

Article

# Assistive Technology (AT), for What?

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**Abstract:** Amartya Sen’s seminal Tanner lecture: *Equality of What?* began a contestation on social justice and human wellbeing that saw a new human development paradigm emerge—the capability approach (CA)—which has been influential ever since. Following interviews with leading global assistive technology (AT) stakeholders, and users, this paper takes inspiration from Sen’s core question and posits, *AT for what?* arguing that AT should be understood as a mechanism to achieve the things that AT users’ value. Significantly, our research found no commonly agreed operational global framework for (disability) justice within which leading AT stakeholders were operating. Instead, actors were loosely aligned through funding priorities and the CRPD. We suggest that this raises the possibility for (welcome and needed) incoming actors to diverge from efficiently designed collective action, due to perverse incentives enabled by unanchored interventions. The Global Report on Assistive Technology (GReAT) helps, greatly! However, we find there are still vital gaps in coordination; as technology advances, and AT proliferates, no longer can the device-plus-service approach suffice. Rather, those of us interested in human flourishing might explore locating AT access within an operational global framework for disability justice, which recognizes AT as a mechanism to achieve broader aims, linked to people’s capabilities to choose what they can do and be.

**Keywords:** assistive technology; capability approach; equality; wellbeing; social justice; innovation; Amartya Sen; disability justice



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## 1. Introduction

This year (2022) has seen the publication of the World’s first Global Report on Assistive Technology (GReAT) [1]. This completes almost a decade of work to ensure assistive technology (AT) access is a core development issue. The lack of access to assistive products (APs), such as wheelchairs, hearing aids, and eyeglasses, as well as less well-referenced products such as incontinence pads, mobile phone applications, or walking sticks, affects as many as 2.5 billion people globally. Furthermore, the provision of APs would reap a 1:9 return on investment [2]. This could result in a family in need netting (or living without) over GBP 100,000 in their lifetime [2] or more, if we count dynamic overspills in the economy such as employment of assistive technology services and manufacturing of devices [3].

The publication of GReAT must be celebrated as a successful milestone, continuing the previously documented progress [3] which has been made under the stewardship of the World Health Organization. Congratulations are due to all involved. This day may never have come. Yet still, it is remiss to suggest we are anywhere other than at the end of the beginning of the needed work. The situation remains vital and urgent. People lose their lives, livelihoods, and loved ones every day for lack of AT.

The journey to this point was previously documented by Layton and colleagues [3], who found that progress brings challenges. Increased interest in the AT space had enabled the possibility of a disconnect arising between the established expertise (of AT organizations,

practitioners, and researchers) and the newly funded activity [3]. Their warning: there was (is) a need to ensure global oversight and governance of activity if we are not to waste the opportunity [3]. They proposed the establishment of “a multi-donor Assistive Technology Trust Fund to . . . [to] promote greater global cohesion across and confidence in the AT sector.” [3]. Two years later, the Global Partnership on Assistive Technology—ATscale—now fulfills this role with a mission to reach 300 million people with access to AT by 2030 [4], albeit with a different governance structure to the one proposed in [3].

Operationalizing a global multi-stakeholder partnership on AT, or any global operational framework for GReAT, will be complex. Ultimately, the success of such a program of work and the partnerships needed to deliver it will be to create a greater level of opportunity and inclusion for disabled people. However, that broad goal will not be enough without further specificity.

Global partnerships and funds have been used previously to drive global change (e.g., GAVI, the vaccine alliance [5], and The Global Fund [6]). Often, these initiatives use tools to help unlock access. The Global Cooperation on Assistive Technology (GATE) has lent on previous tools to help unlock access to AT. For example, the Priority Assistive Products List (APL) [7] follows in the footsteps of the World Health Organization’s Essential Medicine List [8]. The hope is to drive down unit costs of products in the same way unit medicine costs have fallen. However, as is demonstrated by the individual market analyses for wheelchairs [9] prostheses [10], hearing aids [11] and eyeglasses [12], and digital products [13], AT is not a single sector but a market of markets that cut across domains such as health and education [14,15]. Despite these complexities, and as we saw above, large returns on investment are possible for governments, but nuances in delivery and governance are needed. The work is complex, the actors are numerous, and the potential for mission drift is high.

Alongside the rise in the economic case, and increasing numbers of reports on how to operationalize the market-shaping elements of AT provision [16,17], there have also been calls specifically for mission-led [15] and open-innovation approaches [14]. Whilst some of these approaches appreciate the ‘markets of markets’ reality that exists for AP, the necessary integration of service delivery, and the importance of AT for changing lives, there remains a focus on quantifying the costs and qualifying the benefits of what is measurable.

In short, we question whether AT approaches still need to be operationalized tightly enough to enable collective global actors to drive toward a measurable outcome that would incorporate the qualities of a capabilities approach. Such an approach would need to take account of broader elements of AT use, such as the identity of being a disabled person and to stigmatizing attitudes that can prevent use [18–21] and its use within broader contexts, such as the physical and digital infrastructure.

In this paper, we consider the evidence from interviews with ten leading global experts on AT, undertaken as part of a wider study on access to AT for the poorest disabled people (early results are published here [22], which makes a case for the need for AT to enable participation in society within poor urban communities). This evidence is supplemented by five AT user and stakeholder interviews from Sierra Leone (also captured as part of the wider study). We also draw upon previous work we performed to map the experience of the London 2012 Paralympic Games [23], which considered what could be learned about driving large, complex partnerships toward disability inclusion. This work found that delivering a program that results in disability inclusion required twelve clear steps, which can be grouped into three stages: beforehand (Get Set), at the beginning (Get Ready), and throughout (Go). We consider our findings from this AT study in the context of what the 12-step London 2012 framework revealed to make the case that a global operational framework to drive AT interventions to support the delivery of the World Report objectives is missing and a necessary factor in global success.

