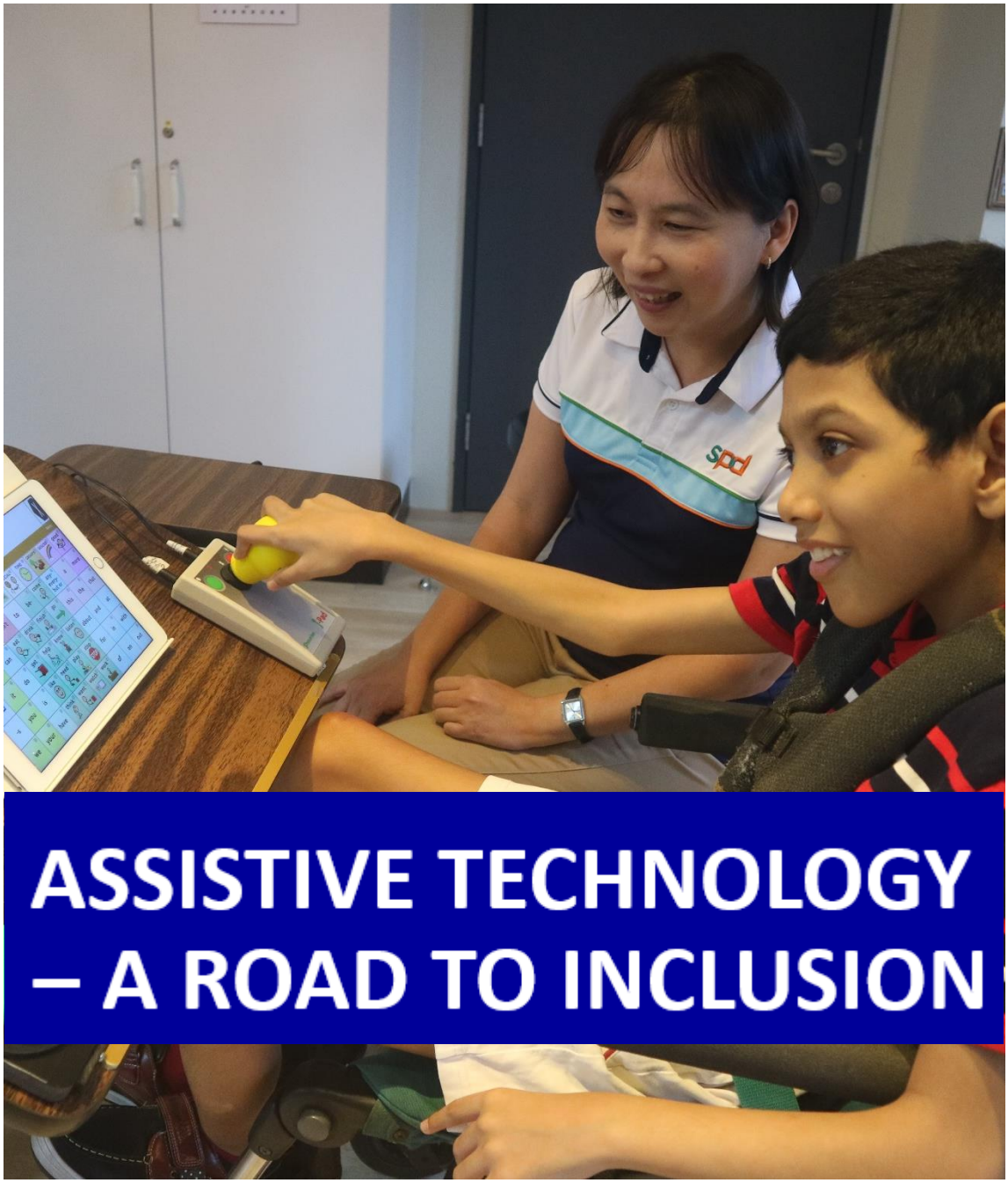

ASSISTIVE TECHNOLOGY – A ROAD TO INCLUSION

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ABOUT THE BOOKLET

Assistive Technology – A Road to Inclusion is a publication produced by the Disabled People's Association, Singapore (DPA). The publication aims to reveal the role and potential of assistive technology in improving the lives of people with disabilities, and raise public awareness about its importance. Assistive Technology (known by its acronym AT) enables individuals with disabilities to function effectively and reduces the barriers they face in different aspects of life. Today, a range of AT devices are available to meet the different needs of people with and without disabilities. AT units (which include AT clinics and AT-related services such as information, training and development, research etc) work together with experts to recommend suitable assistive devices to the users.

