



## Capturing and Creating Value in the Assistive Technologies Landscape through a Mission-Oriented Approach: A New Research and Policy Agenda

### Sarah Albala

Research Fellow in Public Value and Policy Evaluation,  
UCL Institute for Innovation and Public Purpose

### Julian Walker

Associate Professor, UCL Development Planning unit

### Catherine Holloway

Associate Professor, UCL Interaction Centre  
Academic Director, Global Disability Innovation Hub

### Victoria Austin

CEO, Global Disability Innovation Hub CIC  
AT2030 Director

### Malcolm MacLachlan

Professor of Psychology and Social Inclusion  
Director of the ALL (Assisting Living & Learning) Institute,  
Maynooth University

### Rainer Kattel

Professor of Innovation and Public Governance  
Deputy Director, UCL Institute for Innovation and Public Purpose

### David Banes

AT2030 Research Consultant, ALL Institute, Maynooth University

### Mariana Mazzucato

Professor in the Economics of Innovation and Public Value  
Director, UCL Institute for Innovation and Public Purpose

### Rose Bandukda

Senior Social Development Officer,  
Ministry of Labour and Social Protection,  
Government of Kenya

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## Background

Policy makers are increasingly embracing the idea of using industrial and innovation policy to tackle the ‘grand challenges’ facing modern societies. Examples of challenge-led policy frameworks include the United Nations’ Sustainable Development Goals (SDGs), the European Union’s Horizon 2020 research and development programme, and the UK’s 2017 Industrial Strategy White Paper. Policies which are challenge-led are more apt to confront the direction of growth and to acknowledge existing challenges in multilevel ecosystems. The SDGs has an overarching challenge to ‘leave no one behind’ by ensuring that the most marginalized are included in our collective approach to social gain. However, delivering challenge-led growth requires a new tool kit. One that recognizes the importance of market shaping and market co-creating and provides new ways to evaluate dynamic impact and spillovers of innovations and investments [1]. Such dynamic evaluative schemes require thinking beyond classic returns on investment (ROI) models and can further explain the complexities of the Assistive Technology (AT) ecosystem. A key lever for equitable achievement of the SDGs is the provision of and access to quality and affordable assistive products (APs); which have been shown to be both mediators and moderators of achievement of each of the SDGs [2]. The provision of APs is both a social and a market challenge, to which a market shaping ethos may be fruitfully applied [3].

Industrial policies have always been composed of both a horizontal and a vertical element. Horizontal policies have historically been focused on skills, infrastructure, and education, while ‘vertical’ policies have focused on sectors

like transport, health, energy or technologies. Vertical policies, such as sectoral policies, in particular require rethinking. By focusing on challenges, and more specifically on policy missions, we have the opportunity to determine the *direction* of growth by making strategic investments across many different sectors and nurturing new industrial landscapes. This approach is especially relevant when tackling such dynamic and cross sectoral issues as the provision of AT. A coordinated and systematic approach is needed in order to tackle several of the major barriers that exist in disseminating APs. As part of the larger AT2030 project this paper will initially set out a research mission that seeks to understand the complexities of the AT landscape by presenting a novel means of exploring, capturing and evaluating the multitudes of value within the AT value chain. By presenting this alternative model which captures the spill-over effects of investing and supporting the entirety of the AT web, we hope to provide a reoriented framework which leverages existing stakeholder networks and policy action layouts, to reimagine standard thinking about the supply chain, to address market failures, and to restructure actor mandates.

