



# **DATEurope** *Digital Assistive Technology* *Industry Association*

## **Shaping an Identity for Digital Assistive Technologies**

### **A DATEurope Discussion paper**

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#### *Executive Summary*

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The provision of Digital Assistive and Accessible Technologies has been constrained by a lack of understanding of the value and impact of the technologies on the lives of people with a disability. Barriers have been created because of criteria for the provision of assistive technology being established prior to the widespread uptake of digital and smart technologies. As a result in many cases, only those devices and aids designed specifically for people with a disability are supported, rather than seeking to fund the functionality and features that people identify and require.

In this paper, we seek to build upon definitions of assistive and accessible technologies by outlining how the identity of traditional and digital solutions vary and differ. The concept of identity is shaped through an understanding of the attributes of the technology drawn from a deep understanding of the ecosystem that surrounds the technology and the delivery chain that supports implementation.

That ecosystem comprises -

- Awareness
- Advice/Assessment
- Provision, purchasing, and procurement
- Training
- Support
- Research and Development
- Policy and coordination

In each case, we identify variations in the chain that criteria should allow for. The importance of relating the funding model to the form of technology is discussed and the steady move towards self-determination and direct funding of AT is highlighted.

In the conclusion of the report, we recommend a series of questions for policymakers and administrators to consider in determining that the criteria and process of provision of TV is appropriate and responsive to innovation and the growth of digital and smart assistive products.

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## *Identity*

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In this paper, we propose that it is appropriate to identify an identity for digital assistive technologies. This is distinct from a definition, a definition is a relatively simple description of a subject or object, that may be physical or virtual, including ideas and concepts. Identity is constructed by the combination of unique characteristics, relationships, and roles or purposes. If a distinctive definition is feasible, we can build upon that by addressing the concept of identity.

As our identity is being applied to digital technologies, there is a challenge in recognising the attributes that constitute that identity, hence in this discussion, we draw upon the expertise of those who develop, use and work with Digital Technologies to clearly describe those attributes.

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## *Why identity for DAT has become important*

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The range of products available to address barriers to the inclusion of persons with a disability has diversified significantly over the past 20 years. As the demand for products has increased, the industry has responded. At the same time, there has been a steady influence of disruptive innovation and technologies upon the marketplace, often driven by the availability of mainstream technologies as a means of delivering both assistive technologies and accessible products for use by those with disabilities.

Increasingly some of the distinctions between digital and traditional assistive technology has become blurred as traditional AT such as wheelchairs embrace and integrate “smart” features that enhance the product by incorporating access to digital elements or data for maximum benefit. Many technologies have fully transitioned from analogue or mechanical products to digital, offering the same functionality in new ways. Such transformations challenge existing provision systems to rethink the criteria for provision to take full advantage of these opportunities. Equally, the rapid pace of digital innovation further challenges both the user and professional to acquire knowledge and skills and maintain current knowledge of possible solutions.

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## *Defining AT*

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Before seeking to outline the attributes of digital assistive technologies, it is helpful to consider the wider definitions of assistive technologies within which digital forms operate.

The Americans with Disabilities Act (2009) offers a federal definition of assistive technology (AT) as:

...any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of individuals with disabilities. [20 U.S.C. Chapter 33, Section 1401 (25)]

Under this definition, Assistive Technology can be anything that helps a person with a disability perform a task. Similarly, the World Health Organisation (WHO 2016) describes AT as

“Assistive technology enables people to live healthy, productive, independent, and dignified lives, and to participate in education, the labour market, and civic life. Assistive technology reduces the need for formal health and support services, long-term care, and the work of caregivers. Without assistive technology, people are often excluded, isolated, and locked into poverty, thereby increasing the impact of disease and disability on a person, their family, and society.”<sup>1</sup>



Whilst the Assistive Technology Industry Association (ATIA) in the US builds upon the federal definition and describes AT on its website as

“Assistive technology (AT) is any item, piece of equipment, software program, or product system that is used to increase, maintain, or improve the functional capabilities of persons with disabilities.