The use of AT is one of the paths to promote inclusion of people with disabilities. With it, students with disability can access education fully and adults with disability can work productively and pursue meaningful careers. But it should be kept in mind that though technology has removed many barriers, it is not without limitations.

This booklet provides basic information about AT and discusses its range, scope, types, benefits and limitations. It also provides information about the AT-related services available in Singapore.

CONTENTS

WHAT IS ASSISTIVE TECHNOLOGY (AT)?

AT is an umbrella term that includes assistive, adaptive and rehabilitative devices for people with disabilities. It refers to any product or service that maintains or improves the ability of individuals with disabilities (or impairments) to live independent and productive lives. AT opens the door of possibilities for them by providing practical solutions to improve or enhance their functional independence, to perform tasks they have difficulty with or are unable to accomplish on their own. A person with disability may use AT to communicate, learn, work, travel, and to participate in recreational and social activities.

AT, as defined by Cowan and Turner-Smith (1999), is “any device or system that allows an individual to perform a task that they would otherwise be unable to do, or increases the ease and safety with which the task can be performed.”

People with different disabilities require different types of assistive devices. Here are some scenarios showing how AT can aid persons with disabilities:

- Following Bala’s stroke, his bathroom was fitted with **grab rails** to help him prevent falls.
- Joyce has weakness in her legs and travelling outdoors used to be difficult and inconvenient for her. Now she uses a **motorised scooter** to travel longer distances.
- A **communication board** helps Meiling, who has speech difficulties, to express herself and reduces frustration and misunderstandings.
- A **pressure relief cushion** on a wheelchair can prevent Siti, who has paralysis, from getting pressure sores.

For persons with disabilities, access to AT is a precondition for achieving equal opportunities, enjoying human rights and living in dignity.

RANGE AND SCOPE

When people think of AT, what comes to mind are probably computers or electronic devices. But AT applications are more accurately viewed as a continuum which ranges from ‘high tech’ to 'no tech’.

- **High Tech**: High-tech devices incorporate sophisticated electronics or computers.
- **Medium Tech**: Medium-tech devices are relatively complicated mechanical devices such as wheelchairs.
- **Low Tech**: Low-tech items are less sophisticated, such as adapted spoon handles, non-tipping drinking cups, and Velcro fasteners.
- **No Tech**: No-tech solutions are those that make use of procedures, services, and existing conditions in the environment, and do not involve the use of physical devices or equipment. These might include services such as physical therapy, occupational therapy or the services of other specialists.

AT addresses the functional limitations of people with disabilities. A functional limitation refers to any physical, mental or sensory condition that prevents a person from caring for himself or herself while communicating, working, playing, or simply functioning in an environment where other people can function smoothly. Limitations includes difficulty in interpreting information, visual impairments, hearing loss, and the inability to move all or a part of one's body.

The benefits of AT cut across age, disability and health challenges. People with disabilities can benefit from technology in many facets in life, including education, employment, health, recreation and daily living. It can help them become more independent which, in turn, builds their self-confidence and self-esteem.

According to the United Nations Convention on the Rights of Persons with Disabilities, “disability results from the interaction between persons with impairments and attitudinal and environmental barriers that hinder their full

and effective participation in society on an equal basis with others." With the use of AT and advanced technology, it is now possible to tackle accessibility issues. For example, people with visual impairment can use computers and enjoy TV programmes; people with hearing loss can use telephones and automated telephone services; and people with physical disabilities can meet the challenges posed by their environment.

AT equips and supports people with disabilities to:

- Access information.
- Be confident.
- Demonstrate competence and achieve results.
- Explore learning possibilities and expand life experiences.
- Foster independent living.
- Improve functioning and functional abilities as well as quality of life.
- Interact and communicate with others.
- Modify the environment to meet their needs.
- Be included into the larger society by levelling the playing field for them.

