

# *ComLink*, an Open and Component Based Development Environment for Communication Aids

**Mats Lundälv**, DART, Sahlgrenska University Hospital, Göteborg, Sweden

**Andrew Lysley**, The ACE Centre Advisory Trust, Oxford, UK

**Peter Head**, P<sup>2</sup> Technological Resources, London, UK

**Doeko Hekstra**, Handicom, Harderwijk, The Netherlands

**Abstract.** Users of Alternative and Augmentative Communication (AAC) and Assistive Technology (AT) need devices that can be easily tailored to their particular requirements, in a frequently changing environment. They also request a smooth integration of a range of devices for communication, environmental control, education, work, and leisure. This broad and diverse variety of individual needs presents a difficult challenge to manufacturers and other service providers. Economically and technically it is difficult to produce, maintain, and support products which meet these needs. *ComLink* responds to these challenges by offering an open platform for building modular AAC and AT software.

*ComLink* is the major outcome of the **Comspec Project**, funded by the European Union (EU). Based on the Java platform, it suggests standards for component development, software for creating and running AAC and AT applications, and sample components and applications. By using an environment like *ComLink*, Assistive Technology companies no longer need to build entire applications from scratch. Instead, they can use ready-made components, concentrating their resources on improving application design, meeting new user needs, and creating specialised components where necessary. The *ComLink* editors, with their graphical user interface, make it easy to combine and adjust components to make an application. Assessment and resource centre staff can use the same editors to modify applications to suit the diverse needs of end-users.

However, to be more widely adopted as a platform for development and service provision by developers and practitioners in the field, the current *ComLink* software needs to be brought a step further in terms of basic functionality and performance. The Comspec project partners and others are currently involved in a range of actions to make this happen.

## 1. Meeting Diverse Needs

The **Comspec Project** had its origins in a 1989 survey by a group of Nordic and UK assessment centres (The Nordic Council for Handicap Issues funded the project). Findings from a survey showed that the only way to provide the requested range of functions and adaptability would be to adopt a **modular** approach. Moreover, it was clear that, even with a modular approach, it would be difficult for any single developer — or even a small group of developers — to maintain such a system. An **open** modular software architecture would be needed, to enable a larger group of independent developers to contribute to a common system. We successfully applied to the EU's Technology Initiative for Disabled and Elderly People (TIDE) for funding to produce design tools and basic modules for Microsoft Windows. The **Comspec Project** ran from autumn 1994 to summer 1998; we have given the name *ComLink* to the resulting software package.

The *ComLink* user interface is designed and presented in a layered structure hiding technical complexity which is not relevant for most users. Four different **user roles** have been identified (See figure 1 below):

- End-users ('consumers', in US terminology) who will require highly functional and flexible aids, well tailored to their specific needs, without having to know about any technical details of the application they are using
- Facilitators who will need to make day-to-day adjustments and minor changes to existing *ComLink* applications
- System Integrators who will make more radical changes to an existing application, or create new *ComLink* applications from scratch
- Component Developers who will create new *ComLink* modules which are made available to Integrators either commercially or in the Public Domain

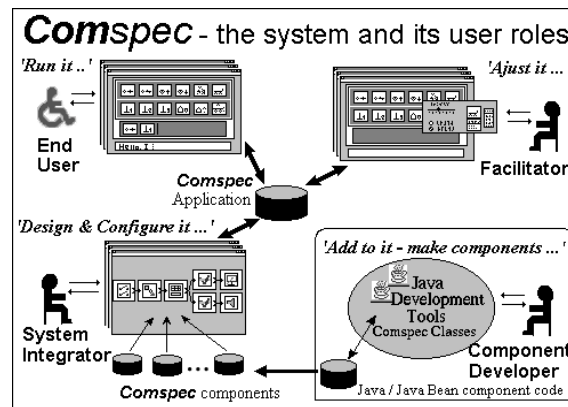


Figure 1: Users and User Roles

## 2. Environments and Subsystems

### 2.1 Environments

*ComLink* applications can be used in two environments. Applications are created, modified, and tested using the **Editing environment**. The end-user runs the application in the smaller **Runtime environment**, without the editors. A configurable toolbar is still available in the Runtime version, so that a Facilitator can make simple adjustments to the application.