- AT can be low-tech: communication boards made of cardboard or fuzzy felt.
- AT can be high-tech: special-purpose computers.
- AT can be hardware: prosthetics, mounting systems, and positioning devices.
- AT can be computer hardware: special switches, keyboards, and pointing devices.
- AT can be computer software: screen readers and communication programs.
- AT can be inclusive or specialized learning materials and curriculum aids.
- AT can be specialized curricular software.
- AT can be much more—electronic devices, wheelchairs, walkers, braces, educational software, power lifts, pencil holders, eye-gaze and head trackers, and much more.

Assistive technology helps people who have difficulty speaking, typing, writing, remembering, pointing, seeing, hearing, learning, walking, and many other things. Different disabilities require different assistive technologies.”<sup>2</sup> . However, even this description has a focus on dedicated assistive technologies designed to address the specific needs of people with disabilities, rather than a broader range of technologies with benefits to disabled people.

Such definitions of assistive technology can be contrasted with more cautious or hesitant definitions such as that offered by the UK government which states that

“The phrase ‘assistive technology’ is often used to describe products or systems that support and assist individuals with disabilities, restricted mobility or other impairments to perform functions that might otherwise be difficult or impossible.

Just because a product is used in a healthcare environment or by a healthcare professional does not automatically mean it is a medical device. It will only be considered a medical device if the manufacturer has stated that it has a medical purpose and if the product’s primary mode of action is physical or mechanical.”<sup>3</sup>

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<sup>1</sup> (<https://www.who.int/news-room/fact-sheets/detail/assistive-technology>)

<sup>2</sup> (<https://www.atia.org/home/at-resources/what-is-at/>)

<sup>3</sup> ([https://www.gov.uk/government/publications/assistive-technology-definition-and-safe-use/assistive-technology-definition-and-safe-](https://www.gov.uk/government/publications/assistive-technology-definition-and-safe-use/assistive-technology-definition-and-safe-use)

The variations in these definitions, from all-encompassing to more narrow or hesitant reflect the challenges in seeking to discuss the breadth of potential digital assistive products. Key challenges emerge when assistive technology is an element within a wider product or system, adding assistive functionality to a product that enhances or enables its use by persons with a disability or that adds features that target those with disabilities beyond the original scope of the device. For instance, making a mobile phone or tablet a communication aid. The aid is only possible as a combination of the integrated features of the device with added features in the form of an app.

For all these reasons, we need to recognise the limitations of current definitions and highlight a need to refine our understanding of such technologies by sharing a common identity for digital AT.

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### *Defining Digital*

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In addition to defining assistive technologies, it is also useful to define more clearly what we mean by digital, especially when applied to AT. In many respects “Digital” is an umbrella term for technology-based products and solutions. In that technology is so pervasive today, it remains a rather vague term. However, digital technology may refer to the use of new algorithms or applications to solve a problem.<sup>4</sup> Such digital technologies include electronic tools, systems, devices, and resources that generate, store, or process data. Digital technology encompasses digital devices, systems, and resources that help create, store, and manage data. Examples of digital technologies would include social media, online games, multimedia, and mobile phones.<sup>5</sup>

The processing of such data is enabled through devices and processors designed to perform specific functions. Devices that process such data would include personal computers and tablets, cameras, calculators, and digital toys, alongside systems such as software and apps, augmented and virtual reality, and less tangible forms of technology such as the Internet. The processing power of consumer technologies is now so great that the potential range of assistive features is increasing year on year.

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[use#:~:text=The%20phrase%20'assistive%20technology'%20is,otherwise%20be%20difficult%20or%20impossible](#)

<sup>4</sup> <https://www.pcmag.com/encyclopedia/term/digital-technology>

<sup>5</sup> (<https://www.education.vic.gov.au/school/teachers/teachingresources/digital/Pages/teach.aspx>)

Digital can be described as the representation of physical items or activities through code. It often tags the use of the latest technologies that seek to improve organizational processes and functions whilst improving interactions between individuals, groups, and things, making new opportunities feasible.