The AT2030 project aims to ensure life-changing AT is available to all people, regardless of financial means or geography. With over 1 billion people who need AT such as wheelchairs, glasses or prosthetic limbs, the culminative market need is large and is further expanding due to the relationship between AT need and an ageing population. Further it is important to contextualize and understand the importance of AT. Technologies have the potential to be transformational; both for AP users and

for the broader system that facilitates their usage. With a plethora of disruptive technologies and practices, such as 3D printing, augmented reality, machine learning, co-design, task shifting, and the creation of new personnel cohorts, we are now able to create new ways of doing things that would have been previously unimaginable. This project is part of a larger global alliance initiative, that is to develop a global mission through organisation(s) which can reach 500 million people with AT by 2030. For a Global Alliance to be an enactment of mission-oriented policies they must be situated on two core pillars; first they must set a purpose for public investment and, secondly they must enable spill-overs in a new form of supply and demand, where activity in one context can have a positive (or negative) effect in another context. Further, well designed interventions can tilt the playing field and produce an environment that enables public funding from grants to procurement, and regulation to crowd in private investments and resolve key underfunding and under resourcing issues surrounding AT. In doing so they should also allow for grassroots activity to rise up.

Yet, currently the way in which AT is designed, manufactured, distributed, provided and explained to users, repaired, upgraded, and adapted – is economically challenging, especially if viewed through traditional value metrics. A further challenge is the heterogeneous nature of AT. There are 50 essential priority APs defined by the WHO [4], which range from wheelchairs, to pill organisers, communication software and screen readers, to incontinence pads – each representing a very different marketplace. While these 50 products are seen to be

priority products, there are many times this number of APs; and in some cases, hundreds of product versions within a single type of product; for instance, manual wheelchairs.

An additional challenge for AT market-led strategies is that many of the countries in the global South, which have the highest gap in access to ATs, are also characterised by the dominance of informal markets. Informal markets make up 85.8% of the African and 68.2% of the Asian labour market [5]. In countries dominated by informal markets, only 5–15% of those who need ATs have access to them [6]. While there is a limited research base in relation to the role of the informal markets in delivering ATs, this pattern suggests that the sector is likely to play a key role in the provision and maintenance of ATs, and existing research does demonstrate the limited role of ‘formal’ interventions delivering ATs in regions such as sub-Saharan Africa [7]. This means that policy-led and market shaping interventions designed to support access to ATs also need to consider how to engage with economic actors in the informal sector, which are beyond the direct regulatory reach of the state. However, by focusing on AT-related policy missions we have the opportunity to determine the direction of AT innovation by helping public, private and third sector actors to make strategic investments across several fields and by nurturing new innovation and industrial landscapes to grow. Currently there is a dearth of evidence capturing best practices for ensuring a functioning global marketplace. The lack of evidence is, in part, a result of the varied AT market landscape. Some marketplaces are dominated by charity and NGO investment e.g. wheelchair provision, while others, such as screen

readers and digitally accessible products, are driven by private companies. A call for a unified global effort to look further into the barriers within the current system has taken place at the World Health Assembly which urged “Member States to develop, implement and strengthen policies and programmes to improve access to assistive technology and requesting the Director-General to prepare by 2021 a global report on effective access to assistive technology”.

Internationally there are already policy frameworks in place that prompt action from AT system stakeholders and can be utilised to rethink AT economics and resourcing. The United Nations Convention on the Rights of Persons with Disabilities lays out international policy that aims to secure disabled persons’ rights. One of the four rules on the precondition for equal participation requires that States ensure the development and supply of APs to assist people with disabilities. Further, beyond the supporting of the development, production, distribution and servicing of AT, states are also required to support the dissemination of knowledge about such products. Lastly, because states ought to enable persons with disability to have access to such products, financial accessibility is essential [8].

Even within the EU state aid law there are regulations which are meant to achieve equality of people with disabilities based on accessibility, participation, equality, employment, education and training, social protection, health and external action [9]. An interpretation of such regulation and law could easily point towards using such policies as a toolbox for direct improvements in the availability and access to AT within the EU internal market. Markets are always co-produced

rather than self-regulating, joint action is necessary in order to make markets more effective, raise consumer welfare, and promote specific rights and values[10]. Through the proper leveraging of policy interventions and partnerships and the recognition of the government as both a historic and current market shaper – and often also market maker in places where there are no suppliers – there is potential for an increased production of accessible goods, an adjustment or reduction of prices and a greater choice of APs that are properly matched to the user through a system which is fit-for-purpose. Proper regulatory frameworks could also enable better consumer valued and designed AT to become far more accessible by encouraging products to utilise Universal Design Principles; helping to reduce the often high abandonment rates. This approach would extend beyond existing market options that tend to favour mass-market technologies and procurers’ preferences, by providing additional APs that are further designed around users’ capabilities and quality of life [11].

