  - o Grounding market shaping in health ecosystem-level thinking serves to reframe issues, boundaries, and constraints in the market to potentially make AT more accessible.

  - o The **proposed Market Shaping Strategy for Wheelchairs is to**:

    1. Build and stimulate demand through the integration of wheelchair services, including procurement and provision, into healthcare systems.

    2. Pool resources to catalyse increases in funded demand and to limit fragmentation in the market.

    3. Strengthen procurement via adoption of specifications and standards, improved tendering and increased market information.

    4. Identify and support cost-effective supply systems.

- ✓ **The digital ecosystem is driven by mobile technology globally, both within and beyond the AT sector** [AT2030.56]**:**

  - o Prioritising mobile phones, particularly smartphones, as the digital AT of choice, where appropriate, would allow mobile to become the gateway to access additional applications,
    content, supportive add-

ons e.g., braille readers or switches, and features that can augment or replace stand-alone AT.

- o Recommendations include:

   1. Developing and adopting policies, including legislation, regulations, minimum product standards, and guidelines to support accessibility and uptake of digital AT at the global and country level.

   2. Supporting LMIC governments to increase awareness of digital AT by including digital AT products such as smartphones and AAC devices on national assistive product lists.

   3. Supporting innovative financing schemes or negotiating pricing agreements to reduce the cost of digital AT to end users, and

   4. Increasing the availability of training programmes for users, suppliers, and service providers on digital AT and digital literacy skills.

- ✓ **The product narratives on eyeglasses, prostheses, hearing aids and wheelchairs, have been foundational in driving investments to overcome supply and demand-side barriers for priority AT.**

  - o The product narratives helped to identify opportunities for AT2030 and stakeholders in the AT sector by outlining strategic objectives with concrete actions that focused on innovative and appropriate products, innovative service delivery models and harnessing local capacity.

  - o **Eyeglasses market – 5 key objectives are provided for market strengthening** [AT2030.58]**:**

    1. Mobilise key stakeholders, including donors, multilaterals, NGO implementers, and the private sector, around reliable data and scalable proven models to accelerate efforts against vision impairment caused by refractive errors.

    2. Strengthen global policy guidance

around service delivery standards for low-resource settings to accelerate the adoption of innovative models and products that support a simplified service delivery.

3. Support governments to develop comprehensive eye care plans integrating validated models of vision screening and provision within the public health system and facilitate scale-up of those models.

4. Engage the private sector to expand delivery of affordable, quality eyeglasses and related services in LMICs.

5. Build and drive awareness and consumer demand for eyeglasses.

o **Prosthetic market – 5 key objectives are provided for market strengthening** [AT2030.59]**:**

1. Develop foundational datasets to inform the investment case for prosthetic services and guide the development of standards.

2. Support countries to define appropriate policies and invest in the key requirements of a functioning prosthetic provisioning system.

3. Accelerate market validation and adoption of innovative technologies that can simplify, decentralise, and lower the cost of prosthetic service provision requirements of a functioning prosthetic provisioning system.

4. Accelerate the uptake of affordable, quality prosthetic components by increasing market transparency to empower buyers to make value-based purchasing decisions.

5. Strengthen regional supply mechanisms to increase affordability and availability of quality prosthetic components.

o **Hearing aid market – 5 key objectives are provided for market strengthening** [AT2030.60]:

1. Strengthen global policy guidance around service delivery standards, product selection
and product quality.

2. Support LMIC governments to strengthen hearing aid provision including demand generation and investment in service delivery capacity, government purchasing and procurement support.

3. Engage the private sector to expand delivery of affordable, quality hearing aids and related services.

4. Work with suppliers to enter LMIC markets with affordable, quality hearing aids.

5. Spur innovation to support simplified provision models and introduction of optimal products.

o **Wheelchair market – 4 key objectives are provided for market strengthening** [AT2030.61]**:**

1. Build and stimulate demand through the integration of wheelchair services, including procurement & provision, into healthcare systems.
2. Pool resources to catalyse increases in funded demand and to limit fragmentation in the market.
3. Strengthen procurement via adoption of specifications and standards, improved tendering and increased market information.
4. Identify and support cost-effective supply systems.

What market to business strategies work to deliver pathways to digital accessibility and digital AT? (SRQ 10 x 1 output)

Evidence to date suggests that:

- ✓ **There are specific market to business strategies that deliver pathways for the development of accessible and digital AT solutions more effectively to ensure access to products and services to those in need [**AT2030.130**]:**
  - o Accessible features in mainstream digital technologies are not used to their fullest in LMICs and digital AT is not reaching persons with disabilities.
  - o **The following strategies are recommended:**
    1. Raise awareness of digital accessibility and digital AT products that are available to persons with disabilities, their families as well as clinicians.
    2. Make the products more affordable (reduce the cost) to increase access.
    3. Provide training to ensure knowledge of how to use the digital solution properly.
    4. Ensure policies in place to mandate accessible websites, apps and other platforms so that digital solutions are accessible and usable across the digital ecosystem.
    5. Co-ordination between stakeholders within the supply chain, product and service providers, and governments is needed – leading to digital solutions being updated and maintained to keep pace with evolving needs and new technologies.

What is the impact of an evidenced intervention upon Quality of Life (QOL), social participation and inclusion? (SRQ 19 x 1 output)

Evidence to date suggests that:

✓ **A number of strategies promise to expand AT access in Sierra Leone:**

1. Ensuring that the benefits of informal AT providers in providing broader and less expensive access to otherwise underserved populations is promoted whilst protecting AT users from unsafe products.

2. Create a realistic role for under-resourced government agencies in this task.

3. Introduce regulations to improve quality without pushing providers into the informal market, increasing costs and reducing accessibility.

4. In the absence of state capacity for the regulation of informal AT markets and providers, to determine what other forms of non-state regulation could fill the gap. Determine how more formal and informal private AT providers can be encouraged to sell AT consistently and affordably. [AT2030.19]

SP 7: Open-up market access

Overarching research question: What aligned and consolidated global AT efforts are needed to lay the foundations for systems-level change in increasing access to AT?

Has AT2030 produced levers of change to increase access to 50 priority APL (priority assistive product listing) with technical specifications and implementation guidance? **(SRQ 1 x 1 output)**

Evidence to date suggests that:

✓ **The provision of technical specifications for assistive products to guide procurement is a game-changer to potentially increasing access to AT** [AT2030.62]**:**

   o 26 assistive product specifications describe the minimum requirements related to technical performance and function that the products should meet for safe and effective use, based on the priority APL, addressing 6 key areas of functional difficulties: mobility, hearing, vision, communication and self-care.

- Using commonly understood terminology and product classifications keeps stakeholders aligned.

- Keeping descriptions general rather than describing a brand allows competition amongst suppliers, which can bring down costs.

- Considering a product's range can ensure a more customized provision to the user, but to do this well, requires local capacity.

- The AT specifications provide an easy reference – a starting point – for procurement teams. However, it is advisable for the procurement team to adapt each specification for the population and particular context, using national, regional or international standards.

SP 8: County capacity

Overarching research question: What works to build capacity and participation to mediate access and participation in activities of citizenship?

How best can the Country Capacity Assessment process support the provision of AT to people in low-resource settings?
(SRQ 11 x 2 outputs)

Evidence to date suggests that it is important to:

- ✓ **Implement the ATA-C tool to assess the country capacity to make the most effective, high-quality AT available at affordable, yet sustainable prices** [AT2030.57]**:**

  - Through examining and understanding existing practices of AT provision in Sierra Leone through informal markets, we better understood how such informal markets can be supported as well as improved, and how formal sector actors working in AT provision can work with

and influence informal markets, such as in Freetown and Bo.

1. The study suggests that there is an extremely limited level of AT coverage amongst low-income citizens in Sierra Leone, and that existing formal policy commitments to address AT needs are rarely substantiated in practice, largely due to resource constraints and lack of institutional capacity.

- o **In order to expand AT access in Sierre Leone, the following strategies (as responses to challenges) are suggested:**

    1. Ensure that the benefits of informal AT providers in providing broader and less expensive access to otherwise underserved populations is promoted whilst protecting AT users from unsafe products.
    2. Create a realistic role for under-resourced government agencies in this task.
    3. Introduce regulations to improve quality without pushing providers into the informal market, increasing costs and reducing accessibility.
    4. In the absence of state capacity for the regulation of informal AT markets and providers, to determine what other forms of non-state regulation could fill the gap.
    5. Determine how more formal and informal private AT providers can be encouraged to sell AT consistently and affordably.

- o Furthermore, recommendations are made regarding:

    1. **Regulation and Incentives** – the current regulatory regime: (a) disincentivises 'crowding-in' of formal private providers such as Index, or the transition of informal providers to increasing formality by imposing heavy bureaucratic and regulatory requirements, many of which do not improve the standard of AT for users; and (b) lacks the capacity to effectively regulate the quality of APs and AT services that users receive.

        - To this end, the following changes to AT regulatory practices are suggested:

1. Extending tax (import duties) benefits specified in the 2011 Disabilities Act to all importers of APs.
2. Reviewing and streamlining the regulations applied to formal private AT providers.
3. Promoting the 'social regulation' of AT providers. The state has a very limited capacity to regulate informal AT providers.

2. Recommendations around **Knowledge and Information Sharing** address AP safety and quality for users who access AT without the guidance and support of qualified staff or systemic AT quality control through the application of minimum standards, include the provision of:

1. Simple AT users' guides.
2. Basic 'repair manuals, and
3. Compiling resources on AT providers and service providers.

✓ **The ATA-C tool was also implemented in Indonesia, serving to assess the country capacity and support the government to improve AT provision** [AT2030.141]

o Despite the strong government commitment to expand access to AP, there remain key areas of under-coverage in the urban and peri-urban communities.

o This affects many people on low incomes who live in these communities, especially those unable to meet eligibility requirements to access state programmes.

o For low-income users who require more expensive and complex APs e.g., hearing aids, they are even more likely to be under-served.

o **Key learnings of 'what works' includes:**

1. Using the new data collection system for disabled people to facilitate portable registration as a Kartu Indonesia

Sehat (health insurance) red card holder, rather than linking registration to their original domiciles.

2. Replicating the Jamkesus/Jamkesta model for public access to AT which streamlines registration and increases the range of Aps and AP services, including repairs.

3. Developing training and information resources for local leaders involved in identifying and checking eligibility of AT users for state schemes to prioritize users who are vulnerable or at risk of dropping out of state schemes.

4. Also, incorporating users' perspectives into AT strategy and AP development; supporting local start-up AT enterprises to scale up and scaling up informal AT enterprises by supporting their legal registration and their ability to implement minimum standards to protect AT users.

- ✓ **A number of important lessons have been learnt from conducting the AT Country Capacity Assessments during the period 2019 to 2020** [AT2030.141]

  o ATA-C was piloted in 11 countries and served to:

    - Raise awareness about AT issues in every country where it was implemented.

    - Directly lead to a greater degree of coordination among AT actors across the entire AT ecosystem, even sharing information across different governments.

    - Help form the basis for new policies (or ongoing policy development), and in some countries, budget allocations for AT.

    - However, it also (i) led to frustration in some countries due to its wide scope, (ii) was difficult for some implementing partners to use (iii) did not capture well the experiences of AT users, or the contributions and shortcomings of informal AT product and service providers, and (iv) was difficult for

stakeholders to translate the findings into a prioritized action plan.

- o **Four key recommendations were suggested:**

    1. Update the guidelines to include more explicit instructions on how to adapt the tool to a given context.

    2. Translate the tool into research software to improve usability.

    3. Incorporating perspectives of AT users would add substantially to the tool's usefulness for policy and program development, as well as advocacy.

    4. Making financial resources available for immediate follow-up actions

Section summary and recommendations

These programme outputs address the overarching research question: **What works to develop conceptual foundations, build evidence and evaluate impact across AT ecosystem elements, to deliver on AT2030's mission?**

In summary, multiple projects demonstrate that strengthened coordination within a comprehensive strategy is key to increasing access to AT. Building on outputs from Africa, strategies are being implemented to ensure sustainable scaling of rehabilitation services and to increase access to AT. Viewing AT provision and access through the lens of market shaping has the potential to transform the AT sector, by targeting the root-causes of market shortcomings at the demand- and/or supply-side. A flagship endeavor within this is the prioritising of mobile phones, particularly smartphones, as the digital AT of choice. This will allow mobile to become the gateway to access additional applications, content, supportive add-ons e.g., braille readers or switches, and features that can augment or replace stand-alone AT.

Market to business strategies work to deliver pathways to AT. Levers of change include product specifications and priority assistive product listings, noting the need for procurement teams to adapt each specification for the population and particular context, using national, regional or international standards.

Cases 3A and 3B

Applying Market Shaping Approaches to Increase Access to Assistive Technology: Summary of the Wheelchair Product Narrative [AT2030:28]

✓ To accelerate access to AT, market shaping interventions can play a role in enhancing market efficiencies, coordinating and incentivizing the number of stakeholders involved in demand and supply-side activities.
✓ ATscale, the Global Partnership for AT, aims to mobilise global stakeholders to shape markets in line with a unified strategy.
✓ The first product analysed was wheelchairs.
✓ Findings showed that:
  o The market in LMICs for appropriate wheelchairs is highly fragmented and characterized by limited government interest, investment and a low willingness-to-pay.
  o The market is dominated by cheaper, low-quality wheelchairs with non-profits attempting to fill the need, but market uptake is limited.
✓ ATscale used the developed wheelchair product narrative as an illustrative case study and presented a proposed market shaping strategy.

Lessons Learned from Assistive Technology Country Capacity Assessments (2019 – 2020) [AT2030:57]

✓ The Assistive Technology Capacity Assessment (ATA-C) tool was developed and piloted in order to evaluate a country's capacity to deliver appropriate AT at scale to people in need.
✓ The ATA-C tool has now been used to complete 11 country capacity assessments (CCAs), and many more are currently underway.
✓ The tool has had several key successes across the board, including:
  o It raised awareness about AT issues in every country where it has been implemented.
  o The CCA process led directly to a greater degree of coordination. among AT actors in each country.
  o In some countries, findings have already helped form the basis for new policies and even budget allocations for AT.
  o In others, the findings are informing ongoing policy development.

9. Capacity & participation

Capacity and participation focuses on accelerating access to AT by learning from and building the capacity of existing community-led activities; building on lessons from London 2012 to shift attitudes and working with communities and stakeholders to improve accessibility of the built environment. The key objective of this cluster is: **Building community solutions and maximizing the power of the Paralympics to overcome stigma and promoting Inclusive Design.**

This section reports on 10 outputs within the capacity and participation cluster.