TYPES OF ASSISTIVE DEVICES

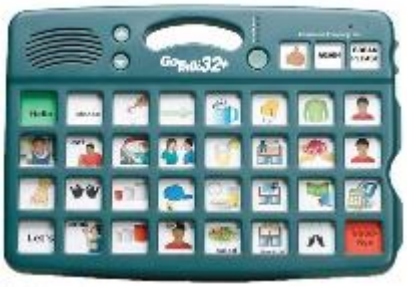
People with different disabilities require different AT devices. People with reduced mobility use mobility aids such as wheelchairs, scooters, walkers, canes, crutches, prosthetic devices and orthotic devices. Persons with hearing loss can use hearing aids or cochlear implants, and benefit from closed captioning or subtitling being provided in movies and television programmes. People with sensory impairments use voice recognition programs, screen readers and screen enlargement applications to help them access education and employment. Learners with disabilities depend on devices such as automatic page turners, book holders and adapted pencil grips in the classroom. A child with limited motor skills can enjoy playing with toys and games using adaptive switches.

Modifications or additions such as ramps, automatic door openers, grab bars, and wider doorways help to improve accessibility to buildings, businesses and workplaces. Other examples of AT are kitchen implements with large, cushioned grips for those who experience difficulty in holding things, and medication dispensers with alarms to help people take their medicine on time.

Assistive devices even help us to control the environment. Such devices, usually with a remote control, enable people to tilt the bed, turn lights and fans on and off, open and close doors, as well as work their TV, telephone and computer. These controls come in the form of joysticks, tap buttons, or switches, or can even be voice-activated.

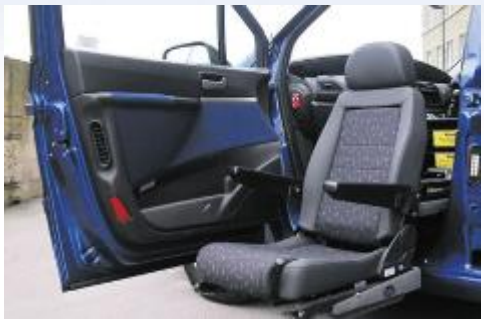
Assistive technology can be categorised by the type of technology, by the function of technology, by the type of disability it supports and other criteria.

Aids for daily living  Utensil strap for individuals with limited grip strength.	These aids are used for activities such as eating, bathing, cooking, dressing, toilet needs, home maintenance, etc. Examples include modified eating utensils, adapted books, pencil holders, page turners, dressing aids and adapted personal hygiene aids.

Aids for people with hearing loss  Behind-the-Ear (BTE) hearing aid.	Aids include assistive listening devices (induction or FM loop systems), hearing aids, TTYs, visual and tactile alerting systems (for alarm and door bells), etc.
Aids for the visually impaired  Screen magnifier.	Aids include magnifiers, Braille or speech output devices, large-print screens, closed circuit television (CCTV) for magnifying documents, text-to-speech software, etc.
Augmentative and Alternative Communication (AAC)  Portable communication tool.	Aids include electronic and non-electronic devices that help persons with speech or hearing difficulties to communicate. Examples are communication boards, speech synthesisers, modified typewriters, head pointers and text-to-voice software.

Computer access aids  Computer keyboard aid.	Examples are headsticks, light pointers, modified or alternate keyboards, switches activated by pressure or sound/voice, touch screens, voice-to-text and speech recognition software.
Environmental controls  The PowerLink 4 control device, which allows users to control up to two electrical appliances with single switches.	Examples include electronic systems that help people control various appliances, such as switches for the telephone or TV. Controls can be activated in various ways – by pressure, touch, movement of eyebrows or breath, etc.
Home and workplace modifications  Automatic door opener.	This includes structural adaptations that remove or reduce physical barriers. Examples are ramps, lifts, structural changes like fitting a grab pole in the bathroom, adjustable toilet seats, automatic door openers, expanded doorways, etc.

Mobility aids  Wheelchair.	These devices help people to move about their environments. Examples are electric or manual wheelchairs, modifications of vehicles for travel, scooters, crutches, canes and walkers, etc.
Prosthetics and orthotics  Prosthetic leg.	These refer to replacement or augmentation of body parts with artificial limbs or other orthotic aids such as splints or braces. Prosthetics to assist people with cognitive limitations or deficits include audio tapes or pagers (that function as prompts or reminders).
Recreation  Racing wheelchair.	Devices to enable participation in sports, social and cultural events fall into this category. Examples are audio description for movies (for people with vision loss), adaptive controls for video games, adaptive fishing rods, cuffs for grasping paddles or racquets, and modified seating systems in boats, etc.
Seating and positioning  Customised seating for wheelchairs.	This refers to adapted seats, cushions, standing tables, positioning belts, braces, cushions or wedges to maintain posture. Such devices help to provide body support.

Vehicle modifications  Swivel seat extending from car.	This category includes adaptive driving aids, hand controls, customised wheelchairs, modified vans and other motor vehicles.