Due to the varied landscape of AT, it is important to engage not only the government and the private sector, but to fully embrace the varied and essential roles that social enterprise, local and international civil society, universities, individual AT users, informal markets and innovators play. However, the role of Government is pivotal in creating a playing field which is tilted towards innovation and equality. In this way it can play a varied and vital role in shaping the AT ecosystem through both its traditional and recognised role to govern, finance, create policy, and legislation along with performing less traditional parts which are beyond defined state craft. From the start of AT2030 the Government of Kenya has

been a partner. It recognises the role it can play in transforming the AT market landscape within the country by supporting innovation and an enabling an environment for investors. To ensure sustainability and protection of AT users and investors, it is committed to developing an AT mission and driving the policy framework to ensure AT is available to all Kenyan citizens who require it. The resulting framework will borrow from relevant research findings of the AT2030 programme, following the approach detailed in this paper in the efforts of ensuring an inclusive society that supports innovation and attracts public investment. The Government of Kenya is committed to co-creation as a method of policy development to ensure inclusivity and sustainability. Thus, it has set up an Inter-Agency Coordinating Committee that consists of both Disabled Persons Organizations, private and public sector players alongside Government Ministries. The committee is tasked with facilitating effective coordination and monitoring of formulation of the AT policy framework and will work collaboratively with AT2030 as we progress the AT mission together.

Governments worldwide must take on such leadership roles and recognise their importance in the market. This would entail governments cooperating and receiving input from a diverse range of players, leveraging different knowledge and skills systems where AT is at play and building relationships with AT producers and industries.

New frameworks of partnerships already exist that can be used to model alternative actor arrangements in the AT marketplace. Dynamic public-private partnerships (dPPP) are such an attempt to involve participation from public,

private and third sector actors. Specifically, Product Development Partnerships (PDPs) are a type of cross sectoral partnerships which aim to deliver health focused agendas through the diffusion of an innovation (whether be a drug, vaccine or AT etc.). PDPs ideally form strong partnerships which are governed by formal agreements and deal with issues spanning from intellectual property, regulatory pathways, markets, manufacturing and price. Such partnerships ideally inspire the public sector to embrace a larger remit of possibilities beyond a traditional market fixing role, with often stagnant, limited or redundant policy options. A successful PDP requires collaboration that meets with the differing and complementary goals of those partners. The 6 broad areas for a collaborative PDP entail either planning, analysing implementing and/or establishing 1) research and development programs, 2) market and distribution 3), procurement and supply 4) manufacturing abilities 5) regulatory systems, 6) IP rights management systems [12]. The AT market would appear to be the appropriate venue for launching such an approach. Yet, PDPs while an excellent step in creating a structure that brings many actors to the table in order to solve ‘wicked problems’, specifically health challenges, are still being operated under traditional market relationships where private industry is placed in a position of resource and financing power.

NGOs, foundations, and charities play an important role in leveraging cross sectoral relationships in the existing AT landscape; as they have the potential to function both as a collaborative juncture between private and public sector, as well as take on a larger market shaping role. Currently, the charity-based model is one of the key