A review of the outputs across the sub-programmes 9, 10, 11 and 12, demonstrate a range of findings regarding factors that lead to the development of capacity and participation through embracing inclusive design for accessible, enabling environments; exploring the impact of COVID-19 on people living in informal settlements and finding strategies to enable participation in all areas of citizenship for persons with disabilities and to ensure access to AT.

For the future, the overarching research question is: **What works to build capacity and participation to mediate access and participation in activities of citizenship?**

BUILD CAPACITY & PARTICIPATION

STRENGTHEN POLICY, SYSTEMS, IMPLEMENTATION
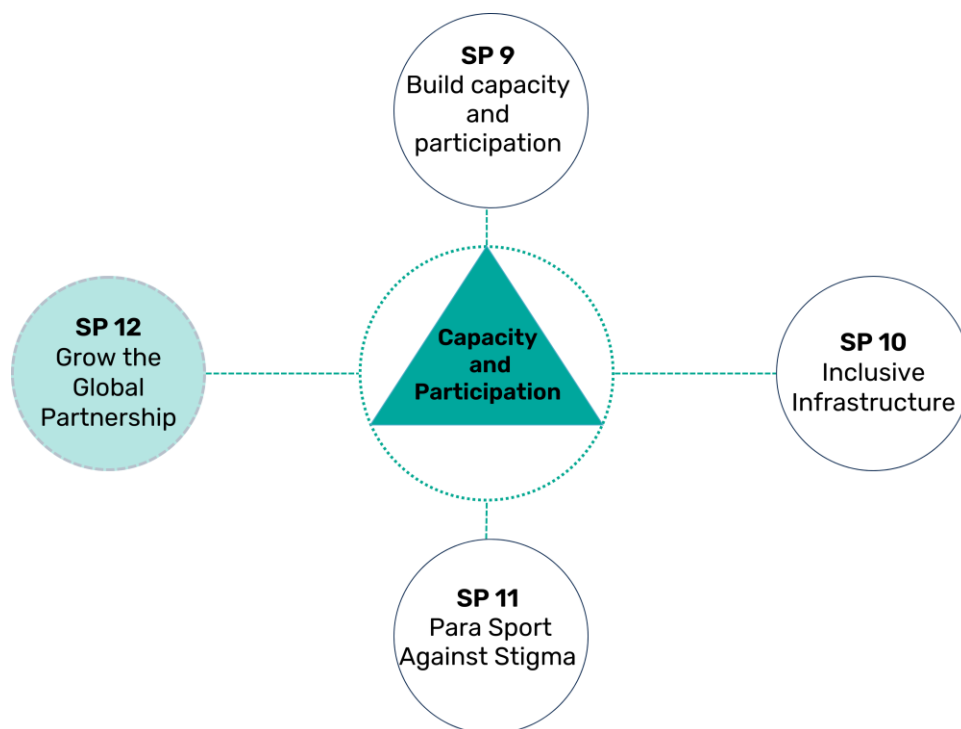
Figure 19: Sub-programmes within the Capacity and Participation Cluster

This Cluster consists of four Sub-Programmes, namely:

(i)   **SP 9: Build capacity and participation:** To learn from and build the capacity of existing community-led activities, this sub-programme will undertake action research working in informal settlements in Sierra Leone and Indonesia. Scoping of community-led solutions to AT, researching community-led practice; and developing mechanisms for the amplification of the views of AT users to inform the rest of the programme, this sub-programme is led by the Development Planning Unit at UCL with input from Leonard Cheshire.

(ii)   **SP 10: Inclusive Infrastructure:** Led by GDI, 'Inclusive Infrastructure' is a 3-year sub-programme, which considers the idea that equal access to AT is dependent on an enabling physical environment. The programme aims to build on the current state of accessibility and inclusion in

the built environment and infrastructure in 6 LMICs, to build a picture of what inclusive design 'looks like' in different contexts through engaging stakeholders who help shape the built environment, with the inclusion and participation of AT users.

(iii) **SP 11: Para Sport Against Stigma:** Over the next four years (2020-24) Para Sport Against Stigma – led by Loughborough University – will build on lessons learned from London 2012. The programme will use a four-pillar approach towards overcoming the role of stigma in the adoption of AT, consisting of education, athlete development, Paralympic broadcast and action research activities.

(iv) ***SP 12: Grow the Global Partnership****: This sub-programme captures the work that GDI Hub is doing to ensure that partnerships and networks are solidified globally in the effort to ensure that assistive technology reaches those that need it. To support the wider AT2030 programme, several partnerships have developed. (Note: no specific outputs analysed)*

Through the delivery of 4 projects across 3 of the 4 sub-programmes, with 10 outputs, including 2 peer-reviewed papers, 2 working papers, 1 report and 3 case studies, we strived to answer the key research question, as well as the associated 4 secondary research questions.

Figure 20 shows the number of outputs analysed per project, depicting a clear emphasis on the following:

➢ Pillar 1 – Research (on Para Sport Against Stigma) (n-4)
➢ Inclusive Infrastructure (n-3)
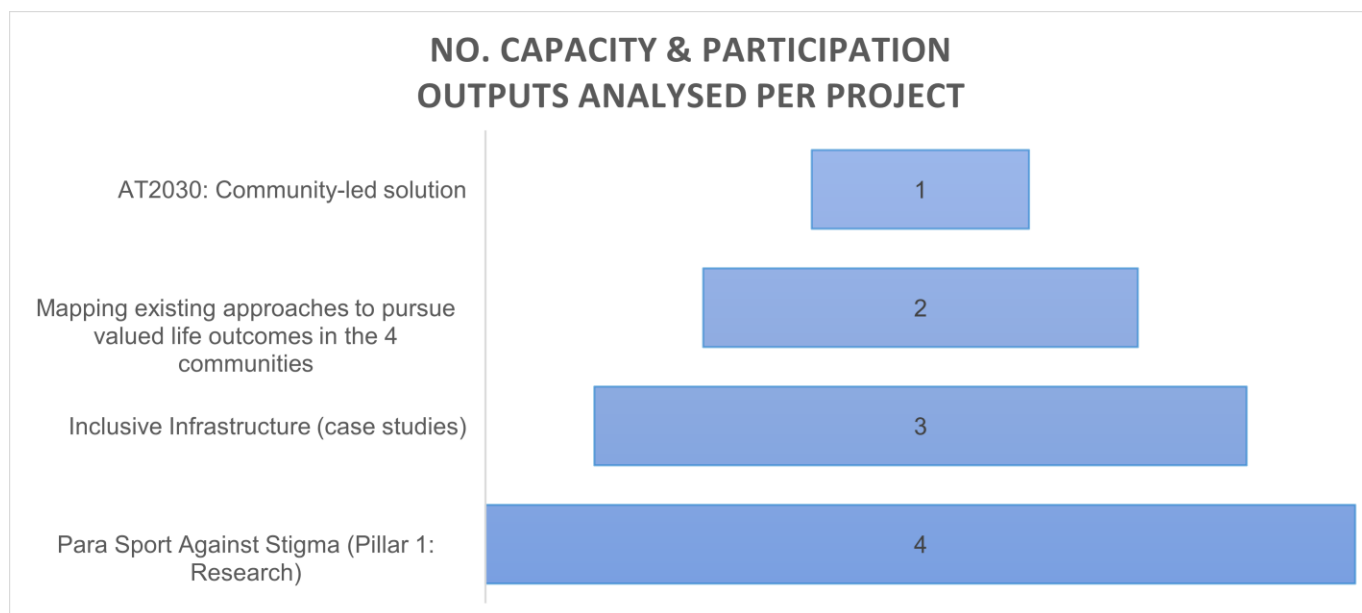
Figure 20: Outputs analysed per project (capacity and participation)

SP 9: Build capacity and participation

Overarching research question: How can collective, and community-led responses, enable disabled people to access better life outcomes through increasing the relevance and uptake of AT, particularly in informal settings?

What Works to improve access to AT?

How are Women with disabilities affected by the COVID-19 pandemic living in informal settlements? (SRQ 2 x 1 output)

Evidence to date suggests that:

- ✓ **The knowledge and experience of women, and disabled women in particular, needs to be put at the centre of international and national health responses** [AT2030.8]**:**

  - ○ Women, but especially women with disabilities living in informal settlements in the Global South have been severely impacted by the COVID-19 pandemic, for example: decreased livelihoods resulting in lack of access to food, high rates of gender-based violence,

and difficulties accessing water and sanitation which heightened the health crisis.

- o As women are key actors in managing crises during global events such as the pandemic within informal settlements, they should be at the heart of health responses, both in their countries, and across the globe.

How can data, as well as collective and community-led responses enable participation in activities of citizenship and access to AT for people with disabilities?
(SRQ 5 x 3 outputs)

Evidence to date suggests that:

- ✓ **The use of the Rapid Assistive Technology Assessment (rATA) tool is key to understanding the need for, and access to AT, especially in settlements occupied largely by low-income communities without specific provision for, or particular visibility of, people with disabilities, such as in Sierra Leone and Indonesia** [AT2030.53]**:**

  - o The rATA tool could address the need for AT data (products and services) in low-income settlements in the global south, in order to close the gap between need and access. This is important given the close association between disability and poverty, and the unique challenges faced by these residents in accessing AT.

  - o Running rATA in Sierra Leone and Indonesia uncovered valuable data, for example: the most common impairments reported by participants in the four communities were mobility and vision; assistive product variety is extremely low and there is limited knowledge about APs and AT.

  - o Being organized as a community around a specific impairment could help to concentrate demand, resulting in more visibility as a group, and therefore making it easier for NGO's and other charitable donors to identify need. This approach could also raise awareness about where and how to get AP (sharing of knowledge), increasing access and thereby lowering stigma.

- ✓ **AT serves as mediator for participation in citizenship for persons with disabilities who live in informal settlements, such as in Freetown (Sierra Leone)** [AT2030.78]**:**

  - o Although appropriate AT is almost entirely absent, it remains an important mediator of access to both formal and informal citizenship participation. However, stigma and negative status regarding disability were also found to be present and significant.

  - o Citizenship participation for persons with disabilities was valued as a means toward achieving a better future.

  - o There is also a desire for collective participation among persons with disabilities who live in informal settlements and also increasing engagement between organisations of persons with disabilities and organisations of the urban poor.

  - o It is important that AT as an enabler of citizen participation is better understood to avoid a de-facto and reductive focus on economically productive activities such as learning and earning.

SP 10: Inclusive Infrastructure

Overarching research question: What is the current state of inclusive and accessible environments, and infrastructure in LMICs, and what is the role of inclusive design in creating an enabling environment for disabled people?

How can inclusive design and accessible, enabling environments drive disability inclusion? (SRQ 6 x 1 output)

Evidence to date suggests that:

- ✓ **In order to create more inclusive environments, the physical infrastructure, planning and design is crucial, but equally important are the processes of inclusion and participation (Case Study: Solo, Indonesia)** [AT2030.122]**:**

- o Creating robust mechanisms of community participation and leadership is fundamental to ensuring long-term sustainable and continued progress to creating more inclusive cities.

- o An enabling environment for persons with disabilities should integrate: a supportive legislative environment, an inclusive culture and mindset, participation in planning, design and decision-making, positive cultural change, an accessible and inclusive built environment and access to good quality and affordable assistive technology.

- o So, what does an inclusive environment (like Solo) look like?

  1. **Participation:** A city where people with disabilities are recognised and directly involved in urban development

  2. **Mobility:** A city with an integrated inclusive transport network that facilitates people's mobility from door to door.

  3. **Urban life:** A city where all types of spaces are inclusive and accessible, enabling people with disabilities to fully participate in urban life

  4. **Leisure and wellbeing:** Inclusive tourism, recreational spaces and green spaces for all

  5. **Resilience:** Inclusive and sustainable infrastructure that supports resilience to crises and climate change

  6. **Assistive technologies and enabling infrastructure:** easy and affordable access to the assistive technologies people need and a built environment and infrastructure that supports their use.

  7. **Opportunities:** equity of access to opportunities and information for all, including those employed in the informal sector.

SP 11: Para Sport Against Stigma

Overarching research question: Building on the lessons learnt from the Paralympics in London 2012, what approaches overcome stigma related to AT?

What works to reduce stigma related to disability and to AT, and promotes social inclusion? (SQR 18 x 4 outputs)

Evidence to date suggests that:

✓ **Paralympic broadcasting is an important vehicle in disability representation and the development of empowering disability narratives (reach: 49 countries and over 250 million people)** [AT2030.149]**:** [AT2030.151]**:** [AT2030.152]**:**

  o In order to enhance the sustainable development, reach and impact of the Paralympic broadcasting of Tokyo in 2020 across Sub-Saharan Africa as a vehicle for disability stigma reduction and AT adoption, we need to recognize:

  • The pedagogical value, complexities and limits of Paralympic disability narratives.

  • The need for providing greater disability resources more widely across different communication contexts and genres for effective progressive social change.

  • The importance of a de-centralized media approach that engages with disability community advocacy groups, localized communication activities and practices, and culturally specific disability narratives.

  • Communication for Social Change (CfSC) has value in connecting mediation with mediatization – that is, from communication practices to wider social-cultural processes of change – in the context of Paralympic broadcasting in Sub-Saharan Africa.

  • Paralympic coverage has

demonstrated its pedagogical power to engage public(s) on issues related to disability that have contributed to challenging the negative associations, stereotypes and stigma toward disability.

- o **We also learnt that:**

  - The exposure provided by the main free to air channels in most of the Sub-Saharan countries of the Tokyo 2020 Paralympics Games not only demonstrated significant emotional appeal of this spectacle along with the performances of the athletes, it also helped to raise awareness and importance of inclusion among both the general population and sports enthusiasts.

  - Audience research highlighted the popularity and importance of radio broadcast and community screening activities in community spaces such as Schools.

  - Focus group audience research conducted in Malawi further indicates that the impact of the Paralympic broadcast on audiences' disability attitudes was positive.

  - Personal and localised stories of Para athletes and their experience of disability were particularly powerful in capturing the audience and reducing some forms of disability stigma

  - Paralympic broadcasting is an important vehicle in disability representation and the development of empowering disability narratives.

  - Localising Paralympic content through Chichewa interpretations and commentary was successful and should be further developed as a localising activity for future Paralympic Games.

  - Audience and community research indicate that Paralympic coverage is a useful tool for tackling negative cultural disability attitudes and showcasing

the role of AT in enabling individuals with a disability to play sport and participate in civic life.

