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GNApp – An Open Source Augmentative and Alternative Communication Framework

[1]DR L COETZEE AND M PISTORIUS
Meraka Institute, CSIR, PO Box 395, Pretoria 0001
[1]Email: lcoetze1@csir.co.za

NAP – NATIONAL ACCESSIBILITY PORTAL
- Five-year research & development project aimed at addressing the marginalisation of people with disabilities from the mainstream economy and society;
- Aims to enable people with disabilities to play an active role in the economy and allow them to improve the quality of their lives;
- Addresses a critical human need to communicate with others through new and affordable technology;
- Aims to generate tangible outputs in the form of technology building blocks and technology demonstrators; and
- Operates in partnership with a representative group of Disabled Persons' Organisations and the Office on the Status of Disabled Persons (OSDP) in the Presidency.

AAC – WHAT IS AUGMENTATIVE AND ALTERNATIVE COMMUNICATION?
- AAC is the supplementation and/or replacement of natural speech and/or writing, using aided and/or unaided symbols. It refers to an area of clinical practice that attempts to compensate (*either temporarily or permanently*) for the impairment and disability of individuals with little or no functional speech (i.e. less than 15 intelligible words)   ASHA (1991, p10)

AUGMENTATIVE AND ALTERNATIVE COMMUNICATION STRATEGIES
- AAC strategies are used by people to describe the way people supplement their communication when they can not speak clearly enough to be understood by those around them; and
- These strategies include a wide range of communication methods ranging from gestures and communication boards to assistive communication devices or applications.

WHY ARE AAC STRATEGIES SO IMPORTANT?
- Communication is a human right;
- THAT a person communicates is more important than HOW s/he communicates;
- AAC provides a person with a means to communicate and can also facilitate speech development;
- AAC can facilitate entrance into literacy;
- AAC facilitates interactions and greater independence; and
- AAC provides access to different communication contexts and partners.

WHO CAN BENEFIT FROM AUGMENTATIVE AND ALTERNATIVE COMMUNICATION?
- Any individual with little or no functional speech:
  - Severe intellectual or physical disabilities;
  - Multiple disabilities;
  - Congenital disorders e.g. CP, Syndromes;
  - Acquired disorders e.g. stroke, Parkinson's disease and motor neuron disease; and
  - Anyone who has some speech but requires an augmentative device for purposes of writing or carrying on long conversations.

AAC – DEVICES: CHALLENGES WITHIN THE SOUTH AFRICAN CONTEXT
- Little or no financial aid is available to purchase AAC devices;
- Most AAC devices are imported;
- Expensive R5000.00 – 100 000.00+;
- Problematic support and maintenance. Devices often have to be shipped back to Europe or North America at user's expense; and
- Not localised for the South African context (only English speech synthesis, English cultural representation).

## AAC – DEVICES: NEEDS WITHIN THE SOUTH AFRICAN CONTEXT
- Affordable technology (free or inexpensive);
- Localisable (multi-lingual and multi-cultural support);
- Multiple input modalities (keyboard, mouse, switch);
- Configurable;
- Intuitive (i.e. little training required to use the system); and
- Locally supported and maintained.

GNApp – GRAND NAP APPLICATION
- A highly configurable framework integrating across various research areas to provide a complete augmentative and alternative communication suite of applications complying with the South African needs.