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### *Digital AT*

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In producing a working definition of digital AT, which begins to describe the scope of the features and functions that digital AT offers we can seek to merge and relate the definitions of AT and of Digital technologies described above.

Digital assistive technologies could be subject to a narrow definition, describing those devices and aids that are expressly designed to bridge the digital divide, their sole purpose is to give access to other technologies that are used by any member of a population. Such a limited scope of understanding of DAT needs to be challenged. Digital assistive technologies not only have a relationship with wider digital devices but also with the physical world. Increasingly the use of digital AT refers to the capacity to reinterpret the physical world into a digital format (digital photography). It can interact with that physical world to represent information in new ways and to control that physical world through a digital signal or device. The growth of the use of augmented and mediated reality and Internet of things-based technologies brings this relationship into sharp relief.

Increasingly interpretation, analysis, anticipation, and automation lie at the heart of digital AT, moving beyond the limitation of analogue systems by using Sensors, Networks, AI and new form factors to both reproduce the functions of traditional AT, and to create new forms of AT.



Furthermore, the distinction between traditional and digital technologies is becoming blurred as digital features are embedded into design. Traditional products are evolving to become smart products. Wheelchairs become smart chairs, incorporating digital controls, and with the advent of AI and advanced sensors incorporate obstacle avoidance and wayfinding, integrating with a mobile phone to offer both. Similarly, white canes (mobility canes) are also increasingly embedded with smart technologies adding audio and tactile signals for the user to make movement feel safer.

Such a shift to digital assistive and accessible technology is at the heart of the smart home revolution, where low-cost accessible consumer technologies based on the internet of things have disrupted the environmental control industry and facilitated DIY control over the built environment for many people with a disability. Increasingly those offering traditional electronic and mechanical

products for home control are embracing this shift, offering many years of experience to be applied to the design of individual and accessible smart homes.

In light of these trends and considerations, a working definition could be

“Any item, piece of equipment, or product system, whether bespoke or available readily and acquired commercially, modified, or customized, that is produced in digital form or integrates the use of digital signals or data and used to increase, maintain, or improve functional capabilities of individuals with disabilities. Such technologies seek to maximise access to information, communication, mobility, control, and decision making and incorporate any digital technology that enhances the lives of persons with a disability.”

This definition would include a diverse basket of features and functions designed to enhance the lives of any member of the population, with increased value to those with a disability. This might include:

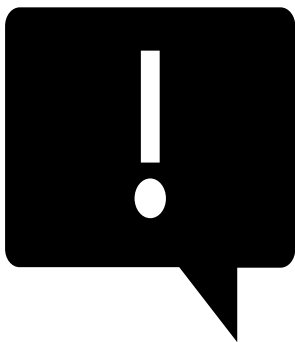
- Control Technologies
- Communication Technologies
- Information Technologies
- Creative Technologies

Examples might include technologies that make the digital world accessible such as screen and text readers, alternative input devices such as keyboards, mice, switches, touchpads, voice recognition, or eye and head-tracking. But would also include wider digital technologies that are accessible to people with a disability, but which make the real world more manageable and improve their quality of life. These might include smart speakers, wayfinding, amplifiers, and electronic or digital hand-held magnifiers to access text and images in physical books and magazines.

