


Concept Paper

Assistive Technology Is a Resource for Building Capabilities, but Is It Just Addressing the Symptoms of Inequality?

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Abstract: Advocacy for assistive technology interventions is compatible with the capabilities approach but is insufficient for addressing the disadvantage experienced by people with disability. This paper reflects on equality as an objective of the capabilities approach arising from economics, and it summarises how assistive technology and accessibility are mechanisms for achieving equality in the contemporary legal context of international disability rights. Research and advocacy for assistive technology have failed to communicate a coherent set of actions for policy makers to adopt. Defined concepts and interventions are required to prioritise and coordinate action to support individuals with assistive technology in parallel with improving collective resources by improving accessibility. Radical change in economic paradigms and societal structures that drive poverty and disability may be required for the effective adoption of assistive technology and closure of capability gaps.

Keywords: assistive technology; capabilities approach; accessibility; equality; disadvantage

1. Introduction

The capabilities approach considers the relationship between people's opportunities to do or be certain things and their welfare, which is commonly understood as health, comfort and happiness. It is less concerned with what people have or are given than with what they can do when given a choice. The capabilities approach has been discussed in the context of sustainable development as an approach to address the important and contemporary challenge of how society can end poverty and support equality for an increasingly diverse population. This paper responds to the editors' invitation to contribute to a Special Issue on "Assistive Technology and the Wellbeing of Societies from a Capabilities Approach" exploring the links between access to assistive technology or environment interventions and justice, equity and the wellbeing of societies.

The systemic social and economic disadvantages experienced by people with disability and other groups in society have been identified and measured for almost half a century [1,2]. Economists reported the costs of living with disability for individuals and their families in relation to their limited opportunities to participate in employment and be included in community life [3]. More recently, the World Report on Disability [4] reported that people experience disability largely because of a lack of access to support services and other environmental barriers. It also emphasised that people living with the same type and extent of impairment have dramatically different experiences of disability and participation depending on their context. These findings were affirmed more recently in the United Nations' (UN) Disability and Development Report [5] examining disability and the Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development. The report highlighted the disproportionate levels of poverty experienced by people with disability, with the main barriers to inclusion being discrimination, lack of accessibility, lack of access to assistive technology and other services and rehabilitation.

Assistive technology and other environmental interventions can bridge a gap between environmental demands and an individual's capacity, where such a gap limits their opportunities for participation. The UN Convention on the Rights of Persons with Disabilities



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(CRPD) [6] contains provisions for both assistive technology and accessibility, recognised as key factors in enabling full and effective participation of people with disability in society on an equal basis with others. The compatibility of the capabilities approach with the contemporary human rights established by the CRPD is theoretically pleasing but is yet to achieve any real progress toward equality.

This paper reflects on the failure to clearly define and communicate the relationship between assistive technology and accessibility and translate it into policy and action. It responds to the Special Issue call for papers by elaborating on the continuum of assistive technology and environmental interventions and need to provide and evaluate societal as well as individual interventions. It advocates for the rejection of dominant economic paradigms that perpetuate discrimination and disadvantage, based on earlier research using interpretive policy analysis that investigated different perspectives in the complex process of implementing human rights principles [7] and a re-reading of a leading economist's landmark recommendations for addressing poverty in Australia [1]. Rather than contributing new theory or data, this paper calls for action and radical change.

1.1. The Capabilities Approach and Equality

Amartya Sen recognised the fundamental diversity of humans and proposed an alternative to standard welfare economics approaches that presumed a relationship between material prosperity and welfare. Sen observed that an individual's opportunities in life depend not only on the commodities they own but also the availability of collective resources [8–10]. His 1979 lecture highlighted why equality for people with disability is not adequately addressed via economic approaches centred on income or commodities [8].

Sen's work challenges liberal values that assume individuals can and should emancipate themselves and achieve equality by making choices that maximise their wellbeing or utility within existing social structures [11]. He discussed 'advantage' as the "real opportunities that the person has, especially compared with others. The opportunities are not judged only by the results achieved, and therefore not just by the level of wellbeing achieved" [12] (p. 3). When applied to disability, this might compare people with and without disability or people with similar impairments in different contexts to demonstrate the significance of an individual's personal situation and resources and other environmental factors, including social and economic policies [13]. Sen's ideas have been extended by contemporary economic thinkers re-framing wellbeing with principles of social justice and sustainability [14].

In discussing the challenge of indexing basic capabilities, Sen was reluctant to create a fixed list that might determine priorities without being sensitive to cultural differences. He noted, however, that lists could be useful for specific purposes and contexts, including promoting justice [15], and could be assisted by "certain established conventions of relative importance" [8] (p. 219). The CRPD provides such a list for promoting equality of people with disability.

