



# My Technology Space:

Tools and resources for planning the use of  
Assistive Technology for cognitive support  
following Acquired Brain Injury

National ABI Conference, Adelaide

25<sup>th</sup> September 2024

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# Overview of this presentation

1. Introducing the project team
2. How assistive technology can support executive functioning
3. My Technology Space



# Introducing the Project Team

## Coordinating principal investigators



Assoc Prof Libby Callaway



Prof Grahame Simpson

## Lived experience advisors



Josh Taylor



Libby Witts



Scott Thomas

## Team Members



Associate Professor  
Kate Tregloan



Associate Professor  
Prue Morgan



Ms Sue Sloan



Ms Jan Mackey



Dr Em Bould



Professor Emerita  
Robyn Tate



Dr Natasha  
Brusco



Dr Adeline  
Hodgkinson



Ms. Lisa Licciardi



Mr Brendan  
Worne



Ms Kate Mather



Dr Jessica Massey

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## Friends of RAIL

### Who are Friends of RAIL?

Friends of RAIL include those people with their own personal experience of rehabilitation, ageing and independent living or disability care; family members and friends, including care partners; and other informal supporters who may provide support for decision making or be an appointed representative of a person with lived experience. This is in addition to others in the community interested in supporting our research.

### Why are Friends of RAIL important?

Friends are important to RAIL as they have first-hand experience with the target areas of research for our centre – that is rehabilitation, ageing and/or independent living. Friends of RAIL provide a non-clinical and non-research perspective which is valuable in identifying and prioritising research issues. At RAIL, we are committed to **conducting research that occurs with the community** rather than only conducting research for the community.

### Why join Friends of RAIL?

Friends of RAIL is free to join. The benefits of being a Friend of RAIL include:

- Receiving newsletters that keep you up to date with relevant activities, events and the work of RAIL (click [here](#) to access our most recent Friends newsletters)
- Providing input to the Centre's planning and development, including research priorities for RAIL.
- Contributing to a range of research activities e.g. reviewing research concepts and protocols from a community perspective, and reviewing grant applications.
- Having access to free education and program opportunities.
- Receiving invitations to participate in RAIL events, research and/or working groups.

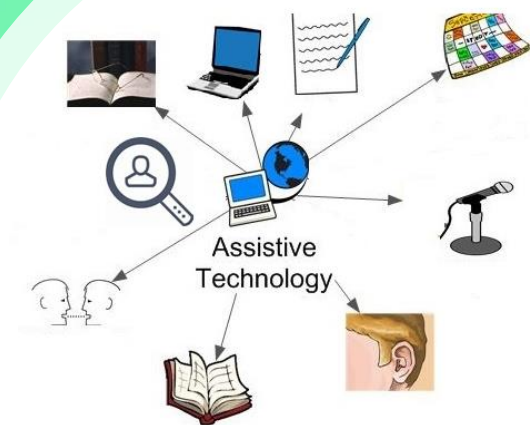


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## How assistive technology can support executive functioning after ABI



ABI frequently results in cognitive impairment in the area of executive function.

Common issues include difficulty with prospective memory, planning and organisation and initiation of functional tasks (Sloan, 2017).

These issues can have significant impact on independence.

But ... “how can I use technology for cognitive support after ABI?”

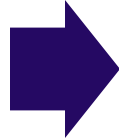


# T012 Technology Project



## Phase 1: Scoping

Talk to a range of people, explore existing products, develop framework for evaluation, scan + shortlist technologies for trial



## Phase 2:

### Testing & evaluating

Try out technologies with people with ABI based on their goals for support, using rigorous research design (Victoria & NSW)