GNApp – FEATURES
- Easily configurable (using Authoring and Icon tools);
- Easily localisable (provides synthesised speech output through a variety of TTS engines in available languages (Afrikaans, English, isiZulu) (Louw, Davel, Barnard (2005)). Alternative playback pre-recorded voice prompts);
- Variety of input modalities e.g.
  - Mouse input
  - Switch input with different interface scan modes;
- Open Source;
- Text prediction (in the chosen language); and
- Extensive logging for language activity monitoring; and
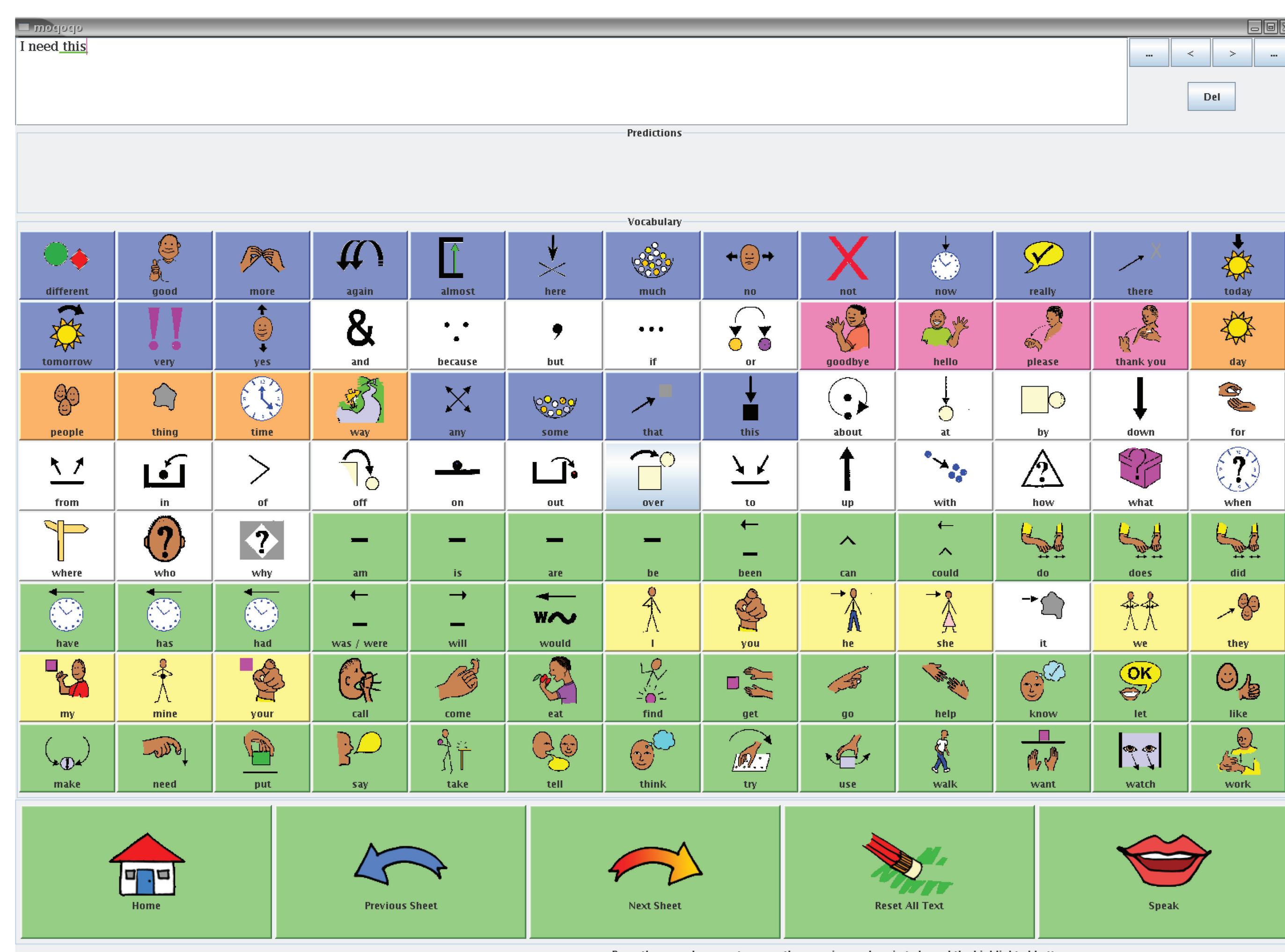
- Supports a variety of display options (Lloyd, Fuller & Arvidson(1997)):
  - Frequency of use (most used symbols are placed strategically)
  - Taxonomic/ Categorised (similar symbols are placed together)