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### *Why is Digital AT important?*

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The pervasive nature of digital technologies adds weight to our understanding of the importance of digital AT, bringing added value to many areas of the daily lives of persons with a disability. A study undertaken by the London Office of Technology and Innovation suggested that there are many areas in which Digital AT offers an “essential way to enhance social care in the UK. Voice assistants, smart watches, Internet of Things-enabled fall alarms, and motion detectors seem to hold promise to support independent living and reduce the strain on a stretched system and the burden on carers. The coronavirus pandemic has meant that new ways of delivering services involving technology have been implemented at a rapid pace.”<sup>6</sup>

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<sup>6</sup> <https://loti.london/blog/whats-the-evidence-base-for-digital-assistive-technology/>



The study focuses on the impact of digital assistive technologies to enable independent living for some of those with high levels of support needs. In exploring a wider community of persons with a disability, GSMA (2022) note that “Digital assistive technologies, particularly mobile-based ATs, have the potential to be a valuable and cost-effective tool for persons with disabilities.” They continue by commenting that over 80% of Digital assistive technologies require the use of a mobile phone. However, as technology evolves, we are seeing an increasingly diverse range of consumer technologies such as eBook readers, smartwatches, and smart speakers with digital assistants becoming part of the range of platforms upon which assistive technology applications are built and functions integrated.

In this review, we will identify many other ways in which digital assistive technologies are important, offering a direct relationship between vendor and user and influencing the design of services and provision for persons with disabilities.

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### *Assistive and Accessible Technologies*

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#### **From Definition to Identity**

Whilst the definitions of AT above can be applied to all forms of AT, distinct identities are helpful in that whilst the purpose of the devices may be common, the journey undertaken to receive and use the different forms will be quite distinct. That journey constitutes many of the attributes that determine identity. As with personal identity that is made up of multiple characteristics and we are not defined by only one characteristic, the identity of digital technology is also made up of interrelated attributes and complexity is common.

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### *Defining the Identity of DAT*

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In seeking to describe those attributes we draw upon our understanding and experience of the AT ecosystem and the delivery chain for both traditional and Digital AT.

This ecosystem is comprised of several parts, which are similar to those described by the WHO (2016) as the 5 Ps as Policy, People, Products, Provision, and Personnel. However, in our case, we will link these more closely to the delivery chain for products where variations become clearer.

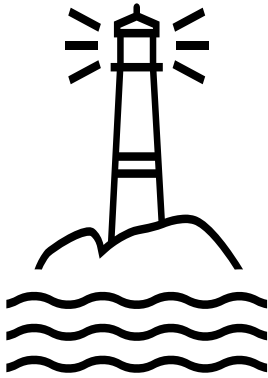
For our purposes, we describe these as

- Awareness
- Advice/Assessment
- Provision, purchasing, and procurement
- Training
- Support
- Research and Development
- Policy and coordination

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## Awareness

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Traditional approaches to raising awareness of assistive technology have focused on the need to “educate” PWD and their families about assistive technology, its availability, and its benefits. This is an underlying value in many models of AT provision but especially in healthcare-driven approaches such as that at the Disability Evidence Portal<sup>7</sup>

This model is driven by a belief that professionals know about the AT and that potential users do not. Professionals in areas of traditional AT such as Orthotics, Prosthetics, Mobility Aids and Vision aids have often trained for many years to acquire knowledge and have a key role to impart that knowledge to others.

The importance of this knowledge is related both to professional status, and the prevailing model of provision based within clinics and face-to-face advice. Such a clinical approach is usually the gateway to triggering the purchase and supply of physical assistive technologies that have a medium to high cost.

Such a model has been challenged by the arrival of digital assistive technologies and the widespread uptake and pervasive nature of smartphones and social media. This has had a positive impact in democratizing the availability of information that can now be produced and shared by many more stakeholders, including those with disabilities, who can share and review their experience of both traditional and digital AT.

Digital assistive technologies are increasingly built upon consumer technologies such as phones and tablets, alongside a legacy of technologies for access to computers. These platforms offer the capability for the user to share information about the product to their preferred networks, such as social media or by email. They can both share a link with a vendor or developer and add their own comments and thoughts about the value of a product.

As such comments are posted on public sources, it is possible for others to ask questions or to share their own experiences, offering a much wider diversity of experience to inform other potential users of the assistive technology. Some traditional products are beginning to understand this and include cards with QR codes on them for users to make use of to perform a similar exercise, but this is still the exception rather than the rule.