## Phase 3:

### Sharing findings

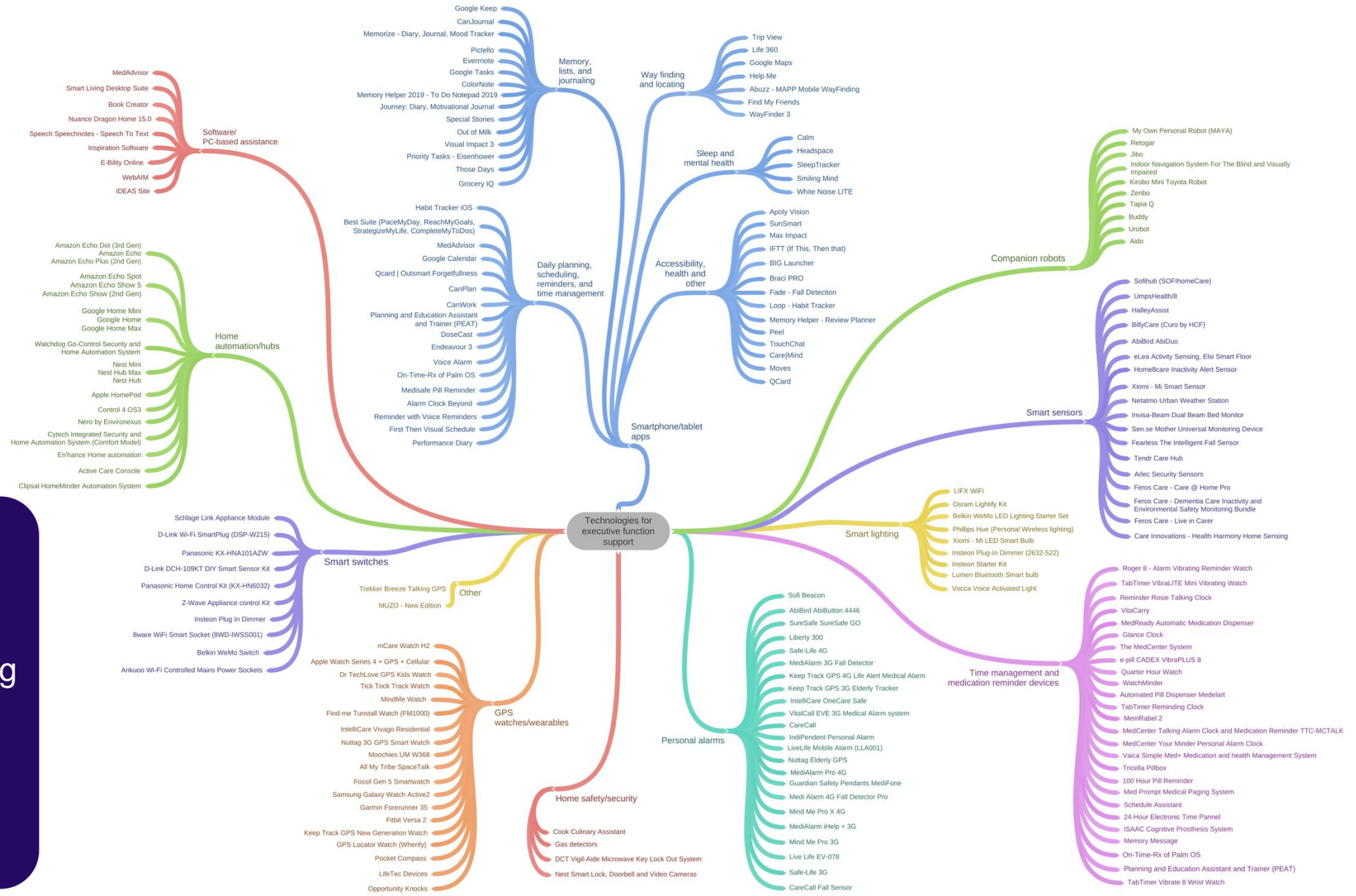
Digital education resource development, tech capability building of key stakeholders



# Phase 1

## Phase 1: Scoping

Talk to a range of people, explore existing products, develop framework for evaluation, scan + shortlist technologies for trial





# Phase 1

## Phase 1: Scoping

Talk to a range of people, explore existing products, develop framework for evaluation, scan + shortlist technologies for trial

Scroll and choose

Software for your device



Apps for a tablet or a mobile phone



Smart home hubs



Smart Switches



Smart lighting



Smart sensors



Wearables



Home Safety



Personal alarms



Reminder timers and clocks

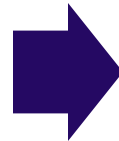


# Phase 2



## Phase 1: Scoping

Talk to a range of people, explore existing products, develop framework for evaluation, scan + shortlist technologies for trial



## Phase 2: Testing & evaluating

Try out technologies with people with ABI based on their goals for support, using rigorous research design (Victoria & NSW)



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Published on 29.8.2023 in Vol 12 (2023)  
Preprints (earlier versions) of this paper are available at <https://preprints.jmir.org/preprint/48503>, first published April 26, 2023.