  - Syntactic categories (displayed with same colour)
  - Alphabetic/Numeric
  - Schematic/Topic or Activity based (symbols for activity grouped together).
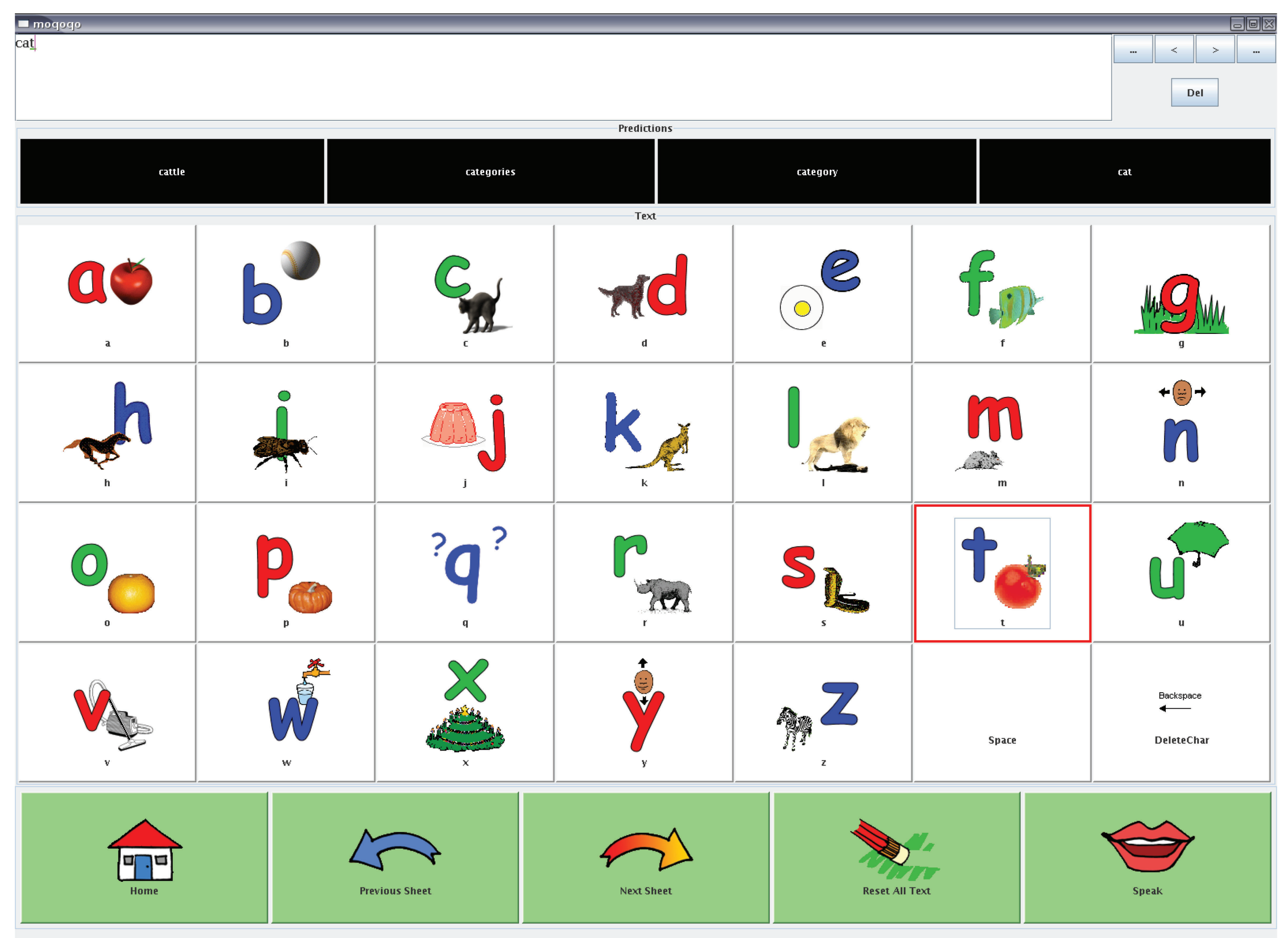
GNApp – ARCHITECTURE
- GNApp is driven by an XML file containing the configuration for a specific usage scenario containing:
  - Language choice
  - Speech synthesis engine
  - Display layout
  - Input scan mode
  - Text dictionary, and
  - Icons;
- The XML file is interpreted by an XML engine which links to the synthesis and GUI modules; and
- The GUI receives input from the user (dependent on the chosen input modality), passes the event on to the XML engine, which interprets the event, and compiles the text which is then passed to the Synthesis engine for audible output.