We wish to be clear that we make the case in this paper not for a halt to work on GReAT, but for more work alongside: a study that operationally frames AT as a social justice issue, moving beyond unit costs and economic returns on investment to focus on what AT

enables. Following Sen, we have termed this investigation *AT for what?* to recognize the importance of understanding AT purely as a (vital and important) *mechanism* to achieve *outcomes* related to the things disabled people value doing and being.

It follows that if AT is the mechanism, then some version of justice—however understood—is the goal to which it contributes. Hence, knowing what we mean by justice in this context feels like a vital next step to avoid perverse incentives and wasted effort. Now is the time to define “AT for what?” and ensure that every single actor knows how to contribute toward that goal. We offer this paper as a starting point for discussion.

## 2. Background

### 2.1. Assistive Technology (AT) the Importance of Definitions

Assistive technology has an honorable history of good intentions but suffers from a less-than-consistent understanding of its meaning [24], with the Foundation for AT adopting the following definition in 2001: “any product or service designed to enable independence by disabled an older people” [24]). This loose frame remains helpful, and the current WHO definition builds upon it with a more precise wording for the World Health Assembly Directive, defining it as “a subset of health technology, refers to assistive products and related systems and services developed for people to maintain or improve functioning and thereby promote well-being. It enables people with difficulties in functioning to live healthy, productive, independent and dignified lives, participating in education, the labour market and social life” [25]. Within this definition, we see a clear mention of functioning—pointing to what people will be able to do because of having AT.

A core component of AT is the assistive product—the actual device. Within GReAT, two definitions of the product are given by the WHO and ISO (see below). Both refer to the use of AT to enhance wellbeing and to its ability to prevent impairments. The WHO definition remains embedded within the definition of AT, which includes the knowledge and skills needed to provide the products.

#### 2.1.1. WHO Definitions [7]

- *Assistive technology (AT)* is the application of organized knowledge and skills related to assistive products, including systems and services. Assistive technology is a subset of health technology.
- An *assistive product* is any external product (including devices, equipment, instruments or software), especially produced or generally available, the primary purpose of which is to maintain or improve an individual’s functioning and independence, and thereby promote their well-being. Assistive products are also used to prevent impairments and secondary health conditions.

#### 2.1.2. ISO Definition [26]

- An *assistive product* is any product that optimizes a person’s functioning and reduces disability. It includes devices, equipment, instruments and software. Assistive products can be especially produced or generally available items.

These definitions are important. A recent commentary by Elsaesser and colleagues called out the problematic nature of attempting to standardize terminology across disciplinary, regional, language, and stakeholder/sector boundaries [27]. The evidence in this paper would back this call to action because, as the authors state, “standard terminology is critical to naming complex problems, collectively envisaged solutions, collecting data, measuring outcomes and documenting services provided and thereby increasing access to effective AT” (ibid, p3).

However, even within these two definitions, there are important differences. In the WHO definition, there is no mention of ‘disability’ or ‘disabled people’. In keeping with the adoption of the language within the International Classification of Functioning [28], there has been a move to only measuring improvements in the individual’s functioning. This brings with it implications.

First, although the International Classification of Functioning (ICF) model is based upon the bio-psychosocial model of disability and should therefore consider elements beyond the body, as Shakespeare points out, this tends not to happen. Instead, classifications are primarily mapped only to indicators of what a person can/cannot do with their body (not even their mind), and measures of the psychological and social aspects of a person's experience are, in effect, missing because they are so hard to measure: it certainly does not take account of the frivolous, those things we do for enjoyment [29]. Within the GReAT, we begin to see elements of the 5Ps (provision, personnel, products, people, and policy) broken down and measured. Examples in Section 2 [1] of AT need prevalence by age and by product, alongside satisfaction levels, and details of providing services, such as repair services, which are accessible, are beginning to help us map a more detailed picture of the AT space. The outcomes are captured more qualitatively in the written descriptions of the lives of AT users.

Second, the WHO definition can more easily include older people, who may not identify as being disabled, something which was acknowledged in the WHO's launch of the Digital and Assistive Technologies for Ageing (DATA) Initiative [30]. In doing this, we also see a move away from the disability identity, which can be of the utmost importance for disabled peoples' communities. The balance remains essential. In this paper, we are concerned with disabled people who use AT.

## 2.2. *Sen and the Capability Approach (CA)*

Amartya Sen's seminal Tanner lecture [31] entitled Equality of What? began a contestation of what was meant by social justice and human wellbeing that saw—in 1980—a new human development paradigm take hold<sup>1</sup>. The CA to human development underpinned the philosophy adopted by UNDP for its human development paradigm [32], and has been influential ever since in global development and economics, including influencing both the WHO IFC [28] and the World Report on Disability [33]. Sen's approach was to apply a new normative evaluation framework for assessing the well-being of an individual in terms of what they are able to do and the choices they have, thus moving the socio-economic argument of measuring development advances away from simple measures of gross domestic product (GDP) [31,34,35].