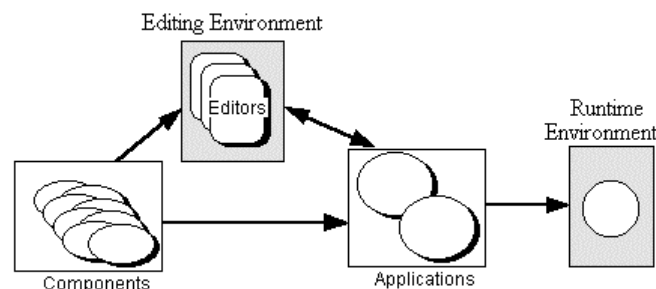


Figure 2: The Comspec/ComLink Environments –  
how Components are used in the Editors to create Runtime Applications

### 2.2 Subsystems

The appearance and behaviour of a *ComLink* application is defined by the content of four different **subsystems**, each with its own **editor**: Configuration, Layout, Vocabulary, and Toolbar. (See figure 3 below.) The editors enable rehabilitation professionals and facilitators to build, configure, and adapt AAC and AT applications for individual user needs. All four editors support separate storage (and consequently export and import) of subsystem data. For example, a layout can be imported from another application. This encourages re-use, distribution, and sharing of ideas and work between applications and between developers.

All four subsystems, and in fact the editors themselves, are designed to be readily and separately maintained or extended by adding new functional components.

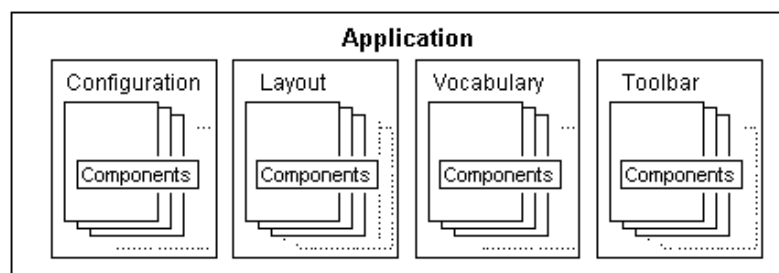


Figure 3: The four Comspec/ComLink Subsystems

### 3. ComLink Editors

#### 3.1 Configuration Editor

The Configuration contains the information about which technical components are included in the system and how they are interconnected. The **Configuration Editor** is the tool for selecting, linking and configuring the basic functional components of an AAC and AT application. Figure 4 shows a configuration built from a typical set of configuration components including a switch input, a scanning selection method, a selection set, filters, and outputs. The Selection Set and Layout Output components contain references to layout components in the Layout part of the application. Filters can be used for fine-tuned control over the content and timing of output.

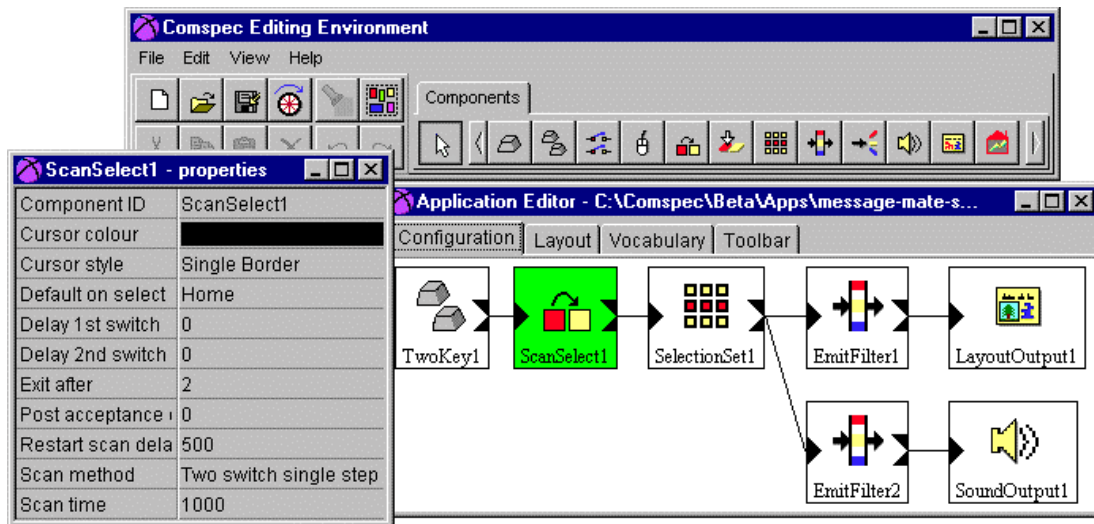


Figure 4: Configuration Editor

#### 3.2 Layout Editor

The **Layout Editor** (see Figure 5) is the tool for the design and refinement of the user interface of the aid. The Layout can be paged. Each page can contain Outputs and Card Stack components which also serve as containers of Simple Components. In this way hierarchical selection sets can be constructed. The simple components are linked to Vocabulary Items in the Vocabulary, and suitable representations are chosen for display.

