# Issue Paper – Symbol users with Speech, Language and Literacy Difficulties.

## Description of the Technologies

Voice Output Communication Aids (VOCAs) are devices that have been developed to allow pictures, symbols or words to be used with speech synthesis. The devices may be specialist items with built in systems carrying the symbols. They may also be a generic computer, tablet or mobile with specialist software or apps. The symbols are activated by single or multiple touches, eyes dwelling on a chosen image or manual use of a keyboard or switches. An external input device usually allows for step by step scanning up and down rows and columns of symbols on a grid. Symbols and word choices are personalised to suit the user, representing known objects, actions and happenings.

## Users

The users of Alternative and Augmentative Communication (AAC) based on images or pictographs as symbols tends to be those who have no speech or very unintelligible speech, difficulties expressing themselves and/or individuals who may need reading support. Individuals may also have severe mobility and dexterity disabilities and/or cognitive impairments. Depending on the skills of the user, the environment and task in hand, symbols may be used to represent a phrase or whole sentence of speech or be made up of individual parts of speech to aid sentence making.

## Issues

* There is a need to adapt AAC resources to be more context sensitive. The technologies already available tend to use word for word translation where one word may be seen with different symbol options e.g. without context or text to speech to help with meaning, the word ‘bow’ can be the front of a ship, a weapon shooting arrows, the action of lowering the top half of the body when meeting an important person or an attractively tied knot.
* Translations of text to symbols and symbols to text tend to have approximations of the correctly written language – often condensed to a simplistic form.
* No universal text to symbol /symbol to text conversions are available
* No systems are available that cope with colloquially spoken language which may be very different from the written language (as in Arabic) so using text to speech for a symbol may not help understanding
* Localisation and cultural nuances of symbol requirements have not been widely researched and westernised symbols tend to be used.

## Challenges for those with speech, language literacy difficulties as symbol users.

A symbol user using one set of symbols may have difficulties communicating with another symbol user. Just as with different languages, barriers exist due to the different types of images, grammar and meaning.

* In-put –
	+ Users cannot communicate online with those using different symbol sets
	+ Users cannot interact with forms, messaging or social media
	+ Users may use one symbol that represents a phrase not just one word so translation may be difficult
	+ Users may select symbols that contract sentences failing to provide the appropriate grammatical order for easy text translation
	+ Individualised symbols personal to the user need additional metadata (Information) if used online.
* Output-
	+ Users cannot easily take text from web pages to convert to symbols that would help understanding
	+ Word for symbol translation fails to support poor readers due to high level of ambiguity.
	+ Personalised symbols require additional metadata (further information to be understood)

### Present situation

* Some websites carry symbols as a way to support reading – these are based on word for word translation and may not fit the context or be recognised by users of other symbol sets just as a foreign language or hieroglyphics may not be recognised.
* Universally symbol users are unable to fill in forms or write messages using their symbol sets
* There is limited language support using two symbol sets for mapping ‘symbols to text / text to symbols’ using concept coding. <http://www.conceptcoding.org/AAATE_2013_Inclusive_AAC-MMLS4All.pdf>

### Effect of memory impairments

Symbol users:

* may be unable to cope with large amounts of online material depending on ability and this may limit the degree to which they can cope with content that is text based.

### Effect of impaired executive function

Symbol users:

* may find it hard to plan a route through web pages unless navigation is clear
* may have co-occurring difficulties that impact on successful online interactions
* may be overwhelmed by the amount of interactions required to complete tasks.

### Effect of attention-related limitations

Symbol users:

* may find symbol based content helps draw attention to content.

### Effect of impaired language-related functions

Symbol users:

* may find dense text based content incomprehensible or harder to cope with compared to symbol based content.

### Effect of impaired literacy-related functions

Symbol users:

* may not comprehend the meaning of text based content
* may fail to act correctly when warnings or other interactive items appear on the web.

### Effect of reduced knowledge

Symbol users:

* may fail to recognize images, such as symbols or icons that are not in their known set
* may lack the ability to use the web as it has been intended, fail to find information and fail to interact with operational elements.

## Proposed Solutions

The strategy of mapping symbol sets to a common vocabulary may allow developers to incorporate helpful symbols knowing these can be automatically presented to the user in their own symbol language. This schema would also allow symbol users to use their own symbols in an edit box or form knowing it can be recognised by other symbol users with the automatic translation.

Awaiting Chaohai’s technical section.

## References

Lundalv, M. & Derbring. S. (2012). AAC vocabu­lary standardisation and harmonisation. *Lecture Notes in Computer Science. 7383,* 303-310. doi: 10.1007/978-3-642-31534-3\_46.

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