Sen's approach was further developed through Nussbaum; here, the capability approach evolved into the capabilities approach, and as Onazi [36] explains, Nussbaum gives more precision and direction [37] on what constitutes a just society [38]. This includes more prominence for disability justice [39,40]. Nussbaum ends her critique of how we value (and neglect to value) disabled people, specifically people with mental disabilities with: "If we are to include the mentally disabled it cannot be because we think we will gain thereby, in a narrow economic or self-interested sense of "gain." It can only be out of our attachment to justice and our love of others, our sense that our lives are intertwined with theirs and that we share ends with them. . . It is time, then, to see what a new account of social cooperation and its goals can do to advance the search for justice, in one of the most difficult areas of human life" [39].

Significant attempts have been made to map the capability approach to disability with varying degrees of success, some of the more helpful being Refs. [41–43]. Mitra, for example, argues that the capability approach can help analyze and disentangle the factors which contribute to disability, helping to discern across a person's characteristics (e.g., impairment, age, race, and gender), resources, and environment (encompassing physical, social, economic, and political) [41].

Key to understanding and operationalizing Sen's capability approach is the idea of capabilities and functionings. Mitra argues that, within disability, capabilities represent "potential disability", or put another way, potential capabilities. We each have a capability set, which will almost certainly be reduced (or at least changed) if we were to develop an impairment (ibid). Functionings are what we wish to do as a person and can do. What happens when what we wish to do (our functionings) cannot be realized due to our

impairment (when all other things are equal) is disability. We become disabled not because of our impairment, but because that impairment combined with the resources we have (e.g., assistive products and training) within the environment we are in, does not produce the outcome we would like, for example, playing said basketball game (ibid). This approach has been used in the past within engineering studies to measure the accessibility of footways for wheelchair users [44,45] and has been used to measure the impact in Bangladesh of AT, demonstrating reduced capability poverty when wheelchairs are provided [46], as well as informing the wider policy arena. It is now helpful to look at the role of the United Nations Convention on the Rights of Persons with Disabilities (CRPD), and other justice frameworks in the AT agenda.

### 2.3. *The CRPD and (Disability) Justice Frameworks*

The most universal and overarching global statement on disability inclusion is that the CRPD exists for the purpose of protecting and ensuring the full and equal enjoyment of all human rights and fundamental freedoms by all persons with disabilities, and respect for the dignity of all people who have impairments that interact with barriers in society to hinder their full participation [47]. The CRPD covers both access to assistive technology (Article 5) and the accessibility of infrastructure (Article 9). Interestingly, Article 5 is based upon individual reasonable accommodations, and therefore, comes after such an assessment, whereas accessibility must be provided to groups and is therefore provided before an access issue or 'upfront' [48].

The CRPD is an important piece of the infrastructure for disability inclusion; a necessary factor in liberation; and an important global human rights instrument. Both in practical ways, through bringing together a single statement of human rights, and as a symbolic statement of the political will it generates. However, in common with many UN treaties, while it has a role to play in global advocacy and civil society mobilization, it can fall at the hurdle of implementation and has not yet delivered AT policies implementation, which is a known gap in AT provision [48].

A recent review of the literature demonstrated how AT provision and use enables each of the articles of the CRPD [49]. The authors demonstrated that in some instances, AT was directly referenced (for example, reference to mobility) but in other instances, the link was more indirect (e.g., access to health services (ibid)). However, the review argues that state parties (signatories to the CRPD) should develop contextually relevant approaches (ibid) to help alleviate the implementation problems we see globally. This gap in implementation can be seen in the reporting on the CRPD, which is in place to help safeguard and check progress toward the realization of the convention. In a recent review of CRPD Reports by states parties, it was found that there is a lack of evaluation of policies, and given that each state has implemented a different policy (perhaps developing a more context-specific one), the lack of evaluation means that it is impossible to measure the effectiveness of approaches [50].

Onazi argues that despite both a high level of ratification of the CRPD in Africa and the African Union's 'African Disability Protocol', which captures the unique experiences of disabled Africans, there is a lack of disability justice [36] and there remains a gap in disability inclusion. The problem is not so much one of a lack of policy—there are sufficient laws and policies in place—but within these, there is a lack of ability to challenge the negative cultural beliefs and social perceptions of disability that prevail (ibid). These attitudes are not only prevalent in those adhering to the policy, but in the policymakers themselves—they set a normative frame in which the policies are then implemented and absorbed. A further complication is that the CRPD and other high-level policies have their own normative delivery frameworks, which, as Onazi suggests, tend to come from Western societies (ibid). This leads to disability justice being defined in relation to the realization of an individual's inclusion or exclusion within elements of their life. Onazi argues that this should be expanded to include the relational elements of the community experience as well as the individual (ibid).

#### 2.4. Disability Justice and Wider Justice Framing

There is no universally adopted global definition of disability justice. However, the Disability Justice Collective, which grew out of US-based Sins Invalids, has published its own framework covering many aspects of intersectional justice one might expect to see in such a framework. Their ten principles include intersectionality; leadership by the most impacted; anti-capitalist politics; cross-movement solidarity; recognizing wholeness; sustainability; cross-disability solidarity; interdependence; collective access; and collective liberation [51]. However, this is exceptionally far-reaching in its objectives and does not relate directly to AT, and not all global actors would sign up to an ‘anti-capitalist politic’ for AT, for instance.

