

Introduction

The following text was produced in November 2024, within a project called "Controlling the computer with the brain" at Dart – center for AT and AAC, which is part of Region Västra Götaland in Sweden. The project's aim is to explore whether brain computer interface technology (BCI) could be used in everyday life for people with no other possibilities of expressing themselves.

At that time, we had experience using one specific BCI technology (details of which will not be presented here) and had surveyed the market for BCI systems for communication that were classified as medical devices under the MDR. What became clear was that, although BCI systems were available, they were not optimized for communication purposes.

We are now sharing this summary of the communication-related aspects that we, at the time, considered important for BCI technology developers to take into account if they intend their systems to be used for communication by a range of potential users with communication difficulties. However, this document should not be regarded as a set of recommendations. We are currently developing a more comprehensive set of requirements, informed by a broader analysis of the field and existing technologies, which will be available in the future.

Vision

Our vision is for BCI technology to be used as an equal way of communicating compared to eye gaze or other alternative access methods that are traditionally supported in the various communication software available today. If BCI technology could be used with already existing software, it may be the best possible outcome. Another way of working towards the same goal is to incorporate communication software/application within the BCI system.

Standard features in communication software

For BCI developers who aim to optimize their systems for use with existing communication software, it may be useful to examine how currently available communication applications and software are designed and structured. The examples listed below are intended to provide such points of reference. It is not a technical specification of any means, rather just made for developers to be able to appreciate the range of features needed/expected from users for communication in everyday life.

The list is limited to communication software that, at the time this text was written, had been procured by Region Västra Götaland through a public procurement process and was included in the region's assistive technology catalog.

Software examples used for communication and accessibility tools

- Grid 3, Smartbox: <https://thinksmartbox.com/grid/>
- Mind Express, Jabbla: <https://www.jabbla.com/en/mind-express/>

Software examples used mainly for communication

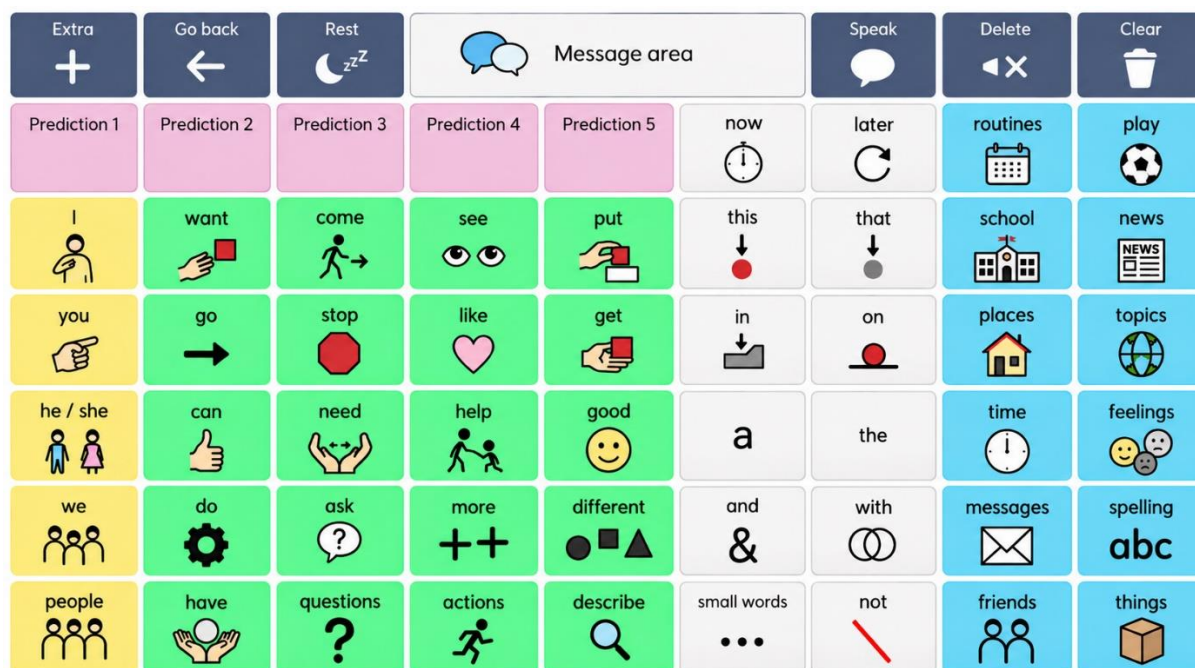
- TD Snap, Tobii: <https://se.tobiidynavox.com/pages/td-snap>

Software feature specifications

Category	Feature	More details
<i>Vocabulary</i>	Customizable linguistic representations	E.g., photos, drawings, AAC symbols, words or letters. Preferably, combinations of all these.
	Possibility to organize and reorganize vocabulary on the grid	
	Save word/phrases written in the message field to a cell	
<i>Speech synthesis</i>	Voice customization	A range of voices, pitch, speed, tone
	Customizable activation	Options to choose when speech is activated, for example automatically after each letter, each word, or each sentence, or manually by a cell that reads out the message field.
<i>Grids and cells</i>	Message field	
	Custom sizes and shapes of cells	
	Customizable grid sizes	The number of cells per page desirable would be highly dependent on user characteristics.
	Customizable colors and themes	
	Customizable highlights when cell is activated	
<i>Dynamic displays</i>	Several pages to a board, interconnected with each other so that the user can independently navigate between them.	For example, one display with a keyboard, one with phrases, one with commonly used words, or different displays for various activities.
<i>Accessibility</i>	Be able to send emails, browse the Internet, send text messages and use word processors	Either integrated in the software's interface or with the software as a selection method against the regular interface
	Be able to participate in video meetings	

Communication aspects in BCI systems
- examples of features in AAC software applications

<i>Message history, word prediction</i>	Customizable vocabulary, system should learn new words and save them to the wordlist	
	Easy access to previous selected words and message history	



An example of how a dynamic display with symbols can look like. Some buttons link to displays with more content. The illustration is made by ChatGPT.