existing AT delivery mechanisms that exist within many local as well as global communities. In this model NGOs are credited with providing materials, engaging in low cost prototype distribution and development, participating in mass distribution, fundraising and refurbishing existing APs [13]. Beyond this role in the AT supply chain, such actors serve a critical function in value creation for social ends [14]. NGOs do so by leveraging unique expertise in order to advocate and influence activities, operationalize goals, and build institutional and social capacity [15]. In order to perform such activities fruitfully, NGOs will be required to work in dynamic cross-sectorial partnerships. NGO programmes, if successfully envisioned and implemented, can in fact parallel the framework for a mission-oriented approach. Programmes developed not only require cross sectoral thinking, but must be targeted, societally relevant and incorporate bottom up solutions. This is in keeping with the mission oriented approach which entails that the mission be; 1) bold and inspirational with wide societal relevance, 2) has a clear direction target and is measurable and time bound, 3) ambitious but realistic research and innovation actions, 4) cross-disciplinary and cross sectoral, and contains 5) multiple bottom up solutions [16]. Given that the AT2030 project has a global focus, the role of informal markets must be stressed. Thus, in addition to working with a wider range of partners, such as charities and NGOs, there is also a need to consider how to influence informal AT markets using a wide range of policy tools, that go beyond direct regulation by state actors. To this end it may be strategic to draw on models such as the *Formalization of the Informal Economy* and other efforts which promote social regulation of

informal markets. The AT2030 project aims to address this by further studying informal markets and ATs, and thereby explore how to extend efforts to extend the shaping of access, price and quality of ATs into informal markets.

## Project Agenda

This component of the AT2030 programme brings a mission-oriented ethos to AT. It does so by invigorating and working with and through several complementary and interconnecting levels of activity. The individual AT-user is central to how the system must work; from issues of technology fitting the person's needs, to how they encounter and deal with stigma, both as people with disabilities and AT users. Our ethnographic work seeks to understand and build on the values and initiatives regarding AT provision. The service providers; AT makers, producers, and suppliers, constitute a market that in almost all countries is incoherent and lack the absorptive capacity to embrace and scale innovation; and this is where market shaping can guide both social and commercial gain in a planned and sustainable way. AT2030 will work with government and other key stakeholders, through action research methodologies, to learn from and be guided by, the values and aspirations of national stakeholders; to secure their commitments and to identify examples of existing good practices for future scaling. This country-led research will connect AT policy innovation with the systems requirements to deliver; powered by the engagement of global, national and local partners that will be driven by our mission-led approach.

The research project will go about applying a mission-oriented approach to

AT which will inherently leverage policy and governance structures by demonstrating the overall public value that is created by AT. In a strongly market-oriented world, funders and investors can be motivated by returns on investment (ROI). One such ROI alternative is the Social Return on Investment Tool. This tool was developed based on cost-benefit analysis and social accounting to capture and monetise the social and environmental value that is otherwise not traditionally captured. As a method it has been standardised by Social Value UK and is often expressed as a ratio of benefits to costs [17]. This method is limited as it is often only applied to a particular industry and not an entire ecosystem, and it does not take into account various spill-over outcomes. We recognise that for some it is problematic to try and monetise social gains, but to incentivise such gains beyond current levels of engagement, monetisation can create a clearer context for public and private investment, than might otherwise be the case. In order to capture dynamic cross-sectoral spill-over effects, the literature will be thoroughly researched and source theories, models, and ideas from industrial policy, science and technology studies, political economy, methods papers on policy evaluation, narratives of assistive technology users, and case study reports that detail existing AT supply chain networks, and the expertise and experience from essential

actors will be garnered. Further, this project will incorporate the experiences of ongoing as well as future AT programmes that are developing on the ground as case studies whereby the absorptive capacities of the AT ecosystem in a particular system can be fully articulated and mapped, as well as capturing how such technology is currently embedded into social, economic and political domains. The diagram below ( Figure 1) visualises the suggested AT innovation ecosystem and the subsequent spill-overs and outcomes to be captured.

This paradigm moves beyond cost savings and places focus on creating opportunities for market shaping and optimal partnerships. Through this framework, and the evidence and research compiled, a policy toolkit with explorative case studies will be provided which demonstrates how the restructuring of the AT environment through a dynamically designed system will enhance the experience, delivery effectiveness and impact both at the individual to the state level. Overall, we hope to provide an economic case for AT and therefore strengthen the rationale for governments to truly invest and modify the market. An economic case that is theoretically robust and accompanied by empirical evidence that articulates the benefits of AT investment whilst being broad enough to incorporate a variety of technology types and landscapes will be truly transformative for the AT agenda.