Other forms of digital awareness are also possible. The pervasive nature of smartphones with cameras has allowed the sharing of very visual information globally. From Instagram and Snapchat to TikTok people with disabilities can share photos and videos of their assistive technology and their use of that technology.

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<sup>7</sup> <https://www.disabilityevidence.org/questions-evidence/how-can-we-promote-access-assistive-technology-individuals-disabilities-low-and>



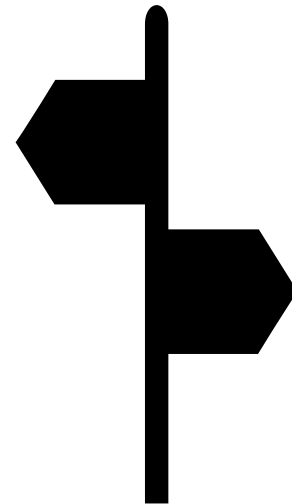
Such trends constitute the first steps of a model of provision, shaped by digital technology, that cuts across and redefines the role of assistive technology professionals.

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### *Advice and Assessment*

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As suggested above traditional models of provision of assistive technology have been driven by the role of professionals as gatekeepers to the choice of assistive technology. A surprising amount of time has been spent encouraging professionals to engage with potential users of assistive technology as partners and as active in the assessment process. At a workshop with assistive technology users in 2019, they suggested that they were able to act as experts in describing their needs, the tasks to be completed, and the setting they needed to use the technology in but felt less confident in knowing the range of technologies available that would best fit this mix. But they stressed that they were the experts in having the insight as to not only if an AT was fit for purpose, but whether they were motivated to use it. The role of the professional appeared often to be to find the assistive technology that met the need at the lowest cost or best value, and often other options were not offered as choices.



The relatively low cost of many digital assistive and accessible consumer technologies has further encouraged the growth of models of self-determination in choice-making from a range of options available. These models have become increasingly viable as there is an increasing opportunity for persons with disabilities to purchase AT directly through the internet and mobile device app stores. This represents a shift in provision from “business to provider”, to “business to consumer”, offering a very direct relationship between developer and end-user without mediation from a professional

Buchanan and Layton (2019) shed light on this in an open letter from the perspective of the user regarding assistive technologies and current trends. They observe that Assistive technology is being located and chosen differently, that it is more mainstream and is being used differently, and that the need for an intermediary is decreasing. All these trends are realised as a result of the influence of digital technologies.

The thrust in this shift is toward supporting users to make informed decisions. The availability of independent sources of information and evaluation such as GARI.info and ATvisor.AI have further accelerated these trends. Gari.info<sup>8</sup> offers an in-depth database of the accessibility features and integrated assistive functions of a wide range of mobile phones. The data is maintained by the manufacturers and allows users to search by brand and model of phone as well as the specific needs or features they are seeking. In recent years the database is being expanded to include tablets wearables, assistive apps, and smart TVs.

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<sup>8</sup> [www.gari.info](http://www.gari.info)

A second tool that is increasingly used is ATVisor.AI<sup>9</sup>. This is an AI-driven tool for matching a profile of a user to a wide range of assistive products. The tool uses the data and choices of people with similar profiles to increase the accuracy of recommendations based on the experience and feedback of other users.



These tools offer new ways to guide AT decision-making, they place the experience and preferences of users at the heart of decision-making and engage experts as a further tier of advice as and when required. Such an approach is ideal for many forms of digital AT, notably where the user already has the appropriate platform such as a phone and can rapidly find apps to enhance the assistive features of that phone. Rapid first intervention can be made at the touch of a screen taking the user directly to the phone marketplace to download the app they want to try.