LIMITATIONS OF AT

AT has many benefits, but it also has limitations and may not be the solution for every need. Sometimes, it is not a substitute for a caregiver's assistance and for receiving personal care. AT should be considered as an addition or aid to human support, not as a replacement. Its main limitations are:

Suitability: People have different needs, abilities and preferences. As such, a one-size-fits-all approach is not workable. Some people may benefit more from a caregiver's support or human-based services than from using AT. In some cases, AT may be ineffective and even cause confusion or distress to the user. For example, tele-care will not work if the person is unfamiliar with the equipment or is confused by alarm sounds or recorded messages.

Training: Some degree of training is required to use certain assistive devices efficiently. Simple AT such as a magnifying glass can be easily used, but more time and effort is needed to learn to use complex AT. For example, consider a screen-reading programme – while using it, the user begins to hear spoken words. But the user must first learn the various ways of getting the information from the screen in order to work quickly and efficiently. Similarly, users who know how to load the software that magnifies the text on a computer screen will not fully benefit unless they also learn how to move around the screen. Without proper training and prior knowledge, AT may prove to be a frustration or hinder the user's progress.

Cost: Many assistive devices are expensive; they may cost thousands of dollars. Not all persons with disability can afford to pay for the assistive devices that suit their needs.

Compatibility: The compatibility of the user with the device also matters. For instance, people with cognitive impairments may have problems using the devices. This can cause frustration to the user who may even stop using the device. Though AT is able to considerably reduce the need for human assistance in some cases, in others, assistive devices serve more to supplement personal care for persons with disabilities.

Technology can never be fully relied on. For example, if the user's assistive device is not working properly or breaks down, then the user is unable to accomplish the task. Getting it fixed will require time and money.

WHICH AT TO USE?

Choosing a suitable AT is the most important decision. Consult experts such as doctors, mainstream and special education teachers, speech-language pathologists, rehabilitation engineers, occupational therapists, or other specialists and representatives from AT manufacturers. These professionals may carry out needs assessments, give advice and define goals. The next step is to undergo a trial of the assistive technology device before the most appropriate assistive device is recommended.

Matching: This involves understanding the tasks in which the user has difficulties, analysing the user's abilities and challenges, and the context in which the user performs those tasks.

Assessment: Rather than a one-time event conducted by a specialist, an AT assessment is best done as a collaborative and continuous process. This provides opportunity to accurately assess which technologies will improve the user's performance, participation and independence. An external AT specialist may conduct specialised evaluation and training, recommend specific AT and coordinate the assessment process. A proper AT assessment also considers supporting services such as training for the user and caregiver or staff, integration of the assistive technology into educational, professional and

personal settings, and technical support issues. There should also be a plan for the implementation and evaluation of the user's progress.

An AT assessment always considers the user's perspectives and inputs. In some situations, organisations which work with or serve the user may require the expertise and assistance of a professional (such as a rehabilitation engineer or occupational or speech therapist) who provides assistive technology services. As an example, a young woman with cerebral palsy was hired by a bank's credit department. Part of her job was to open the mail and remove the enclosed cheques, but she kept ripping the enclosed cheques while opening the envelopes. A rehabilitation engineer fabricated a device, made of lightweight aluminium, that helps her to open the envelopes without incident.

Lastly, before purchasing the assistive device, it must be evaluated.

The following table shows the AT assessment criteria (Case-Smith, 2001:583)**:**

Effectiveness	How much the device improves the user's living situation and enhances functional capability and independence.
Affordability	The extent to which the user is able to purchase, maintain, and repair the device without financial hardship.
Reliability	The degree to which the device is dependable, consistent and predictable in its performance for a reasonable length of time.
Portability	The effect of the device's size and weight on the user's ability to move, carry, relocate and operate it in varied locations.
Durability	The extent to which the device can be used for an extended period of time.
Securability	How the device affords physical control and is secure from theft or vandalism.

Safety	How safe the device is for the user, caregiver or family member who uses it.
Learnability	The device's ease of assembly, initial learning requirements, and the time and effort needed to master usage.
Comfort & Acceptance	The extent to which the user feels physically comfortable with the device and does not experience pain or discomfort with its use; how aesthetically appealing the user finds the device and the user's psychological comfort when using it in private or public.
Maintenance & Reparability	The degree to which the device is easy to maintain and repair (either by the consumer, a local repair shop or a supplier).
Operability	The extent to which the device is easy to use, adaptable and flexible, and has easy access to controls and displays, if any.