**Evaluation of the Effectiveness of Assistive Technology for Executive Function Support for People With Acquired Brain Injury: Protocol for Single-Case Experimental Designs**

Em Bould<sup>1</sup>; Robyn Tate<sup>2</sup>; Grahame Simpson<sup>3</sup>; Natasha Brusco<sup>4</sup>; Lisa Licciardi<sup>1</sup>; Libby Callaway<sup>5</sup>

**Abstract**

**Background:** Executive function, including prospective memory, initiating, planning, and sequencing everyday activities, is frequently affected by acquired brain injury (ABI). Executive dysfunction necessitates the use of compensatory cognitive strategies and, in more severe cases, human support over time. To compensate for the executive dysfunction experienced, growing options for electronic mainstream and assistive technologies may be used by people with ABI and their supporters.

**Objective:** We outline the study protocol for a series of single-case experimental designs (SCEDs) to evaluate the effectiveness of smart home, mobile, and/or wearable technologies in reducing executive function difficulties following ABI.

**Citation**

Please cite as:  
Bould E, Tate R, Simpson G, Brusco N, Licciardi L, Callaway L. Evaluation of the Effectiveness of Assistive Technology for Executive Function Support for People With Acquired Brain Injury: Protocol for Single-Case Experimental Designs. JMIR Res Protoc 2023;12:e48503  
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# Phase 2

## Phase 2:

### Testing & evaluating

Try out technologies with people with ABI based on their goals for support, using rigorous research design (Victoria & NSW)



## Michelle's story:

Initiate breakfast between 9am-9:30am each day

- Sofihub with movement sensors



**Photo 1:** Sofihub sensor mounted above cereal box



**Photo 3:** Swann contact sensor mounted on microwave door





# Phase 2

## Phase 2:

### Testing & evaluating

Try out technologies with people with ABI based on their goals for support, using rigorous research design (Victoria & NSW)

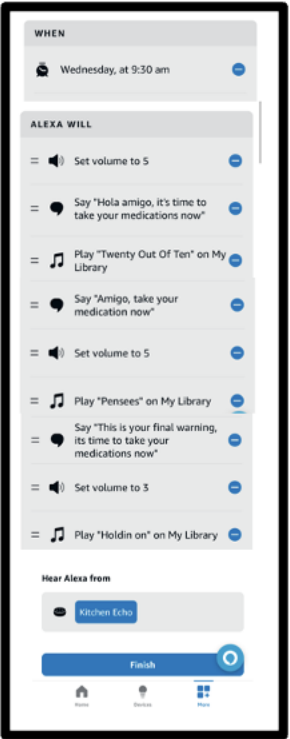


Photo 4: Example of the Alexa routine

### Katie's story:

Take medication independently at 9am each day  
- Eve motion sensor & Amazon Echo



Photo 5: Eve motion sensor mounted over the medication storage box on the kitchen bench



Photo 6: Eve motion sensor mounted over medication box and kitchen smart speaker position