GNApp – ARCHITECTURAL MODULES
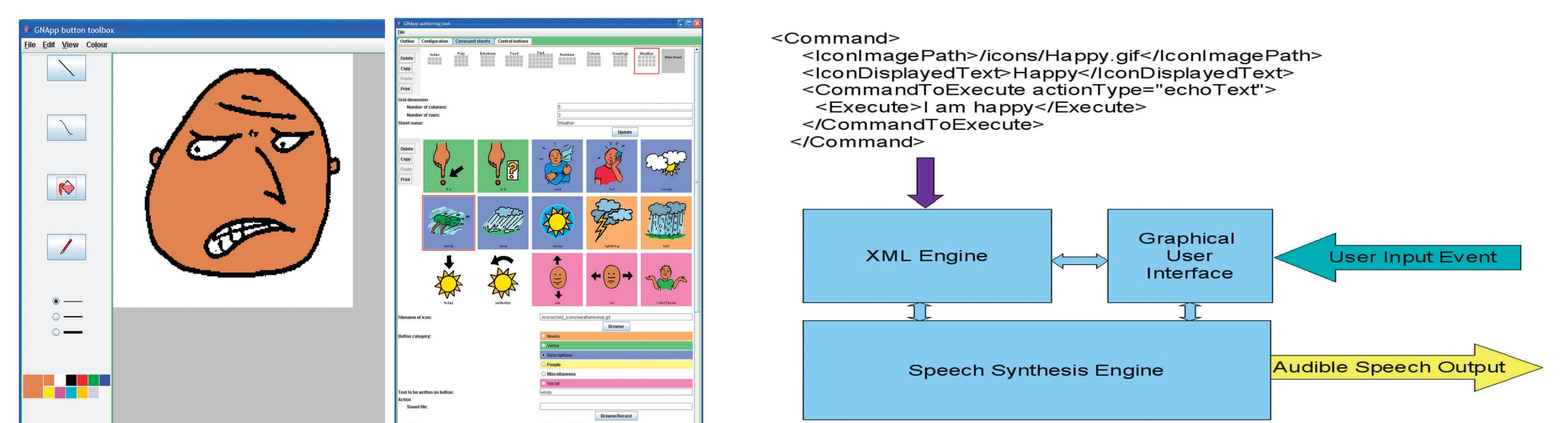
Supporting applications – Icon Editor and Authoring tool

CONCLUSIONS
- Provides a low cost alternative in localised languages to commercial AAC devices;
- Includes a suite of applications for fast and easy configuration;
- Supports advanced display and input modalities;
- Provides logging information useful to therapists allowing for directed training;
- Locally developed and supported;
- Open Source; and
- Portable across different platforms and architectures.

REFERENCES
1. American Speech-Language-Hearing Association (ASHA 1991, p10)
2. Louw J.A., Davel M. and Barnard E., "A general-purpose IsiZulu Speech Synthesiser", The 14th International Conference of the African Language Association of Southern Africa (ALASA), Johannesburg, South Africa, July 2005.
3. Lloyd L. L., Fuller D. R., & Arvidson H. H. (1997). Augmentative and Alternative Communication: A Hand Book of Principles and Practices. Allyn and Bacon: Massachusetts ISBN: 0-205-19884-8 (page130 -131) (chapter 9). Paul H. Brooks: Baltimore ISBN: 1-55766-333-5

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African Advanced Institute for Information & Communications Technology