Training

It is important to provide hands-on training and technical assistance to persons with disabilities as well as family members and caregivers, if necessary. Many organisations offer training in AT. The training focuses on active learning to master new skills and assists the individuals, families, and professionals in the selection, acquisition and use of assistive devices.

Training new users also encourages them to explore the world of AT. Specialised training include the following aspects:

- Instructions on setting up and using the device
- Working with modifications to the device
- Learning to troubleshoot problems
- Repairs and maintenance

- Making use of the device to meet individual goals

Regular training may be needed for devices for which the technology changes rapidly. Hands-on training and skill development with more complex technology and awareness of the latest developments in the field will be useful.

AT AND ITS APPLICATION

Daily life

Assistive devices can help one move around, see, communicate, eat, or get dressed. AT ranges from simple tools such as calendar clocks and touch lamps to high-tech solutions such as satellite navigation systems that can pinpoint the whereabouts of missing persons. Another example is sensors which makes it possible to monitor a person's activities in a given environment (at home or in the workplace). Daily living aids include button hooks, zipper pulls, key holders, straw holders and modified eating utensils, as well as jar openers, wrist braces that stabilise one's hand, switches to call for help, writing aids, personal care products, kitchen and dining aids, and adaptive clothing, etc. The variety is endless and designed for every situation.

Education

AT helps students with disabilities to communicate, learn and participate in classroom activities. In particular, with AT, students with severe disabilities are able to access mainstream schooling and interact with their classmates and teachers in ways previously not possible. Study tools are available for students with disabilities, for example, speech-to-text software, word-prediction programmes, scan-and-read systems and captioning.

Employment

The use of AT with other types of workplace support can bridge the gap between a person's physical abilities and job requirements. In the workplace, the purchase of assistive devices should match a functional need of the employee with disability, rather than requiring that device be identified as a prerequisite to employment.

For example, a young man learned to use a specialised software programme (as a part of vocational training for enhancing employability) in anticipation of becoming employed. However, when he got a job, he discovered that the software programme he learned was not compatible with his new company's database. Hence it is important to consider such details when developing an individualised programme to facilitate employment for people with disabilities.

Effective job accommodation strategies and usage of AT resources can help persons with disabilities compete on an equal basis in employment and overcome, or at least minimise, many of the barriers that limit their employment potential.

Technological improvements and the emergence of a global village have resulted in deeper explorations of AT's promise and possibilities. In a virtual environment and society, physical, intellectual and sensory impairments are less restrictive and people with such disabilities are able to carry out activities that they may not otherwise be able to do. The adoption of appropriate AT in the workplace helps individuals with disabilities to remain competitive in their work performance and allows them to be cost-effective enough to be hired.

Healthcare

Examples of AT in this realm are blood pressure monitors, automated bathing machines and autonomous droids (that interact with patients and monitor their health status). It offers safer, more accessible and user-friendly devices in clinical and non-clinical environments. Advances in AT have also improved treatment of acute conditions and boosted the development of new treatments for various diseases.

Sports

An increasing number of people with disabilities are participating in sports with the help of AT devices. There are also adaptive sports in which an existing sport is modified to enable players with a disability to participate. AT can be found in sports ranging from local community recreation games to the elite Paralympic Games. More complex AT devices have been developed over time, and sports for people with disabilities have become increasingly competition oriented. Outrigger skis and wheelchairs for racing are examples of such AT devices.

AT IN SINGAPORE

The government has taken measures to ensure that persons with disabilities have access to AT and can afford it. For example, the Assistive Technology Fund (ATF) provides subsidies for persons with disabilities to purchase, replace, upgrade or repair AT devices. The Special Assistance Fund (SAF) helps persons with disabilities, who have low or no income, to purchase assistive equipment, technical aids or undertake home retrofits to improve mobility, increase independence or help in rehabilitation. Older Singaporeans with disabilities can also tap on the Seniors' Mobility and Enabling Fund to subsidise up to 90% of the cost of assistive devices which aid mobility and enable independent living. This scheme is administered by the Ministry of Health (MOH).

SG Enable has set up an AT Resource Centre at Enabling Village, an integrated community space for persons with disabilities. The centre promotes the adoption of AT and enables persons with disabilities, caregivers, therapists and social service professionals to try out and obtain advice on AT devices. AT-related services are available at hospitals, rehabilitation/day activity centres and some Voluntary Welfare Organisations, and are served by AT teams.