# Phase 2

## Phase 2:

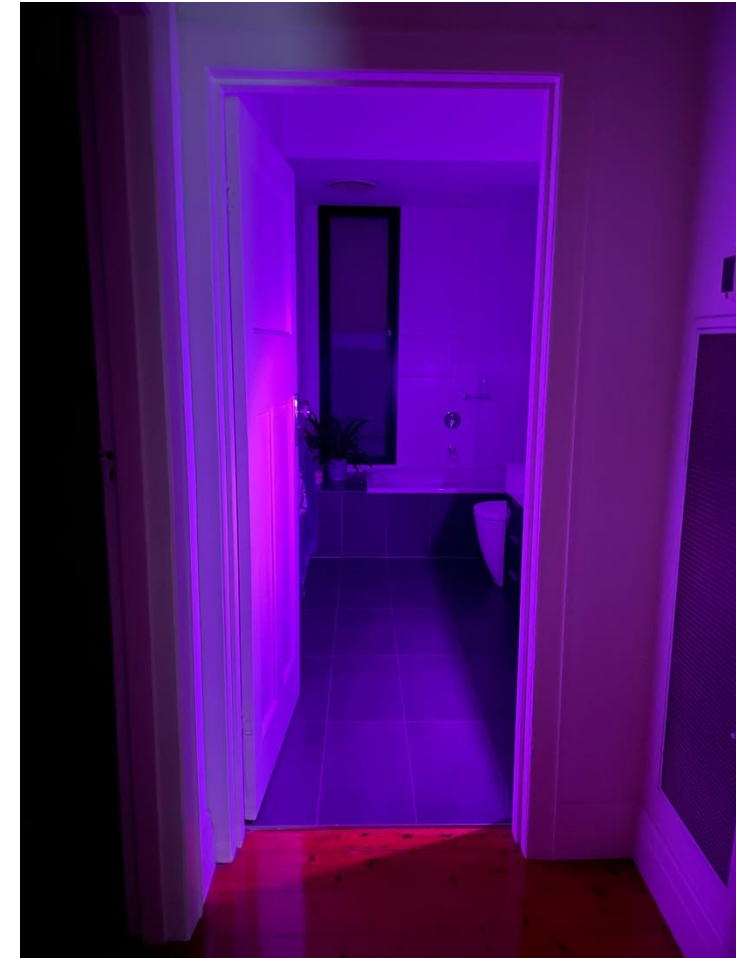
### Testing & evaluating

Try out technologies with people with ABI based on their goals for support, using rigorous research design  
(Victoria & NSW)



## Sam's story:

Initiate brushing teeth each evening before bed  
- Mirabella smart globe in lamp on vanity



# Phase 2

## Phase 2:

### Testing & evaluating

Try out technologies with people with ABI based on their goals for support, using rigorous research design  
(Victoria & NSW)



**Photo 8:** Aqara presence sensor FP2 mounted on wall

### John's story:

Play audiobook in afternoon between 2pm-4pm  
- Aqara presence sensor & Amazon Echo

A movement sensor was placed on the wall near to a chair that John sits on in his living room.

A smart speaker was set to communicate with John from 1.30pm to 3.30pm on Monday, Tuesday, Wednesday, Thursday and Friday when movement was sensed.

Smart speaker: "Good afternoon John, do you want to listen to your audiobook?"

If John replied, "Yes", his audiobook would start playing using an online App called Audible.



# Phase 2

## Phase 2:

### Testing & evaluating

Try out technologies with people with ABI based on their goals for support, using rigorous research design (Victoria & NSW)



**Photo 13:** IFTTT notification displayed on Imani's Apple watch

## Imani's story:

Initiating sorting travel photos and mementoes  
- Smart watch, smart sensor & smart lighting



**Photo 14:** Smart lighting enabled in Imani's bedroom



**Photo 12:** Photo sorting workstation

In the nominated time window (the time Imani identified she often gets bored and would like to do the task) a reminder is delivered to the Apple watch and iPhone (Photo 13) and smart lighting turned on (Photo 14), prompting Imani to initiate the task.

# Phase 3



## Phase 1: Scoping

Talk to a range of people, explore existing products, develop framework for evaluation, scan + shortlist technologies for trial



## Phase 2: Testing & evaluating

Try out technologies with people with ABI based on their goals for support, using rigorous research design (Victoria & NSW)



## Phase 3: Sharing findings

Digital education resource development, tech capability building of key stakeholders