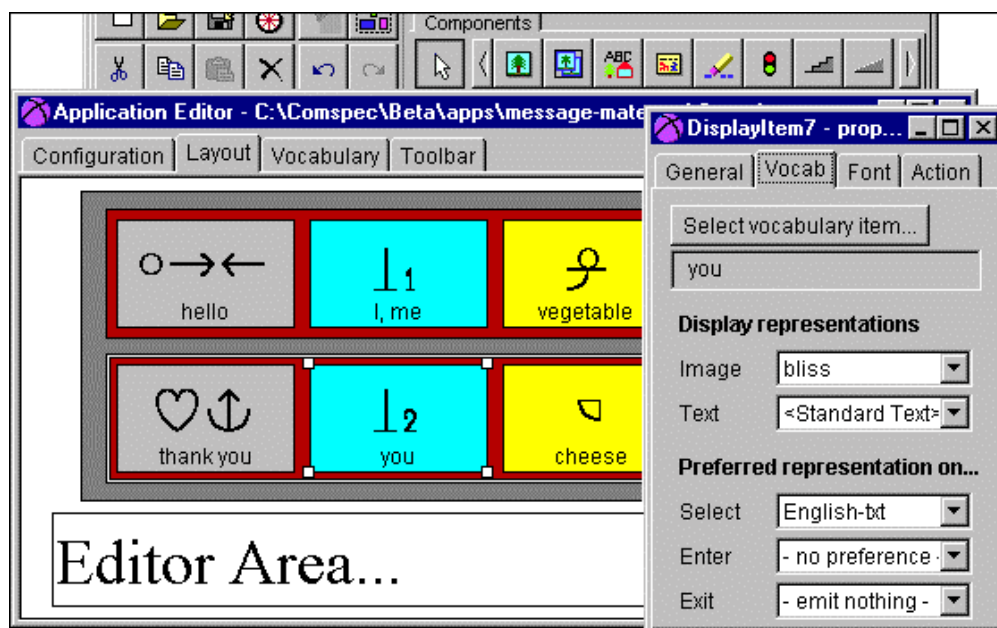


Figure 5: Layout Editor

### 3.3 Vocabulary Editor

The **Vocabulary Editor** (Figure 6) is the tool for managing the language resources of the AAC system. Each Vocabulary Item can be equipped with a choice of representations of different modalities (text, graphic, sound, etc.). New representation or media types can be defined subsequently.

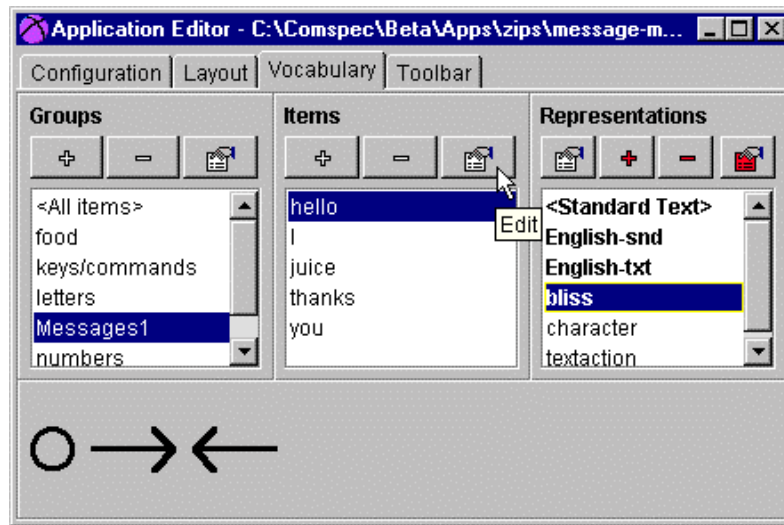


Figure 6: Vocabulary Editor

### 3.4 Toolbar Editor

The **Toolbar Editor** (Figure 7) is the editor for designing the Facilitator Toolbar. Functions and settings needed for day-to-day adjustments, and which are buried in the different sub-systems, can be selected and presented together for the non-technical user.