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### *Provision, Purchasing, and Procurement*

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As suggested above, the dominant model by which assistive technology is provided is challenged by the growth of digital assistive technologies. We have suggested that the role of the professional shifts and evolves considering the availability of digital solutions. This allows for an escalated model of provision to be introduced which can be sufficiently flexible to support self-determination, whilst offering more intensive engagement by professionals to address complex challenges and barriers, and to ensure that where costs were significant that best value was sought. Such an escalation applies expertise where it is most needed but does not allow the cost of advice to outweigh the cost of the AT.

In research undertaken on behalf of the **GARI initiative**, several models of funding were identified that were used to support the purchase and provision of assistive technologies. These included: -

**Domain-Specific Funding** where funding for assistive technologies is closely related to the context and purpose of the provision.

**Direct payments** provide the money required for assistive technologies directly to the person with a disability to purchase and procure the products and services they require.

**Public and Private Insurance** schemes are a combination of private and public health insurance schemes. In both cases, eligibility depends on contributions made to a shared fund.

**Not-for-profit and charitable** funders distribute assistive technology as a service or charitable activity.

**Private funding** based on personal sources is widespread in the purchase of consumer-based AT including phones and tablet devices.

**Refurbishment and reuse** are an extension of a social or philanthropic model of provision. These can include both technology loan programs and the refurbishment of donated devices.

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<sup>9</sup> [www.ATVisor.ai](http://www.ATVisor.ai)

Within these frameworks, a trend towards funding models based upon direct payments and the principles of self-determination were especially relevant to the availability of Digital Assistive Technologies.

Two of the most notable of these are the NDIS in Australia and the nascent AT passport piloted in Ireland.

## **NDIS**

State funding for AT in Australia is mostly now made through the National Disability Insurance Scheme (NDIS). The types of support that the NDIS may fund include daily personal activities and the level 1 capital support budget for basic assistive technology allows the user to purchase the equipment without any professional assessment or any specialised assistance. Low-cost items of less than \$1,500 do not require quotations before purchase and may include many aids to daily living. Such aids could include accessible consumer technologies with apps and enhancements, where the person with a disability believes these to be the most efficient way of addressing their needs.

## **AT Passport**

The AT Passport (O'Donnell et al 2016) in Ireland is similar to the NDIS scheme, and in its pilot period focuses on digital assistive technology. The passport is user-driven and allows the user to have control over the choice of AT where they are confident with the capacity to call upon professional advice where needed. Such a model facilitates the sharing of data about those choices with other stakeholders in the implementation process and offers the potential to link to AI-driven assessment and recommendation tools as an alternative to professional intervention.

We should recognise that digital AT and its related smart products can have an impact on service delivery as well as on product design. Smart products can provide real-time feedback loops to help gauge the efficacy and effectiveness of a product to address the identified needs of an individual. Data provided by the technology can help an individual recognise the impact upon their daily life, but can also inform service delivery, procurement, and policymakers about the value of the products they have provided. Such data can include frequency of use, length of use, problems, and unanticipated issues that can both help to review the provision made and inform future use of the same products for other users.

At one level we can see this in the results provided by products such as Grammarly<sup>10</sup> when offered to people with Dyslexia. The weekly data provided suggests whether the tool is being used to improve text quality and could help to identify outstanding challenges encountered that may need further support. Similarly, smart wheelchairs may be able to provide early warnings of battery life problems for powered chairs which may require action by the vendor, or which suggests that real-world experience of using the chair indicates exactly how many hours are needed between charges for a user.

The integration of digital technologies both as standalone or dedicated aids and devices and as enhanced smart products means that such data can readily be made available to the individual as an app in their smartphone. Such trends can be observed in other areas of daily life and their increased introduction to assistive technologies is inevitable. For instance, in daily living, it is possible for a smart thermostat to give you daily live data on the cost of the energy you are using to help plan a budget that can be afforded. Similarly, security cameras and video doorbells provide a live feed of

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<sup>1010</sup> <https://www.grammarly.com/>

movements around your house or when someone wishes to make a delivery. Other technologies include smart smoke and heat alarms which provide an alert to the owner of the house if heat, smoke, or carbon monoxide are triggered. Such sensors can be readily applied to many other technologies, providing early warning of potential problems with existing products such as wheelchairs, hearing aids, assistive listening devices or others.