Cerebral Palsy Alliance Singapore

Formerly known as Spastic Children's Association of Singapore, the Cerebral Palsy Alliance Singapore (CPAS) was established in 1957 to provide services to persons with cerebral palsy and multiple disabilities. These include early intervention, special education, rehabilitation, day activity centre programmes, vocational training and employment. Its vision is to empower all persons with cerebral palsy to realise their full potential and lead fulfilled, dignified lives. CPAS has an AT clinic which offers various devices and services, including the following:

- Wheeled Mobility Devices and walking aids
- Activities of Daily Living (ADL) equipment
- Electronic aids for daily living
- Sensory and vision aids
- Augmentative and Alternative Communication (AAC) devices
- Classroom and architectural modifications
- Alternative computer access
- Home and workplace modifications
- Seating and positioning aids

Professionals in CPAS's Assistive Technology Clinic (AT Clinic) assess children and adults diagnosed with cerebral palsy and other conditions, and recommend assistive technology equipment and devices. They also help clients develop skills as well as train parents, caregivers and teaching staff.

The AT Clinic offers consultation services and follow-up sessions on finding suitable assistive devices. The AT team, including therapists from the Speech and Language Pathology Department (SLP), will then recommend the purchase of AT equipment or devices after successful trials. Families in need of financial support may approach the Social Work Department for assistance.

For more information, please visit www.cpas.org.sg.

iC2 PrepHouse Limited

Singapore's first and only institution of its kind, iC2 provides structured educational and rehabilitative programmes for children and youths with visual impairment. These programmes aim to empower and enable them to live life confidently and independently, and maximise their potential.

The AT centre at iC2 is equipped with electronic desktop magnifiers, hand-held magnifiers, refreshable Braille displays, screen enlarging software and screen reading software. Different models of such devices offer different features that may or may not be necessary for a particular user. For example, some screen enlarging software comes with a screen reader feature to enhance access, using both visual and auditory channels. Specialised screen readers are more versatile and offer the most features such as the ability to voice all the text displayed on the screen, including those in menus and dialogue boxes. The AT assessment has an important role in helping to determine the most appropriate device for the user.

For more information, please visit www.ic2.com.sg.

Singapore Association of the Visually Handicapped

The Singapore Association of the Visually Handicapped (SAVH) is a voluntary welfare organisation founded in 1951. SAVH's mission is to help the visually impaired help themselves by acquiring new skills and gaining self-reliance to integrate into society.

The Assistive Devices Centre (ADC) at SAVH serves its clients by promoting the use of assistive devices and tools to help them function in all aspects of life, including education, recreation and employment. The ADC assists clients in sourcing for devices such as white canes, magnifiers and monoculars, assistive lifestyle products such as Braille watches, talking clocks, talking medical equipment, and games suitable for persons with vision impairment. Financial assistance, handled by its Social Work Department, is given to needy clients.

The Centre also assists clients to purchase electronic assistive devices such as Braille notetakers, scanning and reading software, screen reading and magnification software, and desktop or portable electronic magnifiers. As such devices are costly, clients can apply to the Assistive Device Fund, administered by SG Enable, to obtain subsidies of up to 90% of the equipment cost.

For more information, please visit www.savh.org.sg.

SPD

SPD is a leading organisation for people with disabilities in Singapore. It is dedicated to the cause of integrating people with disabilities in all aspects of community living. SPD's Assistive Technology Centre was established in August 2001, and was appointed by the National Council of Social Service as a Specialised Assistive Technology Centre (Specialised ATC) in January 2005. It was then appointed as a Centre of Specialisation for Assistive Technology in August 2009 and March 2011. With this appointment, the Specialised ATC was recognised as an expert in AT to build capability in this field. It provides advice, consultations and coaching sessions to persons with disabilities. The following services are provided by the Centre:

- AT assessment
- Training on the use of AT devices
- Trials and loans of devices from AT Loan Library
- School and work area assessment
- Technical support
- Sales co-ordination support
- Inclusive Technology Portal

The AT Loan Library at SPD has a wide range of AT devices available for loan for trials, training and temporary accommodation. Loans are extended to people with disabilities as well as professionals working with them.

SPD provides its AT services at Tech Able, located within the Enabling Village. Visitors to Tech Able can view the wide range of assistive devices and technology

for people with disabilities there. The team of AT specialists from SPD also provides consultation, assessment and training as well as referral support.

For more information, please visit www.spd.org.sg.