In the wider investigation that accompanied this study, the analytical framework selected was Fraser’s Parity of Participation [52], an inclusive justice framework, albeit not disability-specific, adopted because it identifies a progressive justice framework that has been applied in other contexts—most specifically gender—encompassing the need for recognition (or identity and self); redistribution (or resources including AT); and representation (of those most affected). This framework is helpful context in considering justice in the AT space.

Both approaches identify the normative nature of framing, and neither is without controversy nor challenge. Identifying an operational approach to delivery with similar complexity toward a disability inclusion aim is challenging. For another study, we mapped the London 2012 Disability Inclusion approach, using a Delphi methodology with expert testimony [23] as an example, and found 12 steps of the operational activity necessary to deliver the complex intervention, as shown in Figure 1. This is helpful to consider as context. We shall discuss later in the paper what it reveals about the potential gaps that the AT sector could seek to address.



**Figure 1.** 12-step framework for delivering disability inclusion in London 2012. Taken from [23].

The above background helps to make a case for a deeper understanding of the intersection between the global work on AT in the context of the principles of the CA. This paper intends to both reveal the disconnection between these approaches and to begin to map out a path to better alignment.

### 3. Materials and Methods

This qualitative research study was conducted using individual semi-structured interviews between the lead author, VA, and ten international experts' leading programs of work related to assistive technology. Eight experts were selected from the Advisory Board of AT2030's global program on access to AT funded by UK Aid. These global leaders represented organizations leading the implementation of AT programs at a strategic level in bilateral, multi-lateral, and NGO organizations. The selections were based on expertise, ensured gender, disability, and racial diversity, and diversity location (global/ Africa) as much as possible. Interviews were conducted personally, and though all participants drew on their professional experience, these responses were not on behalf of the organizations represented and provided no formal policy position of individual AT2030 board members or the AT2030 project. Participants are labeled I-#. To ensure good representation from the global disability movement, two interviewees were added who did not sit on the AT2030 board, respectively from the International Paralympic Committee and ATscale Boards. This took the total core participants to ten global experts. The interviews were loosely guided with a topic guide that considered the following topics: defining AT and its value; motivation, value and goals for AT work; understanding of disability justice or inclusion; the specific context of urban poverty; the relationship between AT and disability justice or inclusion; and the role of global policy and actors.

This paper supplemented this evidence with five interviews with disabled slum dwellers and their organizations in Freetown Sierra Leone. These interviews were with disabled slum dwellers from urban settlements (Dwoarzark, Thompson Bay, and Heppo) in Freetown and the leaders of two organizations of the urban poor who have been working with the AT2030 project since 2018. These participants were chosen as part of a wider cohort within a partnership between UCL and the Sierra Leone Urban Research Center in 2019. Participants are labeled SL-#. The initial study with this group has been published [22]. The interviews were loosely guided with a topic guide that considered the following issues: changes in the community since 2020 about AT access and disability inclusion; participation of disabled people in the community; community priorities; disabled people's priorities in the community; strategic importance of AT access; and the importance of and access to rights and justice.

The interviews were conducted between July and September 2021, held remotely, and recorded for analysis only. All were carried out in English. Interviews were pseudo-anonymized and thematic analysis followed Braun and Clarke's approach [53]. VA undertook this analysis at the end of 2021. This paper reports the initial themes, which may be explored in more detail in future work, and builds on evidence published in our earlier paper [22] as mentioned above.

The research was conducted under the AT2030 program designed to test innovative approaches and find out 'what works' to get AT to the people who need it worldwide. AT2030 is funded by UK Aid, led by GDI Hub, and delivered through a partnership of more than 70 partners in more than 35 countries. AT2030 is mid-way through its delivery, which began in 2018. Ethical approval for this study was granted by UCL, under project numbers 1106/014 and 15367/001.

Author positionality is relevant to this study. Care was taken to ensure that robust research methods were in place. Our earlier work [22] set out some initial themes for investigation. However, all analysis is somewhat subjective and relies on the authors' world view, which here is tempered by the lens of our own experience of living as queer, white women with global north educations. VA lives with two mental health conditions and CH, two conditions of neurodiversity. They also co-founded GDI Hub, which leads the AT2030 program, and co-direct the UCL-WHO Global Collaborating Center on AT. Following Patricia Hill Collins [54,55], we claim the value of lived experience as a valuable contribution to the thinking in this paper. Where our reflections are our own or are influenced by other roles, rather than evidenced through the interviews, this is clearly stated in the paper.

## 4. Results

The study revealed four themes which are now discussed in turn.

### 4.1. AT for What: The Value of AT in Enabling People to Do and Be the Things They Value

A core theme emerging from the data was an expanding and nuanced understanding of the value of AT by users. This went beyond physical functioning and toward the actions of life, the doings and beings of a person's existence. In Sierra Leone, which has a specific context, there was a focus on recognition—disabled slum dwellers often referred to the value of being seen and recognized, and how AT enabled this. For instance, representatives from the HEPPPO settlement, which has over 80% AT coverage, said: "With AT we can move to meetings. We can interact with different people; stakeholders and the committee will recognize us" (SL-1). The value was not simply in being able to access the meeting, but in what access to the meeting represented and what it enabled them to be, overcoming—to some degree—the stigma and exclusion.