✓ **Including a disability rights advocate as presenter about disability inclusion (through the Malawi Broadcasting Corporation – MBC) and as part of the commentary team for the Tokyo 2020 Paralympic Games, had some far-reaching (potential) benefits** [AT2030.150]**:**

  o This was a progressive and impactful approach to raise awareness and promote inclusion.

  o He (Andrew) was able to promote disability-related conversations to both people with and without disabilities, as well as to potentially influence those individuals in positions of power to create the much-needed change.

  o He played an 'activist' role to draw attention to social inequalities and disability rights. For example, at times, he used humour to highlight very low disability sport participation rates in Malawi so that the corporate world and those in authority would listen.

  o The Paralympic Games broadcasting put Malawi on the international map and could help bring in much needed funding and resources for athletes and inspire people with disabilities to think differently about possibilities in life, for example, helping parents to focus on the abilities of their disabled child, rather than their 'inabilities' and that participation in sport is possible, even at the highest level of competition.

Sub-programme 12: Grow the global partnership

Overarching research question:In support of the wider AT2030 programme, how best to ensure that partnerships and networks are solidified globally in order to ensure increased access to AT?

This sub-programme captures the work that GDI Hub is doing to ensure that partnerships and networks are solidified globally in the effort to ensure that assistive technology reaches those that need it. To support the wider AT2030 programme, several partnerships have developed, such as those with the International Society for Prosthetics and Orthotics (ISPO), India AT Innovation Challenge which includes AIIMS and IIT-Delhi, Keio University (Tokyo Summit), to mention a few. Currently AT2030 works with more than 70 partners across the globe in 41 countries. GDI also supports the growth of ATscale, the Global Partnership for Assistive Technology, often working together to ensure that the maximum impact is reached across all activities.

All evidence points to the fundamental importance of partnerships and networks, both bottom up and user-led, and top-down engaging key stakeholders. The broad array of outputs and areas of focus and the emerging relationships between and across [streams of research / pillars / clusters / sub-programmes etc.] suggest strategic attention ought to be given to solidifying and further leverage off partnerships. This is echoed in the literature, where thought leaders in assistive technology across global regions recognise and applaud the AT2030 initiatives but call for coherence across global initiatives in the interest of increased access to AT for all (Layton et al., 2020).

Section summary and recommendations

This programme cluster addresses what works to build capacity and participation in order to mediate access and participation in activities of citizenship. The projects delivered demonstrate a particular focus upon determining what collective and community-led responses enable disabled people to access better life outcomes through increasing the relevance and uptake of AT, particularly in informal settlements, as well as overcoming stigma and promoting inclusive design.

What works to build community solutions, maximizing the power of the Paralympics and other strategies to overcome stigma and promoting Inclusive Design?

✓ **The *Rapid* Assistive Technology Assessment (rATA) tool uncovers the need for, and access to AT**, especially in contexts without specific provision for, or particular visibility of disability and AT use.

o Further research could help to understand how urban low-income communities could develop support mechanisms to advocate for ATs; and give insights into how to improve access to information, secure devices and address stigma around AT.

✓ **AT as mediator of participation:** Consistent with the mission led approach, our findings suggest it is valuable to recognize the power of AT to achieve participation in citizenship, above and beyond transactional gains in economically productive activities such as learning and earning.

o Further work might consider AT for the purposes of citizenship participation in greater depth, especially for the poorest, as a necessary pre-requisite for delivering expressed global commitments on disability justice and inclusion.

o Policymakers and donors might consider the specific role participation must play in disability justice, and question: with what technology, provided within which social support structures, is the recourse of disability justice for the poorest best enabled?

o A greater degree of nuance is needed in the global evidence base on AT to address the specific issues of persons with disabilities who live in informal settlements—often this is the poorest group who are most in need yet research about the lived experience of this group, and their voices, are infrequently heard.

✓ **Creating inclusive environments:** In order to create more inclusive environments, the physical infrastructure, planning and design is crucial, but equally important are the processes of inclusion and participation.

Recommended actions include:

o Cooperation, collaboration and coordination: across government sectors, with practitioners, with communities – an inclusive city is built together.

- o Engage the private sector in inclusive city initiatives, privately-owned spaces and infrastructure that serves the public must also be inclusive.

- o Develop further tools to support community participation in urban planning and governance, particularly for people with disabilities.

- o Dedicate budgets to inclusive city design and work towards long-term financial sustainability for inclusive design implementation.

- o Embrace local knowledge, develop an inclusive design strategy for Solo that integrates local expertise and culture.

- o Support assistive technology users through developing inclusive infrastructure that considers the needs of diverse AT users.

- o Encourage and facilitate community leaders to amplify the voices of their communities to integrate bottom-up urban planning.

- o Scale and replicate what works, where innovations have been successful, learn from them and test how they can be applied elsewhere.

- ✓ Paralympic learnings include deep understandings of power of positive images and storytelling, via conduits such as the media and communities, to overcome stigma and promoting inclusive design

CASES 4A and 4B

Paralympic Broadcasting in Sub-Saharan Africa: Sport, Media and Communication for Social Change [AT2030:149]

Paralympic coverage has demonstrated its pedagogical power to engage public(s) and challenge stigma toward disability. Yet, the Global picture of Paralympic broadcasting is deeply uneven, with audiences in parts of the Global South afforded limited opportunities to watch the Games. Considering this, the International Paralympic Committee has begun to broadcast Paralympic coverage across sub-Saharan Africa with an explicit aim to challenge stigma toward disability. In this article, we draw on examples from research to argue that ideas from the field of Communication for Social Change (CfSC) can add value towards this aim. We argue that thinking with CfSC concepts show the importance of a 'decentred' media approach that engages with disability community advocacy groups, localised communication activities and practices, and culturally specific disability narratives (Noske-Turner et al., 2022).

Co-creating Inclusive Public Spaces: Learnings from Four Global Case Studies on inclusive Cities [AT2030:155]

Persons with disabilities can experience multi-dimensional exclusion from urban life, including but not limited to physical, attitudinal and social barriers. Public spaces, including recreational and social spaces, are often not prioritised. Inclusive public spaces are fundamental to participation and inclusive in society. Including persons with disabilities in the design and planning of the built environment supports equal rights and helps identify people's aspirations for inclusive environments. Four city case studies were discussed in the paper: Ulaanbaatar, Mongolia; Varanasi, India; Surakarta, Indonesia; and Nairobi, Kenya. The paper concludes by discussing how people, policy and practice also help represent three essential dimensions of inclusive city design and forming a framework for successful implementation and delivery (Patrick & McKinnon, 2022).

Conclusions and recommendations

Then and now…

Ten months into the rollout of the AT2030 programme, Austin and Holloway (2019) described the research aims as follows:

"How best could a targeted intervention around AT affect positive change for poor, disabled and older people in the Global South?"

To understand this question, two specific lines of enquiry were undertaken:

- *What are the barriers which prevent access to AT for the people that need it, with a focus on those living in low resource settings? (Barriers)*
- *How should DFID, in partnership with others, best direct its intervention toward overcoming these barriers?*

Describing the early findings in their Consultation Paper "Overcoming systematic global barriers to AT: a new methodology and quick-start testing through a £20m programme" for the WHO GReAT Consultation, Austin and Holloway described the flexible and iterative mixed methods and multi-partnerships approaches being used, noting:

"The programme is still in its early stages, but the working assumption is still that the participation of AT users is a necessary factor in the design of innovative solutions, and moreover that the availability of AT products alone is not sufficient to 'enable a lifetime of potential' without a systematic approach to inclusion" (Austin and Holloway, 2019, p 2).

This 'What Works' report is written 45 months into the AT2030 programme which seeks to transform access to life-changing AT by creating partnerships with the private sector to build and shape markets testing innovative approaches and backing 'what works' to get AT to those that need it the most. The body of work has exceeded expected targets (GDI Hub Annual Reports, 2021/2022).

Over 70 partners across more than 35 countries have collaborated in working to achieve AT2030's targets and to deliver impact regarding access to AT in LMICs. The targets to be achieved by 2024 and the achievements to March 2022 (as per most recent logframe) are provided below:

AT2030 TARGETS (2024)	ACHIEVEMENTS TO DATE (MARCH 2022)
REACH[1] - enabling a lifetime of potential through life-changing AT	
• 9 million people directly reached through increased access to AT	• **6 million people**
• 20 million people indirectly reached through all programme activities	• **22 million people**
• Capture 40 life stories reflecting the life-changing impact of AT (14 per annum)	• **13 life stories captured**
NEW MODELS of 'what works' to improve access to AT have been tested - focus on innovative technologies, AT ventures, innovative service delivery models and global capacity support	
• Scale up / ensure on track to scale up 10 innovative AT ventures	• **10 AT ventures**
• Support 44 AT ventures for sustainability	• **27 AT ventures**
• Number of entities (countries or organisations) implementing AT2030 funded ideas (findings, research or new methodologies) = 30	• **39 entities**
• Develop 10 innovative service delivery models	• **9 models**
INNOVATION – Innovation Ecosystem established via acceleration programme	

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[1] Direct Reach (People) – who participate at an individual level in the activities and/or outputs of AT2030
Direct Reach (Systemic) – Groups who benefit from the outputs and outcomes of the AT2030 relating to improved provision of AT through policy and system advances, and community- and organisational-led change.
Indirect Reach – Individuals who are not directly connected with the programme but could still derive benefit from it.

• Support 32 new innovative assistive technologies	• **30 technologies**
• Establishment of Innovate Now's accelerator programme with 5 cohorts conducted	• **4 cohorts run**
• Number of AT Impact Fund investments = 6	• **6 investments**
DATA & EVIDENCE – Critical research questions are answered and methodologies produced	
• Publishing of 25 peer reviewed journal articles	• **34 articles published**
• 60 influencing papers[2] which answer critical research questions published	• **63 papers published**
• Number of downloads/views of the above = 203 100	• **43 024**
CAPACITY AND PARTICIPATION – Partnerships directly supported, and tools developed/lessons learnt to support countries and global agencies	
• Support 100 partnerships[3] to increase AT capacity	• **85 partnerships**
• Develop 65 strategic tools[4] to increase AT capacity (incl. ATscale)	• **50 tools**
• Produce 20 case studies	• **17 case studies**
• £19,8m in matched funding provided through partnerships	• **£13,8m matched funding**
COUNTRY TESTING & IMPLEMENTATION – Evidence from in-country pilot activity through investment to stimulate demand, improve supply of AT for LMICs and create a more enabling market environment	
• Conduct 10 Country Capacity Assessments (CCA)	• **12 CCAs**
• 7 countries to deliver CCA Action Plans	• **10 CCA Action Plans**

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[2] Influencing papers are not peer reviewed / journal articles, but typically published as Policy Papers, Insight Papers or other Programme Lessons

[3] A partnership is described as the participation of a (registered) organisation in the delivery of one or more of AT2030's activities. The GDI Hub has sub-contracts/MOUs with some partners but not all. These partnerships include those with 'beneficiary partner organisations' such as local governments in cities where inclusive infrastructure programming occurs. (85 with 22 being UK-based)

[4] AT innovators map, WHO AT data repository online, TAP training, I'mPOSSIBLE localised, APL (Liberia), National Roadmap to Increase Access to AT (2021 – 2023), InnovateNow Innovation Toolkit etc.

• Number of countries with direct investment in AT matched to be sustainable = 4	• **4 countries**
• Number of 'one-stop-shop' pilots at the country level = 2	• **2 pilots**
• Number of 52 min daily digests of the Japan Paralympic Games produced = 13	• **13 produced**
• Broadcasts across a number of African countries = 30	• **49 countries**

From the above data it is evident that in most areas the AT2030 programme has exceeded not only its annual targets, but in many cases, also the targets set for 2024. In the latest reporting period from April 2021 to March 2022, AT2030 met or exceeded expectations against 14/16 Output, 4/4 Outcome and 2/3 Impact Indicators, and delivered a strong value for money assessment, including a 100% match funding target. Already the programme has reached 28 million people[5] and GDI Hub is very proud of the fact that it received an A+ rating from the FCDO in 2019-2020, being recognised as 'excellent – exceeding expectations.

So, what do we now know that we did not know when we started out?

The 'What Works' report sourced evidence of impact across the AT2030 deliverables, and by surveying key partners. A deep dive into a selection of 98 outputs published under the programme included 59 academic outputs and 38 knowledge translation works. This section summarises our key findings:

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[5] AT2030 Reach falls into three categories as per the detailed Reach Definitions attached to the programme. In this reporting period (2021-2022) AT2030 delivered: 862,408 in Direct Reach (People); 5,046,928 in Direct Reach (Systemic); and 22,487,343 in Indirect Reach.

Finding 1: 'HOW we know what works'

- ✓ AT2030 projects describe their method or approach and publish their findings in the public domain. These commitments strengthened the evidence base, kick started scale and enabled critical review and engagement from global stakeholders.
- ✓ AT2030 is not yet known for consistent methodological rigor but is known for fearless engagement with 'what matters' across fields of research and within complex ecosystems; being brave enough to test 'what works' or to learn what doesn't work.
- → Opportunity exists to refine and implement a preferred AT2030 research methodological approach and a set of criteria to be developed to ensure alignment with the research framework.

  A 'limitation' to the existing outputs has been the research drift from initial research question or aim, through to the delivered outputs and conclusions. Whilst understandable in the light of the multiple contextual complexities with which AT2030 research grapples, tightening this link will strengthen the research.
- → Options include action research cycles or iterative study designs, allowing a research program to develop yet delivering on intent.

Finding 2: 'WHAT we know regarding what works'

Two frameworks are used to think about the coverage of the AT2030 work. Firstly, the 5 P (plus Place) AT Ecosystem model (WHO, 2017) and secondly the IMPACT 2 model (Smith, 2002) of AT outcomes research.

1. For the 5 P (plus Place) AT Ecosystem Model, analysis of the title and research aims of each output selected the main focus (one only). Products and provision were the core focus of the majority of outputs analysed.
   - ✓ We have learnt across multiple data points about the 5 P's and how they work or do not work together. Place is a critical 6 P and working with People to tailor the offering is of paramount importance and a major contribution of the AT2030 body of work to the AT evidence base.