For that making provision, we can now obtain real-time data on the use of products to inform planning and decision-making, such data can be anonymised, but the potential benefits are huge and may justify a continued expansion and requirement for such options in the future, and provide a case for the provision of consumer technologies that support and integrate with traditional products.

Such disruption and evolution of provision and associated assistive technology services can also be observed in other areas of service, notably training and support.

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### *Training*

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In traditional models of AT delivery training and support are delivered in person either at a clinic or at the individual's workplace, school, college, or home. The location often being chosen based on where the technology is to be used. A small amount of online training was available for some assistive technologies, often developed by third parties and licensed to organisations to train professionals and aides. The growth of digital assistive technologies has allowed for a wider range of on-demand training to become available and to be integrated directly into the product itself, in the form of help files or links to training videos.

#### **WHO TAP**

WHO's online Training in Assistive Products (TAP) (2022)<sup>11</sup> is designed to prepare primary health and other personnel to fulfill an assistive technology role. This may include identifying people who may benefit from assistive technology; providing simple assistive products such as magnifiers and dressing aids; or referral for more complex products and other services. Appropriate to a broad range of contexts, TAP is targeted at primary health care and community workforce, as well as those providing services to people who need assistive products within other sectors.

TAP includes a range of assistive products to support cognition, communication, vision, hearing, self-care, and mobility from WHO's Priority Assistive Products List. TAP has a modular structure; personnel may select the modules that match their role and the needs of the local population. For each assistive product, an introductory and product-specific module will together cover key learning content to support the acquisition of skills to provide that product safely and effectively, through a four-step process: select, fit, use and follow up.

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<sup>11</sup> <https://www.who.int/teams/health-product-policy-and-standards/assistive-and-medical-technology/assistive-technology/training-in-products>



Some Assistive technologies have begun to offer integrated personal training delivered remotely through the product itself, often as a premium service or as part of a subscription package. Further innovation has seen the advent of augmented reality as a potential means of delivering targeted training, this may be by augmenting the display of digital assistive products or as part of the smart enhancement of a product, recognising for instance the footplate of a wheelchair, or an added QR code, and displaying an explainer video with instructions of how to fit a footplate or adjust seating based on the section of the wheelchair chosen.

The period of the Covid-19 pandemic has clearly demonstrated the potential of remote training for products, the use of a shared screen to show a user how features of an application may operate, and to allow the trainer to observe the user trying to replicate the use, means that feedback can be made rapidly and without the need for travel or long periods of training which may be beyond the capacity of the user to assimilate.

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### *Support*

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Similar approaches can be taken with the increased use of remote support. Post-sales support not only includes the ways in which repair and maintenance are delivered to ensure maximum use but also includes the process of customisation and fitting to adapt the product to the individual needs and preferences of the user.

The immediacy of the configuration of digital assistive technologies through an interface on a mobile phone means that the user can make small but important changes and see the impact of those changes immediately. Colours, contrasts, and font sizes can all be adjusted within the app, whilst app features can be adjusted as required. For instance, magnification on a phone can be increased or decreased by simple on-screen gestures, often familiar to the user from other applications where gestures are implemented consistently.

Such an approach is also relevant to smart assistive technologies. For instance, it is much easier for a user to adjust settings on a digital hearing aid using a manufacturer's app installed on a paired mobile phone. Small adjustments that improve use according to context can be made by the user without any special knowledge or reference to an expert such as an audiologist. It seems likely that the next generation of aids will be much more context-aware, listening for background sound and adjusting the aid to accommodate and mitigate these.