Tech Able

Tech Able is a resource and assessment centre for AT. Located at the Enabling Village, the centre helps people with disabilities to live and work independently by promoting the adoption of AT and infocomm technologies for education, employment and independent living.

Services and facilities at Tech Able include:

- Consultation, assessment and training on AT by SPD's assistive technology specialists.
- A showcase and loan library for assistive devices and solutions.
- A simulated home-office and an AT/ICT Lab for visitors to try out AT devices designed for a range of disabilities. The Lab also shows employers how persons with disabilities can be integrated into the workplace using technology.
- A Communications Training Lab, equipped with communication software, devices and PC stations accessible to persons with disabilities.
- A co-working space where innovators, makers and researchers can hold discussions, test ideas and ideate products and services for persons with disabilities.

SG Enable

SG Enable is an agency dedicated to enabling persons with disabilities. Among other services, SG Enable administers the Assistive Technology Fund (ATF), which persons with disabilities can tap on to acquire, replace, upgrade or repair assistive technology devices. It subsidises up to 90% of the cost of the assistive technology devices, subject to lifetime cap of $40,000. For more information on ATF, please visit www.sgenable.sg.

The Singapore Association for the Deaf

Established in 1955, the Singapore Association for the Deaf (SADeaf) has been serving the Deaf and hard-of-hearing community for the past six decades. SADeaf now serves more than 5,300 deaf and hard-of-hearing persons and provides a gamut of services such as sign language interpretation, note-taking, Deaf awareness workshops, employment support, counselling and financial assistance, as well as sports and recreational activities. A member of the National Council of Social Service and affiliated to the World Federation of the Deaf, SADeaf's mission is to assist deaf and hard-of-hearing persons to achieve a better quality of life and to enable them to integrate and contribute to society.

The Hearing Care Centre (HCC) at SADeaf aims to serve its clients via the provision of hearing care services and assistive devices. The HCC's services include:

- One free basic hearing test for each registered client per year
- Taking ear impressions and making ear moulds
- Sale of batteries and accessories for hearing aids at nominal rates
- Free hearing aid checks
- Sale of hearing aid batteries
- Sale of vibrating alarm clocks
- Advice on assistive accessories
- Free hearing aids for clients and members (only suitable for those with mild to moderate hearing loss)

Vibrating alarm clocks and watches, flashlight door knockers, emergency lights, amplified telephone and sensors to detect sounds (such as crying babies) are some of the AT devices used by people with hearing loss. Captioning and induction loop systems also aid persons with hearing difficulties. The Ministry of Education provides assistive devices such as FM systems to schools upon request. The FM system comprises a transmitter and a set of receivers to aid the deaf and hard-of-hearing students in mainstream schools to hear better in the classroom. Though AT is useful, the demand for such equipment is

relatively low in Singapore due to the high cost of the equipment and lack of proper information on these AT devices and related services.

For more information, please visit www.sadeaf.org.sg.

RECOMMENDATIONS FOR FUTURE

Set up a one-stop Disability Interactive AT Learning Hub in Singapore with the following features.

Information service: An information help desk for users, employers, interested individuals and organisations (both local and international) to obtain information on the types and models of AT devices, pricing, subsidies and funds available to buy AT devices. This would also enable easy access to information about the best current technologies and to get a first look at new ones. Research findings must be available upon request.

- Consultation and assessment: A centralised AT Clinic with islandwide branches to provide assessment and recommendations of suitable AT devices to clients.
- AT-related training and research wing: To groom experts and researchers to drive development in the field of AT and related services. Facilities and grants for research and development are essential to achieve this.
- Setting up a support group or association: For the assistive technology industry, which includes manufacturers, sellers and providers of AT products. This can become a comprehensive resource for disability best practices in the AT sector. This will help to ensure that the best products and services are delivered to people with disabilities.
- Marketing wing: This marketing wing will focus on encouraging the use of AT. It will guide companies to develop marketing strategies to reach people with disabilities, as well as creative messaging to resonate with the disability community.

- An AT Learning Hub: To function as a one-stop information centre on assistive technology and related topics. There is also the possibility of organising guided tours to the centre for foreigners in the disability and inclusion sector. To this end, the existing Tech Able at Enabling Village might consider taking on these additional roles and functions.

- Funding and Assistance: As AT devices are costly, the amount of funding and related assistance should be aligned to the affordability of such devices. Besides the direct cost of the devices, other expenses, such as pick-up and drop-off services and respite care for parents with children with disabilities or caregivers of elderly clients, should also be taken into consideration.