→ **REC:** include specifying 2 or more P foci in setting out research aims is encouraged. This will enable the context and the focus to be clearly stated and amplify the contribution of the AT2030 reach across all P's.
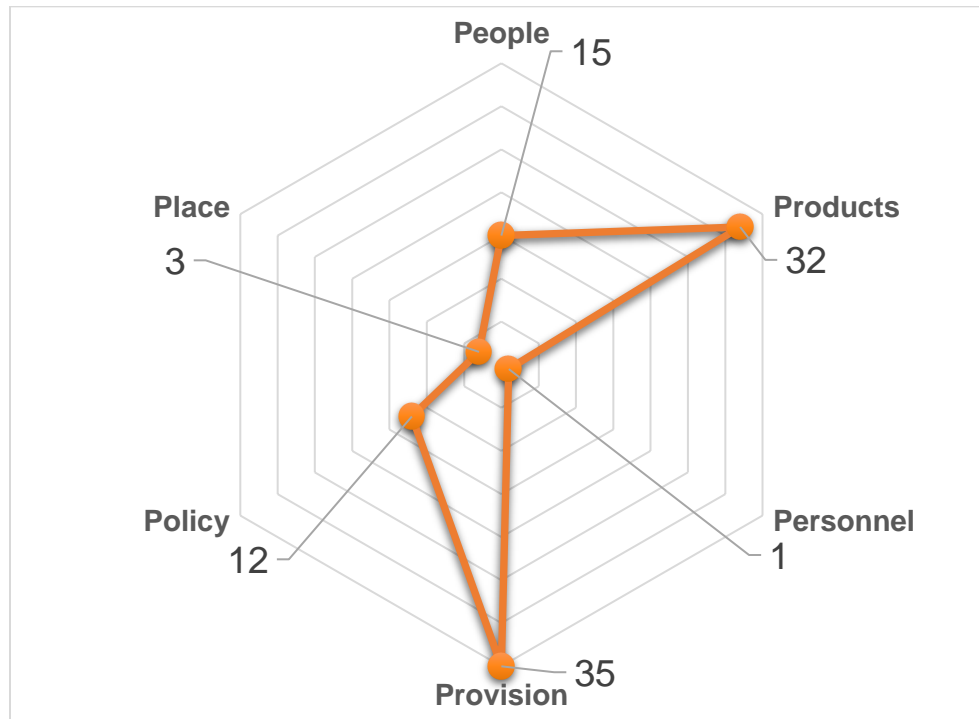
Figure 21: WHO 5 + 1 P's (n 98)

2. Assistive technology outcomes research can be categorised according to the IMPACT 2 Model of Professor Roger O. Smith of RESNA (Smith, 2002). This model enables us to identify the locus of research - that is, researching the AT user, their context (environment, task, the presence of supportive factors which may mediate need such as universal design or health promotion), whether we are measuring a baseline, running an intervention, measuring an outcome, capturing any outcome co-variates (things happening at the same time) or measuring precursor variables and/or outcomes (in terms of function or other dimensions).

Mapping the AT2030 sets of research sub questions to the IMPACT 2 model demonstrates

most of the research is occurring upstream or downstream of the actual AT user.

✓ AT2030 intentionally focusses on factors underrepresented in the literature, specifically the potential of innovation and enterprise, market shaping and the reimagination of disability through sport.

→ Vigilance in strategically mapping research to ensure AT2030 addresses suitable locus of impact.

CONTEXT	BASELINE	INTERVENTION	OUTCOMES
- How can data, as well as collective and community-led responses, enable participation in activities of citizenship and access to AT for people with disabilities? - What pathways and strategies expand access to rehabilitation and AT services utilising national scale-up tactics? - What market to business strategies deliver pathways to digital accessibility and digital AT? - How best can the Country Capacity Assessment process support the provision of AT to people in low-resource settings? - What ecosystem best mitigates the impact of humanitarian crises upon AT access and facilitates social inclusion? - What are the systemic success factors which support entrepreneurial activities and sustainable business models within emerging AT ecosystems?	- What is AT need and coverage as estimated through specified tools in identified localities for defined assistive products?	- How can the potential of mobile technology be leveraged to support digital inclusion and increase access to AT? - What novel approaches and thinking is needed to enable AT innovation, service provision and disability inclusion?	- What is the impact of an evidenced intervention (e.g., clubfoot initiative) upon quality of life, social participation, and inclusion? - Should functioning be measured when evaluating outcomes of rehabilitation and AT? - Has AT2030 produced levers of change to increase access to 50 priority APL with technical specifications and implementation guidance
ENVIRONMENT - How are Women with disabilities affected by COVID-19 pandemic living in informal settlements? - How can informal markets be improved, and AT actors be supported to increase access to AT? - What market shaping interventions promote effective and sustainable AT access? - How can a co-designed, open-source visual tool enable access to information to support AT innovation? - How can inclusive design and accessible, enabling environments drive disability inclusion?			
PERSON - What works to reduce stigma related to disability and to AT, and promotes social inclusion?			

Figure 22: AT2030 research focus mapped to IMPACT 2 model of AT outcomes research

Finding 3: The Global Overarching Strategic Priorities remain fit for purpose

The four Programme Clusters are fit for purpose to guide the tranches of AT2030 work and deliver on AT2030s mission. Cluster sub-programme elements are not mutually exclusive, as evidenced by the overlap of sub research questions which emerged from deconstruction and synthesising of the AT2030 data. For example, addressing stigma or ecosystem factors falls across several clusters (and pillars) and sub-programmes.

→ **REC 1:** strengthen strategic oversight (as noted in Annual Report improved cross-programme communications and linkages (Sept 2020) of the multiple concurrent outputs across Cluster to align and maximise impact

→ **REC 2:** Regular review of Cluster activities and aligning research planning over the medium to longer term will ensure a) evaluation occurs and b) longer term impacts can be measured

Cluster 1: Data & Evidence

What works to develop conceptual foundations, build research evidence and evaluate impact across AT ecosystem elements, to deliver on AT2030 mission?

Research, Evidence, Impact and Promotion are effective tools with which to a) frame the economics of AT around a mission-led approach; b) develop a return-on-investment framework; c) research what works to overcome stigma; d) support the development of the Global Report on Assistive Technology, and e) produce evidence of local production systems for AT in LMICs.

✓ Improving data and evidence can unlock investment into AT.

→ **REC 1:** The Program is ready to commit to a more systematic approach, set of methods, and evaluation structure, perhaps establishing a mixed method protocol to guide selection of methods based on a P analysis of the sub research question (refer to Figures 26 and 28).

→ **REC 2:** Strategic oversight across clusters and sub-programmes is needed to further align and build value for research endeavour.

→ **REC 3:** AT2030 can move from single research enquiries to multi-phase programs of research given its level of maturity.

→ **REC 4:** Consider disrupting the data and evidence pillar to become a crosscutting feature of all pillars, thereby strengthening rigor and method of all activities.

Cluster 2: Innovation

What works to spark innovation and new solutions to get access to AT for the people that need it, with particular focus on the innovations which support new products and service delivery models to scale?

Innovation strategies included delivering AT innovations in East Africa through inclusive innovation ecosystems, AT accelerator, service delivery and wheelchair provision. Additionally, horizon scanning to scope the disability mobile gap and programmes to address stigma, as well as 3D printing for humanitarian response and an AT Makeathon.

An **Assistive Technology Impact Fund (ATIF)** was established to better enable frontier technology solutions to reach people with disabilities in Africa, and to test business models that are most likely to succeed.

✓ Multiple examples were conceptualised, piloted, trialled and scaled, demonstrating that supporting new products and service delivery models is effective in scaling access.

✓ Inclusive approaches are key to understanding wicked problems – see learnings from COVID-19 and from humanitarian challenges.

✓ Innovation in novel technologies can be kick-started with fit-for-purpose innovation ecosystems.

✓ Addressing change at multiple levels in an ecosystem is feasible and effective, for example work on stigma, on markets, on enterprise and on digital and mobile technologies.

✓ The Innovation Hub India project, led by multiple partners which explores the delivery of an Innovation Hub in India with regional reach is still in its inception phase and has not yet produced any evidence-based deliverables to be reported on to date.

→ **REC 1:** Key learnings from in-country implementation support recommendations for the next tranche of research, for example business to business strategies and AI

→ **REC 2:** Implementing conceptual frameworks such as Disability Interactions in future research projects, can be considered.

→ **REC 3:** Evaluation methodologies of new innovations can be systematized and further strengthened.

Cluster 3: Country Implementation

What works to develop conceptual foundations, build evidence and evaluate impact across AT ecosystem elements, to deliver on AT2030's mission?

Drive Affordability and Availability & Open-up Market Access:

✓ Feasibility has been demonstrated for market shaping and systems-level change was demonstrated to be possible.

✓ AT Product Narratives are proving effective in informing global investment and scoping market-shaping opportunities.

✓ AT2030 knowledge could support the development of standardised evaluation frameworks for country-wide implementation, which are context flexible.

→ **REC 1**: Expand and strengthen ecosystem networks as these are essential precursors to market shaping.

→ **REC 2**: Expand and strengthen strategic partnerships as these are essential precursors to systems level change.

Country Capacity:

✓ Country Capacity Assessments have been developed, tested and iterated. Country-wide national action plans are underway, with related investment.

→ **REC 1:** Continue to refine country capacity assessment tools.

→ **REC 2:** Further explore the levers of change to facilitate country capacity building.

Cluster 4: Capacity & Participation

What works to build capacity and participation to mediate access and participation in activities of citizenship?

Building capacity and participation: rich and nuanced evidence emerged from action research working in informal settlements in Sierra Leone and Indonesia. The research featured the scoping of community-led solutions to AT, researching community-led practice; and developing mechanisms for the amplification of the views of AT users to inform the rest of the programme.

→ In-depth understanding of the levers of change in individual ecosystems is essential precursors to systems level change.

→ **REC:** Sound methodological principles of person-first and community-focused research are emerging and being verified across projects; these can form an AT2030-unique mixed methods approach to future work i.e. HOW we do things.

Inclusive Infrastructure: Work on enabling physical environments is founded on evaluation of the current state of accessibility and inclusion in the built environment and infrastructure in 6 LMICs. A picture of what inclusive design 'looks like' in different contexts is emerging.

→ **REC:** Methods for engaging stakeholders to shape the built environment, with the inclusion and participation of AT users, are emerging and need to be explored across contexts and consolidated.

Para Sport Against Stigma: A four-pillar approach towards overcoming the role of stigma in the adoption of AT, consisting of education, athlete development, Paralympic broadcasting and action research activities, has been underway.

- ✓ Media and champions are demonstrated to be impactful pathways to address stigma, AT adoption and inclusion.
- → Evidence is emerging regarding nuances of stigma, for example its relationship to funding contexts. Further research is indicated to test in different contexts and build a model for implementing the para sport against stigma approach.

Grow the Global Partnership

- → Objective evidence demonstrates the extent and strength of global partnerships and networks working to ensure assistive technology reaches those that need it. Documented outputs such as the WHO/ UNICEF Global Report and GReAT Background Papers attest to this, as well as collaborations with ATscale, IDA, UNICEF and many other global stakeholders, including leading and participating in high-level global events such as the Global Disability Summits.

    Community participation and capacity building – "*the exclusion of AT users from programme design, policy and decision-making leads to poorer outcomes, continued power imbalances and political exclusion – these things are all part of the problem and solutions must be designed to counter this* (Holloway et al., 2018)."

In summary – what is working, and what next?

AT2030 Principles	
(Austin Victoria & Holloway Cathy, 2019)	
What is working…	**What may work for next steps…**
10. AT2030 are delivering a global, mission-led approach with measurable outcomes and clarity of how to ensure a return on investment.	AT2030 has delivered a never-before seen tranche of research entirely targeted at impact and tackling the complex reality of life for AT users. **Coordination within the context of global endeavors is recommended** (Layton et al., 2020)
11. Research and better data is demonstrated to be essential to enable countries to understand the ROI for AT and genuine economic choices before them.	A unique output of AT2030 is the valuing of human potential and the realization of humanistic, mission-led principles into practical tools applicable for markets. Building on this powerful start, **further work is required to refine data collection methods and to implement knowledge translation with key stakeholders.**
12. Testing and piloting market shaping - accepting there is a way to go before this approach can be scaled. Need a strong research base.	A strong body of work on market shaping is underway, with the outputs clearly showing iterations of methods and tests in different environments. **A research vision to systematically work through market shaping variables, aiming towards an evaluation framework, is recommended, together with innovative procurement models.**

7. Determined work on systemic interventions with national governments.	AT2030 is uniquely placed to engage with national governments and the continued open-source documentation of policy change strategies will be invaluable for the sector as a whole. **The use of developed tools such as CCA and rATA to be radically scaled, and the tackling of the sparse data and data management challenges e.g., through the use of the Disability Management Information Systems (DMIS).**
8. Harnessing innovation and new market entrants – with a focus on leapfrog technology, looking beyond the traditional understanding of products or services and bringing in new players.	A diverse set of innovations and innovators have been identified and tested (GDI Accelerate): next steps are to consolidate **methods and evaluation strategies to objectively measure research outcomes and impact, including longitudinally. Additionally, a key focus on new digital and future A-tech e.g., AI is suggested.**
9. Community participation and capacity building – the exclusion of AT users from programme design, policy and decision-making leads to poorer outcomes, continued power imbalances and political exclusion – these things are all part of the problem and solutions must be designed to counter this	AT2030 has demonstrated creativity and stamina in coupling community values and a recognition of individual worth with the reality of markets and enterprise. AT2030 underpinning philosophies are well articulated. **Translating these into research tools and applying these consistently across projects will build the brand and sector trust in AT2030's approach, contributing to broad uptake and scale.**

Additional future direction and considerations

Building on the work to date, and responding to current trends, the following areas of enquiry can be further developed and integrated into the research and programmatic agenda of AT2030:

➢ Supporting WHO activities related to TAP:

   o Expand and strengthen WHO's online TAP and help to establish the first regional TAP resource hub in SEAR

   o Build and improve the AT Data Portal

   o Support the development of WHO APL II

   o Digital Accessible Assistive Technology

   o Signposting to 'all' currently available/validated AT Procurement Catalogues

   o Supporting the provision of technical capacity to assist with the delivery of WHO tools at a country level (upon request)

➢ Use "what works" and tools to build country-level data, capacity and knowledge; develop accessible guidance documents (road map and principles) for strengthening programmes

➢ AT in temporary and informal settings, and humanitarian and disaster situations e.g. public health emergencies – development of an AT Provision and Coordination Framework

➢ Momentum to bring in 'new players' across the AT innovation ecosystem for broad spectrum growth and achieving scale

➢ Recognition (via evidence-based research) of the social, economic, cultural and rights-based significance of AT

➢ Convergence of work in the spaces of inclusive infrastructure, inclusive climate resilient cities (building out from COSP) and community participation, and pushing the innovation boundaries in this space

➢ Centering disability justice as the 'AT for what', intersecting with climate justice, EdTech, and gender among others

➢ Working with prominent global Tech companies to establish a Commission on Accessible Technologies to identify and invest in the reducing the barriers to providing accessibility through mainstream technologies

➢ Global procurement – an expanded role in supporting UNICEF's global procurement of AT, at a substantially reduced unit cost e.g. collaborate to finalise selection of two products to add to the UNICEF/WHO supply catalogues (in addition to hearing aids and wheelchairs)