1.2. The Contemporary Legal Context of Equality in the Convention on the Rights of Persons with Disabilities (CRPD)

A record number of States ratified the CRPD after sustained advocacy from the international disability rights movement. They demanded respect for their autonomy and dignity and their right to participation, including making choices pertaining to their own lives. Individual autonomy and choice are promoted in the CRPD, recognising that agency is distributed and contextualised [16], and that collective social action and solidarity are necessary for any human to realise their rights as an individual [17]. The preamble (parts t and y) of the CRPD recognises and seeks to redress the past discrimination of people with disability that has resulted in poverty.

Consistent with the capabilities approach, the CRPD's stance on equality requires recognition and accommodation of difference, resulting in different treatment [18]. This notion of substantive equality is developed in Article 5 (1), which considers both the equality

of opportunities and equality of outcomes, superseding interpretations of equality from earlier international human rights instruments [19]. The shift from formal equality to substantive equality in international law has important implications for States' obligations [20]. The effect of the CRPD's definition of disability on public policy is to direct attention to both individual support (in the form of rehabilitation and personal assistance) and collective social actions to reduce or remove barriers and promote inclusion [21]. The CRPD contains provisions for accessibility and assistive technology, and advocates for universal design as a strategy to improve accessibility and lessen the need for assistive products.

1.3. Assistive Technology for Individuals

Assistive technology is "the application of organized knowledge and skills related to assistive products, including systems and services" [22] (p. 2229) and assistive products are "any product that optimizes a person's functioning and reduces disability" [23]. Assistive technology can increase quality of life and participation, and make a significant contribution toward the full enjoyment of most, if not all, human rights for people with disability [24]. As an intervention for individuals, assistive technology is often embedded in rehabilitation, alongside human assistance and environmental modifications. The lack of specification of assistive technology interventions, other than naming assistive products, may reflect the complexity of assistive technology provision, or an assumption that it is the assistive product itself, regardless of the services and other contextual factors, that determines outcomes [25]. Either way, the result is that assistive technology is difficult to commodify, and a focus on the cost or outcomes from one assistive product is inconsistent with the situation of most individuals [26]. The failure to communicate the nature and process of assistive technology interventions contributes to policies that fund only assistive products.

1.4. Accessibility and Inclusive Policy

An individual's functioning depends not only on their assistive technology but also on the accessibility of public policies, systems and services. Accessibility is a precondition for freedom of movement and for freedom of opinion and expression, and thus necessary for people with disability to have equal opportunities for participation in society [20]. Accessible environments minimise the experience of disability, or capability gap, between a person and their desired activity [27]. Therefore, the World Report on Disability's first recommendation is to facilitate access to mainstream systems and services [4].

The combination of specific initiatives for people with disability and efforts to address inequalities between disabled and non-disabled people in all sectors was adopted in international development prior to the CRPD, and it was described as a 'twin-track approach' [28]. Subsequently this was adopted by the Office of the United Nations High Commissioner for Human Rights [19] and incorporated into a disability-inclusive policy framework described by the Special Rapporteur of the Human Rights Council on the rights of persons with disabilities [21]. The framework is built on the three aspects of non-discrimination, accessibility and individual supports. Assistive technology is considered an individual support specific to people with disability, whilst accessibility is a mainstream approach to inclusion in all sectors that is facilitated by universal design [21]. Universal design is "a process that enables and empowers a diverse population by improving human performance, health and wellness, and social participation" [29] (p. 29). Situations where assistive technologies are provided are also opportunities to assess whether and how provisions to improve accessibility and other collective resources might leverage the capabilities of the individual and community.

2. Problems and Proposals

Economists have acknowledged that poverty arises from the organisation of society; it is not a personal attribute [1]. The World Report on Disability suggests that people experience disability largely as a result of a lack of access to support services and other environmental factors [4]. While assistive technology is an important enabler for individuals,

it is a reactive rather than proactive action, whereas accessibility represents an investment in environmental infrastructure with compounding returns through the removal of barriers. For example, modifying a home to be accessible is estimated to cost nineteen times more than building the home with the same features included, but a voluntary approach to building accessible homes in Australia failed and required regulation [30]. Advocates have failed to communicate how to prioritise and provide assistive technology for individuals in parallel with collective action to improve accessibility and disrupt the societal structures that perpetuate poverty. Capability gaps remain and inequality is increasing.

2.1. Consistent Terminology for Valid Empirical Claims

Sen observed that economists used the term ‘utility’ quite loosely as a proxy for satisfaction, happiness, desire, fulfilment, wellbeing and advantage. He critiqued the effect of this on economic analysis: “Mathematical exactness of formulation has proceeded hand in hand with remarkable inexactness of content” [12] (p. 2). Whether it is the same term being used for several distinct concepts or multiple terms being used for the same concept, vague terminology and usage leads to empirical assumptions that do not reflect reality. This is evidently a problem when policymakers rely on economic analyses to inform decision-making and do not look beyond an overall cost–benefit ratio to the underlying assumptions that inform analyses.