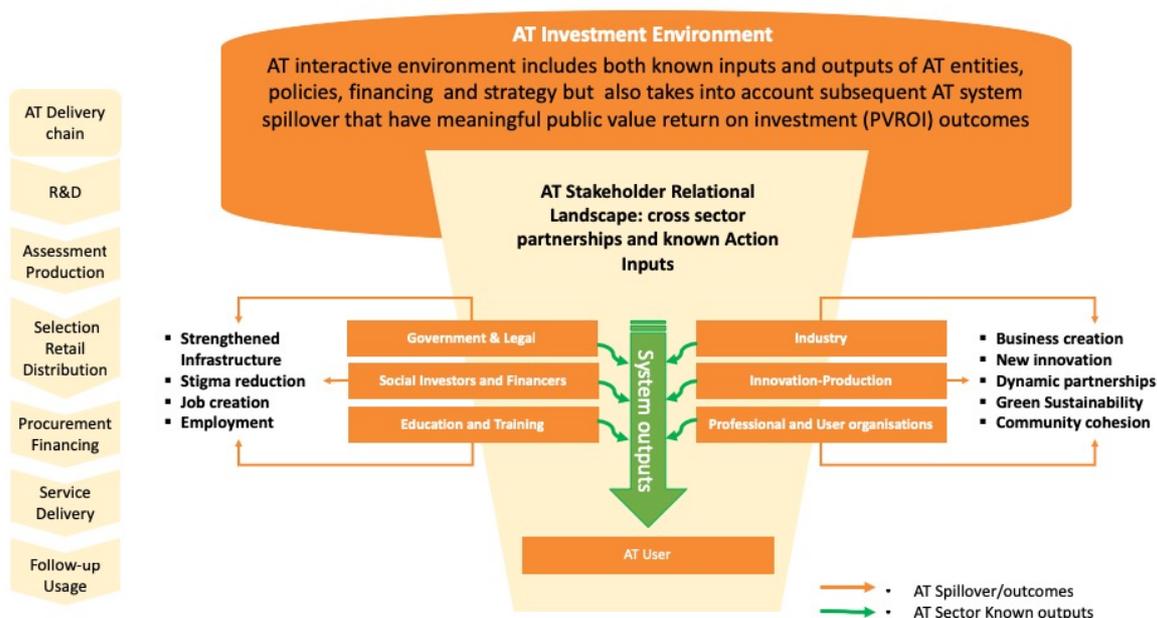


Figure 1: Inputs, outputs, and outcomes from key contributing sectors are presented in this diagram. The visual highlights what is already known about the inputs and outputs of the AT system, such as those captured through typical supply chain metrics, but also brings forth potential spill overs and outcomes. We show the inputs, outputs, and outcomes from key contributing sectors in We propose that through the suggested Public Value Return on Investment toolkit for AT which we loosely derived from Social Return on Investment [17], AT Public value could be captured. Possible AT Sector roles are described thus:

- **Government and Legal:** Regulatory agencies, policy setting, market shaping, AT grant funders, health and social care Institutions, large scale procurement and distribution systems
- **Social Investors and Financers:** NGOs, start-ups, foundations investing in needs based or niche AT from innovation to delivery
- **Education and Training:** Rehabilitation, public health centers, schools as procurers, distributors and user contact points with AT
- **Industry:** Manufacturers, dealers, wholesalers identify profitable AT and try to bring to scalable markets
- **Innovation-Production:** Universities, R&D hubs, testing organisations creating new, improved, or universal design products
- **Professional and User organisations:** special interest groups, e.g. disability advocates, lobbying for better quality and AT access
- **AT User:** require access to AT that is affordable, desirable and sustainable in a given context

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