Finally, as a key recommendation, AT2030 is encouraged to embrace an adapted version of the Translational Research Framework (Sax Institute, n.d.) in order to firm up a research method protocol for the programme that flows through a process including efficacy, replicability and effectiveness in a more systematic and iterative way (Figure 23).
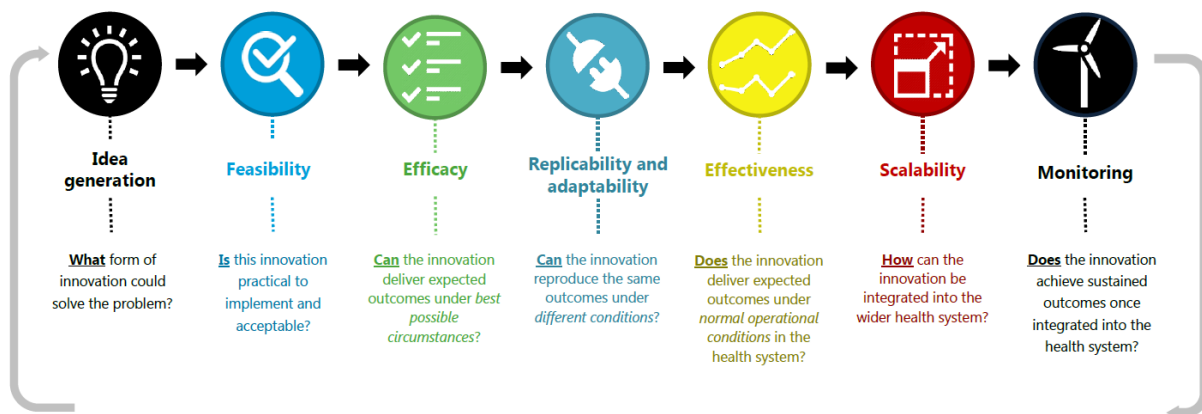
Figure 23: Translational Research Framework: testing policy, program and service innovation

Drawing from the Sax Institute's framework, an adapted version for AT2030 is proposed – see Figure 24:
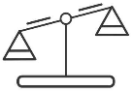
IDEA GENERATION	**What** form of innovation could solve the problem – lack of access to AT?	Co-designed, AT-user centred, sustainability, real world problem
FEASIBILITY	**Is** this AT-related innovation practical to implement and acceptable i.e., will it work to enable access to AT?	Consider frameworks such as WHO 5 P framework
EFFICACY	**Can** the AT-related innovation deliver expected outcomes under best possible circumstances?	Demonstrate that the AT innovation works in one context (and works well)
REPLICABILITY/ ADAPTABILITY	**Can** the AT-related innovation reproduce the same outcomes under different conditions?	Stepwise / systematic trial in different conditions, as defined by the WHO 5 P framework
EFFECTIVENESS	**Does** the AT-related innovation deliver expected outcomes under normal operational conditions or contexts?	Measure outcomes in real world settings, be context conscious
SCALABILITY	**How** can the innovation be integrated into the wider AT ecosystem?	Actively work on all the P's that need to work together for integration across the system
MONITORING	**Does** the AT-related innovation achieve sustained outcomes once integrated into the wider AT ecosystem?	Build in evaluation of impact, not only measuring impact

Figure 184: Translational Research Framework – applied to AT2030

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Annexure A: Partners & projects overview

CLUSTER	SUB-PROGRAMME	PROJECT	PARTNER
1 - Data & Evidence	1: Research, Evidence and Impact	What Works	GDI Hub
1 - Data & Evidence	1: Research, Evidence and Impact	Impact Stories & Community Collaboration	UCL
1 - Data & Evidence	1: Research, Evidence and Impact	Mobile Screening Tool	LSHTM
1 - Data & Evidence	1: Research, Evidence and Impact	AT2030 Insights Portal	UCL
1 - Data & Evidence	1: Research, Evidence and Impact	Develop market shaping framework methodology	UCL
1 - Data & Evidence	1: Research, Evidence and Impact	Frame the economics of AT around a mission-led approach and develop a return-on-investment framework	GDI Hub/UCL
1 - Data & Evidence	1: Research, Evidence and Impact	Researching What Works to Overcome Stigma	GDI Hub/UCL
1 - Data & Evidence	1: Research, Evidence and Impact	Assistive Technology in Humanitarian Settings	UCL
1 - Data & Evidence	2: Research, Impact and Promotion	Improving Sparse Data	UCL
1 - Data & Evidence	2: Research, Impact and Promotion	Systematic Reviews & Influencing Papers	GDI Hub/UCL
1 - Data & Evidence	2: Research, Impact and Promotion	Digital Transformation of Prosthetic & Orthotic Services	UCL
1 - Data & Evidence	2: Research, Impact and Promotion	Disability Interactions	UCL
1 - Data & Evidence	2: Research, Impact and Promotion	GReAT Report	GDI Hub/UCL
2 - Innovation	3: Innovation	World Wizzy/Daisy	UCL
2 - Innovation	3: Innovation	Systems Strengthening of Local Production Systems	UCL

2 - Innovation	3: Innovation	Virtual Live Labs	GDI Hub/UCL
2 - Innovation	3: Innovation	Evaluation of InnovateNow	Maynooth University
2 - Innovation	3: Innovation	Strengthening the Kenyan AT Innovation Ecosystem	Maynooth University
2 - Innovation	3: Innovation	A revolution in wheelchair manufacture applying 3D printing technologies	GDI Hub/UCL
2 - Innovation	3: Innovation	At Innovation for humanitarian response - combine telemedicine and 3D printing to provide orthotic devices	GDI Hub/UCL
2 - Innovation	3: Innovation	Confidence socket research project	GDI Hub/UCL
2 - Innovation	3: Innovation	Harnessing the power of mobile	GDI Hub/UCL
2 - Innovation	3: Innovation	InnovateNow	UCL
2 - Innovation	3: Innovation	Stigma in Youth	GDI Hub/UCL
2 - Innovation	4: Innovation Hub India	Seminar Series on Tactile Interactivity	UCL
2 - Innovation	4: Innovation Hub India	Advanced AT Accelerator	UCL
2 - Innovation	4: Innovation Hub India	Early-Stage AT Accelerator	UCL
2 - Innovation	4: Innovation Hub India	Academic Exchange	UCL
2 - Innovation	5: Assistive Tech Impact Fund	ATIF	GDI Hub
3 - Country Implementation	6: Drive Availability and Affordability	Creation of Market Shaping Tools	Clinton Health Access Initiative
3 - Country Implementation	6: Drive Availability and Affordability	Pilot Testing of Market Interventions with Specific Countries/Opportunities	Clinton Health Access Initiative
3 - Country Implementation	6: Drive Availability and Affordability	Scoping Market-shaping Opportunities and Create a Market Shaping Plan	Clinton Health Access Initiative
3 - Country Implementation	7: Open-up Market Access	Assistive Product Specifications (AT Procurement Manual and Technical Specifications)	World Health Organization

3 - Country Implementation	7: Open-up Market Access	Developing model/s of integration of AT service provision	World Health Organization
3 - Country Implementation	7: Open-up Market Access	Development of Training in Assistive Products (TAP)	World Health Organization
3 - Country Implementation	7: Open-up Market Access	Procurement Workshops	UNICEF
3 - Country Implementation	8: Country Capacity Assessment	Country Capacity Assessment in x10 FCDO Priority Countries	Clinton Health Access Initiative
3 - Country Implementation	8: Country Capacity Assessment	Country Capacity Assessment in x3 FCDO Priority Countries	World Health Organization
3 - Country Implementation	8: Country Capacity Assessment	Country Investment Fund Research	Maynooth University
3 - Country Implementation	8: Country Capacity Assessment	Country Level Rapid Implementation Trials	Clinton Health Access Initiative
4 - Capacity & Participation	9: Build Capacity & Participation	Build Capacity & Participation	UCL
4 - Capacity & Participation	10: Inclusive Infrastructure	Inclusive Infrastructure	GDI Hub
4 - Capacity & Participation	11: Para Sport Against Stigma	Para Sport Against Stigma	Loughborough University London
4 - Capacity & Participation	12: Grow the Global Partnership	Grow the Global Partnership	GDI Hub

Annexure B: List of sub-research questions

SRQ 1	Has AT2030 produced levers of change to increase access to 50 priority APL with technical specifications and implementation guidance?
SRQ 2	How are Women with disabilities affected by the COVID-19 pandemic living in informal settlements?
SRQ 3	How best can the Country Capacity Assessment process support the provision of AT to people in low-resource settings?
SRQ 4	How can a co-designed, open-source visual tool enable access to information to support AT innovation?
SRQ 5	How can data, as well as collective and community-led responses enable participation in activities of citizenship and access to AT for people with disabilities?
SRQ 6	How can inclusive design and accessible, enabling environments drive disability inclusion?
SRQ 7	How can the potential of mobile technology be leveraged to support digital inclusion and increase access to AT?
SRQ 8	Should functioning be measured when evaluating outcomes of rehabilitation and AT?
SRQ 9	How can informal markets be improved, and AT actors be supported to increase access to AT?
SRQ 10	What market to business strategies work to deliver pathways to digital accessibility and digital AT?
SRQ 11	What pathways and strategies expand access to rehabilitation and AT services utilising national scale-up tactics?
SRQ 12	What are systemic success factors which support entrepreneurial activities and sustainable business models within emerging AT ecosystems?
SRQ 13	What ecosystem best mitigates the impact of humanitarian crises upon AT access and facilitates societal inclusion?
SRQ 14	What is AT need and coverage as estimated through specified tools in identified localities or defined assistive products?
SRQ 15	What is the impact of an evidenced intervention (e.g. clubfoot initiatives) upon quality of life, social participation, and inclusion?

SRQ 16	What market shaping interventions promote effective and sustainable AT access?
SRQ 17	What novel approaches and thinking is needed to enable AT innovation, service provision and disability inclusion?
SRQ 18	What works to reduce stigma related to disability and to AT, and promotes social inclusion?
SRQ 19	What is the impact of an evidenced intervention upon Quality of Life (QOL), social participation and inclusion?

Annexure C: List of included outputs with citations

OUTPUT	TITLE and LINK	HARVARD STYLE CITATION
Output 8 [AT2030.008] Re-posted 'article' on AT2030 website	Gender and disability in informal settlements during COVID-19: What we have learnt so far https://at2030.org/gender-and-disability-in-informal-settlements-during-covid19.what-we-have-learnt-so-far/	Vermehren Ignacia Ossul, 2020. Gender and disability in informal settlements during COVID-19: What we have learnt so far [WWW Document]. URL https://at2030.org/gender-and-disability-in-informal-settlements-during-covid19.what-we-have-learnt-so-far/ (accessed 8.11.22). (Vermehren Ignacia Ossul, 2020)
Output 9 [AT2030.009]	Building the Assistive Technology ecosystem, one coffee at a time https://rhysjwilliams.medium.com/opening-the-doors-of-assistive-technology-one-coffee-at-a-time-181e63a3d14b	Williams, R., 2021. Building the Assistive Technology ecosystem, one coffee at a time [WWW Document]. URL https://rhysjwilliams.medium.com/opening-the-doors-of-assistive-technology-one-coffee-at-a-time-181e63a3d14b (accessed 7.19.22). (Williams, 2021)
Output 19 [AT2030.019]	Country Capacity Assessment for Assistive Technologies: Informal Markets Study, Sierra Leone https://www.ucl.ac.uk/bartlett/development/sites/bartlett/files/at2030_dpu_informal_merkets_study_sierra_leone_16_nov.pdf	Walker Julian, Sallam Nada, Sesay Samuel, Gandi Ibrahim, 2020. Country Capacity Assessment for Assistive Technologies: Informal Markets Study, Sierra Leone. (Walker Julian et al., 2020)
Output 21 [AT2030.021]	Catalysing AT access: Scaling rehabilitative services and increasing access to AT in Kenya https://at2030.org/catalysing-at-access:--scaling-rehabilitative-services-and-increasing-access-to-at-in-kenya/	Clinton Health Access Initiative, 2021a. Catalysing AT access: Scaling rehabilitative services and increasing access to AT in Kenya. (Clinton Health Access Initiative, 2021a)
Output 23 [AT2030.023]	Inclusive Design and Accessibility of the Built Environment in Ulaanbaatar, Mongolia	McKinnon Iain Patrick, Austin Victoria, 2020. Inclusive Design and Accessibility of the Built Environment in Ulaanbaatar, Mongolia. AT2030 Inclusive Infrastructure Case Studies. https://doi.org/10.13140/RG.2.2.26922.44485

	https://at2030.org/static/at2030_core/outputs/Final_-_Full_report_-_Inclusive_Infrastructure_Case_Study_1_-_2VcSNJQ.pdf	(McKinnon Iain Patrick and Austin Victoria, 2020)
Output 25 [AT2030.025]	An AT Innovate case study: Amparo https://at2030.org/an-at-innovator-case-study:-amparo/	Williams, R., Oldfrey, B., Holloway, C., 2020a. An AT Innovator case study: Amparo. (Williams et al., 2020a)
Output 26 [AT2030.026]	Digital Fabrication of Lower Limb Prosthetic Sockets https://at2030.org/digital-fabrication-of-lower-limb-prosthetic-sockets/	Oldfrey, B., Miodownik, M., Barbareschi, G., Williams, R., Holloway, C., 2020. Digital Fabrication of Lower Limb Prosthetic Sockets. (Oldfrey et al., 2020)
Output 27 [AT2030.027]	Inclusive Design and Accessibility of the Built Environment in Varanasi, India https://at2030.org/inclusive-design-and-accessibility-of-the-built-environment-in-varanasi-india/	McKinnon Iain Patrick, Mishra S, Gupta S, Roy P, Choudry U, Murugkar K, Raheja G, 2021. Inclusive Design and Accessibility of the Built Environment in Varanasi, India. AT2030 Inclusive Infrastructure Case Studies. (McKinnon Iain Patrick et al., 2021)
Output 28* [AT2030.028]	Applying Market Shaping Approaches to Increase Access to Assistive Technology: Summary of the Wheelchair Product Narrative https://discovery.ucl.ac.uk/id/eprint/10084646/	Savage, M., Tyler, N., Seghers, F., Afdhila, N., Fineberg, A.E., Frost, R., Holloway, C., Boiten, S., Allen, M., Kejariwal, R., 2019. Applying Market Shaping Approaches to Increase Access to Assistive Technology: Summary of the Wheelchair Product Narrative. (Savage et al., 2019)
Output 29* [AT2030.029]	Estimating assistive product need in Cameroon and India: results of population-based surveys and comparison of self-report and clinical impairment assessment approaches	Boggs, D., Kuper, H., Mactaggart, I., Murthy, G.V.S., Oye, J., Polack, S., 2021b. Estimating assistive product need in Cameroon and India: results of population-based surveys and comparison of self-report and clinical impairment assessment approaches. Tropical Medicine and International Health 26, 146–158. https://doi.org/10.1111/tmi.13523