Variation in terminology and concepts related to assistive technology is problematic and contributes to wasteful overlapping of efforts in theory and in practice. Researchers and assistive product developers fail to learn from and build on earlier designs and experiments when addressing the same issue but with different words. Literature searches using the search term ‘assistive technology’ are less likely to retrieve relevant results than searches using the Medical Subject Heading (MESH) ‘Self-Help Devices’. Scholars from other fields, such as the World Intellectual Property Organization (WIPO), located conflicting definitions for assistive technology (only referring to assistive products) and then developed their own taxonomies of ‘conventional’ and ‘emerging’ assistive technologies without definitions and with categories that are internally inconsistent and conflate assistive products with accessibility [31]. Assistive technology advocates resort to basic case studies (usually involving wheelchairs) to avoid the difficulty of delineating and explaining interfaces with medical devices, mainstream products (including hardware and software), and modifications to physical and virtual environments that extend beyond the remit of health services. This results in a paucity of rigorous and replicable research required to provide empirical evidence to address funding priorities and workforce development needs [32,33].

Consistent usage of terminology and concepts is central to welfare economics, and it is necessary for the assessment of inequality and economic development to address real and practical problems. The World Health Organization’s (WHO) international data collection efforts to date [34,35] are all but meaningless given that government survey respondents in different countries do not have a shared understanding of assistive technology. It is not about suggesting that interventions targeting accessibility are superior to assistive technology but rather providing clarity on the role and relevance of different concepts to maximise equality through individual and collective actions.

Institutions and researchers are yet to support proposals for standard assistive technology terminology which would build upon the common language and taxonomy provided by the WHO’s International Classification of Functioning, Disability and Health (ICF) [36,37]. This has logical benefits, as both the ICF and the capabilities approach recognise diversity and have been developed in health economics to assess and evaluate important domains of wellbeing [38]. Intervention specification is necessary to assess quality, return on investment, and comparative advantage. Development and adoption of agreed terms and definitions in the field of assistive technology would facilitate the measurement of capabilities against established conventions and assist with determining priorities for policy. A starting point could be to provide basic technical advice (e.g., a position paper) to guide the judiciary and parliaments on the relevance of, relationship between

and interdependence of assistive technology and accessibility and why they should not be conflated as measures to promote equality via a disability-inclusive policy framework.

2.2. Objective Criteria for Prioritising Resources

Much of economics is concerned with commodities and people. While there are multiple ways of generating government revenue “... all government expenditures compete with one another for scarce resources” [39] (p. 104). The distinction between accessibility and ‘reasonable accommodation’ (usually in the form of individual supports including assistive technology) is critical to the implementation of the CRPD, and therefore government and private sector budget decisions. The obligation to provide reasonable accommodations under Article 5 (3) of the CRPD is an immediate duty to realise the right to non-discrimination [40]. In contrast, the CRPD’s provisions for accessibility are subject to progressive realisation. This recognises the time required to transform public services and infrastructure to be accessible, and the potential for additional individual supports to bridge the immediate need [19].

The UN acknowledges that the concepts of accessibility, individual support and reasonable accommodation are often confused, and that “reasonable accommodation requires further development in international human rights law” [19] (p. 18). The recent Global report on assistive technology is in many ways a significant milestone in advocacy lead by the WHO, but it could have contributed to this legal and technical development [34]. Instead, it notes the importance of inclusive environments but does not provide empirical evidence, technical advice, or objective criteria for prioritising individual versus collective interventions. The implications are significant for legal, policy and budgetary decision-making. There is a history of arbitrary or poorly defined interventions being allocated and funded across different sectors or portfolios that do not cooperate, leading to inefficient efforts to tackle disadvantage [41]. There is also a risk that increased expenditure on assistive technology for individuals might be offset by a proportionate reduction in spending in collective efforts, including improved accessibility, to address poverty and inequality. These are the budget decisions that policymakers are forced to make.

2.3. A Long-Term View That Addresses the Causes Rather Than Symptoms of Inequality

The basic objective of development is to create an enabling environment for people to live long, healthy, and creative lives, not to accumulate commodities. Proposals to increase the supply of assistive technology address symptoms rather than the inherent inequality and discrimination against people with disability in societal structures. Sen described how securing commodities gives people command over them, but what each person will be able to do with commodities varies depending on the individual and their context, so a person’s wellbeing cannot be assessed by the characteristics of the commodities they possess [12]. The presence of assistive products does not determine an individual’s wellbeing, yet this resource or output-based economic mindset tends to dominate efforts to increase access to assistive technology [34,42]. Recommendations to increase supply of assistive products based on a generic list is contrary to a capabilities approach, which recognises the disparate environmental factors and therefore opportunities available to people with similar impairment.