One of the international experts who worked closely with the local research team on the AT2030 project in Sierra Leone for a short time summarized this well when they described the start of operationalizing the AT2030 program in Sierra Leone. They explained that as they: "*went into an informal settlement we started organizing workshops with the local teams. Anecdotally, speaking to people in the settlement, one thing that people who had AT felt, was that they could participate. Disabled People who had access to AT, that is. It was like a status thing. Disabled People in general were so invisible, so the fact they had AT meant that someone had recognized that they exist and had difficulty. Being able to access to crutches gives status, and being recognized as a disabled person was important*". (I-06)

This concept of recognition was supported by an international expert, who lives and works in an African context, and they described how: "*Many disabled people are in the habit of exclusion. The excluded have been convinced that there is nothing that can be done to get out of this situation, and they have believed that to be true*". (I-02)

The terminology here is interesting—habit of exclusion. Habits are commonly associated with individual actions, but here they are located within the community. This strong theme of AT for inclusion and the need for validation demonstrated the interlinking of societal norms and AT provision in enabling the full value of AT to be realized.

Meeting access again was the topic when I-06 discussed "*The legitimization of participation*". They continue: "*the structural shift, is important—the technology can enable you to go to the meeting, but you might still be 'in valid' . . . you might not have an authentic platform if stigma still prevents participation . . . you need more than the tech, but also a legitimate platform.*"

While people who had AT valued the recognition it bestowed, they also valued the economic returns they could make once they had AT (even if this was not always appropriate or well-fitting AT). For example, SL-02 explains:

*"The technology helps me greatly because without it I can't go anywhere, within and outside the community . . . even though it's painful [his prosthetic is from 2007] I can go many places. It helps me to get money. The business I am currently doing, I wouldn't be able to have that without the technology [prosthetic]."*

It is not surprising that access to employment, education, and income was raised by most of the interviewees (slum dwellers, national stakeholders, and international experts alike). However, access to AT was more than simply obtaining money for survival; it was about being able to perform family roles and being independent. This is captured nicely by SL-1:

*"Without my AT I can't do business without relying on someone, I can't collect my daughter. With my AT I can go to my job. Without my AT I am nothing"*. (SL-1)

This identity element was also present in people wishing to access education as is seen in the language of wishing to become an expert by SL-03:



*“For me I can say with my crutches I can move and go to class on a [motorbike] taxi, I can be more expert because so many people think that disabled people are not educated”.*

Becoming an expert can be completed independently; however, it is linked with the idea of others’ judgments. So, it is similar in nature to the ‘habit of exclusion’ in that the capabilities of the individual are affected by the lens of wishing to be a part of society.

#### Reflection from Practice

We add our reflections from practice to enhance the evidence from this section. What stands out when we reflect on what people wish to do is the conflict that arises between the need for AT to access activities, and the lack of engagement, being hidden, or being excluded from participation in critical community activities means that AT users as a group are often hidden from the agenda, or only a sub-group of people are heard. For example, where are the people needing AT to support their mental health or neurodiversity? We should also realize the changing nature of the “for what” of AT. As people become more experts, realizing the full potential of themselves and technology, we see that people’s expectations shifting upwards can happen quickly, with systems and funding often lagging these new levels of desire.

In conclusion to this theme, a vital aspect of AT to the group we interviewed was the nature of what it enabled: its ‘for what’. This went far beyond the traditional aspects of work and learning. This also included *recognition* of self, along the vein Fraser describes in her justice framework. AT was viewed, by the poorest users and international experts alike, as a mechanism to achieve a wider aim. As this expert summarized: *“I don’t feel AT is valid as a goal in and of itself, any more than any other technology—it’s what they allow you to do”.* I-06

We consider the second theme, the lack of an overarching framework for action.

#### 4.2. The Lack of Any Commonly Adopted Explicit Operational Framework through Which to Guide Interventions

The UN CRPD was defined by one international expert (I-08) as the north star, and the road map (I-08) for disability justice. They go on to explain: *“It’s very technical. . . It provides for the outcome and the steps along the route for the [signatory] State Parties”.* However, this participant was an outlier in the belief that the CRPD was so practical. Others described how, even with this roadmap, there were weaknesses in delivery terms both generally and specifically to AT, which are related to the way the CRPD enabled recourse to justice locally:

*“I don’t think it [the CRPD] is powerful [operationally]; it doesn’t ‘declare’ much in terms of rights to tech, and where it does, this involves ‘progressive realization’—as long as a country is on the right road, even if it doesn’t expect to get there very soon, its ok. Some have called for a specific ‘General Comment’ on AT. But there is some resistance to this too. The CRPD is an implement of persuasion”.* (I-06).

This criticism of simply having to be on the right path generally, which may or may not include AT, and which may or may not be moving in the right direction quickly, was summarized by one general leader perfectly: *“Some of the events I’ve been able to participate in—GDS or GReAT—are about mobilizing people and agenda setting which is important and good to celebrate. But are we missing a call that is pushing us to go much faster, because the gap is growing faster while we take time to make systemic working a priority.”* (I-01).

The need to link global interventions to their ‘for what?’ was repeated by participants, for example: *“Global policies need to be linked to outcomes of wellbeing or of general participation”* (I-05). These calls were called to have *“more ambitions, and more bold, work with more urgency”* (I-01).

There was concern that as frameworks are developed, they might unintentionally degrade the human rights they are trying to preserve. This was explained by D-08: *“Some aspects of AT may fall into a medical model category that looks at fixing PWD as if there is something wrong within the bodies. This is a grey area and a danger in how its framed as it could be problematic”*

and against the human rights agenda". Another issue within the operational framework was that it is hard to quantify the outcome, rather than the mechanism to achieve the outcome: "AT is hard to portray as a stand-alone thing, because AT as a wider understanding of technology which is assistance is not a stand-alone thing but a reasonable accommodation—what's AT for education?; what's AT for health?; what's AT for sports recreation and cultural participation?; what's AT for women's rights and reproduction? So this challenges and debates and advancements—it would be more counter-intuitive, as a stand-alone thing" (I-08).