	https://onlinelibrary.wiley.com/doi/10.1111/tmi.13523	(Boggs et al., 2021b)
Output 30* [AT2030.030]	Additive Manufacturing Techniques for Smart Prosthetics Liners https://at2030.org/additive-manufacturing-techniques-for-smart-prosthetics-liners/	Oldfrey, B., Tchorzewska, A., Jackson, R., Croysdale, M., Loureiro, R., Holloway, C., Miodownik, M., 2021. Additive manufacturing techniques for smart prosthetic liners. Medical Engineering and Physics 87, 45–55. https://doi.org/10.1016/j.medengphy.2020.11.006 (B. Oldfrey et al., 2021)
Output 31* [AT2030.031]	Bridging the Divide: Exploring the use of digital and physical technology to aid mobility impaired people living in an informal settlement https://dl.acm.org/doi/10.1145/3373625.3417021	Barbareschi, G., Oldfrey, B., Xin, L., Nyachomba Magomere, G., Ambeyi Wetende, W., Wanjira, C., Olenja, J., Austin, V., Holloway, C., 2020d. Bridging the Divide: Exploring the use of digital and physical technology to aid mobility impaired people living in an informal settlement, in: ASSETS 2020 - 22nd International ACM SIGACCESS Conference on Computers and Accessibility. Association for Computing Machinery, Inc. https://doi.org/10.1145/3373625.3417021 (Barbareschi et al., 2020d)
Output 32* [AT2030.032]	Assistive Technology Use and Provision During COVID-19: Results From a Rapid Global Survey https://www.ijhpm.com/article_3954_ec965671ae00a3f198168e08a53dbf21.pdf	Smith, E.M., Toro Hernandez, M.L., Ebuenyi, I.D., Syurina, E.V., Barbareschi, G., Best, K.L., Danemayer, J., Oldfrey, B., Ibrahim, N., Holloway, C., MacLachlan, M., 2020. Assistive Technology Use and Provision During COVID-19: Results From a Rapid Global Survey. International Journal of Health Policy and Management. https://doi.org/10.34172/ijhpm.2020.210 (Smith et al., 2020)
Output 33* [AT2030.033]	Developing inclusive and resilient systems: COVID-19 and assistive technology https://www.tandfonline.com/doi/full/10.1080/09687599.2020.1829558	Smith, E.M., MacLachlan, M., Ebuenyi, I.D., Holloway, C., Austin, V., 2021. Developing inclusive and resilient systems: COVID-19 and assistive technology. Disability and Society 36, 151–154. https://doi.org/10.1080/09687599.2020.1829558 (Smith et al., 2021)

Output 34* [AT2030.034]	COVID-19 as social disability: the opportunity of social empathy for empowerment https://gh.bmj.com/content/5/8/e003039	Ebuenyi, I.D., Smith, E.M., Holloway, C., Jensen, R., D'Arino, L., MacLachlan, M., 2020. COVID-19 as social disability: The opportunity of social empathy for empowerment. BMJ Global Health 5. https://doi.org/10.1136/bmjgh-2020-003039 (Ebuenyi et al., 2020)
Output 35* [AT2030.035]	Value beyond function: analysing the perception of wheelchair innovations in Kenya https://at2030.org/value-beyond-function/	Barbareschi, G., Daymond, S., Honeywill, J., Singh, A., Noble, D., N. Mbugua, N., Harris, I., Austin, V., Holloway, C., 2020b. Value beyond function: Analyzing the perception of wheelchair innovations in Kenya, in: ASSETS 2020 - 22nd International ACM SIGACCESS Conference on Computers and Accessibility. Association for Computing Machinery, Inc. https://doi.org/10.1145/3373625.3417017 (Barbareschi et al., 2020b)
Output 36* [AT2030.036]	Inclusion and Independence: The impact of Mobile Technology on the Lives of Persons with Disabilities in Kenya and Bangladesh https://discovery.ucl.ac.uk/id/eprint/10124329/1/16%20July%20_Accepted%20_GHTC%20Impact%20of%20Mobile%20Technology%20on%20Lives%20of%20Persons%20with%20Disabilities_final_NJ%20CAJ_GB_edit.docx.pdf	Jahan, N., Barbareschi, G., Jan, C.A., Mutuku, C.M., Rahman, N., Austin, V., Holloway, C., 2020. Inclusion and Independence: The impact of Mobile Technology on the Lives of Persons with Disabilities in Kenya and Bangladesh, in: 2020 IEEE Global Humanitarian Technology Conference, GHTC 2020. Institute of Electrical and Electronics Engineers Inc. https://doi.org/10.1109/GHTC46280.2020.9342934 (Jahan et al., 2020)
Output 37* [AT2030.037]	Disability design and innovation in computing research in low resource settings https://dl.acm.org/doi/10.1145/3373625.3417301	Morgado-Ramirez, D.Z., Barbareschi, G., Kate Donovan-Hall, M., Sobuh, M., Elayyan, N., Nakandi, B.T., Tamale Ssekitoleko, R., Olenja, J., Nyachomba Magomere, G., Daymond, S., Honeywill, J., Harris, I., Mbugua, N., Kenney, L., Holloway, C., 2020. Disability design and innovation in computing research in low resource settings, in: ASSETS 2020 - 22nd International ACM SIGACCESS Conference on Computers and Accessibility. Association for Computing Machinery, Inc. https://doi.org/10.1145/3373625.3417301 (Morgado-Ramirez et al., 2020)
Output 38* [AT2030.038]	Uncovering unexpected impacts: the case of digital manufacturing of wheelchairs in Kenya https://www.resna.org/sites/default/files/c	Barbareschi, G., Daymond, S., Honeywill, J., Noble, D., Mbugua, N., Harris, I., Holloway, C., 2020a. Uncovering unexpected impacts: the case of digital manufacturing of wheelchairs in Kenya. Online, 22-23 September.

	onference/2020/GAATO/150Barbareschi.html	(Barbareschi et al., 2020a)
Output 39* [AT2030.039]	When They See a Wheelchair, They've Not Even Seen Me"—Factors Shaping the Experience of Disability Stigma and Discrimination in Kenya https://discovery.ucl.ac.uk/id/eprint/10127662/	Barbareschi, G., Carew, M.T., Johnson, E.A., Kopi, N., Holloway, C., 2021a. "When they see a wheelchair, they've not even seen me"—factors shaping the experience of disability stigma and discrimination in Kenya. International Journal of Environmental Research and Public Health 18. https://doi.org/10.3390/ijerph18084272 (Barbareschi et al., 2021a)
Output 41* [AT2030.041]	Measuring Assistive Technology Supply and Demand: A Scoping Review https://www.tandfonline.com/doi/pdf/10.1080/10400435.2021.1957039	Danemayer, J., Boggs, D., Polack, S., Smith, E.M., Ramos, V.D., Battistella, L.R., Holloway, C., 2021. Measuring assistive technology supply and demand: A scoping review. Assistive Technology 33, 35–49. https://doi.org/10.1080/10400435.2021.1957039 (Danemayer et al., 2021)
Output 42* [AT2030.042]	Shifting the focus to functioning: essential for achieving Sustainable Development Goal 3, inclusive Universal Health Coverage and supporting COVID-19 survivors' https://www.tandfonline.com/doi/full/10.1080/16549716.2021.1903214	Boggs, D., Polack, S., Kuper, H., Foster, A., 2021c. Shifting the focus to functioning: essential for achieving Sustainable Development Goal 3, inclusive Universal Health Coverage and supporting COVID-19 survivors. Global Health Action 14. https://doi.org/10.1080/16549716.2021.1903214 (Boggs et al., 2021c)
Output 43* [AT2030.043]	Estimating Need for Glasses and Hearing Aids in The Gambia: Results from a National Survey and Comparison of Clinical Impairment and Self-Report Assessment Approaches' https://www.mdpi.com/1660-4601/18/12/6302	Boggs, D., Hydara, A., Faal, Y., Okoh, J.A., Olaniyan, S.I., Sanneh, H., Ngett, A., Bah, I., Aleser, M., Denis, E., McCormick, I., Bright, T., Bell, S., Kim, M., Foster, A., Kuper, H., Burton, M.J., Mactaggart, I., Polack, S., 2021a. Estimating need for glasses and hearing aids in the gambia: Results from a national survey and comparison of clinical impairment and self-report assessment approaches. International Journal of Environmental Research and Public Health 18. https://doi.org/10.3390/ijerph18126302 (Boggs et al., 2021a)
Output 44 [AT2030.044]	Episode 1 – Manufacturing https://www.disabilityinnovation.com/news/podcast	Barbareschi G, Oldfrey B. 2021. Innovation Action Insights Episode 1- Manufacturing. [Podcast] 01 February 2021. Available at: https://www.disabilityinnovation.com/news/podcast (Accessed 28 September 2022).

		(Barbareschi et al ., 2021)
Output 45 [AT2030.045]	Episode 2 - exploring COVID-19 Innovations https://www.disabilityinnovation.com/news/episode-2-podcast	Barbareschi G. 2021. Innovation Action Insights Episode 2- Exploring COVID-19 Innovations. [Podcast]. 01 March 2021. https://www.disabilityinnovation.com/news/episode-2-podcast (Accessed 28 September 2022) (Barbareschi., 2021)
Output 46 [AT2030.046]	Episode 3 - exploring Sustainability & Circular Economy https://www.disabilityinnovation.com/news/episode-3	Barbareschi G. 2021. Innovation Action Insights Episode 3 – Sustainability. [Podcast]. 01 March 2021. https://www.disabilityinnovation.com/news/episode-3 (Accessed 28 September 2022). (Barbareschi., 2021)
Output 47 [AT2030.047]	Episode 4 - Assistive Technology https://www.disabilityinnovation.com/news/new-podcast-4	Barbareschi G. 2021. Innovation Action Insights Episode 4 –Assistive Technology. [Podcast]. 01 March 2021. https://www.disabilityinnovation.com/news/new-podcast-4 (Accessed 28 September 2022). (Barbareschi., 2021)
Output 48 [AT2030.048]	Episode 5 – materials https://innovationaction.org/podcasts/	Barbareschi G. 2021. Innovation Action Insights Episode 4 –Assistive Technology. [Podcast]. 01 March 2021. https://innovationaction.org/podcasts/ (Accessed 28 September 2022). (Barbareschi., 2021)
Output 49 [AT2030.049]	Powering Inclusion: AI and AT. The findings of an online expert roundtable https://at2030.org/powering-inclusion:-ai-and-at.-the-findings-of-an-online-expert-roundtable/	Holloway, C., Shawe-Taylor, J., Pinho, A.R., 2020. Powering Inclusion: Artificial Intelligence and Assistive Technology. https://doi.org/10.1145/3310322 (Holloway et al., 2020)
Output 51 [AT2030.051]	Shujaaz Inc. Final Report https://www.at2030.org/final-narrative-report/	Shujaaz Inc. 2020. UCL/AT2030 Final Report, 2020. Viewed 28 September 2022. https://www.at2030.org/final-narrative-report/ (Shujaaz Inc, 2020)

Output 53* [AT2030.053]	Assistive Technology in urban low-income communities in Sierra Leone and Indonesia: Rapid Assistive Technology Assessment (rATA) survey results https://www.ucl.ac.uk/bartlett/development/sites/bartlett_development/files/rata_report_final_20jan22.pdf	Ossul Vermehren, I., Walker Bartlett, J., 2022. Assistive Technology in urban low-income communities in Sierra Leone & Indonesia. Rapid Assistive Technology Assessment (rATA) survey results. Viewed 28 September 2022, https://www.ucl.ac.uk/bartlett/development/sites/bartlett_development/files/rata_report_final_20jan22.pdf (Ossul Vermehren and Walker Bartlett, 2022)
Output 54 [AT2030.054]	Preventing lifelong impairment: Access to clubfoot treatment in low and middle-income countries https://at2030.org/static/at2030_core/outputs/AT_Clubfoot_Narrative_April_2021_Final.pdf	Clinton Health Access Initiative, 2021b. Preventing lifelong impairment: Access to clubfoot treatment in low-and middle-income countries. Viewed 28 September 2022, https://at2030.org/static/at2030_core/outputs/AT_Clubfoot_Narrative_April_2021_Final.pdf (Clinton Health Access Initiative, 2021b)
Output 55 [AT2030.055]	Understanding the mobile disability gap https://at2030.org/static/at2030_core/outputs/GSMA_Understanding-the-mobile-disability-gap_116pg_Accessible_QEXwKVP.pdf	Aranda-Jan, C., Boutard, A., 2019. Understanding the mobile disability gap. AT2030, viewed 28 September 2022, https://at2030.org/static/at2030_core/outputs/GSMA_Understanding-the-mobile-disability-gap_116pg_Accessible_QEXwKVP.pdf (Aranda-Jan and Boutard, 2019)
Output 56* [AT2030.056]	Product Narrative: Digital Assistive Technology https://at2030.org/pn-digital-assistive-technology/	Savage, M., Bhatnagar, T., Liao, C., Chaudron, M., Boyar, J., Laurentius, D., Torrens, G., Perry, K., Morjaria, P., Barajas, F.R. and Goedde, B., 2020. Product Narrative: Digital Assistive Technology. A market landscape and strategic approach to increasing access to digital assistive technology in low-and middle-income countries. AT2030, viewed on 28 September 2022, https://at2030.org/pn-digital-assistive-technology/ (Savage M., et al., 2020)
Output 57 [AT2030.057]	Lessons learned from assistive technology country capacity assessments, 2019-2020 https://at2030.org/static/at2030_core/outputs/CCA_Lessons_Learned_-_AT_2030_template_final_OCT_2020.pdf	Bostian Luke, 2020. Lessons learned from assistive technology country capacity assessments, 2019-2020. AT2030, viewed on 27 September 2022, https://at2030.org/static/at2030_core/outputs/CCA_Lessons_Learned_-_AT_2030_template_final_OCT_2020.pdf (Bostian, L., 2020)