Welfare systems do not address the sources that give rise to the problems they respond to, so they are often not effective in meeting people’s needs. Indeed, welfare systems can generate new problems or inequalities that tend to trigger responses in the form of additional measures that increase complexity. People with disability have sought to be treated with dignity and have the same opportunities as other members of the community through the removal of barriers rather than the provision of special treatment [2]. Recent international policy analysis demonstrates the difficulty of shifting disability support from charity and welfare to a rights-based approach, and the potential for additional resources under this paradigm reinforcing negative perceptions of people with disability [43]. There is a risk that progress toward the WHO’s goals will be measured by growth of assistive

products (commodities) rather than capabilities. Perhaps due to its purpose and scope, the Global report on assistive technology lacks a long-term view of the upstream drivers of inequality or the downstream effects of continuous growth of assistive technology supply. The UN's Disability and Development Report [5], however, could have questioned or challenged the economic paradigms that discriminate against people with disability in their recommended actions for ending poverty.

3. A Call for Radical Reform

Changes to policy wording and the publication of reports do not necessarily change the organisation of systems and entrenched norms and values of society that reproduce the inequalities for people with disability [3]. The provisions contained in the CRPD with respect to accessibility and the provision of assistive technology necessitate fundamental revisions to policy and practice in ratifying countries. Recommendations from the Global report on assistive technology such as raising awareness, improving markets and prioritising assistive technology in policy fall short of stopping the trend toward increasing inequality. The report relies on conventional economic goal of growth rather than re-distribution, and it has only one sentence recognising the need to factor in reuse and other regenerative economic mechanisms to reduce the environmental impact of more assistive products [34]. Policies centred on individuals and relying on rational consumer behaviour risk exacerbating inequalities [7], whereas effective deployment of assistive technology should draw on community resources and the social contract that comes with human rights to ensure the use and usability of assistive technology as much as the affordability of assistive products. Greater leverage comes from changing the economic paradigm that drives the system's goals and design [44].

The rights agenda is not always complementary with the increasing drive for economic efficiency in policy or the emphasis on individualism over collectivism [45]. The CRPD has been described as a "potential catalyst for radical reappraisal of policy and practice" [46] (p. 79), but this has been stifled in part by debate as to whether the focus should be on services targeted to people with disability or more inclusive mainstream services [17]. A commitment to full citizenship and equal rights for people with disability cannot be implemented through programs that run in parallel to mainstream society, rather than expanding its margins [47]. Assistive technology is not always an appropriate, efficient or sustainable method of promoting inclusion. This will be met with resistance from lobby groups, but silent avoidance of big decisions and failure to challenge societal structures are acceptance of perpetual inequality.

4. Conclusions

The capabilities approach is compatible with advocacy for assistive technology and accessibility interventions, but both have failed to communicate a coherent set of actions to achieve equality. This paper responded to the editors' call to discuss the continuum of assistive technology and environmental interventions, arguing that efforts to date have not operationalised this continuum, and have focused on assistive products and individual interventions rather than accessibility and societal action as part of a disability-inclusive policy framework. If the capabilities approach seeks to change the conditions people live in rather than the people themselves, assistive technology interventions should be considered just one of the mechanisms of change, complementing societal efforts to reduce discrimination and improve accessibility as a collective resource. Assistive technology advocates need terminology to communicate its interface with accessibility and other interventions and to describe, deliver and measure actions and outcomes; and share strategies globally. This will facilitate prioritisation and decision-making, recognising that the judiciary and policymakers use different levers to reconcile individual freedoms with collective equality and fiscal responsibility of public resources.

The idea that assistive technology and accessibility can close capability gaps across society may remain theoretical without fundamental changes to structures that perpetuate

inequality. Efforts to increase access to assistive technology led by the WHO have emphasised provision of assistive products within health systems, rather than the conditions and structures that perpetuate the inextricable links between disability and poverty. This is inconsistent with the UN's 2030 agenda and CRPD, which should guide implementation of a capabilities approach. Collective social action, not just additional welfare support targeting individuals, is critical to developing the conditions that increase the capabilities of people with disability. Major investments in accessibility are required to address the profound inequalities experienced by people with disability, and to enable efficient and sustainable use of assistive technology. Implementation of the vision set out by the UN may necessitate replacing conventional economic goals of commodities and growth with a contemporary economic paradigm of inclusive and sustainable development.

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