Ultimately, no common operational framework was found to which all global stakeholders were working beneath the level of the CRPD, which incorporates AT. Returning to D-01, who put this in context: "there are a lot of people patting each other on the back for accomplishments while we are looking at a large and growing gap. We need to do more to close the gap—the call to action needs to be louder. (I-01)

#### 4.3. The Proliferation of What Counts as AT and the Lack of Alignment with a Common Definition

The research did not set out to investigate what is or is not AT. However, during the interviews and discussions, a theme emerged which began to discuss this topic. People spoke of the rise in the number of actors within the AT space due to the broadening of scope and scale of investment, for instance, the welcome entry into the area of Health NGOs such as the Clinton Health Access Initiative (CHAI), and a blurring of lines between what is and is not AT: are automated captions on a mainstream product such as Zoom, or MS Teams, an assistive technology, for example?

Currently within the framework of AT provision is the core idea of priority assistive products, defined as "products that are highly needed and necessary to maintain or improve an individual's functioning and which need to be available at a price the community/state can afford" [7]. However, alongside these essential products, technologies are advancing, and it is hard for global priority lists to keep up. Often, new tech is promoted without integration, with the needs and values of disabled people. As D-IYO states:

*"Techie nerds want to solve an engineering problem and they don't have the discourse on human rights. They are not the same animal—the person that is advocating for human rights and the person designing the tech."* (I-04).

At the extreme, the technologies can be seen to enforce ableism. Talking about the development of exoskeletons—a technology designed to enable wheelchair users to walk—one international leader said:

*"What is so dramatically important about walking very slowly and uncomfortably? Its ableism. It's exactly what AT does wrong, because it has to be exciting and futuristic and sexy. It doesn't deal with the real needs of real people"*. (I-09).

This role of technology as a 'fix' to a person's body was a mindset people wished to see eradicated:

*"The premise that our bodies are broken and need to be fixed is problematic to the real inclusion of PWD."* (I-04).

However, this does not mean medical needs should be ignored within the design space—as I-09 states: "[Tom] Shakespeare, makes the point—ignoring medical needs is not empowering."

The increasing "role of digital in promoting justice in promoting SDG's" was discussed by I-09 too, and they linked this to aiding the inclusion of marginalized groups. They highlight some of the issues of developing data-driven interventions, though, which reminds of the need for an open and inclusive approach: "[users] in the study want access to the pool of data but don't want to contribute" in part, this is due to the fear of surveillance.

This digital agenda has two components, states I-10: "there are more digital products coming in this sector, but also digital plays a big role in service provision". Relating the experience of using applications such as Uber and GoJek, they relate how these applications have "they have changed the whole world" and ask: *If I can get a pizza delivered at home, why can't I get a specified wheelchair [delivered] at home?"* They continue:

*“However, this revolution to mobile and digital is not being matched by the understanding of the insurance company or social protection authorities’ understanding of need. Therefore, we are finding insurance company . . . or . . . SP systems say they do not cover digital products like mobile phones or [they refuse] to move beyond AT that we know”. (I-10).*

There was an understanding that information itself and access to this information was a fundamental human right: *“a lot of persons with disabilities are actually facing an information access barrier . . . for example, if I am deaf, . . . [and] the channels that are going to be used to deliver that [key] communication is not going to be accessible to myself automatically I will be blocked from engagement, just for that simple reason. It will have the information itself”. (I-2).*

As information is increasingly digital, the evidence suggested that it is necessary that these two core aims of work are discussed together: *“First, how can you improve access to information for low-income communities, and secondly what is the role of AT in creating solidarity between disabled and non-disabled populations”. (I-5).*

This was explained in terms of a low-income community in Sierra Leone which was autonomously led and inhabited by disabled people and their families. This peer and person-to-person support that grows into a collective is yet to be realized digitally. However, as D-10 states, there is *“Huge need, but demand is not there. The information market has not come, and people who have it don’t want to spend time talking about it”.*

There was also some evidence that with future technologies, we can overcome these barriers: *“broader technologies are advancing very fast, so we need to go with them—we have to be at or ahead, there are [possibilities to affect] changes in people’s understandings”. (I-10).*

However, there were also warnings in these advances when discussing the advances in technology about the context in which many low-income people live.

Linked to this, delivery of AT to individuals is no longer only the domain of healthcare workers or educators, (as recommended in GReAT, task shifting is a bit part of the next step. However, AT is now being developed and sold outside of the usual systems. As D-06 remarked: *“There is a much greater blurring now . . . [with] norming of access to smartphones”.* This blurring of the lines could have negative impacts on the justice approach if mishandled, as further discussed by I-06: *“for instance, the wrong model with the wrong aim could be harming disability justice by using an understanding that people should be lucky and grateful to receive AT.”* This summarizes and underlines the importance of a standard definition which is well understood.