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## *Research and Development*

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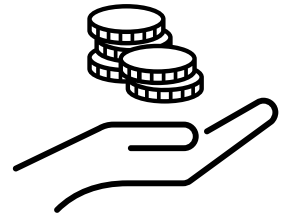
The pace of innovation in digital assistive technology is much greater than for traditional physical products. Research and development of digital technologies are closely allied to the product development cycle and to changes in the features of the platform which must be accommodated or built upon.

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## *Policy and Coordination*

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Digital assistive technology presents new challenges for those responsible for the implementation of assistive technology and the coordination of provision. Warranties and repairs are often replaced by regular updates including patches, fixes, and upgrades, the concept of an assistive technology being purchased and used without change for several years are alien to digital technologies. Equally, digital technology will follow the user as they change platforms such as a new or replacement mobile phone.



A key issue for policy and procurement of digital assistive technologies is an understanding and potential expansion of the range of licenses that the AT is provided under. This should include an understanding of the total cost of ownership of a digital AT. Where technologies such as the screen reader “NVDA” are made available under an open license, procurement should incorporate third-party software support and potential training where the technology itself does not offer this. When procuring significant numbers of products, open licenses be attractive if total costs are considered.

Policy and coordination need to be tailored to accommodate rapid innovation in the field of digital AT. In many cases, the relatively short lifespan of a digital product, with a low price point, allows for new and innovative products to be used in the future as and when they emerge.

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## *Using the Identify model for procurement and provision.*

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The challenge ahead is for policymakers and all those with a responsibility for the provision of assistive technology is to consider whether the rules and criteria that have put in place allow for variations of identity, from traditional physical products to smart enhancements and ultimately to

fully digital approaches using dedicated devices or accessible consumer products. Those responsible are faced with a shift in paradigm away from technology designed for the minority, towards technologies designed for all, and with further features that are added through digital products.

In some cases, the rules designed to ensure the availability of traditional Assistive Technologies are preventing access to Digital options. In a study undertaken on behalf of the GARI initiative, it was found that a narrow focus on funding only technology designed for people with a disability, rather than inclusive of people with disabilities limited the availability of digital and consumer products. The detailed analysis of relevant standards indicated that many of the features and functions of consumer technologies, that were the basis of further digital assistive technologies, were likely to be classified as ensuring that the device itself was accessible, rather than as offering a platform for a much wider range of assistive functions. Such reduced availability limited access to information and services that would enhance quality of life.

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### *Conclusion*

#### *Reducing the barriers to accessing digital assistive technologies.*

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Our review strongly suggests that in establishing an identity for digital assistive technologies we anticipate that AT provision, services and funding will need to evolve to encompass the potential and power of the new technologies. To do this effectively, policymakers and administrators should review their criteria for provision to ensure that there are no barriers to providing all forms of digital assistive technology, regardless of whether they were designed to specifically address needs, or whether they are inclusive systems that have significant added value for those with a disability, shifting the parameters away from approval of devices and towards support for any device that offers the features and functionality that a person with a disability requires. The following questions offer a useful starting point for such a review.

1. Do the criteria exclude the provision of consumer technologies that bring benefits to people with a disability?
2. Do the criteria require regulatory compliance that is inappropriate for all forms of AT?
3. If criteria are based upon an approved list for provision, is that list updated regularly to make use of the opportunities offered by innovation?
4. Are criteria founded on a principle of best value for the required functionality?
5. Are any requirements for warranty appropriate to the cost of the product?



6. Are consumers given control over customisation of the product?
7. Is self-determination to fulfill needs for assistive products embedded into the processes?
8. Is the total cost of ownership considered in the identification and purchase of assistive technologies?
9. What is the timetable for the refresh and replacement of assistive technology and is this adjusted for digital assistive technologies?
10. Where digital assistive technology is procured, is it licensed to the individual for installation on personal devices and transfer to future devices when available?

By considering these and other questions shaped by the availability of digital solutions, policies and processes for the procurement and provision of AT can fully take advantage of the distinctive identity and value of digital AT.

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