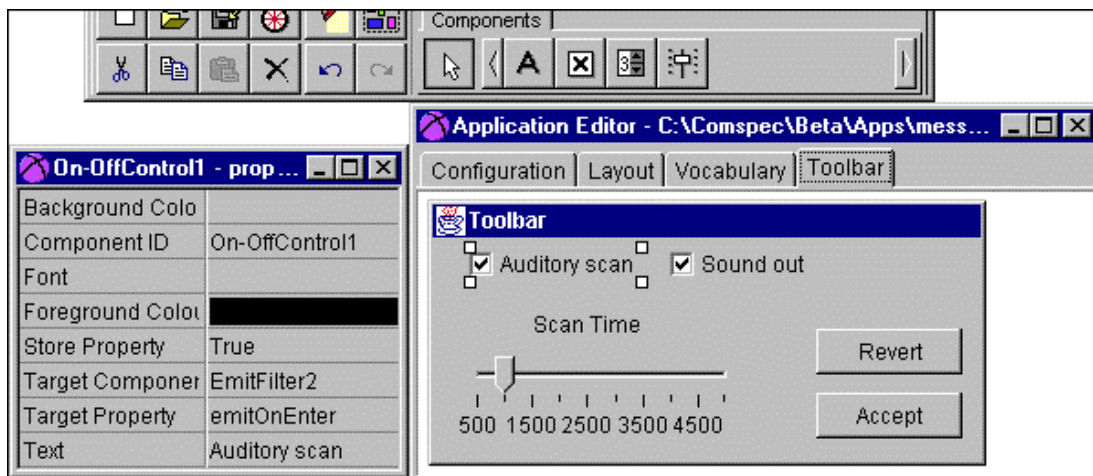


Figure 7: Toolbar Editor

## 4. Conclusions

ComLink uses the **Java/JavaBeans** technology of *Sun Micro Systems*. This software environment, being rapidly adopted, will make it possible to provide Comspec/ComLink components and applications for the major operating system platforms, such as Windows 95/98/NT, MacOS and UNIX, as well as for web browsing applications over the Internet. The Java platform is now also introduced for a rapidly growing range of standard or dedicated devices like PalmTops, PDAs, Interactive Television equipment etc. This is a big potential advantage for the rehab industry and other service providers, as well as for end-users and facilitators: ComLink components and applications only need to be developed once, and can

with minimal modifications be made available for an increasing variety of different computing platforms and purposes.

The outcome of the Comspec project confirms the value and usefulness of an open modular software platform for future development of AAC and AT systems. Despite the problems and delays caused by dependency on leading-edge technologies, a good foundation for further development has been produced. The current implementation is, however, to be regarded as a beta test version rather than a product ready for commercial release. A revision of the current version is needed to optimise the software in terms of performance speed and capacity to manage large applications with large amounts of multimedia. Some vital basic functionality needs to be added, including making it possible to integrate *ComLink* components and applications with other existing and emerging standard commercial components and applications.

The commercial and non-commercial partners of the Comspec Consortium are eager to use and add to the resources provided in the current *ComLink* software package for our future development work. We invite all interested parties to join us in this effort. The successful future of Comspec depends on a critical mass of developers adopting Comspec as part of their future strategies. We will encourage partners to adopt *ComLink* as a suitable development platform for AAC and special needs applications under the European Union's Telematics 5<sup>th</sup> Framework Programme. Two national Swedish projects building on *ComLink* have just started, and a couple of proposals involving *ComLink* technology have been submitted to the 5<sup>th</sup> Framework Programme.

A full-featured version of the Comspec/*ComLink* software environment will enable manufacturers and assessment centres to use a common set of tools to create and modify high quality applications. This will make it more technically and economically feasible to produce, adapt, maintain, upgrade, and support new products to meet the diverse needs of the expanding market of elderly and disabled people. The open and modular characteristics of the Comspec/*ComLink* technology also provide an ideal platform for R&D in the fields of AT and special education, since new approaches and design ideas can be rapidly realised and tested. Novel functionality can be made available in the form of new components for rapid development. The power of the new components will be further enhanced as they are combined with existing *ComLink* components and applications in a variety of ways.

For *ComLink* leaflets, brochures, or a demonstration CD-ROM, please contact Handicom at: [comspec@handicom.nl](mailto:comspec@handicom.nl)

The Comspec software, source code, documentation and contact information are published on the Comspec Project Web site: <http://www.handicom.nl/comspec/>

### Bibliography

1. Lundälv M, Svanæs D: Comspec – Toward a Modular Software Architecture and Protocol for AAC Devices. Paper presented at the first TIDE Congress, Brussels, 1993.
2. Lundälv M: Comspec - The Advent of an Integrated Modular Communication System. Paper presented at the Future Integrated Solutions Conference, Oxford, 1994.
3. Lundälv M: Comspec - a Modular and Open Software Platform for AAC Aids on the Drawing-Board. In Porrero IP, Puig de la Bellacasa R (ed), The European Context for Assistive Technology, Brussels: IOS Press, 1995: pp 41-44.
4. Fuller P, Lysley A, Colven D: Trees in the Forest or Seeing the Wood for the Trees!. In Porrero IP, Puig de la Bellacasa R (ed), The European Context for Assistive Technology, Brussels: IOS Press, 1995: pp 3-16.
5. Tyvand S, Stegavik H, Stav E: Developing Comspec in the World of OpenDoc. Paper presented at the ECART3 Conference, Lisbon, 1995.
6. Colven D, Lundälv M: From SAW to Comspec. Paper presented at the 7th Biennial Conference of ISAAC, Vancouver, Canada, 1996.
7. M.Lundälv, D.Hekstra, E.Stav, *Comspec* – a Java Based Development Environment for Communication Aids, Improving the Quality of Life for the European Citizen, I. Placencia Porrer an E. Ballabio (Eds.) IOS Press 1999, ISBN 90 5199 406 0