#### *4.4. The Relegation of AT Access Claims behind Urban Poverty Claims for Poor Disabled People*

There is little question that poverty makes access to AT less likely. As one expert commented: *“If you have a disability, you are more likely to be poor and vice versa, so I would expect that the poorer you are, the harder it is to access AT because of the cost, because of the environment, being able to actually source it, and I would expect that AT is more common in urban areas in most countries than rural areas (where it’s pretty unlikely, if you are poor). The poorer you are the higher your costs (of life), on healthcare, and travel, all your basic needs, so your likelihood of purchasing AT is less than if you were even slightly richer”. (I-7)*

This relationship between poverty and disability is “huge”, as stated by I-05, who then notes: *“the problem is when communities or countries start doing better . . . when people are incredibly poor that difference is not that much become more prevalent”. “[AT] is essential, is as essential as food and clothes. That’s how I see assistive technology”,* as stated by I-10. However, what if you have no access to food? Where then does AT provision sit within your hierarchy of needs?

In this quote is the idea that when in ‘very very low-income settings’, disabled people’s basic needs are as unmet as those of non-disabled peoples; it is only as countries and communities gain wealth that the disability gap for inclusion becomes more prevalent. This idea might seem at odds with some of the work and reflections on stigma and inclusion. However, it states that, at the very bottom of the pyramid, the need for survival is a great leveler. The problem, though, is one of almost chicken and egg. Without the ability to have AT, people cannot increase their access to the things they value doing and being.

We now discuss the results through the lens of the 12-step disability inclusion framework derived from the London 2012 Paralympics to examine what, if anything, can be learned from such an analysis.

### 5. Considering AT in the Light of the London 2012 Disability Inclusion Framework

The evidence above suggests that there could be a need to anchor more directly global AT interventions in a broader operational framework for justice. We therefore now look at another, similar major initiative—the Paralympics—and its framework for intervention, considering whether there is anything to learn from this approach.

The delivery of disability inclusion in the London 2012 Paralympic Games program is considered one of the most challenging and successful disability inclusion interventions [23]. It should be acknowledged that there is much to separate it from global work on AT delivery: a largely national rather than global locus of leadership (though with global stakeholders, such as the International Paralympic Committee and delivery partners); and the delivery of a discrete program of events, which together create a megaevent, compared with a continuous program of activity. However, arguably, the Paralympics in 2012 have much in common with the AT agenda of 2022. This is with respect to opportunity and ambition.

Yet we posit that there is enough in common to warrant a fruitful comparison. London 2012 represented an opportunity not just for inclusive games, but for a legacy of inclusion and regeneration for the area of East London. The games were used as a catalyst in much the same way as the GReAT report release is being used. Before London 2012, the Paralympics were poorly attended—people were not paying attention and did not see the potential. In the same way, one could argue that people—the public—and the average Government Minister, without experience of AT, had not realized its importance; they had not been paying attention. There is more attention on AT now.

The most essential similarities are that both can change the outcome on disability inclusion; have large numbers of influential stakeholders; can unlock investment; have global reach; and are complex to deliver. Our research found the London 2012 approach was not uniquely applicable. Still, it would benefit other areas of disability innovation that are complex and involve not only delivery by changes in attitude [23]. In fact, it is difficult to offer another comparison intervention that has been mapped in such a way by scale and thematics alone.

Hence, we utilize the 12-step London 2012 framework (L2012) to make this loose comparison, using the GReAT report on AT as the sector-defining document to consider which aspects of the L2012 framework are apparent in the AT space, and which might require further investigation and backing. Using the L2012 as a lens, we developed Table 1.

ATscale and WHO GATE both offer advocacy and political leadership (L2012-2), and GReAT has now offered a set of objectives toward a loose mission of addressing AT access (L2012-3 and 4). As a part of this, partnerships (L2012-6) are strengthening, and increasingly, the number of global experts (L2012-7) and resources (L2012-8) is expanding, though still wantonly lacking in tackling the scale of the problem. AT2030 [56] is one example of inclusive innovation being trailed (L2012-9) in various ways around products and delivery, though in its early days.

On the other hand, data are growing, but still not good enough to measure progress, and there is no single program management (PM) function keeping a check on all the actions taking place in the world, which means duplication, a break on learning, and competition in unnecessary places (L2012-10). The culture of delivery (L2012-11) has been fraught with a scarcity mindset and scarce resources, not least because of this. How we do these matters! How we have done this so far has not always been fully inclusive of the 12 steps (we include the learning from our own research here). Further, because there is no united PM function, there is also a sizeable gap in reflection, refinement, and learning from mistakes (L2012-12).

**Table 1.** London 2012 12 Step Model applied to AT.

Stage	Element of Model	AT Articulation for This Study	Current State of Play	
Get ready	1	Leadership by the most affected	(Poor) Disabled people set agenda	Limited involvement of (poor) disabled people/AT users in leadership and policy-making process.
	2	P/political leadership	Leadership, advocacy and political buy-in at all levels	Good global engagement, national engagement and political backing patchy varies according to local priorities.
	3	Mission	Clarity of mission	AT access now well-articulated, but AT is viewed as <i>the mission</i> , not the <i>mechanism</i> to achieve a wider mission of justice or inclusion.
	4	Actions	Clarity of actions and delivery plans	Clarity of global objectives, delivery plans now needed and a mechanism to enable all actors to contribute
	5	Governance	Representative, accountable, transparent, and clear	WHO-UNICEF governance of Global Report, but ATscale governance of the global fund, and others leading other programs and resources. Not transparent, accountable, representative, or clear.
Get set	6	Diverse partnerships	Everyone knows how to play their part in delivering the mission and is welcome to do so.	Partnerships are diverse, but not everyone knows how to contribute.
	7	Expert technical assistance	Is available to build capacity at all levels	Growing but capacity is limited by funding.
	8	Resources	Open access to tools and pooled resources	Growing, but much more is needed.
Go	9	Inclusive innovation	Bottom-up and the knowledge implemented	Being trialed but mechanisms to scale are limited.
	10	Good-enough data and project management	Hard decisions made and implemented	No common mechanism to catch and measure progress or make decisions—linked to governance.
	11	Striving for excellence	Culturally relevant strategy; how we do this matters	Intention present, but lack of clarity on governance and progress measurement makes this harder.
	12	Reflection and recognition	Regular, inclusive reflection, refinement, and celebration	GReAT holds the potential for doing this well.

