

HLT and communicative disabilities: The need for co-operation between government, industry and academia

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Abstract

An initiative was taken to analyse the specific needs of communicatively disabled people in terms of applications and related HLT resources so as to inform policy, research and development and eventually stimulate take-up by industry.

1 Introduction

The **Dutch Language Union**: a Dutch-Flemish intergovernmental organization that has the aim of promoting the Dutch language.

The DLU is interested in HLT because these can play a vital role in strengthening the position of a language in the information society.

The DLU aims at creating the right conditions for making it easier to speak Dutch in all sorts of situations and wants to achieve this for all speakers of Dutch, hence also for those with communicative disabilities.

Together with the relevant ministries in the Netherlands and Flanders, the DLU set up a number of initiatives aimed at promoting the development of HLT for Dutch.

Governmental support was considered to be mandatory because companies are not always willing to invest in developing such technology for a language with a relatively small market.

2 HLT and communicative disabilities

To improve the position of people with communication disorders it is first essential to identify the tools they require to improve their communicative capabilities: tools that assist verbal dialogue, reading and writing, and the use of communication devices.

On behalf of the DLU Rietveld and Stolte (2005) investigated those needs. The study revealed the need for a wide range of HLT products and services, but the requirements appeared to be very diverse. This makes it impossible to develop products that everyone can use and helps explain why communicative disabilities arouse so little interest in the business sector.

Question:

How can we make it easier for companies to develop HLT-based products for people with communicative disabilities?

3 Basic Language Resource Kit (BLARK)

Survey of Dutch language resources carried out in 2000-2003 and based on matrices identifying:

Applications: classes of HLT applications (Computer Assisted Language Learning, access control, speech input, speech output etc)

Modules: the basic software components needed for developing HLT applications.

Data: data sets and electronic descriptions that are used to build, improve, or evaluate modules.

Matrices were drawn up describing

- modules required for applications,

- data required for modules, and

- relative importance of modules and data

The BLARK initiative resulted in the Dutch-Flemish HLT stimulation programme STEVIN

Question:

Is a BLARK approach a viable solution for communicative disabilities?

4 A new initiative for stimulating HLT for communicative disabilities

Given the success of the BLARK and the STEVIN programme, it seems worthwhile to investigate whether such an approach would be applicable in the field of HLT for communicative disabilities.

Round table conference with experts on HLT and communicative disabilities.

Aim: identifying a minimum common set of HLT resources that would be useful for developing applications for a number of communicative disabilities, some sort of minimum common denominator.

The rationale behind this initiative is that if indeed it is possible to identify such a core of resources that could be employed for developing applications for a wide range of disabilities, then it would be easier to convince policy institutions to finance the development of such HLT resources.

A working group of experts was formed which has the task of investigating whether matrices can be defined for drawing up an inventory of HLT resources that would be required for developing applications for people with communication disabilities.

The **outcome** should be an overview of the needs of people with communicative disabilities in terms of applications and related HLT resources, which can be presented to policy institutions, not only those involved in STEVIN, but also those concerned with health care, social assistance and independent living.

The **ultimate aim** is then to convince these institutions to support a research and development programme in which government, academia and industry participate.

Below we present some preliminary results which may be subject to change, as a result of feedback from the field.

5 Matrices

With respect to applications the following three dimensions appeared to be meaningful:

- the purpose of the applications: diagnosis, monitoring, training, therapy, compensation, and augmentative and alternative communication (AAC).

- the function it concerns: reading, writing, listening, and speaking

- the target group, the disability: visual, hearing, mental/ cognitive, motor, neurological, and oncological.

The combination of these three dimensions indicates what kinds of applications should be considered.

Concrete examples of applications needed are:

- training systems using speech recognition for dysarthria patients,

- diagnostic instruments and training material capable of self-adaptation for patients with cochlear implants,

- automatic recognition of sign language,
- automatic conversion of speech to symbols,
- speech-based applications for cognitively heavily impaired people.

We now should consider which types of HLT are needed for these applications. A useful way of looking at the technologies is to consider them as conversions between the following five modalities:

1 Auditive - spoken language

2 Visual 1 - written language

3 Visual 2 - images: symbols, gestures, animations, agents

4 Tactile - Braille, 3D-images (with relief)

5 Cognitive - concepts

Below some examples of conversions of modalities and (classes of) technologies are given

- 5 → 2 : text (language) generation: e.g. writing tools
- 2 → 2 : text modification and summarization
- 1 → 2 : speech recognition
- 2 → 1 : speech synthesis
- 2 → 4 : text to Braille conversion
- 1 → 1 : speech manipulation, e.g. delayed or frequency-altered auditory feedback (DAF & FAF)
- 2 → 3 : from text to virtual talking heads, agents, gestures.

6 Future steps

After the matrices have been defined, important questions have to be answered such as:

- What is the relevance of technologies to applications?

- What is already available, and what isn't?

- What is the quality level, is it suitable?

Aim: define a priority list indicating what is most needed and which technologies have the highest priority.

A provisional report containing the inventory, the priority lists and the recommendations will be presented to:

- healthcare professionals

- research centres

- universities

- health and social service organizations

- patient and user organizations

- HLT companies

- potential product manufacturers

Comments and feedback will then be incorporated and the final report will be submitted to policy institutions in an attempt to convince them to support a stimulation programme in the domain of HLT and communicative disabilities in which government, industry and academia cooperate.

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