my  
**technology**  
space



# A website to help people think about the use of assistive technology for cognitive support after brain injury

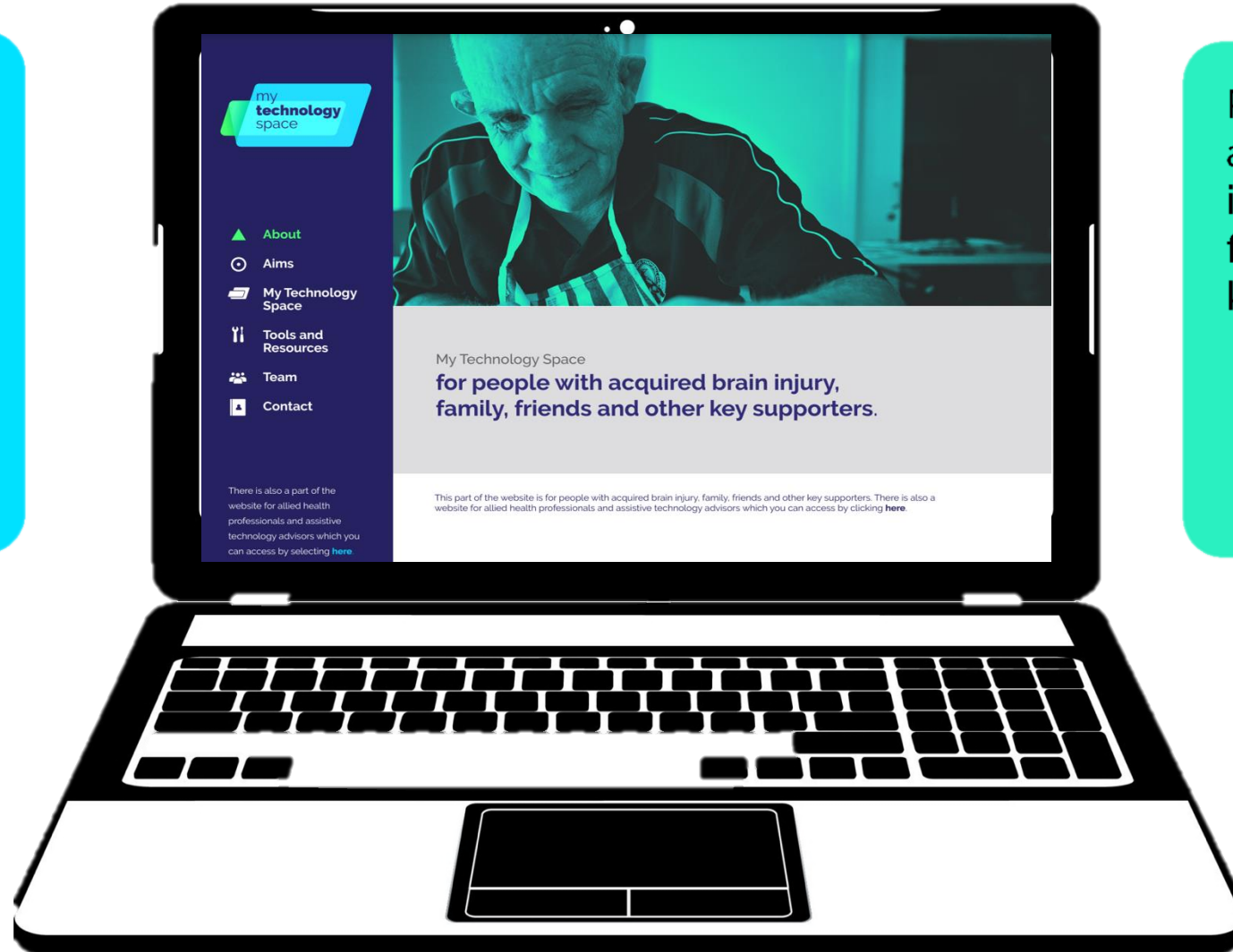




# Aims of My Technology Space

# My Technology Space

Allied health professionals or other assistive technology advisors >>>



People with acquired brain injury, family, friends and other key supporters >>>





People with  
acquired brain  
injury, family,  
friends and other  
key supporters >>>



▲ About

🎯 Aims

📁 My Technology  
Space

🔧 Tools and  
Resources

👥 Team

👤 Contact

There is also a website for allied  
health professionals and  
assistive technology advisors  
which you can access by  
selecting [here](#).

# My Technology Space

Home / My Technology Space

🔍 Search...

○ About me and my goals >>>

○ My current supports >>>

○ My future supports >>>

○ Types of assistive technology >>>

○ Choosing assistive technology >>>

○ My outcomes >>>

People with  
acquired brain  
injury, family,  
friends and other  
key supporters >>>



Information

For the person and their family and friends to consider goals, supports, assistive technologies and outcomes



Checklists

Getting to know the person & their goals; current & future supports; Assistive Technology product checklist; Interest checklist; Role checklist; Community Integration Questionnaire-Revised



Tools

Psychosocial Impact of Assistive Devices Scale (plain language version)  
User Experience Questionnaire



Other  
resources

Weblinks to other assistive technology resources for people with ABI  
Stories of technology use

People with  
acquired brain  
injury, family,  
friends and other  
key supporters >>>



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Allied health  
professionals or  
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advisors >>>



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- 👤 Contact

There is also a website for people with acquired brain injury, family, friends and other key supporters, which you can access by selecting [here](#).

# My Technology Space

Home / My Technology Space

🔍 Search...