Output 58* [AT2030.058]	Product Narrative: Eyeglasses https://at2030.org/pn-eyeglasses/	Chaudron Mathilde, Savage Margaret, Seghers Frederic, Fineberg Alison End, Goedde Barbara, Austin Vicki, Holloway Catherine, Oldfrey Ben, Morjaria Priya, Perry Katherine, 2020. Product Narrative: Eyeglasses. AT2030, viewed 28 September 2022, https://at2030.org/pn-eyeglasses/ (Chaudron et al., 2020)
Output 59* [AT2030.059]	Product Narrative: Prostheses https://at2030.org/static/at2030_core/outputs/Prostheses_Product_Narrative_a11y_20200827.pdf	Liao Cynthia, Seghers Frederic, Savage Margaret, Fineberg Alison End, Goedde Barbara, Austin Vicki, Holloway Catherine, Oldfrey Ben, 2020. Product Narrative: Prostheses, AT2030, viewed 28 September 2022, https://at2030.org/static/at2030_core/outputs/Prostheses_Product_Narrative_a11y_20200827.pdf (Liao et al., 2020)
Output 60* [AT2030.060]	Product Narrative: Hearing Aids https://at2030.org/static/at2030_core/outputs/Final_Product_Narrative_Hearing_Aids_2020.pdf	Kejariwal Rachit, Kobayashi Emily, Savage Margaret, Seghers Frederic, Bhosa Tucker, Fineberg Alison End, Goedde Barbara, Austin Vicki, Holloway Catherine, 2019. Product Narrative: Hearing Aids. AT2030, viewed 25 September 2022, https://at2030.org/static/at2030_core/outputs/Final_Product_Narrative_Hearing_Aids_2020.pdf (Kejariwal et al., 2019)
Output 61* [AT2030.061]	Product Narrative: wheelchairs https://at2030.org/static/at2030_core/outputs/Wheelchair-Product-Narrative_YYYbjUZ.pdf	Savage Margaret, Afdhila Novia, Seghers Frederic, Frost Richard, Fineberg Alison End, Austin Vicki, Holloway Catherine, 2019. Product Narrative: Wheelchairs. AT2030, viewed 25 September 2022, https://at2030.org/static/at2030_core/outputs/Wheelchair-Product-Narrative_YYYbjUZ.pdf (Savage et al., 2019)
Output 62* [AT2030.062]	Assistive product specifications and how to use them https://apps.who.int/iris/bitstream/handle/10665/339851/9789240020283-eng.pdf	World Health Organization, 2021. Assistive product specifications and how to use them. World Health Organization, viewed on 25 September 2022, https://apps.who.int/iris/bitstream/handle/10665/339851/9789240020283-eng.pdf (World Health Organization, 2021)
Output 64* [AT2030.064]	New economics of assistive technology: A call for a mission's approach https://at2030.org/new-economics-of-	Albala, S., Holloway, C., Austin, V., Kattel, R., 2021. New economics of assistive technology: A call for a missions approach UCL Institute for Innovation and Public

	assistive-technology:-a-call-for-a-missions-approach/	Purpose. AT2030, viewed on 25 September 2022, https://at2030.org/new-economics-of-assistive-technology:-a-call-for-a-missions-approach/ (Albala et al., 2021)
Output 66* [AT2030.066]	Disability Interactions: Creating Inclusive Innovations https://www.morganclaypool.com/doi/abs/10.2200/S01141ED1V01Y202111HCI053	Holloway, C. and Barbareschi, G., 2021. Disability Interactions: Creating Inclusive Innovations. Synthesis Lectures on Human-Centered Informatics, 14(6), pp.i-198. (Holloway et al., 2022)
Output 70* [AT2030.070]	The Digital and Assistive Technologies for Ageing initiative: Learning from the GATE initiative https://www.thelancet.com/journals/lanhl/article/PIIS2666-7568(20)30049-0/fulltext	Khasnabis, C., Holloway, C., MacLachlan, M., 2020. The Digital and Assistive Technologies for Ageing initiative: learning from the GATE initiative. The Lancet Healthy Longevity 1, e94–e95. https://doi.org/10.1016/S2666-7568(20)30049-0 (Khasnabis et al., 2020)
Output 72* [AT2030.072]	GREAT: Assistive technology innovation ecosystem design: A Kenyan case study https://apps.who.int/iris/bitstream/handle/10665/330372/9789240000261-eng.pdf?sequence=1#page=465	Holloway, C., Chiira, B., Oldfrey, B., Barbareschi, G., Pandya, U., Ayah, R., Albala, S., Olenja, J., Ramos, F., Chapman, K. and Dawes, H., 2019. Assistive technology innovation ecosystem design: A Kenyan case study. *Global perspectives on assistive technology*, p.457. (Holloway et al., 2019)
Output 73* [AT2030.073]	Could AI Democratise Education? Socio-Technical Imaginaries of an EdTech Revolution https://arxiv.org/abs/2112.02034	Bulathwela, S., Pérez-Ortiz, M., Holloway, C. and Shawe-Taylor, J., 2021. Could AI Democratise Education? Socio-Technical Imaginaries of an EdTech Revolution. *arXiv preprint arXiv:2112.02034.* (Bulathwela et al., 2021)
Output 74* [AT2030.074]	Overcoming systematic global barriers to AT: a new methodology and quick-start testing through a £20m programme https://discovery.ucl.ac.uk/id/eprint/10084627/1/107_AUSTIN_Victoria-Overcoming-systematic-global-barriers-to-AT-a-new-methodology-and-quick-start-testing-through-a-£20m-programme.-V2.pdf	Austin, V. and Holloway, C., 2019, August. Overcoming systematic global barriers to AT: a new methodology and quick-start testing through a£ 20m programme. Global Disability Innovation Hub. (Austin et al., 2019)

Output 75* [AT2030.075]	Intersections between Systems Thinking and Market Shaping for Assistive Technology: The SMART (Systems-Market for Assistive and Related Technologies) Thinking Matrix https://www.mdpi.com/370130	MacLachlan, M., McVeigh, J., Cooke, M., Ferri, D., Holloway, C., Austin, V. and Javadi, D., 2018. Intersections between systems thinking and market shaping for assistive technology: the smart (Systems-Market for assistive and related technologies) thinking matrix. *International journal of environmental research and public health*, *15*(12), p.2627. (Maclachlan et al., 2018)
Output 76* [AT2030.076]	Mobile phones as assistive technologies: Gaps and opportunities https://www.at2030.org/mobile-phones-as-assistive-technologies:-gaps-and-opportunities/	Barbareschi, G., Aranda Jan, C., Nique, M., Ramos Barajas, F. and Holloway, C., 2019, August. Mobile phones as assistive technologies: gaps and opportunities. WHO. (Barbareschi et al., 2019)
Output 77* [AT2030.077]	What difference does tech make? Conceptualizations of Disability and Assistive Technology among Kenyan Youth: Conceptualizations of Disability and AT https://dl.acm.org/doi/abs/10.1145/3441852.3471226	Barbareschi, G., Shitawa Kopi, N., Oldfrey, B. and Holloway, C., 2021, October. What difference does tech make? Conceptualizations of Disability and Assistive Technology among Kenyan Youth: Conceptualizations of Disability and AT. In *The 23rd International ACM SIGACCESS Conference on Computers and Accessibility* (pp. 1-13). (Barbareschi et al., 2021b)
Output 78* [AT2030.078]	Give Us the Chance to Be Part of You, We Want Our Voices to Be Heard": Assistive Technology as a Mediator of Participation in (Formal and Informal) Citizenship Activities for Persons with Disabilities Who Are Slum Dwellers in Freetown, Sierra Leone https://www.mdpi.com/1120170	Austin, V., Holloway, C., Ossul Vermehren, I., Dumbuya, A., Barbareschi, G. and Walker, J., 2021. "Give Us the Chance to Be Part of You, We Want Our Voices to Be Heard": Assistive Technology as a Mediator of Participation in (Formal and Informal) Citizenship Activities for Persons with Disabilities Who Are Slum Dwellers in Freetown, Sierra Leone. *International journal of environmental research and public health*, *18*(11), p.5547. (Austin et al., 2021a)
Output 79* [AT2030.079]	This Is the Story of Community Leadership with Political Backing.(PM1)" Critical Junctures in Paralympic Legacy: Framing the London 2012 Disability Inclusion Model for New Global Challenges https://www.mdpi.com/2071-1050/13/16/9253	Austin, V., Mattick, K. and Holloway, C., 2021. "This Is the Story of Community Leadership with Political Backing.(PM1)" Critical Junctures in Paralympic Legacy: Framing the London 2012 Disability Inclusion Model for New Global Challenges. *Sustainability*, *13*(16), p.9253. (Austin et al., 2021b)

Output 80* [AT2030.080]	A review of innovation strategies and processes to improve access to AT: Looking ahead to open innovation ecosystems https://www.tandfonline.com/doi/pdf/10.1080/10400435.2021.1970653	Holloway, C., Morgado Ramirez, D.Z., Bhatnagar, T., Oldfrey, B., Morjaria, P., Moulic, S.G., Ebuenyi, I.D., Barbareschi, G., Meeks, F., Massie, J. and Ramos-Barajas, F., 2021. A review of innovation strategies and processes to improve access to AT: Looking ahead to open innovation ecosystems. *Assistive Technology*, *33*(sup1), pp.68-86. (Holloway et al., 2021)
Output 81* [AT2030.081]	Could Assistive Technology Provision Models Help Pave the Way for More Environmentally Sustainable Models of Product Design, Manufacture and Service in a Post-COVID World? https://www.mdpi.com/1294130	Oldfrey, B., Barbareschi, G., Morjaria, P., Giltsoff, T., Massie, J., Miodownik, M. and Holloway, C., 2021. Could assistive technology provision models help pave the way for more environmentally sustainable models of product design, manufacture and service in a post-covid world? *Sustainability*, *13*(19), p.10867. (Oldfrey et al., 2021)
Output 82* [AT2030.082]	Drawing Erasable Tactile Diagrams on Tacilia https://discovery.ucl.ac.uk/id/eprint/10131452/	Bhatnagar, T., Upadhyay, V., Sharma, A., Rao, P.M., Miodownik, M., Marquardt, N. and Holloway, C., 2021, July. Drawing Erasable Tactile Diagrams on Tacilia. IEEE. (Bhatnagar Tigmanshu et al., 2021b)
Output 83* [AT2030.083]	Estimating need and coverage for five priority assistive products: a systematic review of global population-based research https://gh.bmj.com/content/7/1/e007662.abstract	Danemayer, J., Boggs, D., Ramos, V.D., Smith, E., Kular, A., Bhot, W., Ramos-Barajas, F., Polack, S. and Holloway, C., 2022. Estimating need and coverage for five priority assistive products: a systematic review of global population-based research. *BMJ global health*, *7*(1), p.e007662. (Danemayer et al., 2021b)
Output 85* [AT2030.085]	The social network: How people with visual impairment use mobile phones in Kibera, Kenya https://dl.acm.org/doi/abs/10.1145/3313831.3376658	Barbareschi, G., Holloway, C., Arnold, K., Magomere, G., Wetende, W.A., Ngare, G. and Olenja, J., 2020, April. The social network: How people with visual impairment use mobile phones in kibera, Kenya. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (pp. 1-15). (Barbareschi et al., 2020c)
Output 86* [AT2030.086]	Transforming a Monolithic Sheet of Nitinol into a Passive Reconfigurable Tactile Pixel Array Display at Braille Resolution	Bhatnagar, T., Marquardt, N., Miodownik, M. and Holloway, C., 2021, July. Transforming a Monolithic Sheet of Nitinol into a Passive Reconfigurable Tactile Pixel Array Display at Braille Resolution. In *2021 IEEE World Haptics Conference (WHC)* (pp. 409-414). IEEE.

	https://ieeexplore.ieee.org/abstract/document/9517239/	(Bhatnagar et al., 2021)
Output 87* [AT2030.087]	Scoping research Report on Assistive Technology On the road for universal assistive technology coverage https://assets.publishing.service.gov.uk/media/5d1f5a2fed915d0bbba6bf15/AT_Scoping_Report-Final.pdf	Holloway, C., Austin, V., Barbareschi, G., Ramos Barajas, F., Pannell, L., Morgado Ramirez, D., Frost, R., McKinnon, I., Chris Holmes of Richmond, Lord, Frazer, R., Kett, M., Groce, N., Carew, M., Abu Alghaib, O., Tebbutt, E., Kobayashi, E., Seghers, F., 2018. Scoping research report on Assistive Technology - on the road for universal AT coverage. Viewed on 27 September 2022, https://assets.publishing.service.gov.uk/media/5d1f5a2fed915d0bbba6bf15/AT_Scoping_Report-Final.pdf (Holloway et al., 2018)
Output 88* [AT2030.088]	Capturing and creating value in the assistive technologies landscape through a mission-oriented approach: a new research and policy agenda https://www.researchgate.net/publication/341931939_Capturing_and_Creating_Value_in_the_Assistive_Technologies_Landscape_through_a_Mission-Oriented_Approach_A_New_Research_and_Policy_Agenda	Albala, S., Holloway, C., MacLachlan, M., Baines, D., Walker, J. and Austin, V., 2019. Capturing and creating value in the assistive technologies landscape through a mission-oriented approach: a new research and policy agenda. AT2030 Working Paper Series (1). (Albala et al., 2020)
Output 90 [AT2030.090]	Assistive technology innovators across emerging markets https://at2030.org/at-innovators/map/	AT2030. 2020. Assistive technology innovators across emerging markets. AT2030, viewed on 25 September 2022, https://at2030.org/at-innovators/map/ (AT2030, 2020)
Output 92 [AT2030.092]	Designing for resilience through circular economy https://www.innovationaction.org/circular/	Innovation Action. 2020. Designing for resilience through circular economy. Innovation Action, viewed on 24 September 2022, https://www.innovationaction.org/circular/ (Innovation Action, 2020)
Output 93 [AT2030.093]	Inclusive Entrepreneur toolkit https://airtable.com/shrorrnqOQG9L20Ii	*Inclusive Entrepreneur toolkit.* 2022. Accessed 24 September 2022, https://airtable.com/shrorrnqOQG9L20Ii (Inclusive Entrepreneur toolkit, 2022)

Output 94 [AT2030.094]	MiracleFeet: the human impact of foot braces in Nigeria and Liberia https://docs.google.com/document/d/16b_xp-PwCmPI_3ZyyN0zibNftRh5Vk6V/edit?usp=sharing&ouid=116930795730261890534&rtpof=true&sd=true	Williams, R., Sheopurkar, S., Adabala, S., Adams, T., 2020b. MiracleFeet: the human impact of foot braces in Nigeria and Liberia [WWW Document]. URL https://docs.google.com/document/d/16b_xp-PwCmPI_3ZyyN0zibNftRh5Vk6V/edit (accessed 7.21.22). (Williams et al., 2020b)
Output 98 [AT2030.098]	Adjacent to AT: Phase 1 Wrap-Up (Oct 2020) https://docs.google.com/presentation/d/18_bpaXhaxmzFgQrUHi4eWiUhS_1ewfKr2Gf6HgPAe2Y/edit#slide=id.ga03980c3fc_0_50	Refer to link provided (URL)
Output 106 [AT2030.106]	AT2030 innovate Now Ecosystem https://drive.google.com/file/d/1j5CK8XdkqHVFnYNLL9vEZ63N69Xy2RhR/view?usp=sharing	Refer to link provided (URL)
Output 111 [AT2030.111]	ATIF Blog 1 - Making the Direct-to-Consumer Models work for AT Direct to consumer models	Refer to link provided (URL)
Output 112 [AT2030.112]	ATIF Blog 2 - Finding the customer need for validation Finding the customer and need for validation	Refer to link provided (URL)
Output 113 [AT2030.113]	ATIF Blog 3 - Marketing matters Marketing matters	Refer to link provided (URL)
Output 114 [AT2030.114]	ATIF Blog 4 - Profit for impact Profit for impact (WIP)	Refer to link provided (URL)
Output 115 [AT2030.115]	ATIF Blog 5 - Balancing Volatility - Emerging African Ecosystems Emerging african ecosystems	Refer to link provided (URL)