The most significant gap we see evidenced is the lack of ongoing connection to those that need to set priorities—a lack of leadership by the most affected. That is not to say that there is no representation at the various levels of partnership or that disabled people are not consulted—they/we have been, sometimes, good. However, without solid and unified governance (L2012-5), clarity of mission (L2012-3), and every-level political backing (L2012-2) with the poorest disabled people and their governments who make the difficult decisions between road and schools, AT and food subsidies, represented at every level (L2012-1), the evidence suggests that we have a lower chance of success.

## 6. Discussion: Toward a Disability Justice Framework for AT

Our results suggest that there is no commonly held operational framework for AT access beneath the CRPD, yet the ‘for what’ of AT—what it enables—is vitally important to

those who need it. We also find that the reliance on the APL, and traditional understandings of assistive products as the main driver for tangibly understanding and quantifying AT is becoming weaker due to the proliferation of technology. This is not to say that it is not important: it is. However, technology trends are moving too quickly for such a mechanism, formulated in the current way, to keep up. Furthermore, our research suggests alignment with previous work demonstrating that the poorest are often the hardest hit by a lack of access to AT [57,58], and because the AT space is widening to incoming actors we believe that the need for a framework for justice with which to anchor AT interventions is pressing and becoming more vital every day.

If AT is a mechanism to achieve broader social justice, the question then becomes, how could we define our mission for justice? Like all such missions, it must be determined by those who experience the harshest effects of inaction, for in their wisdom lies the answers to what constitutes disability innovation for a fairer world. Ironically, this type of participation will only be possible with AT access. The need for communities to set the agenda was found to be critical to the success of London 2012.

From the London 2012 approach, we consider that better enabling the views of poor, disabled people (and their representatives) to become priority-setting contributions and ensure their continued engagement in governance and partnerships should be a priority. Alongside working together on a transparent governance and delivery mechanism for the objectives in the world report and a way to measure progress toward the global mission, clarifying the global mission (disability justice) and objectives (AT) so everyone knows how to play their part will be central to delivery.

As this GReAT report is delivered, we propose thinking about AT in a slightly amended way—evolving the definition to include the ‘why’ of AT rather than its pure existence and embracing the full range of technology now available. The suggestion below is a starting point for discussion. The changes to the WHO definition are highlighted in bold:

**“Assistive Technology (AT) is an umbrella term covering the devices, systems, and services related to the delivery of assistive products which maintain or improve an individual’s choice to do the things they value and be recognized for who they truly are. AT is a strategic prerequisite to pursuing human well-being and collective and creative justice practices for those who need it. Hearing aids, wheelchairs, communication aids, spectacles, prostheses, pill organizers, and memory aids are all traditional assistive products; increasingly, mobile devices and mainstream human–computer interaction also function as AT. AT is a necessary and core demand of disability justice.”**

This would recognize that AT is the mechanism, and justice is the mission. The following steps would be to define that mission operationally, with a heavy focus on the bits of the 2012 framework that are missing: a single governance and management approach and leadership by those most affected. Such an oversight could then look to tackle difficult questions, such as how we can explicitly connect AT and disability justice. We hope this definition and discussion begin to offer some shape to the principles of what might be the basis of an operational framework for AT access, framed in disability justice, based on the themes emerging from this investigation.

## 7. Conclusions

Our evidence suggests that AT should be understood as a mechanism to achieve the things that AT users value. We found no commonly agreed global operational framework for (disability) justice within which leading AT stakeholders were operating. Instead, actors were loosely aligned through funding priorities and the CRPD. This raises the possibility for (welcome and needed) incoming actors to diverge from efficiently designed collective action due to perverse incentives enabled by unanchored interventions. The Global Report on Assistive Technology (GReAT) report helps, but we suggest there are still vital gaps. This will become even more problematic as technology advances and what we understand as AT proliferates. No longer can the device-plus-service approach suffice; it should be linked to a broader framework.

In Sen's Tanner lecture [31], he presents an alternative formulation of equality, which he suggests deserves more attention; he says, "I shall not desist from doing some propaganda on its behalf" [35]. We promote the idea of a collective focus on driving forward a framework for AT delivery that better aligns its mechanism to disability justice outcomes with similar gusto. We intend to open a debate about the best way for these normative ideas to be contested and concluded so that global actors, investments, and narratives all pull in the same direction in service of a fairer world and life-changing AT for all.

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## Notes

- <sup>1</sup> A note on Sen's treatment of disability in Tanner, is required. Though he uses reference to disability to illustrate his conceptual point there are two important acknowledgements (1) His language ('cripple') is not in keeping with a progressive understanding (or his current terminology) and (2) Disability is used as conceptual method, in a similar vein to Harraway's Cyborg [32] as challenged by Alison Kafer. Nussbaum gives a much more robust disability focused analysis in her later book [59]. The point about *Equality of What?* nonetheless, remains pertinent.

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