- About the person and their goals >>>
- The person's current supports >>>
- The person's future supports >>>
- Types of assistive technology >>>
- Selecting assistive technology >>>
- Outcomes for the person >>>



Allied health  
professionals or  
other assistive  
technology  
advisors >>>



Information

For the allied health professional or other assistive technology advisor to consider goals, current & future supports, assistive technologies & outcomes



Checklists

Getting to know the person & their goals; current & future supports; Interest checklist; Role checklist; Assistive Technology product checklist; Care and Needs Scale; Community Integration Questionnaire-Revised



Tools

Assessing needs and supports in relation to assistive technology (A-AT)\*  
Assistive Technology Outcome Measure  
Assistive Technology Usability Questionnaire  
Australian Therapy Outcomes Measures  
Canadian Occupational Performance Measure  
Framework for Evaluation of Assistive Technology (FEAT)\*  
Goal Attainment Scale (light)  
ICF Checklist (Part 3 Environmental Factors)  
Psychosocial Impact of Assistive Devices Scale  
Quebec User Evaluation of Satisfaction with Assistive Technology  
Residential Environment Impact Survey (short form)  
System Usability Scale  
User Experience Questionnaire  
User Satisfaction Evaluation Questionnaire



Other  
resources

Weblinks to other assistive technology resources for AHPs and AT advisors  
Stories of technology use

# Tools

**ICF Checklist - Part 3: Environmental Factors**

**What information will I gain from Part 3 the ICF Checklist: Environmental Factors?**

The ICF Checklist (Version 2.1a Clinician Form) is a 'tool to elicit and record information on the functioning and disability of an individual'.<sup>1</sup> The ICF Checklist may be useful to assess and consider the interaction of a person's bodily functions and structures, activities, and participation, as well as their environmental and personal factors that may result in disability.<sup>1</sup>

Part 3 of the ICF Checklist focuses on Environmental Factors, which 'make up the physical, social and attitudinal environment in which people live and conduct their lives'.<sup>2</sup> There are six categories including: products and technology; natural environment and human made changes to environment; support and relationships; attitudes; and services, systems and policies.

When considering technology used for cognitive support after brain injury, completion of the Environmental Factors section of the ICF Checklist enables understanding of the specific physical, social and attitudinal considerations of the person's environment that may be an enabler or barrier for them. It also offers consideration of how these factors impact on a person's ability to participate in the activities they want, and need, to do in their life.

<sup>1</sup> <https://www.who.int/publications/items/ict-checklist>  
<sup>2</sup> [https://cdn.who.int/media/objects/default-source/classification/ict/checklist.pdf?sfvrsn=79597\\_4&download=true](https://cdn.who.int/media/objects/default-source/classification/ict/checklist.pdf?sfvrsn=79597_4&download=true)

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**The Care and Needs Scale**

**What information will I gain from the Care and Needs Scale?**

The Care and Needs Scale (CANS) can be used with older adolescents and adults (16 years and older) to capture information about the type and level of support needs experienced following an acquired brain injury. It consists of two sections: (1) a needs checklist, and (2) support levels.

The 28-item needs checklist samples the types of activities that are most frequently affected after brain injury. Checklist items range from very basic needs (e.g., tracheostomy management, eating) through to activities of daily living (e.g., domestic tasks) and social participation activities.<sup>1</sup> The focus of the checklist is on functional activities, rather than impairments.

Support Levels are categorised into one of five groups dependent on type of activities the person needs support for, and then a support level is assigned depending on the length of time an individual can be left alone. Support levels cover the extent, intensity and frequency of care and support need. A rating is made in one of eight categories, which range from 0 (living independently in the community) to 7 (requires support, assistance, or supervision 24 hours per day).

<sup>1</sup> <https://www.sydney.edu.au/medicine-health/our-research/research-centres/john-walsh-centre-for-rehabilitation-research.html>

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**Interest Checklist**

**There are lots of different types of Interest checklists.**

Most gather information on past, current and future leisure interests, how these influence activity choices.<sup>1,2</sup> Some are adapted to offer easy read options.<sup>3</sup>

**What information will I gain from an Interest Checklist?**

Most Interest checklists help to explore interests that a person has had in the past, those interests the person pursues now, or interests or activities they may like to consider in the future. Depending upon the design of the interest checklist used, items just be listed out or they may be categorised (e.g., clubs, community groups, volunteer work, sports, art and crafts, homemaking, games, or other topics). The information can be useful to support goal setting with the person.