Output 116 [AT2030.116]	ATIF Blog 6 - Changing the landscape Changing the landscape	Refer to link provided (URL)
Output 117 [AT2030.117]	ATIF Blog 7 - Regulations as a limiter of growth Regulations as a limiter of growth	Refer to link provided (URL)
Output 118 [AT2030.118]	ATIF Blog 8 - How to get funding and impact people The difficulty with funding	Refer to link provided (URL)
Output 121* [AT2030.121]	Assistive Technology in Two Humanitarian Contexts, Bangladesh and Jordan https://at2030.org/static/at2030_core/outputs/Report_on_AT_in_Two_Humanitarian_Settings.pdf	Kett, M., Cluster, U., Bangladesh, C., 2022. Assistive Technology in Two Humanitarian Contexts: Bangladesh and Jordan. (Kett et al., 2022)
Output 122 [AT2030.122]	Inclusive Design and Accessibility of the Built Environment in Solo, Indonesia https://at2030.org/inclusive-design-and-accessibility-of-the-built-environment-in-solo,-indonesia/	McKinnon I, Patrick M, Prastika Putri K, Asterina N, Jamil F, 2022. Inclusive Design and Accessibility of the Built Environment in Solo, Indonesia. AT2030 Inclusive Infrastructure Case Studies. (McKinnon I et al., 2022)
Output 123 [AT2030.123]	Assistive Tech Impact Fund - the story so far: Insights from the first cohort of AT ventures https://at2030.org/static/at2030_core/outputs/Insight.pdf	Simpson, L., Hamilton, F., Hassan, M., Rahman, A., Perry, K., Cotton, L., Bandukda, M., Thompson, N., Hajas, D., Holloway, C., 2021. AT Impact Fund, the story so far - Insights from the first cohort of AT ventures. (Simpson et al., 2021)
Output 125* [AT2030.125]	Leveraging the potential of mobile for persons with disabilities (Scoping Study) https://www.gsma.com/mobilefordevelopment/resources/leveraging-the-potential-of-mobile-for-persons-with-disabilities/	Consulting, A., 2018. Leveraging the Potential of Mobile for Persons with Disabilities Scoping Study. GSMA, viewed on September 25 2022, https://www.gsma.com/mobilefordevelopment/resources/leveraging-the-potential-of-mobile-for-persons-with-disabilities/ (Consulting, 2018)
Output 126 [AT2030.126]	How mobile operators are driving inclusion of persons with disabilities https://www.gsma.com/mobilefordevelopm	Aranda-Jan, C., 2019. How mobile operators are driving inclusion of persons with disabilities. [Case study]. Available at:

	ent/resources/how-mobile-operators-are-driving-inclusion-of-persons-with-disabilities/	https://www.gsma.com/mobilefordevelopment/resources/how-mobile-operators-are-driving-inclusion-of-persons-with-disabilities (Accessed 28 September 2022). (Aranda-Jan, 2019)
Output 127 [AT2030.127]	Improving the mobile customer journey for persons with disabilities https://www.gsma.com/mobilefordevelopment/resources/assistive-tech-improving-the-mobile-customer-journey-for-persons-with-disabilities/	Refer to link provided (URL)
Output 130* [AT2030.130]	A Preliminary Study to Understand How Mainstream Accessibility and Digital Assistive Technologies Reaches People in Lower- and Middle-Income Countries https://www.resna.org/sites/default/files/conference/2021/InternationallyAppropriateTechnology/104_Bhatnagar.html	Bhatnagar Tigmanshu, Torrens George, Oldfrey Ben, Morjaria Priya, Barajas Ramos Felipe, Perry Katherine, Holloway Catherine, 2021a. A preliminary study to understand how mainstream accessibility and digital assistive technologies reach people in lower- and middle-income countries. https://www.resna.org/sites/default/files/conference/2021/InternationallyAppropriateTechnology/104_Bhatnagar.html (Bhatnagar Tigmanshu et al., 2021a)
Output 131* [AT2030.131]	Meeting AT needs in humanitarian crises: The current state of provision https://www.tandfonline.com/doi/pdf/10.1080/10400435.2021.1934612	Whittaker, G., Wood, G.A., Oggero, G., Kett, M., Lange, K., 2021. Meeting AT needs in humanitarian crises: The current state of provision. Assistive Technology 33, 3–16. https://doi.org/10.1080/10400435.2021.1934612 (Whittaker et al., 2021)
Output 139* [AT2030.139]	Applying market shaping approaches to increase access to assistive technology in low- and middle-income countries https://www.tandfonline.com/doi/pdf/10.1080/10400435.2021.1991050	Savage, M., Albala, S., Seghers, F., Kattel, R., Liao, C., Chaudron, M., Afdhila, N., 2021. Applying market shaping approaches to increase access to assistive technology in low- and middle-income countries. Assistive Technology 33, 124–135. https://doi.org/10.1080/10400435.2021.1991050 (Savage et al., 2021)
Output 140* [AT2030.140]	Estimating assistive technology need through population-based surveys: An analysis of data from Cameroon and India https://www.who.int/news-room/events/detail/2019/08/22/default-	Boggs, D., Kuper, H., Mactaggart, I., Murthy, G.V.S., Oye, J., Polack, S., 2021b. Estimating assistive product need in Cameroon and India: results of population-based surveys and comparison of self-report and clinical impairment assessment

	calendar/great-consultation-2019#:~:text=The%20GReAT%20Consultation%202019%20was,throughout%20the%202%20day%20programme	approaches. Tropical Medicine and International Health 26, 146–158. https://doi.org/10.1111/tmi.13523 (Boggs et al., 2021b)
Output 141 [AT2030.141]	Country Capacity Assessment for Assistive Technologies: Informal Markets Study, Indonesia https://at2030.org/country-capacity-assessment-for-assistive-technologies:-informal-markets-study,-indonesia/	Walker, J., Sallam, N., Sesay, S. and Gandi, I., 2020. Country Capacity Assessment for Assistive Technologies: Informal Markets Study, Sierra Leone. AT2030 Working Paper Series. 2020. Available online: https://at2030.org/country-capacity-assessment-for-assistivetechnologies:-informal-markets-study,-sierra-leone/ (accessed on 1 March 2021). (Walker et al., 2020)
Output 142* [AT2030.142]	Assistive technology content in United Nations Convention on the Rights of Persons with Disabilities reports by states parties https://www.who.int/news-room/events/detail/2019/08/22/default-calendar/great-consultation-2019#:~:text=The%20GReAT%20Consultation%202019%20was,throughout%20the%202%20day%20programme	Smith, E., Borg, J., Mannan, H., MacLachlan, M. and Smith, E., 2019. Assistive technology content in United Nations convention on the rights of persons with disabilities reports by states parties. Global Perspectives on Assistive Technology: Proceedings of the GReAT Consultation, pp.350-361. (Smith et al., 2019)
Output 143* [AT2030.143]	Rapid Assistive Technology Assessment: Survey on the use and demand for assistive products in Pakistan https://cdn.who.int/media/docs/default-source/assistive-technology-2/base-line-survey-in-pakistans.pdf?sfvrsn=3ed8c9a8_11	Eide, A.H., Ali, S., Mallick, M., Khasnabis, C. and Zhang, W. 2021. Baseline Survey in Pakistan – Rapid Assistive Technology Assessment (rATA). https://cdn.who.int/media/docs/default-source/assistive-technology-2/base-line-survey-in-pakistans.pdf?sfvrsn=3ed8c9a8_11 (Eide et al., 2021)
Output 144* [AT2030.144]	Mobile phones as assistive technologies: Gaps and opportunities https://apps.who.int/iris/bitstream/handle/10665/330372/9789240000261-eng.pdf	Barbareschi, G Barbareschi., Clara Aranda Jan, C., Nique, M, Ramos Barajas, F., Holloway, C. 2019. Mobile phones as assistive technologies: Gaps and opportunities. Global Perspectives on Assistive Technology- Proceedings of the GReAT Consultation. Geneva. Page 294-308. (Barbareschi et al., 2019)

Output 145* [AT2030.145]	ATscale: Establishing a cross-sector partnership to increase access to assistive technology https://apps.who.int/iris/bitstream/handle/10665/330372/9789240000261-eng.pdf	End Fineberga, A., Savageb, M., Austinc, V., Boitend, S., Droopd, J., Allen, M., Heydte, P., Sondergaard, D. and Mitra, G., 2019, August. ATscale–Establishing a Cross-Sector Partnership to Increase Access to Assistive Technology. WHO.
Output 146* [AT2030.146]	Overcoming systematic global barriers to assistive technology: A new methodology and quick-start testing through a £20m programme https://apps.who.int/iris/bitstream/handle/10665/330372/9789240000261-eng.pdf	Austin V, Holloway C., Barbareschi, G., Ramos Barajas, F., Morgado Ramirez, D., Frost, R., McKinnon, I., Holmes, C., Kett, M., Groce, N., Carew, M., Abu Alghaib, O., Tebbutt, E., Zhang, W., Kobayashi, E., Seghers, F., Pannell, L. 2019. Overcoming systematic global barriers to AT: a new methodology and quick-start testing through a £20m programme. *Global Perspectives on Assistive Technology-* Proceedings of the GReAT Consultation. Geneva. Page 294-308. (Austin et al., 2019)
Output 147* [AT2030.147]	Assistive technology innovation ecosystem design: A Kenyan case study https://apps.who.int/iris/bitstream/handle/10665/330372/9789240000261-eng.pdf	Holloway, C., Chiira, B., Oldfrey, B., Barbareschi, G., Pandya, U., Ayah, R., Albala, S., Olenja, J., Ramos, F., Chapman, K. and Dawes, H., 2019. Assistive technology innovation ecosystem design: A Kenyan case study. Global perspectives on assistive technology, p.457. (Holloway et al., 2019)
Output 148* [AT2030.148]	Applying market shaping approaches to increase access to assistive technology: Summary of the wheelchair product narrative https://apps.who.int/iris/bitstream/handle/10665/330372/9789240000261-eng.pdf	Savage M, Afdhila N., Tyler, N., Seghers,F., Fineberg, A., Frost, R., Holloway C., Boiten, S., Allen, M., Kejariwal, T. 2019. Product Narrative: Wheelchairs. *Global Perspectives on Assistive Technology-* Proceedings of the GReAT Consultation. Geneva. Page 470-486. (Savage et al., 2019)
Output 149* [AT2030.149]	Paralympic Broadcasting in Sub-Saharan Africa: Sport, Media and Communication for Social Change https://journals.sagepub.com/doi/full/10.1177/21674795221093722	Noske-Turner, J., Pullen, E., Magalasi, M., Haslett, D. and Tacchi, J., 2022. Paralympic Broadcasting in Sub-Saharan Africa: Sport, Media and Communication for Social Change. *Communication & Sport*. https://journals.sagepub.com/doi/full/10.1177/21674795221093722 (Noske-Turner et al., 2022)

Output 150 [AT2030.150]	Andrew Mtegha's Story: Infusing disability rights advocacy into Paralympic sport broadcasting in Malawi https://at2030.org/andrews-story/	Loughborough London University. 2022. Andrew Mtegha's Story: Infusing disability rights advocacy into Paralympic sport broadcasting in Malawi. AT2030. Viewed on 25 September 2022 https://at2030.org/andrews-story/
Output 151* [AT2030.151]	Para Sport Against Stigma: Research Report on the Tokyo 2020 Broadcasting in Sub-Saharan Africa https://at2030.org/para-sport-against-stigma--research-report-on-the-tokyo-2020--broadcasting-in-sub-saharan-africa/	Global Disability Innovation Hub. 2020. Para Sport Against Stigma: Research Report on the Tokyo 2020 Broadcasting in Sub-Saharan Africa. AT2030. Viewed on 25 September 2022, https://at2030.org/para-sport-against-stigma--research-report-on-the-tokyo-2020--broadcasting-in-sub-saharan-africa/
Output 152* [AT2030.152]	TVMS Paralympics Broadcaster Report https://at2030.org/tvms-final-report-paralympics/	TVMS. 2022 TVMS Paralympics Broadcaster Report. AT2030. Viewed on 24 September 2022, https://at2030.org/tvms-final-report-paralympics/
Output 153* [AT2030.153]	Musculoskeletal impairment among Syrian refugees living in Sultanbeyli, Turkey: prevalence, cause, diagnosis and need for related services and assistive products https://conflictandhealth.biomedcentral.com/articles/10.1186/s13031-021-00362-9	Boggs, D., Atijosan-Ayodele, O., Yonso, H. *et al.* Musculoskeletal impairment among Syrian refugees living in Sultanbeyli, Turkey: prevalence, cause, diagnosis and need for related services and assistive products. *Confl Health* **15**, 29 (2021). https://doi.org/10.1186/s13031-021-00362-9
Output 154* [AT2030.154]	Exploring the Use of Washington Group Questions to Identify People with Clinical Impairments Who Need Services including Assistive Products: Results from Five Population-Based Surveys https://www.mdpi.com/1660-4601/19/7/4304	Boggs D, Kuper H, Mactaggart I, Bright T, Murthy G, Hydara A, McCormick I, Tamblay N, Alvarez ML, Atijosan-Ayodele O, Yonso H, Foster A, Polack S. Exploring the Use of Washington Group Questions to Identify People with Clinical Impairments Who Need Services including Assistive Products: Results from Five Population-Based Surveys. *International Journal of Environmental Research and Public Health*. 2022; 19(7):4304. https://doi.org/10.3390/ijerph19074304
Output 155* [AT2030.155]	Co-creating Inclusive Public Space. Learnings from Four Global Case Studies on Inclusive Cities https://www.journalpublicspace.org/index.php/jps/article/view/1500/862	Patrick M, McKinnon I. Co-creating Inclusive Public Spaces. Learnings from Four Global Case Studies on Inclusive Cities. *The Journal of Public Space*. 2022; 7(2)
(n 98)	*Scientific output e.g. published academic peer-reviewed journal article (n 60)	