- Training: In technologically advanced Singapore, students with disabilities should be able to maximise the use and benefits of AT. School-wide adoption of AT for teaching and learning will benefit all students. As such, there is an urgent need to train teachers in the use of AT for students with disabilities in schools. Where an educational institution is not able to meet the AT-related needs of its students, it should approach the relevant agency or VWO for assistance. Information about these external channels must be provided to the schools.

- Advocacy: Championing the use of AT for persons with disabilities via seminars, hands-on workshops to the following target groups is another possible course of action.

    - Students and persons with disabilities, as well as their classmates and colleagues
    - Family members and caregivers
    - Teachers and senior level managers
    - Employers and prospective employers of people with disability
    - Policymakers and disability/inclusion advocates

TOWARDS INCLUSION

AT benefits not only the individual users with disabilities, but also family members, caregivers, employers, colleagues, teachers and other members of the community and society who interact with them. As assistive technologies become more common, people without disabilities are benefiting from them too. For example, those who are poor readers or for whom English is a second language can also make use of screen readers.

There are certain issues and barriers to adopting AT that need to be addressed. Among them are the lack of information and access, personalised care, and research. Much work has to be done to raise awareness among health and social care professionals on the potential of AT. However, it should also be kept in mind that AT is only one of the options used to support people with disabilities. It cannot be a replacement for person-centred care, nor implemented using a one-size-fits-all approach.

Recognising the importance of AT, the United Nations Convention on the Rights of Persons with Disabilities (CRPD) mandates member states which have signed it to ensure the provision of affordable AT and related services. Under the CRPD, national governments have the primary responsibility to ensure that persons with disabilities can access assistive products. Fostering international cooperation in the area of AT is also crucial to improving the independence of persons with disabilities worldwide.

"For people without disabilities, technology makes things easier. For people with disabilities, technology makes things possible."

- Mary Pat Radabaugh
IBM 1991 training manual

GLOSSARY

Accessibility is the degree to which a building or other structure provides access for (mainly physically) people with disabilities. In Singapore, this is determined primarily by regulation 36(2) of the Building Control Regulations. (Code on Accessibility in the built Environment 2013)

Advocacy is a process of supporting and enabling people to express their views, to access information and services, to find out about options and make informed decisions, and to promote and protect their rights.

Assistive Technology is developed to assist people with disabilities. An example of assistive technology is voice screen-reading software for computers.

Attitudes are a complex collection of beliefs, feelings, values and dispositions which characterise the way we think or feel about certain people or situations. People's attitudes are a product of life experiences, including the relationships we build with the people around us.

Diversity is recognising and valuing differences between individuals and groups of people. It is an important concept in terms of the integration of people with disabilities into society.

Employability has been defined as the capability of getting and keeping satisfactory work. It refers to a person's capability for gaining and maintaining employment. For individuals, employability depends on the knowledge, skills and abilities they possess, in addition to the way they present those assets to employers. As such, employability is affected by both supply-side and demand-side factors which are often outside of an individual's control.

Inclusion addresses, first and foremost, the need for cultural transformation**.** It advocates that people with varying needs, backgrounds, beliefs and abilities should be accommodated**.** With regard to the context of this booklet, persons with disabilities should be integrated into a workplace on the same basis as other employees for that workplace to be truly inclusive. The idea of an inclusive workplace goes beyond merely accommodating the accessibility

needs of a person with disabilities and advocates for integrating that employee into social and professional community at that organisation.

Inclusive Practices comprise attitudes, approaches and strategies which ensure that persons with disability are not excluded or isolated from the society, and feel valued and confident that they will receive appropriate support to fulfil their potential.

Telephone typewriter (TTY) This device is also known as a text telephone (TT), or telecommunications device for the deaf (TDD). TTY indicates a device used with the telephone for communication with and between deaf, hard of hearing, speech impaired and/or hearing persons.

Universal Design (sometimes called Inclusive or Accessible Design) involves designing products and spaces so that they can be used by the widest range of people possible. As opposed to fitting workplaces with accessible features to accommodate new employees with disabilities, Universal Design builds in these features from the start so that if it is done right, you would not even notice the accessible features. For example, rather than having an entrance with steps on one side of it and a ramp on the other side, an entrance based on Universal Design may just have a ramp in front of it. Universal design aims to accommodate the diversity of people's needs and in that way is a necessary step towards an inclusive workplace.

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