**How do I administer an Interest Checklist?**

Interest checklists generally takes 5-10 minutes to complete but they can also take longer depending upon how much discussion is facilitated. An interest checklist can be completed in an interview or casual conversation with the person, or with the person and a proxy if the person with an acquired brain injury may require support to recall or reflect on interest areas.

**How do I report or score the assessment?**

Usually, interests the person has identified are just listed out or counted and used to plan for areas they may wish to explore further.

<sup>1</sup> <https://monash-im-uc.edu.au/default.aspx>  
<sup>2</sup> <https://www.nhs.uk/media/281172/interest-checklist-use-on-page-as-image.pdf>  
<sup>3</sup> <https://monash-im-uc.edu.au/productDetails.aspx?aid=39>

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**Quebec User Evaluation of Satisfaction with Assistive Technology**

**What information will I gain from the Quebec User Evaluation of Satisfaction with Assistive Technology?**

The Quebec User Evaluation of Satisfaction with Assistive Technology version 2.0 (QUEST 2.0) is a 12-item questionnaire that can be used to measure a person's satisfaction with an assistive technology device and its related services. For each item, the person is asked rate their device regarding its physical properties, ease of use and effectiveness, using a 5-point Likert scale from 1 (not satisfied at all) to 5 (very satisfied). They are also asked to rate delivery, maintenance and follow up services using the same 5-point scale. Finally, the person can choose the three assistive technology satisfaction items that are most important to them, from a total of 12 items.

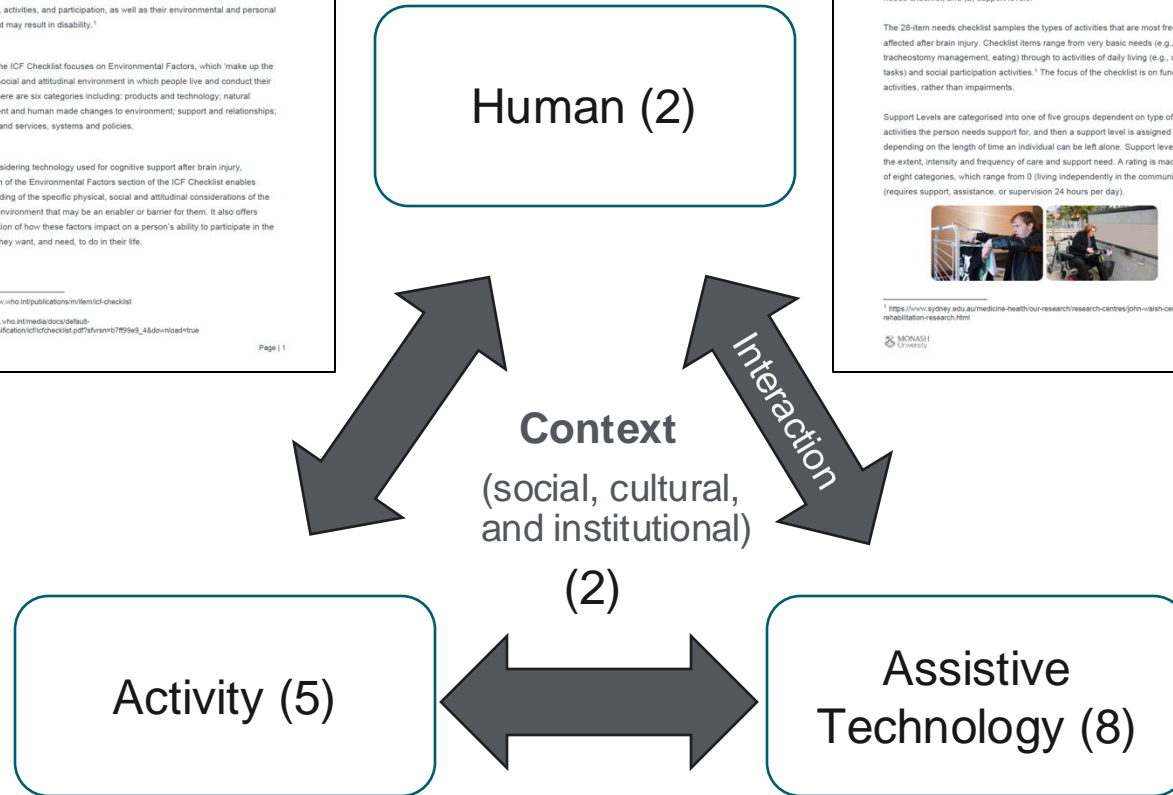
**How long does it take to administer the measure?**

The QUEST takes around 10-15 minutes to administer. The QUEST can be completed in-person or over the telephone with the person, or with the person and the support of a proxy (for example, a family member or other key supporter).

**How do I report or score the measure?**

Responses for each of the 12 items are summed and divided by the number of valid responses to obtain a total score, and two sub-scores. Scores range from 1 to 5, with a higher score indicating greater satisfaction with the assistive technology.

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# Assessing needs and supports in relation to Assistive Technology (A-AT)

A-AT

Assessing needs and supports in relation to Assistive Technology

Name of Person

FirstFamily

What are [Name]'s goals?

What solution(s) are relevant for [Name] to achieve their goals?

Natural Supports

(For example, support from family member)

Paid Supports

For example, support workers, allied health professionals

Cognitive aids and strategies

For example, paper-based calendar; customised signs in prominent locations for key reminders (e.g. medication reminder near coffee machine)

Home modifications and Equipment

For example, Sofihub ambient assisted living product; TabTimer alarm on Webster pack

Assistive Technology

Is Assistive Technology (AT) relevant for [Name] to achieve their goals

Has [Name] used AT in the past or present?

Does AT allow for adaption/accommodation of expected changes to [Name]'s circumstances, development or function, ie growth of child?

Expected frequency of use of proposed performance AT for [Name]

<

>

A-AT

+

# Framework for Evaluation of Assistive Technology (FEAT)

## Framework for Evaluation of Assistive Technology

### What information will I gain from the Framework for Evaluation of Assistive Technology?

The Framework for Evaluation of Assistive Technology (FEAT) is a decision-making tool that aims to support technology users and allied health professionals or other assistive technology advisors to consider potential technology products or options that may be used for cognitive support following brain injury.

The FEAT has nine domains (see Figure 1). The domains allow users of the Framework to consider and respond to questions about a product and its use, allowing their comparison to inform decision making before selecting the final product for trial.



Figure 1: The nine FEAT domains.<sup>1</sup>

<sup>1</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10498320/>

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	Sofihub	
1. Effectiveness	✓	100%
2. Design & Functionality	✓	92%
3. Reliability	✗	71%
4. Value for Money	✓	100%
5. Technical Specifications	✓	100%
6. Sustainability	✓	100%
7. Service Delivery	!	89%
8. Privacy & Security	✗	67%
9. Risk	✗	67%
<b>TOTAL</b>	!	<b>88%</b>
<b>RANK ORDER (Highest to Lowest)</b>	▶	<b>1</b>



F2      $f_x$  [Type in Name AT 1]

Framework for Evaluation of Assistive Technology (FEAT)				Assistive Technology (AT)				Select here to go to the FEAT Summary Table
				[Type in Name AT 1]	[Type in Name AT 2]	[Type in Name AT 3]	[Type in Name AT 4]	
1. Effectiveness	The extent to which the functioning of the AT improves the user's living situation, as evaluated by the advisor and as perceived by the user, including whether it enhances functional capacity and/or independence, improves safety and/or enables participation in meaningful activities.	1.1	AT provides cognitive, safety and/or other functional benefits.					
			Comments:					
		1.2	Description of AT (as per manufacture's claims) meets users specific needs.					
			Comments:					
		1.3	AT does not compromise meeting the users other needs and/or limit the users experience of other ATs.					
			Comments:					
		1.4	The AT does what manufacture claims.					
			Comments:					
		1.5	The AT is effective and meets the users needs.					
			Comments:					
2. Usability		2.1	The AT can be hired/trialled before purchase.					
			Comments:					
		2.2	The AT is easy to assemble/install and/or can be operated immediately once received. No specialised tools, or professional installation/start-up is required.					
			Comments:					
		2.3	There is no training for set up and operation required.					
			Comments:					
		2.4	Set up and interface can be customised for personalisation or to accommodate physical or other access issues, vision impairment etc.					
			Comments:					
		2.5	Weight and dimensions of AT are suitable for users needs.					
			Comments:					
		2.6	If required outside of the home, the AT is portable. The physical range of system					

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- Contributing to a range of research activities e.g. reviewing research concepts and protocols from a community perspective, and reviewing grant applications.
- Having access to free education and program opportunities.
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